QMSOFT® Manual

Release 8.1

L&W Gesellschaft für Fertigungsmesstechnik und Qualitätssicherung mbH

Jun 12, 2025

Contents

CHAPTER 1

Introduction

1.1 What is QMSOFT®?

Almost every company is faced with one of the fundamental requirements of ISO 9000 and other standards, which demands a continuous verification of all the used test equipment (gauges, measuring instruments, reference normals etc.). The systematic inspection of all measuring tools and gauges is essential for a quality assurance system. In a modern industrial environment, the calibration management plays a crucial role in assuring product quality, and this has great influences on the competitiveness of the company.

A well-organized gauge management opens many opportunities to secure the quality of the products and because of this also to increase the economic success of the company. For this purpose, exists with QMSOFT® a proven, highly efficient solution. This system is a tool, which can handle the management and calibratrion of all the quality-assurance-equipment, and it can be performed under a single user interface:

- QMSOFT® is communicating with all of length measuring equipment on the market, so different "manufacturer worlds" can be integrated into a consistent handling concept. The used technology allows the connection of proprietary hardware interfaces into terminal server environments and to retrofit old devices to extend their lifecycle.
- The powerful QMSOFT®-XML-file-interface secure a consistently open system. The flexible floating license model avoids unnecessary licensing and maintenance costs.
- All required nominal data and tolerances of standard gauges and equipment can be calculated by the system at your fingertips! The QMSOFT® standard libraries are the most extensive of its kind on the market and are used by leading software providers in their own systems.
- QMSOFT® is a "turnkey" system: pre-tested procedures for standard test equipment are designed exactly according to the requirements of standards and VDI regulations, which means that calibrations can be started immediately without the prior definition of specific inspection plans!
- The generation of QMSOFT® calibration certificates is based on customizable layout templates with powerful features to control the formatting. A powerful and programmable report generator allows a flexible analysis of the gauge stocks.
- Especially for calibration service laboratories there are order management and billing functions integrated into QMSOFT®, which can reduce the commercial follow-up effort of calibrations.

For further information about QMSOFT® or about the L&W GmbH please visit our website in the internet under the link www.lw-gmbh.com!

1.2 If you need HELP!

This manual should help you to install, to setup the defaults and to use the QMSOFT® gauge management software. If you want to read and/or print the complete manual of QMSOFT®, you can find the corresponding PDF-files in the folder `_Help` of the QMSOFT® program folder.

In the most situations while running QMSOFT® you can press the key `F1` to open the context-sensitive help function.

If you have serious problems with the implementation of our software, which you cannot solve by reading the manual, you can tell us the facts by fax or E-Mail please. Do not forget the version number and the release date of the QMSOFT® installation, the ID-number of the "CodeMeter®-stick" (the copy protection hardware) as well as information about your computer and measuring device configuration, this can help us ensure that our support service is more effective.

In QMSOFT®/GaugeMan program, see the menu item *Help* → *Show list of the actual configuration* a useful feature, that allows you to list all the important information about the QMSOFT® installation in a summary.

A prepared form for faxing a request for support can be found under the menu item *Help* → *Support sheet* in QMSOFT®/GaugeMan program. Please use the following contact information:

L&W Gesellschaft fuer Fertigungsmesstechnik
und Qualitaetssicherung mbH
Gostritzer Str. 67a
01217 Dresden
Germany
Fax: +49 351 871 7480
E-Mail: support@lw-gmbh.com
Website: www.lw-gmbh.com

Please also consider submitting your own contact information, so we can reach you quickly, and please try to understand, that we can not respond immediately to any inquiry in exceptional cases, we always try to hold our response times as short as possible.

CHAPTER 2

QMSOFT®-Installation/Configuration

2.1 Introduction

This section should help you to answer questions, that might arise before or during the installation of the QMSOFT® software, to avoid unnecessary expense and inappropriate configuration settings from the outset.

The following minimum requirements for the used computer technology exist for a proper function of QMSOFT® software:

- CPU-frequency 1,5 GHz or higher; RAM 4 GByte or more
- at least 10 GB free space on the harddisc
- DVD-ROM-drive (for installation only)
- screen resolution at least 1280 x 1024, 32-bit color depth
- 1 free USB-port for the CodeMeter®-stick (copy protection hardware for license handling)
- network connection, at least 100 MBit bandwith
- printer (laserprinter is recommended)
- operating system: Windows 7 or later

Unfortunately, we cannot guarantee the functionality of the software on older operating systems such as Windows XP or on those computer systems that do not meet the minimum requirements listed above.

Here are some additional tips if QMSOFT® is to be used in a professional client/server environment, as the performance and hardware characteristics of the database server and the network infrastructure influence the overall system:

- QMSOFT® assumes that the network infrastructure is correctly configured so that the system can stand on a solid foundation.
- The database server should use a real server operating system with professional server hardware; this is the only way to achieve good performance and professional reliability of the overall solution.
- The backup of the server system should be professionally decorated and maintained.

- In our experience, the processor speed and the number of CPU cores are less important for the performance of QMSOFT®; we recommend using the fastest possible hard disk system for the database server, as this has the greatest influence on the response time of the database.
- The server's RAM should be as large as possible because the SQL Server software stores parts of the database content in RAM, thus requiring fewer hard disk accesses.
- The usable bandwidth of the network should have sufficient free reserves; with a 2 Mbit/s line, you cannot expect reasonable response times from the system.

For QMSOFT® on a single computer environment there are similar aspects (hard drive, memory, processor) in milder form.

2.2 Which kind of installation is required?

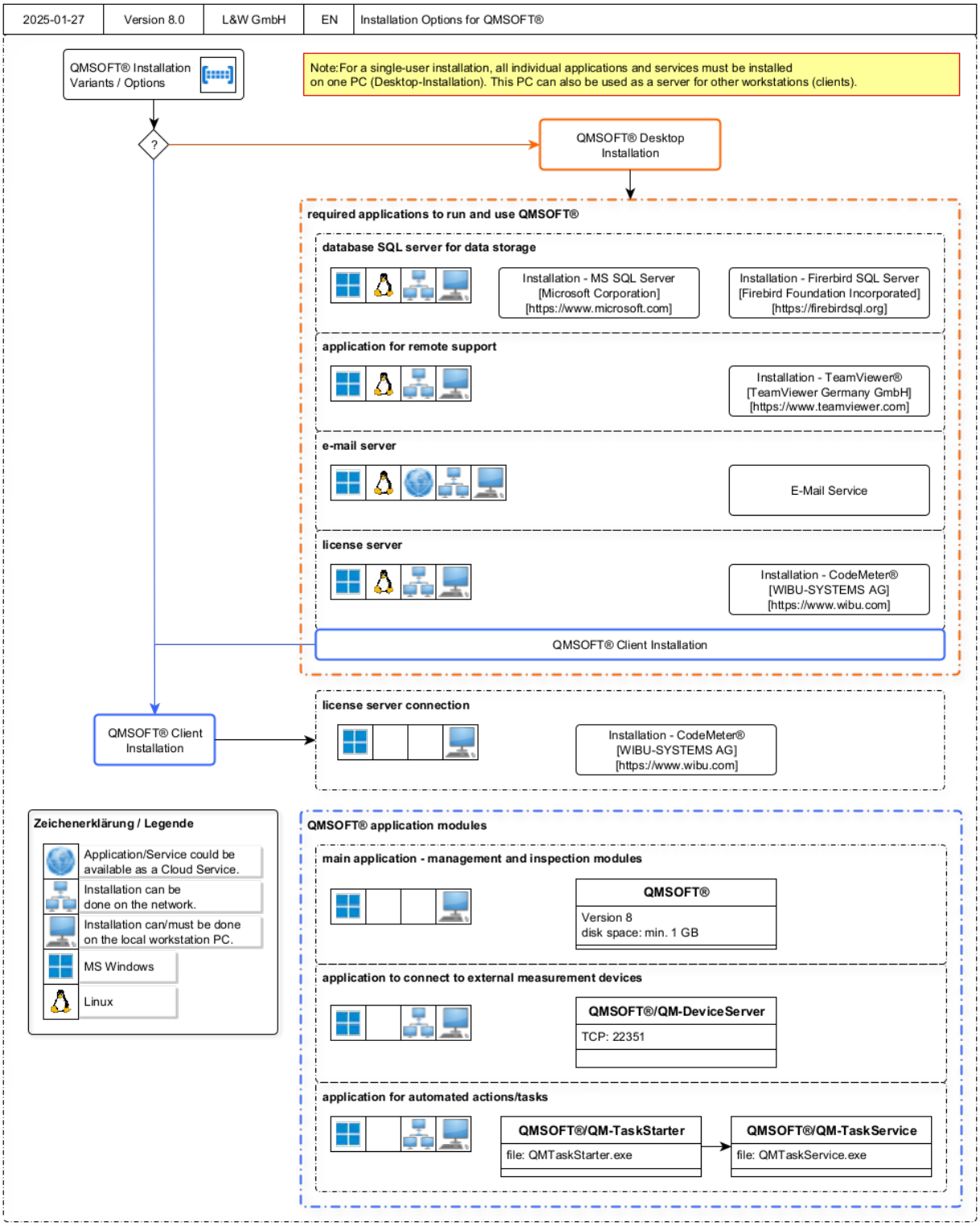


Fig. 2.2.1: QMSOFT® Applications and Installation Options.

The following comments should help to select the optimum type of the installation. Therefore, refer to the following sections carefully.

> **Note**
>
> If you are not sure about your decision, please contact your IT-department before you execute the installation to avoid trouble and problems!

The QMSOFT® software package is delivered on a DVD-ROM or USB-storage-medium. The installation procedure starts automatically, if the "auto start"-property of the DVD-ROM-drive is enabled. If the installation does not start automatically, please execute the program file `StartQmsoftCD.exe` manually. After starting the installation procedure, you will see the following window [Fig. 2.2.2] on the screen, which offers buttons for the different possible installation variants:

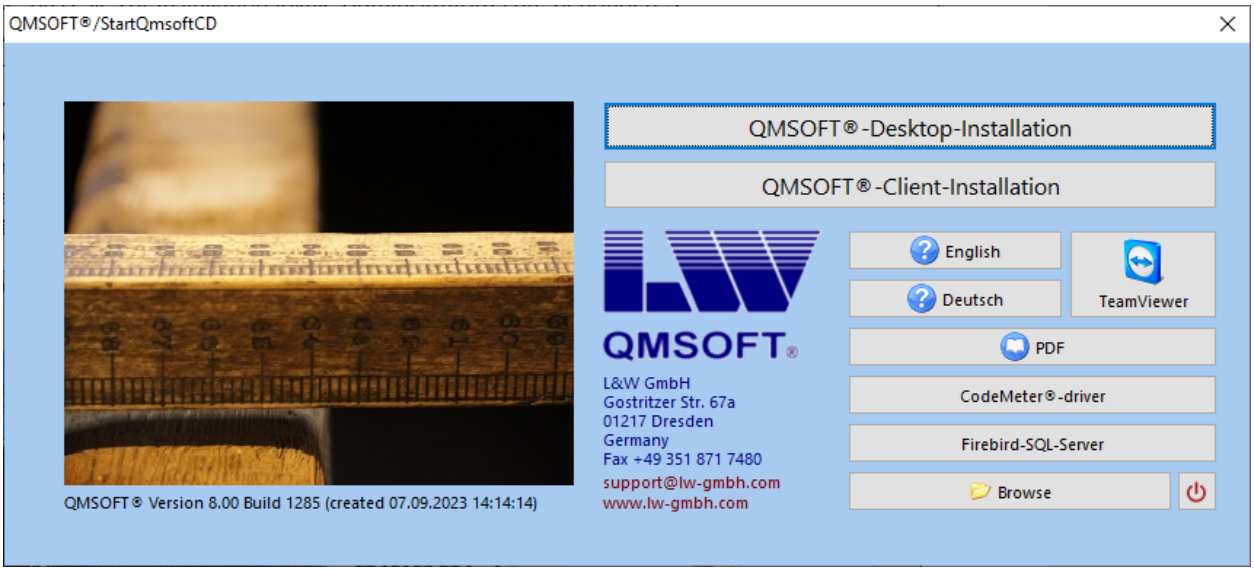


Fig. 2.2.2: Selection of the type of installation

The program system QMSOFT® is general using a database to store all information which is required for the configuration and/or customising the QMSOFT® applications. The QMSOFT® system is designed as a so-called Client/Server-system where QMSOFT® is working as the "Client", which all of the user interactions (inputs, database queries etc.) transfers to the "SQL-database-server" for execution. This "SQL-database-server-software" can run either on the local desktop-computer or on a server-computer in the network.

The choice of QMSOFT® desktop installation or QMSOFT® client Installation depends from the decision, where the database file should be stored: on the local PC or on a central server in the network.

> **Warning**
>
> If you use an older version of QMSOFT® gauge management with the Firebird SQL server, so be sure that your existing Firebird installation is updated (at minimum the Firebird version 2.5.x is required)!

To install QMSOFT® you have two choices:

- **QMSOFT® - Desktop-Installation**

Select this option in this case, that you want to work with QMSOFT® on a single workplace only AND at the same time that the database will be stored locally on your PC. If one of the two conditions NOT met, select the QMSOFT® - Client-Installation!

- **QMSOFT® - Client-Installation**
  Do you want to install more than one workplace in a network OR do you want to have a central database on a network server (also for a single workstation), select this installation option. If both of these conditions are NOT satisfied, so choose the QMSOFT® - Desktop-installation!

The other installation features are the following:

- **English** and **Deutsch**
  With this buttons you can visualize the English or the German context-sensitive help function.
- **PDF**
  By clicking onto this button you can open a Windows-Explorer-window, which shows the content of the folder of the delivery storage medium with the PDF-manuals in different language versions.
- **TeamViewer**
  if you click the "TeamViewer" button the L&W TeamViewer client will start; this will enable a direct access for the L&W service to your PC to get support for the installation.
- **Firebird-SQL-Server**
  This option does install the SQL Database Server "Firebird" only! The QMSOFT® software does use the Firebird Database server as the default SQL database server. This option does not install any other QMSOFT® component. Use this option to install the Firebird SQL Server on the server machine, where you want to place your database files for a shared access from different client PC's.
- **CodeMeter®-driver**
  This selection is installing the hardware driver for the CodeMeter®-stick (a copy-protection and license management hardware). This feature is needed in this case, that the CodeMeter®-hardware should be used on a central server machine in the network (the feature should be executed on the "server" machine only, the QMSOFT® - Desktop- and the QMSOFT® - Client-installation include the driver-installation automatically).
- **Browse**
  By clicking onto this button you can open a Windows-Explorer-window to see the content of the QMSOFT® delivery storage medium.

To install the QMSOFT® applications only without dongle driver and SQL Server, you can run the file `Setup.exe` from the "Setup"-folder of the installation medium. In this case command line parameter "/S" is switching to a so-called "*Perform a Silent Installation*" (an installation process without any further user inputs).

2.3 Installation Process

After clicking one of the buttons "QMSOFT® - Client-Installation" or "QMSOFT® - Desktop-Installation" the installation starts with loading and decompressing the installation kit. This needs a short time (may be because of virus scanning processes), please wait.

2.3.1 Step 1 - CodeMeter® Runtime Kit

Immediately after starting the installation procedure the installation of the "CodeMeter® Runtime Kit" is performed. This software is needed to access the copy protection hardware (CodeMeter® stick). Use the `Next` buttons to go forward through the dialogues, the requests for "Name" and "Organisation" you can ignore, this details have no relevance for installing the QMSOFT® package.

2.3.2 Step 2 - Firebird SQL Server

In case of a "QMSOFT® - Desktop-Installation", now the "Firebird SQL Server" installation is executed (for a "QMSOFT® - Client installation" this installation step is not included on the client side, here the Firebird has to be installed on the server-machine, this is a separate step). Confirm all default settings of the installation routine.

The Firebird SQL Server is started automatically and without a restart the operating system, he is running as an "invisible" service.

Do you have an already installed and running Firebird SQL Server on your computer, the installation process will be aborted with a corresponding notice. In this case please stop the Firebird service with the help of the Windows Task Manager, and then start the QMSOFT® installation again.

Warning

When installing the current Firebird version 4.xx, you will be asked for a user name and password during installation. If you leave this blank, the **default settings "SYSDBA" and "masterkey" for user and password** will be used. Unless you are using the default settings, be sure to be careful with your information. These will be needed again later with "*Step 3 - Database connection*".

2.3.3 Step 3 - QMSOFT® Setup

Now the QMSOFT® installation procedure `Setup.exe` starts, at first it requests the dialogue language for the following installation process. We will proceed with the determination of the directory, in which the QMSOFT® program files will be stored. In most cases this will be the folder "QMSOFT" in the Windows program directory `C:\Programme files(x86)\QMSOFT`.

Change the destination directory only in this case, that there are compelling reasons (e.g. specifications of the IT department), you help us immensely to handle the QMSOFT®-support!

The installation process will continue in the usually way with a progress bar as an indicator for the required/the remaining time. The `Finish` button after completing the process is finnishing the QMSOFT® installation procedure.

Now, if the corresponding function is selected in the "Finish" dialogue of the installer (which is the default), the launcher QMSOFT®/GaugeMan is called immediately, which is the central entry point in the QMSOFT®-system (an icon for easy access was generated on the desktop). For an initial installation, the launcher detects this automatically and will activate a configuration assistant to make some basic settings for the QMSOFT®-system.

2.4 Installation in a Network

These options are available to centralize services and / or data in a network:

- use a central CodeMeter®-stick for the license management to get the feature of "Floating licenses",
- connect the local QMSOFT®-installations on all client computers to a central database server.

The following chapters provide a few tips to avoid installation errors to minimize the need for manual adjustment of parameters.

> **Note**
>
> As an alternative to a CodeMeter USB stick, licensing can also be done via a software-based CmAct license. The following instructions for the CodeMeter setup are equally valid in this case!

2.4.1 CodeMeter® stick on a server

When installing multiple QMSOFT® workplaces in a network usually only one CodeMeter®-stick is used, which is managing the license information for all workplaces. In this case, the CodeMeter®-stick for each licensed program contains the maximum number of concurrent uses. This has the advantage, that all licensed QMSOFT®-programs can be used without a firm commitment to a particular workplace computer as a so-called "floating license" for the user. In contrast to the single-user license it is useful for a network to connect the CodeMeter®- stick to a central server.

To install the CodeMeter®-stick on a "server" proceed as follows:

- Install the CodeMeter®-driver on the server machine, where the dongle as a network provided CodeMeter®-stick is connected (insert QMSOFT®-DVD, after starting the QMSOFT® installation procedure click onto the "dongle driver"-button in the main form),
- Start the "CodeMeter® Control center" on the dongle server (see CodeMeter®-icon in the system tray in the lower right corner of the desktop screen in the Windows taskbar [Fig. 2.4.1])

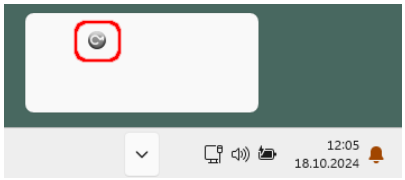


Fig. 2.4.1: CodeMeter®-icon in the system tray.

- In the CodeMeter® control center click now the "WebAdmin"-button to start your internet browser, which provides you the access to the dongle configuration settings
- Select the item *Configuration* from the upper menu, now the item *Server* → *Server access* from the sub-menu, set the item Network Server to enable and click to the button `Apply` to activate it [Fig. 2.4.2]. Exit the browser and start the "CodeMeter control center" again.

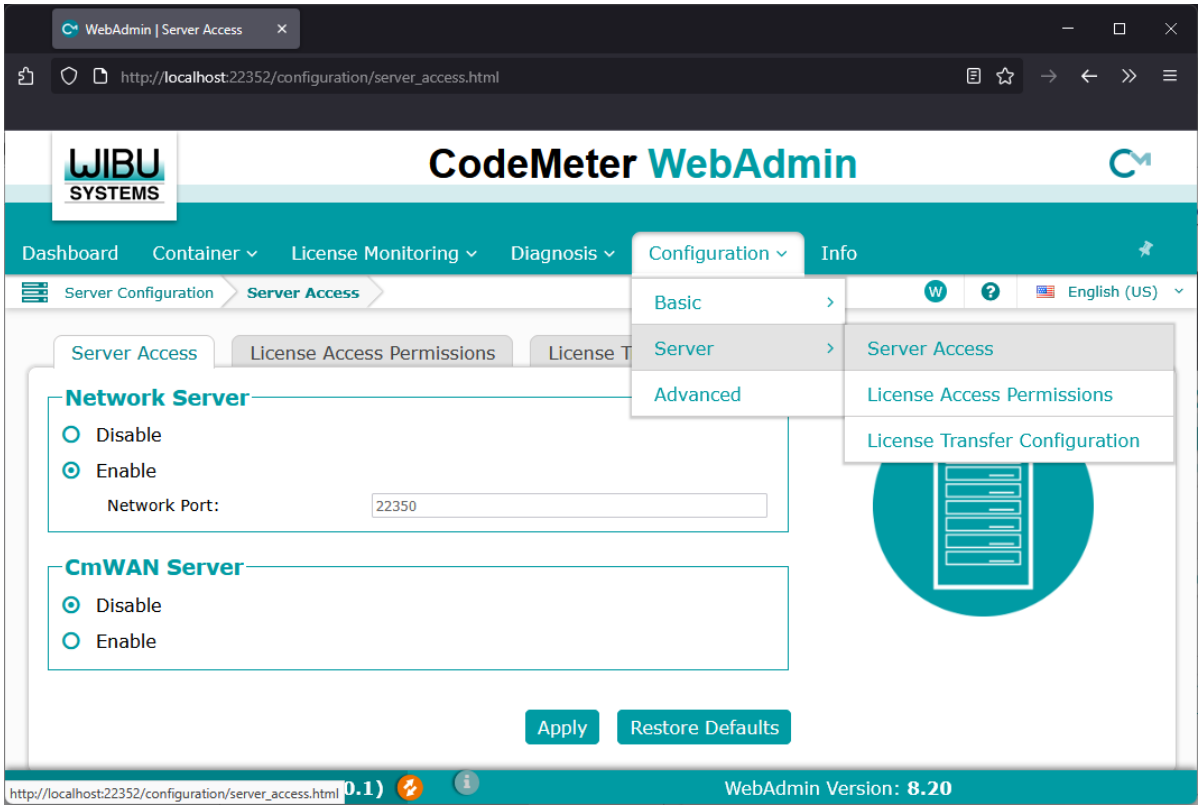


Fig. 2.4.2: CodeMeter® WebAdmin.

Note

Communication between protected applications and CodeMeter License Server (runtime) is based on the TCP/IP protocol. The communication default port is 22350 unless the port has been configured differently in CodeMeter WebAdmin.

If a firewall is active on your computer, you must **open port 22350 for TCP and UDP**. If your firewall filters the traffic using the application name, you must unblock the CodeMeter License Server service `CodeMeter.exe`. You can find the application in the directory `%Program Files (x86)%\CodeMeter\Runtime\bin`. For your firewall define the `CodeMeter.exe` service as exception.

Please note also that some anti-virus programs feature firewall functions. If you are uncertain, please contact the relevant vendor.

The configuration of all of the QMSOFT® client PC's does now require only the setting of the "CodeMeter® access mode" to "network" and the entering of the name of the CodeMeter® server computer.

If there are problems on the client side, you can check the communication with the central CodeMeter®-stick by doing the following steps:

- start the "CodeMeter® control panel" on the local computer, click onto the button "WebAdmin",
- Select the item "Configuration" from the upper menu, now the item "Basic" from the sub-menu, type in into the field "Server Search List" the IP-address (or the network-name) of the computer, to which the CodeMeter-Stick is connected, click onto the button "Apply".
- Check the dongle access by clicking onto menu item "Container" in upper menu, onto button "Host name" and

by selecting the computer from the list. Now click onto menu item “Server” to see an overview over all of the licenses, which are programmed into the dongle [Fig. 2.4.3].

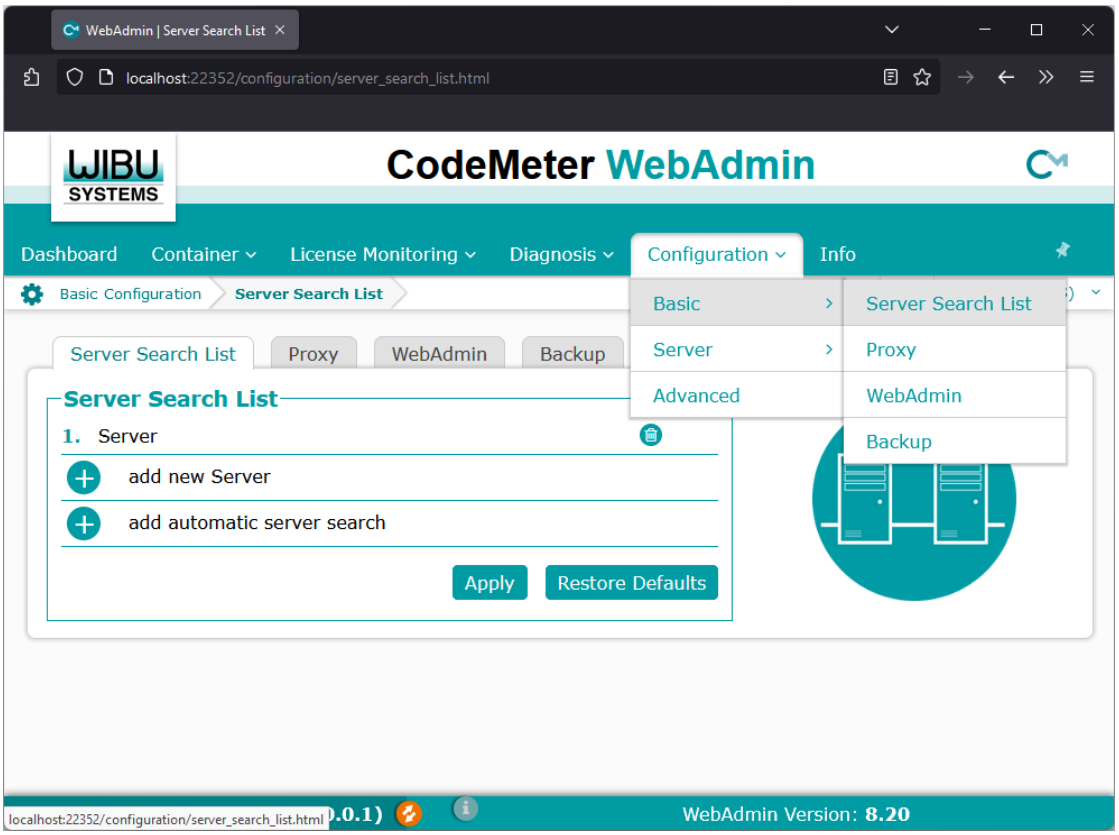


Fig. 2.4.3: CodeMeter®-WebAdmin - Change Server.

Note

Make sure that in the server search list appear only such names or IP addresses of computers, that are actually used as CodeMeter® license server, otherwise you may experience significant delays in accessing the licenses! Remove obsolete entries, which were caused by changing the server machine for example.

2.4.2 Central database server in a network

You must decide which of the SQL server types supported by QMSOFT® you want to use. Firebird SQL Server is a free open source product, alternatively you can use MS SQL Server, where you have to pay a fee for each client license and which is not part of the QMSOFT® installation package [Fig. 2.4.4].

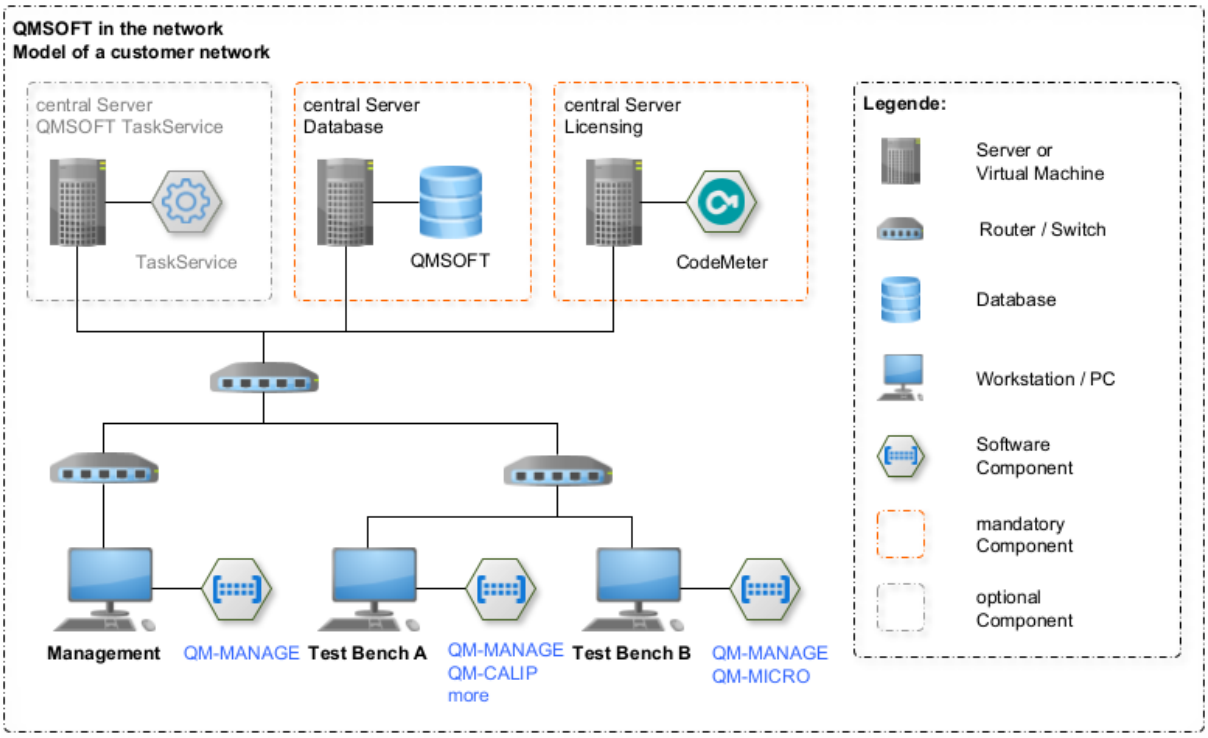


Fig. 2.4.4: Central SQL server, local QMSOFT® clients.

For both SQL Server types, the following points has to be observed.

2.4.2.1 Firebird SQL Server

- on the server machine and on all of the QMSOFT® clients the TCP/IP-port 3050 has to be opened in the Windows Firewall
- the Firebird SQL Server version must be at least version 2.5 (which is a part of the QMSOFT® installation kit)
- Optional: if you want to use the Backup-feature of QMSOFT® also on the local client computer, the Firebird SQL Server also has to be installed onto the local computer, although the central Firebird SQL Server is used.

2.4.2.2 MS SQL Server

- QMSOFT® supports the MS SQL Server versions 2005 and newer,
- the administrator of the SQL server has to create an empty database container with the name "QMSOFT_SYSTEM"

For authentication for SQL Server access, we recommend the user authorization mode with a separate user login that is assigned the access right "dbo" (dbo = database owner). The empty container (database files, see above) has to be created with this user login.

2.4.3 Use of "profiles" for the installation of multiple workstations

If you have to install more than one QMSOFT®-workplaces you can minimize the number of configuration steps, if you are using so-called profiles, which contains configuration settings:

- database connection and login information
- license information (CodeMeter®-ID# and access information) for the CodeMeter®-stick

To use profiles, you have to execute the following steps:

- **installation of the 1st QMSOFT®-workplace**
  Install the first QMSOFT®-workplace.
- **create a profile data file**
  After starting the launcher QMSOFT®/GaugeMan save the settings with the help of the menu item *Profiles* → *Export profile* into a profile data file (use a folder on the central file-server), be sure to have access to this folder from all of the other local computers, which should be used with QMSOFT®.

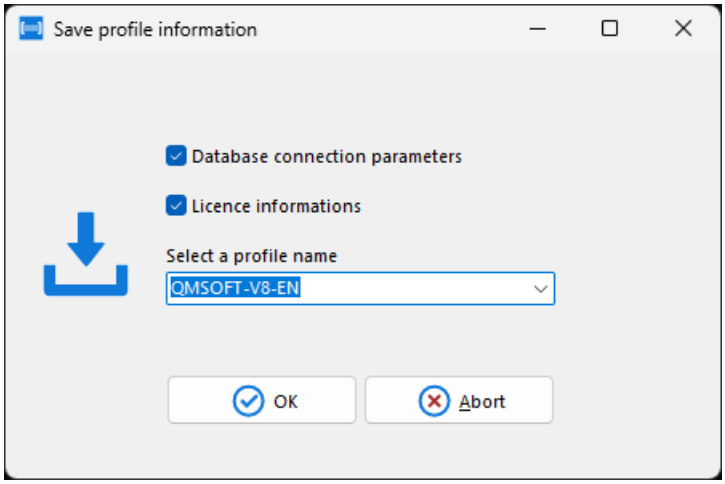


Fig. 2.4.5: Export profile information.

- **installation of all of the other QMSOFT®-workplaces**
  When installing all other QMSOFT® workstations, use the function *`Use existing profile`*. Enter the name and path of the profile file you previously created on the 1st computer. So you use exactly the same settings as on the machine on which the profile was previously created.

The "Profiles" feature is also very helpful if you want to switch between different license- or/and database servers. This is necessary, for example, if you want to use a laptop computer sometimes independently outside the office and sometimes in the office with access to your network.

2.5 Perform a Silent Installation

In some special cases, it may be necessary to execute a silent installation without any interaction. All of the settings will be declared by command-line parameters. To install all of the needed QMSOFT®-components in this way, you have to execute the following installation procedures:

2.5.1 CodeMeter® Runtime Installation

Start the installation routine `CodeMeterRuntime.exe` from the `Additional/WiBu` directory of the QMSOFT® delivery medium.

The following command line parameters are available:

- **/ComponentArgs "*":"/qn"**
  Switches to “quite” installation mode.
- **/?**
  Shows a listet of all available command line parameters

2.5.2 Firebird SQL Server Installation

Depending on the version of the operating system (32 or 64 bit) you must use the appropriate installation procedure (“*” is a placeholder for the actual Firebird version number, please use the file with the highest version number that you find on the distribution media).

- **32-bit-Windows**
  `Additional/Firebird/Firebird*32.exe`
- **64-bit-Windows**
  `Additional/Firebird/Firebird*64.exe`

The following command line parameters are available:

- **/SILENT**
  Switches to Silent-mode.
- **/DIR="<instdir>"**
  Defines the destination directory.
- **/NORESTART**
  Avoid a re-boot after installation.
- **/COMPONENTS="ServerComponent,ClientComponent,…"**
  Enables the selection of the components, which have to install.

2.5.3 QMSOFT® Installation

Execute the program `Setup/Setup.exe`.

- **/S**
  Switches to silent mode.
- **/IOD**
  Ignores an existing QMSOFT®-folder to install a new QMSOFT®-version in parallel.
- **/D="destination folder"** (has to be the last parameter)
  Defines the destination folder.

Example: `Setup.exe /S /IOD /D=C:\Program Files (x86)\QMSOFT_V8`

2.6 Configuration Assistant

When you call QMSOFT® the first time, a wizard starts automatically and will guide you step by step through some basic settings. Please follow the instructions on the screen. In most cases, we recommend again to accept the default settings unchanged.

The following configuration steps will perform the setup wizard:

- creating (or connecting to) the required databases of QMSOFT®
- input / control of license information
- setting up the connection to a measuring device (is only required, if QMSOFT® inspection programs should be used with such a device).

You can use this wizard at any time again by selecting the menu item *Profiles → Start configuration assistent*.

2.6.1 Step 1 - Select configuration

With the first start of QMSOFT® once will set up a connection to a central database, in which all QMSOFT® should be collected (gauge data, certificate layout templates, settings, records of calibrations etc.). If the database already exists, you can connect to this existing database. In both cases the database connection information is needed [Fig. 2.6.1].

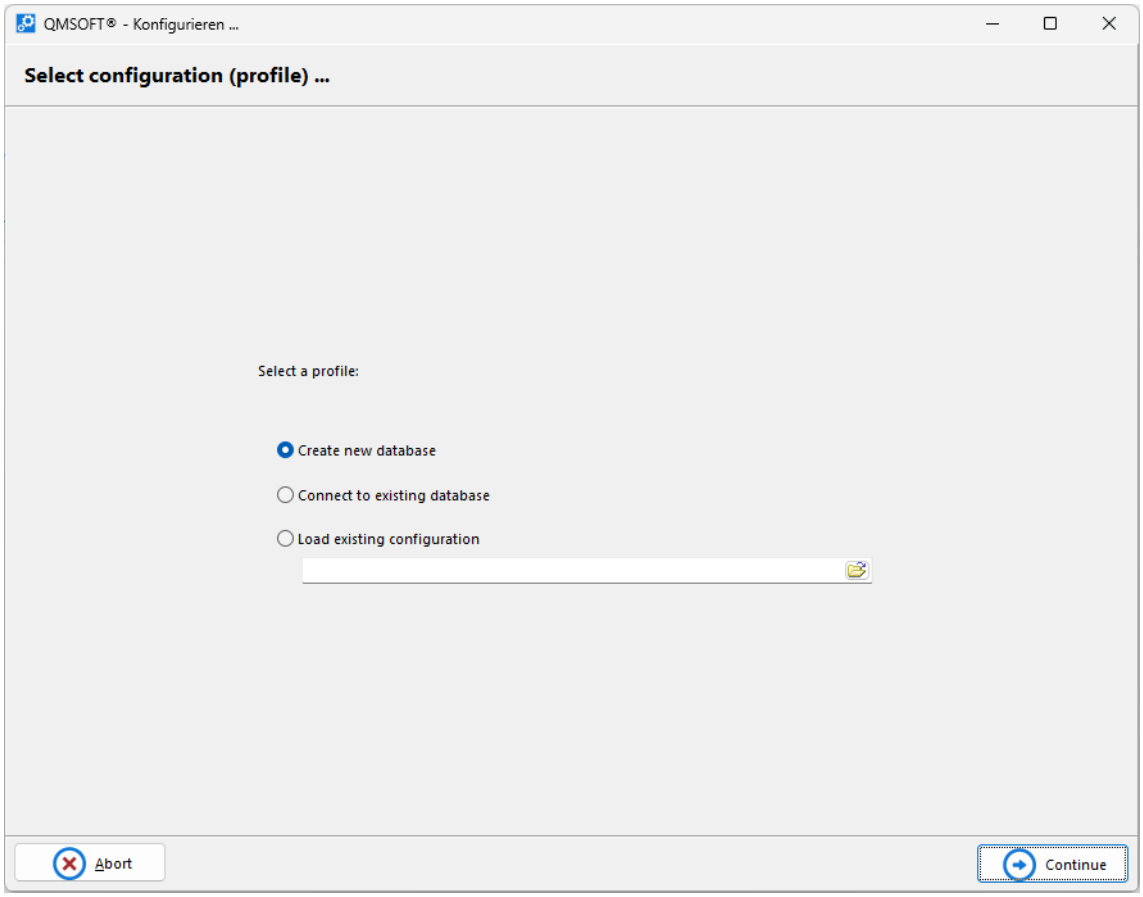


Fig. 2.6.1: Select configuration (profile).

You have the following options:

- **Create new database**
  (default option; used for a local installation or for the 1st workstation in a network)
  A new database with predefined settings, report templates and tolerance tables will be created. The settings for the database connection has to be established in the next configuration step.
- **Connect to existing database**
  (usual option, if you know that a database does already exist)
  This option will usually be used in a network environment, if a database does already exist there OR when installing a program upgrade (in this case please read the special instructions for upgrade installation). In the next configuration step you will enter the settings for the database connection.
- **Load existing configuration**
  (recommended for network installations, 2nd and all of the following computers)
  This option is used for multi-user installations and allows to transfer the configuration of an already installed workstation to the actual workstation. It is usually used only if a database already exists and the configuration has been saved to a file already.

When installing multiple workstations in a network it would be possibly to have some different steps to perform. Please refer to the section "*Special Network Installations*"!

2.6.2 Step 2 - license information

Now the dialogue for entering the QMSOFT® license information is appearing, which you should have received together with a copy-protection hardware (often called as a "dongle"). This copy-protection in the form of a "CodeMeter®-stick" hast to be plugged into a free USB port on the PC (except for several workplaces share a common CodeMeter®-stick in the network). The CodeMeter®-stick was programmed with the license codes you have purchased, therefore you only have to enter your company name and the CodeMeter® ID number [Fig. 2.6.2].

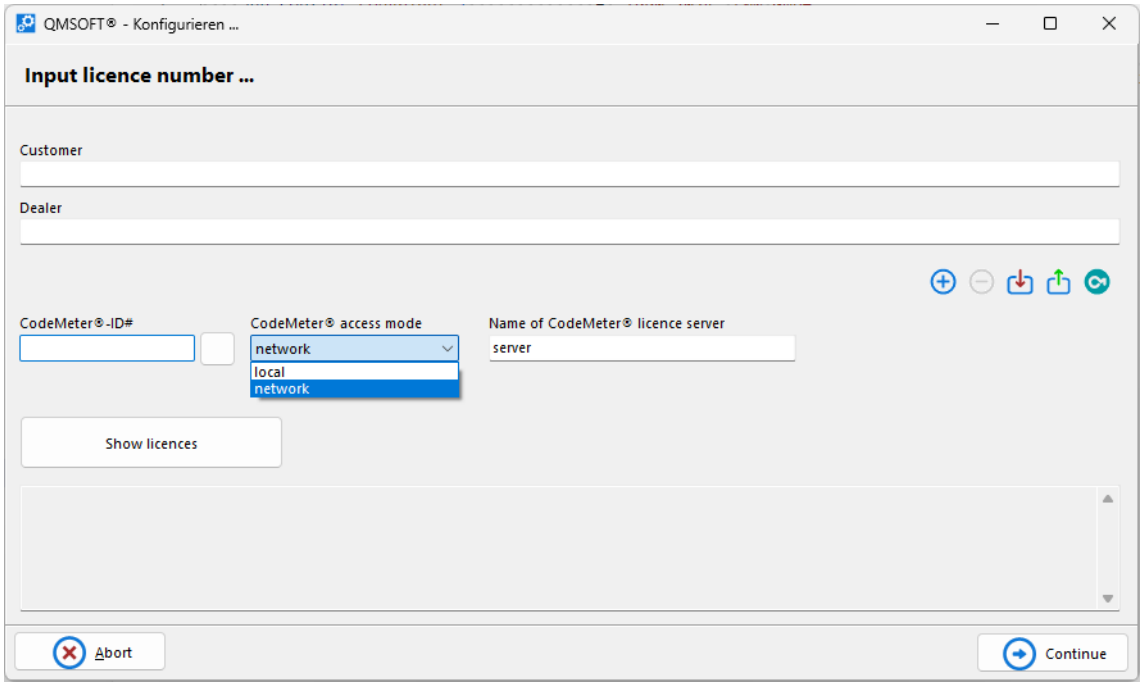


Fig. 2.6.2: Input license number.

Note

If you do not have a CodeMeter®-stick with a valid QMSOFT®-license, you can operate QMSOFT® as a demo system for testing purposes. In this case please skip entering the license information with the appropriate button.

In case that CodeMeter®-stick is not plugged into the local workstation you have to activate the option "CodeMeter® access mode" to "network" and into the appearing input field "Name of CodeMeter® license server" the name or the IP address of the computer, where the CodeMeter® stick can be found (see also chapter *CodeMeter® stick on a server*).

Use the button `Show licenses` to get an overview of the actual license volumes.

2.6.3 Step 3 - Database connection

If one of the options *Create new database* or *Connect to existing database* was selected in the previous form, now you have to configure the parameters for the connection to the database. If you have used the option *Load exisiting configuration*, the connection parameters of this configuration are used.

Now appears the database connection dialogue as shown below [Fig. 2.6.3]:

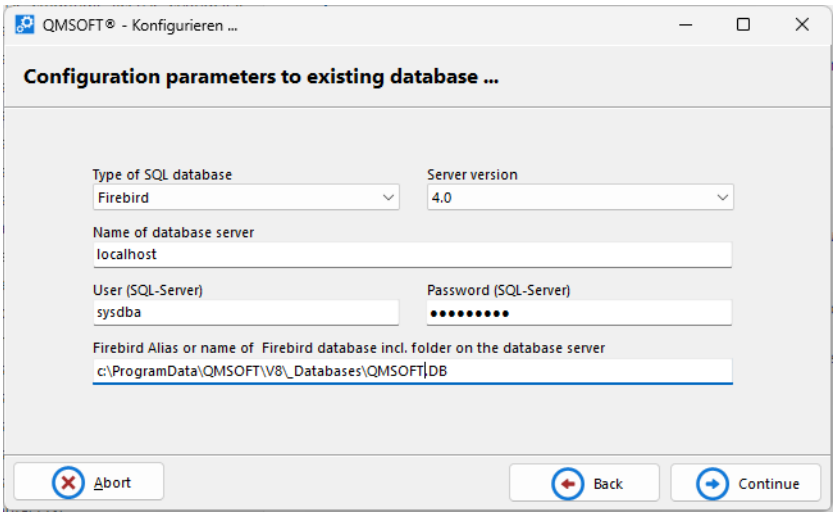


Fig. 2.6.3: Database connection form.

The following settings for database creation and database connection you have to define:

- **Type of SQL data base**
  [default: Firebird]
  Currently, the Firebird SQL server (is included in the QMSOFT®-installation) and the Microsoft SQL Server (version 2008 or newer) are supported.
- **Server version**
  [default: 2.5]
  The program QMSoft does support the Firebird versions 2.5.x, 3.0.x and 4.0.x. The Version 2.5.x will be installed as default when you use the “Desktop” installation.

> **Note**
>
> The Version 4.0 may cause problems if your computer does not have a network connection!

- **Name of database server**
  [default: local PC]
  Select the computer on which your SQL database server software is installed.

> **Note**
>
> When using MS SQL server, you need a local installation of an ODBC driver we recommend to download the OLE DB driver 17 (32bit and 64bit), download here: https://go.microsoft.com/fwlink/?linkid=2187214

- **User and Password (SQL-Server)**
  Normally (if you use the Firebird SQL server) you accept these settings as they are. A change is only required if these settings were changed on the database server or if you use a different database server type (eg MS SQL Server). In this case you have to ask your database administrator to get the login information.

> **Note**
>
> Using a MS SQL Server your administrator has to give you a personal access code (User name and Password), which does enable you the creation of a new database ("dbo" rights). If you are using MS-SQL and if you are authorized for access to the MS-SQL server through your Windows Authentication (Administrator rights in MS-SQL for creating new databases are needed), so leave the username and password empty!
>
> If you use Firebird SQL server the standard default login name is "sysdba", the password is "masterkey".

- **Name of QMSOFT® database incl. physical database folder on the database server**
  [default: `C:\ProgramData\QMSOFT\V8\_Databases\QMSOFT_DB.fdb`]
  Please enter the name of the database file including the folder, where the database file should be stored. Use the default settings when installing a local database; otherwise you have to contact your database administrator to get the name of a folder on one of the server-internal hard-disk drives. Please note that the database folder must already exist!

> **Note**
>
> If the SQL server installed on a separate computer (usually a server), so this directory is NOT a local directory linked to the workplace or NO network drive, the directory name is ALWAYS seen from the server specified as the local directory! A server-side release of this directory is NOT recommended and is also not necessary to access the SQL server software.

If no database exists, the following form appears [Fig. 2.6.4]:

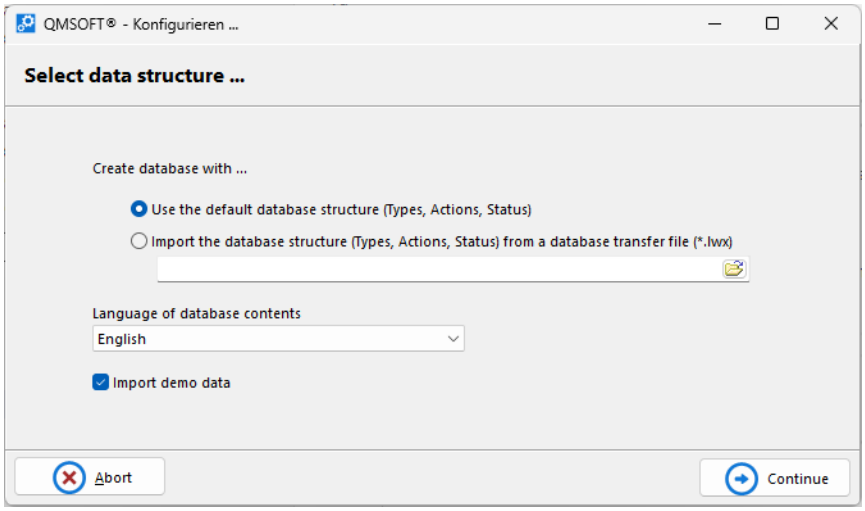


Fig. 2.6.4: Select data structure.

Please setup the following items:

- **Create database with…**

[default: “Use the default database structure…”]
Usually a new database will be created by using the given “default” database structure. In some cases you can have a special file including a different database structure (mostly when you do a conversion of gauge data from an older database). Only if you have such special file use the option “Import the database structure…” and select the related file.

- **Language of database contents**
  [default: English]
  Here you can select the language for the contents of the database, which should be created.
- **Import demo data**
  [default: activated]
  Activating this option you can create a separated “DEMO” client which will be filled with a number of gauge data. This demonstration client data you can use to test the program functions.

Doing a local (“Desktop”) installation you can generally use all of the default settings. Use the `Continue` button to proceed the assistant.

Activated “Firewalls” or special programs like “Norton Security” etc. can block the creation of databases on the local computer. If you get an error message “Unable to connect…” while the database creation process, you have to check the security settings of your computer (the **port “3050”** has to be opened for TCP/IP connections).

2.6.4 Step 4 - Certificate templates and reports

The QMSOFT® system does support a serious of different languages. This also means, that there are predefined certificate and report layouts for different languages. To avoid the installation of unnecessary options you can here select what templates and reports you need [Fig. 2.6.5].

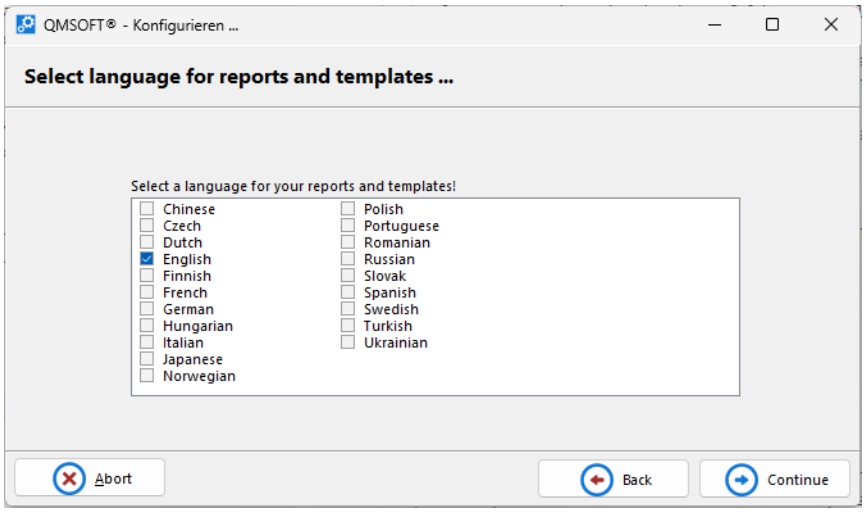


Fig. 2.6.5: Select language for reports and templates.

At any time later you can re-import or add the original templates, so a mistake in this setting will not produce problems.

2.6.5 Step 5 - Create the database

When you continue with the related button the create-procedure of the QMSOFT®-databases will start. A screen [Fig. 2.6.6] will show you the configuration steps and their progress.

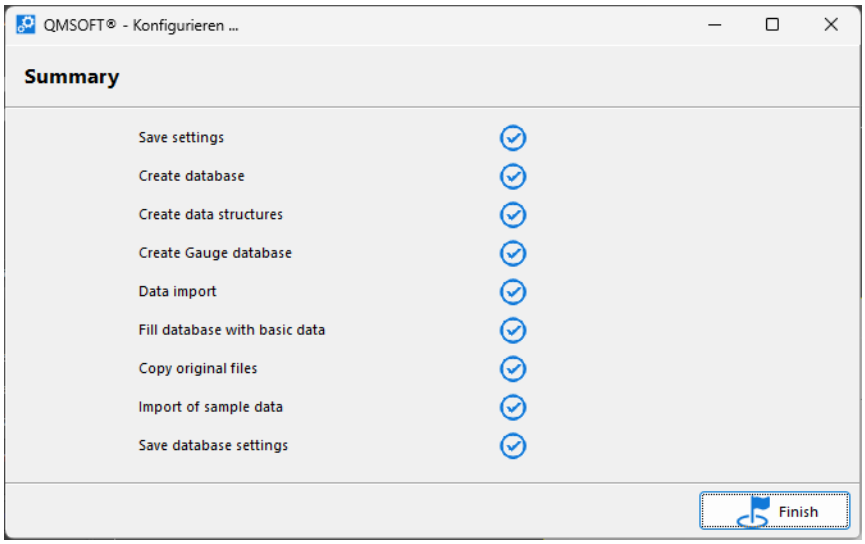


Fig. 2.6.6: Summary of the database creation process.

In case of failure appears a short hint, and the failed step is marked with a red icon. In most cases, the continuation is not possible, please contact us.

Press `Finish` to complete the assistant.

2.7 Change of License Scope

A change of the license volume of a QMSOFT®-installation (enlargement or reduction of the licenses) needs a two-step-procedure, which is based on the exchange of files between the QMSOFT®-user on the one side and the QMSOFT®-manufacturer on the other side. We call this "Remote license update". An exchange of the CodeMeter-stick is also a possible procedure, but this means transportation costs and time delay to get the new license. To execute a remote license update please do the following steps (the proper business procedure is here tacitly assumed):

2.7.1 Create remote context file

> **Note**
>
> Make sure that the CodeMeter® stick is connected to a computer on which a QMSOFT® installation is available. A license upgrade over the network is not possible.

- Open the license settings by clicking the icon "yellow key" in the launcher QMSOFT®/GaugeMan.
- Create a remote context file using the `Disk` button (see upper right area of the license data configuration window).
- Send this file to our e-mail-address support@lw-gmbh.com.

2.7.2 Import remote update file

> **Note**
>
> While importing the file the CodeMeter® stick has to be connected to the computer!
>
> If you use the floating license feature in a network, no other QMSOFT® user should work with QMSOFT®!

- You will receive a remote update file by e-mail.
- Import this remote update file with the help of the `Import` button (see upper right area of the license data configuration window).
- Click the `Show licenses` button, now you should see the new license volume.

Close the license dialogue by clicking the `OK` button. From this point of time the changed license volume can be used.

2.8 Integration of a Measuring Device

The inspection programs in QMSOFT® can take over measures directly from a measuring device, which is connected to the PC. To do this the QMSOFT® inspection programs need a so-called "measuring device object". After a new installation there is no such object created automatically.

> **Note**
>
> Detailed instructions can be found in the "QMSOFT®/QM-DeviceServer" section of the user manual.
>
> There you will find further details on measuring device integration and device properties.

2.8.1 Create measuring device objects

You can create a new measuring device object with the help of the QMSOFT®/QM-DeviceServer. Click onto the first icon in the area "Measuring devices" of the main window of the launcher QMSOFT®/GaugeMan, this brings the QMSOFT®/QM-Device Server into the foreground [Fig. 2.8.1].

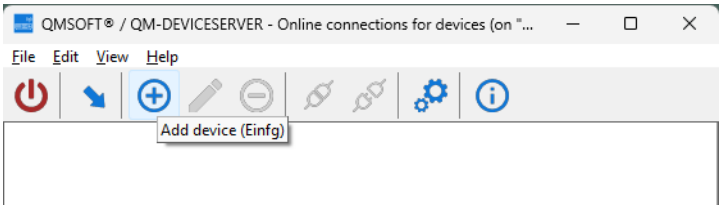


Fig. 2.8.1: Create a measuring device object in QMSOFT®/QM-DeviceServer.

After clicking the "Add device"-button please select the manufacturer and the device designation from the displayed lists.

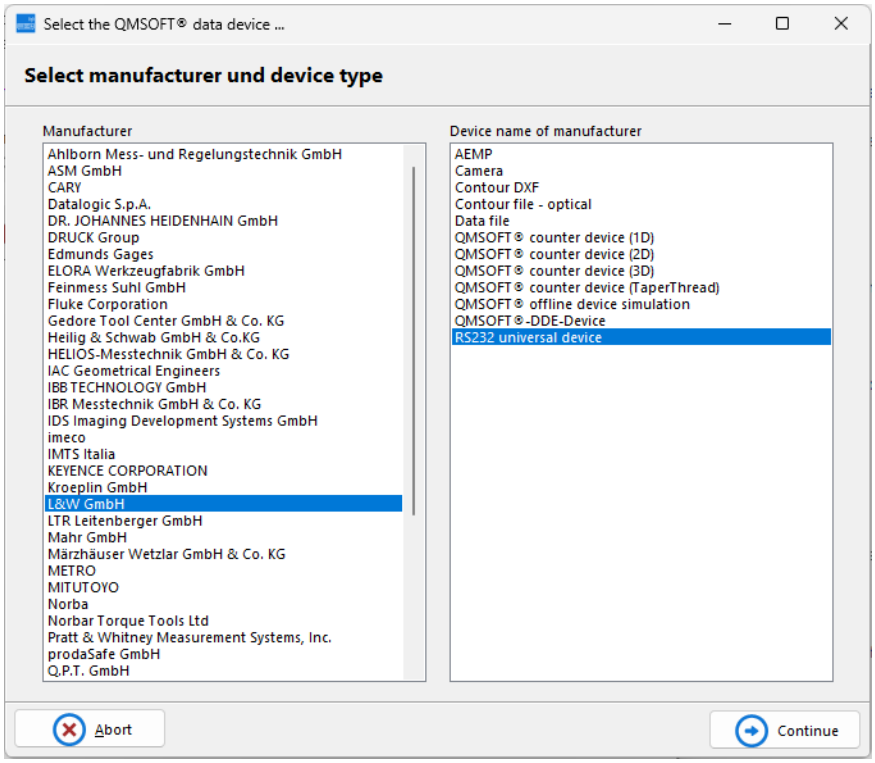


Fig. 2.8.2: Select device manufacturer and device type.

If you don't have an online-connected measuring device, you can select *L&W GmbH* and *QMSOFT® offline device simulation* to create a measuring device object for simulation of measures and/or for manual input of the measures!

Now you can define an own name of the created measuring device object. In the most cases you have nothing else to do. If required, you can use the "Modify device properties" function to setup special configuration properties. Even for devices connected by the RS232 interface the property "COM port", "Baud rate" or others may need to be modified. To do this you have to select the related measuring device object in the main window of the program and to click on it with the right mouse button to edit their properties [Fig. 2.8.3].

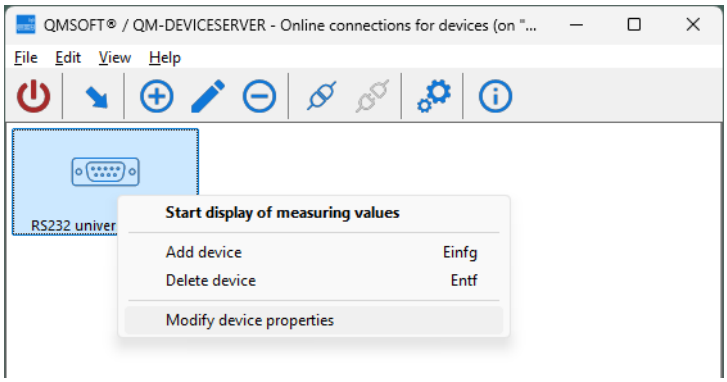


Fig. 2.8.3: Modify device properties.

2.8.2 Link measuring device objects

When you start a QMSOFT® inspection program, which is capable to receive measuring values from an instrument and there is no connection to an instrument defined, you will get the following message [Fig. 2.8.4]:

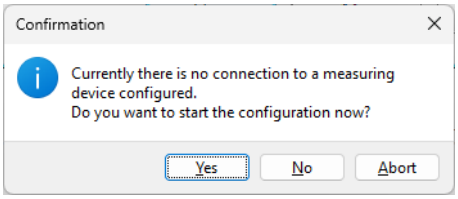


Fig. 2.8.4: A connection to measuring device is needed.

Press `Yes` to start the configuration dialogue of the related QMSOFT® inspection program. Select one of the offered measuring device objects and confirm the selection with the `OK` button.

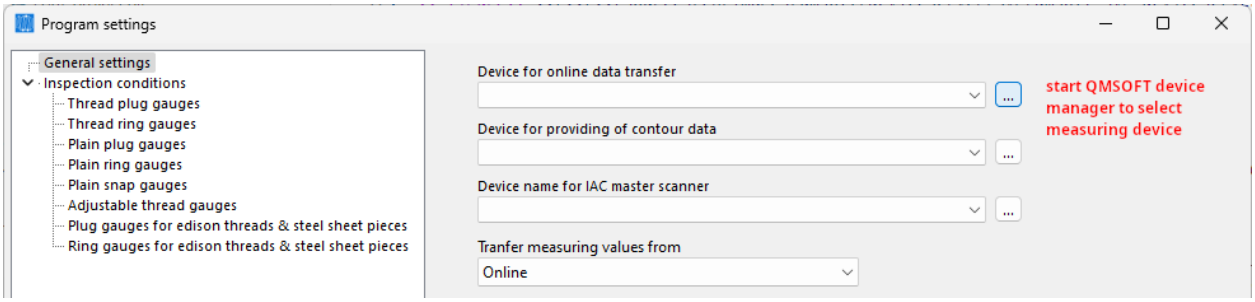


Fig. 2.8.5: Link the measuring device object.

More details about the integration of measuring devices and their properties you can find in the “QMSOFT® Manual - Part: QM-DeviceServer”.

CHAPTER 3

Launcher QMSOFT®/GaugeMan

The launcher QMSOFT®/GaugeMan provides a central access point for all functional groups of the QMSOFT® system. When you start it, you will first be asked for a user name and password. The user name is used in all of the QMSOFT® inspection programs to "sign" the generated calibration certificates. When entering your own login data in the user management, please do not use spaces in the username and password, otherwise the transfer mechanism between the launcher and the called QMSOFT® modules will not work.

For the first access please use username and password "system" (for both strings use lower case characters only).

QMSOFT® consists of several modules, each of which can be run as a single program. Depending on the functionalities of these programs, they are assigned to different categories. In the main window of QMSOFT®/GaugeMan you see different groups of program symbols (so-called icons) that reflect this functional division of the QMSOFT® modules.

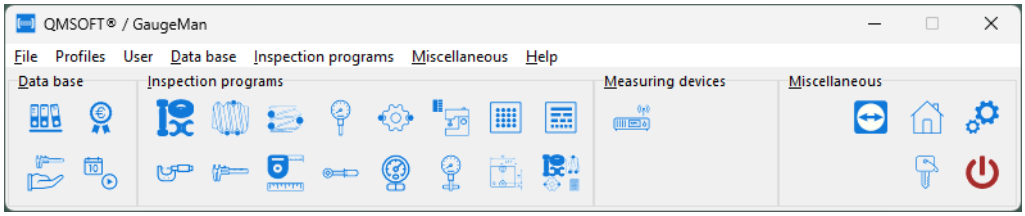


Fig. 3.1: Launcher QMSOFT®/GaugeMan.

The visual assignment to the program categories is realized by grouping the program icons in the QMSOFT®/GaugeMan main window into different frames and by a corresponding menu structure. By moving the mouse pointer over the different icons, you will receive a short note with the program name and a short description.

You can assign any installed program to blank symbol icon fields in the "Miscellaneous" area. Simply click on such an empty box with the mouse and follow the dialog. You can delete self-defined (non-empty) icon fields by right-clicking on the field and deleting the contents using the `Delete` button in the configuration dialog that appears.

All modules can be accessed by clicking on the icon or alternatively via the corresponding menu selection.

The manual for the individual QMSOFT® modules (programs) can always be found under the menu item *Help → Read user manual...* in the module's own main window.

The various QMSOFT® modules are designed to provide a powerful tool for gauge data management and all steps in the calibration of gauge stocks.

3.1 Functional Groups

3.1.1 Database

The programs in this group are designed to store, manage and evaluate the gauge data. The central part of this group is the program QMSOFT®/QM-MANAGE, which represents the gauge management software itself.

When you start the gauge management program, the "Open database" dialog box is displayed. Here you can choose between different data sets (which were created automatically during installation). With the "DB" dataset you can manage your own measuring gauge stock. The "Demo" dataset contains some examples of gauges. Use this stock to gain experience in dealing with QMSOFT®.

3.1.2 Inspection programs

Inspection programs are designed to carry out the gauge inspection for the different types of gauges (e.g. program QMSOFT®/QM-DIAL for dial gauges and dial test indicators). The programs refer to the standardized procedures for each gauge type. Activation takes place automatically via the gauge management program QMSOFT®/QM-MANAGE. You can also start it as a standalone program (in this case, results and certificates are NOT saved in the database).

Inspection programs also include functions for calculating the nominal values (tolerances) of the gauges, for managing inspection positions, for recording and evaluating measured values and for creating template-based certificates.

3.1.3 Measuring devices

Here you will find icons for the QMSOFT®/QM-DeviceServer itself and for all defined measuring device objects. The QMSOFT®/QM-DeviceServer is required for communication between the measuring instruments used for gauge calibration in order to transfer the measured values to the QMSOFT® inspection programs. Depending on your application scenario, you can use QMSOFT® measuring device objects simultaneously on one workstation. Detailed information can be found in the "QMSOFT®/QM-DeviceServer" section in this manual.

3.1.4 Miscellaneous

In this area you will find various features and functionalities for laboratory management, license management, configuration settings and so on.

3.2 Menu item Help

The *Help* menu item provides access to a number of useful functions to display information about the QMSOFT®-system and to create support request sheet in case of problems. Here you also have access to this manual, to the QMSOFT® online help system and to query the current QMSOFT® version information. Using the menu item *Help → Show list of the actual configuration* you will receive a list of the currently available licenses as well as information on the program directories used. This information can help us in case of a support request.

3.3 Menu item File > Settings

With the menu item *File* → *Settings* (also available by menu item *Miscellaneous* → *Settings* you can setup basic properties and parameters of the QMSOFT® system.

The "Setting" form is also available on a more direct way by clicking the icon "Settings" in the main window of the launcher QMSOFT®/GaugeMan.

The setup form displays on the left area of the form a tree structure, which offers the various categories of setup parameters.

3.3.1 Global settings

Normaly the general QMSOFT® program settings [Fig. 3.3.1] are already set to the usual defaults during the installation procedure and must be changed only in exceptional cases.

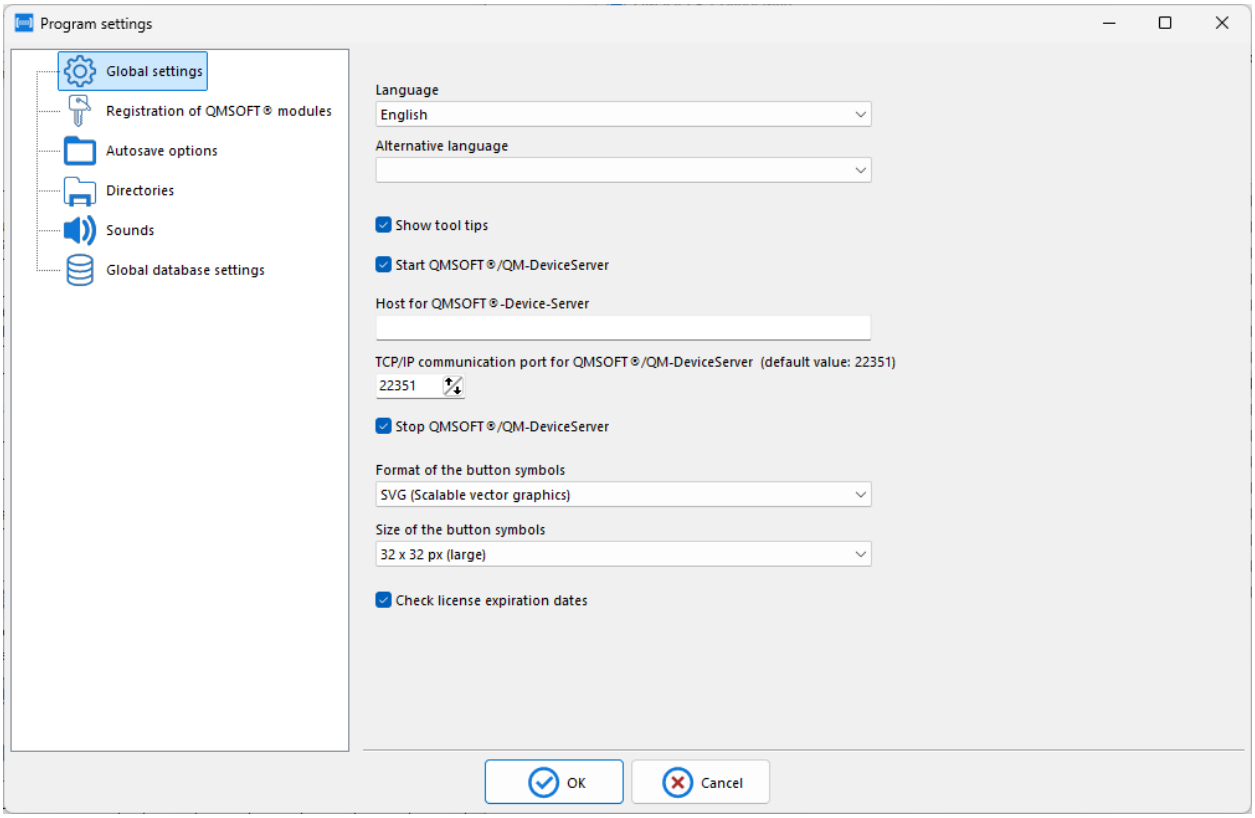


Fig. 3.3.1: General settings.

- Language
  Here you can select the language of the QMSOFT® human interface (primary language). Please note, that the use of some special languages a corresponding license is necessary (Chinese, Japanese, Dutch, Polish, Russian, Czech)!
- Alternative language
  This option is used in the case of incomplete translations of the primary language, in this case the program tries to find the translation in the alternative language (secondary language).
- Show tool tip

This function enables/disables the popup of text-information, which can be displayed while moving the mouse cursor over dialog elements (yellow tool tips).

- Start QMSOFT®/QM-DeviceServer
  This property can spare time by starting the QMSOFT®/QM-DeviceServer in the background, so it is available in the moment, when you need it to take over some measures. If you do not want to use any QMSOFT® inspection programs, you can deactivate this feature.
- Host for QMSOFT®/QM-DeviceServer
  This option is needed in the case of terminal server environment only, when a QMSOFT®-installation on a virtualized machine has to be connected to a proprietary hardware interface on a local machine. Normally this parameter shold keep empty.
- Shutdown QMSOFT®/QM-DeviceServer
  This property can be used to shutdown the QMSOFT®/QM-DeviceServer while closing the launcher QMSOFT®/GaugeMan. Normaly the QMSOFT®/QM-DeviceServer keeps active in the background, so it is available directly after the next start of the launcher.

3.3.2 Registration of QMSOFT® modules

Here you can open the form to input and/or to change the QMSOFT® license information. This form complies with the license form while the installation process (see chapter *Step 2 - license information*).

If you have entered the license information during the installation correctly, so no changes are necessary. The button “Show licenses” can be used to check the current set of the licenses.

For information about changes of the actual license volumes please read chapter *Change of License Scope*.

3.3.3 Autosave options

Here you can control the behavior of the software in terms of automation for automatic saving of calibration certificates [Fig. 3.3.2].

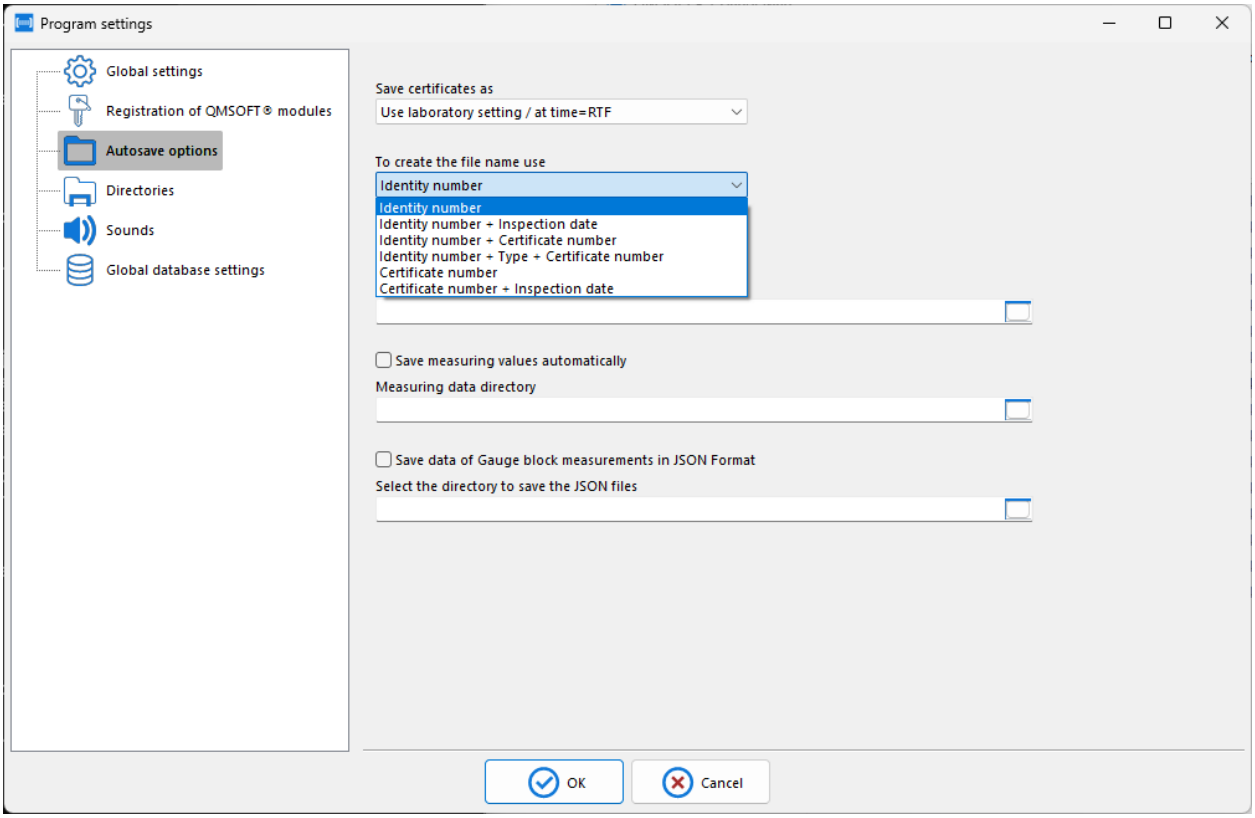


Fig. 3.3.2: Autosave options.

- Save certificates as

  Here you specify, which file format should be used by QMSOFT® for the calibration certificate documents. It is recommended to use either the RTF-format (editable also after creation) or the well-known PDF-format (not editable without additional software).

- To create the file name use

  Here is predetermined, how the name of the automatically saved calibration certificate file has to be builded.

- Save certificates automatically

  Use this option to allow the automatic saving of calibration certificates as separate files as soon as you quit a calibration, regardless of storing the certificate into the QMSOFT®-database. When enabled, a valid directory name should be entered in the input field for the destination directory!

- Save measuring values automatically

  The automatic storage of data files is usually be necessary only in exceptional cases. Data files are used for repeating calibrations, if the gauge data shall not be stored into the QMSOFT®-database (calibrations, which are stored in the gage history, can be repeated at any time as soon as the user has the appropriate authorization for this purpose). When enabled, a valid directory name should be entered in the field “Measuring data directory”!

3.3.4 Directories

The two input fields in this dialog usually have been properly initialized through the program installation process, a change should be done only if you are clear about the effect of this changes!

- Directory to QMSOFT® program data
  Here you will find the name of a (usually in Windows Explorer invisible) directory, which contains the connection settings for the database and for CodeMeter® stick in the form of a so-called INI-file. These settings are the only settings, which are locally stored outside of the database!
- Firebird backup utility
  If you want/need to perform the QMSOFT® database backup on the local desktop PC (usually for a desktop installation of QMSOFT®), here the reference to the backup tool `gbak.exe` should be found. (the default is `C:\Program Files\Firebird\Firebird_2_5\bin\gbak.exe`)

3.3.5 Sounds

If you want in specific program situations some acoustic signals, so you can use this dialog to enable sounds and to select the respective sound file. Here, of course, personal preference plays a large role, such an option is useful in conjunction with the triggering of a measure values to avoid unnecessary exchange of view directions between the computer secreen and the measure display of a measuring device.

3.3.6 Global database settings

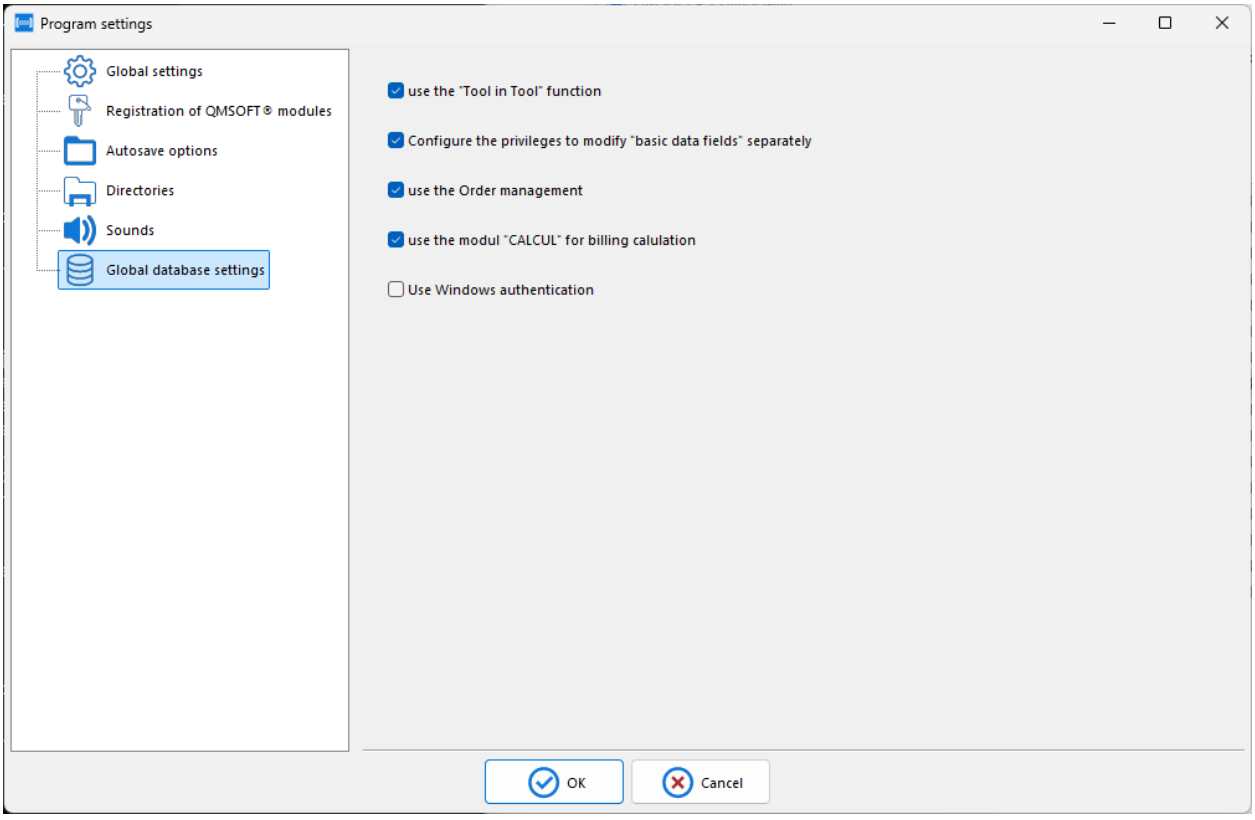


Fig. 3.3.3: Global settings for the Gauge management database.

Use the global database settings [Fig. 3.3.3] to activate or deactivate some functions. Deactivate functions which you will never use to to speed up database access. Please note, that you should activate the “Order management” or “CALCUL” options only if you have purchased the related licenses.

3.4 Menu item File > Backup and Restore

When working with a database regular backups of your database are urgently recommended. When working with the database in a network, please contact your IT staff to organize the backups.

If you are working with a local database on your PC usually, you are responsible for carrying out the data backup.

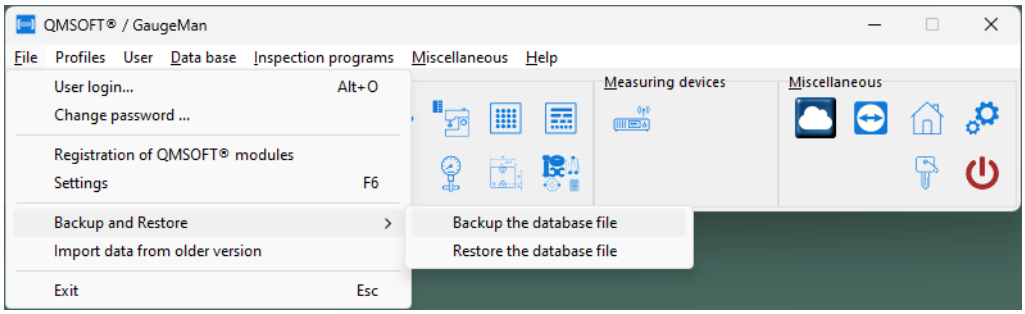


Fig. 3.4.1: Menu *File → Backup and Restore*.

Use the related menu to execute the database backup. Save the backup file to a network directory or to an external storage medium (USB stick ..).

3.5 Menu item Miscellaneous

In this menu some very special features are offered, that should be invoked only in exceptional cases. Contact us in case of doubt, if you are unsure!

3.5.1 QMTaskStarter

For automatic execution of processes such as due date checks, the QMSOFT® system is using a service in the background of your computer. Use the menue to “Start”, “Stop” and for the configuration of this service.

3.5.2 Miscellaneous > Tools

The functions are only for maintenance tasks; please use these funtions only when you are prompted by our support staff for this purpose.

- “Run SQL-script”
  With the help of this feature very special database functions can be performed, for which there is no equivalent in the user interface.
- “Repair old RTF-files”
  This function is required in such cases, where obsolete files in RTF format or QMSOFT® template format are stored in the database, which can be adapted here in a conversion step to fix some formatting and display problems.

- Convert fields in report layouts
  when upgrading from am older QMSOFT® version some changes does require a modification of existing database reports; start this function to execute this operation.

Please note that the "normal" QMSOFT® users have not unlocked all the above functions!

3.5.3 Miscellaneous > Check database

Currently this function is testing all document files, which are stored in the database, to have a reasonable file size, to track down "space-eater" that may arise whenever a document contains large graphics that occupy a lot of memory internally.

3.5.4 Miscellaneous > Reorganize database

This function reads all the translation text items from the language file `Language.999`, which can be used for user-defined language in the database fields that multilingualism functionalities own (the language file can be found in QMSOFT® program directory). Thus the contents of the database with the contents of an actual language file are compared, for example, if after a QMSOFT® update etc. the name of tolerance tables (that are available in the database), no longer match to the current content of the language file, or if the language file itself was changed.

CHAPTER 4

QMSOFT® Laboratory management

In the QMSOFT® start screen, area “Miscellaneous”, you will find the button `Lab management` (see the “House”-icon). Using the QMSOFT® laboratory management functions you will be able to do all the settings which are required for your gauge inspections. Here you get access to: the management of tolerance tables, inspection positions, standards and references used, traceability information, inspection instructions, etc. However, it is possible to access these settings directly in a measurement program if required.

So, if you are working with a central database in a network, all information is available in your “lab environment” and anybody in your defined lab network can use it.

Note

Every type of QMSOFT® installation is using a SQL database server, also in the case, that you do not use the gauge management module QMSOFT®/QM-MANAGE.

The functions you find in the area “Gauge Management” are only important for you if you are using the gauge management module QMSOFT®/QM-MANAGE. If you only use the QMSOFT® inspection programs without the gauge management, you can skip the corresponding parts of this manual.

4.1 Location(s) (Laboratory)

Here you can adjust central pre-settings, which are related to a location or laboratory. Does existist more than one location item, which have acces to the central QMSOFT® database, the settings will have effect to the actual selected laboratory item only.

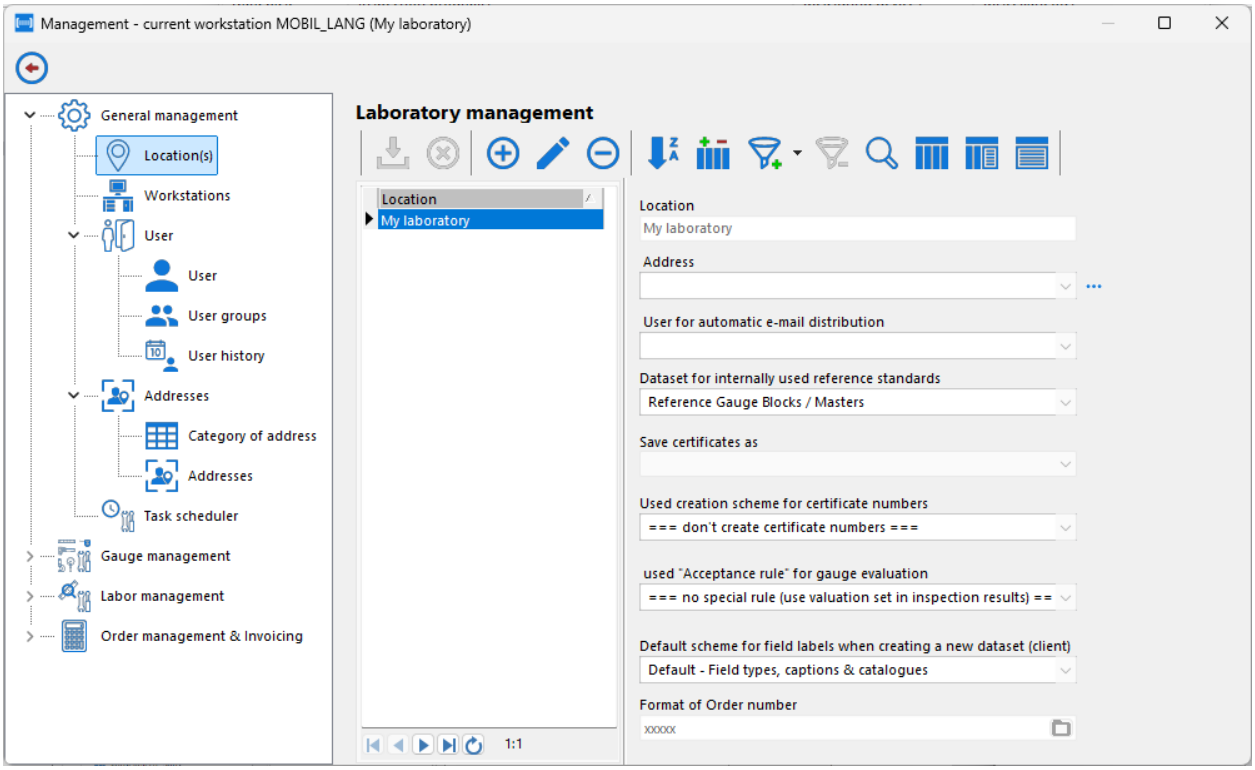


Fig. 4.1.1: "Location(s) management" settings.

- Location (s)
  Define here the name of your laboratory location. Note, that the management of more than one location is only possible with the license "QMSOFT®/QM-MANAGE enterprise edition".

Note

All settings, which you can do here, initially apply to all database clients in your laboratory environment. These settings can be modified by the definition of divergent rules in the client management.

- Address
  You can assign an address information to your laboratory
- User for automatic e-mail distribution
  Select from your user list the user who will be the sender for the "Auto-mail" function. The e-mail address stored for this user is used as "sender" for automatically generated e-mails. If this information is unavailable or incorrect, the function will not work.

Note

Please note that it is only necessary for automatic, timed operations that run independently of the QMSOFT® application. See also section *The QMSOFT® Task Scheduler* of the manual.

- Format of Order number
  If you use the QMSOFT® order management tool you can define here the standard format of the internal order numbers.

- Dataset for internally used reference standards
  The "Dataset for internally used reference standards" defines the link between the Gauge Management System and the *Standards and instruments* management. All gauges (reference normals, probes, additional equipment), which are stored inside of this dataset, can edited also by the functions in *Standards and instruments*.
- Save certificates as
  Here you can define the file format of the certificates.
- Used Creation scheme of calibration certificate numbers
  Here you can define the scheme for the creation of calibration certificate numbers (the scheme "YYMMDD-xxxx" will create a number, which uses the last two digits from year, month and day and a four digit actual number, for example "141117-1234").
  Select `=== don't create certificate numbers ===` if you don't want to use certificate numbers.
- Used "Acceptance rule" for gauge evaluation
  For the verification of the conformity or non-conformity of an instrument or gauge different rules of decision can be applied. Explanations can be found in the norm ISO 14253-1:2018. You can define the corresponding decision rules via the menu *Laboratory administration* → *Acceptance rules*. Then decide here which decision rules should be applied by default for your laboratory. Ultimately, acceptance rules only serve to make a decision for measurements within the uncertainty area.

Note

The definition of acceptance rules is not mandatory. If such rules do not exist, for the valuation of a gauge the settings from the section *Inspection results* will be used for the evaluation of test equipment. Acceptance rules are only required if you want to use different decision rules for different data sets (clients), since the specifications for the "Inspection results" are effective to the entire lab and all datasets (clients).

4.2 Workstations

As soon as a new computer, on which QMSOFT® is installed, is logging into the database, the name is stored into the database automatically. Later all of the workplace-related settings will be stored in relation to this item.

The functions for managing the workstations/workplaces will allow

- An easy overview about all of the computers, which are using QMSOFT®. You can give them an additional name (for example "Gauge block comparator") for a better identification.
- A pre-selection, which of the license types of QMSOFT®/QM-MANAGE can be started at the workstation (professional edition, lite edition, viewer edition). This can be used in network environments to define, that a selected workstation should use in every case the license "QMSOFT®/QM-MANAGE viewer edition" (per default the software is trying to use the "highest" license level).

Note

The pre-selection of using one of the license type of QMSOFT®/QM-MANAGE can also be related to the user, which is logged in, or the user group.

4.3 User, User groups and Privileges

In the delivery status there is only one user item pre-definded, the user name is “system”, the password is also “system”. This user is a member of the user group “Administrators” (QMSOFT® system manager).

For efficient access protection we strongly recommend, that you change the login name and/or the password of the default system administrator to ensure, that no unauthorized access can be made to your data (because anyone can read this manual)! Keep and record the changed login information, so that you are not locking yourself out from the QMSOFT® system!

To the change the access data, first edit the user “system”. Click on the menu item *User* in QMSOFT®/GaugeMan or use the item in the left pane of the “User” of the laboratory management; the user data will be displayed. Select a user entry, click the `Edit user data` button and change the field contents of the Operator and Password entries.

Create a new user item

To create new users, click on the `New user` symbol. An input mask opens in which you must enter the Operator (Login), Password, Last name and other user data. Please make sure that you repeat the password correctly. Be sure to specify the user group to which the new user will be assigned. This means that the user takes on the access rights of this user group. You can also configure these individually in the *Access rights* tab.

User groups and acces rights (privileges)

Using the “User groups” link, you can edit the groups to which users are assigned. Create a new group by clicking on the `New user group` button. To assign or change the privileges of a group, click the *Privileges* tab or use the *User Administration* → *Access Rights* menu in the main window of the QMSOFT®/GaugeMan program.

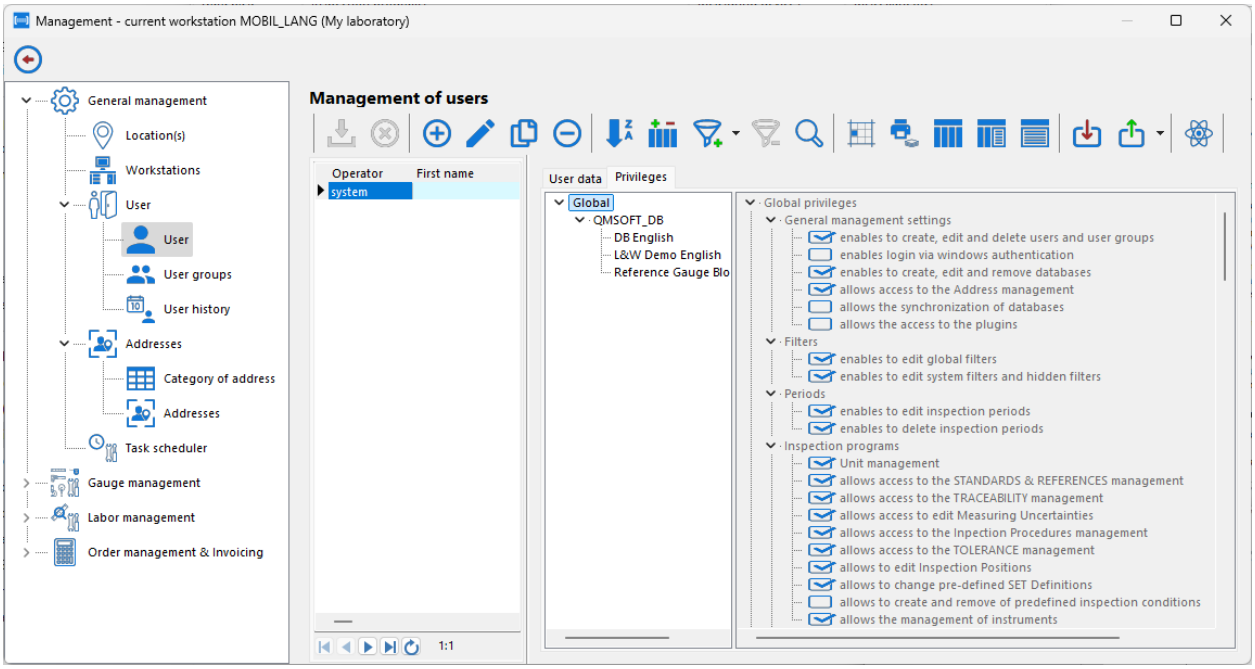


Fig. 4.3.1: Assignement of privileges.

Using the left pane in the *Privileges* tab, you can also decide for which database structure(s) and/or data datasets (clients) the assigned permissions are valid. The “Global” option specifies that the selected settings are valid for all datasets (a separate assignment to the individual client is certainly only necessary in exceptional cases).

Configuration of e-mail settings

If you want to use functions for e-mail delivery (for example, for due date checks), you must make the appropriate settings for the relevant user in the user settings. You need to set up:

- the e-mail address of the sender [Fig. 4.3.2]
- the information about your e-mail outgoing server [Fig. 4.3.3]

Note

If you do not know what to do, please contact your IT department!

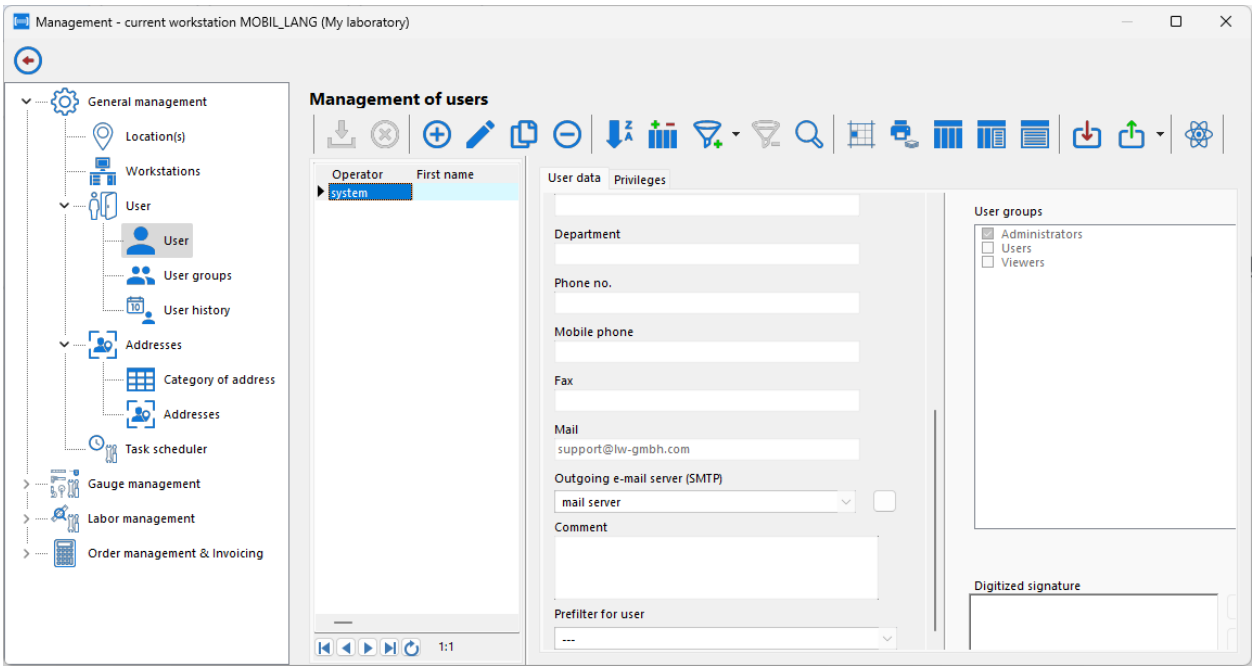


Fig. 4.3.2: Settings to define the e-mail sender.

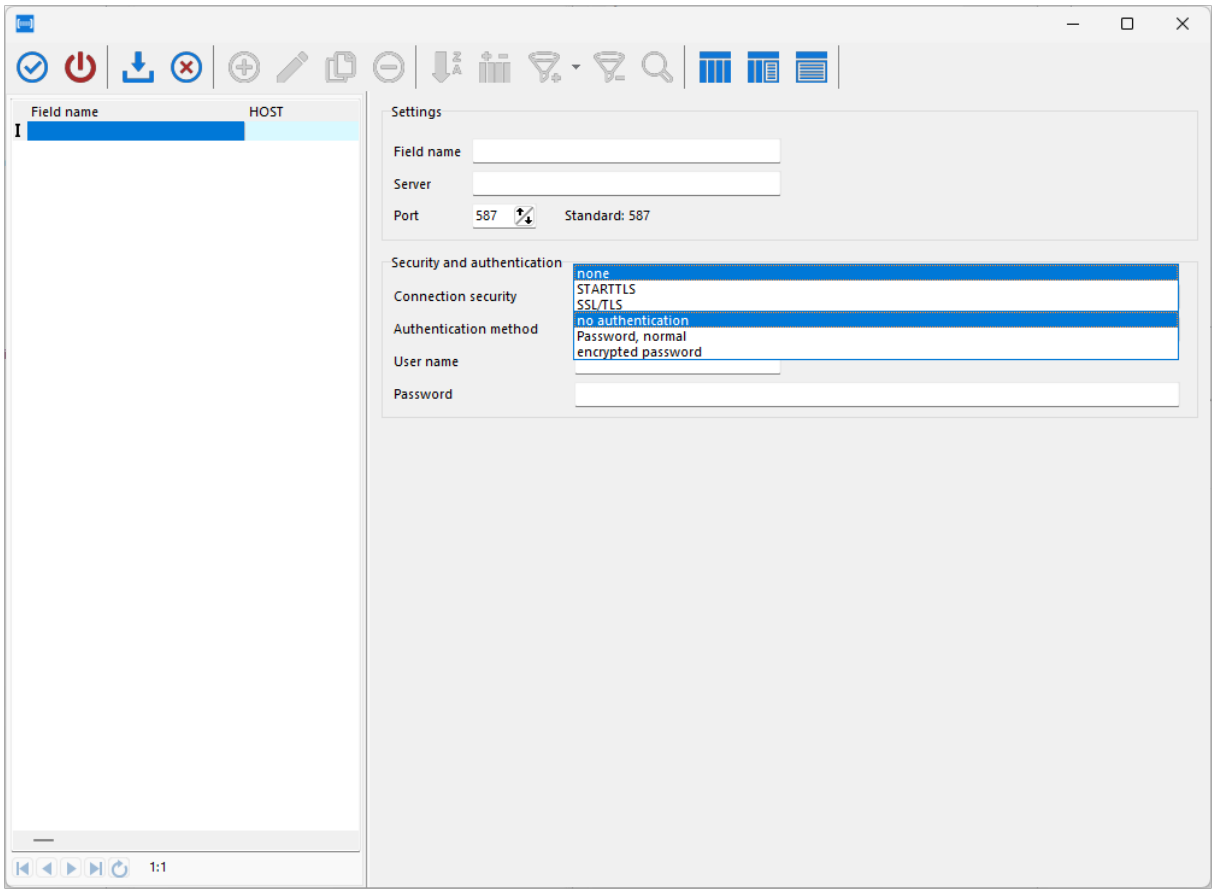


Fig. 4.3.3: Settings to specify the mail server.

User history

The user history records all actions that were performed in QMSOFT®/QM-MANAGE, especially those actions that cannot be saved in the history of a gauge (for example, deleting a gauge, “emptying” the recycle bin, etc.). This makes it possible to trace who performed an action at a specific time in the event of a disruption.

Since a lot of entries accumulate in the user history over time, it is recommended to delete this history from time to time.

4.4 The management of addresses

QMSOFT® does enable to manage the addresses of your customers, suppliers, manufacturers or others. For this purpose, there are a number of predefined address groups. You can modify these groups according to your need.

Use the menu “Adresses” to enter the address information you need. Assign a category if you want to use it later for filtering. Enter an e-mail address if you want to use the automatic e-mail sending features.

4.5 The QMSOFT® Task Scheduler

You can use QMSOFT®/QM-TaskService to define tasks to be performed when QMSOFT® is started or closed or which should be repeated periodically and automatically. Please note that for the periodic, automatic execution of tasks on a time schedule the activation of the QMSOFT®/QM-TaskService on your PC or the database server is required. Of course, you also have to make sure that the related PC or Server is running at the time of execution.

> **Note**
>
> The QMSOFT®/QM-TaskService application will be installed at your PC during the QMSOFT® installation procedure. In the QMSOFT®/GaugeMan starter menu *Miscellaneous* → *QMTaskStarter* you can "Start" or "Stop" the service. However, we generally recommend to set up this feature on a special database server.

To define a task, at first enter a name. If necessary, complete it with a description of the task. Then determine if the task - if multiple computers are connected with your database - to be started at all workstations or only at the currently used computer. Subsequently define the action to be performed

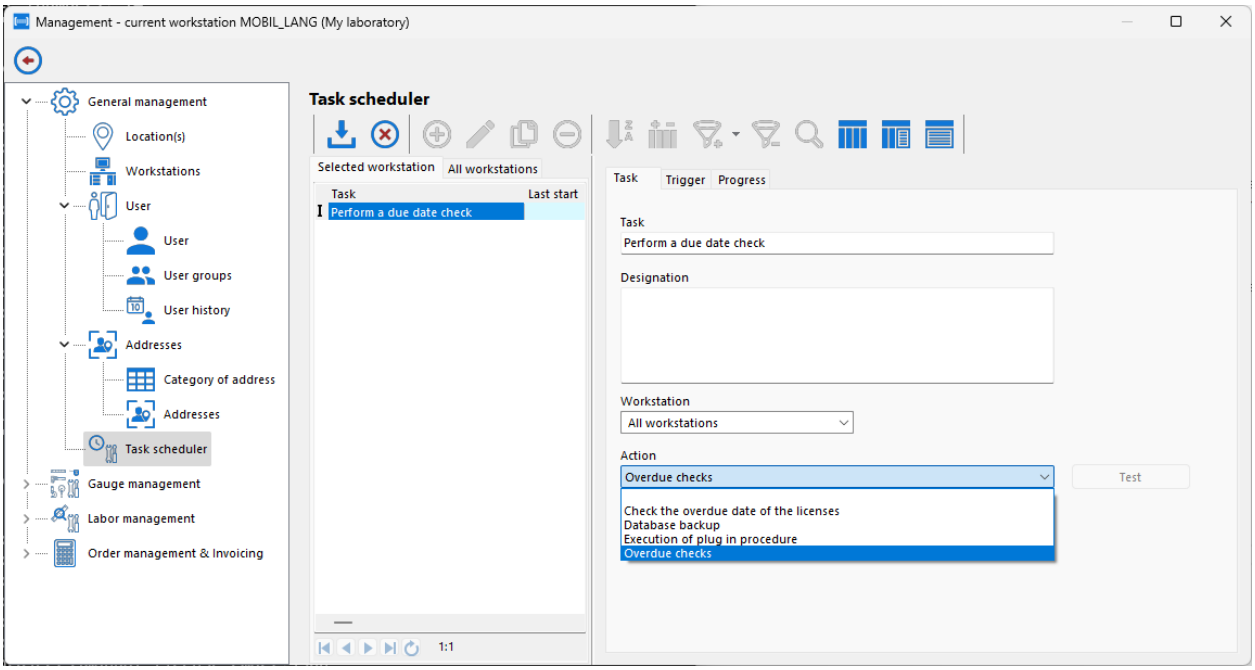


Fig. 4.5.1: Define a task.

Predefined actions which can be started are:

- *`Check the overdue date of the licenses`*
  Checks whether QMSOFT® licenses have expired.
- *`Database backup`*
  Specifies when saving the database should be done in a backup file; should usually be used only if your database is located locally on the PC; otherwise the backup should be set up on your server by the IT administration!
- *`Overdue checks`*
  Defines the execution time for the execution of due date tests. The prerequisite for the execution is that overdue tests have been defined for the existing databases (clients).

- *Execution of plug in procedure*
  This option is specifically designed for system administrators to set up custom programs (for example: data synchronization with SAP); The setup is always in coordination with L&W GmbH.

In the next step go to the register "Trigger" and define the start time(s) for the operation. The start can be executed when opening a dataset, starting or closing QMSOFT® or based on a time table.

4.6 General Settings for the QMSOFT® "Gauge Management"

Here you will find all central settings which are relevant for the Gauge management. If you do not use this part of QMSOFT® you can skip this section.

4.6.1 Database structure(s)

Usually the database will contain only one data structure which is defining the general structure of your Gauge Management data and does define some central basic settings.

In QMSOFT® we understood the term "database structure" as the compilation of

- Gauge types (names, technical characteristics, history data)
- Status items (names, relations)
- Actions/events (names, status-consequences, event-related properties)
- Inspection periods, measuring units
- Figures, text information etc.
- Forced processes

The form "Database structure(s)" contains features to create and manage such structure items.

> **Note**
>
> Depending on the application scenario of QMSOFT® it is possible to use different database structures in QMSOFT®/QM-MANAGE to operate with various languages, or completely different items, which has to be managed. However, the use of multiple structures should always be an exceptional case.

With the help of the displayed tab pages, you can set parameters, that are normally valid for all of the clients in the selected database structure. Possible exceptions can be defined in the client management. See also the next section of the manual.

The "Export database structure" feature allows you to export your entire database structure to a file. This file is intended for use in case you want to create a new database with the same structure.

4.6.1.1 General settings

The following properties are available at this page:

- Structure name
  Use a unique name of the data structure to acknowledge the application field easy.
- active
  The structure can be activated by this checkbox, normally this property should be "marked".
- Master structure
  This property is important only for the case, that you have to exchange data between different databases (QMSOFT®-installations, for example between a central database in a network and a local database on a laptop-computer, which is used outside of the laboratory as a stand-alone-machine). The "Master structure" has priority in the cases of multiple changes of database fields on both sides.
- Scheme for generating ID numbers & criteria for uniqueness
  in case you have defined rules for the uniqueness of ID numbers, you can select the related rule which should be used for all datasets (clients); such rules can be used to make sure that ID numbers are unique across multiple clients.
- Comment
  Here you can type in a short description of the data structure. This is used for a better understanding, what you mean with the "Structure name".

4.6.1.2 Dependencies "Actions - Status"

To understand this function, the knowledge about the use of "Status" and "Actions" in the gauge management module QMSOFT®/QM-MANAGE is required, so it is more suitable for advanced QMSOFT® users to implement so-called "forced procedures", which means to block specific actions depending on the current status of the managed gauges.

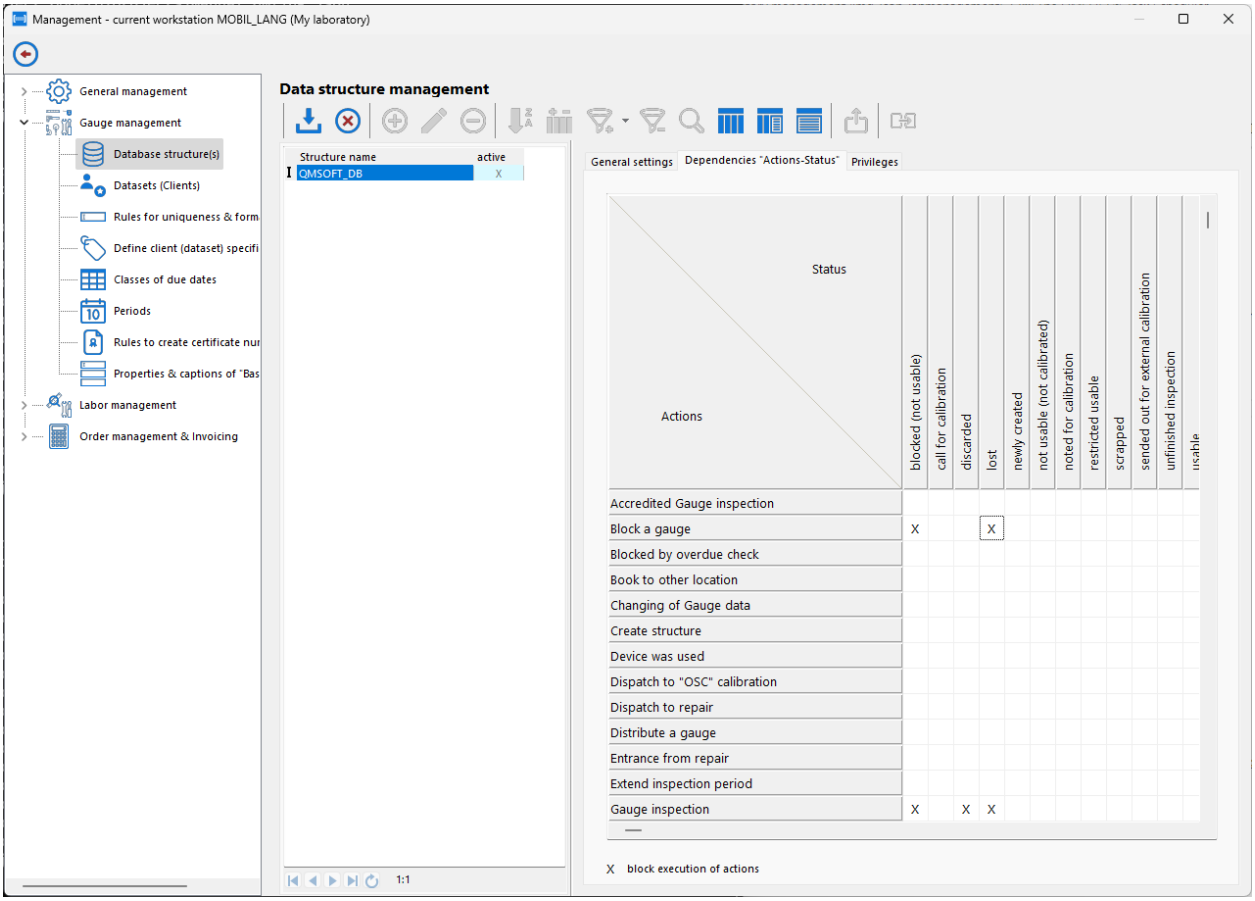


Fig. 4.6.1: Dependencies “Actions - Status”.

Note

In the delivery status of QMSOFT® there are no such dependencies pre-defined!

In the figure above [Fig. 4.6.1] you see a table with the existing status and action items. If you want to block an action, you can set a mark “X” in the cross-point-position of the combination of status and action.

To activate the defined dependency to actually become active, you must still activate this function in the client administration for the corresponding data sets (clients).

4.6.1.3 Privileges

Here you can define the access privileges for the actual data structure, this is also available in the user management.

4.6.2 Dataset (Client) management

Into the QMSOFT® delivery package there are included two respectively three datasets (clients), depending from the activated or de-activated feature “Create demo dataset” while running the installation assistant.

Using this dialog, you can create new client records, delete existing records, or change the properties and settings of all existing QMSOFT® datasets (clients). Some of this settings, which are based on global default values, you can individual modify for the actual dataset only, for example settings for the use of the identity number, for forced procedures (dependencies between status and enabled actions) etc.

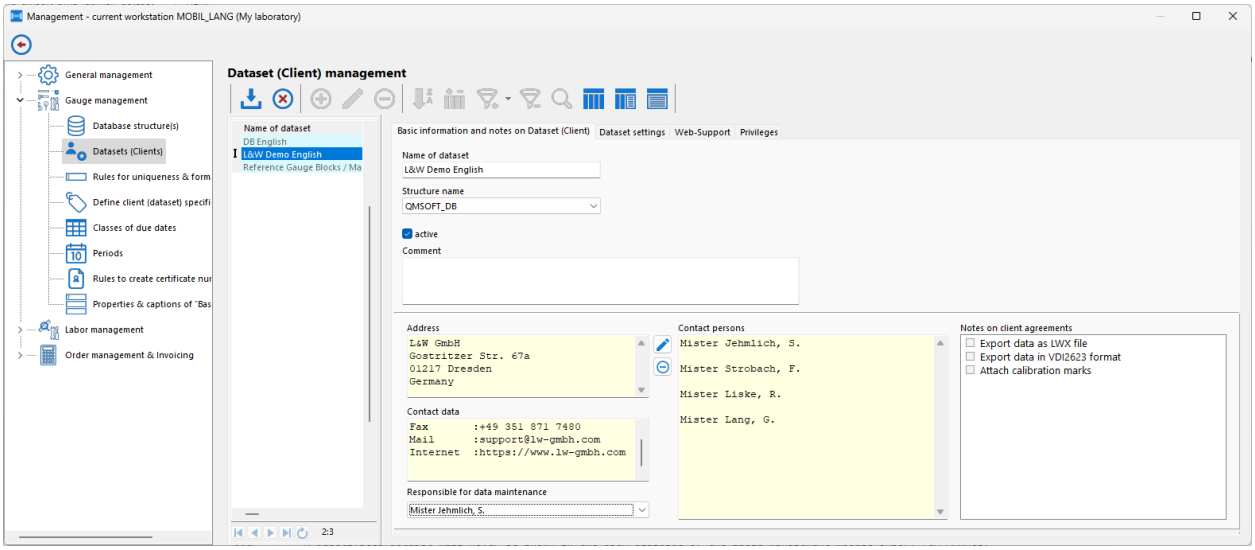


Fig. 4.6.2: Dataset (Client) management.

The dialog offers all of the created client items (datasets) as an overview list. To create a new client/a new dataset, click `New dataset (Client)` button.

4.6.2.1 Basic information of Dataset (Client)

The following information is offered in this dialog:

- NAME OF DATA SET

  The name of the dataset has to be entered. This name is used in the gauge management module QMSOFT®/QM MANAGE to identify a gauge stock in the open dialog.

- STRUCTURE NAME

  Here you define, to which “data structure” the dataset should be assigned (see also section *Database structure(s)*). The assignement defines, which terminology and which set of rules for this dataset has to be applied.

- ACTIVE

  Activate/deactivate the dataset. A deactivated dataset will never be shown in the open-dialogue of the gauge management module QMSOFT®/QM-MANAGE.

- Address
  Assign an address to the dataset. The address itself has to be created in the "Address management", before you can select it.
- Responsible for data maintenance
  If your address information does contain information about contact persons, you can here select one contact person responsible for data maintenance; enter an e-mail address for the contact person when you want to use it for automatic notifications (e.g. information on due dates).
- Notes on client agreements
  In the section *Define client (dataset) specific agreements* you can define a list of special hints about customer agreements. Here you can select those hints that are relevant for this dataset (client). Please note that such hints can be used for a customized control of certificate output.

The name of the client (dataset) and the address data can be used to automatically display this information on the QMSOFT® calibration certificates when the corresponding fields are inserted.

4.6.2.2 General "Dataset settings"

On this page you can change some dataset/client-related properties individually and deviate from the default settings of the data structure management:

- **Rules for the creation and uniqueness of identity numbers**
  If a common rule for the creation of ID numbers was defined, you can select it here. Once the rule has been assigned to the database structure, it is valid for all clients and cannot be changed. However, the usual setting is: "— Setting for this dataset only —".
- **Use unique identity numbers**
  Activating this option will force the use of unique identifiers. If this option is not active, it is possible to enter gauges with the same identification number, provided that the gauges are of different gauge types.
- **Format of ID number**
  If the option "Use unique identity numbers" is activated, you can force the automated creation of a new identity number for a new created gauge by filling out the format field. If you keep this field empty, no identity number will be created.
- **Activate the "gauge action < = > gauge status" dependencies**
  Here you can activate the forced processes (see section *Dependencies "Actions - Status"*) for the actual selected client.

> **Note**
>
> The following three options Client-related settings for "Status", "Actions" and "Types" are only available in the QMSOFT®/QM-MANAGE Enterprise version and should only be used as an exception.

- **Client-related "Status" definitions**
  If you want captions for the gauge status items that differ from the actual data structure, you can enable this feature here (the meaning of the status items should be the same).
- **Client-related "Action" definitions**
  If you want captions for the gauge action items that differ from the actual data structure, you can enable this feature here (the meaning of the action items should be the same).
- **Client-related "Gauge types" definitions**
  If you want captions for the gauge type items that differ from the actual data structure, you can enable this feature here (the meaning of the type items should be the same).

- **Used creation scheme for certificate numbers**
  Select the scheme for the creation of certificate numbers, if it should be divergent from the "Laboratory" settings (see section *Location(s) (Laboratory)*).
- **Used schema for field properties and captions**
  In the laboratory management you will find a function to change the labeling and properties of master data fields. These changes will be saved with a name of this schema. Here you have only to select the schema to be used for this client.

> **Note**
>
> As soon as any existing basic data field requires a look-up table other than other data sets (for example, a list of existing cost centers), the database set must have its own field definition and labeling scheme.

- **Used decision rule to determine gauge acceptance**
  Via the menu item *Acceptance Rules* in the Laboratory Administration, you define the rules for the conformity assessment of a test equipment. Select the acceptance rule to apply to the dataset.

4.6.2.3 Web-Support

These configuration settings are used exclusively in relation with a QMSOFT® Online Service contract between a QMSOFT® customer and the company L&W GmbH. You need a license "QMSOFT®/QM-MANAGE enterprise edition" to use this feature. The required settings are communicated directly between the contractual partners.

4.6.2.4 Privileges

Insert here specific settings for the access permissions, that should be applied to the currently edited dataset (client) item. For a description of the permissions see the section *User, User groups and Privileges*.

4.6.3 Rules for uniqueness of ID numbers

This menu can be used to define a format for the automatic generation of ID numbers and to activate the use of unique ID numbers. The "Assigned Datasets" list shows you all datasets (clients) that use this schema and, if enabled, use a unique ID number across those records. If the schema is assigned to the database structure, it automatically applies to all datasets contained in this database structure.

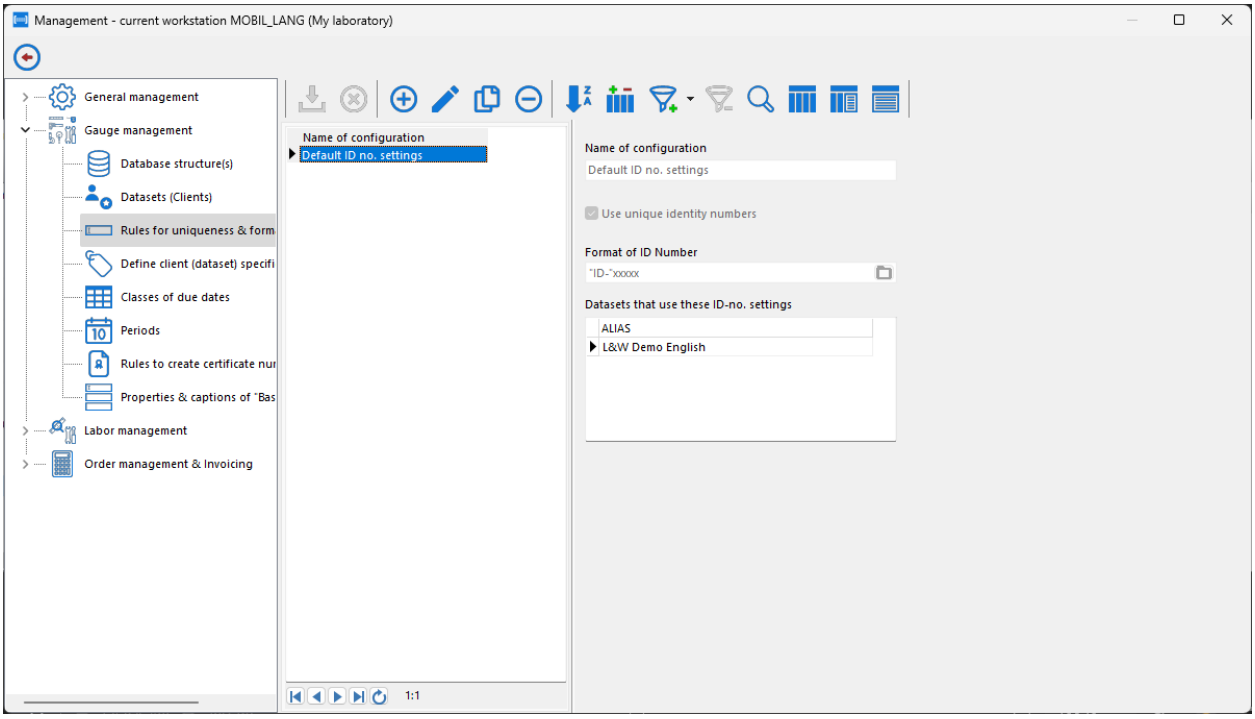


Fig. 4.6.3: Definition of an ID number creation schema & rules for the creation.

4.6.4 Define client (dataset) specific agreements

As explained in section *Basic information of Dataset (Client)*, you can also define special agreements for each client (dataset). You use this menu item to define which client-specific agreements are possible. In addition to pure text information, the entries defined here, can be used as an output condition ("Text Conditions") to control client-specific outputs in the calibration certificate. For information on using such output conditions, see chapter *Calibration certificates*.

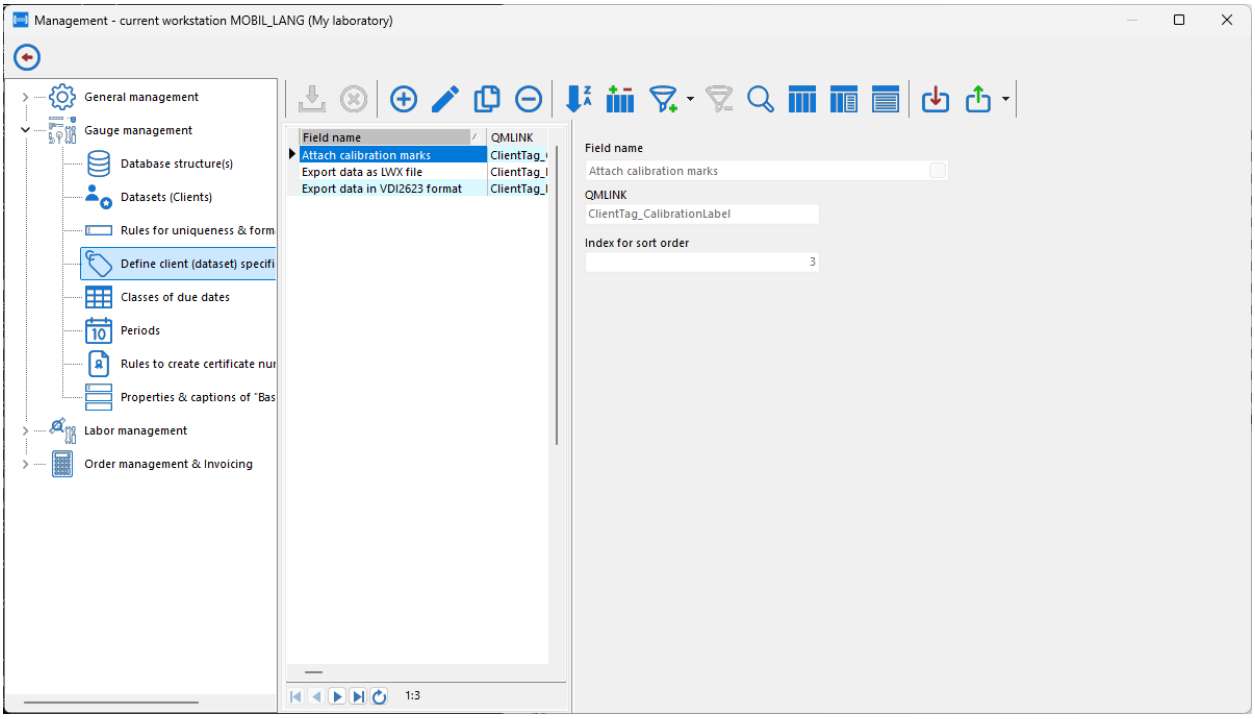


Fig. 4.6.4: Define client specific agreements.

4.6.5 Classes of due dates

In inspection equipment management, you can assign different due dates for different types of inspection or other operations to one gauge / test equipment. Here you can define which types of due dates you want to use. For example, you can use it to define different periods for a periodical inspection and a fundamental maintenance for an instrument.

4.6.6 Inspection “Periods”

Here you will find a list of pre-defined inspection periods which can be used for the managed gauges and instruments.

Two general types of “Periods” does exist:

- Fixed inspection periods such as “month(s)”, “year(s)”, etc., which define a fixed period of time from one inspection to the next. Fixed periods can be distinguished in two variants. The 1st one “Fixed period - next date based on the last inspection date” performs the calculation based on the current date when doing an inspection. If you want to prevent an earlier or later inspection from postponing the next inspection date, you can use the 2nd option “Fixed period - next date based on the next due date”.
- Flexible (counting) time periods like “Day(s) in use” or “Usage nos.” which will count a usage time or number. When using such flexible inspection intervals, it is important to define the corresponding actions which start and stop the counter in the QMSOFT®/QM-MANAGE gauge management system. Disable periods that you do not want to use.

Note

Inside the QMSOFT®/QM-MANAGE gauge management, a flexible time period is always shown as “Alternative period”. If both period types are enabled, the fixed period is only used if it is exceeded before the counter is reached.

4.6.7 Rules to create certificate numbers

For the automatic generation of calibration certificate numbers when creating certificates, you can define different rules for the generation of this number here.

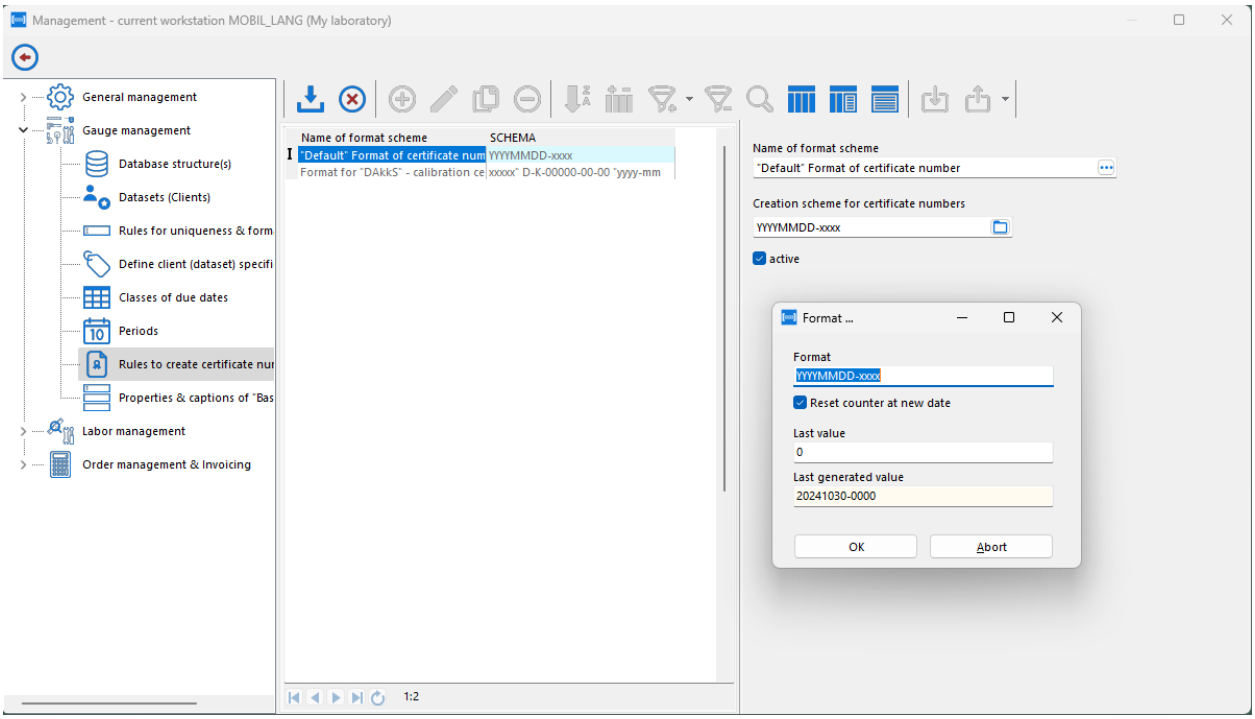


Fig. 4.6.5: Definition of rules for the generation of certificate numbers.

The “default” rule which should be used is usually done in the “location” settings. If it should be necessary to generate different numbers for different gauge actions, do the selection of the related format scheme in the QMSOFT®/QM-MANAGE gauge management program in the *Settings* → *Actions* menu.

Table 4.6.1: predifined letters (placeholder):

Symbol	Description
YY	Year, numerical, 2 digits
YYYY	Year, numerical, 4 digits
M	Month, numerical, dynamic digits (1 resp. 2)
MM	Month, numerical, 2 digits
MMM	Month, textual, 3 letters
MMMM	Month, textual, full month name
D	Day, numerical, dynamic digits (1 bzw. 2)
DD	Day, numerical, 2 digits (leading zero)
DDD	Day, textual, weekday, 2 digits
DDDD	Day, textual, weekday, full name
x	current number, dynamic digits (1 bzw. 2)
xx	current number, 2 digits (leading zero)
xxxxx	current number, 5 digits (leading zeros)
"ABCD"	defined fixed text

4.6.8 Properties and captions of “Basic data fields” (Field definition schemes)

When managing gauges or instruments in the QMSOFT®/QM-MANAGE gauge management database, so-called “Basic data” are stored for each tool. With the help of the functions described here, the properties of these fields as well as their labeling can be changed. Any changes you make here are stored in a “Field definitions scheme”. Using the “Dataset (client)” configuration to select the corresponding field definition scheme to be used.

If you want to make changes on the “Default - Field types, captions & catalogues”, it is generally necessary to create a new scheme by copying the existing one. Then you can overwrite the properties and names of the fields you want to change.

Warning

You need also a new schema if you want to define different contents in the lookup tables (lists) in different datasets (clients)! See also section *The usage of dataset (client) specific catalogues (lookup tables)*.

4.6.8.1 Create and edit a schema for the “basic data” field properties and captions

To create or edit a field definition scheme, click the corresponding buttons (`New` or `Edit`). When creating a new scheme, enter a name and select an existing schema which does define the basis of the new schema. Now you can modify the field labels and field properties.

4.6.8.2 Possible properties of “Basic data” fields

The following figure shows an example of how to set the properties of a basic data field.

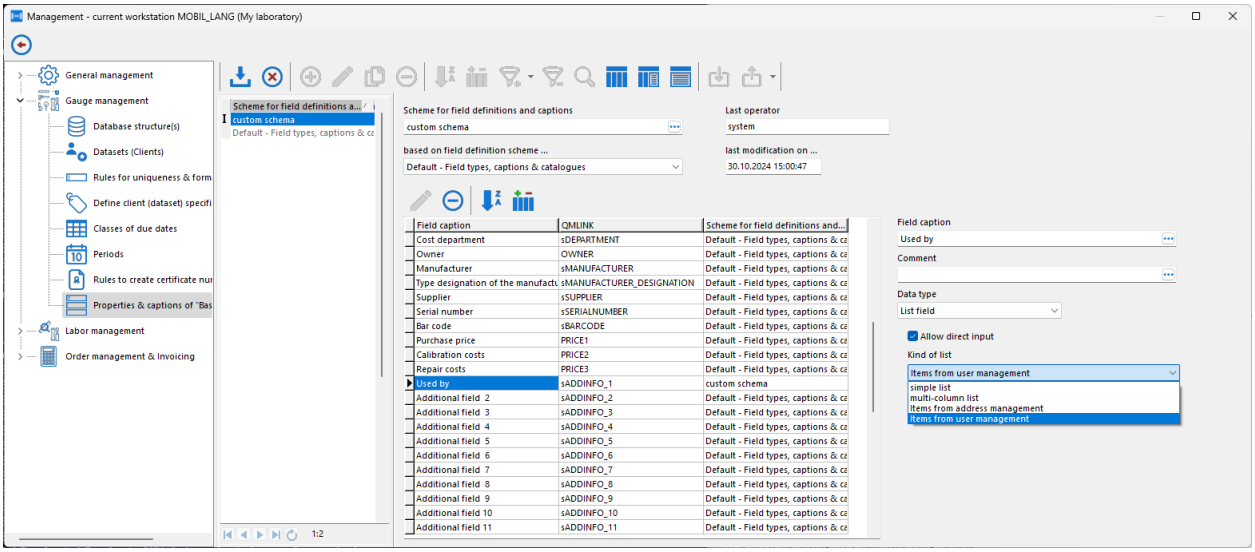


Fig. 4.6.6: Define the caption and the properties of a “Basic data” field.

The field properties you can change are:

- Field caption
  Click the button next to the field caption to change the caption. You can choose between the options *simple text*, *internal software translation* or *user defined translation* when you need the caption in different languages.

Note

When the option *internal software translation* is selected, you can not change the text! In this case switch to *user defined translation* or to *simple text* if no translations are required.

- DATA TYPE
  Select *Simple text* or *List field*. If you want to use a catalogue (lookup table) for this field you need the type *List field*. For fields where the original data type is a number (float) or a date you can not change it.
- ALLOW DIRECT INPUT
  This option is only available for "list" types, catalogues. By activating this option you allow free text entry in this list field. Otherwise only values from a stored catalogue may be selected. To modify a related list, you have to go to the QMSOFT®/QM-MANAGE gauge management program. Use there the menu *Settings* → *Catalogues*. Note that even a different list content for a dataset can only be implemented by using its own labeling scheme.
- KIND OF LIST
  You can choose between the options:
  - "simple list",
  - "multi-column list",
  - "items from address management" or
  - "items from user management"

  Using one of the options "items from address management" or "items from user management" the list will be filled with the information available in the address or user management. The definition of "multi-column list" will be explained in the next section *The definition of "multi-column lists"*.
- DATA CONTENT - FORMAT
  Here you can additionally define a special property of the text or list field. Besides the normal use as "text", the fields may also contain an e-mail address or a link to a file. E-mail addresses, for example assigned to a cost center, can then be used to send notifications about the due status of inspection equipment automatically.

4.6.8.3 The definition of "multi-column lists"

When you define the "Kind of list" as a "multi-column list" you can now create additional columns for your list / catalogue. Note that these are additional columns that are added to the always-existing 1st column with the defined field name.

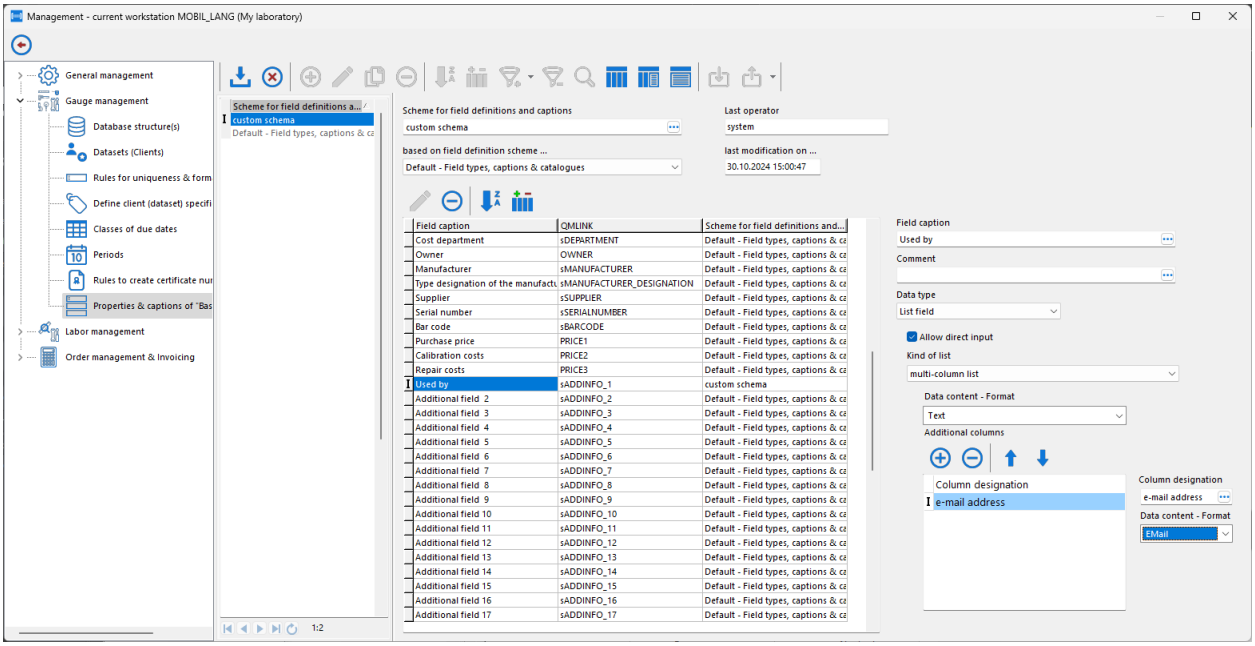


Fig. 4.6.7: Definition of a 2-column list with a name and an e-mail address.

Create new columns by clicking the `Add a field` button and entering the column name and the data format.

4.6.8.4 The usage of dataset (client) specific catalogues (lookup tables)

Since the function described here is quite complex, here follows a brief instruction how to proceed with the definition of a dataset (client) specific lookup table.

First create a new field definition / labeling scheme. Then change the properties of the corresponding field, which requires its own lookup table (for example, the “Cost department” field). Logically, the field in question should be of the data type “List”. For multi-column lists, select the appropriate list type and then define the required additional columns.

Save the new field definition scheme and go to the menu “Datasets (clients) in the gauge management administration”. On the register page “dataset settings” you can now choose the desired schema in the option “Used schema for field properties and captions”.

When you now opening this dataset by using the QMSOFT®/QM-MANAGE gauge management program, so you can now use the function *Settings → Lookup tables* to fill in the table for your “Cost department” field. This table is then displayed in every dataset using the same schema.

4.7 Settings “Labor management”

Under the menu *Laboratory administration* you will find all settings, which are relevant for the execution of Gauge calibrations. If you only use the QMSOFT®/QM-MANAGE gauge management program and do not perform calibrations by yourself, you will normally not need these functions.

4.7.1 Administration of units of measure

All of the QMSOFT® modules are using different numeric inspection properties. Normally such properties have a unit. QMSOFT® offers a central function for the handling of this units.

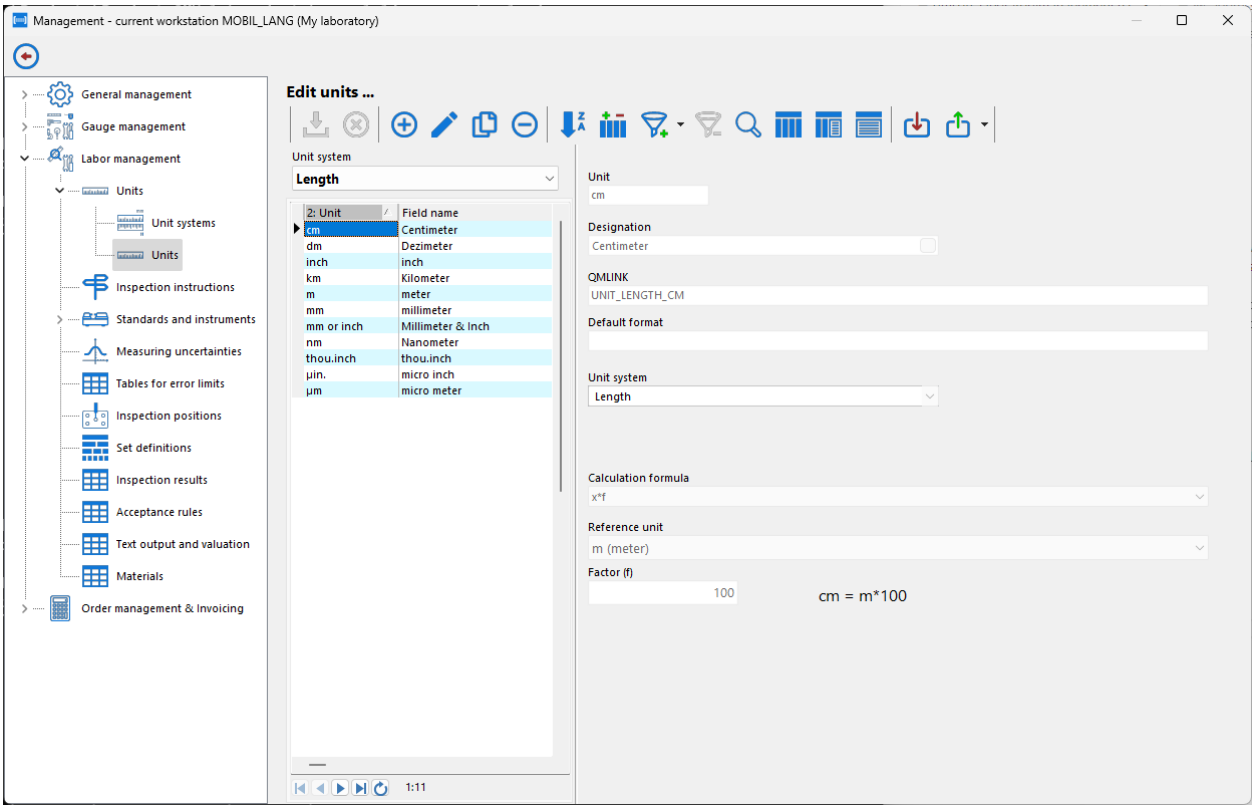


Fig. 4.7.1: Management of measuring units.

The functions “New”, “Edit”, “Copy” and “Delete” are self-explanatory. The editing of unit items should never be necessary (only in exceptional cases), because all units required for QMSOFT® Inspection programms are predefined.

4.7.2 Inspection instructions

The management of inspection instructions is solving two tasks inside of the QMSOFT® system:

- the designation of the inspection process used for the generation of the calibration certificate
- the storage and mapping of relevant documents (for example VDI rules, factory rules etc.) for a quick and consistent access in QMSOFT®.

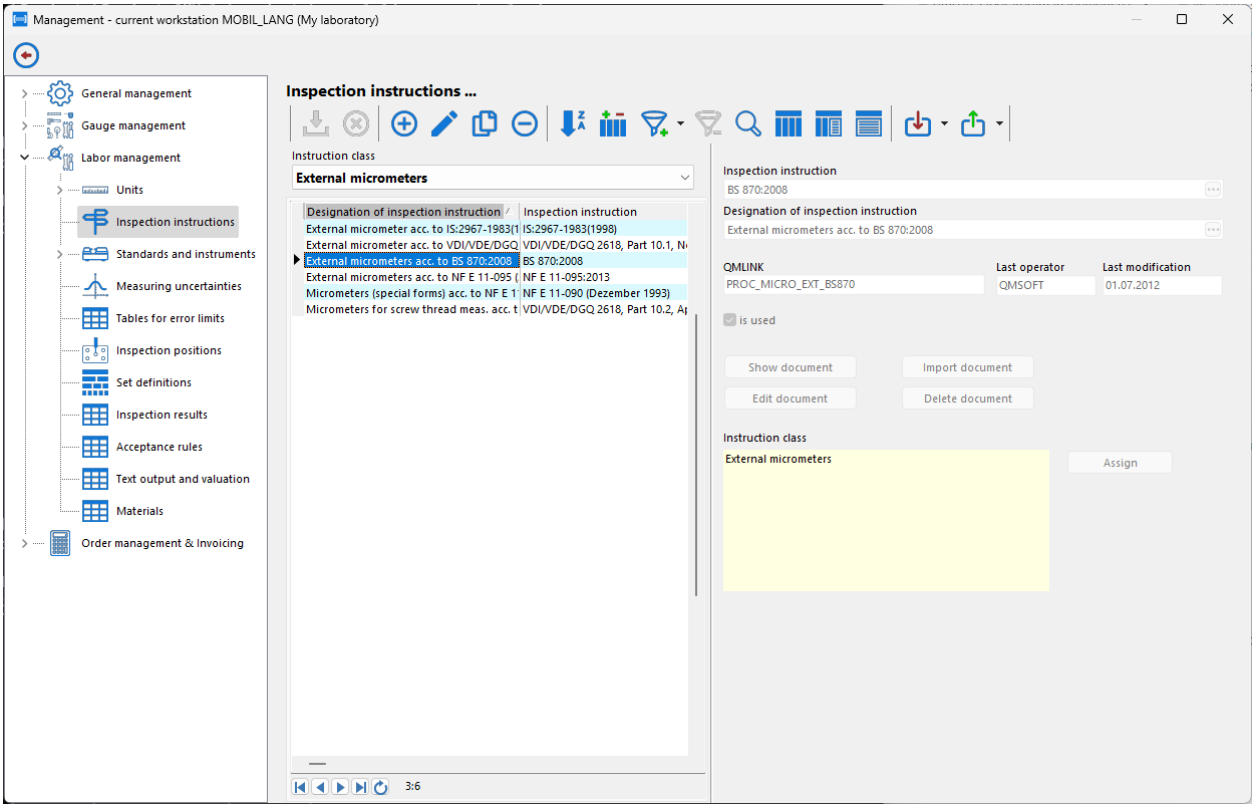


Fig. 4.7.2: Management of inspection instructions.

Numerous inspection procedures are already available as part of the delivery/installation of a QMSOFT® system. These cover the entire spectrum of these gauges that can be calibrated with QMSOFT® inspection modules. The relevant documents are not filed for copyright reasons in the system. However, these can be added by the user at any time.

For clarity, the inspection procedure items can be filtered by various groups, see field “instruction class”.

Note

If necessary, the program users can add their own inspection procedure items here. Make sure in this case the assignment to the relevant “instruction class”!

4.7.3 Standards and instruments

This function allows you to manage all your instruments, reference gauges and standards, which are used in the calibration laboratory, and you can assign this equipment to different categories. This enables QMSOFT® to print the metrological traceability information of an executed calibration process into the calibration certificate (a list of the used equipment with its certificate number of the last calibration). The function also offers the quick access to technical information of the reference standards, which are directly required for specific measurement tasks (for example, the current actual size of a gauge block or setting ring).

4.7.3.1 Standards and instruments

For many measurement tasks (for example inspection of gauge blocks, difference measurements, all types of internal measurements, measurements of threads) the use of reference and setting standards, of probes or thread measuring wires is required. Therefore, enter your used standards in each category, so you can access their relevant information for the current measurement task while performing a measurement. The following categories are distinguished in QMSOFT®:

- **Standards for external measurements**

  For difference measurements "external", inspection of gauge blocks, in most cases gauge blocks (single gauge blocks or gauge block sets) or setting plugs.

- **Standards for internal measurements**

  For difference measurements "internal" (in most cases setting rings).

  You can manage individual standards (for example setting rings) or sets of standards (for example gauge blocks). The use of standards for testing parallel gauge blocks is particularly important because the inspection procedure is based on comparison with a reference gauge block and the inspected gauge block itself. For a reference standard, which consist of only one piece, type in both the nominal size of the standard and the current actual size. If necessary, you can also add a comment. For standards which are organized in a "set", please check the "set" option when entering. You can use the `Show set items` button (or the *Included elements* tab) to edit each element of the set as well as the associated "nominal" and "actual" values.

- **Thread wires**

  For measurements of external threads.

  If you perform the measurement of external threads with QMSOFT®/QM-THREAD, you will need thread measuring wires. Here you have the opportunity to store your thread measuring wires and their "actual" diameter. Since thread measuring wires are commonly designed in so-called ZEISS- or SIP-series, the corresponding items are preconfigured in the QMSOFT® delivery package. If you have the appropriate values of the current thread measuring wires, you can enter it here, or you use the default nominal value of the thread measuring wire. The selection of the appropriate thread measuring wire set is possible while the thread measurement by the identification number of the set.

- **T-Shaped probes (with 2 balls)**

  For measurements of internal threads, or plain rings.

  The so-called T-shaped probe (T-probe) is mainly used for the measurement of internal threads according to the "3-ball method" (see the manual part for QMSOFT®/QM-THREAD). But they can also be used for measurements on plain rings. When using this type of probes, the exact knowledge of the "probe constant" (in the figure below labeled as c [Fig. 4.7.3], the "measure over the balls") is required. For the measurement of internal threads also the diameter of the measuring balls must be known precisely as possible beyond. However, you usually get this value from the manufacturer of the button. T-shaped probes should be calibrated prior to first use. The calibration is carried out by means of a plain setting ring [Fig. 4.7.3], the diameter of the ring must be known exactly. The calibration procedure itself can be executed directly from a QMSOFT® inspection module, where the probe should be used. Relevant information about the calibration procedure can be found in the relevant chapters of the user manual for QMSOFT®/QM-THREAD or QMSOFT®/QM-PLAIN.

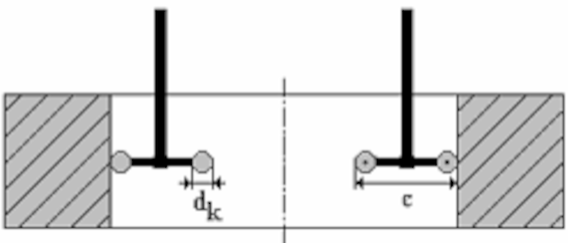


Fig. 4.7.3: Calibration of a T-shaped probe using a setting ring.

- **Finger probe (probe with one measuring ball)**
  For internal measurements.
  This type of probes is primarily used for the measurement of master rings and rings with smaller dimensions, in which a mechanical probing with other methods is not possible. Of course, also for this purpose, the exact diameter of the probe must be known. Due to the deformation occurring during the probing of the probe we speak in this case about the “effective diameter” of the probe. As with a T-shaped probe, this diameter must be determined prior to the application of the probe by calibrating with the help of a setting ring.
- **Ball inserts (2 balls for use in brackets)**
  For internal measurements of threads (2-ball-method) and spline gauges.
  Enter the diameter of the measuring balls, which you need for internal measurements. This ball inserts can be used for the measurement of internal threads with the 2-ball method (see the manual part for QMSOFT®/QM-THREAD) or for the measurement of spline gauges (see the manual part for QMSOFT®/QM-SPLINE).
- **Checking and setting gauges for thread gauges / Master gauges for taper threads**
  Some types of thread gauges may be inspected by the means of checking or setting gauges. Here you can enter the related information for it.
- **Checking gauges for snap gauges**
  Enter the values for snap gauge checking plugs.
- **Instruments**
  All types of measuring devices.
- **Other standards**
  To manage other utilities.

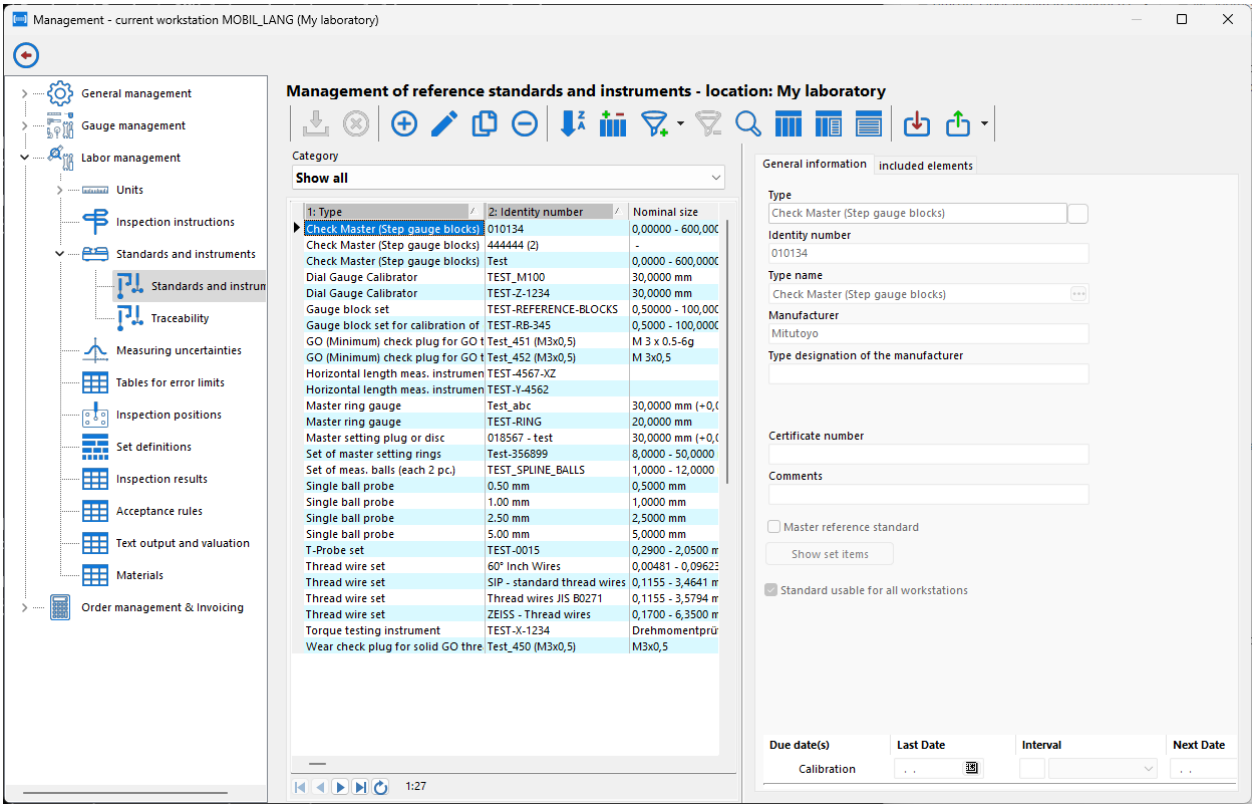


Fig. 4.7.4: Management of standards and instruments.

While documenting the traceability of the measuring results in most cases certainly sufficient to simply list the used equipment, for the use of reference measures (adjusting rings, gauge blocks, etc.), the exact knowledge of the “dimension” of the standard is necessary.

Note

Therefore make sure when entering reference standards to enter the correct “actual values”. Incorrect entries will cause directly measurement errors! Chack also the entered “Format”.

Note

When using the gauge management module QMSOFT®/QM-MANAGE:

With the function, which is described here, it is not possible to store calibration certificates for reference standards or to manage or track the history of it. These functions can be realized only with the help of the gauge management module QMSOFT®/QM-MANAGE. If you use this, you define in the central laboratory settings the dataset/client, which you want to use to store the data of your standards. As a result, an automatic data synchronization between the reference standard data you can see here and the measuring equipment inserted in the assigned dataset/client is guaranteed!

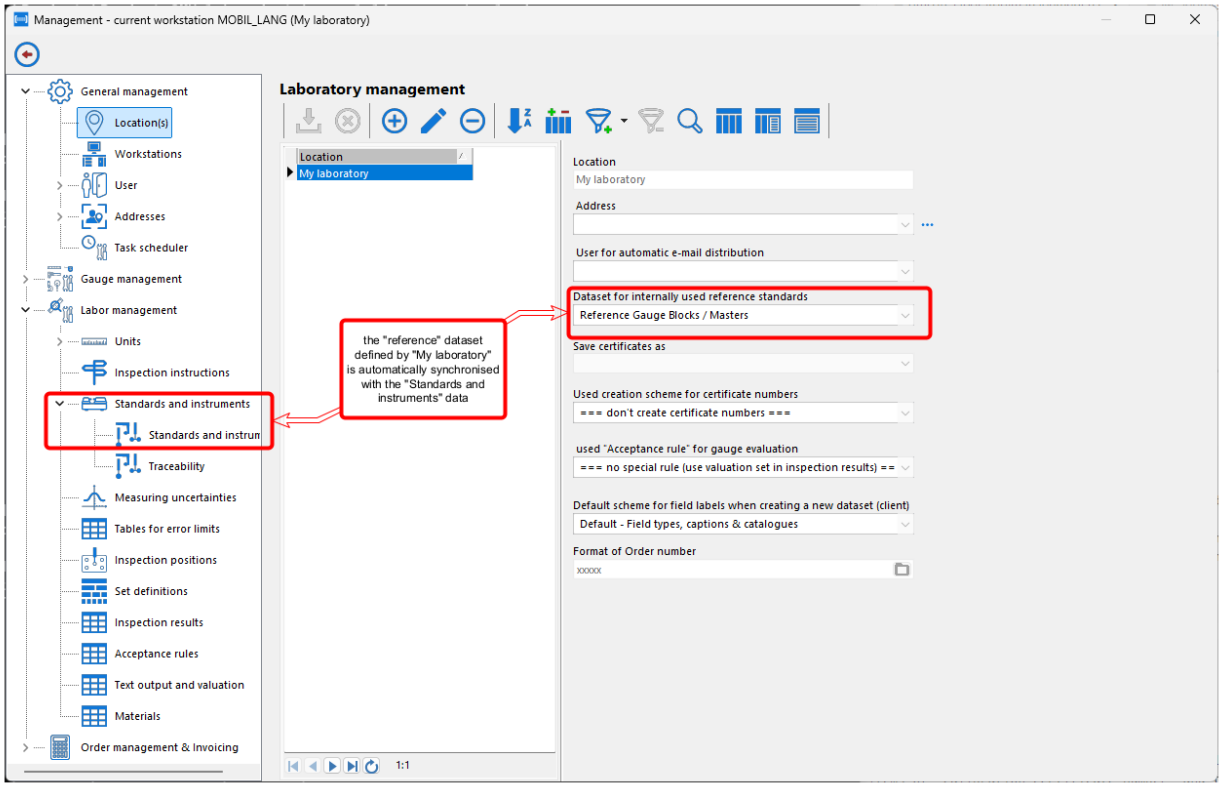


Fig. 4.7.5: Assignment of the standards and normals entries to a dataset.

Warning

The data synchronization does not work with data stored in the history of a reference standard (for example results of an inspection) are. Please check always (also when using QMSOFT®/QM-MANAGE), the current items of "calibration certificate number" and the "actual size".

While a QMSOFT® installation a corresponding client with the name is applied "References & Normals" automatically.

4.7.3.2 Traceability

Part of any calibration certificate should be the recording of all measurement standards and measuring equipment, which was used in the calibration process. This list of reference standards we call "Traceability ".

By selecting the name of the "Traceability" all of the information about all of the used reference standards can be inserted very easily into the calibration certificate by using the related "Certificate field".

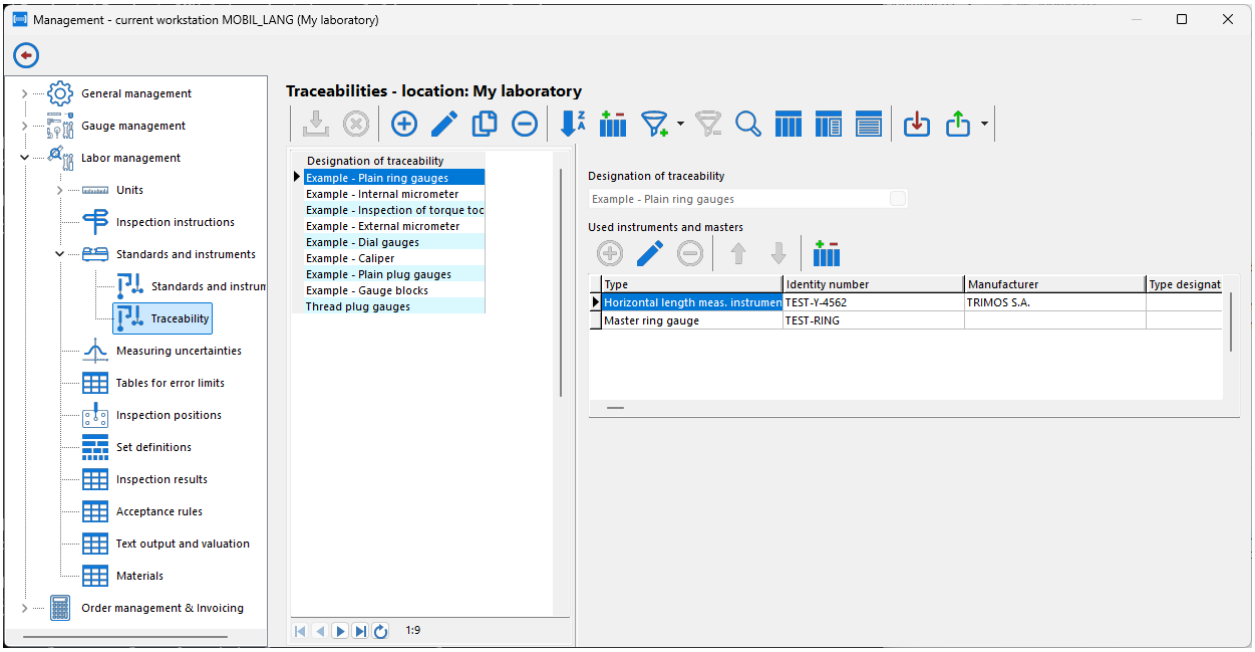


Fig. 4.7.6: Management of traceability.

Create a "Traceability" information by collecting equipment items to a list and save this with a descriptive name. By clicking onto "Add standard" or "Edit standard" you can reach to the list of existing reference standards.

4.7.4 Measuring uncertainties

A calibration certificate should be specified with the actual measured results, the traceability and the measurement uncertainty of the inspection procedure. This feature allows you to create and manage the uncertainty items associated to specific measurement methods.

Comparable with the reference standards the information about “measuring uncertainties” can be used for two applications:

- Recording of the measuring uncertainty on your calibration certificate
- Using the calculated measuring uncertainty to make the decision about an instruments “conformity”

When you do intent to use measuring uncertainty for the “conformity” decision you should think carefully about the goals you want to achieve with it! We recommend to use the following documents:

- ISO 14253-1 “Decision rules for proving conformance or non-conformance with specifications”
- ISO 14253-2 “Guidance for the estimation in GPS measurement, in calibration…”
- ISO/IEC Guide 98 (see also https://www.iso.org/sites/JCGM/GUM-introduction.htm) to learn more about this topic.

See also the section *Acceptance rules* where you can define the rules regarding the “conformance” or “non conformance” of an instrument!

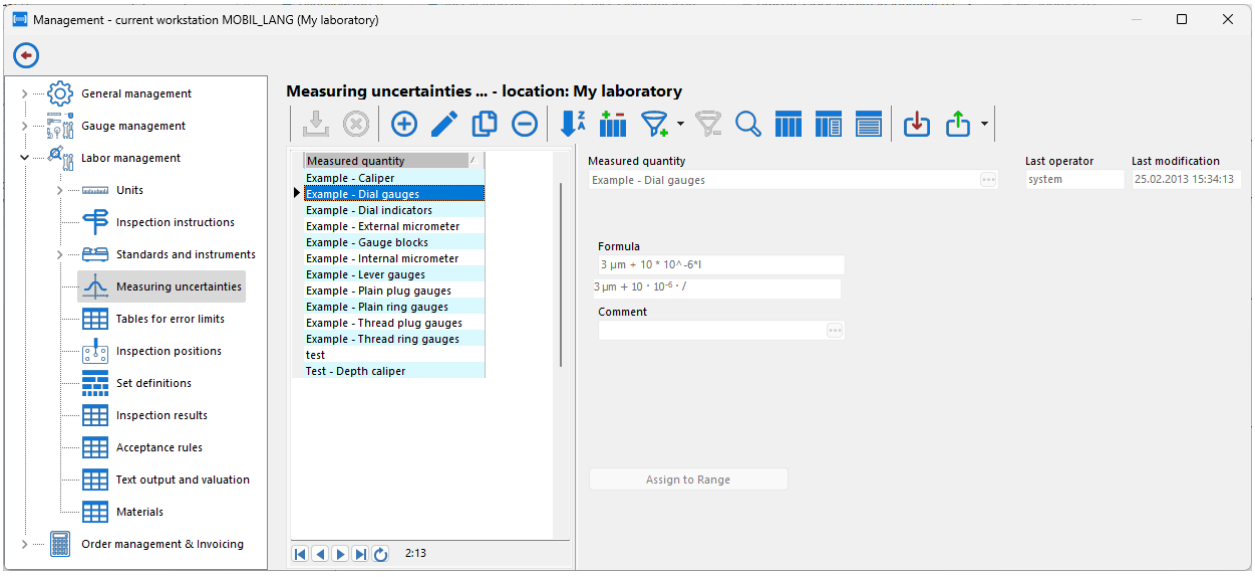


Fig. 4.7.7: Management of measuring uncertainties.

Warning

The automatically created default uncertainty items of a QMSOFT® installation should be used only to demonstrate the operation of the implemented mechanism. Please use this information NOT on your official calibration certificates. They have no relevance to the current uncertainties, that occur in your calibration laboratory at the appropriate calibration!

This manual does not describe, how you can get your uncertainty model, which is reflected in the formula for calculating the measurement uncertainty, this is beyond the scope of this document by far.

4.7.5 Tables of error limits (Tolerance tables)

Although the editing of tolerance tables should usually be done directly from the related QMSOFT® inspection program, this function provides a convenient direct access to edit all of the stored tolerance tables. The only exceptions are internally programmed values for the calculation of solid gauges as cylindrical plug gauges and ring gauges or thread gauges.

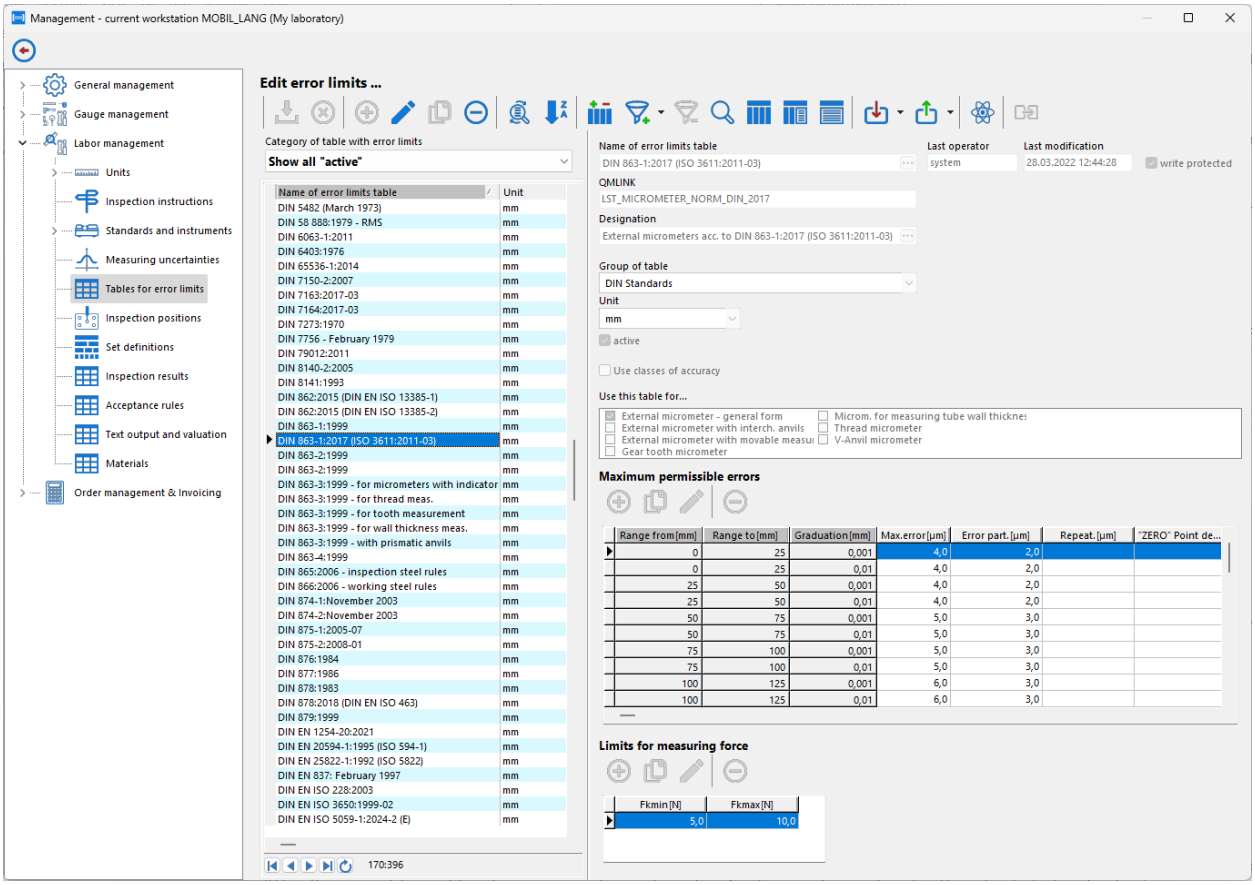


Fig. 4.7.8: Edit tolerance tables - example micrometer.

By setting a filter for relevant categories will get a quick overview about the existing tolerance tables.

4.7.6 Inspection positions

Similar to the management of tolerance tables, the handling of inspection positions usually should be executed inside of the related QMSOFT® inspection program.

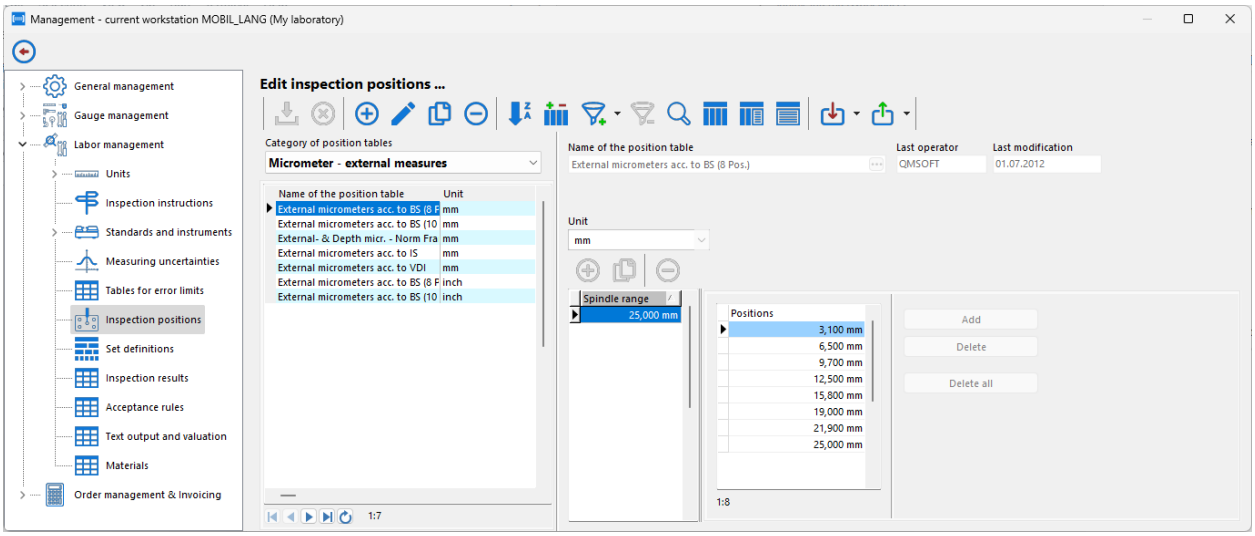


Fig. 4.7.9: Edit inspection positions.

4.7.7 Set definitions

Here you can configure the contained elements for the administration of different sets such as “gauge block set”, “gauge wire set”, “feeler gauge” etc. This is used to quickly enter a corresponding sentence to make it easier for you to enter the individual elements of set.

4.7.8 Inspection results

Here you can define the list of possible “Inspection results” as the result of an inspection, including the resulting condition for use in the “Action Rules”.

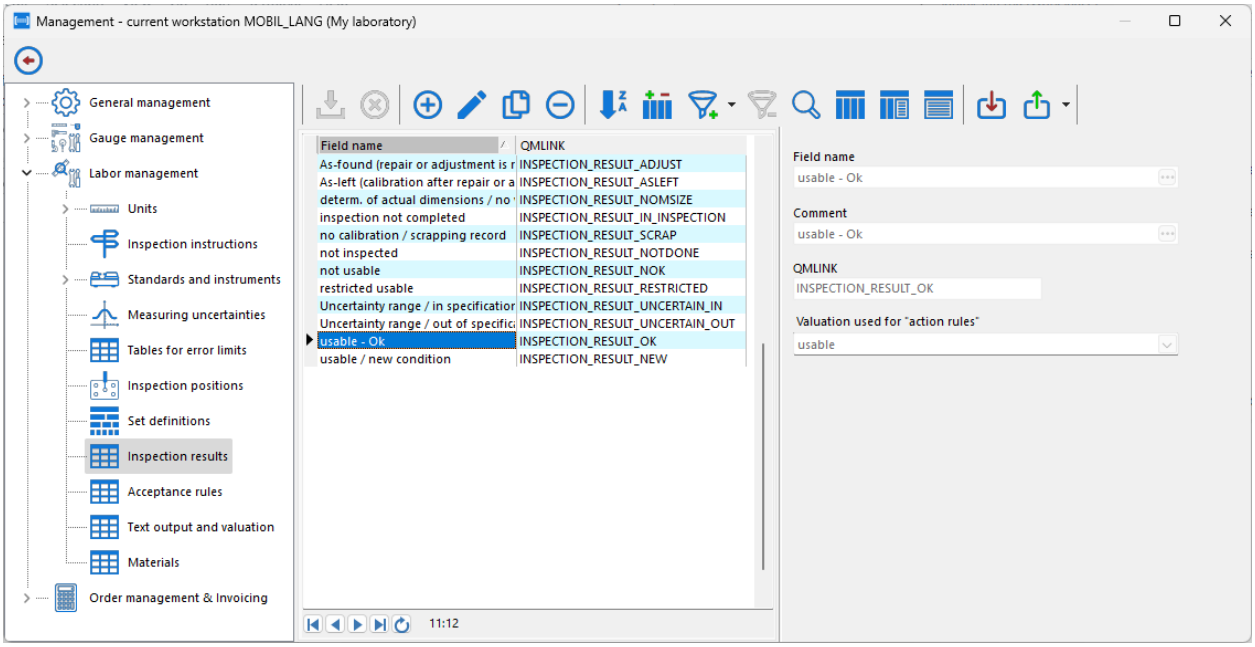


Fig. 4.7.10: Definition of the list of possible “Inspection results”.

The selection list defined here will be displayed at the end of a calibration process exectuted with one of the QM-SOFT® inspection programs. The selection is made automatically according to the test results and is used for the verbal assessment of the calibration. If necessary, change the texts used or add more.

The selection in the field “Evaluation for use in action rules” is used to define - inside the gauge management program QMSOFT®/QM-MANAGE - the rules for setting the “Status - condition” after the execution of a calibration. Thus, usually a rating as “usable” will set the “Status - conditon” in the gauge management to “usable”. See also the chapter *Settings > Actions* where this is used.

4.7.9 Acceptance rules

In the previous section *Inspection results*, the use of “Inpection result” was described. Acceptance rules can now be used to define complementary decision rules for validation the conformity of a test equipment.

These rules are used exclusively for the evaluation of test results which are in the uncertainty range. These rules therefore only become effective if you have activated the option “Consider meassurement uncertainty for valuation” during a calibration in the inspection program. Only for these inspection results you define now the rule to set the valuation used in the “Action rules” in the gauge management system (see also description in the previous section *Inspection results*).

While “Inspection results” are defined centrally, uniformly for your laboratory and thus are the same for all datasets / clients, you can achieve a dataset / client - specific decision rule for the conformity assessment by defining different acceptance rules.

For example, for the one client, an inspection result that is outside the specification but in the uncertainty range can be accepted as “usable”, while for another client it is classified as “unusable” or “restricted usable”.

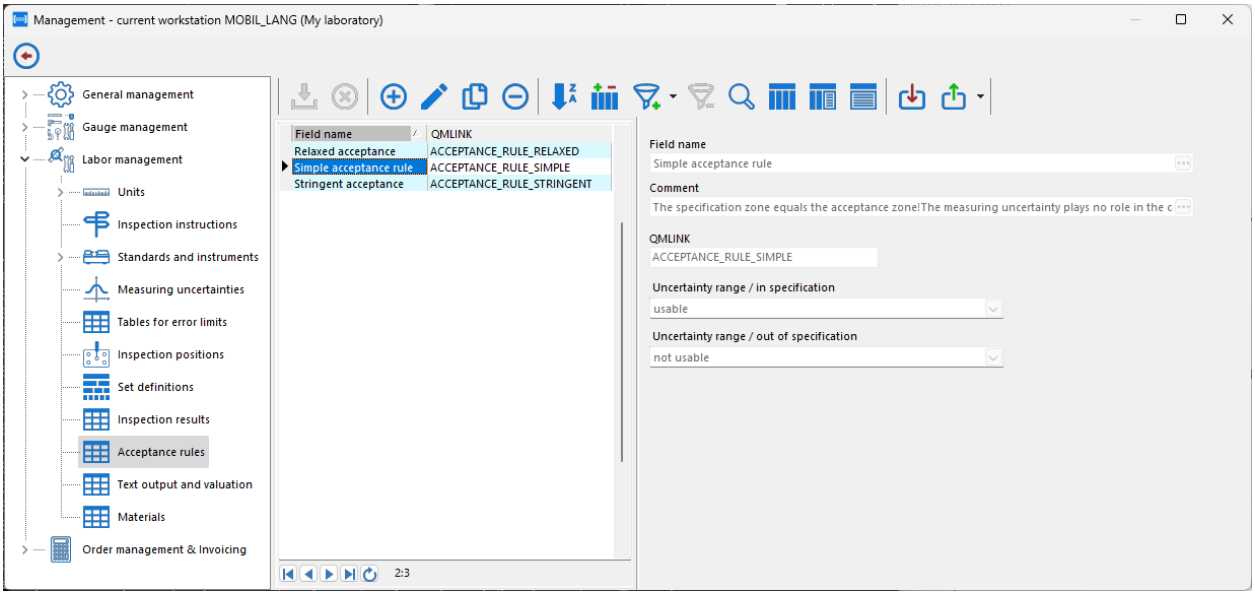


Fig. 4.7.11: Decision rules for the validation of conformity.

If no acceptance rule is assigned to a dataset / client, then only the settings “Valuation used for action rules” in the “Inspection results” definition are relevant to the action rule in the test equipment management (see also chapter *Settings > Actions*).

4.7.10 Settings for “Text output and valuation”

This feature allows you to define a centralized output scheme for outputting text and graphics displayed during the calibration, as well as for outputting tables on the test certificates.

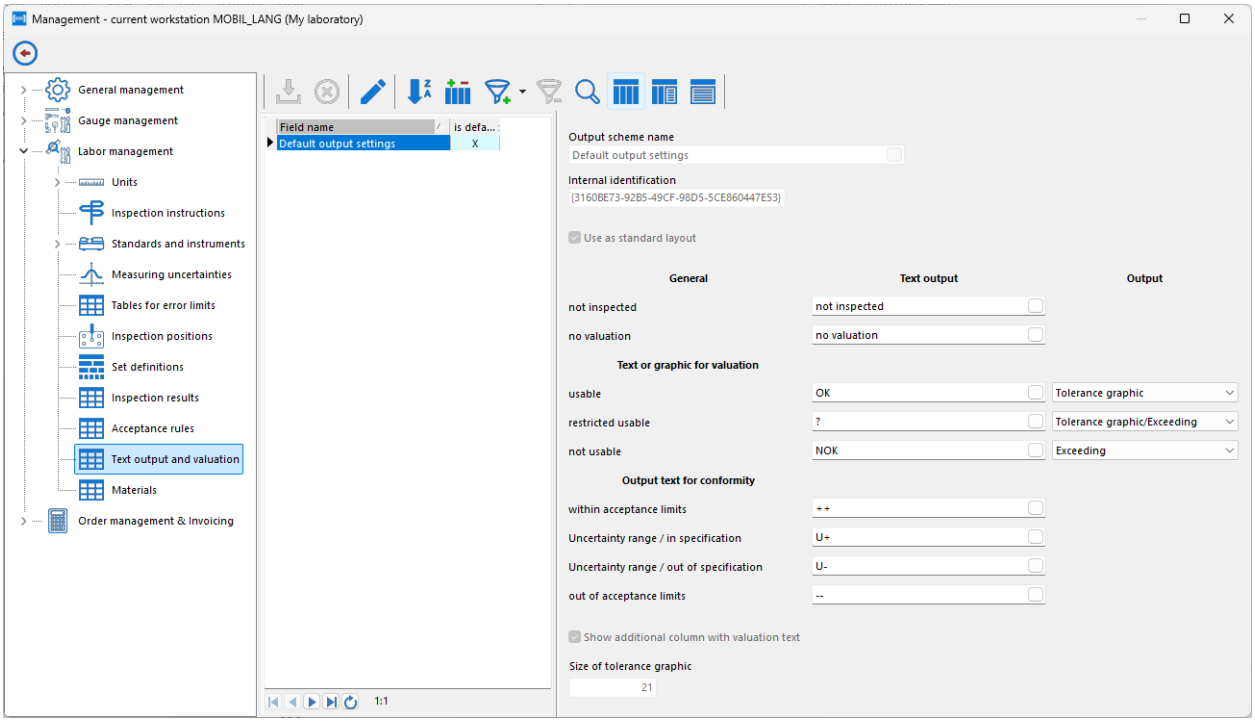


Fig. 4.7.12: Defining a central output schema for text and tolerance graphics.

Define the desired output texts or the output of graphics for the measured value position, separately for the different evaluation results (corresponds to the statement for the decision to decide) and for the different decision cases for the conformity statement. Of course, the decision cases for the conformity statement does only make sense if you have activated the option “Consider measurement uncertainty” during the inspection.

Table 4.7.1: Example: Output of a measurement table in the inspection certificate.

Measure position	Measure value	Value in tolerance field	Conformity
Front / Section 0°-180°	40,00780 mm	2,30 µm	–
Middle / Section 0°-180°	40,00230 mm	|————x———-|	++
Front / Section 90°-270°	40,00580 mm	0,30 µm	U-
Middle / Section 90°-270°	40,00530 mm	|————————-x	U+

Note

Currently, these settings are not yet used uniformly in all QMSOFT® measurement modules.

CHAPTER 5

QMSOFT®/QM-MANAGE

The gauge management program QMSOFT®/QM-MANAGE opens up the possibility to store and manage your gauge stocks either locally on your MS-Windows compatible PC (personal computer) or in a true client/server environment on a database server. It offers all the practical functions relevant for the maintenance and updating of detailed gauge data, including the management of a complete history of the stored gauges. The system has multi-client capabilities, the number of client datasets and the number of gauges and history items is nearly unlimited. The gauge management program works with all oft he QMSOFT® inspection programs and can exchange inspection results including the calibration certificates are automatically applied to the database.

Before you begin…

Please read this section carefully before you start the first work with the gauge management program QMSOFT®/QM-MANAGE to prevent problems and unnecessary effort, that can be caused by improper or inappropriate settings. Here some notes about this part of the QMSOFT®/QM-MANAGE manual:

- In “QMSOFT® Manual - part: Laboratory management” you can find information about configuring the QMSOFT® system. For example, options and choices to manage the user-access (users, user groups) and to create clients/datasets for the module QMSOFT®/QM-MANAGE are described there. This section is intended mainly for QMSOFT® system administrators, who must take the system into operation. Please read this chapter at first!
- In section *Typical tasks* we have summarized such problems, that occur after our experiences in the daily work. Consider the statements there as a “cookbook” with corresponding “recipes” to which you can refer.
- Section *Configuration settings* provides a reference to the program settings and configuration options.
- Please also see section *Catalogues / lookup tables*. Working with lookup-tables prevents incorrect field contents of informations such as “location”, “cost departement” etc.

The settings can be changed anytime. Please note, however, that access to the corresponding functions requires the related usser access right (privilege)! These privileges are assigned after a new installation of the software to the user group “Administrators”.

Note

Because of the fast development in the field of computer technology, on which you are running the QMSOFT® programs, as well as, of course, through the development of QMSOFT® programs by the L&W GmbH even slight

differences between the figures and dialogue captions can occur in this manual and the installed software. Please do not interpret these differences as failures in the software!

5.1 Typical tasks

To facilitate the entry into the program, we explain in this section some typical tasks of the gauge manageent. So run the program QMSOFT®/QM-MANAGE via the icon in the launcher QMSOFT®/GaugeMan. To work with a gauge stock you have to open a releated dataset at first. The dialogue for it will appear automatically when starting the QMSOFT®/QM-MANAGE program [Fig. 5.1.1]. Select now the dataset (Client) you want to open.

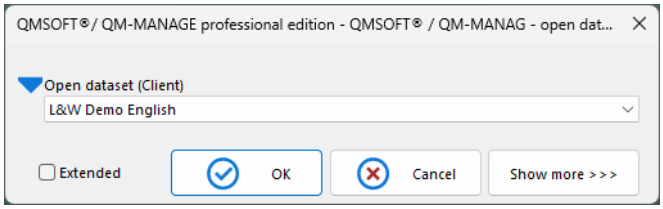


Fig. 5.1.1: Select a dataset/a client.

Starting with a newly installed program there will be three datasets available ("xxx" is a placeholder for the name of the language, which you have used to create the database structure):

- **"DB - xxx"**
  This dataset is an empty dataset, use this dataset to enter your individual gauge data.
- **"L&W DEMO - xxx"**
  The dataset includes some gauge data examples. Use this to test the database functions and to make your experiences in using the QMSOFT®-system.
- **"Reference Gauge Blocks / Masters"**
  This dataset is the default dataset to manage reference standards and normals, which are used for the different calibration procedures. It is associated with the central laboratory management function "Standards and Instruments", see also chapter *Standards and instruments*!

Continue by clicking the `OK` button.

5.1.1 Managing gauges in QMSOFT®/QM-MANAGE

After opening a database, a window appears on your screen with a list of the gauges already saved in the data set [Fig. 5.1.2]. Other views (historical overview, trash) can be activated by clicking on the corresponding tabs above the toolbar. If the window is empty, this simply means, that no gauge has been stored here. In this case it is only possible to enter a new gauge using the `Ins` key or the `Insert a new Gauge` button.

The individual program functions can be called up by clicking on the icons in the toolbar or on the menu items at the top of the window. In the gauge list itself, you can call up the most important functions within a pop-up menu (by clicking with the right mouse button).

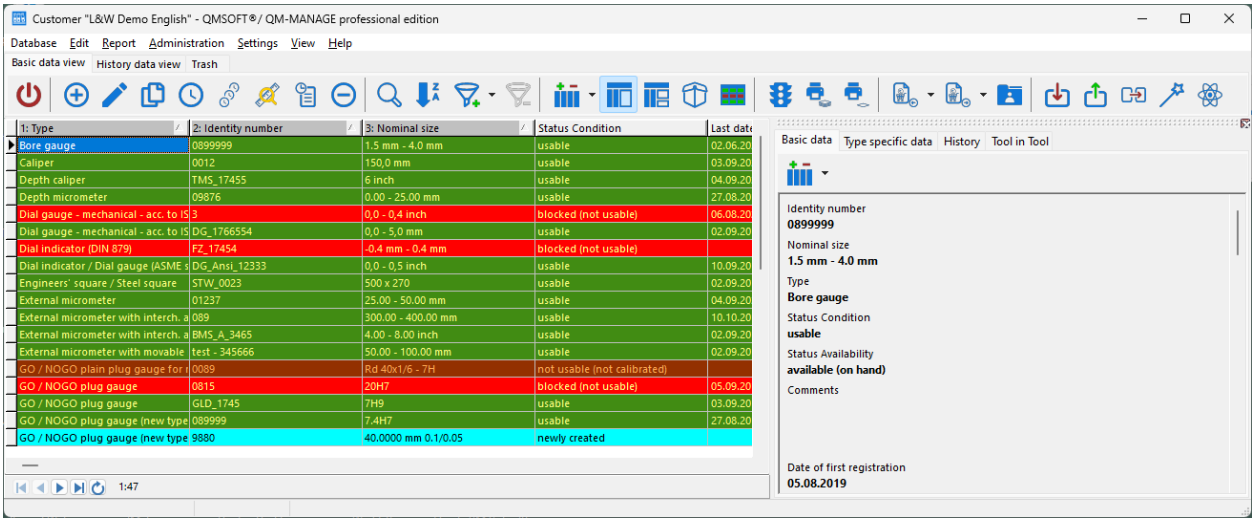


Fig. 5.1.2: QMSOFT®/QM-MANAGE - basic data view.

5.1.1.1 Defining the view of details

Using the menu item *View* [Fig. 5.1.3] you can configure different views at your "Basic gauge data":

- **"Show/Hide columns"**
  Defines the fields (columns) which should be shown on the screen.
- **"Show help texts"**
  Switches on/off the viewing of help texts for menu items and buttons. This help texts will be shown when you move the mouse pointer on a button.
- **"Show grids colored"**
  Switches on/off the colors in the shown grid. The displayed color documents the current status of the gauge. Status and the associated color you can mange in the menu *Settings* → *Status*.
- **"Show the detail panel"**
  The "Detail panel" will show you specific gauge information about this gauge, which is currently selected (e.g. Nominal sizes and Tolerances).
- **"Show gauge picture…"**
  In case that you have stored an image of a special gauge type you can show this on the "Detail panel".

> **Note**
>
> If you have performance problems with your computer or network please switch this option OFF!

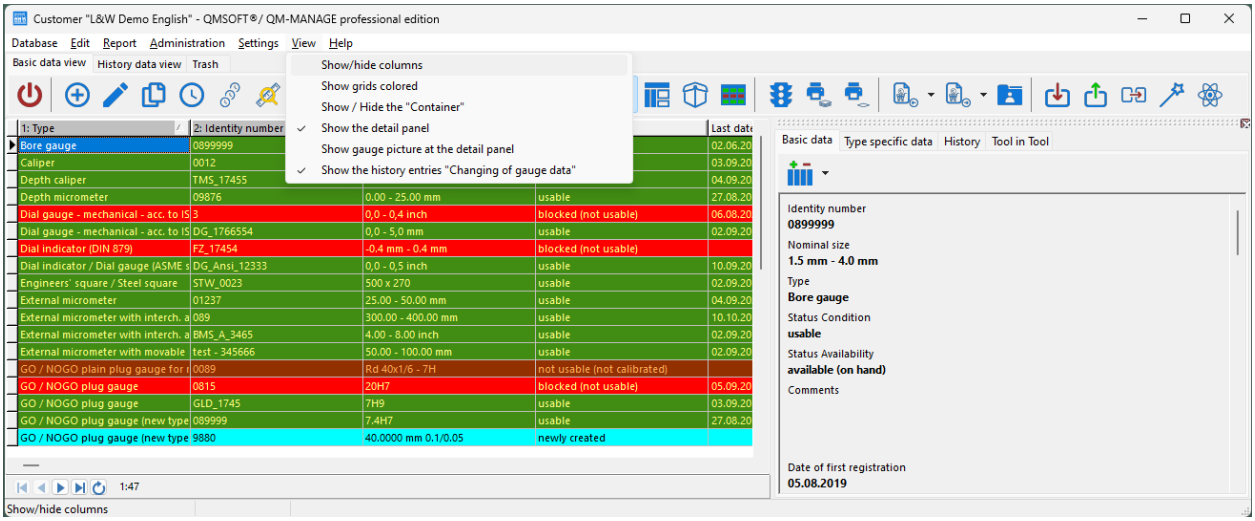


Fig. 5.1.3: The menu *View*.

5.1.1.2 Entering a new gauge

At first you create a new gauge item by pressing the `Ins` key or the `New` button, a new gauge and a corresponding set of gauge basic data can be added to the data base. At first, a selection window will appear on your screen with a list of all of the existing gauge types, which are known to the QMSOFT® system. Highlight the appropriate type of gauge and press `ENTER`.

> **Note**
>
> To make this selection more convenient you can enter the first characters of your Gauge type name to decrease the number of shown types. For example: if you enter “GO” on your keyboard you will get a list with all gauge types beginning with “GO” (see figure).

The following figure [Fig. 5.1.4] shows that after pressing the keystrokes “g” and “o” (that is the character sequence “go”), only a smaller number of gauge types remain in the selection list, making it easier to find the right item.

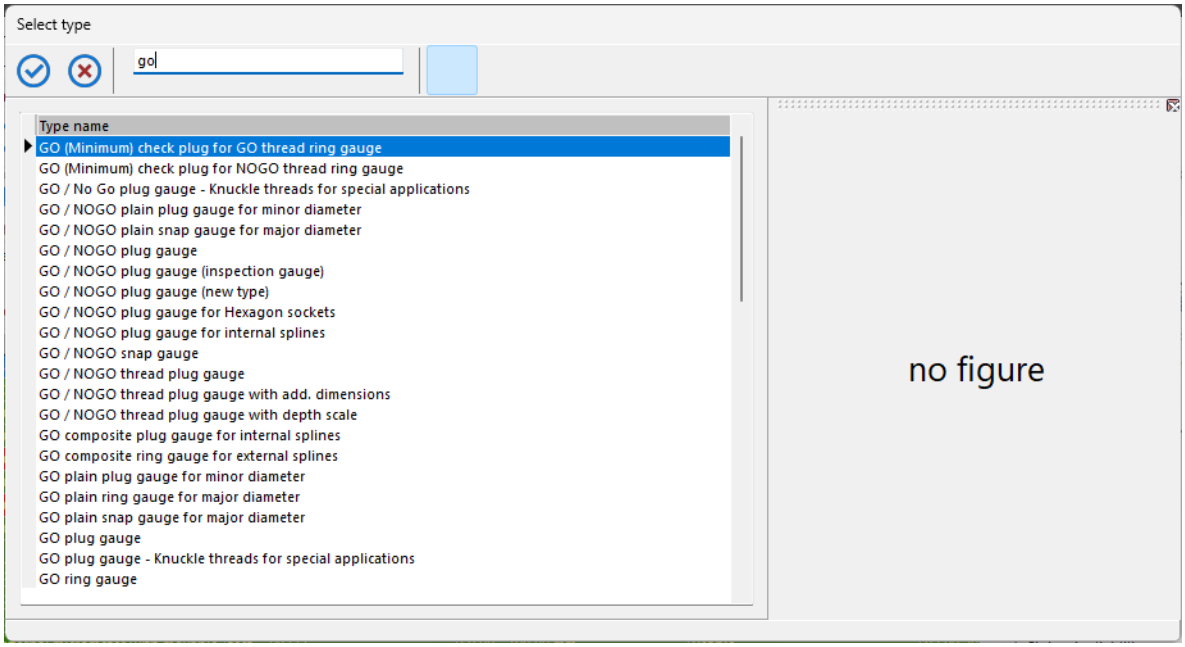


Fig. 5.1.4: Selecting a “go” gauge type.

You can only create a gauge of a “known” gauge type. If you can not find the type of your gauge in the shown list, you have to create at first the “gauge type definition”, please read in chapter *Settings > Types* how to do this.

After selecting the gauge type (in our example a “GO/NOGO plu gauge”) a form appears on the screen usable to enter the set of gauge basic data. This window is divided into two parts:

- The left side contains the **“General basic data”**, which are including all data fields, which are available for all of the different types of gauges. This data are used to manage and organize the handling of the gauge.
- The right side shows the **“Type-specific basic data”**, which includes all the fields, which are defined only for this special type of gauge. Depended on the selected gauge type the fields in the right side will be different

The next figure [Fig. 5.1.5] illustrates this using a “GO / NOGO plug gauge”.

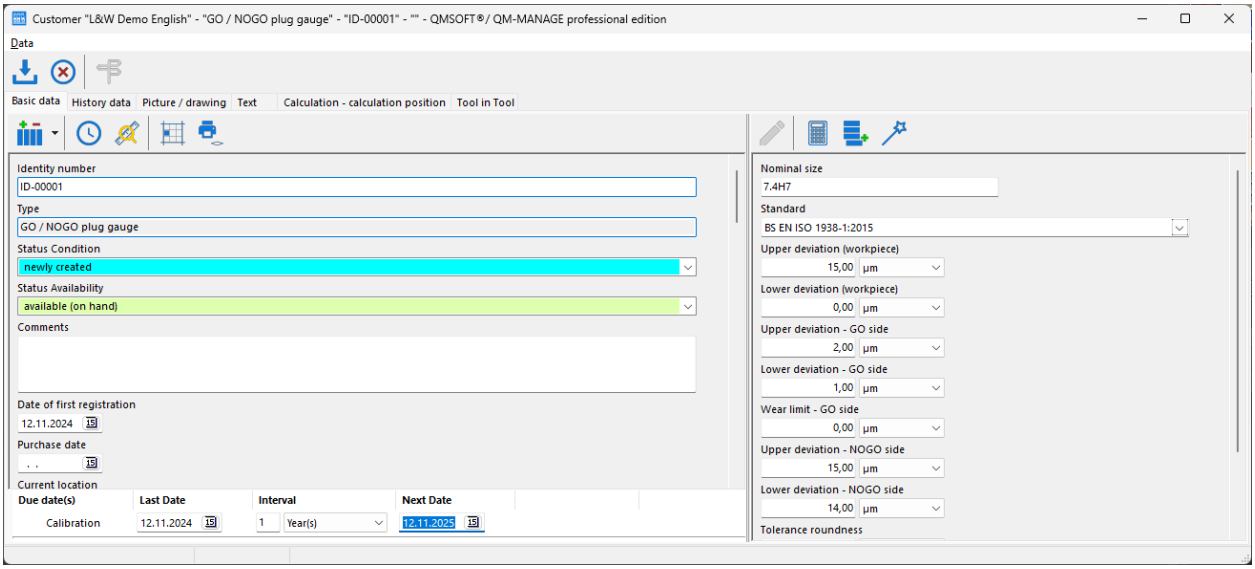


Fig. 5.1.5: The entry of gauge data.

At first you have always to enter the “Gauge Identity Number”. Pay attention, that it is (usually) not possible to change the identity number after saving this gauge! If you try to create a gauge with an already used identity number, you will get an error message, and you have to change it before you can store the gauge.

Per default the gauge management program allows the use of equal identity numbers as long as the gauge type is different (for example a Dial gauge with no. 001 and a Caliper with the same number). The use of absolute unique identity numbers for the complete data set can be forced in the settings of the dataset, see “QMSOFT® Manual - part: Laboratory Management - Dataset (Client) management”. If you switch on the use of unique identity numbers you can also activate the feature to create the next identity number automatically following a cusomizeable schema.

Global basic data

Fill out all of the needed input fields, which are shown on the left side of the form. The fields in this area (referred to as “Global basic data Fields”) are exisiting in the database for each gauge type in the same style and order.

> **Note**
>
> You can lock selected fields in this area for users or for whole user groups. This locks you can setup in the user-management of the laboratory configuration. Locked input fields will be marked with a special color.

Pay attention to the following fact: all fields in the “Global basic data” may be used as parameters for database inquiries. In fact, you want to search to a specific “Gauge location” the correct spelling is very important. To avoid errors while entering this texts you can use different “catalogues” (also named as “lookup tables”).

To use a catalogue for a special field, open the related drop-down-list. If no drop-down-list is available there does not exist any catalogue item. You can use the neighboring button (on the right) to define catalogue items or to change the caption of the field.

Before using “catalogues” your system manager should have customised all entries in the catalogue list. See the menu *Settings → Catalogues*

The “Inspection period” will be automatically set with the “default” period for this gauge type, please modify it if required.

> **Note**
>
> If different periods are defined, please check the settings.

Now continue, so far as you need, to enter the other information into the left screen.

Gauge type dependent basic data

On the right screen side of the input form the titles of the fields will very depending on the type of the gauge being entered in order to correspond with the information needed for the given gauge.

Entering the gauge “Nominal size” or “Designation” for a lot of gauge types, the nominal values of the gauge can be generated from those entered in the data dialog box. Use the key `F7` (or the related calculation button in the toolbar) to do this. The results will be automatically entered into the corresponding fields of the data dialog box (for example: gauge limits for a GO plain ring gauge “20 H7” or a GO screw plug gauge “M10”).

After finnishing of all of the data you have to store the gauge data. Please use the button with the disk icon or the key `F10` to do this.

Measure units / change units

For different gauge types there may be the possibility to change the “unit”-system of the gauge. For example, a “GO / NOGO gauge plug” can be handled with “mm” or “inch” units. If you want to change the gauges default unit, then click at the shown unit list. You will get a message, if you want to change the unit for the next field(s) also [Fig. 5.1.6].

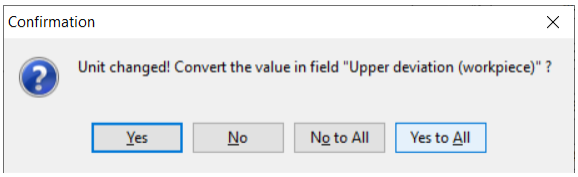


Fig. 5.1.6: Change a field unit.

If you press the button `Yes to All` for all fields with the same unit definition the unit changing will also be made. If there was already a value typed in, you will get a message asking for converting this value to the new unit.

5.1.1.3 Create a set of gauges

Sometimes an inspection equipment does contain a number of homogeneous part. A simple example for this is a “Set of cylindrical pins” (the same working procedure can be used for types as “Gauge block sets”, “Feeler gauges” etc.). This set is mostly packed into a wooden case, and you have one identity number to manage this set in your database. But inside the case you have a serious of cylindrical pins with different diameters and their tolerances.

At first you have to insert the set into the database with its Identity number, the location(s), the inspection period and all the other management information. This you can do in the same way as described in the previous section of this manual.

At second you need to insert the releated information for the single items, which are “members” of the set. If the gauge type, which you have inserted, has the property “set”, the left side of the screen shows a new field area, where the single items of a set can be visualized [Fig. 5.1.7].

Click now the button `Define set`!

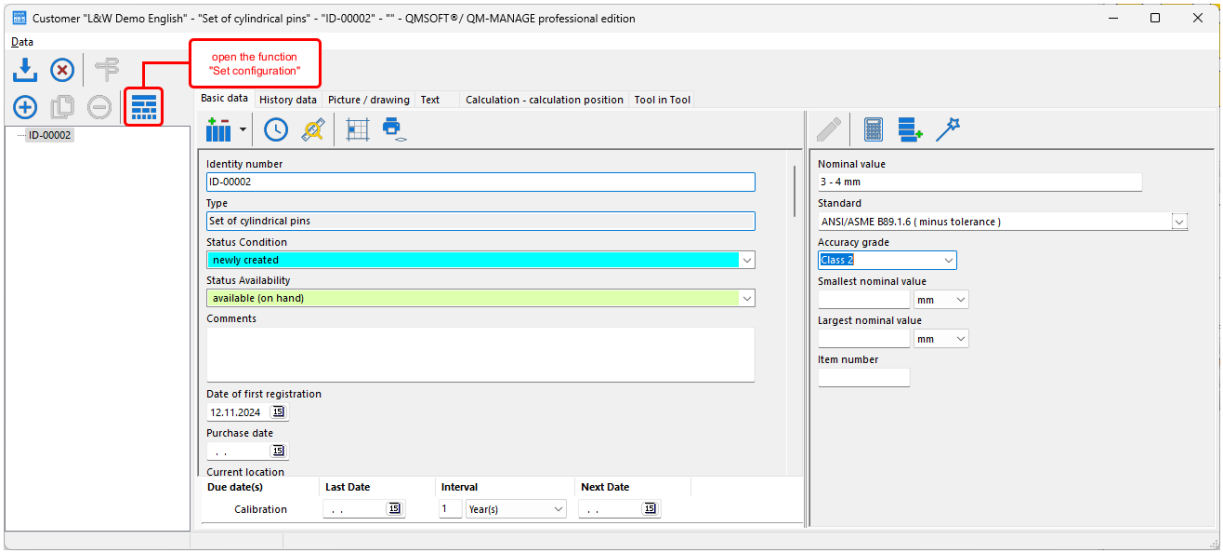


Fig. 5.1.7: Inserting a gauge set in the database.

You will now get the following screen [Fig. 5.1.8]:

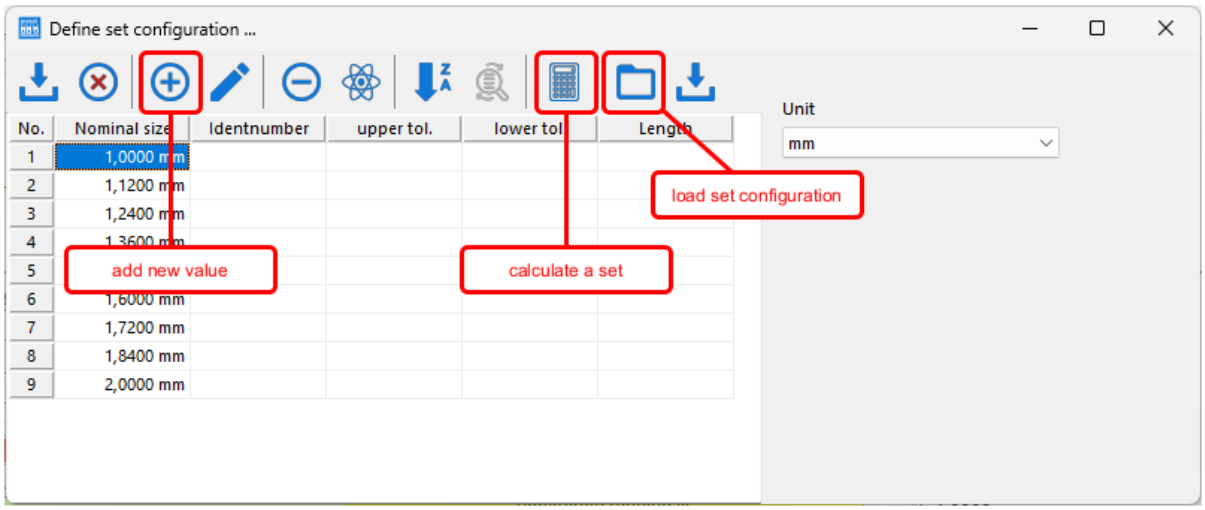


Fig. 5.1.8: Function “Set configuration”.

First you can use the button `Add value` to insert the nominal values of your single items. Two functions will support you to simplify this procedure:

- button `load set configuration`
  By using this function you can open predefined sets to avoid the manual input of all of the values.
- button `calculate a set`
  The function mostly used for sets of cylindrical pins - does allow you to enter the values “smalles value”, “largest value” and “step” to calculated the items in the set.

You will find a more detailed description about this function and their special options inside the manuals for the modules QMSOFT®/QM-BLOCK and QMSOFT®/QM-PIN.

After you have all items in your list, terminate the function by using the `OK` button. The list of your items will now be shown in the left part of the screen [Fig. 5.1.9].

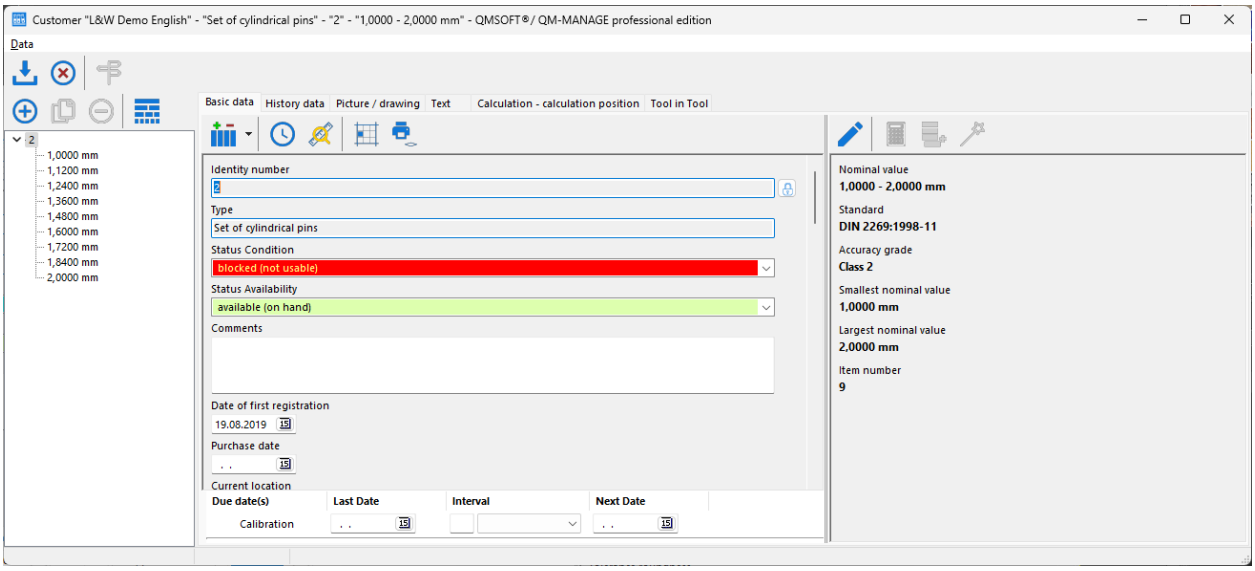


Fig. 5.1.9: Nominal values of a set of cylindrical pins.

As shown in the figure [Fig. 5.1.9] you can enter more detailed information if necessary. You can also select the tolerance table and the tolerance class from a pre-defined list. The manual of QMSOFT®/QM-PIN will you give more information about the defining of tolerances.

Confirm the input by clicking the `Save` button.

If you want to insert a “Gauge block set” the procedure is very similar. The only difference to a set of pins is, that gauge block sets usually have a fixed configuration depended on the manufacturer. In this case when using the function “Set configuration” click the button `Load set configuration`. You can now select a pre-defined configuration from the list [Fig. 5.1.10].

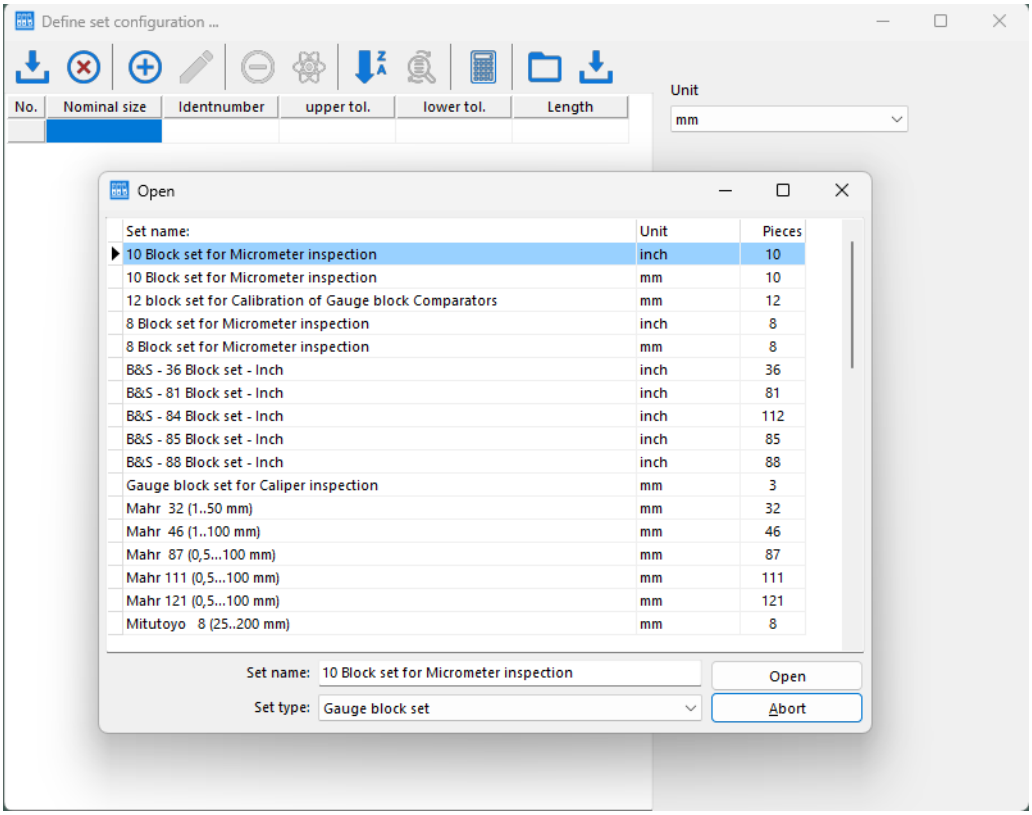


Fig. 5.1.10: Load a pre-definid set configuration for gauge block sets.

5.1.1.4 Copy a gauge

If you have to enter more gauges with partly identical data, e.g. you have to enter five “Dial gauges” with identical ranges, graduations etc., you can use the “Clone a gauge” function to make your work more efficient. Pay attention to enter a new “Identity number” for every new gauge (because it was also copied, and two equal identity numbers for the same gauge type are not allowed). If necessary you can change also the information in all other fields, after the copy process the copied gauge data will be shown in the same form as for the input of a new gauge.

> **Note**
>
> This copy feature DOES NOT copy the related history of the gauge. Please be sure about the content of the field “Last calibration date”, because the content of this field also will be copied!

5.1.1.5 Edit gauge data

By clicking onto the button `Edit gauge data` or pressing the `ENTER` key (if the “Basic data view” shows the gauges in a list) you can open a gauge to edit all of the gauge data. The edit process is the same as for the “New” or “Copy” function, but the access to the field “identity number” is write-protected (locked).

5.1.1.6 Delete a gauge

To delete a gauge with all of the corresponding gauge basic and inspection data you can highlight the gauge, which you want delete from the "Basic data view", and then press the `Del` key or click onto the button `Delete gauge` (trash icon). Confirm the security query to complete the operation.

> **Warning**
>
> If a gauge has been deleted, you can still find it in the "trash" (also called as "paper basket")! You can restore it from the trash as long as it will be not deletet from the trash.

5.1.1.7 Searching, sorting, filtering gauge items

If there are a lot of gauges in your dataset, it will become more and more difficult to keep the overview about the gauge stock. In this case it may be helpful to change the order of the displayed gauge items or to use the filter and/or the search function of the software.

To do this you can use the three toolbar buttons, which can be clicked with the mouse.

For getting a simple sort order by a single column (data field), e.g. according to the location, you can click the appropriate column header in the gauge list. The "sort order"-toolbutton is required only, if you want to sort by multiple columns simultaneously.

"Sort" your equipment 

By clicking the `Sort` button the gauge stock (the dataset) can be sorted according to different columns (data fields) as gauge type, identification number, status etc.

As you will see, the dialogue fort he sorting parameters is very simple. Step by step you have to select successively the fields (columns) of the sort order, choose "ascending" or "descending" sort direction, and confirm with the `OK` button.

You can sort by multiple columns (fields), when you click onto the header line of the first column of the sort order, then click to the other columns (fields) while holding the `Shift` key of the keyboard.

"Search" a gauge 

After pressing the `F3` key or clicking at the `Search` symbol, a dialog box will appear where you can enter the gauge parameter you want to search. In this dialog, the program only offers the "Simple search" for a single parameter. The default setting of the "Field" parameter depends on the current sort order. If your gauge stock is sorted by "Status", the "Status" field will be displayed as the first parameter you can search for.

The "Search" function is designed to support instant search for a gauge using a single data field. The default settings for this "simple" search process depend on the program settings in QMSOFT®/QM-MANAGE. You can specify which data field should be used as the default field in the search dialog form. For more complex searches where you expect multiple gauges as a result, please use the "Filter" function [Fig. 5.1.11]. By defining a "Filter condition" (see next chapter) you get all the corresponding results directly on the screen.

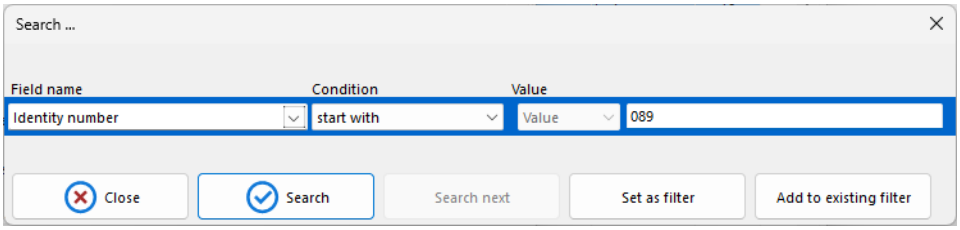


Fig. 5.1.11: Search for a gauge using the field “identity number”.

After selection of the field name you have to define the condition of the search (for example “contains” or “start with”), and then set the value, which you want to search for. If the result oft he search process will contain more than one gauges, you can use the button `Search next` to jump tot he next gauge item. In this case you can use the button `Set as filter` or `Add to existing filter`. With the first button you create a filter condition according to your search query and see all gauges that match this condition.

Existing filter conditions are cleared before. The second button adds the search condition to an existing filter condition, and the result contains all gauges that match the existing and the added filter condition.

If the search result contains only one gauge item, the search dialog is closed automatically.

Extended search options in “Gauge type dependent basic data” or “Gauge history” fields

Because the so-called “Gauge type dependent basic data fields” (fields describing the specific properties of gauges) are different from type to type, the search in these fields is more complicated. This applies equally to information, that is stored in the history of the gauges, too.

Since, as already mentioned, the relevant fields are not uniformly defined, first of all the “name” of the field has to be defined. There is respectively the possibility to search for the plain text name of the field or for the internal QmLink name of the field.

Example:

The gauge typ “Micrometer” has a gauge type dependent basic data field “Construction type”. In the gauge type definition of this type you can find the QmLink item of this field, which is “sCONSTRUCTION_TYPE”.

In the drop-down-list of the search field name (“Field name”) inside of the search dialogue form you can find the item “Nominal field - Name”. Select it, set the search condition “equal” and the value “Construction type” [Fig. 5.1.12] to search for all of the gauges, which have a field “Construction type”.

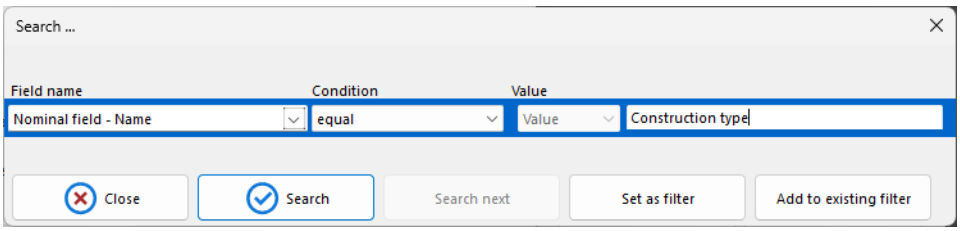


Fig. 5.1.12: Search for fields dependent on the gauge type.

On the same way you also can search fort he QmLink name.

The following “fields” can be used for the extended search feature:

- **“Nominal field - Name”**
  Searches for the name of gauge type dependet basic data fields
- **“Nominal field - QmLink”**

Searches for the QmLink name of gauge type dependet basic data fields

- **“Nom.field - Content (String)”**
  Searches for text in gauge type dependet basic data fields (only for simple fields)
- **“Nom.field - Content (Memo/Catalogue)”**
  Searches for text in gauge type dependet basic data fields (only for multi-line fields)
- **“History field - Name “**
  Searches for the name of gauge type dependet history data fields
- **“History field - QmLink”**
  Searches for the QmLink name of gauge type dependet history data fields
- **“History field - Content (String)”**
  Searches for text in gauge type dependet history data fields (only for simple fields)
- **“History field - Content (Memo/Catalogue)”**
  Searches for text in gauge type dependet history data fields (only for multi-line fields)

Normally this kind of using the search function is used primarily in connection with filters (see following section), since it can be normally assuming here that it is less about finding a concrete test equipment, and more about the “filtering” of all test equipment with the specified properties.

Filters (set filter, save filter and remove filter)

Allows a “reduced view” to the gauge stock (dataset). For example, it is possible to show “Dial gauges” only and to “hide” all of the gauges, which don not have this type. In addition to the limitation of view, “filters” are also used for pre-selection of gauges for performing other functions. Both for the application of the “Replace” function as well as for the issue of gauges you can use the filter at first to select the desired gauges, and then perform the desired function.

“Filters” are used to prepare other functions! To create gauge lists (reports), to export gauge data or to execute the function “Replace content of a field” at first you have to set a “filter” to select the related gauges. After filtering the dataset, the corresponding function can be executed!

If a filter is activated, you will see a yellow status message on your screen with the actual filter condition [Fig. 5.1.13].

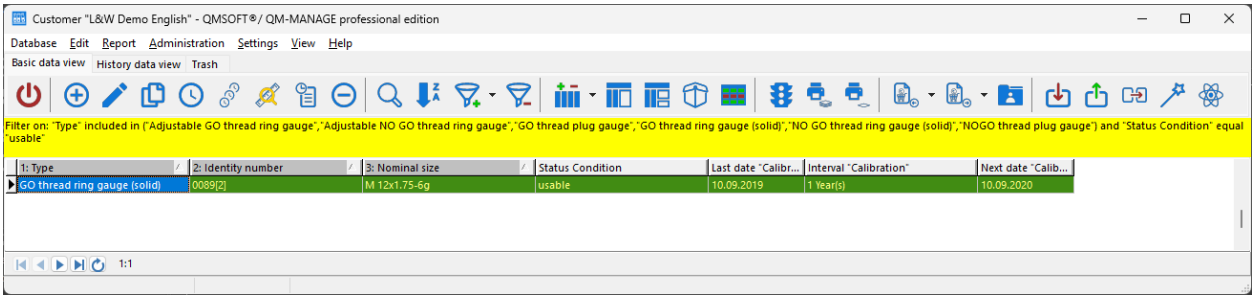


Fig. 5.1.13: Status message “Filter is active”.

To remove a filter, you have to press only the related button. After removing a filter, you will see your complete gauge stock again.

The example shown below [Fig. 5.1.14] demonstrate, how you can setup a filter to display gauges, which have the gauge types “Caliper”, “Depth caliper”, “Depth micrometer” and “External micrometer” only, which have the status “usable”.

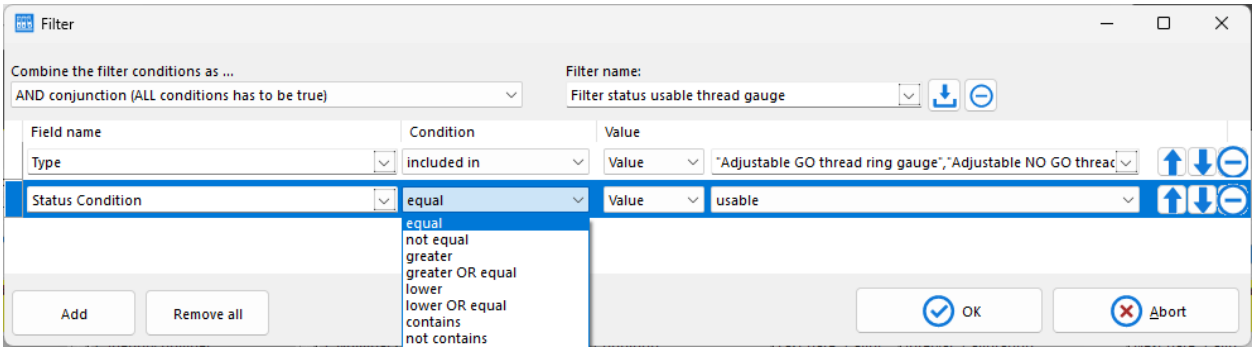


Fig. 5.1.14: Activate a filter.

To do this at first select in the drop-down-box “Combine the filter conditions as…” the item “AND-conjunction…”. This will show such gauge items only, which meet all filter conditions. Click now into the drop-down-list “Condition” to select one of operators from the list (“equal”, “start with” etc.). Use the “included in” operator, if you need a list for the selection. After this you have to enter or select the property, where you want to look for (in our example you set “Status” - “equal” - “usable”).

Use the Buttons `Add` to define more parameters for the filter or `Remove` to remove it from the list.

Saving a “Filter” is very simple by clicking at the `Disc` button and entering a name to save it. Please, take care to assign the filter to one of the shown categories [Fig. 5.1.15].

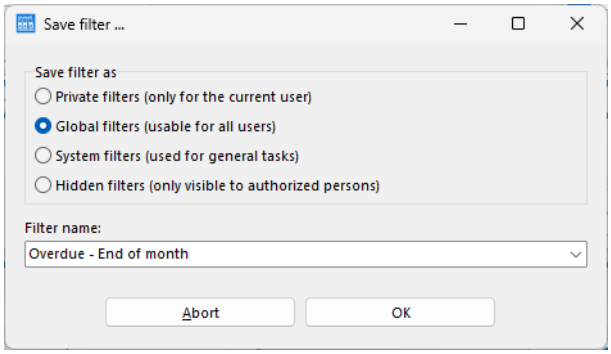


Fig. 5.1.15: Saving a filter and assign it to a categorie.

The filter categories do have the following meaning:

- **Personal filters**
  are usable only for the user who create it.
- **Global filters**
  usable for all program users.
- **System filters**
  are used for special operations such as overdue tests! This category of filters can only be created or changed by authorized persons!
- **Hidden filters**
  can only be created or changed by authorized persons and are visible only for the user who created it. Hidden filters can be used for a personalized pre-selection of tools, provided the filter is activated for a selected user! This has to be done in the “user management”

To load a previous saved filter, you have only to select it from the list when you click at the “Filter name” menu.

Extended filter options in “Gauge type dependent basic data” und “Gauge history”

If it is necessary to apply filters to gauge type-dependent basic data or gauge history data, you can do this in the same way as described under “Extended search options in ‘Gauge type dependent basic data’ or ‘Gauge history” fields’”.

In general, using these fields in a filter context makes more sense than for a simple search. For example, you can create filters that define queries like: Show all “Calipers” where the “Indication type” field contains the text “digital”. This filter shows you all “digital calipers”, even though there is no separate caliper type for this.

The following figure [Fig. 5.1.16] shows such a filter definition.

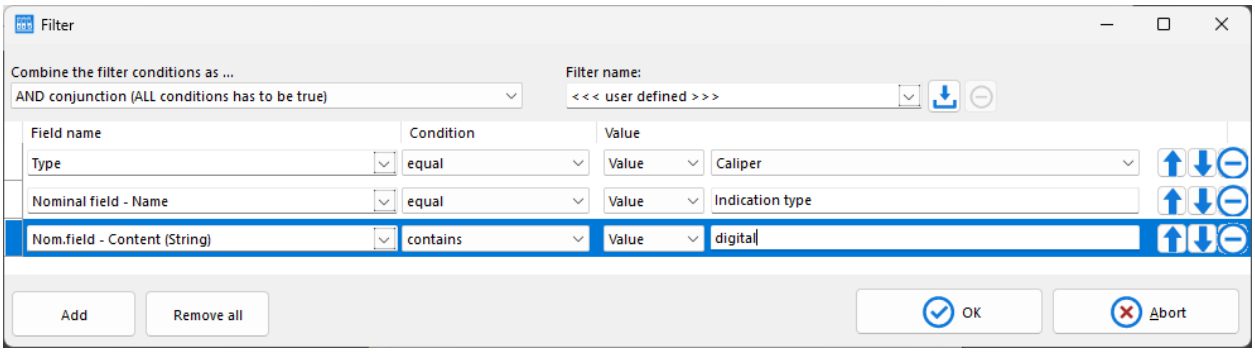


Fig. 5.1.16: Filter to show all caliper gauges.

> **Note**
>
> The names of fields, which can be used to define a filter condition, are sorted into categories to get a better overview. The mostly used fields you can find in the category “Management data”. The fields in the example above you can find in category “Type dependent data”.

5.1.1.8 Using the “Tool-in-tool”-feature

We refer to the logical interaction of several instruments as a “Tool-in-Tool” feature. In contrast to a “Gauge set” (for example a set of gauge blocks), you can “link” gauges of different gauge types together.

The program can show you all the gauges, which were assigned with a logical link to the currently selected gauge. In difference to a gauge set, this linkage does not influence the usual handling of this gauges. They will still have managed as independent items in the management system.

That is in contrast to those gauges, which are an element of a gauge set, they are still displayed separately, and you can regardless of the “parent element” execute history actions [Fig. 5.1.17]. Exception: the actions “Delete” or “Move” of gauges, which are linked to a “Tool-in-tool”-structure, will show a warning dialogue, and after a confirmation the tool-in-tool-assignement will be dissolved.

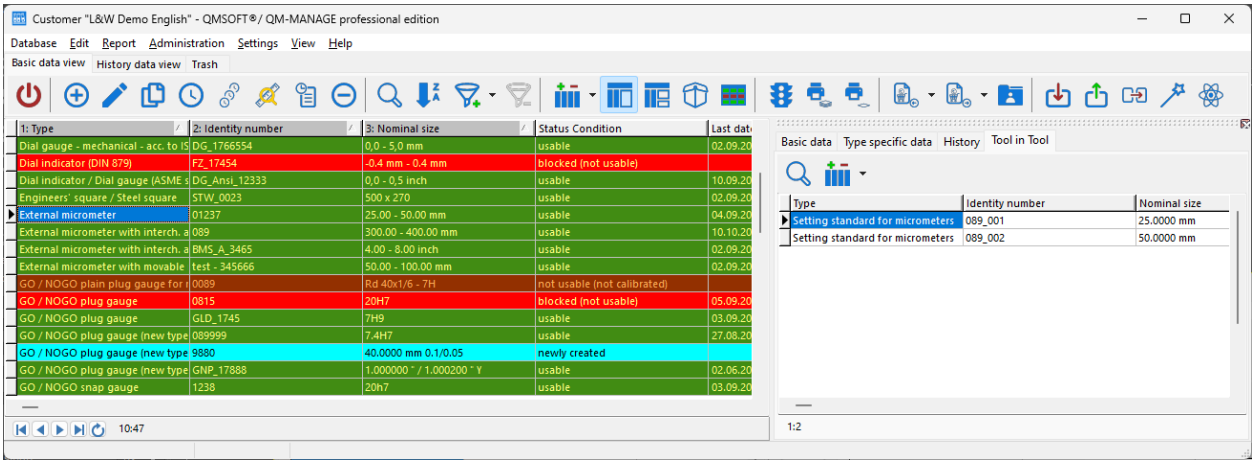


Fig. 5.1.17: Example of a “Tool in Tool” link.

To define a link between a gauge and the related “sub”-tools you need to open the item in the “edit” mode. Now you can switch to the register page “Tool in Tool” on the right side. Click now the `select gauge` button to select the wished gauges and “move” it to the left side where all selected “sub”-tools are shown [Fig. 5.1.18].

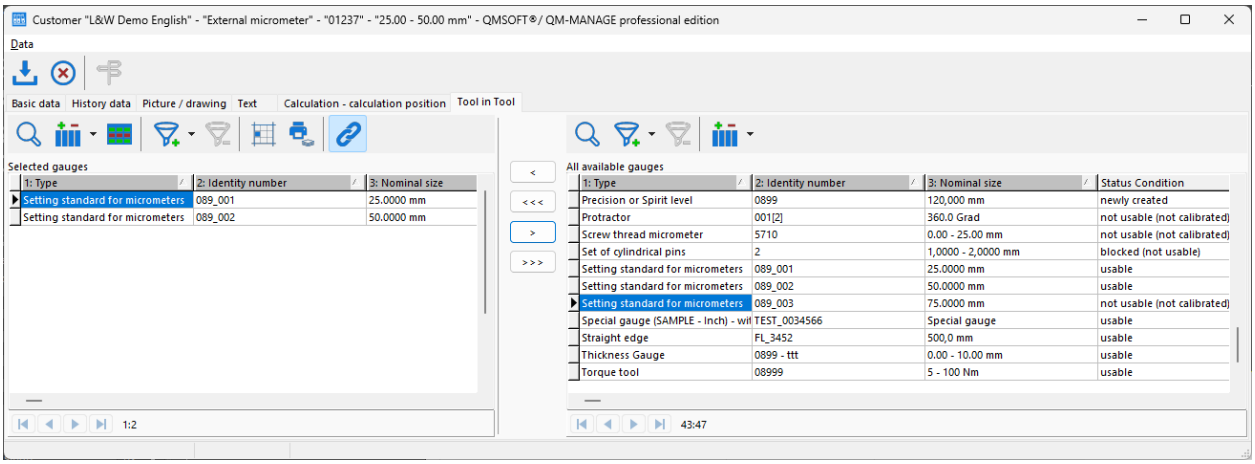


Fig. 5.1.18: Selection of “sub”-tools for a “Tool-in-tool”-collection.

As soon as a gauge becomes a member of a “Tool-in-tool” collection, you can acknowledge this as shown in the following figure [Fig. 5.1.19]. By clicking onto the `...` button you can “jump” directly to the parent gauge.

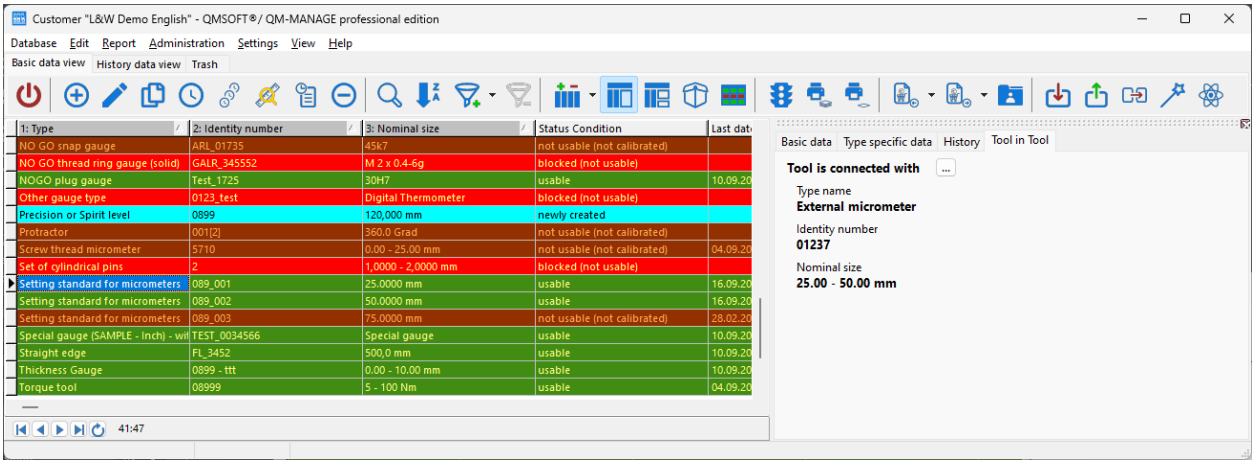


Fig. 5.1.19: Reference to a “Tool in Tool” membership.

5.1.1.9 The gauge-“Container”

Sometimes, for example if you want to “Expend” or “Return” a number of gauges in one step, it could be difficult to find a suitable definition to filter exactly the gauges, which you want to handle. So you can use the “Container” function to arrange these gauges. The “container” you can see, if you switch on the “Detail view”. You will find it in the right register page. With “drag and drop” you can now move selected gauges to the container. For gauges you have placed in the container you can carry out the same functions like for gauges you have filtered. Possible functions are:

- printing a Gauge list
- creating an export of the gauges from the container;
- executing a “Joined action” like “Expense” all gauges placed in the container

Note

Placing a gauge in the “container” will not really move the gauge, the container is only a special view! If you do not need the container contents anymore, you can empty it, the gauges are not deleted by this.

5.1.1.10 Menu item Edit > Special functions

Inside this menu you will find some “special functions” to edit gauge data [Fig. 5.1.20].

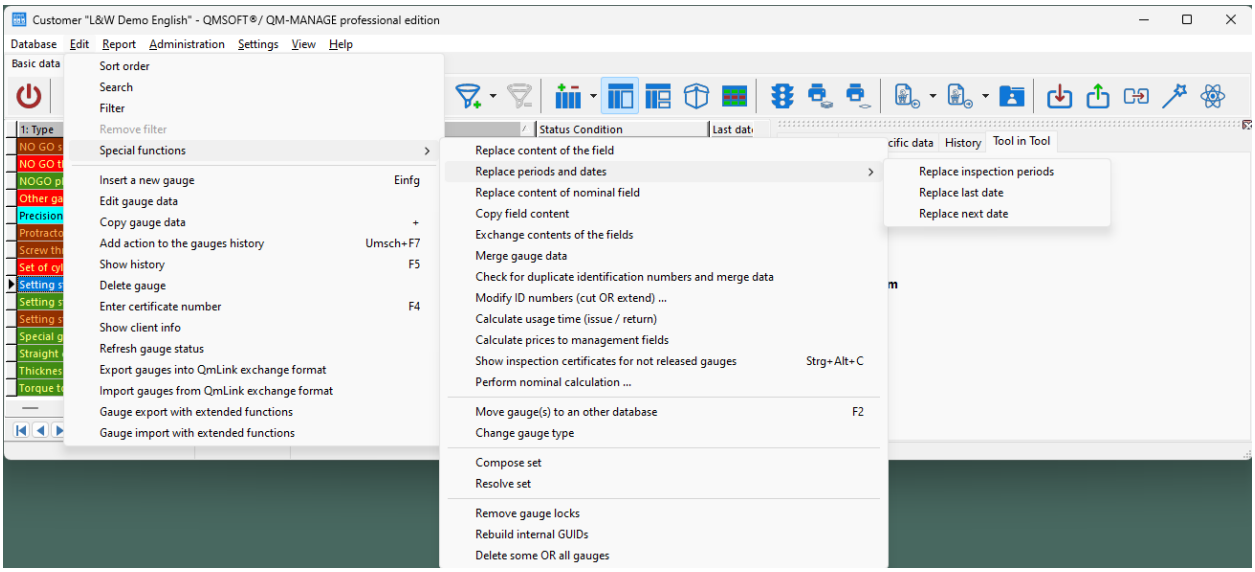


Fig. 5.1.20: *Edit → Special functions*.

Function “Replace content of the field”

Sometimes it is necessary to change special gauge information or to replace it with an other content. For example, the name of a department, which you use in the database for the field “Current location”, was changed. So you have to replace this information for all gauges, which are currently set at this location.

To do this at first you have to set a filter to show only that gauges, which are “infected” with the department name you have to change. After setting the filter call the replace function, select the field “Current location” and enter the information which should be entered in this field. For catalogue fields you will usually select it from the related catalogue.

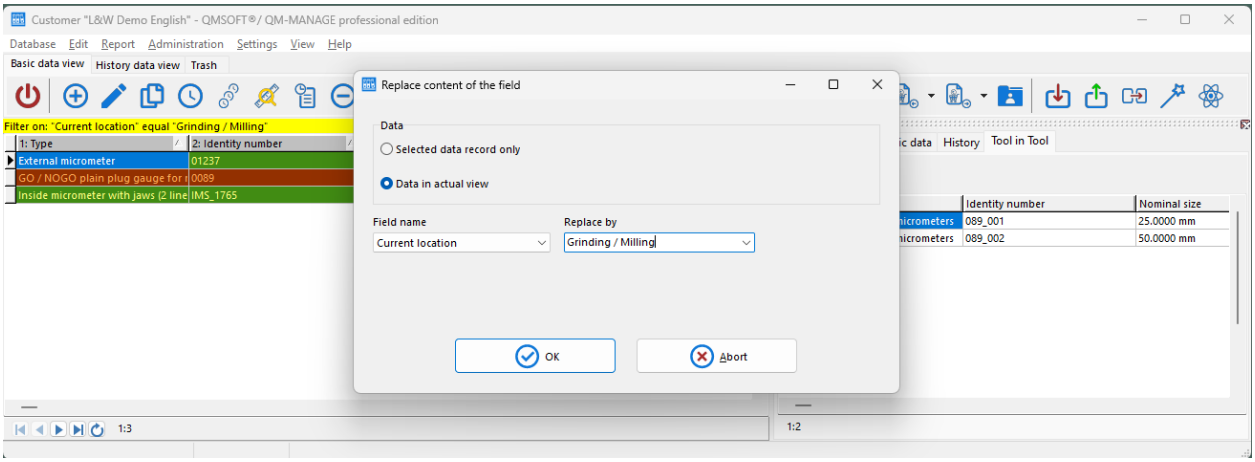


Fig. 5.1.21: Replacing the content of field “Current location”.

In the example [Fig. 5.1.21] at first a filter was set ["Current location" is equal "Grinding / Milling"]. After this the function "Replace content of the filed" was called. The "Replace by" field will show you all values available in the catalogue "Current location".

Before starting the replacement operation select the gauges for those the operation has to be done. For our example we select the option "Data in current filter" to apply the replace operations for the filtered gauges only. Start the replace procedure with the OK button.

Function "Merge gauge data"

It may occasionally happen, that a gauge has been created twice in the dataset by incorrect data input, either with a different identity number or with the same identity number but assigned to different gauge types. To merge the information of both gauges, proceed as follows: Move both gauges into the container, click the menu item "Merge gauge data" function in the "Special features" menu, define now data field by data field, which data field contents should be used in the merge, and then confirm it. Existing history entries are taken from both gauges.

5.1.2 Gauge reports

Gauge reports can visualize specific information about the gauge inventory (data set) on the screen, which can be printed out if necessary or sent as an email attachment. The program knows two types of reports: gauge lists and gauge cards. These functions are called up via the menus *Report → Show gauge list* or *Report → Show gauge card(s)*. First, a report layout (often called a template) must be selected from the list of available report layouts, then the report creation process starts.

5.1.2.1 Gauge report as list

A gauge list is (as the name suggests) a list of gauges that have been compiled according to certain conditions. You can create gauge lists for various purposes. The most commonly used list type is the list of gauges that need to be recalibrated because the next calibration date has been exceeded.

Gauge lists are usually created in the program in conjunction with the filter function. Since the function returns all gauges that are in your current view, you must set an appropriate filter to select the desired gauges for the list output. Without activated filters, the entire inventory of the current data set is displayed in the list.

A gauge list always shows all gauges that are actually displayed in your current view. The currently selected sort order is used. Use the "Filter" function to select the gauges, alternatively the container function can also be used.

5.1.2.2 Gauge report as card

A gauge card is a summary of all information stored for a selected gauge. This contains all basic data of the gauge and the complete history including existing measurement results.

QMSOFT® comes with a report designer that allows the user to customize the layout of the report templates. To learn how to use the designer, please use the corresponding help function within the report designer.

5.1.3 The Gauge history, gauge actions

One of the most important functions of a gauge management system is to perform any kind of operation with a gauge. A gauge operation is any operation that has been performed on a gauge during its life cycle. Every gauge action is saved in the "gauge history". A gauge action may be a gauge inspection, a gauge distribution or the repair of a gauge. Which gauge operations you can perform are defined in the *Settings* → *Actions* option [*Settings > Actions*].

In the gauge management system, "executing a gauge action" means creating a new history record for the associated gauge. All information relevant to this action, such as date/time, name of the user carrying out the action, etc., is stored in this record. In addition to an inspection action, the specific results (e.g. actual dimensions) and the certificate that depend on the type of gauge are also stored in the database.

The sequence of actions stored for a gauge corresponds to the description of the gauge's life cycle and is often referred to as the "gauge history".

Which fields are saved in the history for an action element is determined in the respective definition of the gauge action and the gauge type and can of course be changed. You can also define new actions.

5.1.3.1 Performing a gauge action

To perform a gauge action, use the right mouse key to get the menu as shown in the figure OR use the button `Add action to gauges history` [Fig. 5.1.22]. You can also use the `F7` function key.

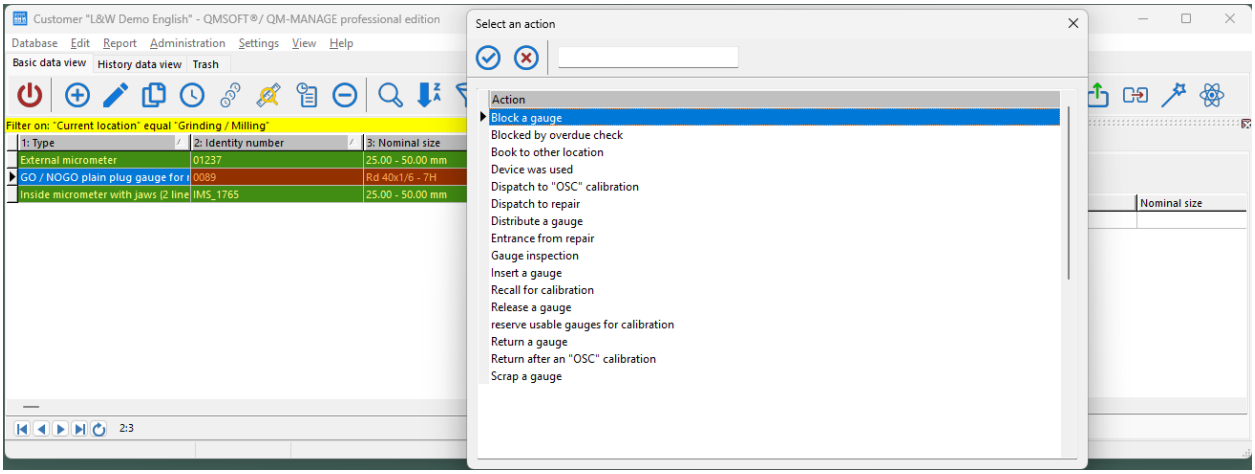


Fig. 5.1.22: Context menu to perform a Gauge action.

This and more features can also be performed by the context menu, to open this menu use the right mouse button in the "Basic data view".

You will get the screen with all Gauge actions available. Select the action type, which you want to perform with the gauge and continue with the `OK` button.

> **Note**
>
> By defining of dependencies "Actions - Status" you can ensure organizational coercive processes. So you can, for example, to ensure that an unexamined or locked gauge can not be issued until the corresponding release action has occurred.

Now you will get the “History view” of the selected gauge. A new history item for the “Action” was just added to the history list. Date, Time and your “Login name” are already entered. In the right area of the dialogue form oft he history overview you can see all the data fields, which are defined fort he performed action [Fig. 5.1.23].

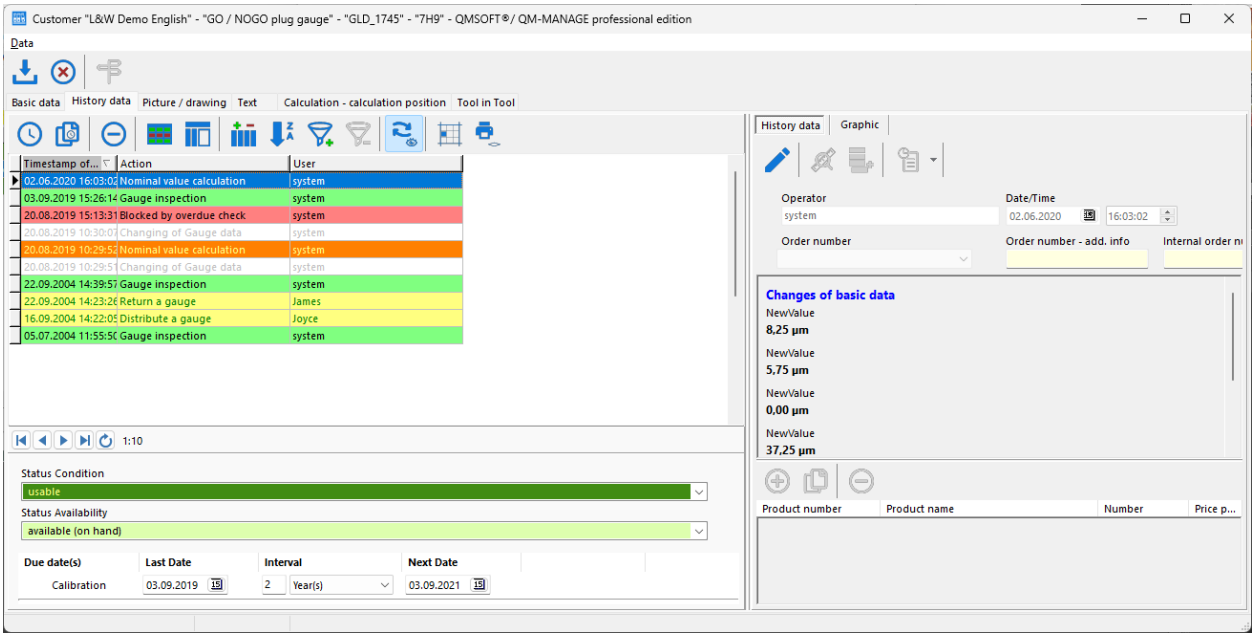


Fig. 5.1.23: Gauge history with a new created action item.

When you insert an action you have initially the ability to enter all of the related data manually into the corresponding fields. Furthermore, an action, usually a gauge inspection, can be connected with an “External program” to execute different operations related with it.

Doing a “Gauge inspection” the user has, besides the option of manual data entry, the possibility to do this automatically by starting a “measurement program” which corresponds to the gauge type being inspected. For example, the QMSOFT®/QM-PLAIN program is designed to support the inspection of all types of plain gauges like cylindrical plug or ring gauges.

By doing so, the inspection itself is supported by the measurement program, and the results of measurement including the inspection certificate are automatically written back to the QMSOFT®/QM-MANAGE database. Once it has been installed, the related measurement program can be opened by pressing the `F4` key or the `Caliper` button.

By performing a gauge action, the “Gauge status” and the dates of the “Last inspection” and “Next inspection” may be changed. Whether and how these fields will be changed depends on the definition of rules made in the “Gauge action” [*Settings > Actions*]. Please pay attention if your action should change the “Status of condition” or/and the “Status of availability”.

5.1.3.2 Performing "Joined gauge actions"

If you want to perform an action on a collection of different gauges (for example, to issue a collection of different gauges to a worker in the workshop), it would be tedious to handle each gauge individually. Here you can use the function "Joined action".

Usually you will select the gauges for a "Joined action" by defining a filter or by placing the gauges in the container box.

In contrast to a "simple" action, you will first see a dialog form on the screen where you can enter the common information that will be used for the history fields of all selected gauges. Then you will get a screen, listing the history entry for all related gauges to enable the change of individual fields. Before the end of the operation, you get one more screen where you can select a report layout to record the operation on a printed list.

5.1.3.3 Using calibration certificate numbers

The gauge management system QMSOFT®/QM-MANAGE offers the feature to assign a calibration certificate number to each certificate, which will be created. You can switch on or off this feature in the general settings of the software. The related settings are described in "QMSOFT® Manual - part: Laboratory Management - Rules to create certificate numbers".

If the function "Use calibration certificate numbers" is activated in the program settings, and the action, which you want to perform, has an existing history field named "Calibration certificate number", the certificate number will be created automatically.

5.1.3.4 Performing gauge inspections 

As already explained, you can define different actions, that can be performed with a gauge. Within these set of actions, the action "Gauge inspection" has a special meaning. For this reason, this action can be started directly from the toolbar (see the "Caliper" symbol).

Inspection of "Standard"-gauges

For the most used gauges like Plain plug and Ring gauges, any types of Thread gauges, Calipers, Micro meters or Dial gauges, the program QMSOFT®/QM-MANAGE does supply special QMSOFT® modules to support the gauge inspection itself, the evaluation of the measure values and the creation of a calibration certificate. All measures, results and also the calibration certificate document will be written back to the gauge management module QMSOFT®/QM-MANAGE and thus saved into the database.

Inspection of a gauge set

Generally, the inspection of a gauge set is similar the inspection for a single gauge. The main differences will arise, when you cancel an inspection of a gauge set and you want later to continue an unfinished inspection. To understand the background of this procedures here some explanations.

Before starting an inspection, the gauge set has to be created in the database. For example, we want to inspect a set of cylindrical pins with the identity number "089999". Select this gauge in your gauge stock and start the gauge inspection by the `Caliper` button. The program will now create a new record in the gauge's history [Fig. 5.1.24].

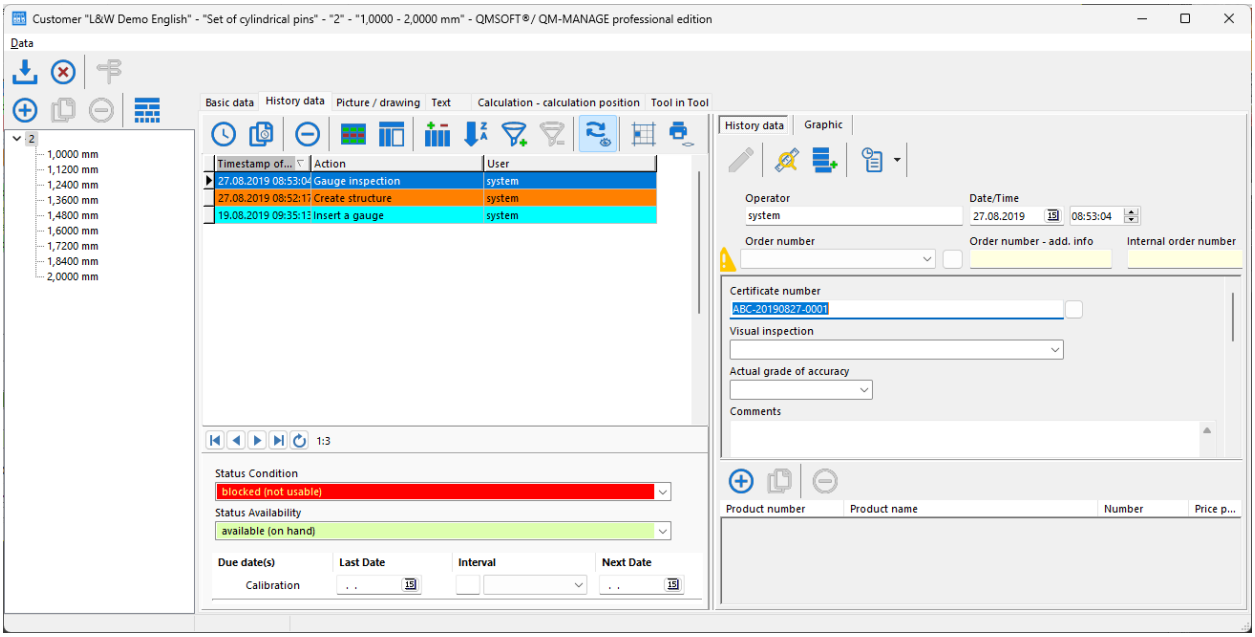


Fig. 5.1.24: New history record for a “Set of cylindrical pins”.

Click now the icon “QMSOFT® Inspection program” (again the `Caliper` button) to execute the related inspection program QMSOFT®/QM-PIN [Fig. 5.1.25]. Carry out your measurements in the dialogs of this inspection program as described in the manual section for QMSOFT®/QM-PIN.

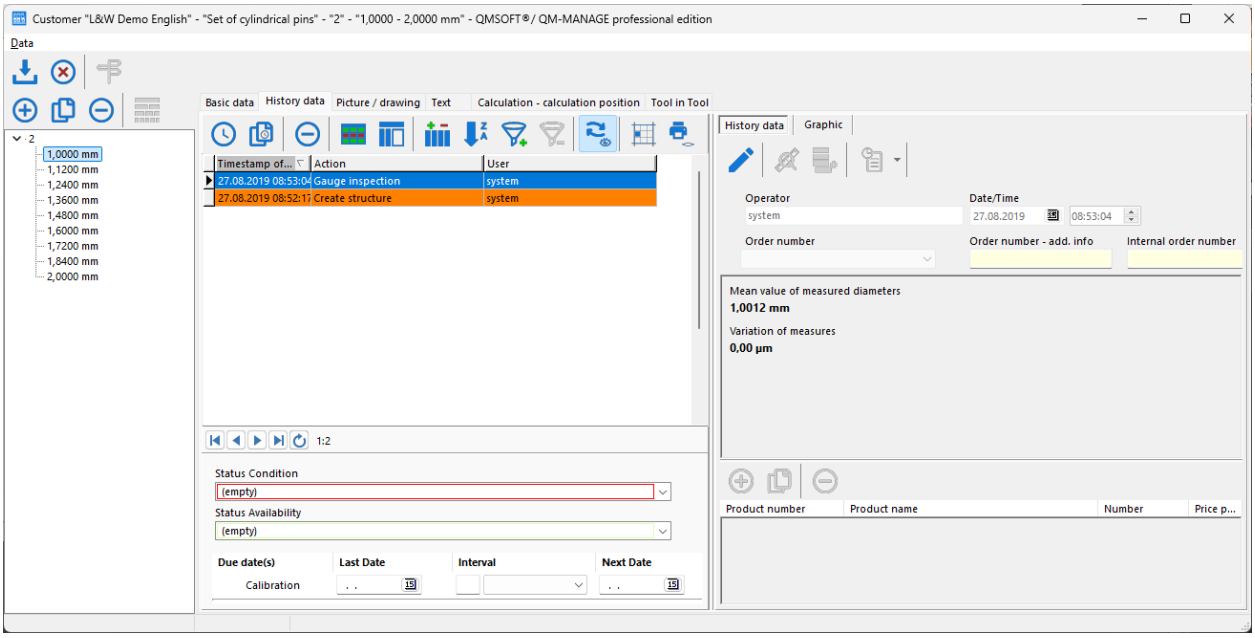


Fig. 5.1.25: History record of a single pin after doing an inspection.

Handling an “incomplete measurement”

Caused by the large number of items it can quite occur, that you can not finish the inspection for a gauge set without a break. In this case cancel the measurement in the inspection program and save the measuring results. The gauge set

will now get the marking “unfinished inspection” in the gauge status [Fig. 5.1.26].

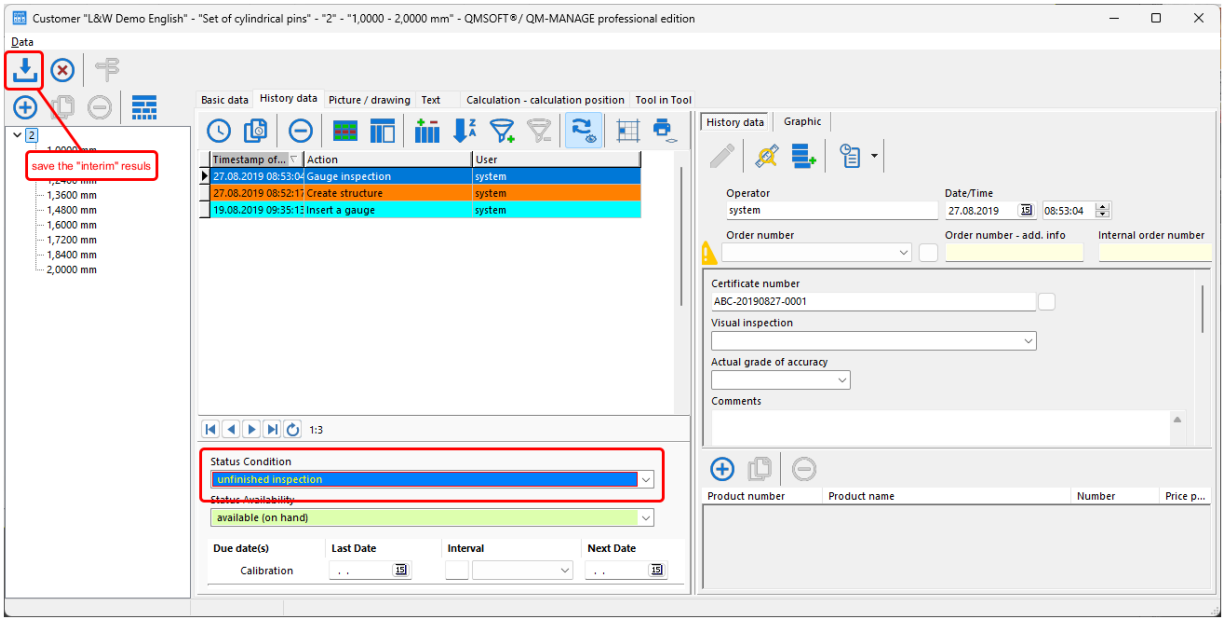


Fig. 5.1.26: History record of an incomplete inspection.

Save the results you have collected until now. To continue an unfinished inspection, do the following steps:

- select the gauge set in your dataset again
- use now the function “Show history” (by pressing the F5 key)
- now the last record in the history is marked, click now the “Edit” icon as shown in the figure

Warning

Do NOT click the icon “Gauge inspection” again, because this is creating a new history record (you want to continue in an existing history record)!

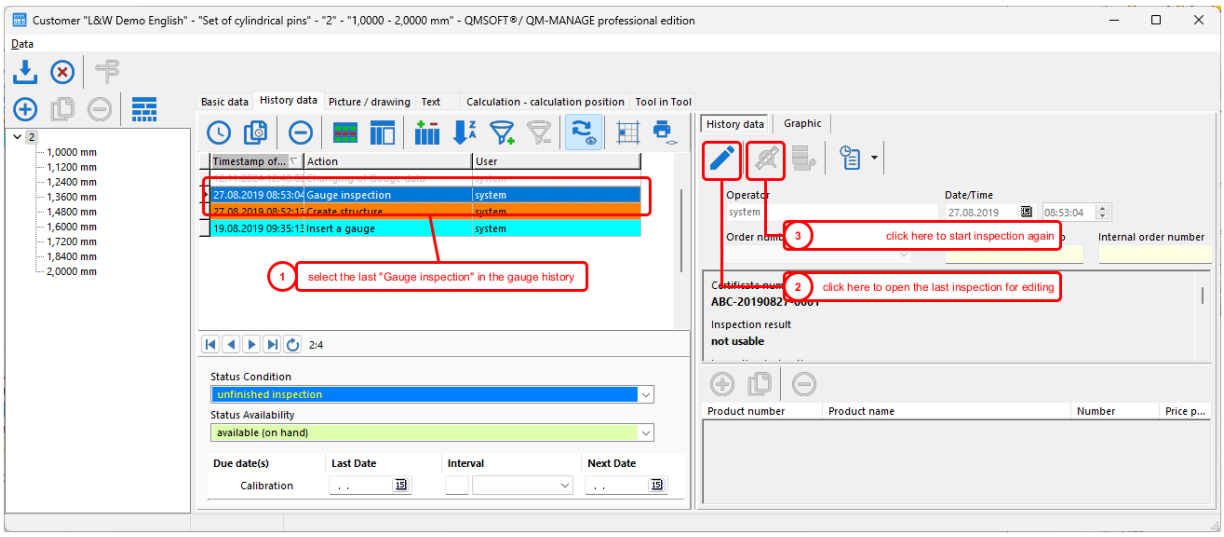


Fig. 5.1.27: Open the last history record and edit it.

- click now the `Start inspection` icon again (remember: this is key button with the “Caliper” icon) and confirm the message “Do you want to overwrite the existing history data record” with “yes” [Fig. 5.1.28].

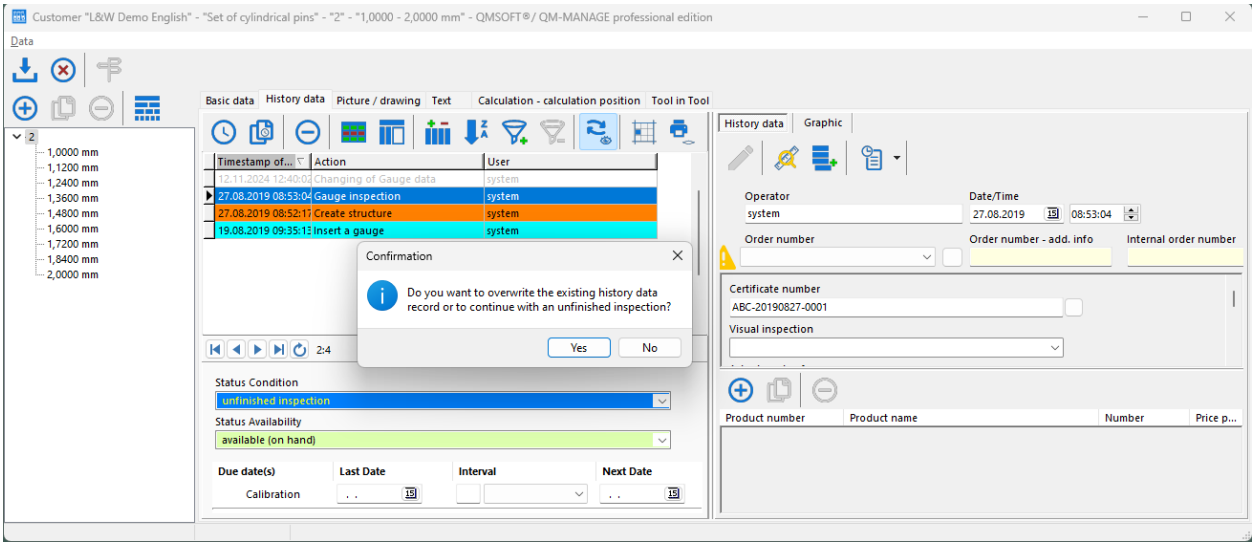


Fig. 5.1.28: Restart the inspection program to continue an interrupted measurement.

Now you can continue the measurement in the inspection program as usual.

Inspection of “special gauges”

Often you have also to inspect a serious of “Special” gauges like knife edges, protractors or others, where no QMSOFT® program for the valuation and creation of inspection certificate exists. To create inspection certificates for this gauge types the QMSOFT®/QM-MANAGE program has a built-in tool to support this operation. This tool is an integrated part of QMSOFT®/QM-MANAGE and is designated as QMSOFT®/QM-CERTIFICATOR.

When you want to use this tool, you have to make a link between the gauge type definition and the QMSOFT®/QM-CERTIFICATOR by selecting the “CERTIFICATOR” in the field “executable program” (see chapter *Settings > Types*). Inside of QMSOFT®/QM-CERTIFICATOR you can define a separate layout template for the gauge type or you use one of the exisiting universal templates.

Alternatively, you can also use the program QMSOFT®/QM-INSPECT for such special gauges, if you have the related license for it. In this case you can set the link for the “Executable program” (see the next figure) to “QMINSPECT”.

Execute the an gauge history action as usual, call up the test program by clicking on the “Caliper” symbol and follow the dialog forms.

Note

Compared to using “Standard inspection programs”:

Since the QMSOFT®/QM-CERTIFICATOR program does not contain any functionality for recording and evaluating measures, you must enter all inspection information in the history fields of the “Gauge inspection” data record (right side of the form) before calling it up [Fig. 5.1.29].

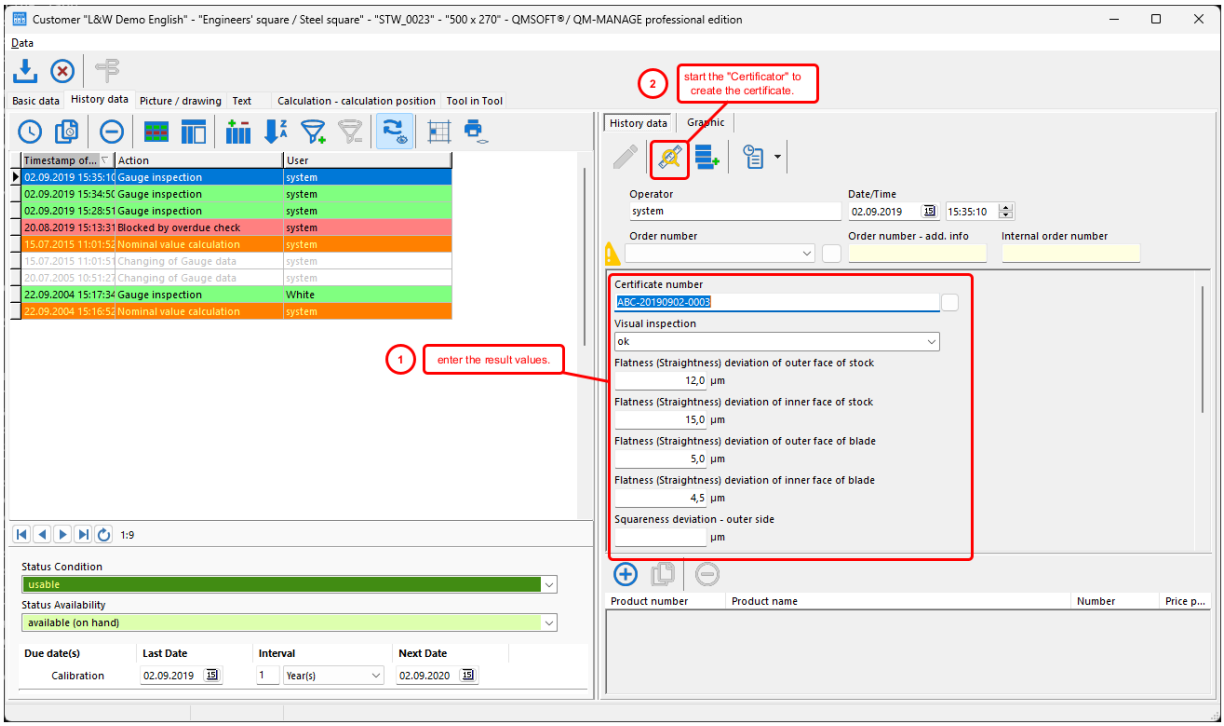


Fig. 5.1.29: Entering results manually.

After clicking on the “Caliper” symbol, the QMSOFT®/QM-CERTIFICATOR inspection program appears on the

screen [Fig. 5.1.30]:

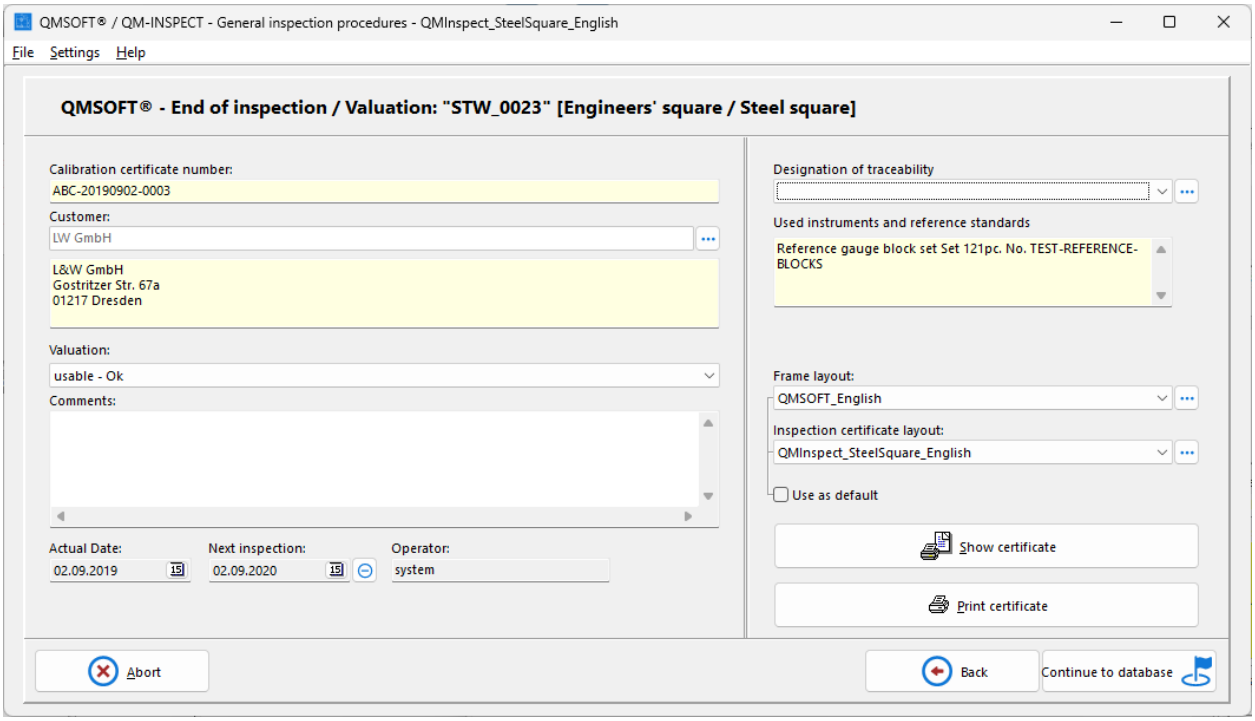


Fig. 5.1.30: QMSOFT®/QM-CERTIFICATOR.

Here you can select one of the existing certificate layout files and use the `Edit layout file` button to open it in the edit mode. After selecting the layout you can use the options `Show certificate` and/or `Print certificate`. Continue to database to save the certificate into the database.

- The QMSOFT®/QM-CERTIFICATOR may also be used to create certificate layouts (template files) with Microsoft®-Word or EXCEL. If you want to use these options open the drop down list at the field “Editor” and select MS Word or MS Excel. The selection “Textcontrol” is using layout templates of the QMSOFT®-System.
- Compared to using “Standard” inspection program - where you will enter the inspection results during the inspection process - you have here to enter your values and results before starting the The QMSOFT®/QM-CERTIFICATOR!

Note

As an alternative to QMSOFT®/QM-CERTIFICATOR, which is a free component of the gauge management program QMSOFT®/QM-MANAGE, you can also use the QMSOFT®/QM-INSPECT program to issue a calibration certificate. This program allows you to create inspection schedules (procedures) consisting of a series of characteristics of the gauge to be inspected and to execute these procedures step by step. For further information see “QMSOFT® Manual - Part: QM-INSPECT”.

5.1.4 The manual execution of overdue test

If an overdue test is defined, use this function for the manual execution of an overdue check. It can be used to show all gauges where the next inspection date is out-of-date. The execution of the test can also perform a gauge action to change the gauge status and to print a report with the related gauges [Fig. 5.1.31].

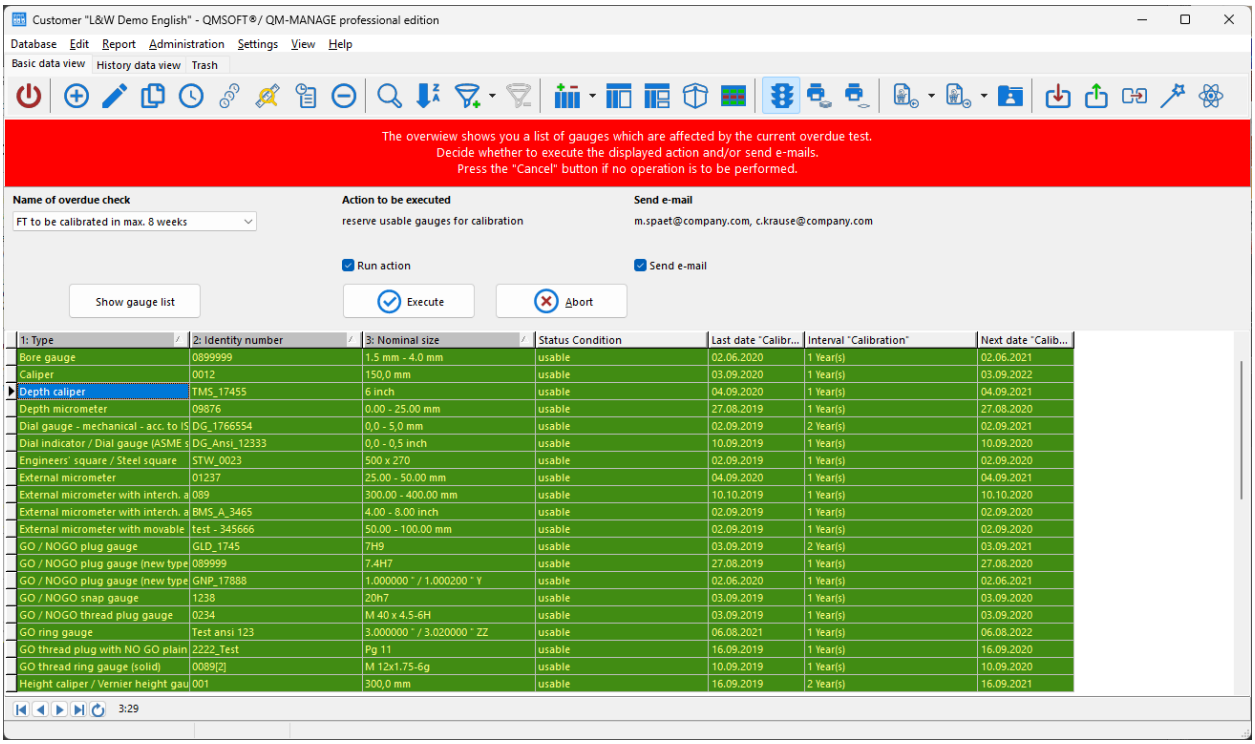


Fig. 5.1.31: Manual overdue test.

Press `Execute` to perform the activated operations.

Please read section *Settings for "Overdue" check / "Maturities"* to get more information about the definition of overdure checks.

5.1.5 Any more special functions

In the menu *Edit* or in the collection of buttons of the toolbar you can find the following "Special" functions:

5.1.5.1 Show gauge info

This function opens a document, which can be used to write down any information, which you want to record as a "free text" for the use by every person, which can open this dataset.

5.1.5.2 Change gauge type

Sometimes you will find that a Gauge does not have the correct assignment to a corresponding gauge type. Use this function to assign the selected gauge to a new type, it is a powerfull tool to change the type of the gauge without any loss of data of the gauge history.

5.1.5.3 Show certificates for non-released gauges

This is a feature to enforce a workflow where the use of gauge can be linked to the confirmation of a calibration certificate. This function is primarily intended for the following scenario: Gauges are calibrated by an external calibration service provider; when the gauges are returned, they should only be released after the recipient has viewed/checked the associated certificates.

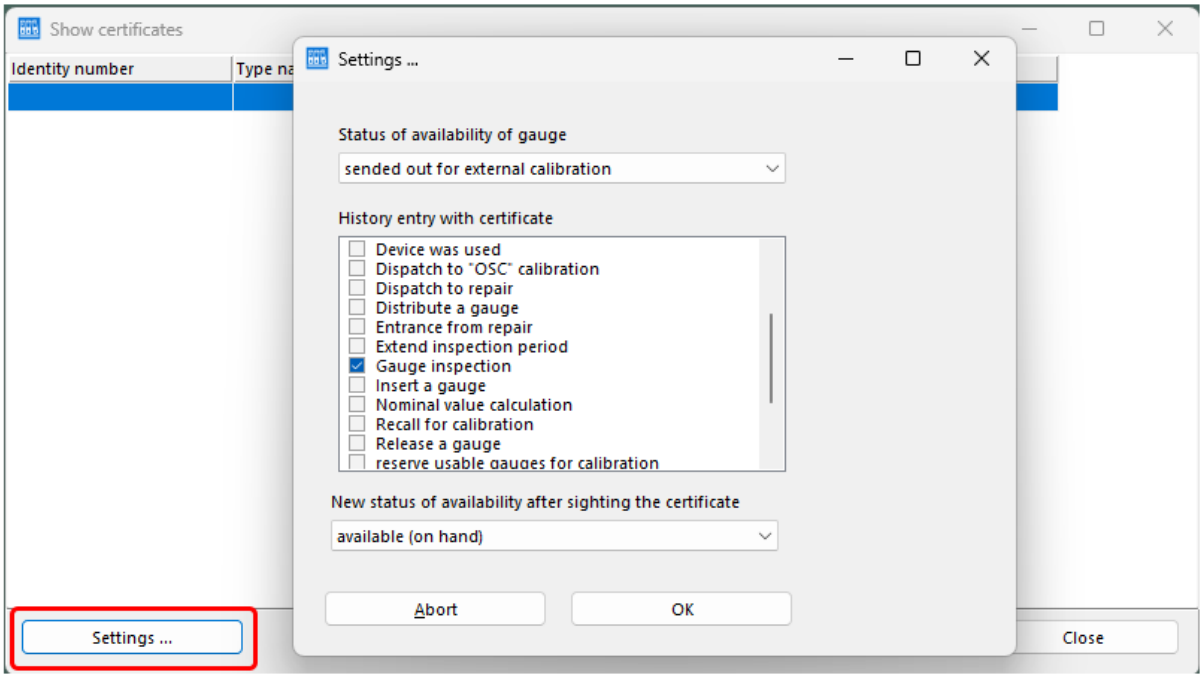


Fig. 5.1.32: Settings for displaying certificates of non-released gauges.

According to the settings all of the gauges, which have the "Status Availability" as "sended out for external calibration", are shown in a list. The field "Status" is indicating, that an item "Gauge inspection" was be found in the history, which contains an calibration certificate.

The user can view step by step all of the certificates of the gauges. This will change the field "Status" to "Certificate viewed", so you will have a good overview about viewing all of the cerificates. If you close the dialogue form, the "Status Availability" will be changed to the new status item, which is configured [Fig. 5.1.32].

Warning

This function is changing the field "Status Condition" only, the field "Status Availability" will not be changed. To get a forced workflow to have an explicite release event of a gauge you should define a separate action "Release gauge", which changes the "Status Condition" to value "released" for example.

5.1.5.4 Export/Import of gauge data

The functions to import and export of gauges (exactly: of gauge data) are primarily used for data exchange between different instances/installations of QMSOFT® databases. The most common application is the exchange of inspection results between a calibration service laboratory and the end-customer or the use of a central database in the laboratory location and mobile on-site computers, that must be synchronized with the central QMSOFT® database.

For the exchange procedure the common known XML file format is used, which is increasingly applied for the exchange of structured data. The logical structure of the generated XML-file corresponds to the QmLink file structure, which was developed by L&W GmbH for the exchange of data between individual QMSOFT® modules. In order to reduce the file size of the data for the exchange will be compressed into a ZIP-file-archive, this archive files have the file extension "LWX".

If you want to exchange data with other products (for example: export an equipment list to MS-Excel) it is recommended using the report feature of QMSOFT®/QM-MANAGE. The report tool is used to output gage data (usually lists) in a variety of formats (TXT, XLS, etc.).

Export of gauge data

By clicking onto the button  or activating the menu item *Edit* → *Export gauges into QmLink exchange format* you will get the following screen [Fig. 5.1.33].

Fig. 5.1.33: Export of gauge data.

Please define the following items:

- **Data**
  With this selection you define the quantity of the gauges of the dataset, which you want to export. The following choices you have:
  - **Selected data record only**
    This option will export the data of the actual gauge item (which has the database cursor in the gauge list view).
  - **Data in current filter**
    This option will export the gauge data of all of the gauges, which are selected by the actual filter. This feature is visible only while a filtered view is active.

  - **All data im Container**
    This option will export the gauge data, which are collected into the “Container”. This feature is visible only while at least one gauge is inside of the “Container”.
  - **All data of the selected client**
    This option will export gauge data of all gauges of the actual client/dataset.

- **Transfer file**
  Define the name and the folder of the export file, the extension should be “lwx”.
- **Transfer configuration**
  Here you have the choice between “—user defined—” and eventually self-created sets of settings. After installing QMSOFT® you will have only the “user defined” item. By using the button `Show transfer configuration` you will get the following screen [Fig. 5.1.34] to check and/or set the transfer options .

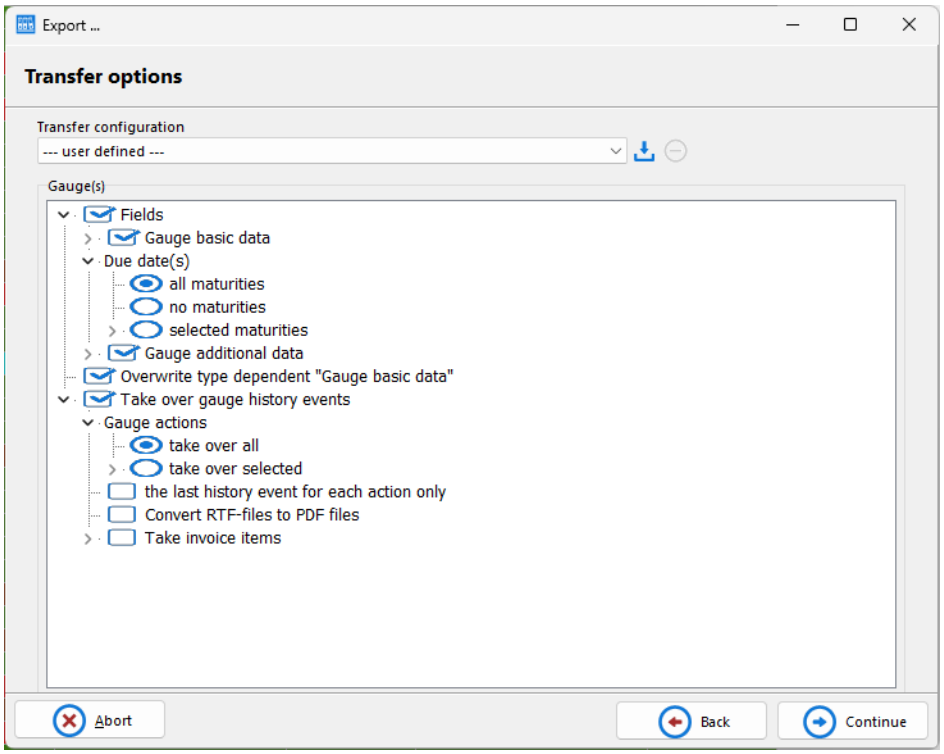


Fig. 5.1.34: Transfer optionen.

After proceeding with the `Continue` button you have to define more options to specify the export volume:

- **Transfer configuration**
  Here the name of the set of the tranfer configuration settings can be selected. Of course this is based on a transfer configuration, which was stored before. You can use the “disc”-icon to save the setting parameters.
- **Options for global gauge data**
  Define either to export all of the basic gauge data fields of the gauge(s) or only-pre-selected gauge data fields should be transfered. If you use “only selected gauge data”, you have to select the fields in a separate dialogue form.
- **Option “Take over type dependent gauge basic data”**
  Here you have to decide, that the so-called “type dependent gauge basic data” should be exported too (for example the tolerances and nominal values of a plain GO plug gauge).

- **Option "Take over gauge history events"**
  Here you have to switch on/off the export of gauge data from the gauge history. If you have switched on this feature, you will have the feature to select all of the history actions (which means the types of this actions) or selected actions. By using the button `Select gauge actions` you can define, which kinds of actions you want to export (for example the action "Gauge calibration" only).
- **The last history event for each action only**
  If you activate this feature, only the last event (you can say the newest event) of the gauge actions will be transferred (the last "Gauge inspection" for example).

The export starts by using the `Continue` button. You will see a progress bar. Once completed, the export file is ready for transfer via e-mail, mass storage or FTP server.

Import of gauge data

With this feature you can import gauge data from a transfer file (a file with the extension "lwx") into the actual dataset (client). Normally this file was created by an export on an other QMSOFT® client machine. By clicking onto the button  or activating the menu item *Edit → Import gauges from QmLink exchange format* you will get the following screen [Fig. 5.1.35]:

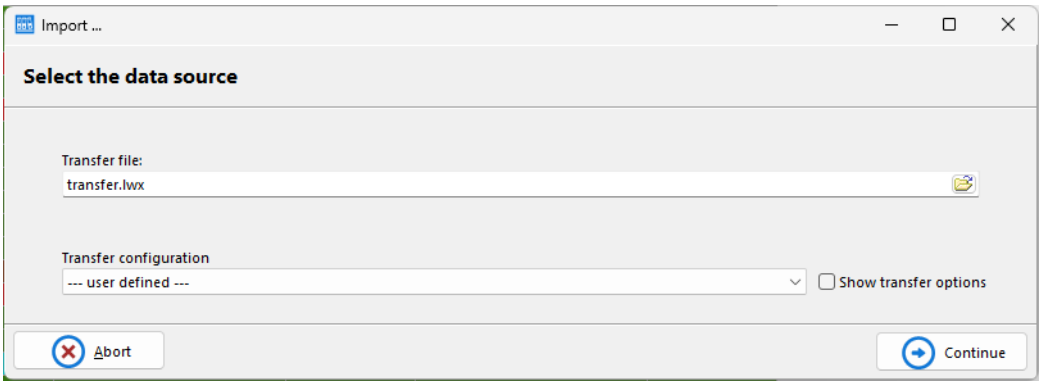


Fig. 5.1.35: Select transfer-file.

At first please select the transfer-file aus, which contains the gauge data. By using the item "Transfer configuration" you can load transfer settings [Fig. 5.1.36], which you have stored at any time.

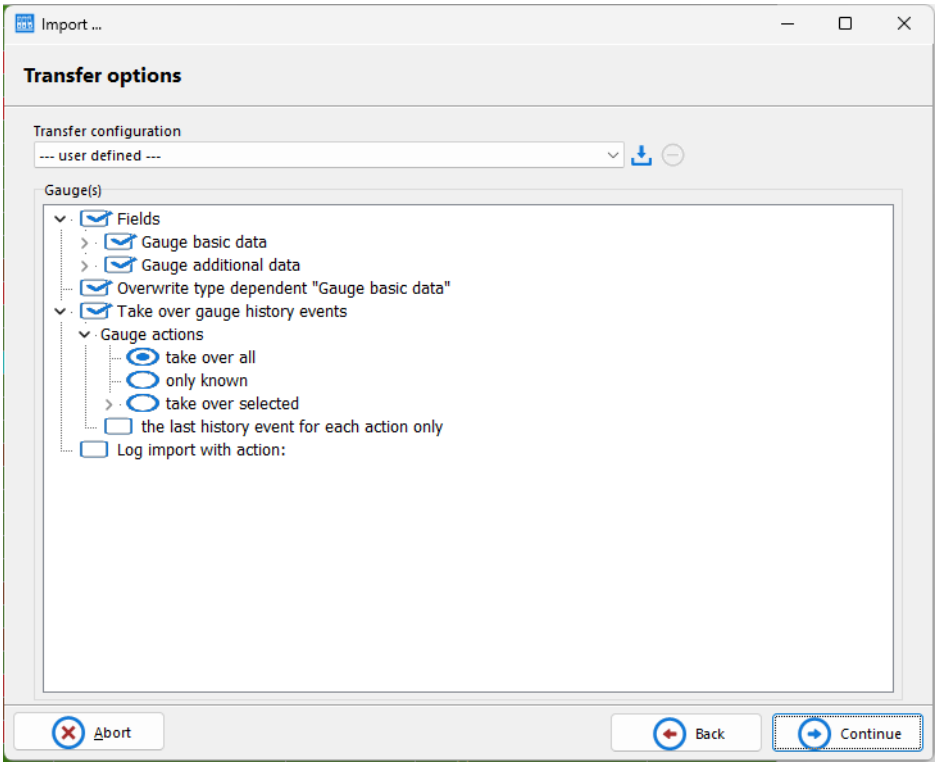


Fig. 5.1.36: Transfer options for import.

The options of the data import function correspond to the options of the data export.

5.2 Configuration settings

This chapter of the manual is used especially by the administrator of the QMSOFT® installation. Please note, that the access to the described features is limited to selected and trained users only.

> **Note**
>
> Some functions to configurate releated gauge management settings (for example menu items “Database structure(s)” and “Datasets (Client) management”) are available by the central laboratory management only. For further information on this topic, see also “QMSOFT® Manual - part: Laboratory Management - General Settings for the QMSOFT® Gauge management”.

The program QMSOFT®/QM MANAGE was developed specifically for gauge inspection and monitoring of length measuring equipment. An extension to “non-length” gauge equipment types (eg electrical instrumentation, pressure measurement etc.) is quite easily possible.

After a new installation all of the described features are assigned to the members of the user group “Administrators” only. If you have problems to access this features, please inform you about your privilegues (“QMSOFT® Manual - part: Laboratory Management - User, User groups and Privileges”).

5.2.1 Catalogues / lookup tables

Using this function you can define and edit different lists, related to the fields in the “Global basic data”. These lists may be used to avoid errors while entering data in the related fields. Here you can add new items, change or delete existing fields. Catalogs with identical lists can be used for all datasets/clients that use the same field definition schema. For further information see “QMSOFT® Manual - part: Laboratory Management - The usage of dataset (client) specific catalogues (lookup tables)”.

To “rebuild” a catalog ensure that all entered text is present in the catalog, use the “Rebuild” function shown in the figure [Fig. 5.2.1].

Also, make sure to deselect the “Allow direct input” option for reference fields if you only want to allow text that matches an entry in the reference list.

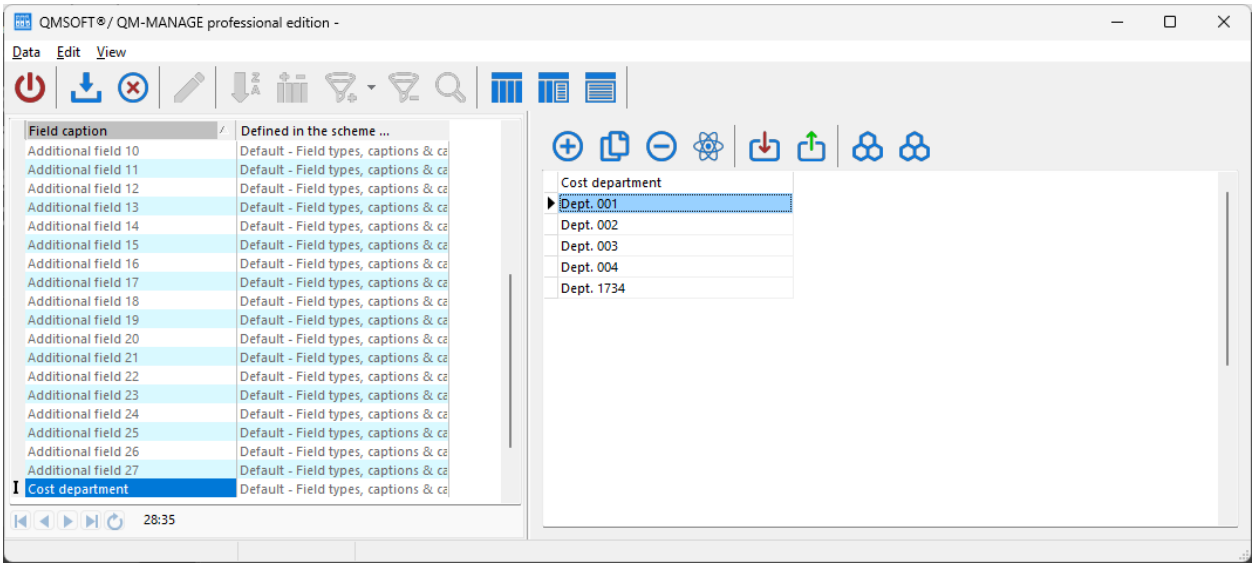


Fig. 5.2.1: Editing of catalogues.

5.2.1.1 Settings for “Overdue” check / “Maturities”

Define due date tests for the selected dataset, which call for the use of test equipment for calibration (or other measures). Maturity tests can be used very flexibly and can be carried out manually or automatically. Due to the manifold setting possibilities of a maturity test, some other system configurations have to be considered in connection with these.

Here you will find a short overview what settings are needed for an overdue check and should therefore be configured in avance:

- **“FILTER” - Select the gauges / test equipment which are affected by the test**
  the selection of gauges which are affected is basically done by using a “Filter”; the following screen [Fig. 5.2.2] is showing an example of a typical filter;

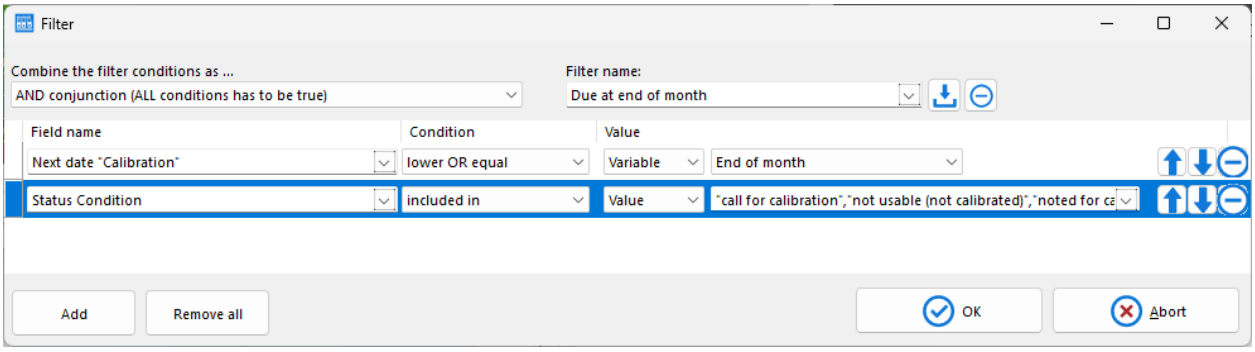


Fig. 5.2.2: Filter definition.

this filter will select all gauges which will be due at the end of the month and fulfill the selected characteristics for the status (exclusion of scrapped test equipment and similar things).

Note

If you are working with flexible due dates (number or period of use), pay attention to use the related fields for the due date check. In this case you generally have to use the field “Alt.(ernative) next date” or the current counter reading.

- **Defining the related “Action”**
  An overdue check is usually combined with a gauge action which will be executed by the overdue check and will register the operation in the gauges history; such “action” could for example be named “Overdue check done” and could set the “Status - condition” to “not usable (not calibrated).
- **Sending e-mails to inform the responsible person(s)**
  an overdue check can be used for the automatic sending of e-mails; if you want to use this option the e-mail address(es) of the person(s) concerned must be defined in the system (e-mail of sender as well the receiver).
- **Start execution by …**
  The program does allow the automatic execution of overdue checks; if you want to use this option you have to define the related task (see chapter *The QMSOFT® Task Scheduler*). Of course you can also start the test manually at any time.

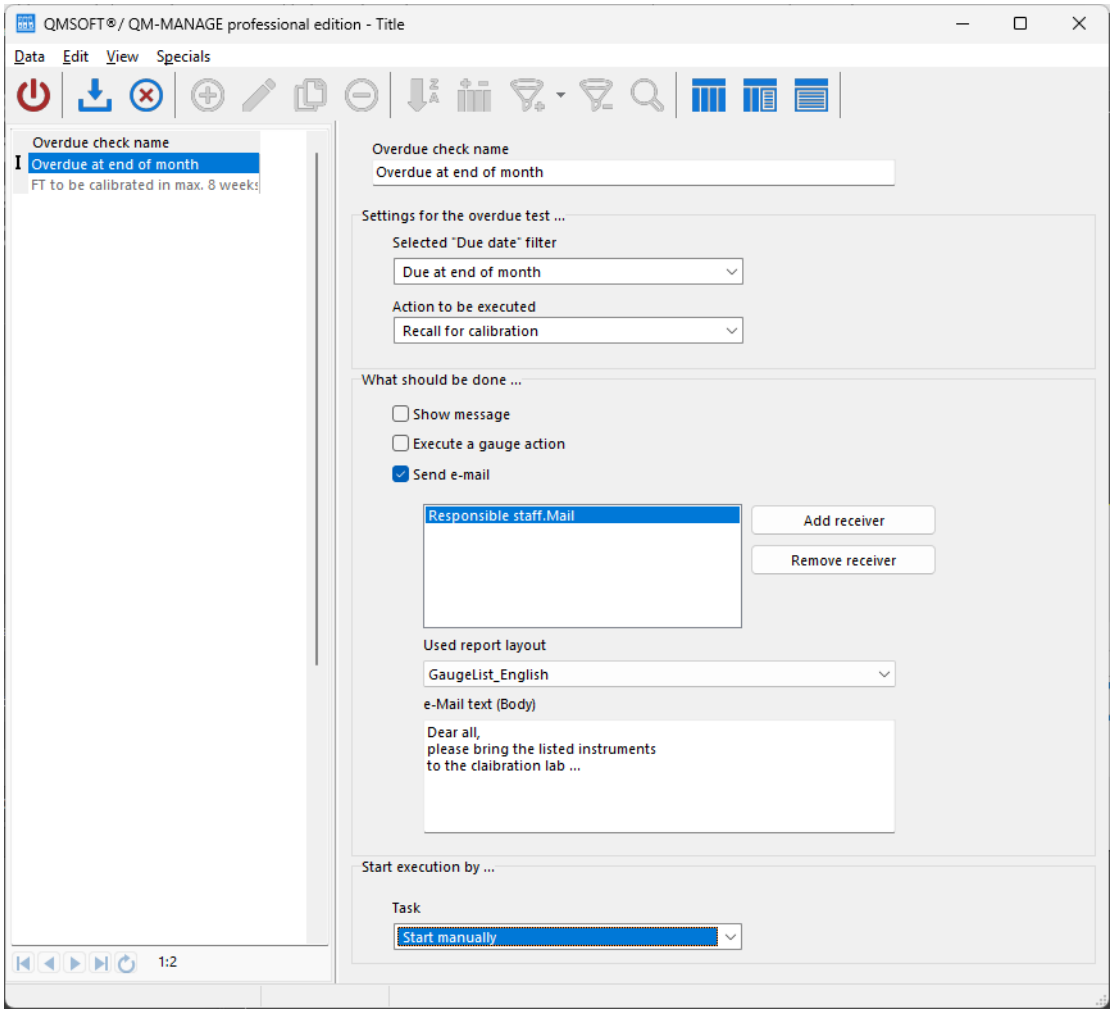


Fig. 5.2.3: Properties of the “overdue” check.

The figure [Fig. 5.2.3] shows the definition of an “overdue” check. Make the following settings:

- Overdue check name
  Enter a name for the test.
- Selected “Due date filter”
  Select the filter to apply for the test. This is mandatory for the execution of the test.
- Select the “Action to be executed”
  Select the action from the list. This is only required if you activate the option “Execute a gauge action”.
- Activate the desired options in the point “What should be done” When activating the “send e-mail” option, specify the recipient and enter text (e-mail body).
- Used report layout
  Select the report layout which will be used to create the list to be displayed. When sending by e-mail the list will be created as PDF document and automatically attached on it.
- Start execution by
  You can start the overdue check manually or by a predefined task in the task scheduler.

5.2.2 Settings > Status

The program QMSOFT®/QM-MANAGE does allow the usage of two different status informations: a “Status Condition” and a “Status Availability”.

Using the options *Settings* → *Status condition* and *Settings* → *Status availability* you can define two different lists of gauge status. The gauge status tables are used to set pre-defined texts for the “Gauge Status” fields [Fig. 5.2.4]. The pre-defined texts are necessary when using the database inquiries functions, so that the program can differentiate between, for example, “Gauge o.k.” and “Gauge ok”. Therefore, searches can only be done, when there is an exact match of the feature and the search criteria. Thus, the program user can make spelling errors in text entries entered from the keyboard.

Use the related buttons to edit an existing entry or to create new or delete existing status texts.

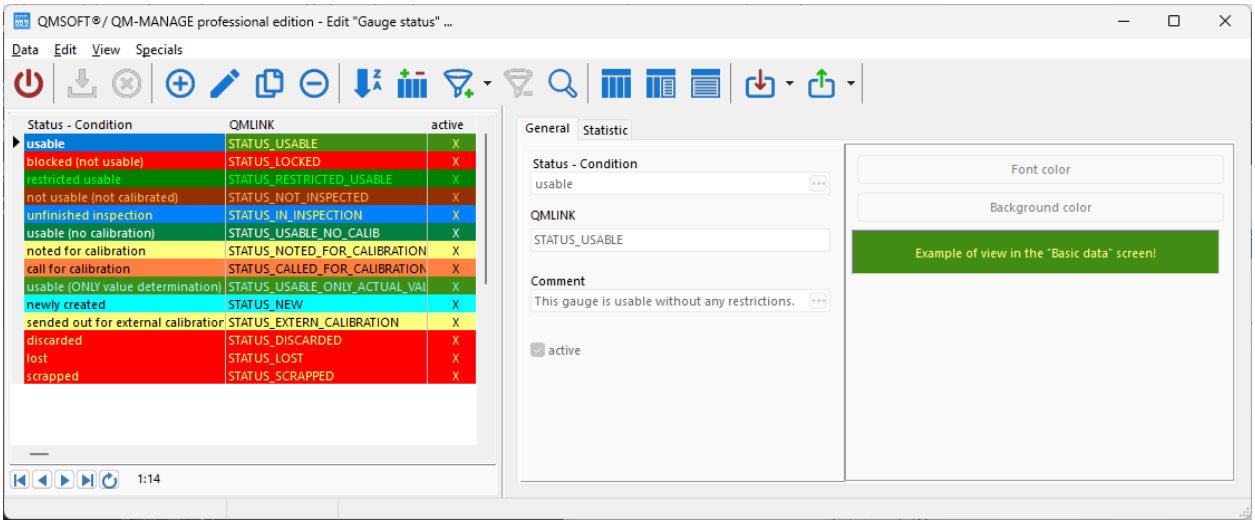


Fig. 5.2.4: List of defined Gauge status.

By removing the “active” checking you can deactivate a status. This may be useful, if you do not want to use it more and you can not delete it because it is still in use for existing gauges.

The QmLink name will be used as identifier, when you export or import gauge data and for the translation to another language.

5.2.3 Settings > Actions

Here you can define all operations which can be made with a gauge and should be saved in the gauge history. All actions, which were done with a gauge during its “lifetime” will be come to the gauge history.

Opening this menu, you get a list of all pre-defined actions [Fig. 5.2.5]. Use the related buttons to edit an existing entry or to create new or delete existing gauge actions. Naturally it is not possible to delete a Gauge action which is being used in an existing gauges history. If you will no more use such an action you can deactivate it.

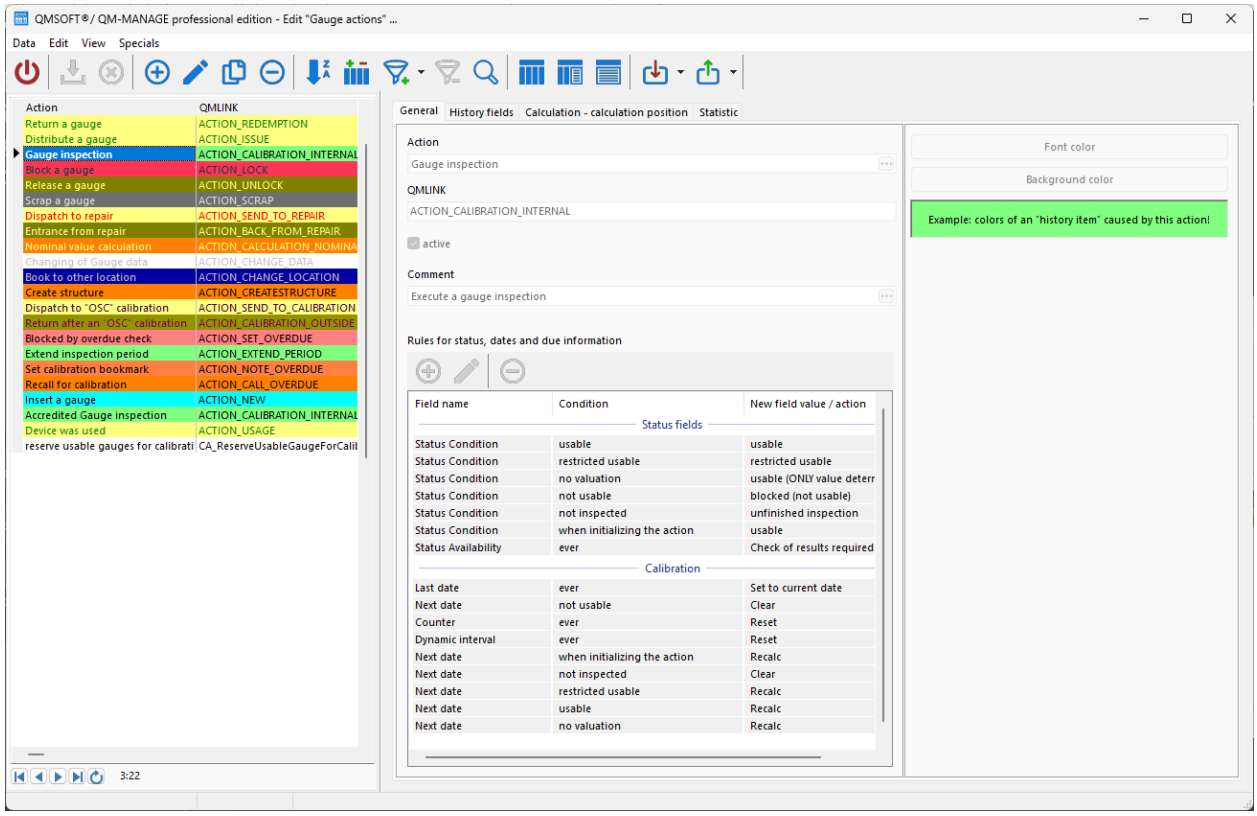


Fig. 5.2.5: List of defined gauge actions.

5.2.3.1 "General" information

To insert a new action item or change an existing item please use the related buttons. Inserting a new action, you will get a screen form with the following input fields:

- **Action**
  A name to identify the operation, will be shown in the gauge history.
- **QmLink**
  A name, which will be used as identifier for export or import gauge data and for translation to an other language (generally you can type any text as you want).
- **active**
  A status, which will decide that an action is usable and will be shown in the Gauge selection list (a new inserted action shall be "active"!)
- **Comment**
  For a better understanding of the meaning of the name of the action you can write here some description.
- **"Font color" and "Background color"**
  Here you can define the visual properties of the action items in the gauge history.

5.2.3.2 "Rules" to modify status and due date informations

For each action you can define a list of rules which can change "Status" and/or information in fields which will influence the next due date. These rules do define what happens with the related fields when you execute the action.

When inserting a new rule related to an action you will get at 1st the following screen [Fig. 5.2.6]:

Fig. 5.2.6: Define a rule for a gauge actions

With the selection in the field "Rule for", you determine if the execution does change a status field or a field which does influence the next due date(s). Then, depending on this selection you will get a list of fields you can affect. Important is the condition you select. The "condition" does determine under which condition the rule is executed. The conditions "usable", "not usable", "restricted usable", "no valuation" and "not inspected" will be set only if you perform a calibration operation.

For a simple action like "Distribute a gauge" you have usually only one result when you do it. In this case you set only the "Status - Availability" to "distributed". When you are working with dynamic inspection intervals you have to start or to increase the counter.

The more complex case is, when you do a gauge inspection, a maintenance operation or similar actions which can give you different results. Here you can use these results to determine what to do in the different situations.

The results of the inspection procedures are provided by the settings in the laboratory management. See the options "Inspection results" (chapter *Inspection instructions*) and "Acceptance rules" (chapter *Acceptance rules*).

5.2.3.3 Tab "History fields"

Creating a new or editing an existing action item you can also define the related fields, which are usable to enter detailed information about the action when executing it. If you are doing this, these fields are available for all of the existing gauge types [Fig. 5.2.7].

Nethertheless you can define other fields, which are type depended and can be used for each type individual. This will be done when making the definition of the "Gauge type" - see *Settings* → *Types*.

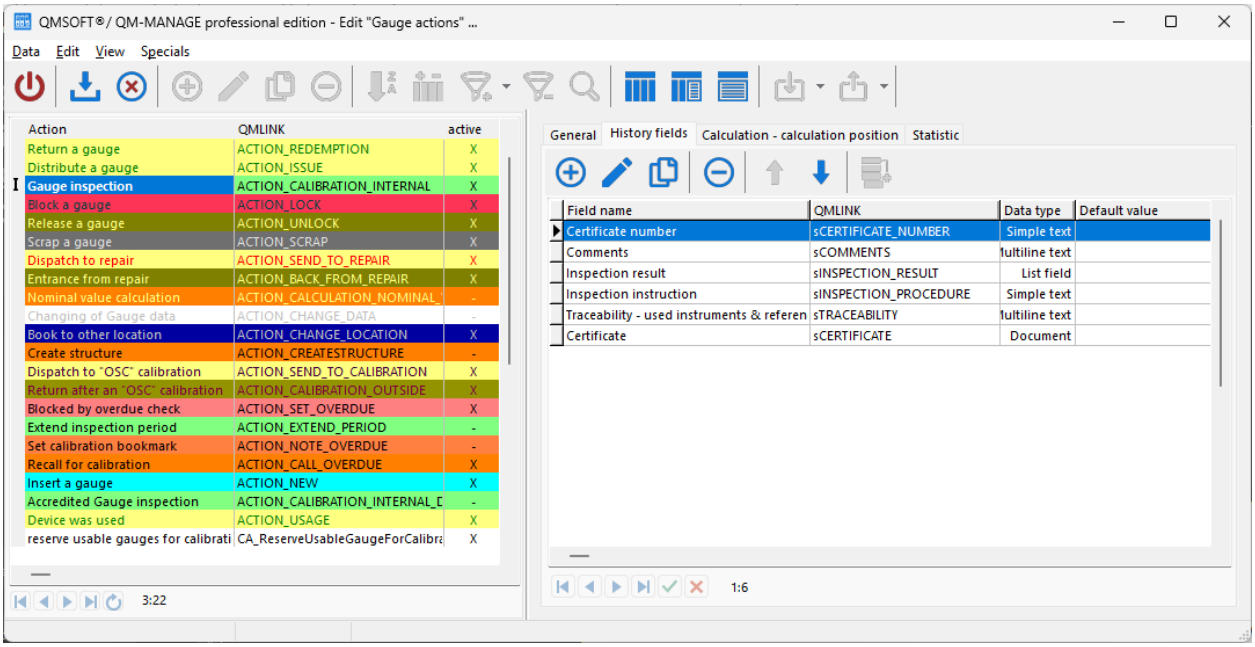


Fig. 5.2.7: Defining the “History fields” for a “Gauge action”.

Add all fields, which you want to fill out when executing the related action. When editing a “Gauge type” you will also see these fields in the field list of the related action. There these fields are marked with yellow colour and are blocked for editing.

In the delivered installation of QMSOFT® there are some predefined action items, which covering most of the usual administrative tasks. Of course, you can also edit these predefined actions and add more history fields. When you insert a field, specify the data type of this field. Available are various of options such as “Simple text”, “List field”, “Float” (for numeric values), Datum fields and “Document”.

When activating the option “Show predefined fields with special properties” you will get a list of predefined fields. These fields belong to two different groups: in the 1st group you will find fields which are available in the gauge’s basic data and can be used as a “Cross reference” field; the 2nd group contains predefined fields which you can use for the history.

Modifying data in the gauge Basic data / “Cross reference”

Using one of the existing “Cross reference” fields, it becomes possible to link a field of the gauge history to a gauge basic data field (for example to “Usage location”). This link between the fields can be used to change the content of gauge basic data fields as a result of a gauge action (for example to record the “move” of a gauge from one location to another location).

5.2.3.4 Tab “Calculation - calculation position”

This page is only visible, if you have a license of the QMSOFT®/QM-CALCUL program and the use of this program is activated.

The function will enable you to add paid positions to an action (see section *Financial calculations with QMSOFT®/QM-CALCUL*).

5.2.3.5 Tab “Statistic”

As in other parts of the program, you can display with the help of this function, which actions are used in which datasets (clients) and how many times they are used. This is helpful, for example, to identify such items, which are never be used.

5.2.4 Settings > Types

The program QMSOFT®/QM-MANAGE has been specially designed for quality assurance of gauges for dimensional length measurement. This includes not only gauge data management but nominal value generation, tolerance calculations as well as the inspection itself. The program can also be expanded to incorporate gauges for other purposes (for example: electrical measurement technique etc.) with relatively little difficulty. Therefore, the gauge basic and inspection data structure as well as the nominal value generation and on-line measurement programs can be defined and configured independent of the adminstration programs.

The menu item *Settings* → *Types* can be used to create new or to edit of existing gauge type items. As you already know every gauge item in the QMSOFT®/QM-MANAGE database is assigned to a “Gauge type”. The type information is defining the technical properties (data fields) for all of the gauges, which are assigned to this gauge type.

The standard dataset structure, which was used for the creation of the QMSOFT®/QM-MANAGE database contains a collection of pre-defined gauge type items. As soon as you have to manage such gauges, which you cannot find a fitting gauge type item in the dataset, you have to define a new one.

Warning

By using the menu item *Settings* → *Types* you will get access to a central feature of the program QMSOFT®/QM-MANAGE. Please be careful while using this function, because it will change the structure of your gauge data immediately. Be sure to have a backup copy of the database to be able to roll-back your changes!

Note

Using the menu “Specials” you will get the function”Import original type definition(s). Especially when you have installed an QMSOFT® update you can import the latest gauge type modifications to ensure, that your type definitions will be match with the current QMSOFT® version! Be carefull when you have done modifications on the QMSOFT® standard types!

Opening the menu, you will get the following screen [Fig. 5.2.8] showing all gauge types defined:

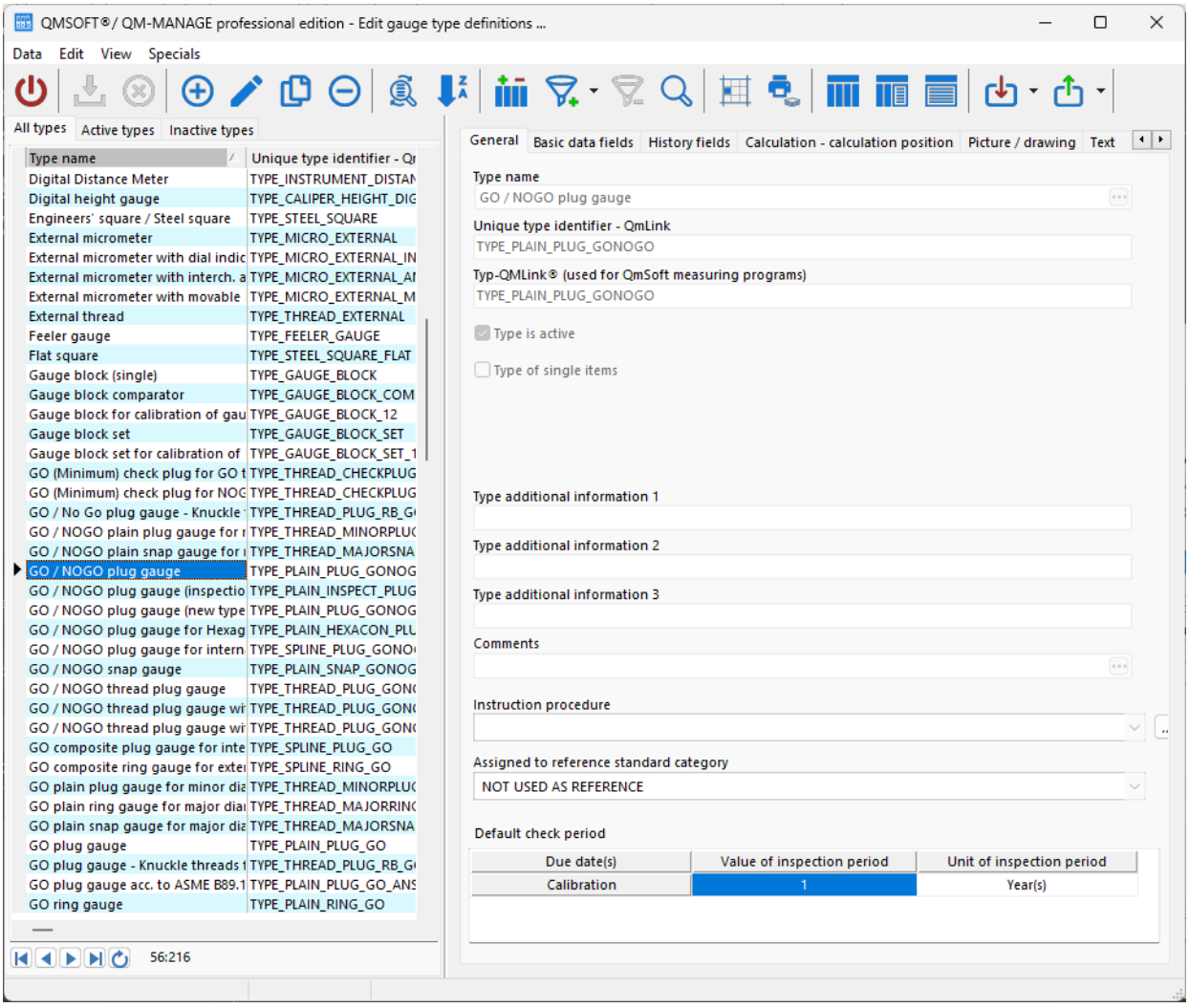


Fig. 5.2.8: Gauge type items.

In the tool bar you find the functions “New” for creation of a new gauge type, “Copy” for creation of a new gauge type based on an existing one and “Delete” to remove a type.

You can not delete a gauge type as long as there are gauges from this type in the dataset. This will also include the “Trash” storage. You can use the tab “Statistic” to check, where which gauge types are in use, and how many gauges exist for every gauge type item.

Warning

You should never change existing gauge types, which are using “external programs”! This may disturb the data exchange with this programs. Use a copy to make your changes! In spite of it you can add new fields at any time.

Note

The inserting of a new gauge type item will be very easy, if you are making a copy of an existing gauge type. Specially for serious existing “Special gauges” in most causes it will be sufficient to copy the existing type “Other

gauge type" and changing the type name and identification. If you need more information to describe the new type, then add new fields. We recommend basically to use the "Copy" function instead of the function "New"!

5.2.4.1 Tab "General"

Enter this information to make the general description of a new gauge type:

- **Type name**
  The type name is the caption of the gauge type item, which will be used to display on the screen display and for all of the printable documents. Pay attention, that the "Type name" does have a multi-language property. Click on the button to the left of the name to enter the translation for the available languages.
- **Unique type identifier - QmLink**
  Internal identifier of the gauge type item, which will be used also for the data exchange (for own gauge type items you can define it free of any syntax).
- **QmLink name (used for QMSOFT® measuring program)**
  Internal identifier of the gauge type item, which will be used for calling of external programs (normally QMSOFT® programs for tolerance calculation and for gauge inspection), which cann be empty, if no external program should be linked. Please do NOT CHANGE this item for all of the existing gauge type items!
- **Type is active**
  Can be used to "deactivate" gauge type items, if this items are not needed by the users (in this case the type item does not appear in any selection list, but it can be re-activated very easily).
- **Type of single items**
  The program is able to manage such gauge types, which are organized in sets of a number of homogeneous gauges (for example gauge blocks in gauge block sets, cylindrical pins in sets of cylindrical pins etc.). If you want to define a gauga type item as such a "set", please activate this checkbox. As soon as this checkbox is marked, a list of exisiting gauge type items appear to select the type of the elements inside of this set (for example select gauge block for a set of gauge blocks).
- **Set type**
  For some set type definitions exists pre-defined series of the content of the set to load it. Select the related category of the set structure.
- **Type additional information 1, 2, 3**
  If you want you kann fill out this fields with additional information to describe and identify the gauge type item.
- **Comments**
  If you want you kann fill out this field with a comment.
- **Instruction procedure**
  Please select from the list of all of the existing inspection instructions the related item (see chapter *Inspection instructions*).
- **Assigned to reference standard category**
  All of the existing gauge types can also be used as a reference standards, which is used for the calibration processes (see chapter *Standards and instruments*). By selecting a category, you define, in which of the categries the gauge type item will be listed. Select the category "NOT USED AS REFERENCE", if the gauges assigned to this type should not appear in the management of the reference standards.
- **Default check period**
  Enter the default inspection period to use for this type. In case that several "Classes of due dates" does exist, enter the related period for each.

5.2.4.2 Tab “Basic data fields”

The “basic data fields” give you the possibility for a free definition of the “Type specific data”. This means here you can enter all the “Field names” and the related information, which should be saved into the database only for this type of gauges. The next figure [Fig. 5.2.9] will show it for the type “GO plug gauge”.

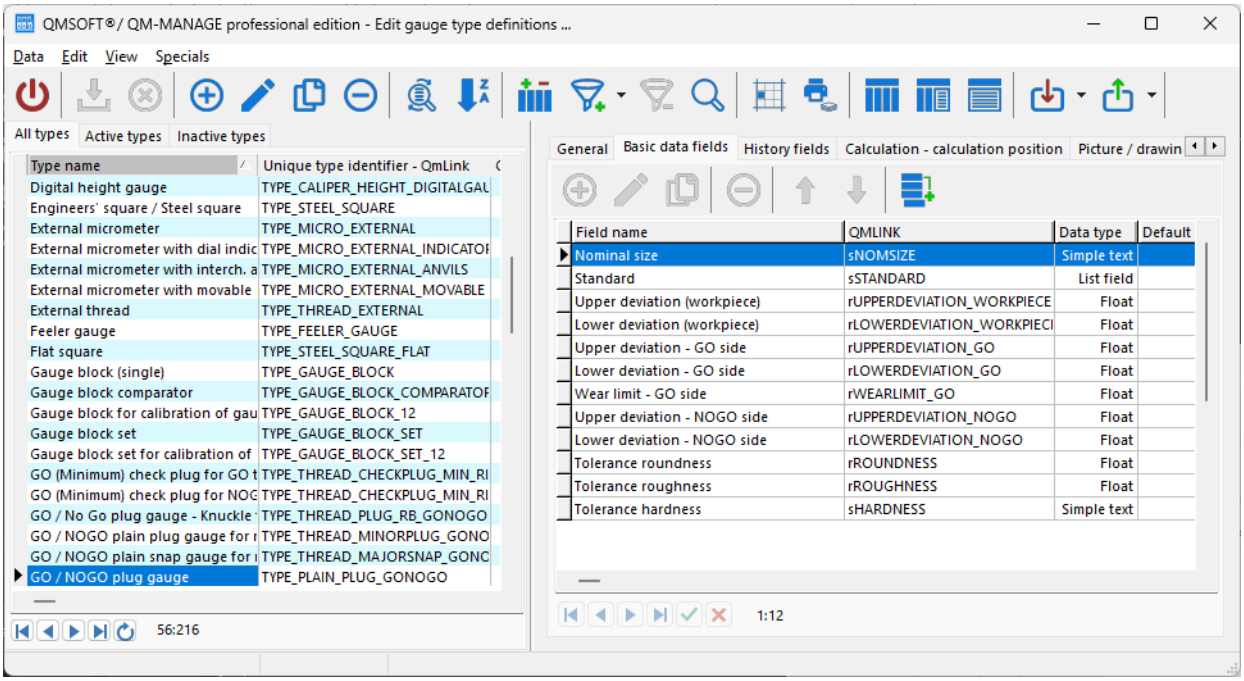


Fig. 5.2.9: “Basic data fields” of gauge type item “GO plug gauge”.

When you click the `Edit` button, you can modify the existing “Basic data fields”. The next figure [Fig. 5.2.10] shows you the properties of the fields.

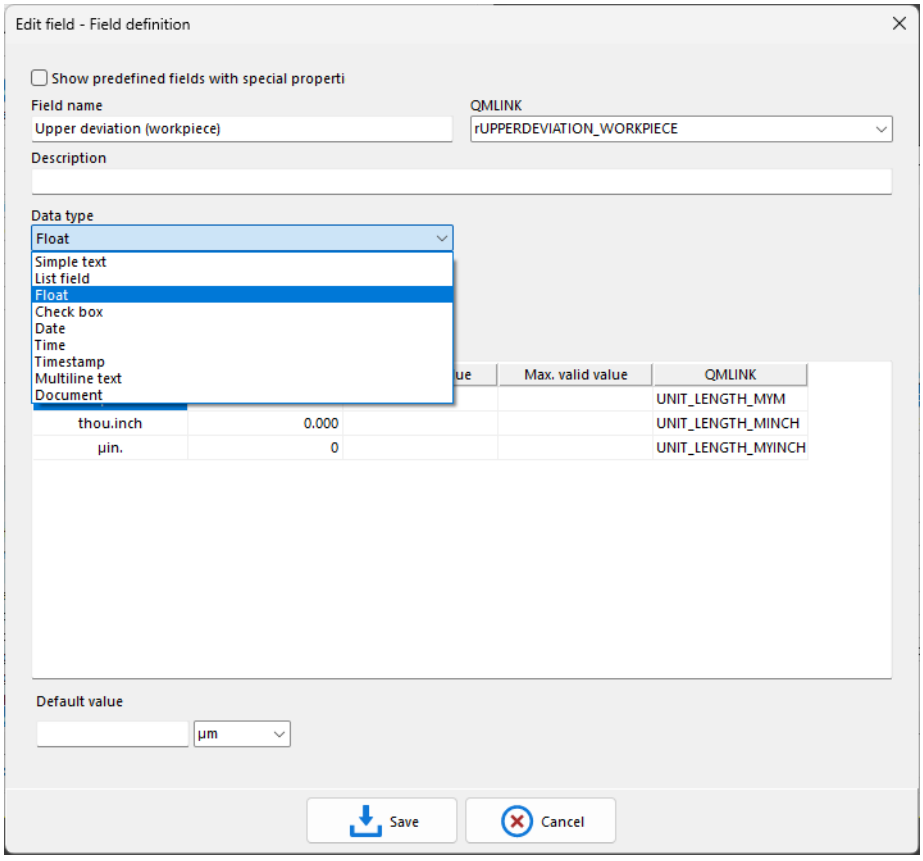


Fig. 5.2.10: Properties of a data field, data type “Float”.

- Field name

  The name (caption) of the data field to show it on the screen.

- QmLink name

  This is an internal identifier for unique identification of the field. Mainly it will be used to assign the field content, if an external QMSOFT® program is assigned. For example: the identifier “rMEASURE_ROUNDNESS” will always identify the result of the roundness measurement independent of the field name, which is currently used. The QmLink names are also being used for the translation of a dataset contents and for the export and import of data.

- Data type

  Does define the type of the field contents like “Text field”, “Numerical value”, “Date”, “List of fixed text” or “Document” [Fig. 5.2.10].

- Field width

  Dependet on the field type here you have to define the “Field width” (the maximum length of the field content).

- Units

  For “float” fields you have to define the “unit”(s), which you want to use for this value. You can also define a list of different units. If there are more than one unit defined for a field (for example “mm” and “inch”), you can select the “default” unit. For each unit, enter the format to specify the number of decimal places.

- Default value

  You can define a “Default” value, which will be filled into the field, when you insert a new gauge of this gauge type item.

For existing gauge type items that use “external” QMSOFT® programs (measurement programs, nominal value calculations), the QmLink names must not be changed!

5.2.4.3 The use of special, predefined fields

If you activate the option “Show predefined fields with special properties”, you will receive a list of fields with a fixed meaning and a unique QmLink.

These fields and ther meaning are:

- **Designation / Nominal size / Range QmLink = sNOMSIZE**
  This field creates a link to the “Description” (nominal value) field in the basic data view to display it in the gauge list; It is useful to define the first field in the list as the “Designation / Nominal size” field with the QmLink “sNOMSIZE” for all instrument types.
- **Standard / Tolerances QmLink = sSTANDARD**
  The simplest case is to define a simple list of names where you can select the text; However, this is of little use if you want to use the tolerance tables and calculation rules stored in QMSOFT® (an overview of the functions included can be found in section *Tables of error limits (Tolerance tables)*). For this purpose, it is generally recommended to activate the option “Select tolerance tables by tolerance structure”. This allows you to define a filter condition that selects the possible tolerance tables for these types from the existing standards. This is shown in the figure using the example of an external micrometer [Fig. 5.2.11]. If you select the “External micrometers” structure here, all available and active tolerance tables for external micrometers will be displayed later. By setting an additional filter, you can further restrict the selection of tables in some categories, for example to certain types of construction. You can use the “Default value” field to set an automatic default for selecting the standard.

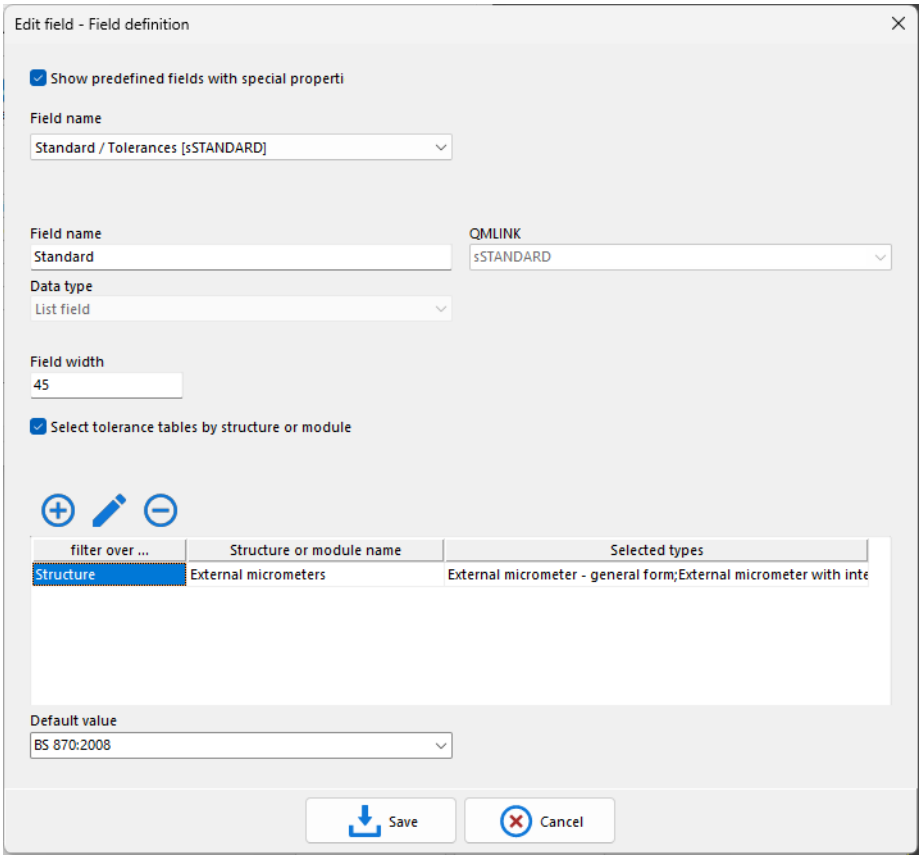


Fig. 5.2.11: Defining the field “Standard” for external micrometers.

- **Selection “Structure” or “Calculation module”**
  When defining the “filter over” condition for the standard field the first selection is “Structure” or “Calculation module” [Fig. 5.2.12]. All standards which are not assigned to a calculation modules provide a tolerance table from which the required limit values can be read directly. Calculation module, signals that the values are provided by a QMSOFT® calculation module.

Note

Using a calculation module will usually require a special license! For all pre-defined types in the QMSOFT® system you should not change these settings!

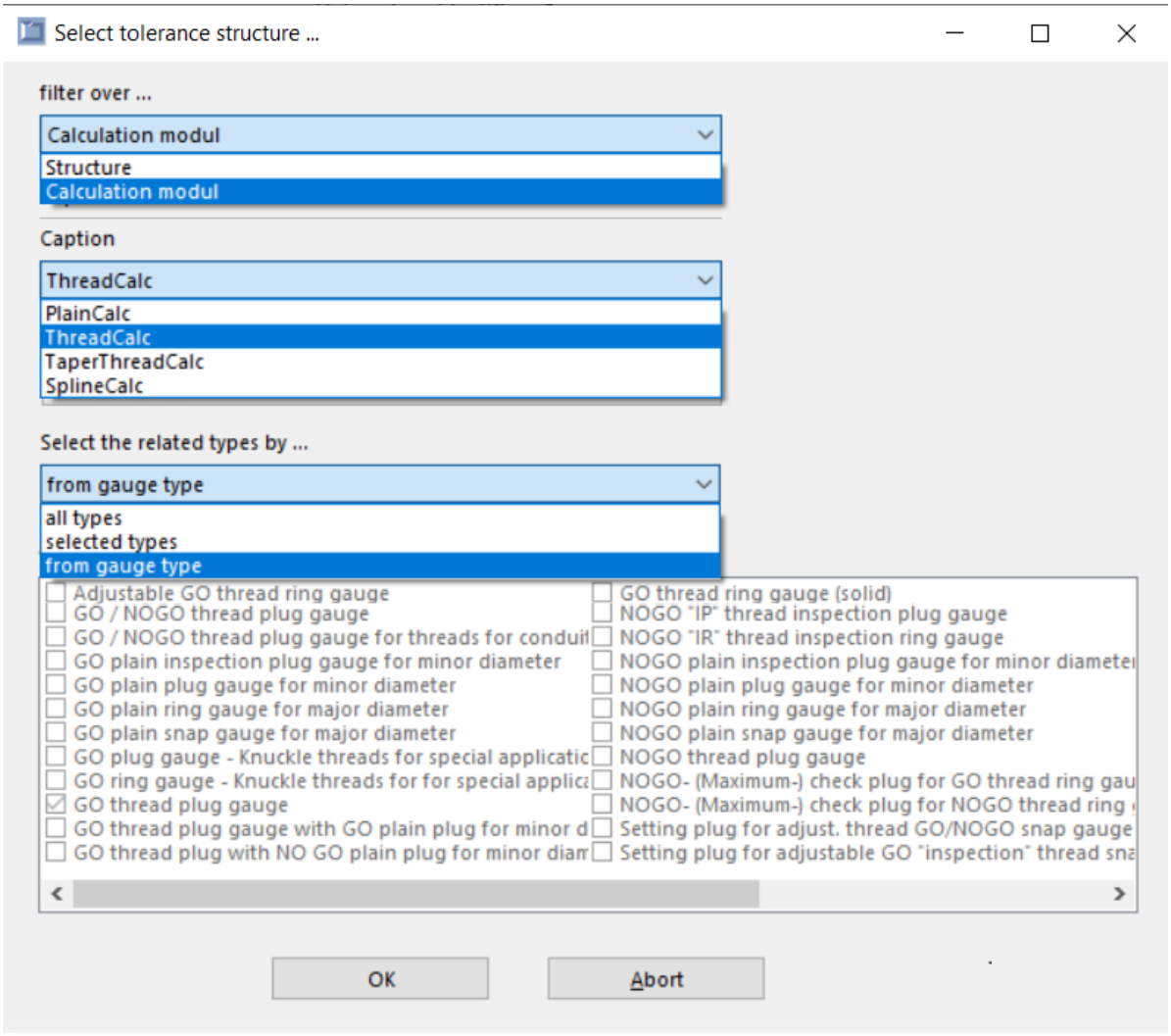


Fig. 5.2.12: Possible settings for the selection of a calculation module.

- **Inspection schedule QmLink = INSPECTIONPLAN**
  When you are using the program QMInspect, you can use this field to assign the related inspection schedule(s) to the gauge type; in this case the schedule will be loaded automatically when you start the inspection. Moreover, if many schedules do exist, it will save you the laborious search for the correct one. Use the import function, to see all available inspection schedules and to mark all usable for this type.

5.2.4.4 Tab “History fields”

Here you can define gauge type dependent fields, which should be saved into the gauge history while executing the specified “Gauge action”. The procedure to define these fields is the same as described before for the actions. Please note that you can define these fields for each gauge action separately!

For the action “Gauge inspection” there are fields for the inspection results and for saving the calbration certificate. The figure [Fig. 5.2.13] illustrates this using the example of a Go plug gauge.

To define history fields please use the same steps as for the basic data fields.

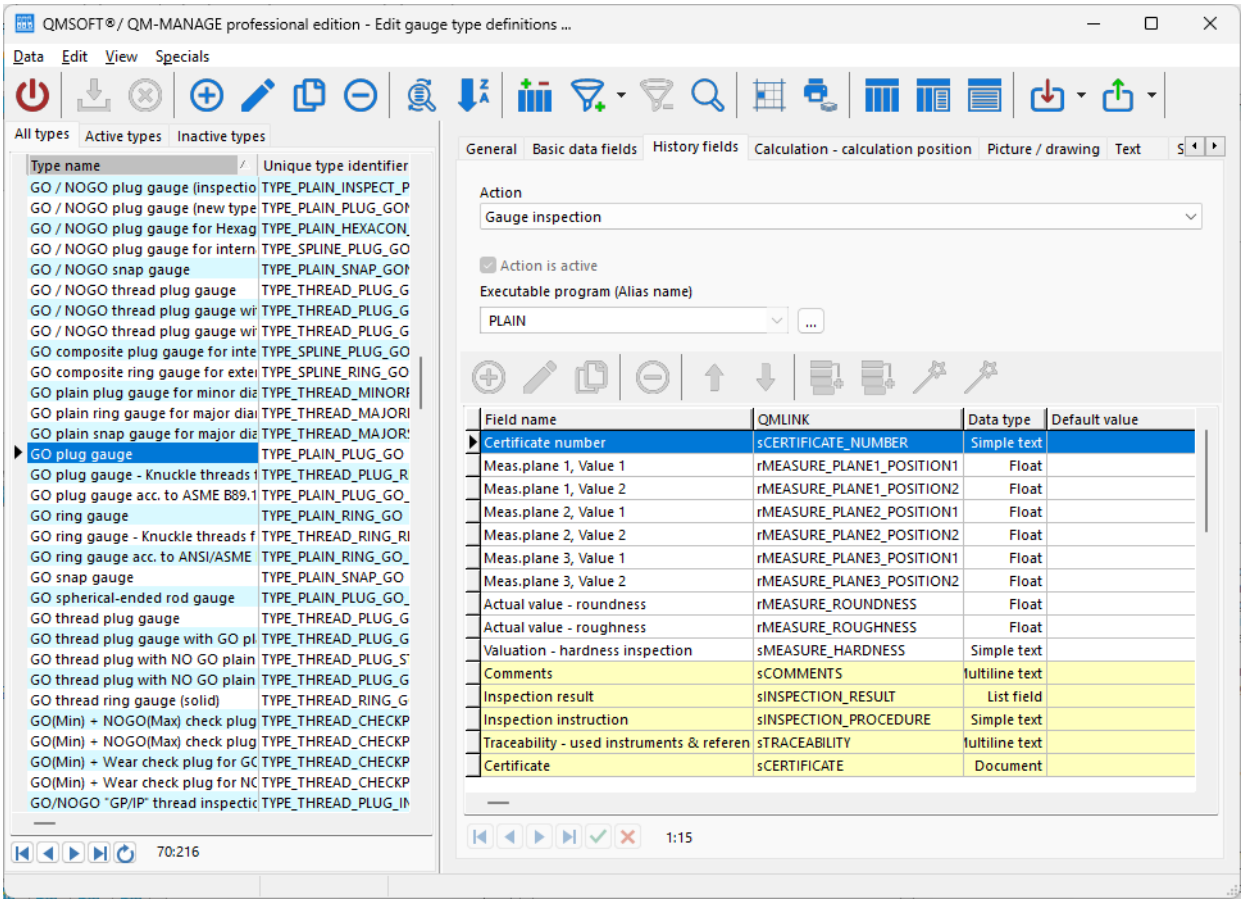


Fig. 5.2.13: History data fields of a “Gauge inspection”.

Fields, which are marked with yellow color, are already defined in the context of the related “Gauge action”. These fields are available in any gauge type. With a special function you can “unlock” these fields for an individual configuration. Otherwise you can also use the complementary function to lock a new field by assignment to the action definition and make it available for all gauge types.

In addition to defining the fields the following parameters can be set for each action:

- **Action is active**
  Here you can define, that a gauge action can be executed for this gauge type item or not.
- **Executable program (Alias name)**
  If the gauge action should generate “nominal values” or if you want to call an external program (for example a QMSOFT® inspection program) to perform special operations related with the gauge action you can her enter the “Alias” name of this program. Click at the “drop down” field to see the list of the programs available.

Distribute changes of history fields to other/to all gauge type items

In ths dialogue form you will also find special tool buttons to distribute your defined fields to other action items or to other gauge type items. This will avoid to do the same operation again and again, when you want to use identical fields for all types or for different actions.

The next figure [Fig. 5.2.14] shows the button for distributing the history fields into other types:

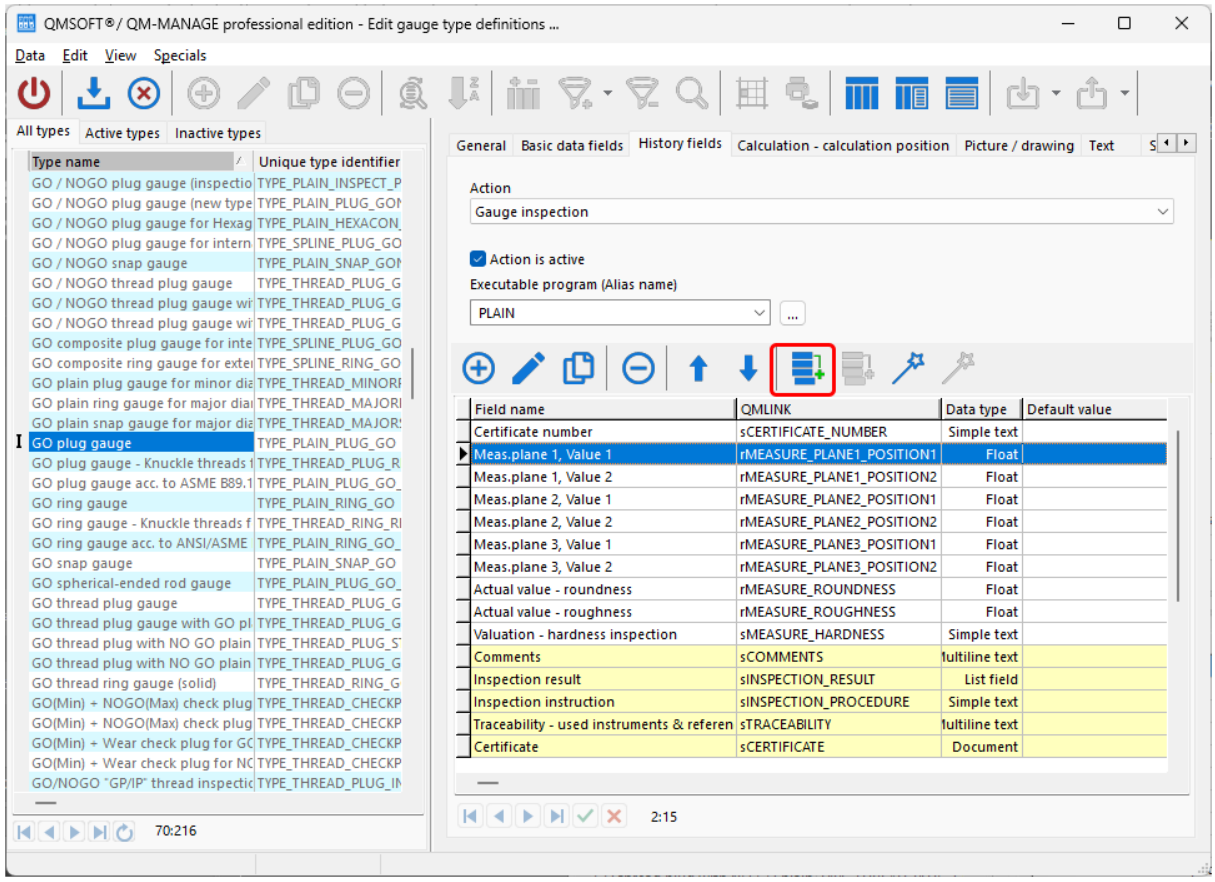


Fig. 5.2.14: Menu buttons for distributing the history fields.

By clicking onto this buttons you will get the following selection form [Fig. 5.2.15]:

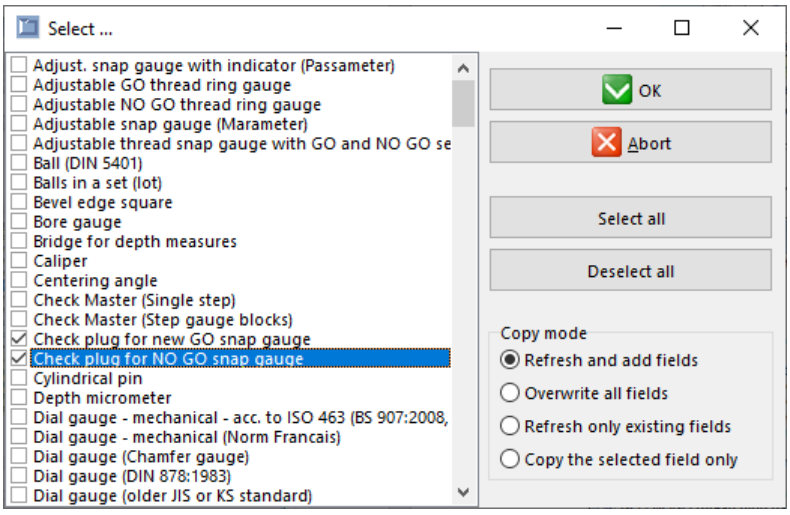


Fig. 5.2.15: Select the destination gauge type items to distribute the fields.

Define here:

- into which gauge type item(s) the selected history field should be copied (use the button `Select all`, if you want to copy into all gauge type items).
- which kind of "Copy mode" you want to use: in most cases the mode "Refresh and add fields" is the 1st choice to synchronize exisitng and add new history fields.

Click onto the `OK` button to execute the operation.

Warning

Be very careful when using this function! The unintentional overwriting of gauge type information can produce gauge type items, for which the tolerance calculation or inspection procedures will not work.

5.2.4.5 Tab "Picture / drawing" and tab "Text"

Using this function, you can store a picture and/or a text document for each gauge type item.

5.2.5 Settings > Program links

Program links will be used to link a "gauge action" with an external program to perform the related operations (as described in the previous chapter). You can use this function to define "exceptions" of the usual QMSOFT® rules, for example to link the QMSOFT® management program with a suitable 3rd party program.

Usually there is no need to use this function because all program links will be set automatically during the QMSOFT® installation process.

5.2.6 Settings > Program settings

You can setup here some basic properties of the program [Fig. 5.2.16]. They will be set to default values while installing QMSOFT®. These settings are separated in general settings, which are valid for all existing databases, and special settings which are valid for the database structure and/or the dataset (client) being currently opened.

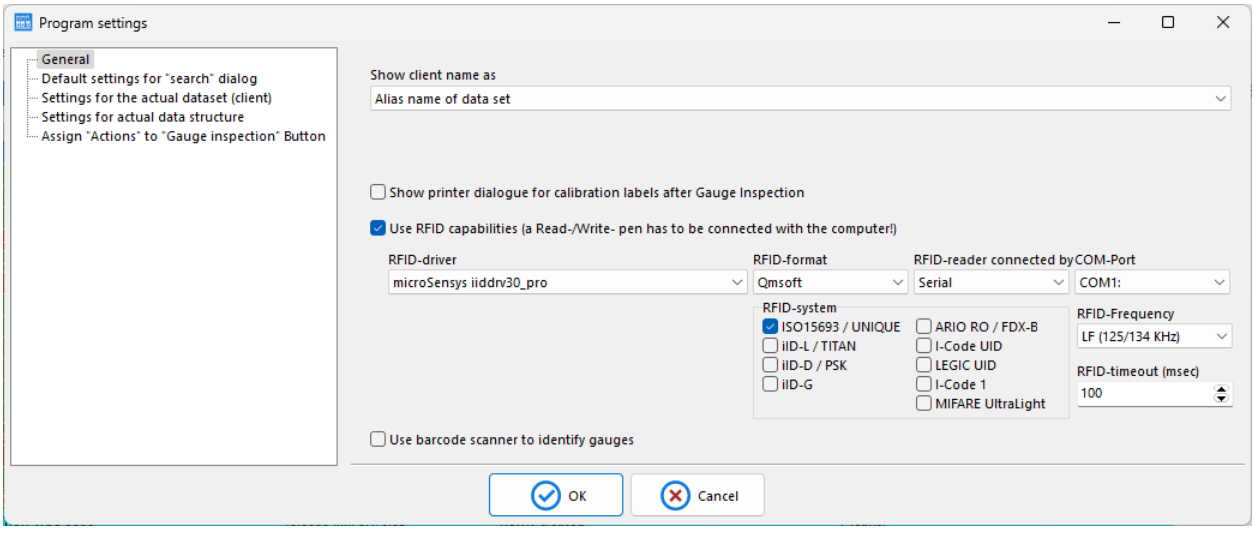


Fig. 5.2.16: General settings.

Note

The “Settings for the actual dataset (client)” and “Settings for actual data structure” correspond with the settings, which you can do in the “Laboratory management”. Therefore, refer to these functions in section *Database structure(s)* and *Dataset (Client) management* of the manual.

5.2.6.1 General

On this tpage you can set the following parameters:

- **Show client name as**
  Here you can define, which kind of client information should be used to identify a dataset (client).
- **Show printer dialogue for calibration labels after Gauge inspection**
  If you want to print out a calibration label after every executet gauge inspection action, so mark this clickbox. Normally you should have a specialized “label printer” and a report layout for the labels.
- **Use RFID capabilitie** and **use Bar Code scanner to identify gauges**
  For a quick read-in process of the identity number and for a very fast search of a gauge item QMSOFT® offers the feature to read in gauge data from a Bar Code Scanner device or from RFID-device. If you want to use such devices, please activate the related option (set a checkmark).

5.2.6.2 Default settings for “search” dialog

Here the properties of the search-functions can be defined, for example the database field, which should be offered as a pre-selection in the search dialogue form.

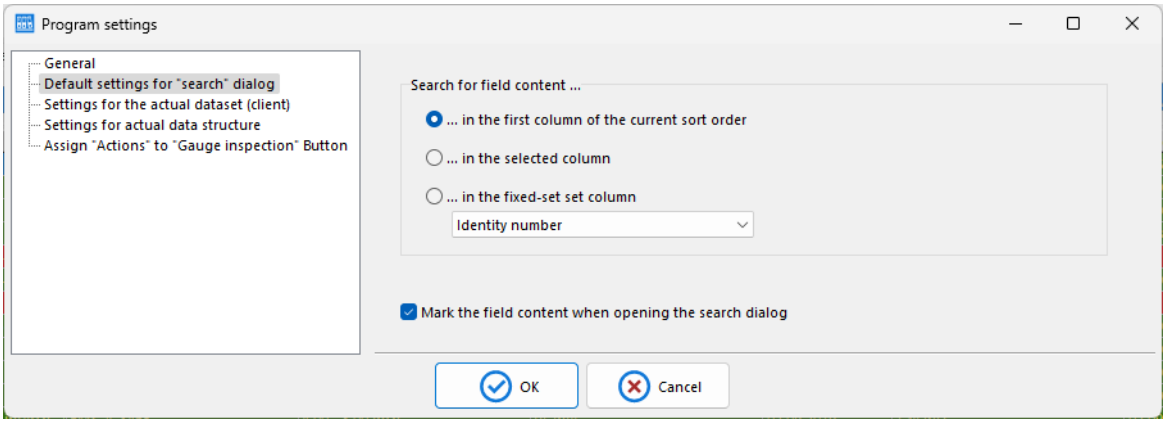


Fig. 5.2.17: Configuration of the Search-function.

The settings in the figure above [Fig. 5.2.17] have the following effects:

- **… in the first column of the current sort order**
  This choice will use the field of the 1st column of the actual sort order of the dataset.
- **… in the selected column**
  This choice will use the field (table column), which has the actual database cursor (marked).
- **… in the firmly set column**

This choice will use a fixed field (which you have to define), independet of the actual sort order or of the actual database cursor position.

5.2.6.3 Assign Actions to `Gauge inspection`

For using the gauge management program one of the basic procedures is to execute different "actions", which are applied to the gauge item(s), and which are stored into the history of the gauges. To have a "quick-start" feature for special (and often used) actions you have a special button (icon) in the toolbar of QMSOFT®/QM-MANAGE, which is assigned to the action item "Gauge inspection" as default.

With the help of this function you can change or extend this assignement individually.

CHAPTER 6

The management of calibration orders

6.1 Basic function of order management - create a new order

To use order management, please note that

a) a special license is required.

b) you must activate the “Usage of order management” option in the QMSOFT® user administration.

To start the order management open the QMSOFT®/QM-MANAGE program and use the menu *Order management* [Fig. 6.1.1].

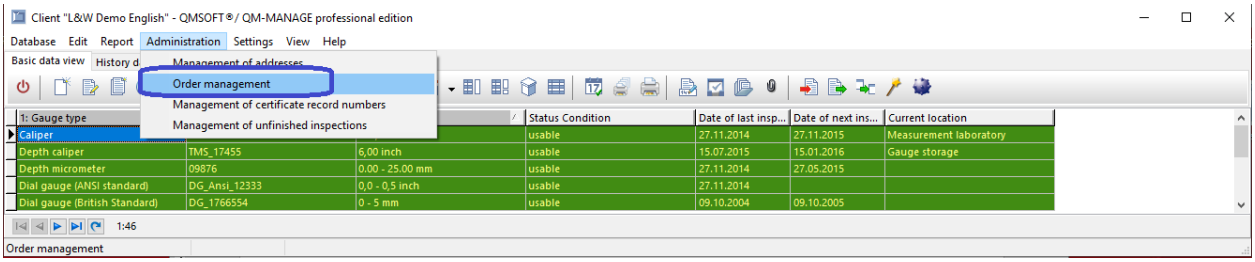


Fig. 6.1.1: Start of Order Management option.

You will now get the following screen [Fig. 6.1.2].

Fig. 6.1.2: Order management - start screen.

If there are already orders for this customer, they will be displayed here. The orders displayed are divided into categories *Orders in progress*, *Not settled orders*, *Archived orders* and *all orders*. A newly created order will of course be displayed under *Orders in progress*. *Not settled orders* are orders that have been completed but for which no billing information is yet available.

The order history includes all work steps for this order. The first step, which is created automatically, is "Receiving goods".

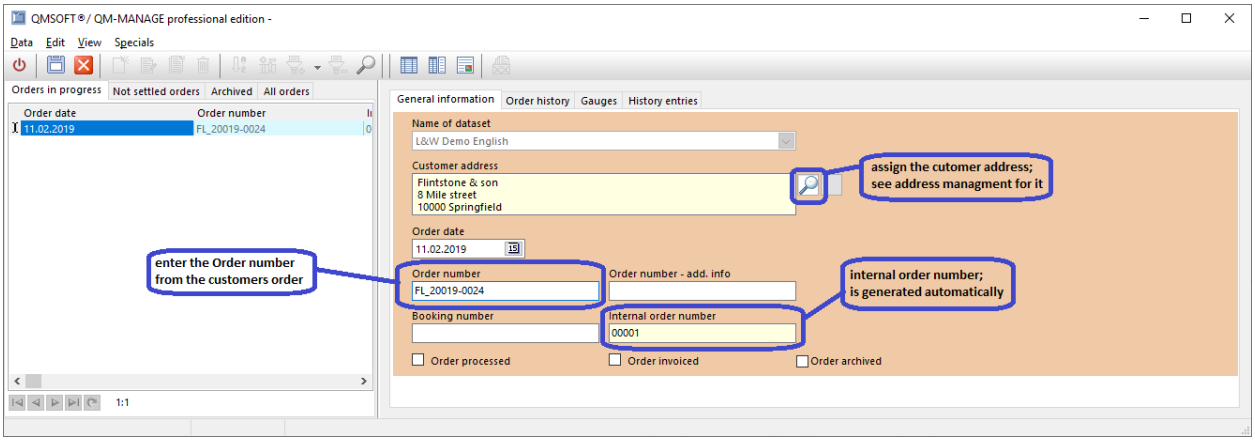


Fig. 6.1.3: Create a new order and entering order parameters.

To create a new order, press the `New` (Insert) button and enter the required information as shown in the screen shot [Fig. 6.1.3].

Please note the checkboxes that indicate the processing status of the order. Although you can set this manually, we generally recommend following the usual process flow that sets this status automatically. For example, when you click "Generate the delivery note" the status "Order processed" is automatically set!

Note

The step "Settle the order" can only be carried out in the QMSOFT®/QM-CALCUL program and is an additional option of the QMSOFT® programs. If you do not use this option, you can set this flag manually.

6.2 The execution of an order

Of course, an order consists of several positions. These are usually gauges or other test equipment for which calibration is to be carried out. The next step after creating a new order is to assign the corresponding positions (gauges) to the order.

There are two ways to assign tools to an order. You decide which is best for your organization:

- Direct assignment of all individual tools in the order management by selecting each individual tool from the existing customer data set. This approach is problematic if not all relevant tools are available in the database!
- You only assign a tool to the order when the required action - in this case usually the “gauge inspection” - is started.

Both options are explained in the next section.

6.2.1 The assignment of tools to the order

After creating a new order, you can now switch to the *Gauges* tab. Click the `Assign` button to display the list of existing tools [Fig. 6.2.1].

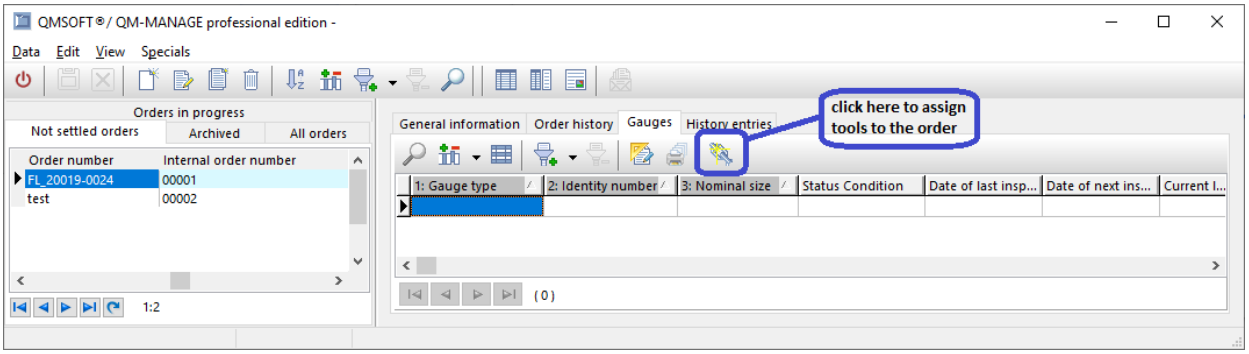


Fig. 6.2.1: Open the function to assign tools to an order.

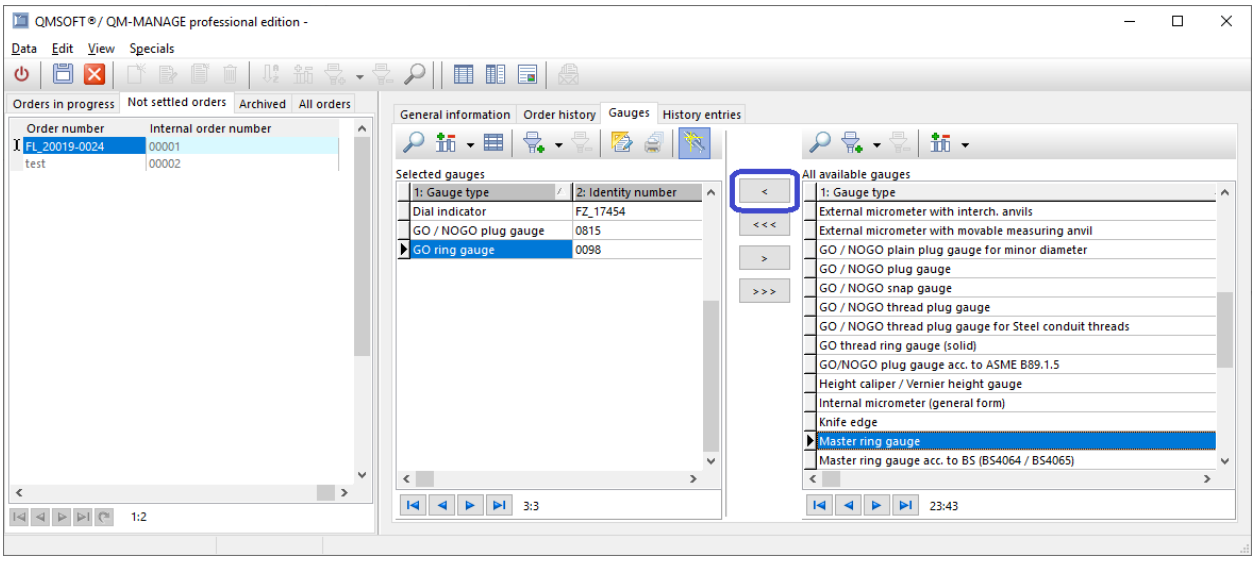


Fig. 6.2.2: Tool assignment to the order.

Now select the measuring instruments for the order step by step [Fig. 6.2.2]. Make sure that the corresponding order is in “Edit” mode. Close the order management when you are finished.

If the tool is not in the list, you must close the order management to first insert it into the gauge management or use the option described below.

6.2.2 Assign tools to an order when doing a calibration

As soon as an action - usually a calibration - is carried out for a tool, it must be clear to which order this belongs. If the assignment to the order has already been made as explained in the previous section, the corresponding order number is already filled in [Fig. 6.2.3].

If not, you must assign it when starting a calibration. If an order number has not yet been created, you can do so here.

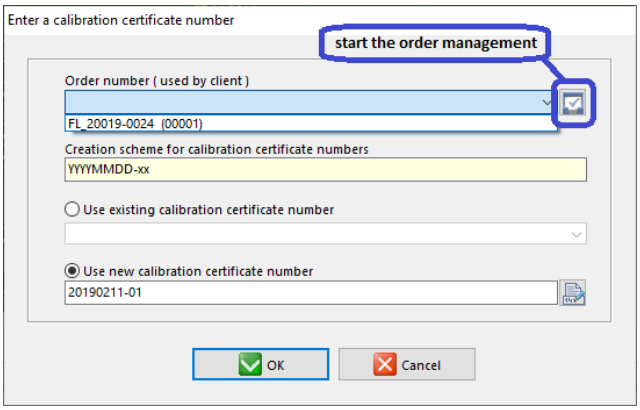


Fig. 6.2.3: Select the corresponding order.

6.2.3 Processing an order and monitor its progress

The easiest way to check the current progress of your work is to apply a filter to the customer record. For example, you can filter by “Order number” and “Last calibration date”. If you set the “last calibration” date to a value before starting the order processing, you will be shown all the tools that still need to be calibrated [Fig. 6.2.4].

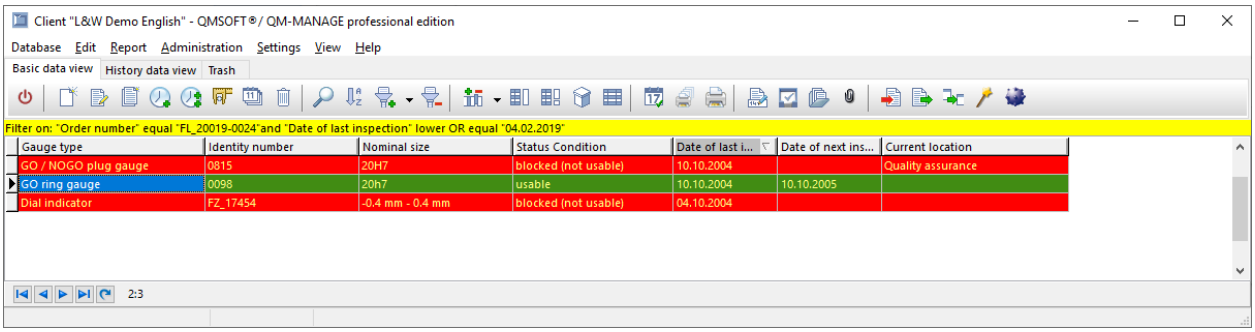


Fig. 6.2.4: Filter showing the remaining tools in the current order.

When the calibration is complete, the “Last calibration date” will be updated and the corresponding gauge will disappear from your screen.

6.2.4 Completion of the order, preparation of the delivery note

After carrying out all the calibrations belonging to the current order, start the order management again. Your current order is still in the “Orders in progress” tab.

Select the order in your list and open the tab “History entries”. Here you can now check again if all calibrations are done and you have not forgotten anything.

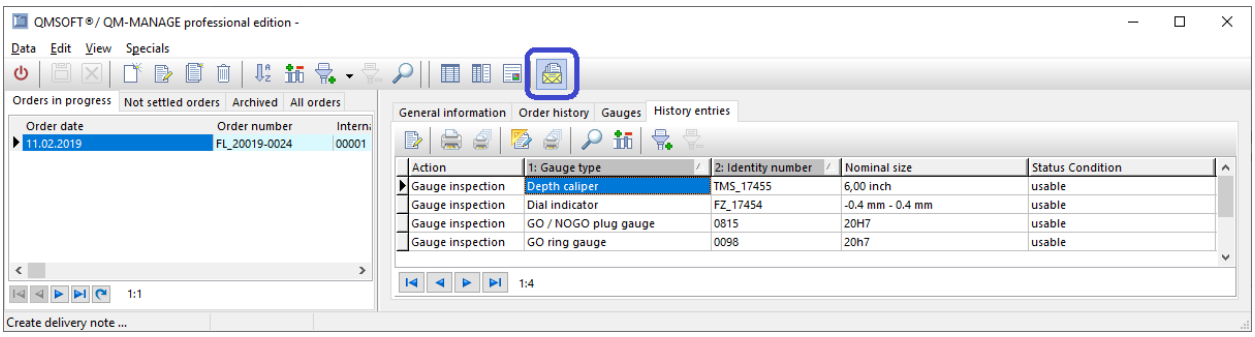


Fig. 6.2.5: History overview.

Now you can click on the button `Generate delivery note` [Fig. 6.2.5].

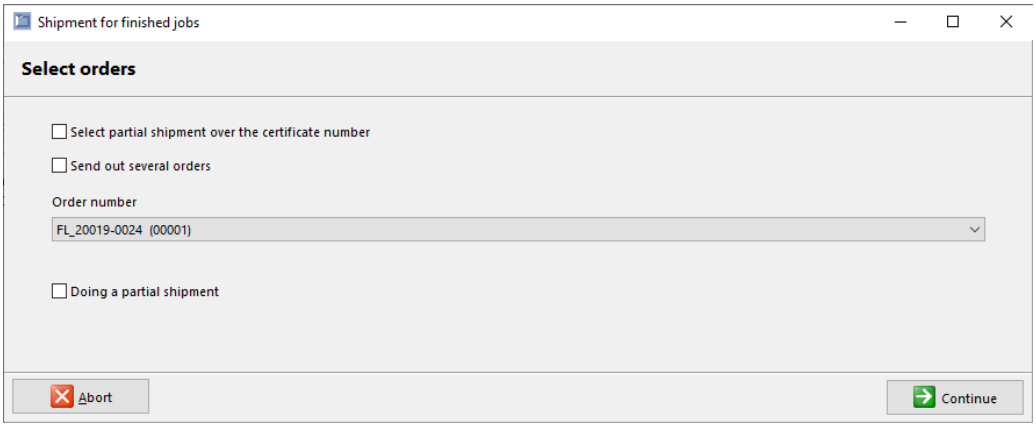


Fig. 6.2.6: Selecting orders for a delivery note; Specifications for partial delivery.

Usually we recommend the simple rule: one order, one delivery note, here you can combine several orders in a delivery note or to carry out a partial delivery [Fig. 6.2.6].

Now click the button `Continue`.

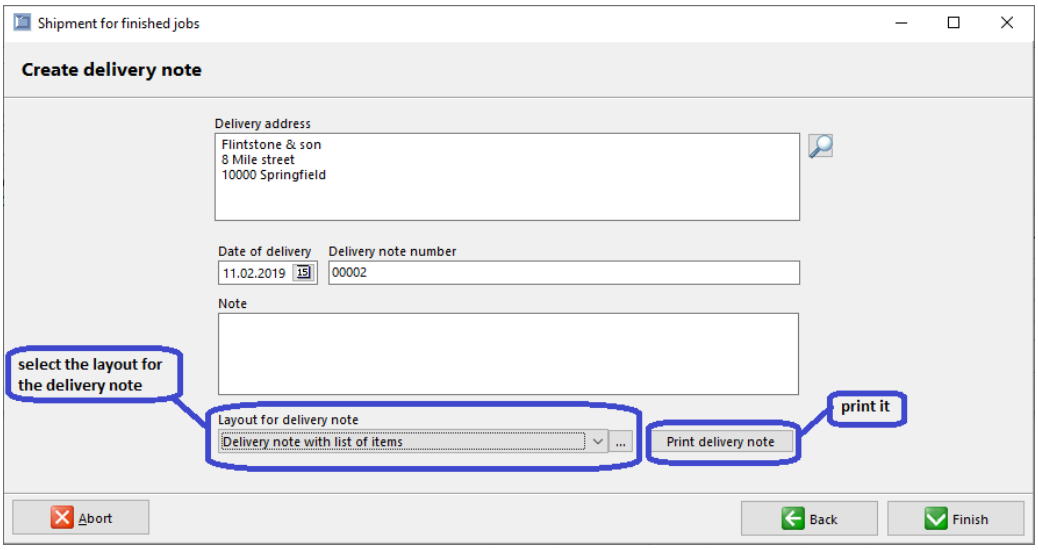


Fig. 6.2.7: Generation of the delivery note.

Select the related layout file and press the `Print` button to create a PDF document for it [Fig. 6.2.7].

After this, press the `Finish` button to complete the processing of the order. The order will now have marked as "Order processed" and does disappear from the "Orders in progress". Now it's visible in the *Not settled orders* tab [Fig. 6.2.8].

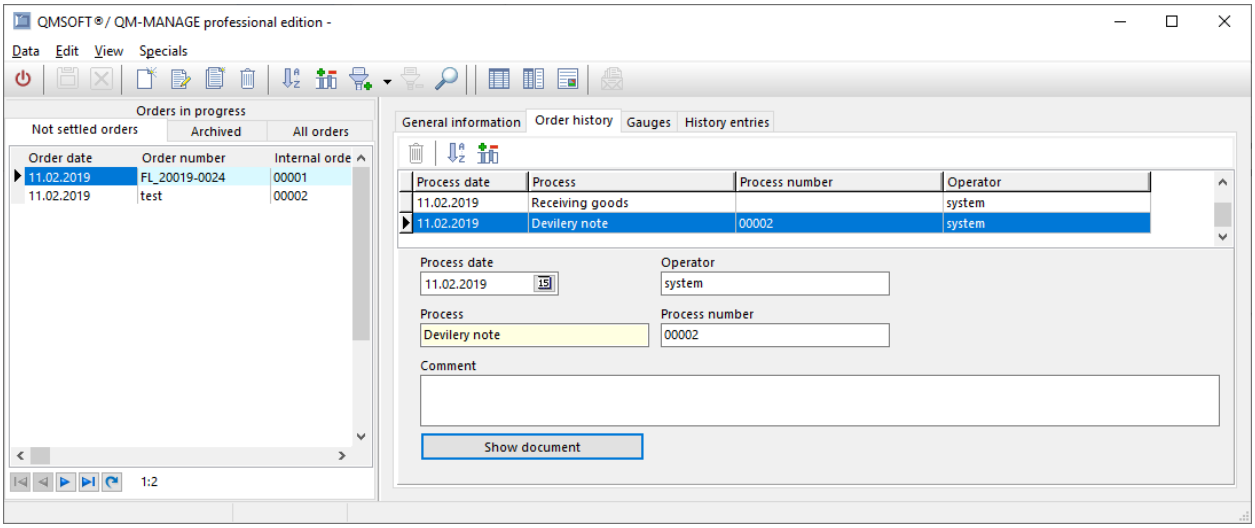


Fig. 6.2.8: Order status after the creation of the delivery note.

6.3 Financial calculations with QMSOFT®/QM-CALCUL

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.1 Settings

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.1.1 Adresses

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.1.2 Price lists

This part of the manual is not available in the English manual, we ask for your understanding!

Product groups

This part of the manual is not available in the English manual, we ask for your understanding!

Products

This part of the manual is not available in the English manual, we ask for your understanding!

Using the feature “Sub product of”

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.1.3 Business processes

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.2 Settings in QMSOFT®/QM-MANAGE

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.2.1 Links between prices and history actions

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.2.2 Linking between prices and gauge types

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.3 Using of calculation positions in the gauge management

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.3.1 Application of calculations to an “action”

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.3.2 Application of gauge-type-dependend calculation positions

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.4 Calculation of services in QMSOFT®/QM-CALCUL

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.4.1 General case

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.4.2 Calculation via inspection orders

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.4.3 Print invoice and close calculation process

This part of the manual is not available in the English manual, we ask for your understanding!

6.3.4.4 Calculated positions in QMSOFT®/QM-MANAGE

This part of the manual is not available in the English manual, we ask for your understanding!

CHAPTER 7

QMSOFT® inspection programs

The various QMSOFT® inspection programs are implemented for specific groups of gauge types and are doing…

- the calculation of tolerances and nominal values based on the relevant information about the gauges, and this information is either requested in the form of an input dialog or transferred from the gauge management program QMSOFT®/QM-MANAGE, when you call the inspection program from there;
- the execution of inspection procedure according to different standards by data input via keyboard or by acquisition of measured values from QMSOFT®/QM-DeviceServer;
- the calculation of evaluated parameters and compliance statement;
- the creation of a calibration certificate, which is based on the corresponding layout templates;
- the return of the results and calculated data incl. of the calibration certificate to the gauge management program QMSOFT®/QM-MANAGE.

For the implemented standards and guidelines please refer to the related parts of this manual. The knowledge about these rules by the QMSOFT® user and the mastery of the measurement methods, which are used for the inspections, is assumed.

7.1 General structure of QMSOFT® inspection programs

The QMSOFT® inspection programs are following a largely unified control scheme, the general structure will be briefly outlined here. The gauge type depended properties we will describe later in the relevant parts of this manual.

7.1.1 Start an inspection program

You can start one of the QMSOFT® inspection programs either directly from the main winddow of the launcher QMSOFT®/GaugeMan (by clicking onto the corresponding icon in the form area “Inspection programs”) or by executing a gauge action “Gauge calibration” in the gauge management program QMSOFT®/QM-MANAGE. The QMSOFT® inspection program will use in both cases the login-information of the calling QMSOFT® program.

Note

After the first start of each of the QMSOFT® inspection programs you should preset or check all of the parameters of

- the connection to a measuring device,
- the inspection procedure,
- the measuring uncertainty,
- the traceability and
- for the certificate templates.

7.1.2 General Screen Layout

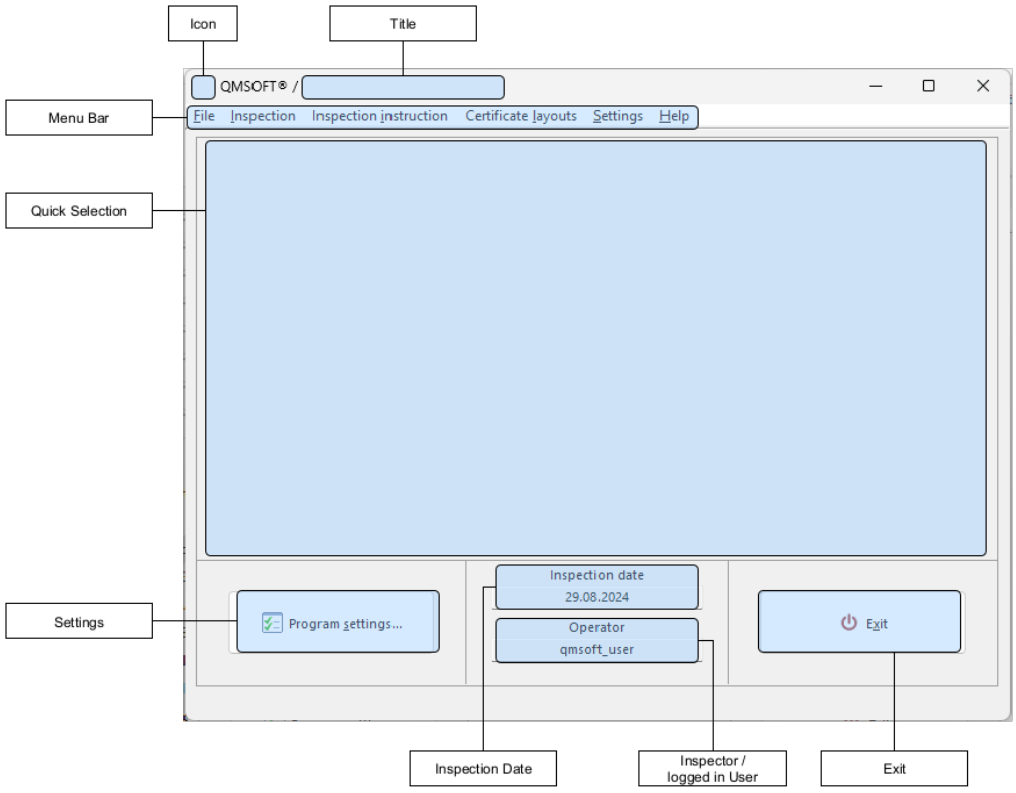


Fig. 7.1.1: General program view after starting the inspection program.

7.1.3 Settings > Program settings

The menu item *Settings* → *Program settings* allows to adjust various basic settings according to the present circumstances. The different categories of settings are described below. Most of the settings have been preset by the installation of QMSOFT® to ensure the correct work of the program as far as possible.

The dialogue form displays at the left side of the window a tree structure with the different categories, into which these program settings are divided. The appropriate fields in the right pane will be displayed by clicking on an appropriate tree branch.

7.1.3.1 General settings

In every QMSOFT® inspection programs you will have this category, where you can connect the program to one of the measuring devices (as soon as at least one measuring device object was created in QMSOFT®/QM-DeviceServer). You can also define, that the measuring machine will be automatic connected as soon as an input of measure values is expected.

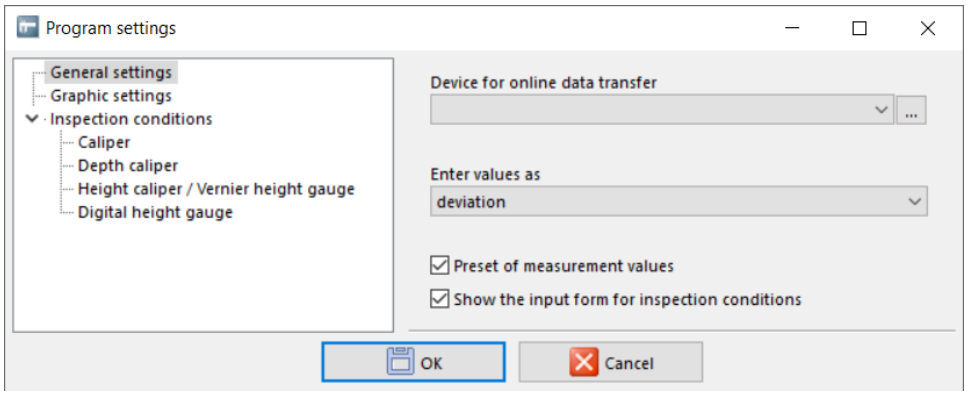


Fig. 7.1.2: General settings.

The figure above [Fig. 7.1.2] shows as an example the gloab settings of QMSOFT®/QM-CALIP, which is used to inspect all of the types of calipers.

7.1.3.2 Graphic settings

All of groups of gauge types, which are using a graphic view of the deviations (dial gauges, lever gauges, dial indicators, micrometers, etc..), are using this category of the settings for the related inspection program. You can adjust color, line width and line type for the output of graphs of the reading/deviations. Note that these settings have to be carried out separately for screen display and for printing.

7.1.3.3 Inspection conditions

For each of the gauge type groups, which are supported by the inspection program, you will find type-related settings for doing the inspection. This setting parameters are dependet on the gauge type, the selected norm or inspection procedure. Settings you make here will be saved as configuration "local computer" into the QMSOFT® database.

> **Note**
>
> If you change these settings during the inspection (there, the appropriate dialog appears automatically), these changes apply in general only to the ACTUAL inspection!

If you need various versions of the configuration of inspection conditions and/or do you want to use this settings at various workplaces, please use the `Save` button and define a unique name for this configuration.

7.1.4 Calibration certificates

All of the QMSOFT® inspection programs allow a free design of the certificate layouts. This is based on layout templates, which can be created and edited by using the QMSOFT® internal editor. A template contains all information about the form of the calibration certificate and the values, which should appear in this. By editing this template, you can change the layout.

All of the templates are stored into the QMSOFT® database.

7.1.4.1 QMSOFT® templates

Basically, a calibration certificate is "assembled" always from two different templates:

- Frame layout template
  contains the header and footer of a calibration certificate
  a header with address information, company logo, general information about the gauge etc.
  a footer with statement of conformity, traceability, measurement uncertainty data, comments, operator's name, inspection date, etc.
  and wraps (between header and footer area) and usually the field {TemplateBody} which will insert the information from the 2nd certificate layout containing the specific technical information.
- Certificate layouts
  providing specific information about the current gauge type and its inspection process.

QMSOFT® contains templates for different languages (German, English, French, Spanish, etc). You can delete all of the templates, which are not required, since the originals can be restored by using the feature "import original template" at any time.

Note

Normally, it is not necessary to change the delivered gauge type dependet templates. To setup a QMSOFT® installation it is enough to create your own frame layout template, for example with your company logo and the address details.

The templates, which are included into the installation kit, are providing samples, which you can use to create your own layout templates [Fig. 7.1.3]. Use the menu items *Certificate layouts → Edit frame layout template* and *Certificate layouts → Edit certificate layouts* to do this.

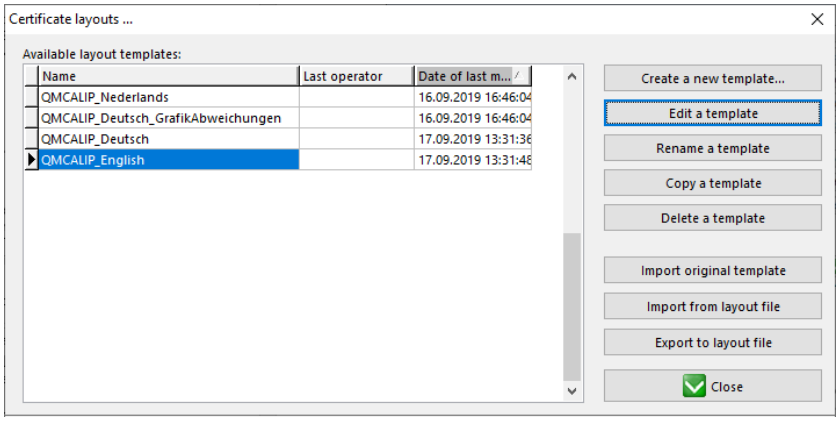


Fig. 7.1.3: Manage layout templates.

A certificate layout template is consisting of three different types of information:

- **Normal text**
  Is text information just like in a known text processing application. You can change the text as you want, and you can set different text properties for the font, color etc.
- **Fields (placeholders)**
  A "field" is including variable information about the gauge, the measuring process or the measuring environment. A "field" will be fulfilled with the actual information while executing the program. Editing a certificate layout file you can change "field" positions, delete "fields" (if you do not need the related information) and insert new "fields". To insert a new "field" in your certificate layout template use the menu item *Insert → Fields* or the `Fields` button inside of the QMSOFT® editor. Using you can also see all available "fields" and the related information. For numerical fields you can set the number of decimal points using the context menu "Field properties" (click with the right mouse button onto the field in the layout template). In the layout a fields are marked with curly braces (e.g. *`{identity number}`*).
- **Text conditions**
  A text condition gives you the possibility to control the certificate layout in dependence of different program situations. A text or field following to a line condition will be print out on the certificate only, if the condition test result is "true". For example, you can print a special text only, if an "External measurement" was done. Please open an existing certificate layout and see the comments for the "text conditions", which items are available.

To create a new layout template we recommend to duplicate one of the existing templates by using the `Copy a template` button and to use a new unique name for the copy. Now you can edit this copy inside of the QMSOFT® editor.

7.1.4.2 QMSOFT® editor

The certificate editor is an integral part of the QMSOFT® program system. This tool does realize all functions to show, edit, save and print calibration certificates and layout templates.

General notes

Depending of the actual situation, in which you call up the QMSOFT® editor, there are two different "operation modes":

- If you are running one of the QMSOFT® inspection programs, the function "Edit frame layout template" and "Edit dertificate layouts" are switching the QMSOFT® editor into the "Template mode" [Fig. 7.1.4]. In this mode it is possible to create and edit templates (frame layout templates or certificate layout templates) for the related inspection program, which are defining the content of the certificates and the arrangement on this document. In this mode it is possible to insert fields (placeholder) into the document, which will be substituted while the certificate creation process by actual variables of the program. It is also possible to control the visibility of text areas by using of so-called "text conditions".

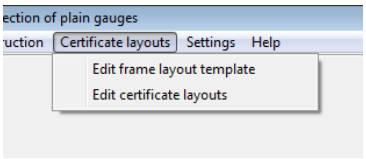


Fig. 7.1.4: Start the QMSOFT® editor in "template mode".

- In the "Certificate mode" you are working in the case, that you call up the QMSOFT® editor after finnishing an inspection by clicking onto the `Show certificate` button. The certificate creation process will combine the contents of all of the both templates and the actual data to a certificate document, which will be shown on the screen. In this mode the QMSOFT® editor can be used in the same way as every other text-processing-tool. Normally no more changes are needed, manual changes will influence only the actual document. The created certificates will be stored per default in the file format RTF. You can change this default into PDF or DOC (see QMSOFT® global settings).

Use of QMSOFT® editor

The operation of the QMSOFT® editor largely resembles that of well-known editors under Microsoft®-Windows (for example WordPad or Word). There are features available to design the text (font, font size, font attributes, tabs, pagination, etc.) as well as to editing text (cut, copy, paste, delete, search/replace). You can mark text areas with keyboard or mouse, so that the processing functions relate only to that selected area. The following describes in brief the main menu items of the QMSOFT® editor.

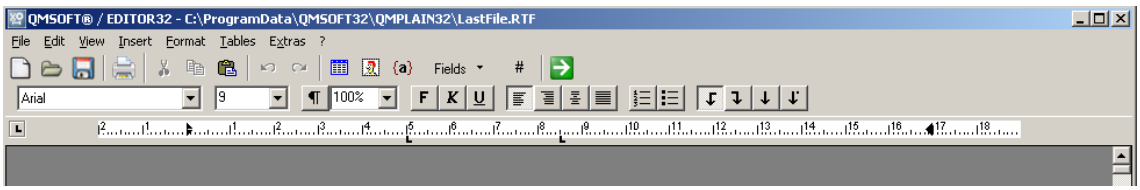


Fig. 7.1.5: Menu and toolbar of the QMSOFT® editor [Fig. 7.1.5].

- Menu item *File*

  Here you can Open, Close, Save and Print certificate files.

- Menu item *Edit*
  Here you will find all functions you need to edit a text section. You can delete, cut and paste or copy text. This functions are usually used for a marked text and are working with the Windows clip-board.
- Menu item *Edit* → *Search*
  Can be used to search text. Here you will also find the function *Replace* to search and replace text.
- Menu item *Insert*
  You can use it to insert a page break. Furthermore, you can insert graphic objects.
- Menu item *View*
  Use this menu to customize the view of the document and/or to switch on/off the lineal and tool bars.
- Menu item *Format*
  Inside this menu you can format characters and paragraphs to change the character size the font or other parameters.
- Menu item *Table*
  The menu table is usable to insert and modify tables.

Warning

If you are working in the "Layout mode" and need to insert a "Field" in this table which does possibly represent a list of values (for example if you have 3 measures for one gauge parameter). Then you need only one table row for it. During the creation of the certificate the program will expand automatically the number of rows to the existing number of values.

Extras of "Layout mode"

As already noted the layout mode is always active if you are working with a certificate layout file. Except the so called "Frame layouts" these certificate layout files are always connected to a special QMSOFT® inspection program. That means that a layout file created for the QMSOFT®/QM-CALIP program (calliper inspection program) can not be used to create an inspection certificate for a thread measurement or a setting ring inspection. The reasons for the dependence of the measuring programs are:

- the "Placeholders" (Fields) which has to be replaced during the creation of a certificate by the actual values,
- the "Text conditions" which will allow you to decide if a text or a text section has to be print in dependence of the current program situation.

In both cases, these information are only available for the special measuring task and therefore are only known if the related program environment is loaded.

Placeholders ("Fields")

A "field" is including variable information of the gauge, the measuring process or the measuring environment. A "field" will be filled out with the actual information while executing the program. While editing a certificate layout file you can change "field" positions, delete "fields" (if you do not need the related information) and insert new "fields". To insert a new "field" in your certificate layout use the menu *Insert* → *Fields*. Using this menu, you can also see all available "Fields" and the related information. Alternative you can also use the menu *View* → *Field* to show all available fields [Fig. 7.1.6].

The available fields are divided into different categories to make it easier to find the required information. Please note if you are using information from the category QMSOFT®/QM-MANAGE will be only available if you start the measuring program by the gauge management software.

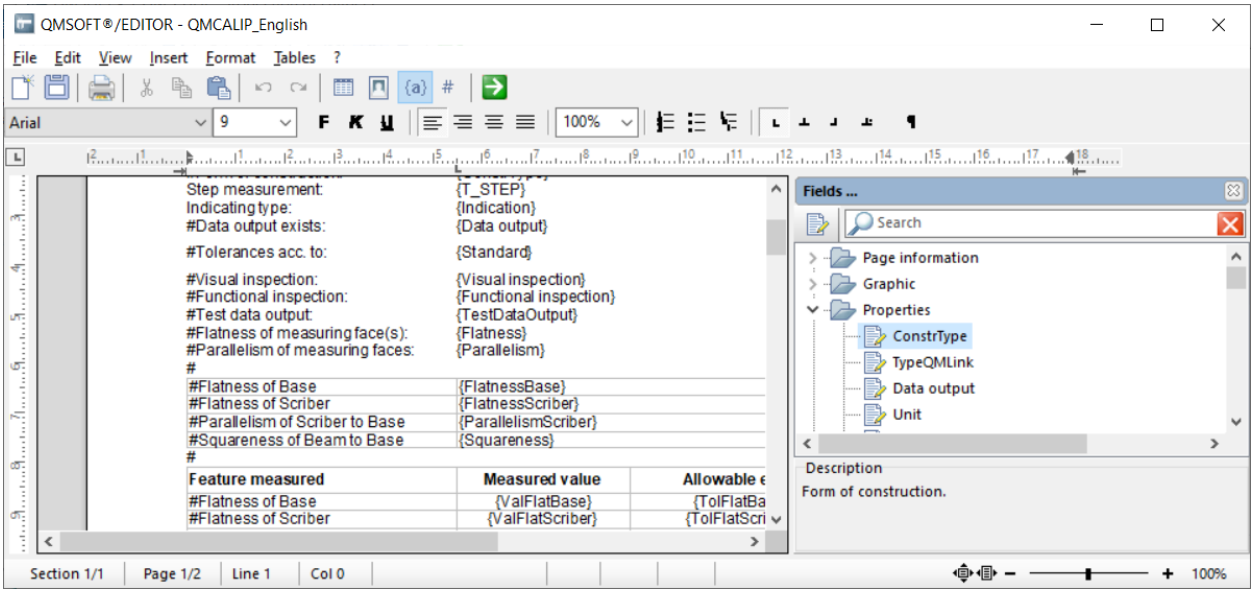


Fig. 7.1.6: Available fields for the certificate.

The meaning of a field (the kind of information which will be inserted here during the program execution) you can see in the field description. Make a double click on the selected field to insert it in your certificate at the current cursor position.

Fields can also be inserted in tables. If a field does represent a list of values (a series of measures) the number of rows in the table will be expanded automatically.

After inserting a field, you can open a screen with the related "Field properties" by doing a double click on it. In dependence of the field type (numerical or text) you can set the field format or - if available - the language of the field content.

Note

Fields, which contains text information, have mostly the field property "Language". With the help of this property you can create multi-lingual certificates without changing the dialogue language. So it is possible to insert the same field multiple into the same document to switch their language property to different languages. If the text property is set to <default> the language will be set by the current language of the program. To change the field properties click with the right mouse button onto the field in the document. Use menu item *Field properties*.

Some fields do represent multiple single values of the corresponding parameter (e.g. diameter measures of the GO side of a plug gauge). In this case, tables are automatically extended to the required number of rows.

Text conditions ("switches")

A "text condition" gives you the possibility to control the certificate layout in dependence of different program situations. A text or field following to a line condition will be print out on the certificate only if the condition is "true". For example, you can print a special text only if an "External measurement" was done. Please open an existing certificate layout and see the comments for the "text conditions" available.

When editing a certificate layout, a "text condition" will be shown as a "#" character. Making a double click on this character (or click with the right mouse button on it and use the menu item *Field properties*) will open a screen section, where you can edit the text conditions. To define a new text condition, use the menu *View* → *Text conditions* to show the "Text condition" window on the screen [Fig. 7.1.7].

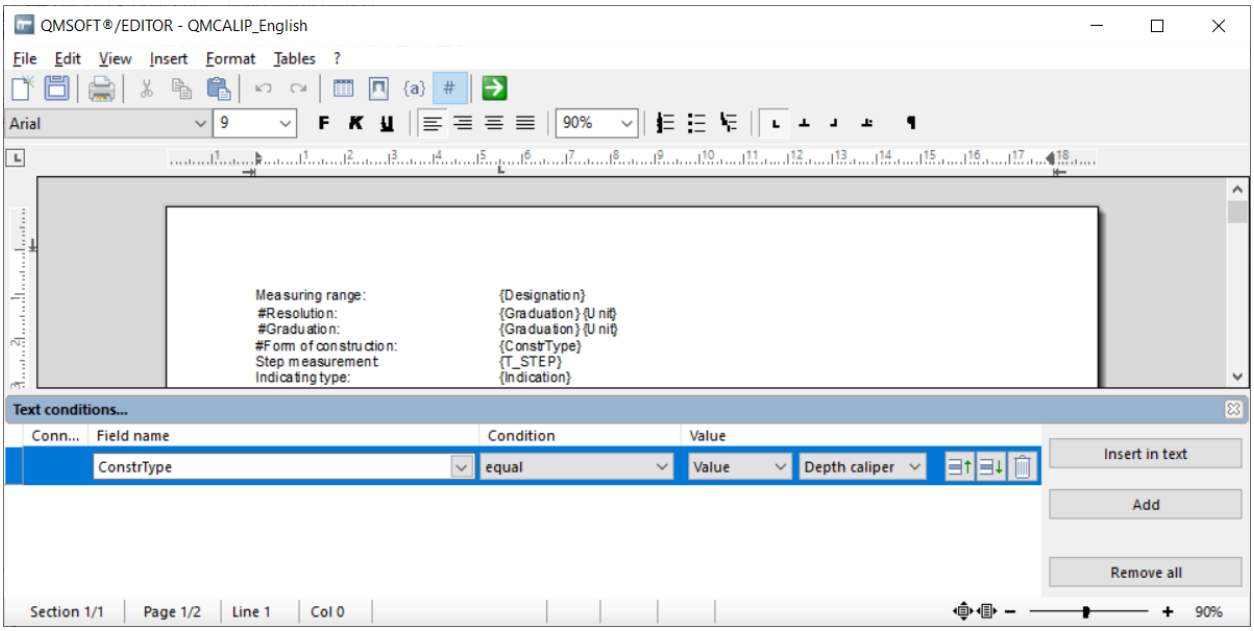


Fig. 7.1.7: Define a text condition.

Use the `Add` button to add a new entry to the list of already defined conditions.

- By “unfolding” the drop-down-list of the “Field name” column, you get an overview of the available conditions. When you click on a list item, the “Field name” is inserted in the field and the description of the field is displayed.
- Now define in the “Condition”-field, which condition must meet the content of the “Field name”. For simple logic “Yes / No” use the condition “is equal to”.
- In the subsequent selection in the field “Value” you have to determine whether the output of the following text takes place when the condition is “True” or “False”.
- You can combine multiple conditions, if you add further condition items to the list. In this case you have to determine, how these conditions are to be combined. The combination with “AND” means, that both (or more) conditions must have the result “true”.
- The `Insert in text` button will insert the “text condition” in your certificate layout. Please make sure that you have set the cursor to the correct position where you want to insert it.

Please note, that a “text condition” is in effect for all following text as long a new condition this override. If you want to remove all conditions, than set an “empty” condition. After this one all of the following text will be printed. To create an “empty” condition, remove all conditions from the list (see the above figure) and use the `Insert` button to place this empty list on the selected position.

Special field type “Tolerance graphic/-excision”

All the “fields”, which you can insert in your layout template, does have special properties to affect the shape of the “print-out”. Simple examples for it are the property “language”, which you can use for “multi-language” text fields, ore the property “Format” to format simple numeric fields. A little bit more complex are the fields with the type “Tolerance graphic/-excision” [Fig. 7.1.8]. In this chapter you will find a description of these properties.

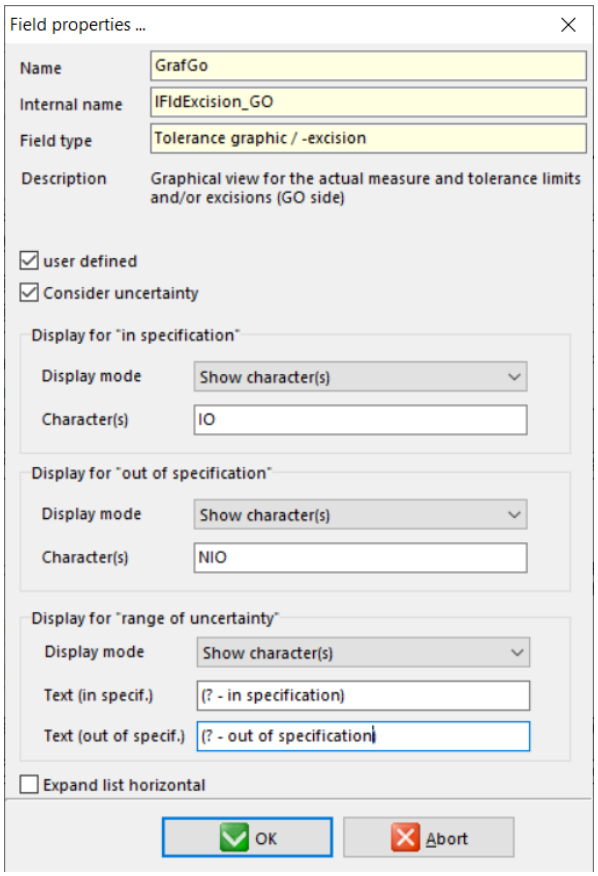


Fig. 7.1.8: Properties for field type “Tolerance graphic/-excision”.

Examples for setting the field properties for the field {GrafGo} (used in the QMSOFT®/QM-PLAIN program) in dependance if you are working with or without the measuring uncertainty for the gauge valuation (see the programs “Inspection conditions” for this):

tabularytabulary

	Use field to show
	Tolerance graphic, if “use uncertainty” =”off”
	Tolerance graphic, if “use uncertainty” =”on”
	Excision of tolerance (no statement about conformity) “use uncertainty” =”off”
	Conformity statement “use uncer tainty”=”on”

Predefined common used switches in all of the QMSOFT® inspection programs

These switches are shared across all QMSOFT® inspection programs (note: the “short name” may depend on the selected language).

tabularytabulary

Short name of condition	
REM	
Comments	
QM-Manage	
Scrap	
Uncertainty	

Predefined switches in QMSOFT®/QM-PLAIN

Such predefined program-dependent switches are often used to avoid the creation of complex combinations of other conditions (see section before). In most cases they are used to define if a list or table of measuring values does exist. So you need only one of these special conditions to hide a table in your certificate.

Short name of condition (language- dependent)	Description
EIN	print (show) text only for master rings, master plugs, master setting discs (only if it is DIN, ANSI or factory standard)
TGoPR	table with measuring values GO side (only plug and ring gauges), including master rings (?) - not used for "snap" gauges - does exist
TNoPR	table with measuring values NO GO side (only plug and ring gauges), including master rings (?) - not used for "snap" gauges - does exist
TGoSnCorr	Table with measuring values (only) for snap gauges - with bending up corrections - GO side - does exist
TGoSnNo	Table with measuring values (only) for snap gauges - without bending up corrections - GO side - does exist
TNoGoSnCorr	Table with measuring values (only) for snap gauges - with bending up corrections - NO GO side - does exist
TNoGoSnNo	Table with measuring values (only) for snap gauges - NO bending up corrections - NO GO side - does exist
I_DEPTH (I_TIE)	Length marking (depth measure) was checked (does only exist at a gauges GO side)
T_LENGTH	additional length or diameter values was measured
I_OUTER	Inspections in the outer area of the measuring faces was done, this option is only usable for Micrometer setting standards
I_Form	Form deviations of a gauge was entered also when doing a "periodical calibration"
I_Double	Gauge has a GO and a NOGO Side
GO	Line will be written if a GO - side exists
GO_Wear	Line will be written if a wear limit exists (only on GO side)
NOGO	Line will be written if a NO GO - side exists

Predefined switches in QMSOFT®/QM-THREAD

Short name of condition (language -dependent)	Description
G_THREAD	the gauge inspected is a thread gauge (without a plain side).
G_SPECIAL	the gauge inspected is a "special gauge" (one side a thread and one plain side).
G_Product	it is an product thread (workpiece) - external or internal
F_DoubleSided	It is a double sided - GO / NOGO gauge
F_Wear	The gauge has a wear limit.
F_SpecWear	The gauge inspected is a "special gauge" with wear limit on the plain side
F_TruncFlank	The gauge (thread gauge) has a truncated portion
I_Add_GO	Additional values (pitch, flank angle..) were checked - GO side
I_Add_NOGO	Additional values (pitch, flank angle..) were checked - NOGO side
I_Add_LENGTH	additional length or diameter values was measured

Additional there does exist a "switch" for each of the sections, where the name starts with "Table - ", which is defining if the related values does exist or not. For example, the condition "TEff-Go" in section "Table - Effective diameter Side1 (GO)" does indicate, that the related values to print the table with measuring values for the effective diameter (1st side of gauge) does exist.

Note

The QMSOFT® version 8 will introduce a new method for the output of measurement tables. This is already available for some programs for example QMSOFT®/QM-PLAIN and QMSOFT®/QM-THREAD. In this case you can replace all the single tables and parameters by only one field **"All existing tables"**. This parameter will output all the measures which were recorded during the test and present them in the dsame form as on the screen during the measurement. See new template files with the "V8" in the name which were created to test this function.

7.1.4.3 The usage of "frame layouts"

Using frame layouts does allow to reduce the effort of adaption of the certificate layouts to personal wishes significantly. The main point when using frame layouts is the knowledge, that the customizing of the layout in the most cases does include only general header information (usually the customers address) or some general information, which is used to complete the certificate. These are mostly information about the operator, the inspection date or the traceability of the measurement.

As you can see in the figure the definition of the "Frame layout" does only include the certificate header and all of the common information [Fig. 7.1.9]. The program depended information, as described in the section before, is represented here by only one field with the name "Template body".

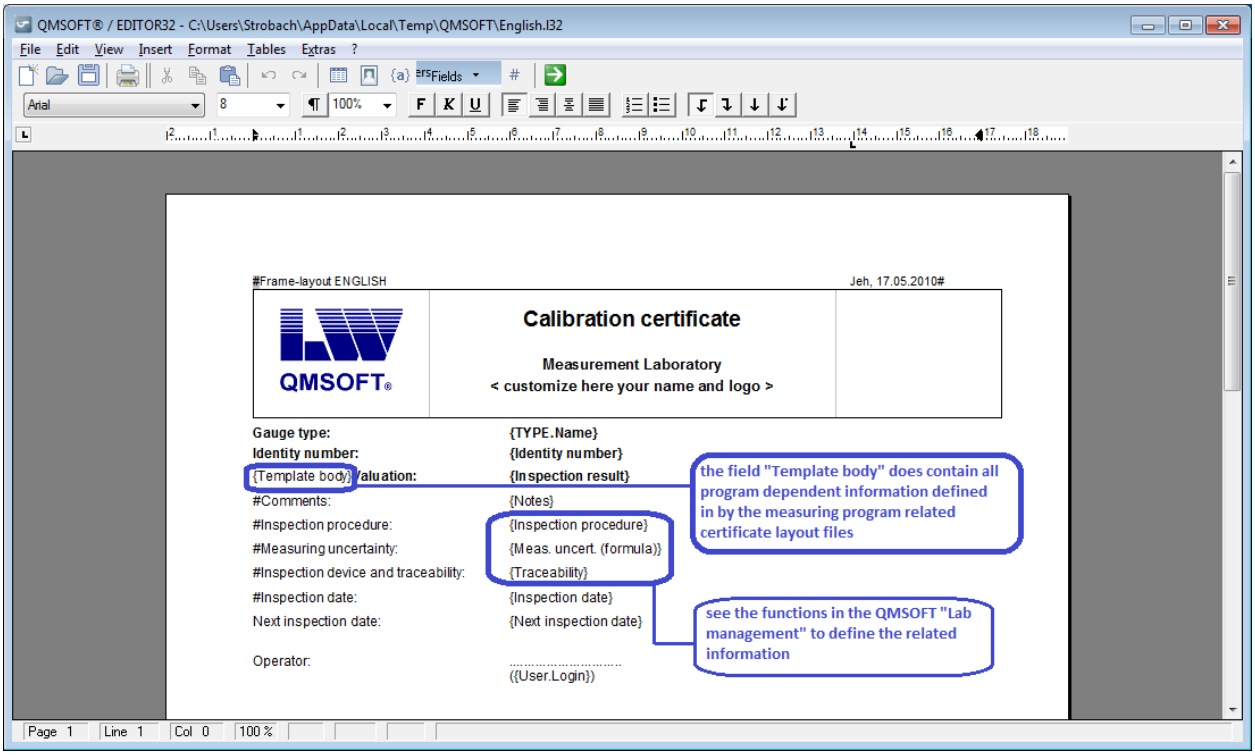


Fig. 7.1.9: Edit a frame layout.

As described in the previous sections you can here also insert "placeholders" (fields) and "text conditions". Naturally you can here only use common information, which is available in all QMSOFT® programs. Examples for this are "gauge type" name, "identity number", "inspection date" or "operator name". Using the QMSOFT®/QM-MANAGE gauge management system you can also insert information, which is available there, like "actual location", "cost department" or other data managed there.

Please note that the common editor fields for “Inspection procedure”, “Measuring uncertainty” and “Traceability” will be filled with the related information defined for the specific calibration. The data for these fields can be managed with the related functions in the QMSOFT® “Laboratory management”.

At least the complete certificate will be composed by using the frame layout and the program depended layout file which does “deliver” the information about the current inspection [Fig. 7.1.10].

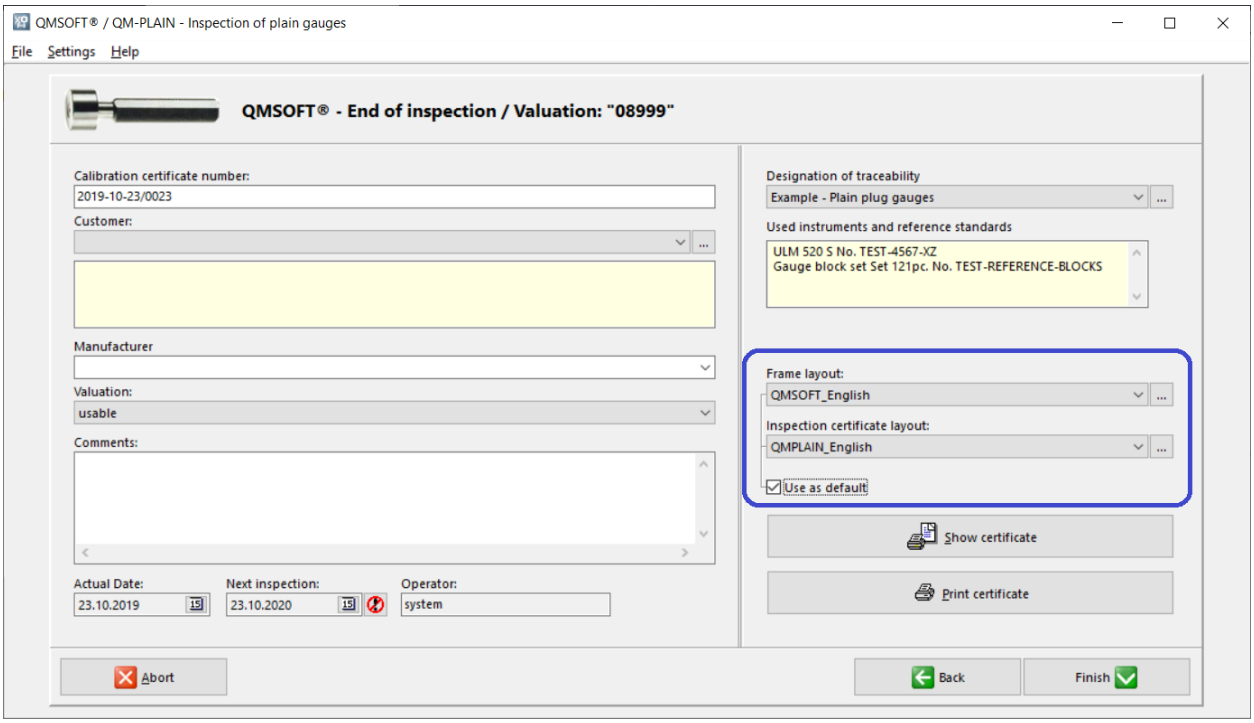


Fig. 7.1.10: Selection of frame layout and inspection certificate layout.

After finishing an inspection, you can set both layout files in the dialogue above. The first one to be used to create your “frame” and the second one creating the certificate body with the program depended information. Activate the check box “Use as default” if you want to save these settings for the following inspections.

7.1.5 Doing a gauge inspection - general process

A QMSOFT® inspection program is presented on the screen with a main window, which contains large buttons, each representing the examination of a group of gauges (gauges of a type). The desired gauge inspection is started, when you click one of these buttons with the mouse or by executing the menu item *Inspection*.

> **Note**
>
> This main window of the inspection programs will be “skipped”, if you call the program from the gauge management module QMSOFT®/QM-MANAGE automatically, the execution proceed with entering or checking of gauge parameters.

7.1.5.1 Entering nominal gauge data

After selecting the gauge type in the main window of the QMSOFT® inspection program a dialogue frame appears, where you can enter or check the properties and nominal values of the gauge. In the most cases you can calculate nominal values/tolerances from a minimum of entered parameters (gauge designation, measuring range and scale graduation etc.) by using the function key `F7` or by clicking onto the `Pocket calculator` button.

Some of the input fields are available independent from the gauge type, all the other of the gauge dependent fields are described in the part of the manual for each of the related inspection program:

- IDENTITY NUMBER
  This field is used to establish an identity number for the gauge. This number will be appear on the calibration certificate.
- STANDARD
  Here you can select the DIN or other standard or (as soon as available) the factory standard. This selection can be used for the calcluation of nominal values/tolerances.
- NOMINAL SIZE OF GAUGE, MEASURING RANGE ETC.
  Into this field(s) the "value(s)" of the nominal size or the measuring range should be entered, this is depending from the gauge type in every case.

After entering/checking of all of the nominal gauge data you can proceed with the `Continue` button, the `ESC` key (`Cancel` button) is canceling the inspection procedure and leads you back to the main window.

7.1.5.2 Measurement

An important part of many kinds of inspection processes is to check the general functionality and some other parameters depended on the type of the inspected gauge. These are for example:

- Functional and Visual inspection
- Flatness, Parallelism of parts of the gauge
- Measuring forces, spindle friction etc.
- Hardness

Depended on the gauge type there will be such an inspection step or not. In the settings of the inspection conditions you can selected, that you will do this as a "Pass" / "Fail" decision or you enter the results of the inspection as actual numerical values.

Before you start to collect measure values you will get a dialogue form to input the results of the functional and visual inspection. By using the button `Reject (Scrap)` it is possible to skip the input of measures, you will get on the shortest way the last dialogue form to create the "Scrap certificate".

Now the dialogue form(s) to collect the measures (more than one form is possible for each partial step, depended from the gauge type). You can type measures by keyboard directly into the rows of the measure tables of the form(s).

How measures from a measuring device have to been triggered is depended from the model of the device (refer to the manual of the device) and from the implementation of the measuring device object inside of QMSOFT®/QM-DeviceServer.

Measures can be repeated simple by using a mouse click into the cell of the measure table, which is setting the input-focus to this location. Now trigger the measure again, it will overwrite the old measure.

After finishing the measurement (or an inspection step) you can go forward with the `Continue` button, the `Back` button will bring the previous input form onto the screen.

7.1.5.3 Output of results

After entering all of the measure data the screen “End of inspection” will appear for finishing the measure process. The summary result of the inspection is shown [Fig. 7.1.11]. All of the calculated result details can be visualized on the screen or printed to a printer device onto a calibration certificate.

Here you can now enter comments on the inspection in the corresponding field. In addition, you can enter the following information (if this information was not taken from the gauge management system QMSOFT®/QM-MANAGE).

- a calibration certificate number
- the name (address) of the customer
- the manufacturer of the measuring device
- the date of the next inspection (you can set or change this using the calendar function)
- the traceability information
- a calibration certificate number,
- the name (the address) of the customer,
- the manufacturer of the gauge,
- the date of the next inspection (you can use the calendar function to set or change it).
- The traceability information
  On the right side of the form you must select the traceability used to obtain the traceability information (the list of instruments used, setting masters and all measuring equipment) on your certificate.
  For definition information, see “QMSOFT® Manual - Laboratory Management - Standards and Instruments”.

Warning

If the QMSOFT® inspection program was started as stand-alone program (this means: outside of QMSOFT®/QM-MANAGE), the calibration certificate can be printed and/or saved, but after finishing the inspection program all of the data are “lost”, a data transfer to the gauge management module is NOT executed! As soon as the QMSOFT® inspection program was started by QMSOFT®/QM-MANAGE, all data including the calibration certificate will be transferred to QMSOFT®/QM-MANAGE and saved into the gauge history.

Note

If in the related inspection program, the option **“Consider measuring uncertainty for valuation”** is activated, the programs result form will also show the used acceptance rule and the resulting decision for the conformity.

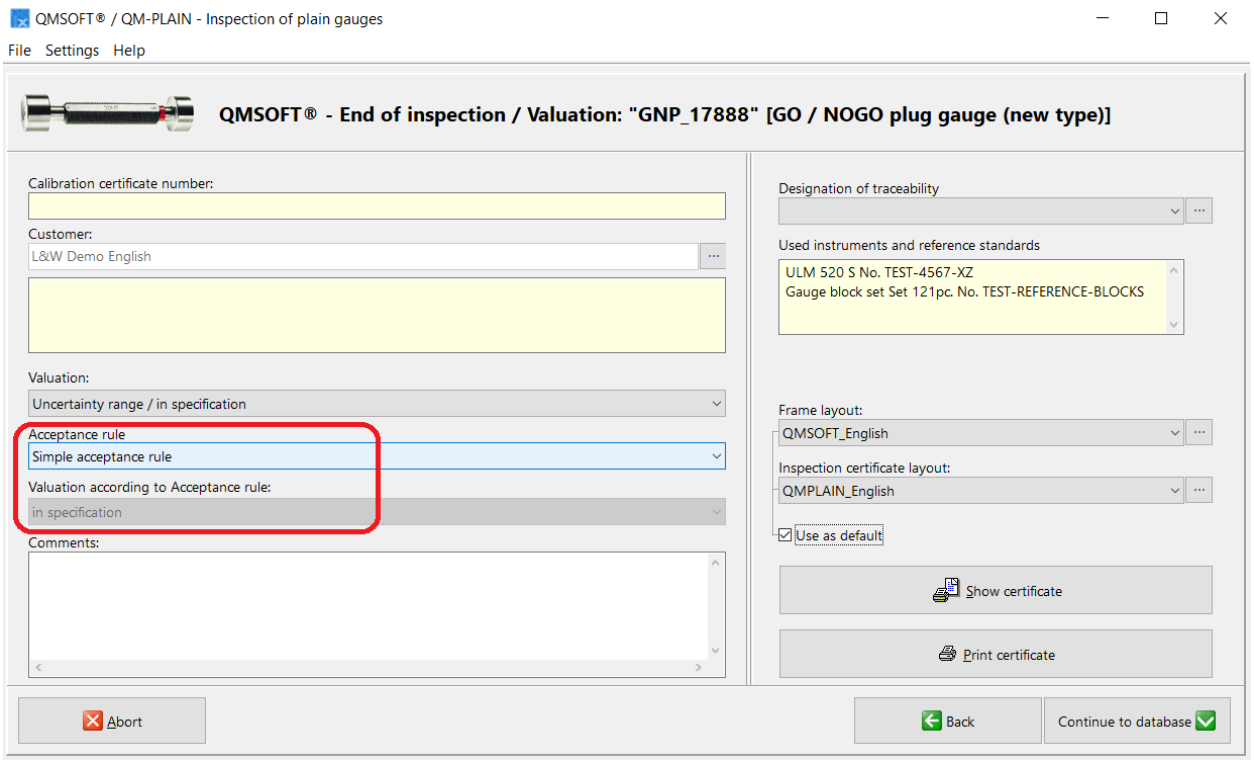


Fig. 7.1.11: Completion of the inspection / issue of the inspection certificate.

7.2 Inspection program QMSOFT®/QM-BLOCK

The program QMSOFT®/QM-BLOCK is designed to the computer supported inspection of gauge blocks used as single gauge blocks or as gauge block sets.

The inspection of gauge blocks and gauge block sets may be done according different evaluation methods. For example you can evaluate only the centre length deviation or the deviation range combined with the centre length deviation. Basically the evaluation and the used tolerances are related to the ISO 3650 standard, the ANSI/ASME B89.1.9, the British standard BS 4311 or the Australian standard AS 1457. It is also possible to define customer-specific tolerance tables with user-defined accuracy classes.

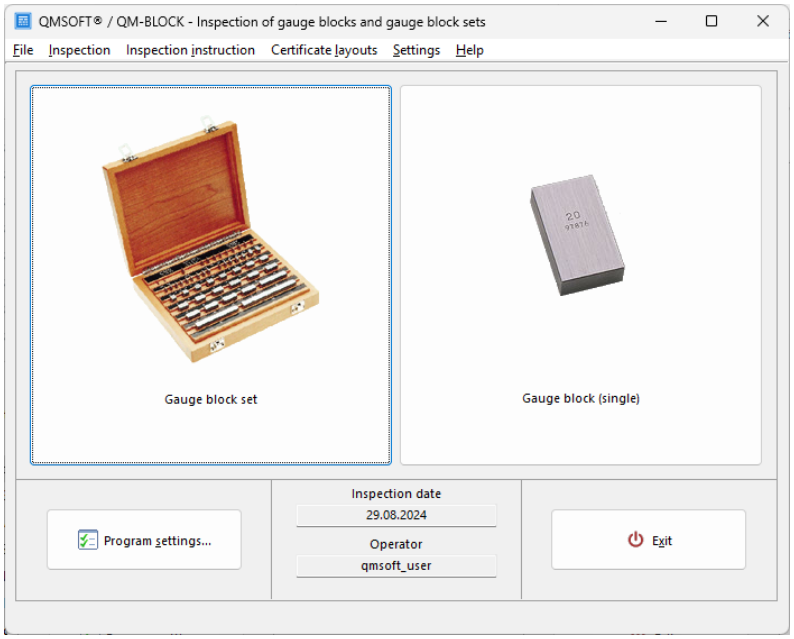


Fig. 7.2.1: QMSOFT®/QM-BLOCK launch.

Note

The inspection program QMSOFT®/QM-BLOCK does not contain the functionality for a gauge management or for the storage of the gauges history. These functions are an exclusive part of the gauge management program QMSOFT®/QM-MANAGE. Even if it is possible to run QMSOFT®/QM-BLOCK as a standalone module, the complete functionality for the management of gauge block sets, the monitoring of the calibration date and the handling of the gauge history does require an additional license for the program QMSOFT®/QM-MANAGE. The "QMSOFT®/QM-MANAGE special edition" license is usually an essential part of the QMSOFT®/QM-BLOCK-package.

Mostly a gauge block inspection instrument does work with the method of "difference measurement". This means that you have a reference gauge block with a well-known actual size which have to be compared with the size of the gauge block should be inspected. Normally, the nominal size of the used reference gauge and the inspected gauge block should be identically. Only a difference of few micrometres may be possible.

To compare both gauge blocks you need the nominal sizes and the centre length deviations of the used reference gauge set. You get this information from the "Calibration certificate" of the used reference gauge block set.

Note

The management of your reference gauge blocks and the input of the actual values of your used reference gauge blocks have to be done by using the "Laboratory management" function in the launcher QMSOFT®/GaugeMan. You have to do this before starting the first calibration of a gauge block!

To inspect a gauge block, you should usually touch 5 measuring points on the gauge blocks face. The order of the measuring points is related to the standard. Measurement data can be entered through an on-line measuring machine or on the keyboard.

Results can be produced on the screen and/or the printer and/or in a file. The nominal values of the gauge will be

processed in connection with the inspection conditions and the measurement results in the results record. Tolerance excesses are marked and identified. It is possible to customise record listings using certificate layout files.

7.2.1 Settings > Show/Edit reference gauge sets

Please read the following section very careful! In order to obtain correct results when inspecting gauge blocks, it is imperative that you enter the actual values of your used gauge blocks into the central QMSOFT® database. This is possible via the menu item *Settings* → *Show/Edit reference gauge sets*. Alternatively, you can also use the central QMSOFT® Lab Management. You will get the following screen [Fig. 7.2.2].

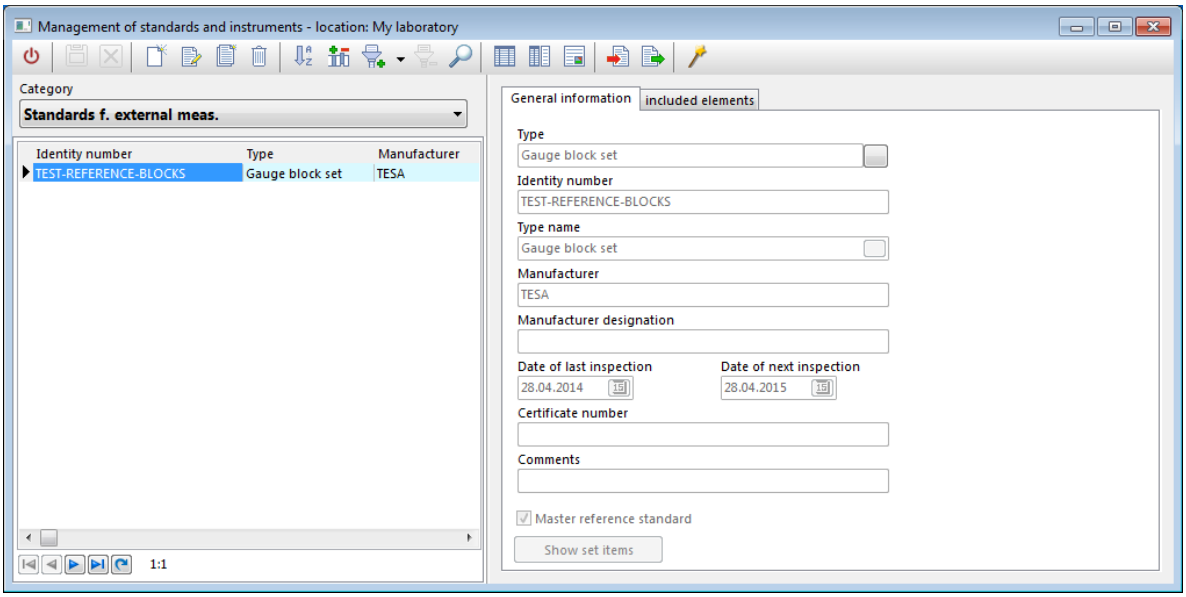


Fig. 7.2.2: Management of standards and instruments, Category “Standards for external measures”.

After installing a new QMSOFT® database there will already exists a gauge block set with the identity number “TEST-BLOCKS” in your database. This one can be used as an example, when you will run QMSOFT® in the demonstration mode. You also can use this example to input your own data (don’t forget to rename the identity number).

Use the `New` button to create a new “reference gauge block set” in the category *Standards f. External measures*.

7.2.1.1 Create a new reference gauge block set

Please now enter your own reference set(s) that you will use for gauge block calibration.

- Click the `New` button to enter a new gauge block set [Fig. 7.2.3]. If the external reference category includes different gauge types, first select the *`Gauge block set`* type.
- Enter the gauge block set identification number, manufacturer information (if known) and last calibration date.
- In the “Type name” field you can enter information that you can use to record traceability on your certificates.

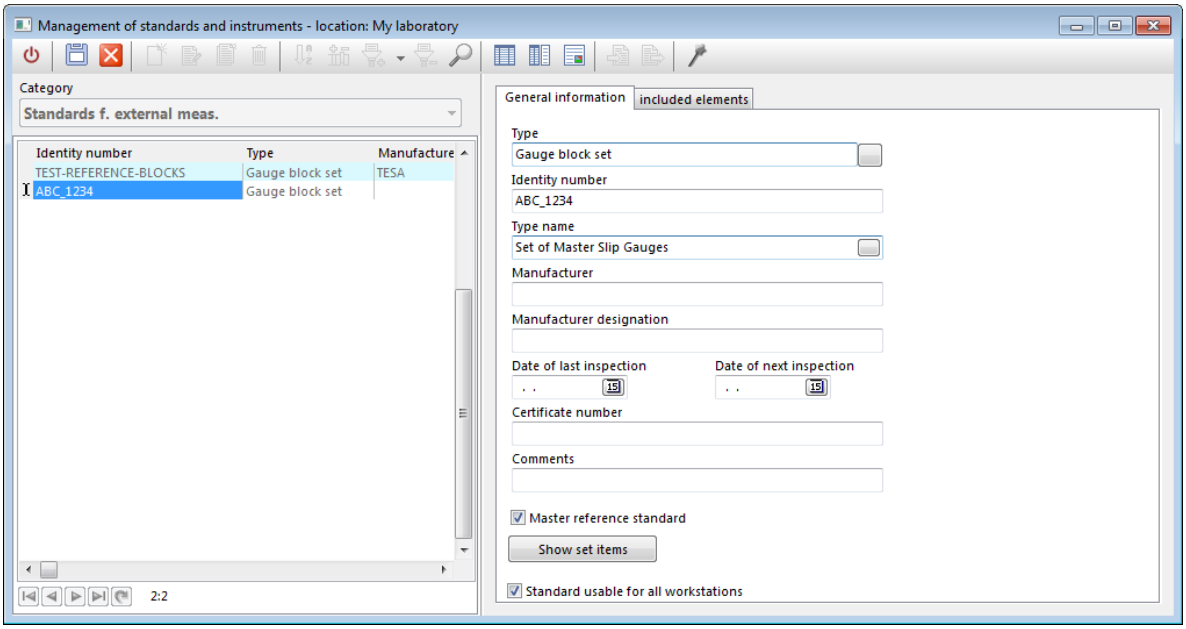


Fig. 7.2.3: Inserting a new reference gauge set in the QMSOFT® database.

Note

Please make sure to fill in the "Date of next inspection" field, otherwise you will receive a warning message when you try to use this item as a reference normal and the next calibration date has passed.

- Go to the second tab page called *`included elements`* to enter the single gauge blocks included in your reference set [Fig. 7.2.4]. Please select the unit for your set and define the value format. **Make sure that you have not less than 5 digits in your format definition for "mm" gauges**.
- You can use the `Load set configuration` function to load predefined set configurations from various manufacturers. Of course, you can also add each single block using the `New` button.
- After defining the single gauge blocks, you can assign an identification number to each gauge block and its material. If all gauge blocks have the same number, you can use the `Fill column` function.

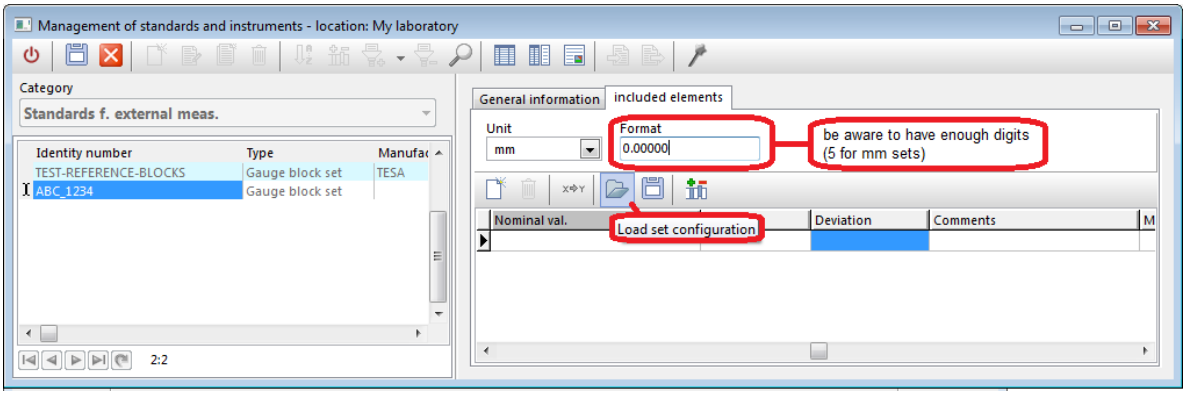


Fig. 7.2.4: Define the content of a new reference gauge block set.

- After you have inserted the gauge block set into your database, you now need to enter the known measures into

the database. To do this, click on the single gauge blocks in the list and enter the value of your known “Center deviation” in the corresponding column [Fig. 7.2.5]. Please note that the unit for the centre length deviation is “µm” (“thou.inch” for inch blocks).

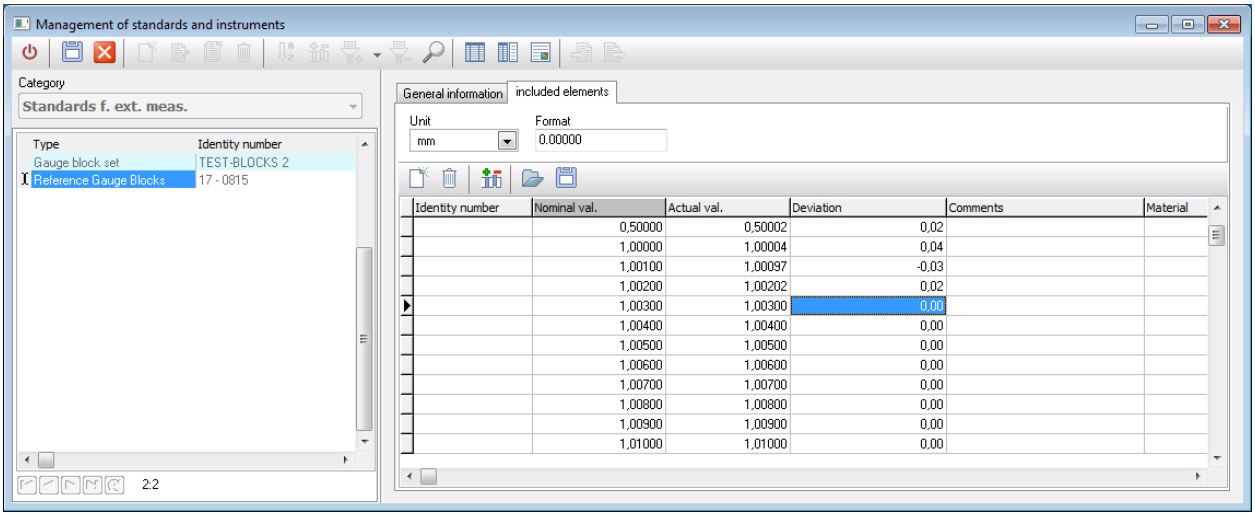


Fig. 7.2.5: Entering the “Centre length deviation” of your reference set.

Complete the creation of your reference set by clicking the `Save` button. You can then close the “Management of Standards and Instruments” by clicking the `Close` button in the upper left corner of the form.

7.2.2 Settings > Program settings ...

In the QMSOFT®/QM-BLOCK program, the *Settings* menu item offers the option of changing various setting parameters such as the measuring device used in an “online” connection, common inspection conditions, tolerance tables, etc.

Please note that the program only works correctly if all settings are correct, otherwise most things work right away with the default settings.

7.2.2.1 General settings

Here you can first select the devices (if available) for the online transmission of the length measurements and temperatures [Fig. 7.2.6]. Please also note the description of the QMSOFT®/QM-DeviceServer. When transferring the length measurements Online, please select the unit of the measured values that come from the connected device.

Note

Usually, gauge block inspection is carried out using special measuring devices (gauge block comparator). In this case, the measurements of the device are usually given in the length unit “µm” or “inch/1000”. The measurements obtained are the difference between the “Reference” measure and the measure of the gauge block being inspected.

If you are using a temperature measuring device, select the appropriate information for the temperature channels. In this case, the temperature values will be read when you turn on temperature compensation.

More setting features are:

- Probe length

  Usually a gauge block testing device does work with the method of “difference measurement”. In most cases the measuring range of the used inductive probe is very small. Normally this means that you have a reference gauge block where the nominal size should be identically with the size of the inspected gauge block. If you have a testing device with a “long range” probe, you can enter the probe length (the measuring range of your probe) here to have the option of using reference gauge blocks with a different size than the gauge block you are inspecting. values greater than 0 mm mean that the assignment between the inspected gauge block and the reference gauge block is carried out in such a way that as many gauge blocks as possible can be measured per reference gauge block.

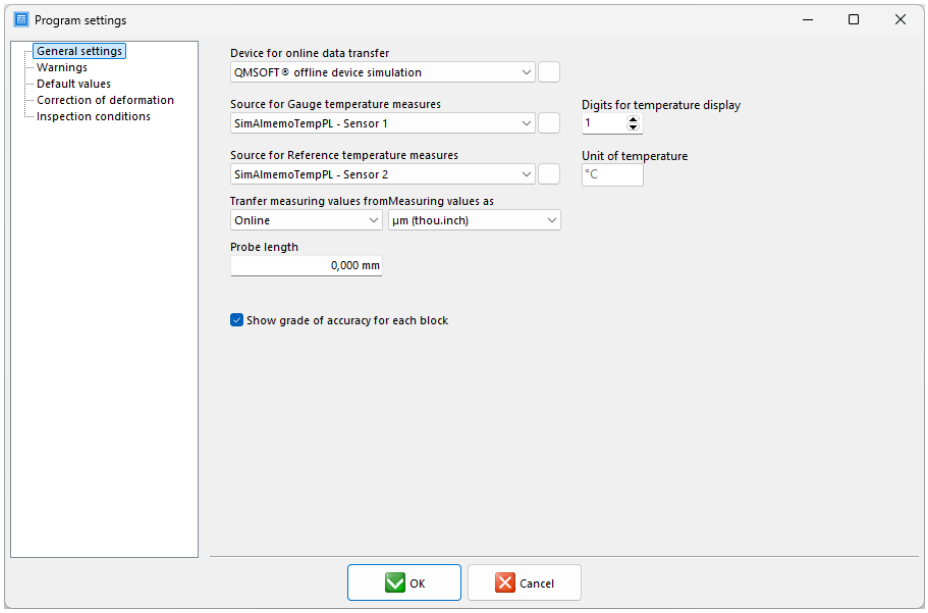


Fig. 7.2.6: QMSOFT®/QM-BLOCK *Settings → Programm settings → General settings*.

7.2.2.2 Settings for warnings

Since the gauge block inspection requires very careful work, the program offers various options for monitoring the measuring process.

Here are the parameters you can watch [Fig. 7.2.7].

- Warning limit for repeatability

  When measuring gauge blocks, you will usually repeat some measuring positions at least twice. The difference between these measuring lengths (called repeatability) gives you important information about the stability of your measuring process. Therefore, you can set limits for these values for both the reference gauge block and the gauge block to be measured, and you will be warned if these limits are exceeded.

- Warning limits for temperature

  If you use a temperature measuring device, you can set different warning limits for the temperature values and for the permissible temperature change.

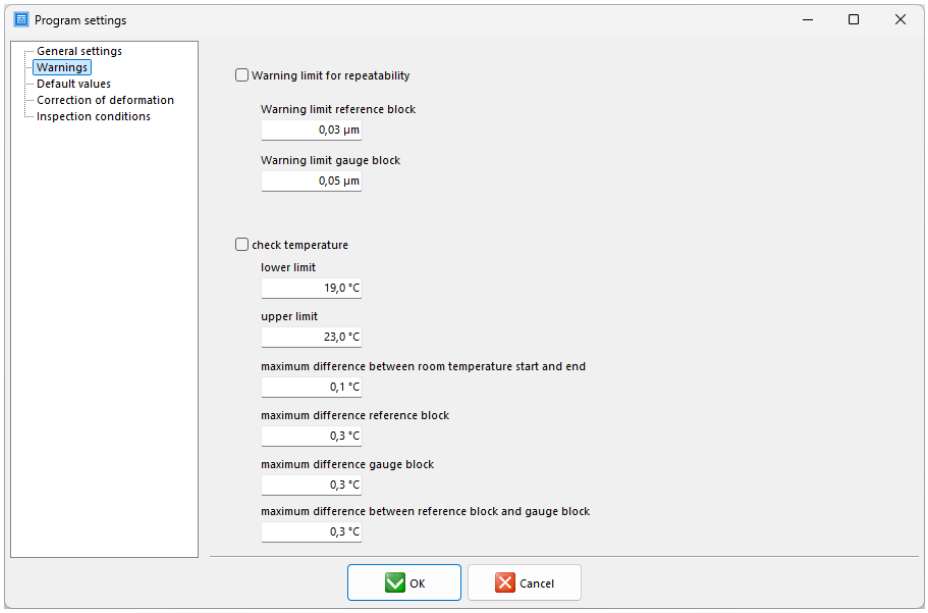


Fig. 7.2.7: QMSOFT®/QM-BLOCK *Settings* → *Programm settings* → *Warnings*.

7.2.2.3 Default values

Preset the defaults for the results of the visual inspections and for the inspection of wringing here. This preset can be changed individually for each of the gauge block while the inspection process is running.

7.2.2.4 Correction of deformation

If you inspect a gauge block or a gauge block set consisting of a material, which is different from the material of your reference gauge, you have to compensate the different deformation values while touching the gauge.

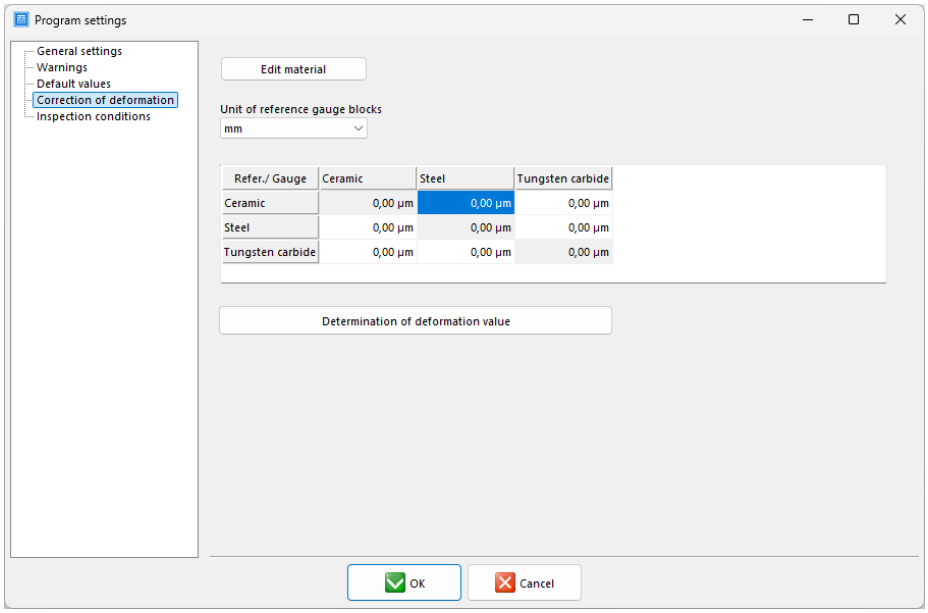


Fig. 7.2.8: QMSOFT®/QM-BLOCK *Settings* → *Programm settings* → *Correction deformation*.

You can determine the differences in deformation by performing a control measurement on reference gauges made of different materials. To do this, you must first enter the nominal sizes of the blocks used and then perform the measurements to determine the deformation.

Note

To compensate for the deformation, the reference gauge blocks that you use to determine the deformation value must have exactly the same material parameters as the gauge blocks you want to inspect.

We DO NOT recommend to use the correction features of QMSOFT®/QM-BLOCK because of the fact, that the properties of the gauge materials mostly are unknown und mostly not the same for a whole set of gauges! In any case, try to carry out calibrations close to a temperature of 20°C and use the same materials for the gauges being inspected and the reference normals!

During the installation process, correction items with the size “0.00 µm” (zero) are generated. The QMSOFT® user is responsible for determining these values!

7.2.2.5 Inspection conditions

Here you can define the default inspection conditions for the gauge block calibration.

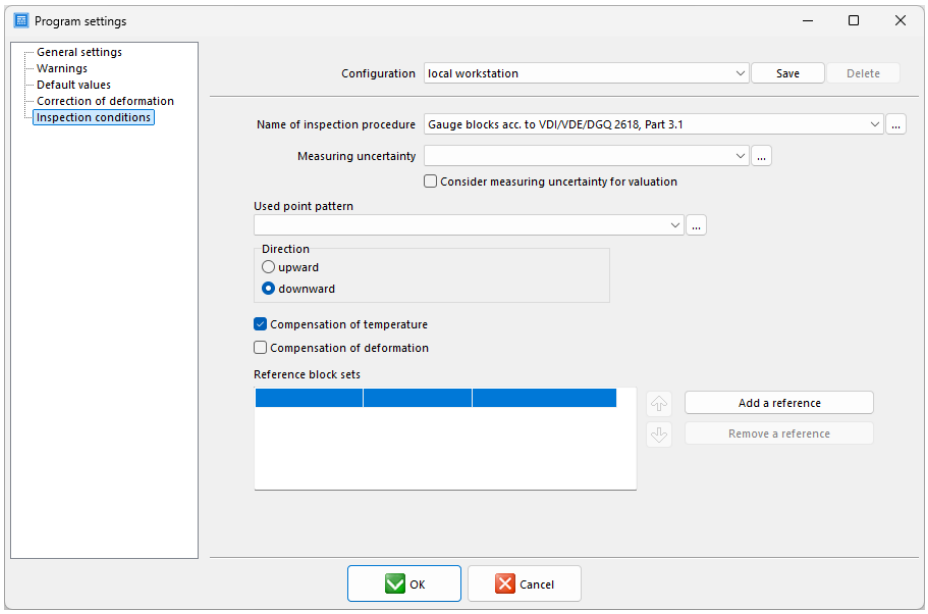


Fig. 7.2.9: QMSOFT®/QM-BLOCK *Settings → Programm settings → Inspection conditions*.

- Name of inspection procedure

  Here you can select the name of the inspection procedure used. This name will be noted in the inspection certificate. The corresponding field name in the layout is *{Inspection procedure}*.

- Measuring uncertainty

  Select the measurement uncertainty to be applied to the selected procedure. The measurement uncertainty formula displayed will be recorded in your inspection certificate.

- Consider measuring uncertainty for valuation

  The selection of measurement uncertainty in the previous field is initially only for documentation purposes. If you want to use the calculated measurement uncertainty to prove the conformity or non-conformity of your inspected measuring device with the defined error limits, you must switch this option on. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the "conformance zone" for the decision if the inspected gauge is within or outside the defined specifications. If the calculated errors of indication are in the "uncertainty range" the valuation of gauge will be set to "restricted usable". This means that neither conformity nor non-conformity with the specifications can be proven.

- Used point pattern

  Select the measuring point pattern which should be used for the inspection [*Settings > Pattern of measuring points*].

- Direction

  Select the wished direction (increasing or decreasing nominal sizes) for the set inspection.

- Compensation of temperature

  Activate this option if you want to compensate for the temperature differences between the reference and measuring gauge. Activating this option only makes sense if you use a measuring device to measure the temperatures of your gauge blocks. Please also make sure that you have entered the correct "thermal expansion factors" for the materials used.

- Compensation of deformation
  Activate this option if you want to correct the different deformations for different materials. Activation only makes sense if the corresponding deformation parameters are determined!
- Reference block sets
  Select (all) reference gauge block set(s) that you want to use for gauge block inspection. The reference set used must be defined in the central standard and instrument management.

> **Note**
>
> If the reference gauge block set used does not contain all the nominal sizes of the gauge blocks you have selected, an error message will appear on the screen when you start the calibration. If you start the measuring process anyway, all dimensions for which no gauge block is available will be blocked for measurement!

7.2.3 Settings > Management of tables for error limits ...

The program offers you the possibility to manage different tables with error limits, for example to define your own limits, as suggested in the document VDI/VDE/DGQ 2618 (class of accuracy 3: internal to the factory) [Fig. 7.2.10]. A table with error limits consists of several pages (at least one page). Each page describes the limits for the respective "class of accuracy" - see also the function of the button `Create a new class` when editing a tolerance table.

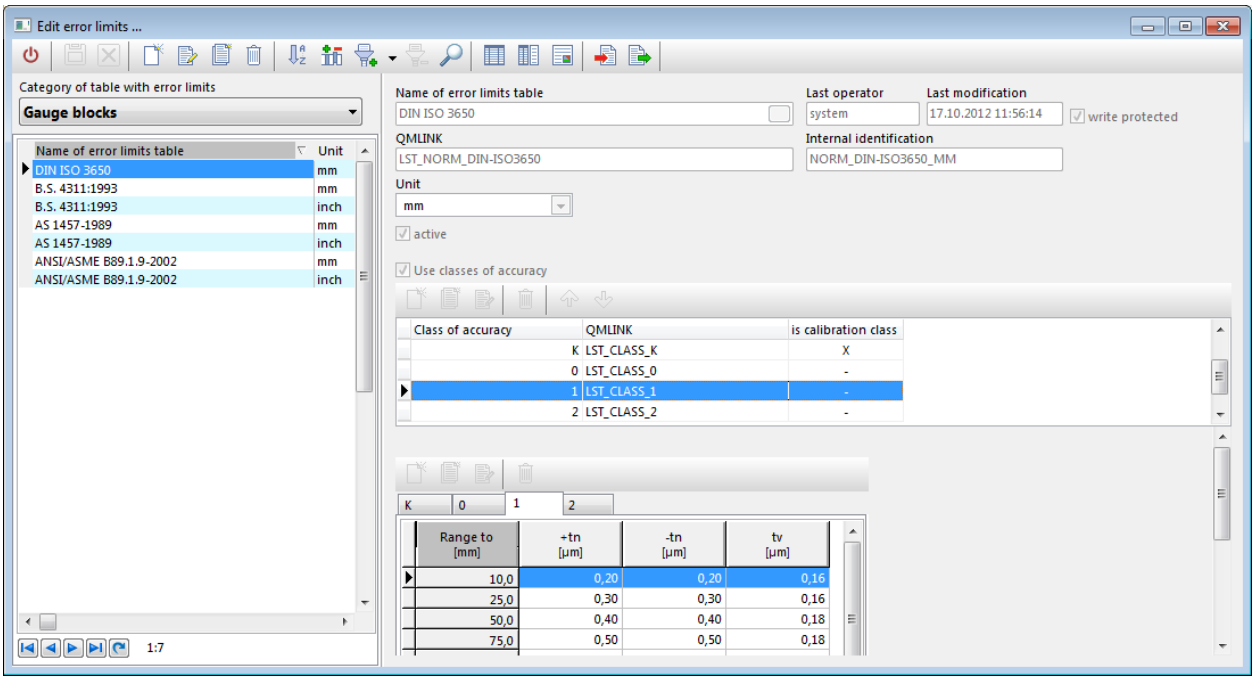


Fig. 7.2.10: QMSOFT®/QM-BLOCK *Settings → Management of tables for error limits ...*

The supplied installation kit contains the tolerances and accuracy classes according to ISO 3650. Using the copy function (see Copy button) you can duplicate and change this tolerance table.

7.2.4 Settings > Pattern of measuring points

Depending on the user's evaluation strategy, it is possible to define any number of "Measurement point patterns" [Fig. 7.2.11]. These patterns define the order of the measurement points that must be touched when inspecting a gauge block. Additionally, you can use the REPETITION parameter to define the number of repetitions that should be performed for the defined measurement points. This can be used to reduce the accuracy of your measurement result. Each "Measurement point pattern" should be given a meaningful name.

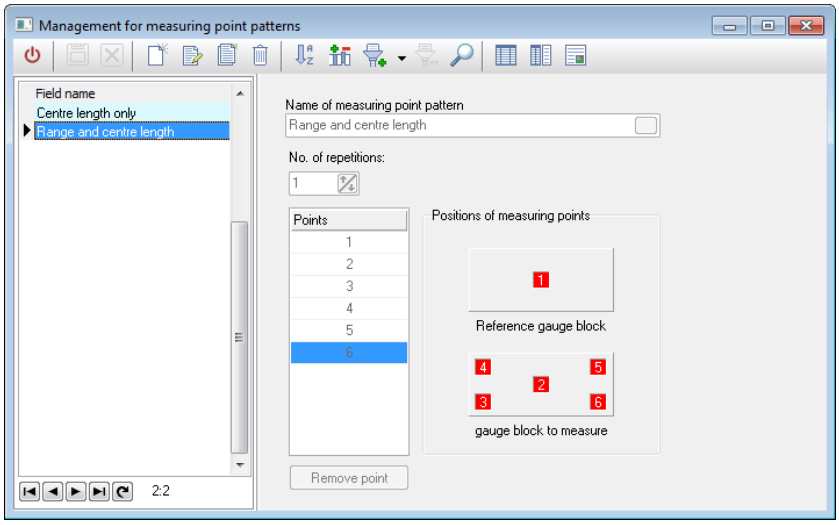


Fig. 7.2.11: QMSOFT®/QM-BLOCK Define a "measuring pattern".

To add a new "Measurement point" to the list shown on the left, click the corresponding button in the "Position of the measurement points" field. To delete a point, use the `Delete` button.

7.2.5 Settings > pre-defined gauge block sets (nominal sizes)

Before inspecting a gauge block set, you must enter all the nominal sizes of the gauge blocks included in that set. To minimize the amount of work required, the program manages predefined "Gauge block set compositions". These compositions refer to the standard sets offered by various manufacturers such as TESA, MAHR and MITUTOYO. When inserting a new gauge block set, you can now select a predefined set and automatically create all the nominal sizes for your gauge block set. You can also create new compositions of gauge block sets.

The program already has a large number of set structures stored that you can expand or reduce as needed. The functions for "Add", "Edit", "Copy" and "Delete" (see corresponding buttons) are self-explanatory and are therefore not explained in more detail here.

7.2.6 Doing a gauge inspection

Start the inspection by clicking the corresponding button on your main screen. Normally you should start the measurement via the gauge management program QMSOFT®/QM-MANAGE. In this case you will go directly to the screen shown.

Note

Normally, the inspection of a gauge block set is performed through the gauge management system. For this reason, only the gauge management system can store the set configuration, manage the general data of the set (such as checking the inspection data), and manage the history of the gauge block set.

7.2.6.1 Entering the gauge data

If you do not perform the measurement using the gauge database, you must first enter the data to describe the gauge block set here [Fig. 7.2.12].

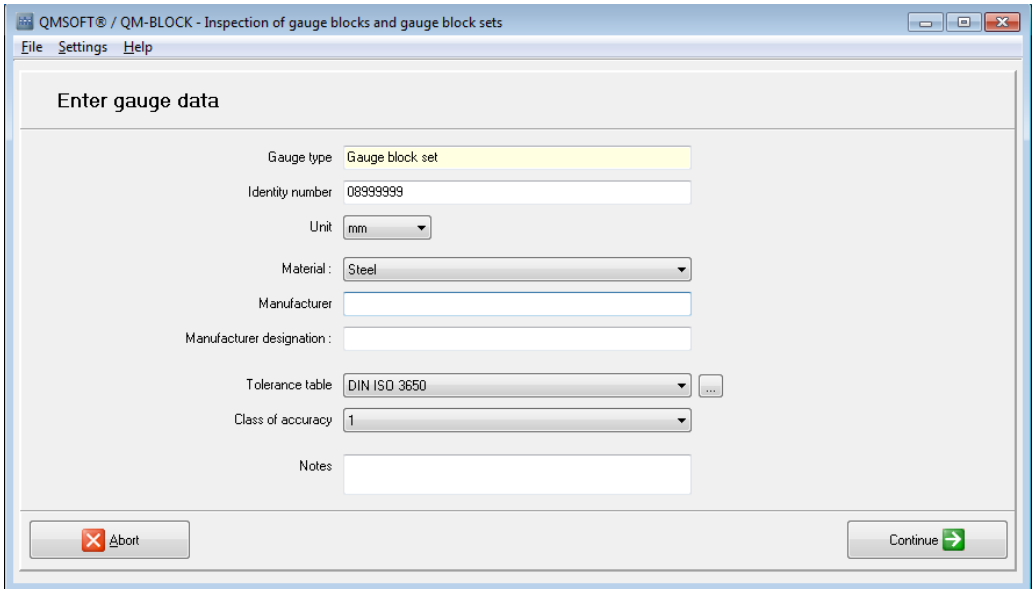


Fig. 7.2.12: QMSOFT®/QM-BLOCK Inspection procedure - Enter the gauge block set data.

These fields must be filled in:

- IDENTITY NUMBER
  Enter an identification number for the measuring device.
- Also select the values for the gauge block unit and material and (optionally) the manufacturer name and a manufacturer designation for the gauge block set.
- ERROR LIMITS ACC. TO
  Select a table defining your error limits from the list.
- CLASS OF ACCURACY
  If you select a tolerance table which does contain different classes of accuracy (e.g. “DIN ISO 3650”) then you have to select the “Class of accuracy”.

If you are inspecting a gauge block set and did not start this inspection via the gauge database, you must now enter individual gauge blocks that are contained in the set. The procedure for this is the same as described in the section [*Create a new reference gauge block set*].

Note

Since the QMSOFT®/QM-BLOCK program is usually used in combination with the gauge management program QMSOFT®/QM-MANAGE, an inspection is started from the gauge history. In this case, the gauge parameters are already entered in the gauge management program.

7.2.6.2 Change inspection conditions

Before starting an inspection, you will be shown the inspection conditions screen again [Fig. 7.2.13]. All your default settings will be displayed and can now be changed if required.

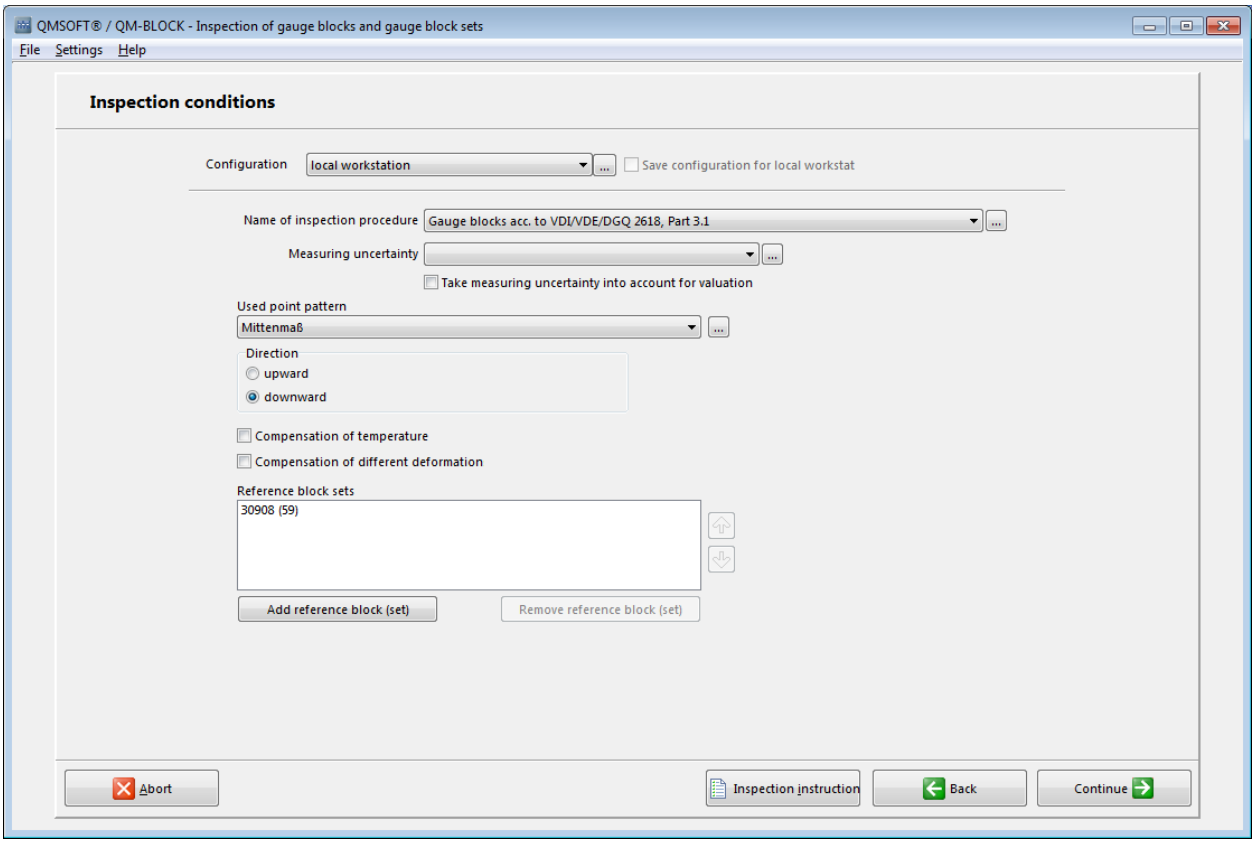


Fig. 7.2.13: QMSOFT®/QM-BLOCK Inspection procedure - Change the default inspection conditions.

Select the reference gauge set(s) used for the inspection. If the reference gauge set used does not contain all the nominal sizes of the gauges you selected, an error message will appear on the screen. Starting the measurement process is only possible if you have all the required nominal sizes in your reference set.

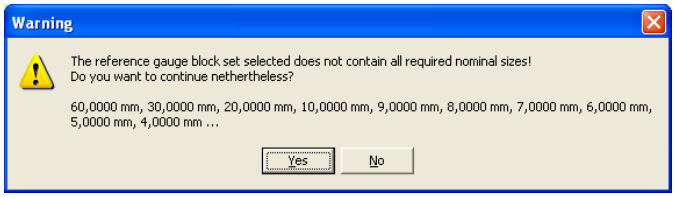


Fig. 7.2.14: Warning message - reference measurement set does not contain all required measurements.

> **Note**
>
> This message will also appear, if you did not enter the actual “Centre length deviation” for all reference gauge blocks, which you need to carry out your measurements. In this case open the related reference gauge block set inside the gauge management system and enter the deviation values!

Press `Continue` to start the measurement.

7.2.6.3 The measuring process

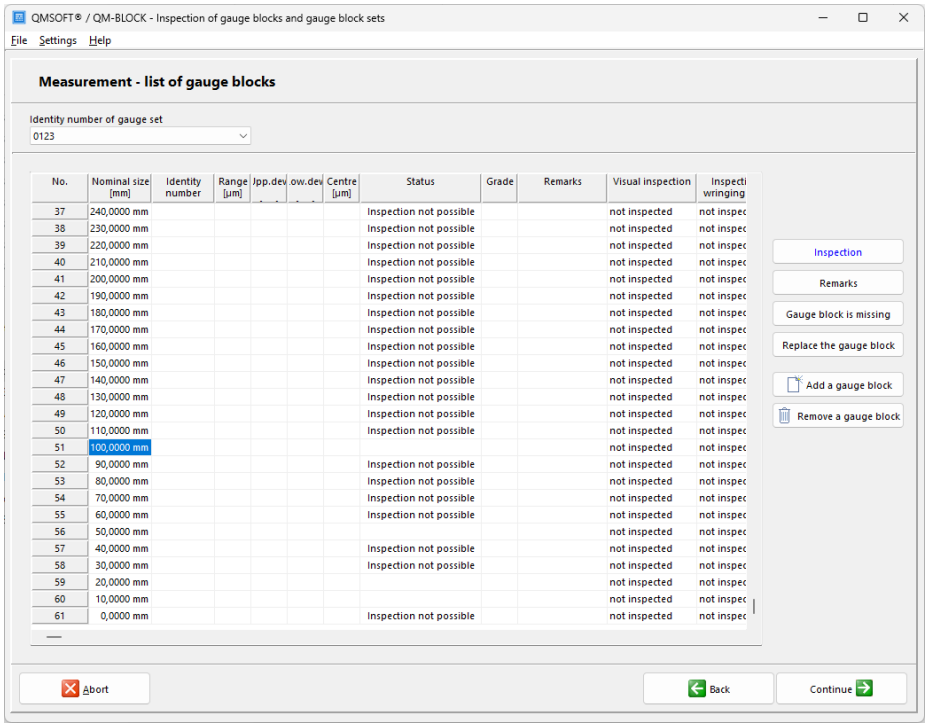


Fig. 7.2.15: QMSOFT®/QM-BLOCK Inspection procedure - Start of the measurement (list of gauge blocks).

When inspecting a gauge block, the following steps are always required:

- From the list displayed, select the gauge block that is now to be inspected [Fig. 7.2.15]. This selection is made automatically depending on the direction used with decreasing or increasing nominal sizes, but you can select a different gauge block at any time.
- You start the inspection of the gauge block by pressing the `Inspection` button or mark the gauge block with the `Replace` button (a replaced gauge block is checked immediately) or mark it as “Missing gauge block”.
- Accept the required measured values for the current gauge block (depending on the active program settings), enter a comment if necessary and continue the inspection with the next one.

During the measurement, the measurement position you need to touch is always displayed on the screen [Fig. 7.2.16]. When the measurement of the selected gauge block is completed, the calculated parameters of this gauge block are displayed. You can now return to the gauge block list or continue with the next gauge block.

When entering measured values via the keyboard, the measured values are entered directly into the table displayed. If you use an online connection to your inspection device, please refer to the operating instructions for the various

interface devices.

The position of the next measurement point to be touched is always displayed on your screen. If you have accepted an incorrect measurement, click on the corresponding position in the table with the mouse and repeat the measurement of this point.

When the measurement is complete for one gauge block, use the `Next gauge block` button to move on to the next one. Use the `Back to the list` button to return to the gauge block list. From the list, you can pause a measurement to save the results.

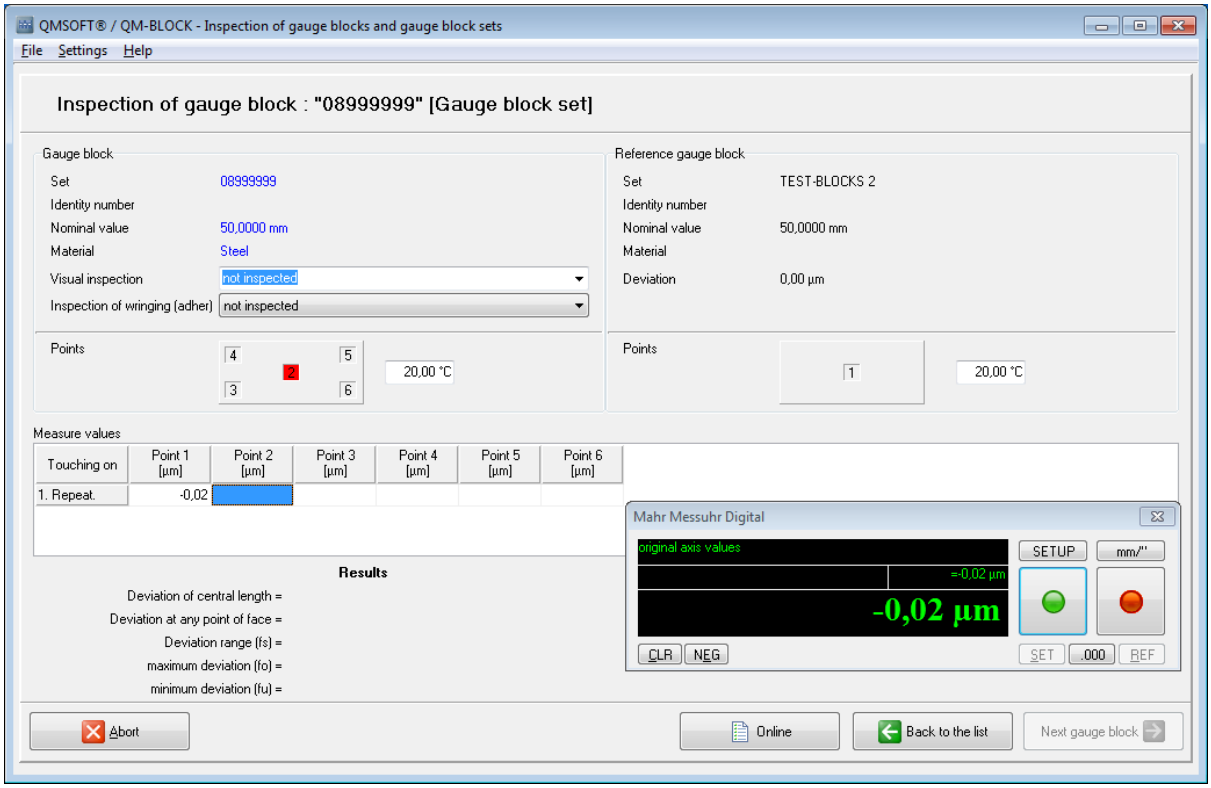


Fig. 7.2.16: QMSOFT®/QM-BLOCK Inspection procedure - Inspection of a single gauge block.

Note

The fields with the measured temperature values are only displayed if the temperature compensation is activated and the temperature channels are connected!

After calibrating all gauge blocks included in your set, you can proceed with the evaluation and the creation of the inspection certificate.

7.2.6.4 Saving of measuring results / Interrupt an measurement

Inspecting a gauge block set is usually a time-consuming process, and you should be able to interrupt the check with the confidence that you can safely save the intermediate results. There are two different ways to do this, depending on how you work.

Saving in a file

If you work independently with the QMSOFT®/QM-BLOCK program and do not use the QMSOFT®/QM-MANAGE gauge management, the easiest way to save your intermediate results is to do so in a file.

If you cancel a measurement in progress, you will receive a message asking whether you want to save the results. If you confirm this, enter the folder and file name in which you want to save the values.

To reload the measurement results, open the program menu *Inspection* → *Load old inspection data...* and open the file you saved previously. Now go through the input windows until you get to the position where you can continue the measurement.

Saving the results in the QMSOFT®/QM-MANAGE database

We recommend always starting the inspection of a gauge block set with QMSOFT®/QM-MANAGE. If the measurement process is interrupted, the data is automatically written back to the gauge block database.

To cancel the measurement, press the `Save and close` button [Fig. 7.2.17].

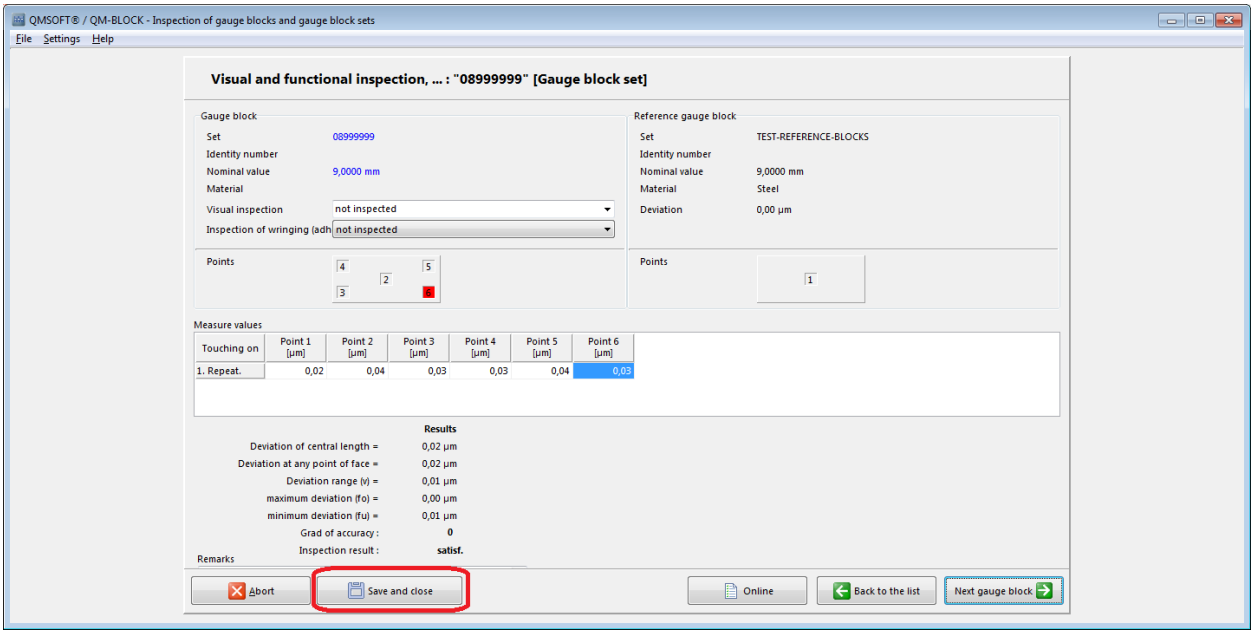


Fig. 7.2.17: QMSOFT®/QM-BLOCK Inspection procedure - Interrupt a measurement by saving the intermediate results.

The program now writes the values back into the database. As long as not all single gauge blocks in the set have been calibrated, the gauge block set is marked with the status “unfinished inspection”.

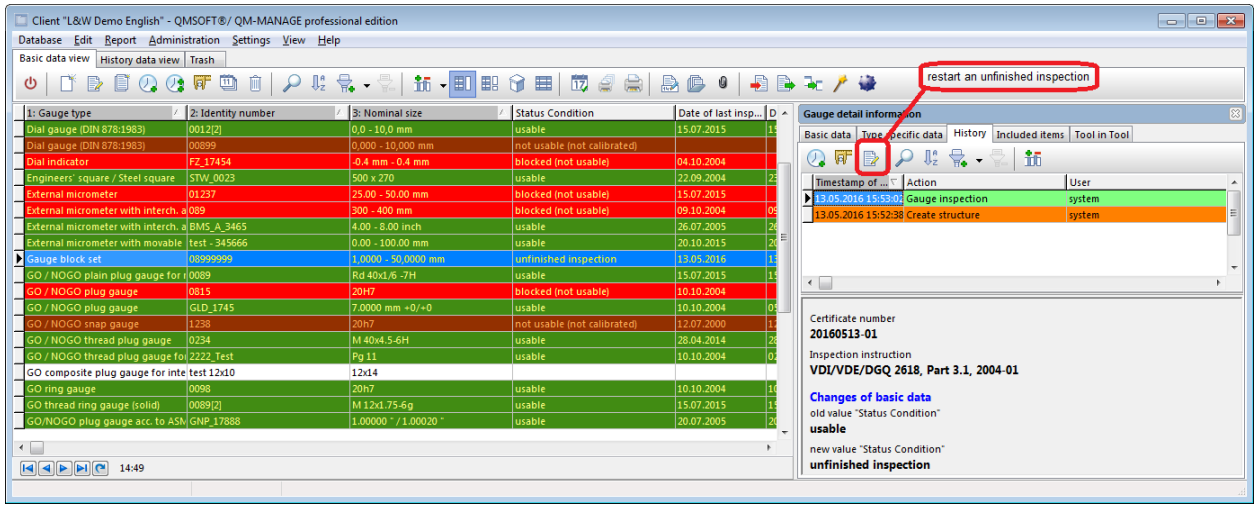


Fig. 7.2.18: QMSOFT®/QM-BLOCK Inspection procedure - Restart an unfinished inspection.

To continue the inspection, select the gauge in the database and go to the last item in the gauge history. Now click the `Edit` button as shown on the screen [Fig. 7.2.18]. In the next window that displays the details of the unfinished inspection, click the `Edit` button again. Now the `Caliper` button will be released [Fig. 7.2.19].

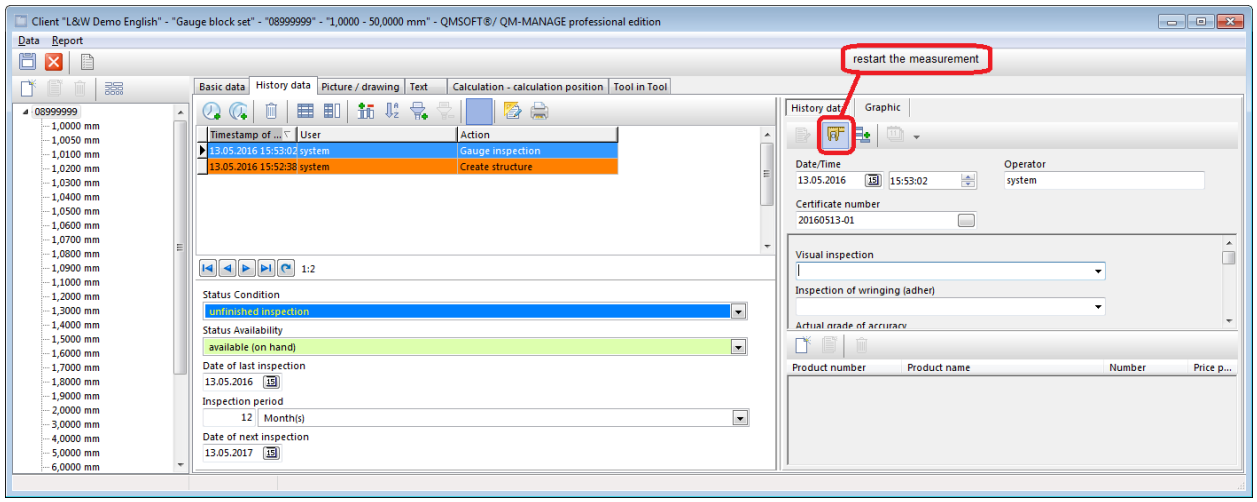


Fig. 7.2.19: QMSOFT®/QM-BLOCK Inspection procedure - Released “Caliper” button - Restarting an unfinished measurement.

Click on it and confirm the following query as to whether you want to overwrite the existing measurement with “yes”. You can now continue the measurement as described in the previous section.

7.2.7 Using a temperature measuring device

The QMSOFT®/QM-BLOCK program offers the possibility of using temperature measurements of the gauge block to be inspected and the reference gauge block for temperature compensation. This can be done either by entering data via the keyboard or by reading a temperature measuring device.

Warning

Regardless of whether the temperature values are entered via the keyboard or read directly from a temperature measuring device, the temperature compensation itself is only carried out when the gauge block measurement values are received by the QMSOFT®/QM-DeviceServer (but not when these measurement values are entered via the keyboard or existing values are edited!). This eliminates the possibility of multiple compensations of the measured values when browsing through the measured value table.

A temperature measuring device is integrated via the QMSOFT®/QM-DeviceServer, which transfers the temperature measurement values from the hardware device to the computer. First install and configure your temperature measuring device in the QMSOFT®/QM-DeviceServer. Also define the setting parameters of the temperature measuring device's interface there.

You can define the connection between the gauge block inspection program QMSOFT®/QM-BLOCK and the QMSOFT®/QM-DeviceServer via the menu item *Settings* → *Program settings* . . . [Fig. 7.2.20].

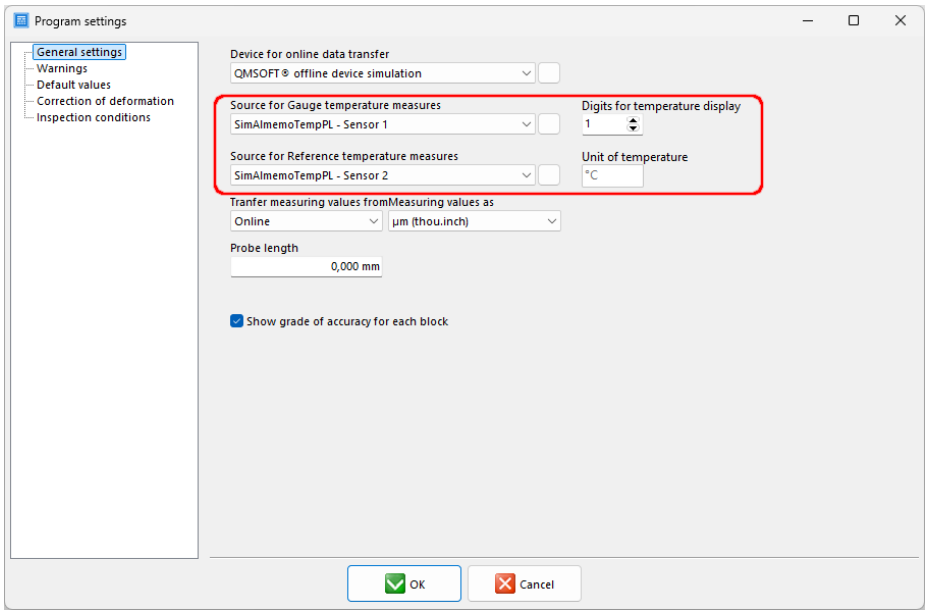


Fig. 7.2.20: QMSOFT®/QM-BLOCK - Settings to connect a temperature measuring device.

7.3 Inspection program QMSOFT®/QM-BORE

The program QMSOFT®/QM-BORE was designed for the inspection of bore gauges with 2-Point contact (with split ball or moveable measuring bolt) and for the inspection of indicating plug gauges based at the regulations of the German VDI 2618 rules, part 13.2.

Measurement data can be transfered directly from an online-connected measuring device or from the keyboard. Against the type of the bore gauge the program does determine the gauge parameters MAXIMUM ERROR OF INDICATION G and REPEATABILITY r based on the measuring data.

The evaluation results can be re-produced on the screen and/or the printer. Tolerance excesses will be shown. The program does enable the gauge valuation according to the VDI 2618 rules, part 13.2 as well as according to your own factory tolerances. The management of these customized tolerance tables is a part of the program.

7.3.1 Settings > Program settings

Working with the program you should make different settings to define the program environment and especially program conditions. Use the menu item *Settings* → *Program settings* to do this.

7.3.1.1 General settings

Here you can choose the default data input device (keyboard of the computer, online-connected measuring machine). If you set "Online" as the default device the online-connection will be started automatically, when a gauge measurement will start and "Online" measurement is possible for the type of inspection.

Please pay also attention to enter a reasonable value for the PLAUSIBILITY LIMIT. Measuring values which are exceed this limit will be refused by the program.

7.3.1.2 Inspection conditions

You can preset parameters, which have influence to the inspection procedure, to be filled with default values [Fig. 7.3.1].

For the used inspection device you have to define:

- IDENTITY NUMBER
  Will be used for the calibration certificate
- TYPE
  Will be used for the calibration certificate
- GRADUATION
  Will be used for the calibration certificate

For the detection of the repeatability r you need this parameter:

- NUMBER OF REPETITIONS
  Number of measures, which you want to have for the calucaltion of the repeatability.

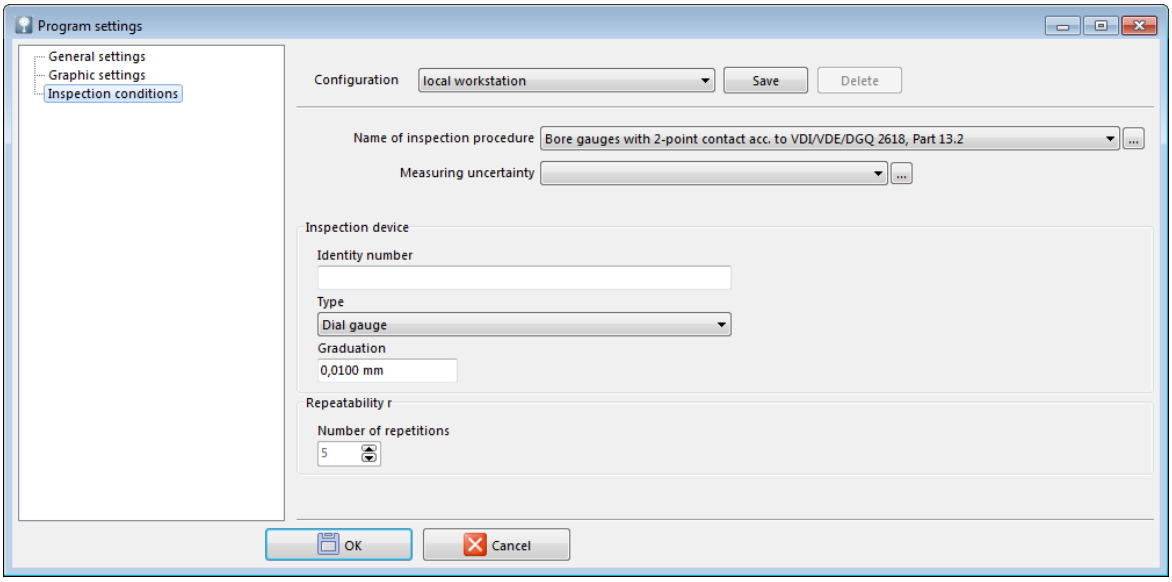


Fig. 7.3.1: Default inspection conditions.

7.3.2 Settings > Management of tables for error limits ...

If you want to valuate a bore gauge in accordance to your own factory tolerance you have here the possibility to enter and manage the related tolerance values. Select the menu *Settings → Management of tables for error limits ...* to show the list of existing tolerance tables and related entries [Fig. 7.3.2].

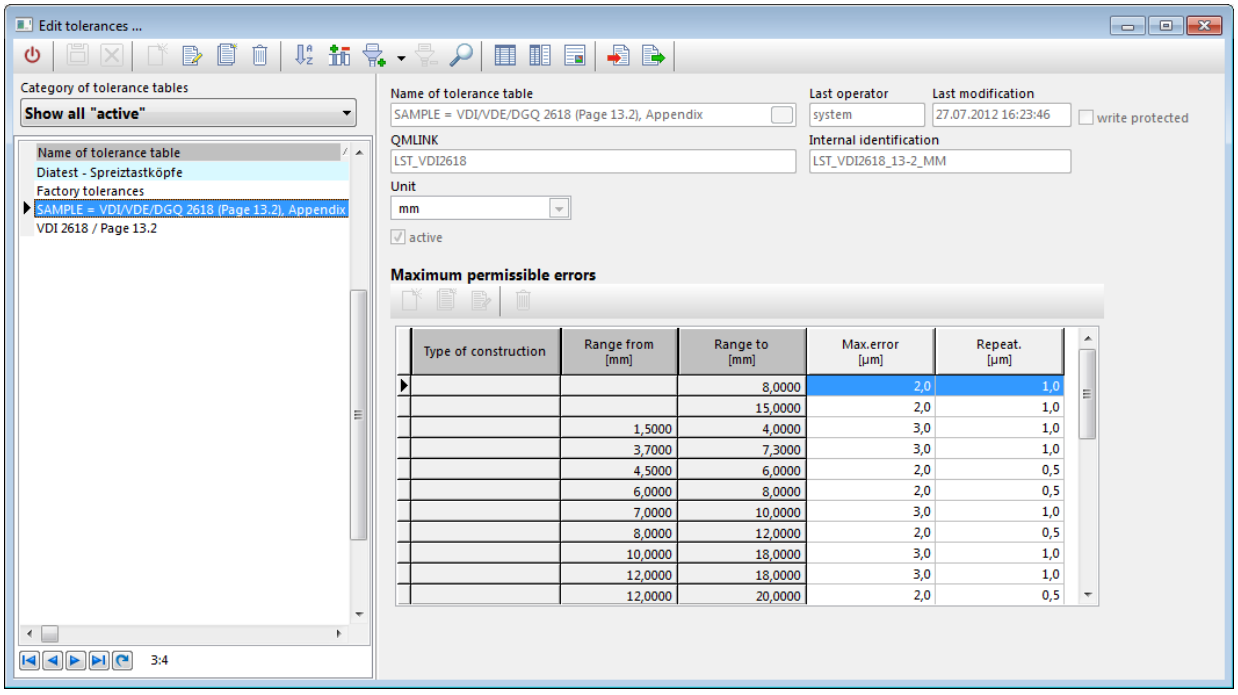


Fig. 7.3.2: Entering factory tolerances.

Here you can insert new tolerances, delete existing tolerances or change it. With the functions `Copy the tolerance`

`table` and `Create a new factory tolerance table` you can copy a tolerance table.

When doing a bore gauge inspection according factory standard this values are used for the valuation of the bore gauge being inspected. The entered values are related to the values “Measuring range from” and “Measuring range to”.

If you want to do a inspection acc. to “Factory standard” make sure, that a corresponding tolerance entry is available. Otherwise the `Continue` button will be locked.

7.3.3 Doing an bore gauge inspection

7.3.3.1 Entering nominal gauge data

After selecting the bore gauge type in the main menu a series of parameters must be entered, which describe the bore gauge and the inspection conditions [Fig. 7.3.3]. The input of these parameters is done in a separate dialog box with a corresponding number of input fields.

If you start the program via the QMSOFT®/QM-MANAGE program some of these parameters are filled with the related information coming from the database.

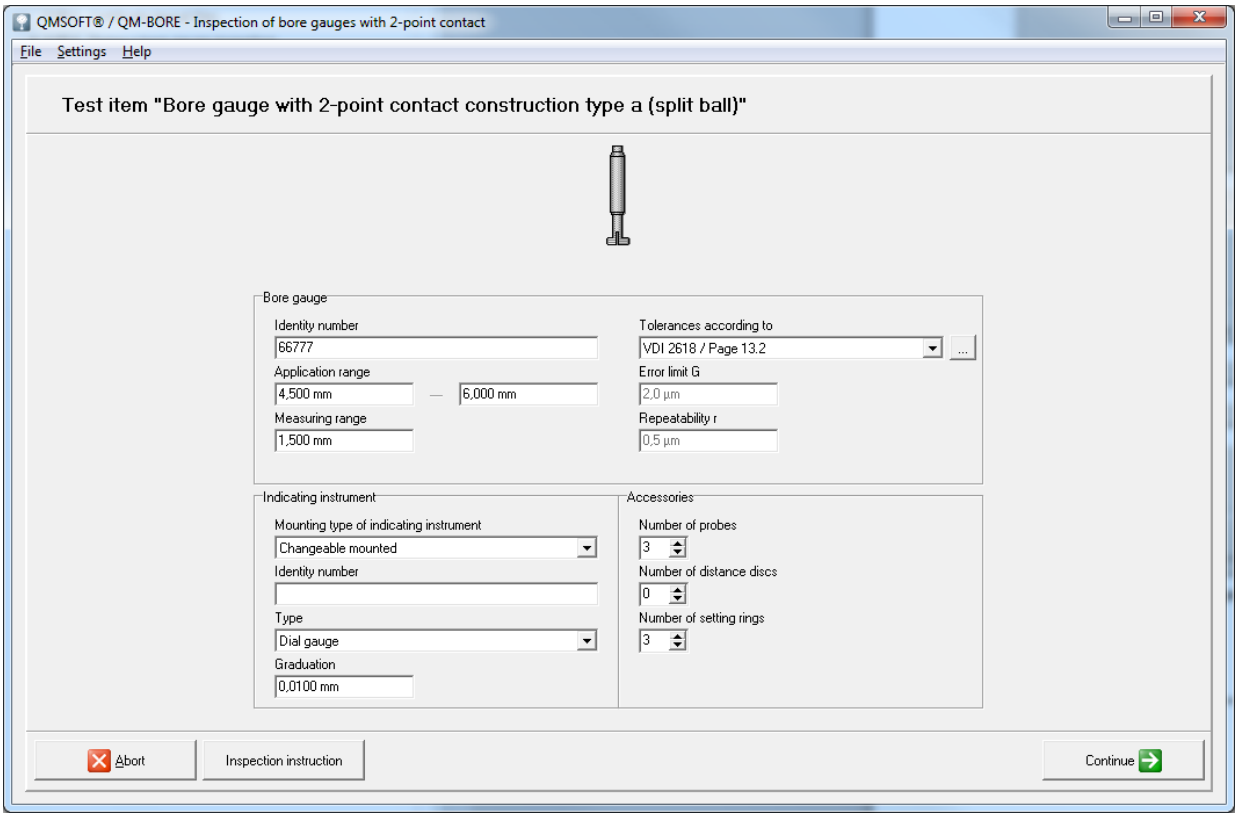


Fig. 7.3.3: Entering nominal gauge data.

Input fields for bore gauges

- Application range from.../to...
  Enter the start and the end value of the application range of the bore gauge.
- Measuring range
  Enter the measuring range of your bore gauge.

- Error limits according to
  Select one of the existing tolerance tables. Selecting "(free tolerance input) " does enable the entering of tolerances in the related fields.
- Error limit G
  Value for the tolerance of the maximum indication error G. The value can be entered or will be taken over from the selected tolerance table.
- Repeatability r
  Value for the tolerance limit of Repeatability r. The value can be entered or will be taken over from the selected tolerance table.

Input fields "Indicating instrument"

- Mounting type of indicating instrument
  Select the type of mounting of the indicating instrument into the bore gauge.
- Identity number
  In case that you have a "changeable mounted" indication instrument, please enter it's identity number.
- Type
  In case that you have a "changeable mounted" indication instrument, please enter the type of it.
- Graduation
  Enter the graduation of the indication instrument.

Input fields "Accessories"

- Number of probes
  Enter the number of the exisiting probes.
- Number of distance discs
  Enter the number of the exisiting distance discs.
- Number of setting rings
  Enter the number of the exisiting setting rings.

Press the `Continue` button to go to the next screen.

Note

If the `Continue` button is not enabled, you has not filled in all the required information!

7.3.3.2 Inspection conditions

After entering the bore gauge parameters you have to confirm the parameters of your inspection conditions and the inspection procedure by modifying the defaults of the inspection condition settings [Fig. 7.3.4].

For the used inspection device you have to define:

- Identity number
  Will be used for the calibration certificate
- Type
  Will be used for the calibration certificate
- Graduation
  Will be used for the calibration certificate

For the detection of the repeatability r you need this parameter:

- NUMBER OF REPETITIONS
  Number of measures, which you want to have for the calculation of the repeatability r.

For the detection of the error limit G you need this parameter:

- NUMBER OF INSPECTION POSITIONS
  Number of measures, which you want to have for the calculation of the error limit G.
- FREE STROKE RANGE
  Here you can define a value of the free stroke range to reduce the inspection range at the start and the end of the measuring range.
- INSPECTION RANGE
  Here the calculated inspection range will be shown, which results from the values of the measuring range and the free stroke range.

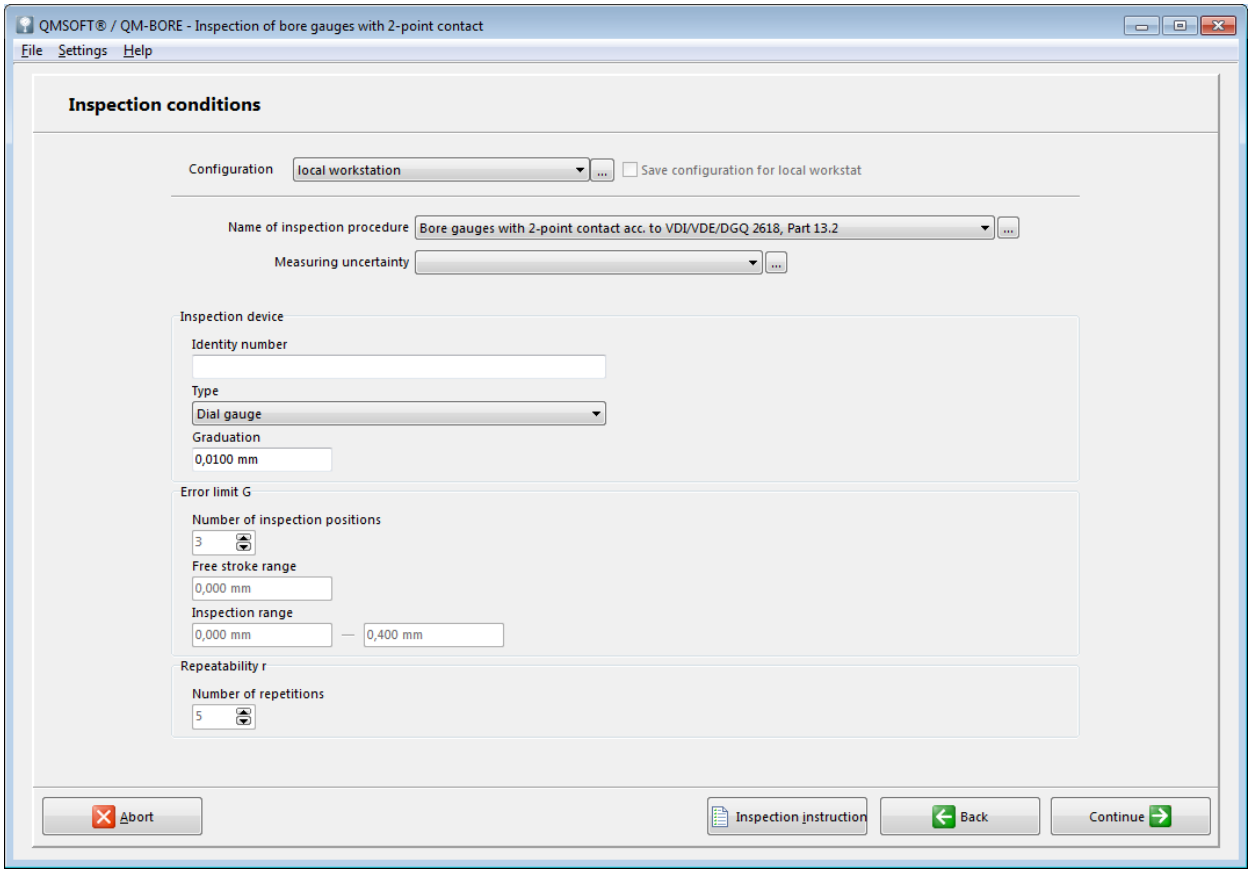


Fig. 7.3.4: Inspection conditions.

Press the `Continue` button to go to the next screen.

7.3.3.3 Measurement

The entering of measuring values is divided in the measures to determine the “Maximum indication error G” and the measures for the repeatability. For each kind of measurement a separate dialog box will appear on the screen. The shown nominal values will be read from the inspection positions entered before.

Press the `Continue` button to go to the next screen.

7.3.3.4 Output of results

The output of all of the inspection results is described in chapter *Output of results*.

7.4 Inspection program QMSOFT®/QM-CALIP

The programm QMSOFT®/QM-CALIP serves as a computer-based support for the inspection of calipers according to different national standards (see the list), respective according to customised factory standards.

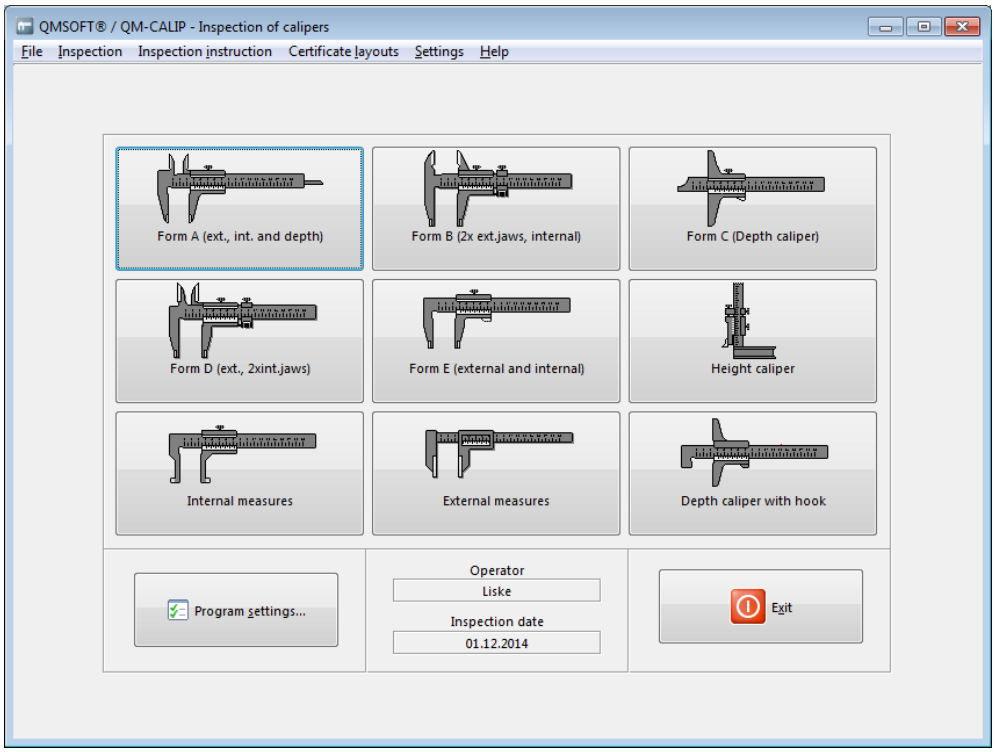


Fig. 7.4.1: QMSOFT®/QM-CALIP start screen.

Measure data can be entered directly from the caliper (if the calliper has a RS232 interface) or from the keyboard. From the measured data the program determines the errors of external, internal and depth measurement of the inspected calliper, tolerance excesses will be shown.

The following standards form the basis of the evaluation:

- DIN 862, December 1988,
- VDI/VDE/DGQ 2618, January 1991

- Australian Standard AS 1984-1977
- British standard BS 887
- Norme francais NFE 11-091, NFE 11-096
- Indian Standard IS:3651-1982 (2000)

The parameters, which are need to evaluate an inspection, will be checked with the application range oft he related standard, which makes it easy to use the proram iteself.

7.4.1 Settings > Program settings

The menu item *Settings → Program settings* contains a collection of basic settings, which are pre-setted by the installation of QMSOFT® to ensure the correct work of the program as far as possible [Fig. 7.4.2]. You will find different categories to get a better overview about all of the pssible parameters.

7.4.1.1 General settings

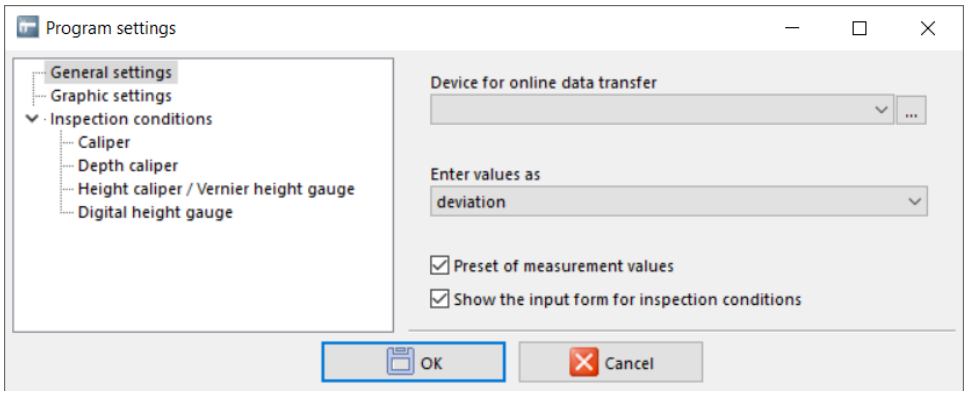


Fig. 7.4.2: General program settings.

Here you can set some global conditions for the inspection of calipers:

- Connected device
  Usually the values for a caliper inspection will be entered manually. When calibrating digital calipers you can define an “online” connection to take over the readings directly via the interface of the caliper;
- Enter values as
  Select if you want to enter the measures as the “absolut value” of the reading or if you want to enter the “deviation”. In the most cases it is more convenient to enter the only the deviation value.
- Preset of measuring values
  Switch “on” this to fill the column “Measure” in the measuring table with the nominal values. If the option “Enter measuring values as” was set to deviation all deviation values will be preset to the value “0.00 mm” (or “0.000 inch”).
- Show the input form for inspection conditions
  Usually this option will be switched on to see the “inspection conditions” window during a calibration. You can deactivate it, if you don’t want to see this information.

7.4.1.2 Inspection conditions

Here you can define the inspection conditions for the different basic designs of calipers [Fig. 7.4.3].

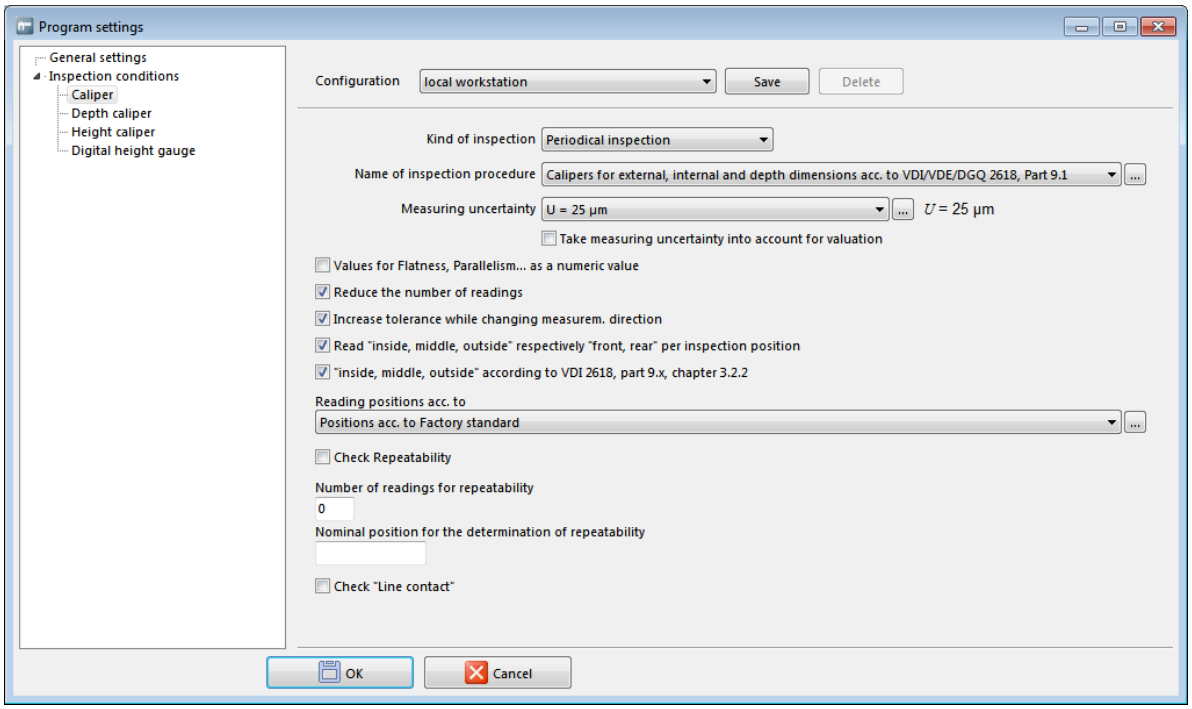


Fig. 7.4.3: Inspection conditions.

Set the following parameters:

- TYPE OF INSPECTION

  Select “Periodical..” or “Incoming inspection”. For an “Incoming inspection” some additional inspections (e.g. hardness inspection) have to be done.

- INSPECTION PROCEDURE

  Here you can select the name of the used inspection procedure. This name will be recorded at the inspection certificate. Some of the predefined inspection procedures will cause fixed settings or restrictions for the inspection parameters. For defining customised procedures see also the QMSOFT® Laboratory management functions.

- MEASURING UNCERTAINTY

  Select the measuring uncertainty which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate. The definition and usage of measuring uncertainty is also described in the QMSOFT® Laboratory management functions.

- TAKE MEASURING UNCERTAINTY INTO ACCOUNT ...

  The selection of the measuring uncertainty in the previous field is at first only used for recording purposes. If you want to use the calculated measuring uncertainty to prove the conformance or non-conformance of your inspected gauge with the defined error limits, then you have to switch on this option. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the “conformance zone” for the decision if the the inspected gauge is in or out of the defined specifications. If the calculated errors of indication are in the “uncertainty range” the valuation of gauge will be set to “restriced usable”. This means that neither conformance or non-conformance with the specifications can be proved.

- VALUES FOR FLATNESS, PARALLELISM... AS NUMERIC VALUES
  If you are inspecting a caliper you have also to check parameters like "Flatness of measuring faces", "Parallelism of measuring faces" and others. If you activate this option, you can enter the results for this inspection as numerical values. Otherwise you have only a "Pass" / "Fail" decision for these parameters.
- INCREASE TOLERANCE WHILE CHANGING THE MEAS. FORCE
  The German "DIN" standard defines a increased tolerance (compared with the general defined) for all measures with a change of the force. Activate this, the tolerance for internal measures will be increased with "0.02 mm".
- REDUCE THE NUMBER OF READINGS
  If this option is switched "on" for the second (and following) parameter you inspect on a caliper the short list "Reading positions for reduced meas." (see the next section of this manual) will be used. For example, if you inspect an caliper with two external measuring jaws and one pair of internal measuring jaws then only for the first external jaws the "full" measurement will be done. The second external jaws and the internal jaws will be inspected on the positions entered in the short list (see the next figure - entering of reading positions).
- READ "INSIDE, MIDDLE, OUTSIDE" RESPECTIVELY "FRONT, REAR" PER INSPECTION POSITION
  Some inspection procedures (e.g. the german VDI/VDE/DGQ 2618, part 9.1/2/3) does demand for the external measurements: ".. to be probed at three points of the measuring faces (inside, middle, outside)..". If it is switched off, you have to enter only one reading for each external position.
- INSIDE, MIDDLE, OUTSIDE" ACCORDING TO VDI 2618, PART 9.X, CHAPTER 3.2.2
  This option is available only as soon as the previous option is selected. Here you can decide whether all or only one inspection position shall be measured with 3 or 2 values, for more information see document VDI/VDE/DGQ 2618, part 9.1/2/3, chapter 3.2.2.
- READING POSITIONS ACCORDING TO
  The shown list is depended on the selected basic design of the caliper. Select the reading positions proposed by the VDI rules or the BS or on your self defined positions. If you want to use your own positions (factory standard) make sure that you have inserted the positions for the used measuring range.

Notes about the selection "Configuration"

When you are defining your inspection parameter and leave the dialogue with ok these settings will be saved as configuration "local workstation". You can also save different configurations when using the button Save and assign a name for it. If you are working in a network a named configuration is also usable on all other workplaces.

7.4.2 Settings > Edit inspection positions

The inspection of a caliper can be made on different positions of the applicable measuring range of the caliper inspected. For this, approbriated gauge blocks (for external or depth measurements) or setting rings (for internal measurements) will be used. The readings you get have to be compared with the sizes of your reference gauges. To make this comparision the program must be informed about the inspection positions you use.

For an inspection according DIN, BS or NF standards there may exist tables with pre-defined measuring positions.

Use the option *Settings → Edit inspection positions* to define the related positions for different types of calipers [Fig. 7.4.4]. The tables with all entered reading positions will be saved into the database.

Please note that the position tables are assigned either to "mm" or "inch" calipers.

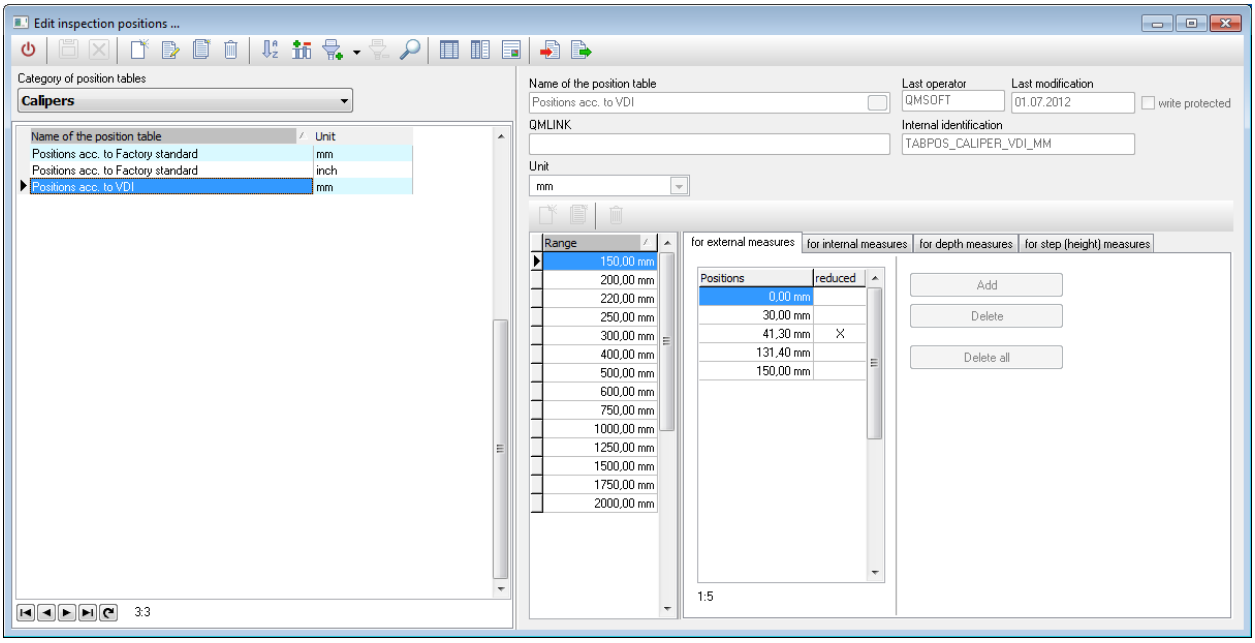


Fig. 7.4.4: Defining inspection positions.

You can enter positions for “External”, “Internal”, “Depth” and “Hight” measures.

The reading positions entered are always in relation to the measuring range of the caliper should be inspected.

The position lists are usually divided in two columns: the column “Positions” does include the reading positions for a “full inspection” of the calipers beam. This list will be used for the first parameter on the caliper (in the most cases for the external measurement).

If the switch “Reduce the number of readings” is activ, for all other parameters the list shown in the column “reduced” will be used. This positions will also used for the internal measures if an inspection according to “VDI/VDE...” is selected.

7.4.3 Settings > Mangement of tables for error limits ...

If you have chosen the option “Factory tolerances” a list of already existing tolerance entries [Fig. 7.4.5] will appear on the screen.

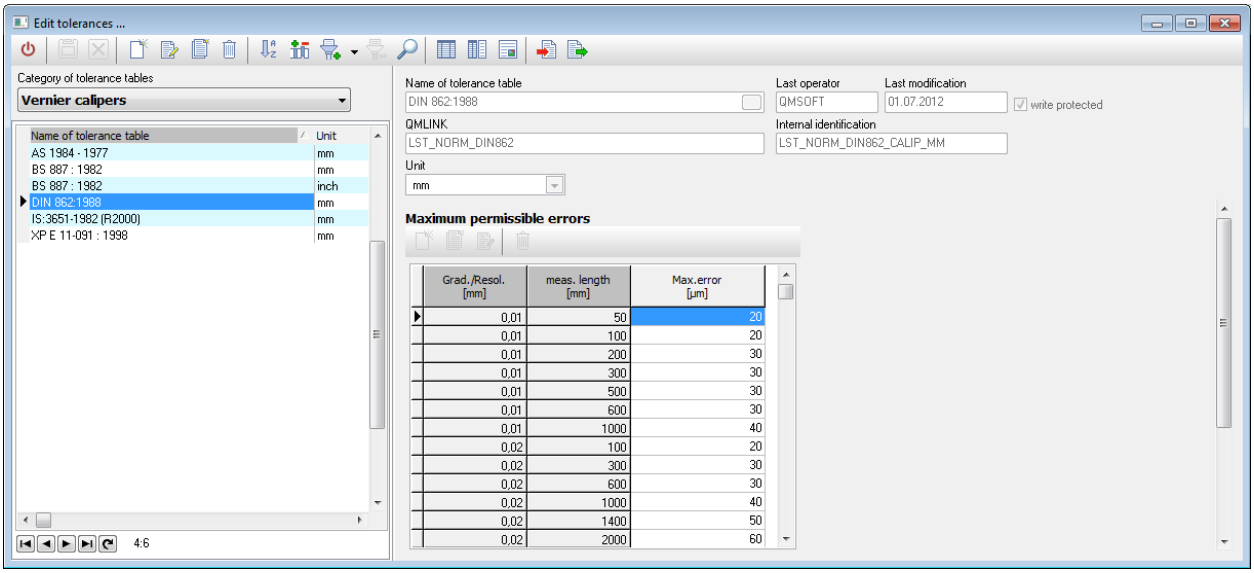


Fig. 7.4.5: Factory tolerances.

Here you can insert new tolerances, delete existing tolerances or change it. With the functions `Copy the tolerance table` and `Create a new factory tolerance table` you can copy a tolerance table from one micrometer type to another.

The tolerance tables will be saved in the system database. When doing a caliper inspection according factory standard this values are used for the valuation of the caliper being inspected. The entered values are related to the type of the caliper, the “Measuring range” and the “Graduation”.

If you want to do a caliper inspection acc. to “factory standard” make sure that a corresponding tolerance entry is available. Otherwise the `Continue` button will be locked.

7.4.4 Doing a caliper inspection

The program is presented on the screen with a main window, that contains large buttons, each representing the examination of a several gauge group (a gauge type). In the menu item *Inspection* you can find all supported gauge types with own submenu-items.

7.4.4.1 Entering nominal caliper data

Before starting the inspection, a series of parameters must be entered that describe the caliper [Fig. 7.4.6].

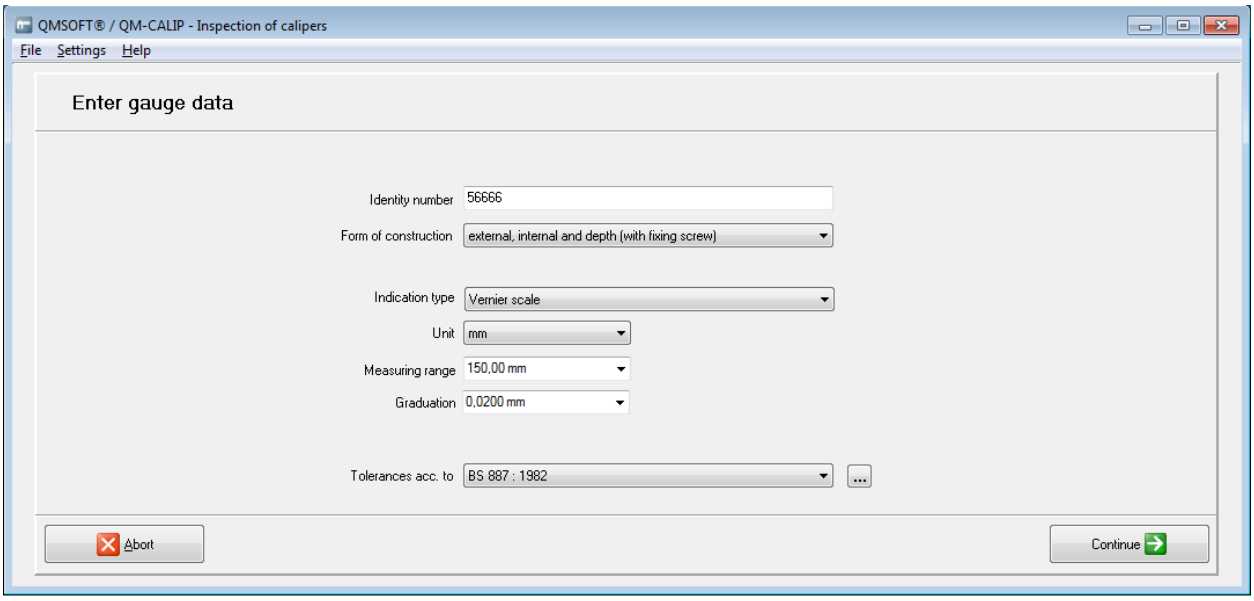


Fig. 7.4.6: Entering of caliper parameters.

The following parameters are needed:

- Form of construction
  Select the "Form of construction" of the caliper from the list of options provided. The content of this field will be entered into the certificate.
- Step- (Height) measuring unit
  Select this option if your calliper has a separate "step" measuring unit which you need to inspect.
- Indication type
  Choose here, from the list provided, the type of the indication (Vernier scale, Dial, Digital). Depended on the chosen option you have to enter in the next field the vernier scale, the graduation or the resolution of the caliper.
- Unit
  Choose the unit for the Caliper.
- Measuring range
  Enter the measuring range of the caliper have to be inspected. For calipers according the DIN or BS standard make sure the validity of this standard.
- Scale, graduation...
  Choose from the list provided, the scale graduation or resolution of the caliper.
- Tolerances acc. to
  Select the standard you want to use for the calipers error limits. If you select "Factory standard", make sure that the required tolerances are entered in the related table.

Note

If the `Continue` Button is disabled check the following things:

- Does the entered values for “Measuring range” and “Graduation” correspond with the standard selected (for example the BS 887 standard is defining only a graduation of 0.02 mm).
- If you are not sure switch to “Factory standard”!
- If you select the option “Reading positions according to: Factory standard” be sure, that you have entered the positions required, otherwise use the function “Inspection conditions” to do it.
- If you select the option “Tolerances according to: Factory standard” be sure, that you have entered the related tolerances for the “Measuring range” and the “Graduation”, otherwise use the function “Factory tolerances” to do it.

7.4.4.2 Measurement

After the entering of the calipers readings you have to inspect some other parameters depended on the type of caliper and/or the selected standard. These are the:

- Functional and Visual inspection
- Flatness of faces for external measurement;
- Parallelism of faces for external measurement
- Combined width of faces for internal measurement
- Parallelism of faces for internal measurement.

For this case an input mask will appear on your screen including the corresponding error limits of these paramaters [Fig. 7.4.7]. Now you have to check, if the actual values of the caliper inspected are inside the shown tolerance or not. Depended on this, choose the approbriate list entry. If you choose “not inspected” the related parameter will not be shown/printed in the calibration certificate.

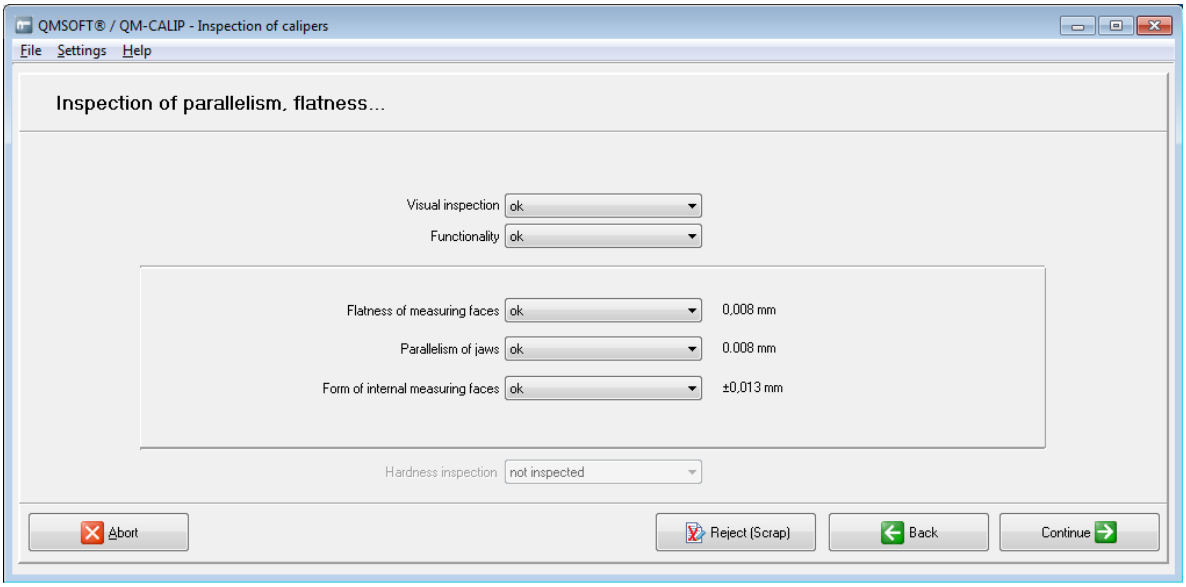


Fig. 7.4.7: Valuation of visual on functional inspection; inspection of faces.

In case that the option to enter “values for flatness, parallelism… as numeric values” is switched on, you can enter the

results for flatness, parallelism and others as numeric value.

The entering of measuring values is divided in the measurement of external, internal and depth measuring values. For each kind of measurement, a seperate dialog box will appear on the screen [Fig. 7.4.8]. The shown nominal values will be read from the inspection positions entered before.

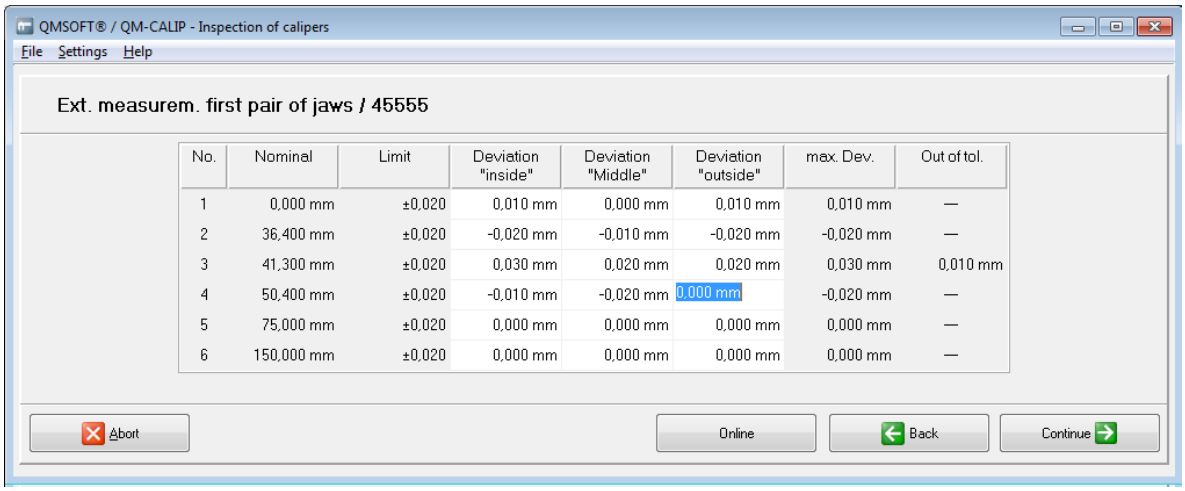


Fig. 7.4.8: Entering of measuring readings.

Enter the readings for the related nominal values via keyboard or pressing the corresponding buttom on your caliper (use the caliper manual to do this). An “Online”-measurement is only for “Digital calipers” possible.

The submitted deviations will appear in mask fields to which the user does not have access.

7.4.4.3 Evaluation

The evaluation of the inspection consists of comparing the measuring values entered with the corresponding error limits. The valuation of the caliper inspected will be done according the following criteria:

- making a inspection for a caliper according the DIN-standard (inspection can be made according DIN or VDI) or the Australian Standard AS 1984 the standardized error limits for the corresponding measuring range and vernier scale / graduation will be used for the calliper valuation,
- for a non-DIN/AS/BS caliper inspection the tolerance assessment is done only if the measuring range and the vernier scale/graduation of the caliper match the corresponding entry in the factory standard tolerance table,
- if neither of the above is filled in, no tolerance assessment will be made.

The output of all oft he inspection results is described in chapter *Output of results*.

7.5 Inspection program QMSOFT®/QM-COMP

The QMSOFT®/QM-COMP program is used to support the technical inspection of classic gauge block comparators, such as those used in the field of calibration technology for many years to calibrate gauge blocks. The implemented inspection procedure is based on the directive "DKD-R4-1:1994 - Auswahl und Kalibrierung von Endmaßmeßgeräten zur Verwendung als Normalgeräte in Kalibrierlaboratorien" and the document "EURAMET cg-2 - Calibration of Gauge Block Comparators", version 2.0 (03/2011), formerly known as the "EA-10/02".

Note

This inspection program is (due to the underlying standards) only applicable in the metric system!

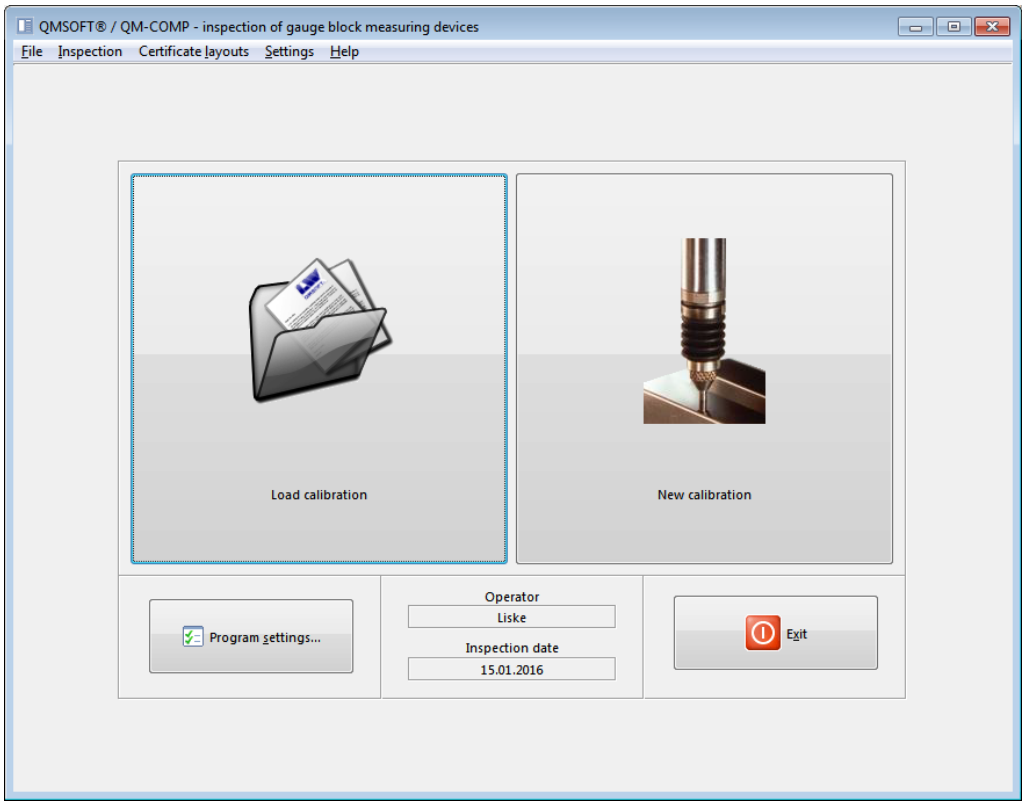


Fig. 7.5.1: QMSOFT®/QM-COMP start screen.

For the calibration procedure a special set of reference gauge blocks, which consists of six pairs of gauge blocks (no. 1 to no. 6) of the same material, is needed. The associated pairs are usually marked with the letters A or B and provided with an identification number by the manufacturer. The reference gauge blocks (except for the special gauge block) should respect the measuring surface quality correspond to the calibration grade "K". The gauge block B of the pair no. 6 has a special "bridge design", the difference of the central lengths of the associated gauge blocks A and B of the pairs 1 to 5 and the deviations f_o and f_u from central length of the gauge blocks B of pairs 2 and 3 have to been determined with a measurement uncertainty of 0.015 µm. The gauge block pair No. 6 does not have to be calibrated. For details please refer to the underlying standard.

Note

The inspection program QMSOFT®/QM-COMP does not contain the functionality for a gauge management or for the storage of the gauges history. These functions are an exclusive part of the gauge management program QMSOFT®/QM-MANAGE. Even if it is possible to run QMSOFT®/QM-COMP as a standalone module, the complete functionality for the management of gauge block comparators, the monitoring of the calibration date and the handling of the device history does require an additional license for the program QMSOFT®/QM-MANAGE professional edition.

7.5.1 Settings > Program settings

Here can be adjusted the link to the measuring device under the heading *General Settings*. Under the heading *Inspection conditions* can be defined the text items for the inspection procedure and the measurement uncertainty statement and the reference gauge block set, which has to be used.

7.5.2 Calibration procedure and evaluation

The inspection of a gauge block comparator is carried out according to a specified procedure that is defined by the standard. Changes to this standard require immediate changes to the software, which cannot be carried out by the QMSOFT® user! This manual assumes that you have a basic understanding of the procedure for inspecting a gauge block comparator.

The starting point for such an inspection is always the gauge management module QMSOFT®/QM-MANAGE. Here the reference gauge block set the gauge block comparator items must have been created.

The inspection procedure is started as usual by clicking on the `caliper` symbol in the basic data overview (or by pressing the function key `F7`) and then clicking again on the same button in the measurement history display (or by pressing the function key `F4`).

7.5.2.1 Information about the gauge block comparator

First, some general information about the gauge block comparator must be provided or checked for accuracy [Fig. 7.5.2]. The input fields are filled in with the values entered in the QMSOFT® gauge block management as soon as the QMSOFT®/QM-COMP inspection program is called up from there. The `Continue` button leads to the next operating step.

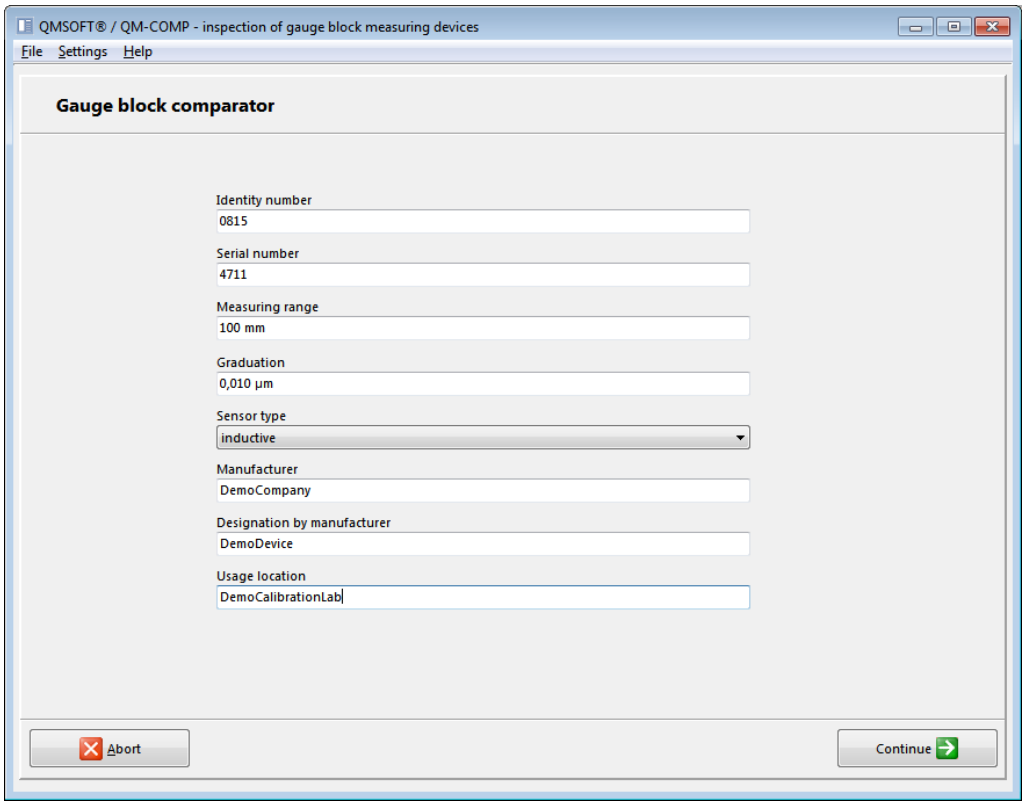


Fig. 7.5.2: Information about the gauge block comparator.

7.5.2.2 Information about the reference gauge block set

Before using QMSOFT®/QM-COMP, you must create a specially designed reference gauge block set in the gauge management module QMSOFT®/QM-MANAGE (gauge type: “Gauge block set for calibration of gauge block comparators”). The form displayed in QMSOFT®/QM-COMP is used to check the accuracy and completeness of the information [Fig. 7.5.3].

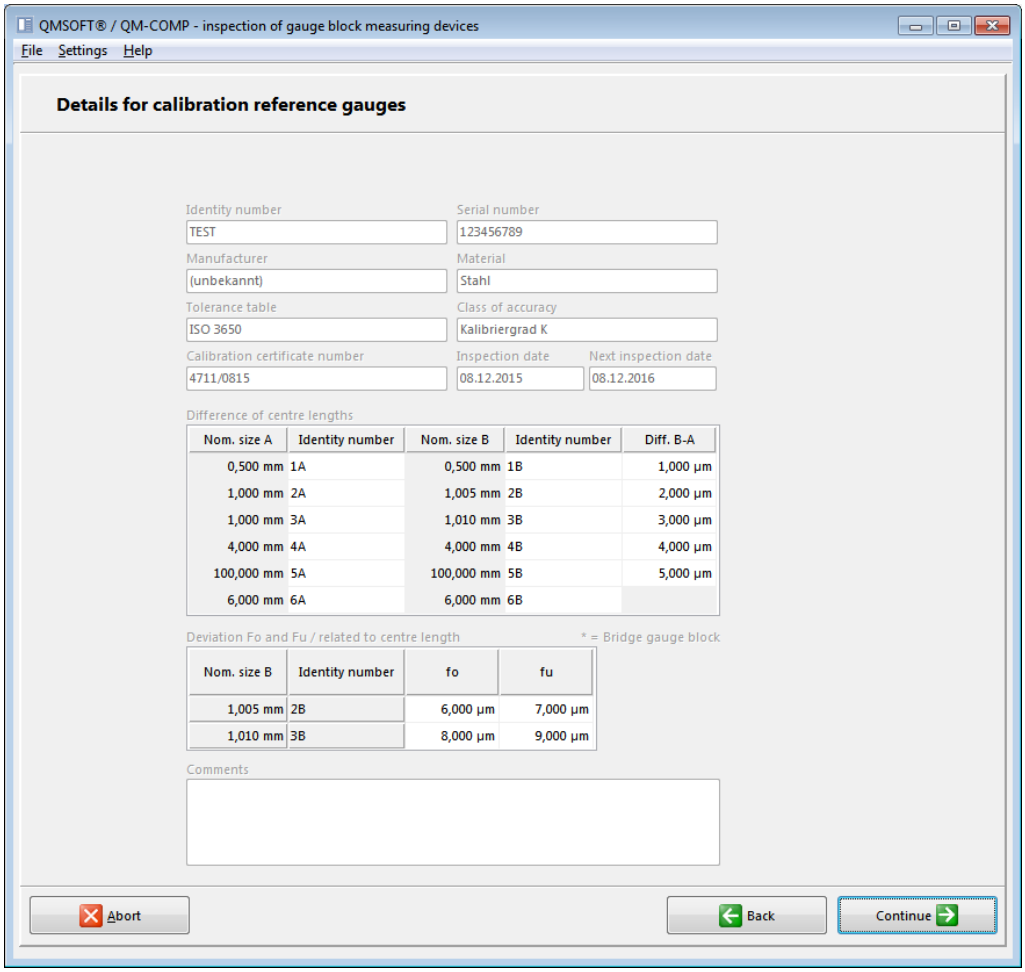


Fig. 7.5.3: Reference gauge block set.

In particular, the information about the differences B-A as well as f_o and f_u is important, as it directly influences the evaluation result.

7.5.2.3 General Information

Further on, information on visual and functional examinations is requested, with the possibility of skipping the inspection section and only receiving a scrap certificate, which is used for devices that cannot be calibrated due to technical defects [Fig. 7.5.4].

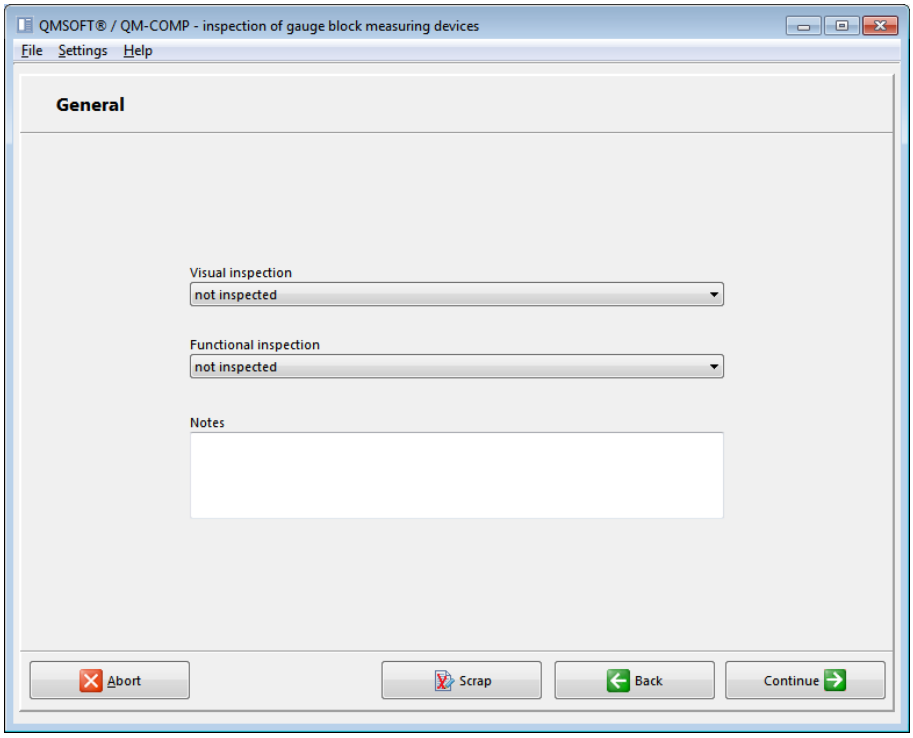


Fig. 7.5.4: Visual and functional inspection.

The default settings are selected so that the standard event is set to “OK” and you can quickly continue by clicking on the `Continue` button. If the results of the functional test are negative, please use the `Scrap` button to go directly to the certificate creation.

7.5.2.4 Selection of calibration steps

The following form [Fig. 7.5.5] allows you to access the various steps of the calibration procedure. To call such a single step, press the corresponding `Determine` button.

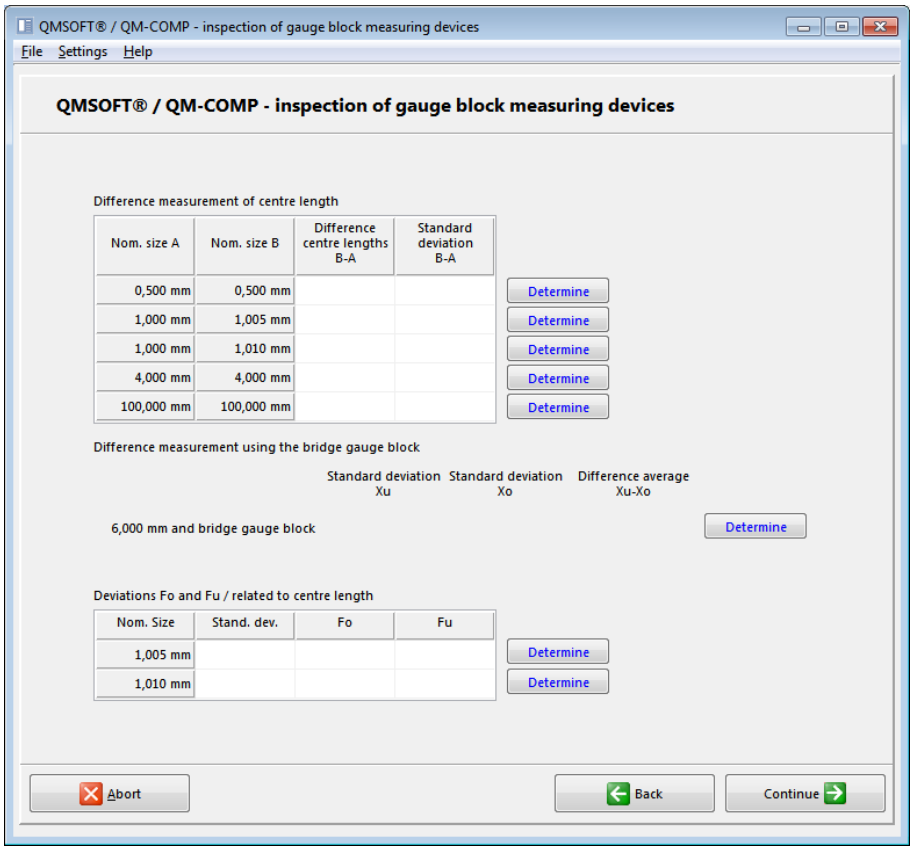


Fig. 7.5.5: Selection of the calibration steps.

After each calibration step you will return back to this form. The caption of a associated `Determine` button will change to a review text. If all calibration steps have been processed, so you can go to the issue of the calibration with the `Continue` button.

Difference measurement of central lengths

Using the reference gauge blocks the gauge block comparator, which has to be calibrated with the pairs 1 to 5 of the reference gauge blocks five difference measurements of the central lengths has to be performed. The five measurements are repeated after the positions of the gauge blocks A and B were exchanged in the gauge block positioning fixture [Fig. 7.5.6].

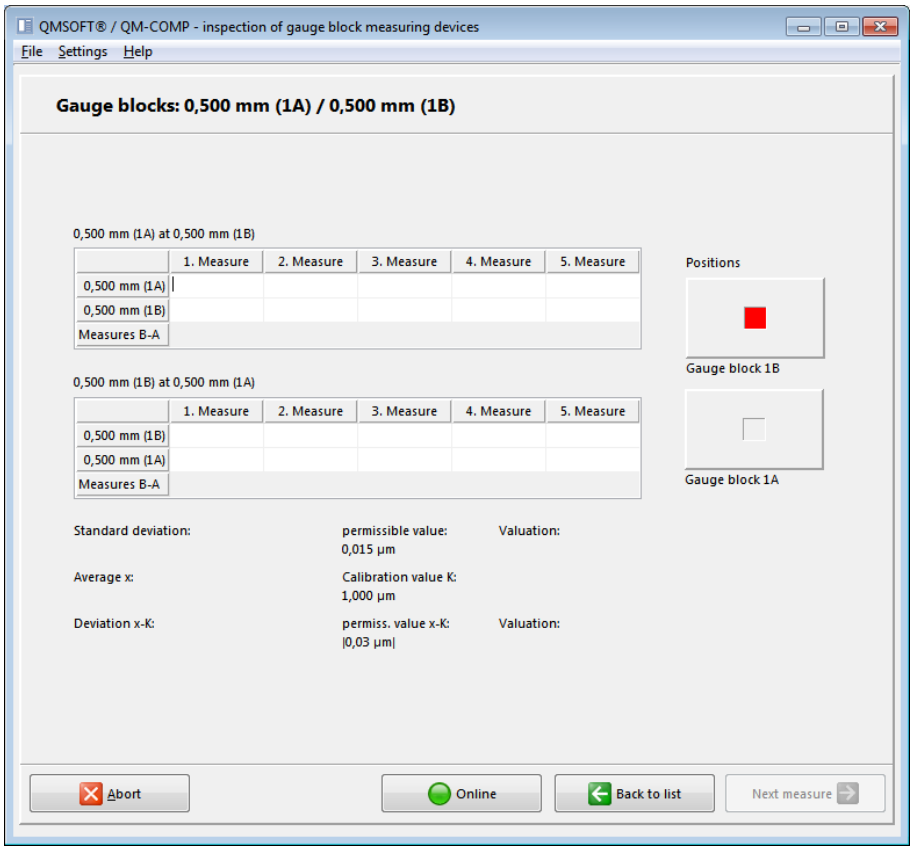


Fig. 7.5.6: Dfference measurement of central length values.

The average value (mean) and the standard deviation are calculated from the individual values of each series of measurements of a gauge block pair (10 measurements) and stated in the calibration certificate.

Difference measurements with the special sized gauge block

For the pair no. 6 two series of measurements are performed with 10 measurements [Fig. 7.5.7]. In the first series of measurements the special sized gauge block is measured with the flat surface and the second measurement series with the bridge-shaped measuring surface on the measuring table. By these measurements, the sensitivity of the lower measuring sensor is included in the review.

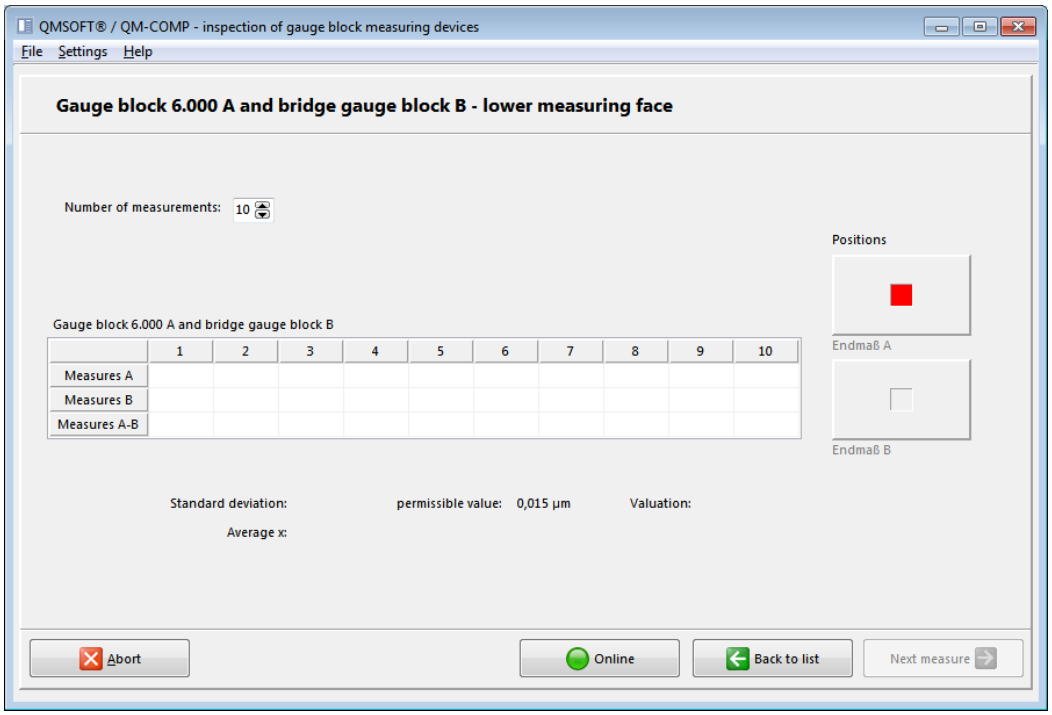


Fig. 7.5.7: Difference measurements with the special sized gauge block.

From the determined individual values of both series of measurements (each with 10 measuring values), which belong to the two layers of the special sized gauge block, the mean values, the difference between the mean values and standard deviations are calculated and reported on the calibration certificate.

Deviations f_o und f_u from central length

With the gauge blocks of sizes 1.005 mm or 1.01 mm (for determination of the deviations f_o and f_u) you have to measure five times at each touching position (specified in accordance with DIN 861, chapter 6.3.2), starting from the measuring surface center [Fig. 7.5.8]. The four series of measurements must be repeated after the final dimension has been rotated while maintaining its support surface by 180°.

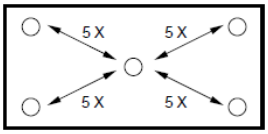


Fig. 7.5.8: Repeat measures five times.

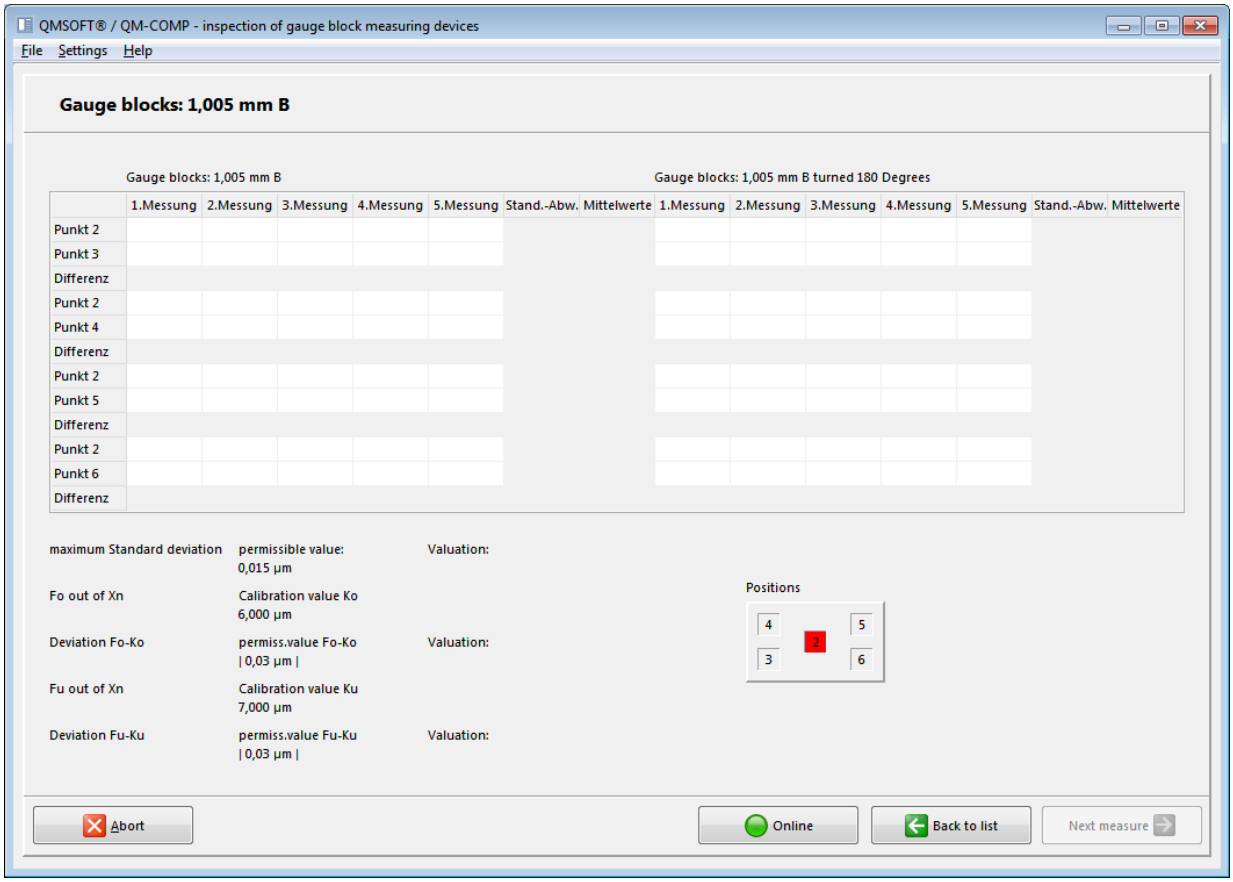


Fig. 7.5.9: Deviations f_o and f_u from central length.

The four series of measurements must be repeated after the gauge block has been rotated while maintaining its support surface by 180° [Fig. 7.5.9].

From the determined measuring values, the mean value and standard deviation shall be calculated for each measurement series. The deviations f_o and f_u from the central length results from the eight averages.

7.5.2.5 Evaluation criteria

According to the calibration procedure all of the calculated standard deviation values must not exceed a value of 0,015 µm. The permissible deviation of the mean values of the difference measurements and the permissible deviation of the values f_o and f_u from the values of the reference gauge blocks are equal to $\pm$ 0.03 µm. The difference between the averages of the difference measurements with the special sized gauge block must not exceed $\pm$ 0.03 µm.

All results are recorded in a detailed calibration certificate. A corresponding certificate template is included in the software delivery kit. According to the DKD guidelines, the following points must be documented.

- the usage location,
- the type, serial number, manufacturer and the identification number and the uncertainty of the used reference gauge blocks,
- the device type, model and serial number of all of the components of the gauge block comparator device, the principle of measuring sensors,
- the used measuring range and the display graduation during the calibration process,

- the settings of all of the controls of the digital measure readout device,
- the temperature range at which the calibration has been performed,
- the measurement results in tabular form:
  The "differences of central lengths" E in opposite to the values of N of the reference normals at 20 °C and to the differences $E - N$ and the standard deviations.
  For the gauge block pair no. 6. the mean values of the two series of measures, the difference between the mean values and standard deviations has to be indicated.
  The determined "deviations f_o and f_u from central length" E in opposite the values N of the reference gauge blocks and to provide the difference as well as the maximum standard deviation of the corresponding eight test series.
- The specification of measurement uncertainty must use the following rules:
  The measurement uncertainty of gauge block comparator amounts (for averaging at least five individual measurements)
  $u = 0.03\mu m + 0.002 \cdot D$
  for an indicated length difference D $\leq$ 10 mm.

The indicated uncertainty of measurement equal to twice the standard deviation (k = 2) and was prepared in accordance WECC Doc. 191 and DKD-3 estimated. It does not include the effect of temperature and the measuring surface quality of the used gauge blocks.

If the device meets the condition, the measuring stand and the display device of the gauge block measuring device each receive a calibration label.

7.6 Inspection program QMSOFT®/QM-DIAL

The program QMSOFT®/QM-DIAL is used for inspection of dial gauges, dial indicators and dial test indicators. It was designed to support the inspection of this gauges according to the worldwide mostly used standards. So the QMSOFT®/QM-DIAL program does include features to carry out the inspection according to the following documents:

- ISO standards: ISO 463:2006 and ISO 9493:2001
- German standards: DIN 878:1983, DIN 879, DIN 2270:1985
- the American standard: ANSI/ASME B89.1.10M-1987
- British standards: BS 907:2007, BS 2795:1981
- Australian standard: AS 2103-1978
- Korean standards: KS B 5206, KS B 5207, KS B 5238
- Japanese standards: JIS B 7503, JIS B 7533 and the standard JMAS 2001
- French standards: NF E 11-050, NF E11-056:2013 and NF E 11-053:2013.

The program also permits the inspection of non-standardized values of the above mentioned gauges and the inspection under non-standardized conditions (works standard specifications). The usage of the program requires only small knowlegde on computer technologies because special attention was paid to design a user-friendly human interface [Fig. 7.6.1].

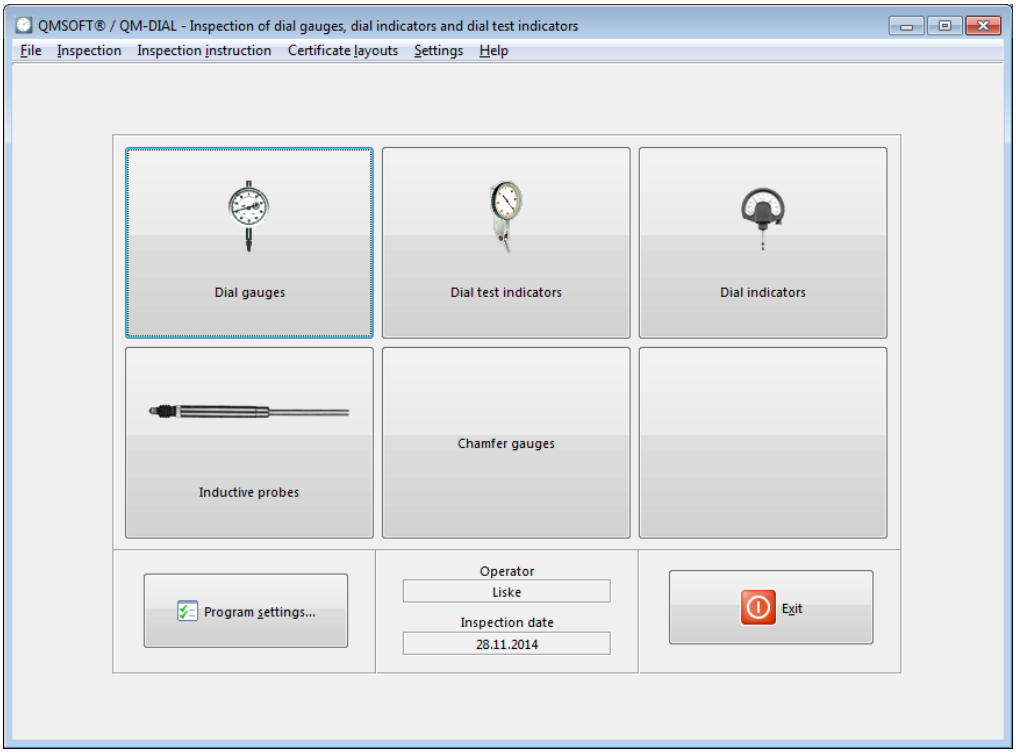


Fig. 7.6.1: Startscreen of QMSOFT®/QM-DIAL.

In coordination with the inspection strategy and the selected standard the program computes the related gauge parameters. These are, for example, for DIN 878:1983 based dial gauges: the deviation range f_e, the deviation range f_t of the sub measure range, the total deviation range f_{ges}, the repeatability f_w and the discrimination error f_u. For the evaluation according the ISO 463, British or Australian Standard the error limits over different intervals (e.g.: any one-tenth revolution, any half revolution, one revolution…) will be calculated. The input parameters necessary for the evaluation are inspected on plausibility according to the usage purpose of the standards.

7.6.1 Settings > Program settings

The menu item *Settings* → *Program settings* contains a collection of settings, which are pre-setted by the installation of QMSOFT® to ensure the correct work of the program as far as possible.

The dialogue form displays at the left side of the window a tree structure with the different categories, into which these program settings are divided. The appropriate fields in the right panel will be displayed by clicking on an appropriate tree branch.

7.6.1.1 General settings

In the category *General Settings* [Fig. 7.6.2] you can select the connection to a measuring device from the list of available connections defined in the QMSOFT®/QM-DeviceServer. Please also select the default data input source (computer keyboard, online measuring device). If you set “Online” as the default device, the online connection will start automatically as soon as a measurement starts.

The option Warning if … can be used to define a plausibility limit for measured values. This can be helpful in order to avoid completely incorrect measured values when using a measuring device connected “online”.

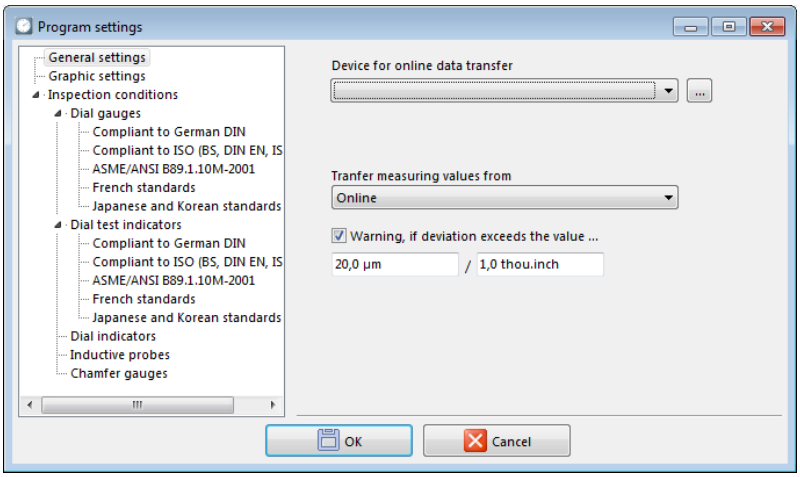


Fig. 7.6.2: General settings.

7.6.1.2 Inspection conditions

Here you can define parameters that depend directly on the corresponding standard or the gauge type defined by the standard and the associated inspection procedure [Fig. 7.6.3].

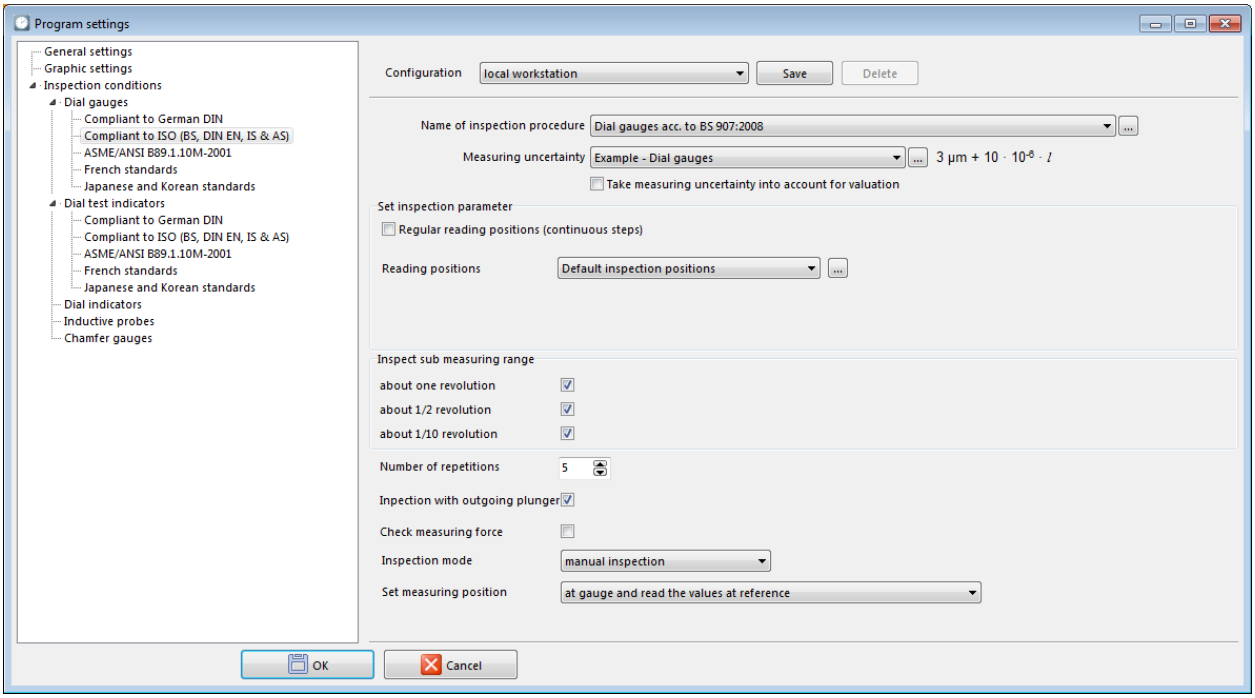


Fig. 7.6.3: Inspection conditions - example Dial Gauge acc. to BS 907.

For each gauge type and the associated list of available standards, you can define the “Default” parameters for the inspection conditions.

Depending on the standard or procedure chosen, there may be restrictions on the variation of the parameters. For example, a defined minimum number of measurements must be carried out.

- Name of inspection procedure
  Here you can select the name of the used inspection procedure. This name will be recorded at the inspection certificate. Some of the predefined inspection procedures will cause fixed settings or restrictions for the inspection parameters. For defining customized procedures see also the QMSOFT® Laboratory management functions.
- Measuring uncertainty
  Select the measuring uncertainty which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate. The definition and usage of measuring uncertainty is also described in QMSOFT® Laboratory management.
- Consider measuring uncertainty for valuation
  The selection of the measuring uncertainty in the previous field is at first only used for recording purposes. If you want to use the calculated measuring uncertainty to prove the conformance or non-conformance of your inspected gauge with the defined error limits, then you have to switch on this option. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the "conformance zone" for the decision if the the inspected gauge is in or out of the defined specifications. If the calculated errors of indication are in the "uncertainty range" the valuation of gauge will be set to "restriced usable". This means that neither conformance nor non-conformance with the specifications can be proved.

The next part of the screen is showing the main parameters to define your measuring procedure.

- Regular reading positions (continuous steps)
  If you activate this option the calibration will be performed with continuous inspection steps. The ispection step will be set during the calibration process. If this option is inactive you have explicit to define the reading positions [Fig. 7.6.4]. If you do not work with continuous measuring positions you can select the name of the defined positions table.

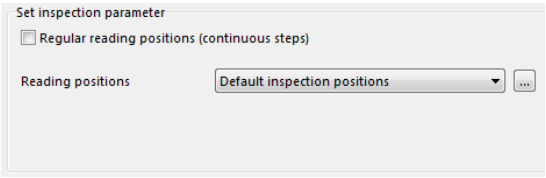


Fig. 7.6.4: Select the inspection positions.

Click onto the button ... to manage the inspection positions.

- Inspect sub meas. range
  Here you can decide if you want to inspect the measuring deviations in a local measuring range. If a local range has to be inspected, you can enter the inspection step for this local range and the number of readings for it. With the option "Enter the start position" you can enter the position where you want to start the inspection of the local range manually. Otherwise the start position for it will be determined for the range where the difference of any two successive errors of indication is the greatest.
- Number of repetitions
  Enter the number of repetitions as soon as the repeatability has to be checked (a value of zero will switch off this inspection step).
- Inspection with outgoing plunger
  Select this option if you want to take readings during the gauges plunger is coming out (or back for dial test indicators). In this case, you have to make readings on all measuring positions used with incoming plunger. These values will be used to calculate the "Error of Discrimination" (Hysteresis).
- Check measuring force
  Select this option if you want to evaluate the measuring force of the dial gauge.

Parameter for partial measuring range inspection

Depending on the inspection procedure, you can decide whether you want to check the measurement deviations in a local measuring range [Fig. 7.6.5]. Some procedures always require a test of the local range.

Using the procedure according to BS 907:2008, you can select the areas you want to check for local faults. You can also deselect all.

Fig. 7.6.5: Settings for partial measuring range.

If you specify your inspection parameters and exit the dialog with `OK`, these settings are saved as a "Local Workstation" configuration. You can also save different configurations using the `Save` button and give them a name. If you are working in a network, a named configuration can also be used on all other workstations.

7.6.1.3 Remarks about ISO standards (BS, IS and DIN EN) and older national standards

In recent years, the standards ISO 463:2006 "Mechanical dial gauges" and ISO 9493:2010 "Dial test indicators" have been incorporated into national standards such as BS EN ISO, DIN EN ISO and others. Inspection according to these ISO standards is therefore becoming more common, although older national standards are still used in some cases. The metrological characteristics defined in these ISO standards are quite similar to those of BS 907:1965 and BS 2795:1981.

Inspections according to previous German standards

Related to earlier editions of German standards (DIN 878:1983, DIN 2270:1985 and associated VDI guidelines), the following functions are available to you.

Dial gauge according to DIN 878:1983

The dial gauge is inspected exactly according to the DIN standards specified in the inspection conditions and selected in the main menu. In addition, the dial gauge must correspond to the standard values (measuring range, graduation). For example, the graduation is always 0.010 mm, the measuring range can only have the values 0.4, 0.8, 3.0, 5.0 or 10.0 mm.

Dial gauge according to VDI/VDE/DGQ 2618, Part 11.1

The dial gauge is inspected according to the VDI/VDG/DGQ rules specified in the inspection conditions and selected in the main menu. The dial gauge must also correspond to the standard values (measuring range, graduation). For example, the graduation is always 0.010 mm, the measuring range can only have the values 0.4, 0.8, 3.0, 5.0 or 10.0 mm).

Dial indicator according to DIN 879:1999

The dial indicator is inspected exactly according to the DIN standards specified in the inspection conditions and selected in the main menu. The dial indicator must also correspond to the standard values. For example, measuring range 0.05, 0.1, 0.2, 0.26, 0.5, 1.0 or 3.0 mm, graduation 0.0005, 0.001, 0.002, 0.005, 0.01 or 0.05 mm.

Dial indicator according to VDI/VDE/DGQ 2618, Part 11.2

The dial indicator is inspected according to the VDI/VDE/DGQ rules specified in the inspection conditions and selected in the main menu. The dial indicator must also correspond to the standard values. For example, measuring range 0.05, 0.1, 0.2, 0.26, 0.5, 1.0 or 3.0 mm, graduation 0.0005, 0.001, 0.002, 0.005, 0.01 or 0.05 mm.

Dial test indicator according to DIN 2270:1985

The dial test indicator is inspected exactly according to the DIN standards specified in the inspection conditions and selected in the main menu. The dial test indicator must also correspond to the standard values. For example, measuring range 0.2, 0.24, 0.5, 0.8 or 1.6 mm, graduation 0.002 or 0.01 mm.

Dial test indicator according to VDI/VDE/DGQ 2618, Part 11.3

The dial test indicator is inspected according to the VDI/VDE/DGQ standards specified in the inspection conditions and selected in the main menu. The dial test indicator must also correspond to the standard values. For example, measuring range 0.2, 0.24, 0.5, 0.8 or 1.6 mm, graduation 0.002 or 0.01 mm.

Inspection according to ASME/ANSI B89.1.10M-1987

The inspection procedure according to the American standard is similar to that according to DIN or VDI inspections. However, the partial measuring range is not tested and the integration of the measuring devices to be tested takes place according to other priorities.

- Inspect at each .. grad.
  Select the number of graduations where you want to take over a reading. At minimum you have to take four readings per revolution. This means if your dial is graduated in 100 units you can select at maximum 25 graduations.
- Number of repetitions
  The number of values to inspect the repeatability must be entered (min.: 5, max.: 999 values).
- Measure plunger going out
  Select this option if you want to take readings during the gauges plunger is coming out (or back for dial test indicators). In this case, you have to make readings on all measuring positions used with incoming plunger. These values will be used to calculate the "Error of Discrimination".
- Measuring force
  Select this option if you want to evaluate the measuring force of the dial gauge.
- File to save measures
  Here you can enter the name of a file which will store all your readings while inspecting the gauge. You can recall these stored values using the menu *Inspection* → *Repeat an inspection*.

Inspection according to Korean and Japanese standards

Depending on the selected gauge type, the input mask for specifying the gauge parameters now appears. The user must now enter the target and evaluation parameters that describe the gauge to be inspected in more detail. These values and parameters are similar to the parameters described previously.

7.6.2 Settings > Edit inspection positions ...

If you do not work with continuous measuring positions, you can define the measured values over the measuring range by explicitly setting the positions [Fig. 7.6.6]. The adjustable positions are related to the measuring parameters: range start, range end and range per revolution.

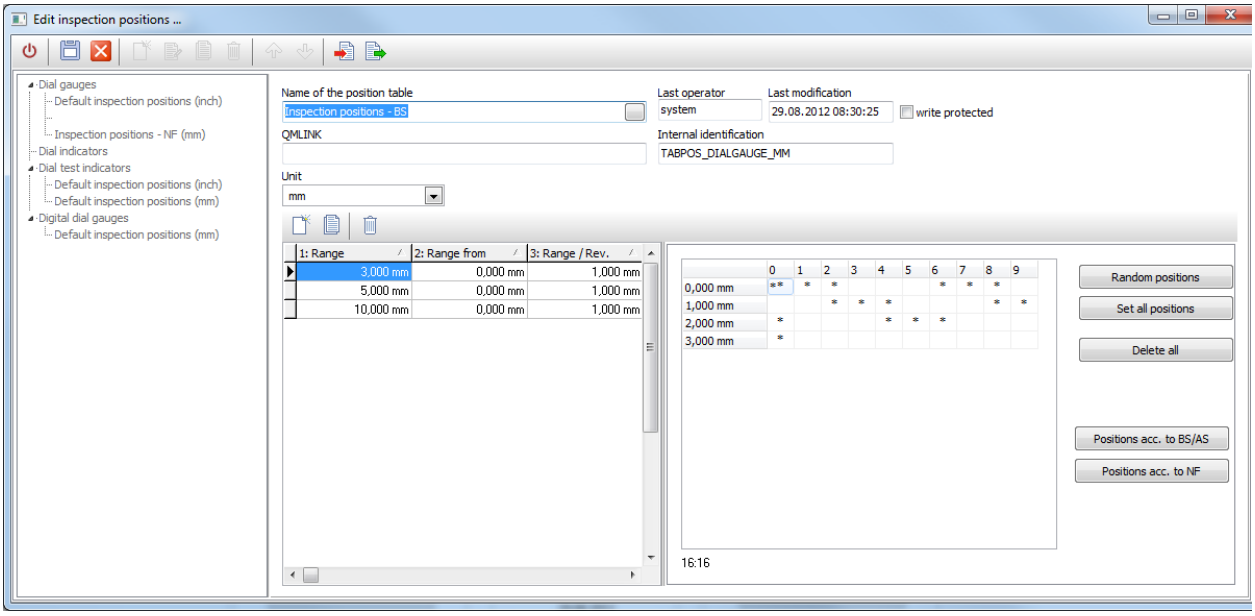


Fig. 7.6.6: Setting of reading positions for BS inspection.

When inspecting a gauge according to British Standard with more than three turn, a special pattern of reading positions is used. Press the `Positions acc. to BS/AS` button to display the selected reading positions according to BS 907 recommendation.

7.6.3 Settings > Management of tables for error limits ...

This menu gives you access to all implemented standards with the lists of the associated gauge characteristics and their maximum permissible errors (MPEs). The values for predefined standards are "read-only" and cannot be changed by the program user. In addition, QMSOFT®/QM-DIAL offers the option of defining tolerance values for dial gauges, dial indicators and dial test indicators based on manufacturer specifications. This can be the case if the inspection conditions specified in the standards (inspection range, inspection methods) cannot be met or if non-standardized sizes of the measuring devices to be inspected (measuring range, graduation) are to be taken into account.

To evaluate gauges according to your factory standard, a table with error limits must be created. The entry of error limits and their permanent storage is supported by the option *Settings → Management of tables for error limits ...*. With this option, you receive a list with the associated "basic standard" or program module for which you want to enter limit values [Fig. 7.6.7]. This is necessary because these standards define very different gauge parameters.

After selecting the menu *Settings →Management of tables for error limits...* the following screen [Fig. 7.6.7] appears with all existing tables. You can now create new tables or change entries in an existing table.

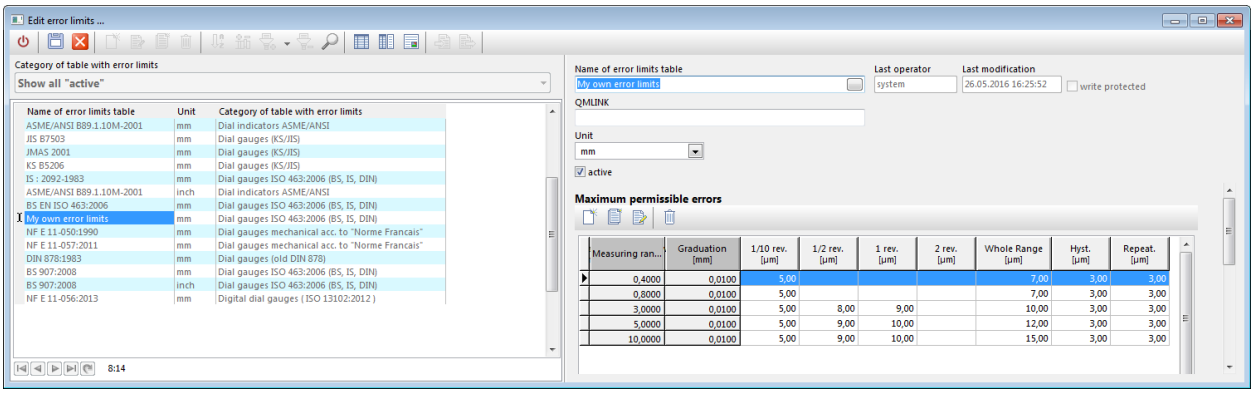


Fig. 7.6.7: Entering of Limits of error.

Please note that you need to manage different tables for different unit systems (mm, inch).

7.6.4 Doing a gauge inspection

After completing the configuration phase of the program, the main window of QMSOFT®/QM-DIAL is displayed on the screen. Here you will find different buttons with a measurement graphic that you can use to perform the inspection for the corresponding measurement type. To start an inspection, click on the corresponding button. You can also start the inspection of a gauge via the menu *Inspection*.

7.6.4.1 Entering nominal gauge data

After starting an inspection, you will see the following screen to enter your gauge parameters [Fig. 7.6.8].

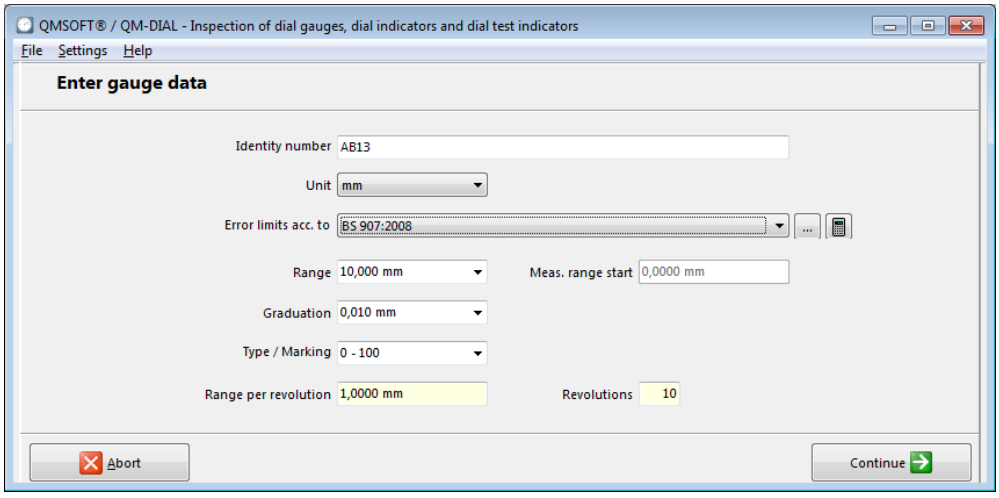


Fig. 7.6.8: Entering of parameters for a Dial Gauge according to BS 907.

Enter the following parameters.

- ERROR LIMITS ACC. TO
  Select the related standard which you need to use. In dependence of the selected standard (for example BS 907:2008), the input of parameters could be restricted to the values, which are allowed in the related standard.

If you select a table with customized error limits you can set the parameters free, please note, that the values for the parameter MEASURING RANGE and GRADUATION are a part of the related table (the ... button allows to manage the tables with limits of error). Please note also that you may have different tables with self defined error limits for one type of gauge.

- MEASURING RANGE
  Enter the value of the total measuring range.
- GRADUATION
  Select the value for the graduation out of a given list. The list will show you only the graduations which are valid for the selected standard.
- TYPE / MARKING
  Select the "Type of dial". For digital dial gauges choose "digital".
- RANGE / REVOLUTION
  Enter the range of one turn of the gauges pointer (the movement per one revolution). This value will be pre set to $100 * graduation$. This value is necessary for the settlement of the inspection positions. The parameter is only available for "mechanical" gauges.

7.6.4.2 Inspection conditions

After entering the gauge parameters, a few parameters relating to the scope of the inspection procedure and the inspection steps must be specified. As already shown, which parameters you can change depends on the gauge type selected. When inspecting according to the factory standard, you can set all parameters freely. Even if most inspection conditions are only set individually in the menu *Settings* → *Program settings*, it may be necessary to change these predefined settings depending on the current inspection.

Please note that any change to the parameters will change the configuration to "user definied". Changes you make during the measurement process are not saved. In most cases, you only change the settings for the reading positions/inspection steps. If these settings are normally related to the gauge range, you cannot set these parameters when defining the "global" conditions [Fig. 7.6.9].

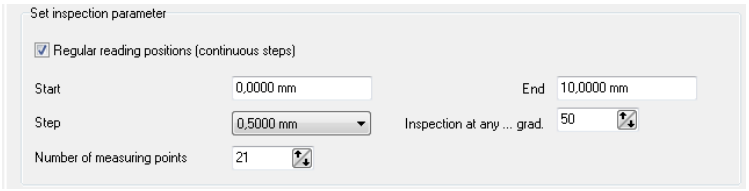


Fig. 7.6.9: Setting the inspection parameter.

7.6.4.3 Measurement

The measured values must be entered in the following order:

- measured value 1 to n when the measuring bolt is retracting and
- measured value n to 1 when the measuring bolt is extending,
- measured value 1 to t when the measuring bolt is retracting in the partial measuring range (if the partial measuring range is included in the isnpection) and
- measured value 1 to w for repeated measurements.

The valid inspection position is displayed. The measured values are inspected for plausibility and rejected if the deviation is more than half the value of the valid inspection level.

The measured values are entered using the keyboard directly in the displayed measured value tables [Fig. 7.6.10].

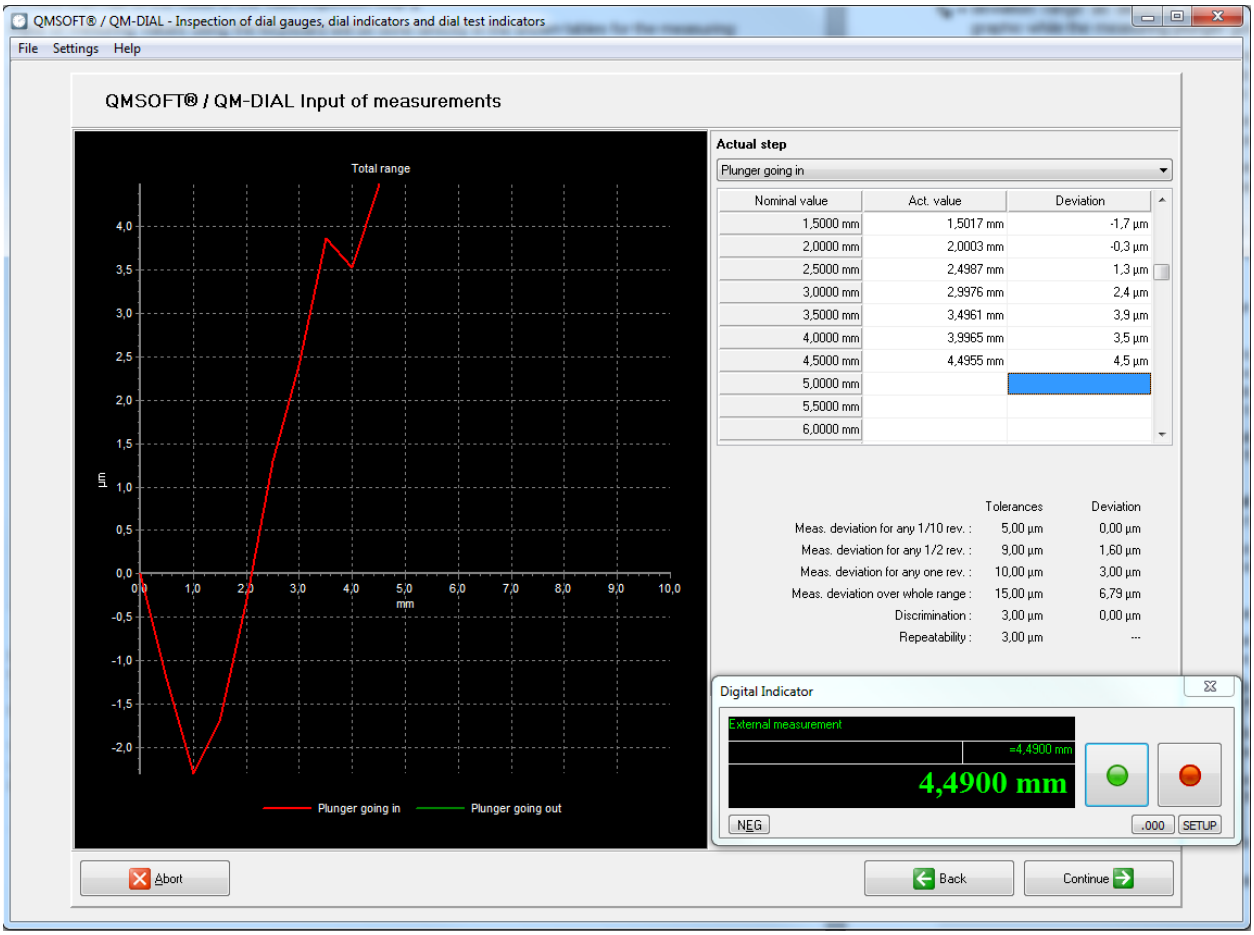


Fig. 7.6.10: Entering of measuring values.

Online data entry via a measuring device is more effective. Some handling procedures depend on the measuring device used (see the relevant manufacturer documentation).

You can repeat each measured value by placing the cursor on the desired line in the measured value table. You can use the `Back` and `Continue` buttons to switch between the individual tables with entered data.

7.6.5 Evaluation

The evaluation depends on the type of gauge selected or the corresponding standard. A inspection of a dial gauge according to ISO 463:2006 includes the following metrological characteristics.

- Hysteresis of indication
  Reversal measuring range as difference of indications for the same value of the measuring object while measuring with increasing or decreasing values of the indication.
- Repeatability
  Repeatability as characteristic value of measured variation at n measures on the same position within the measuring range in the same direction of the measuring plunger movement.
- Error of indication over an interval of reading

The display errors are calculated over every tenth of a turn, every half turn, every single turn and over the entire display range.

For an evaluation according to DIN 878:1981 the measuring values includes the computering of the five deviation parameters f_e, f_t, f_{ges}, f_w and f_u according to the definitions given in the DIN standard.

- f_e
  Deviation range as distance between the maximum and the minimum value in the deviation graphic while the measuring plunger going into
- f_t
  deviation range in the sub measuring range between the maximum and the minimum value in the deviation graphic, measured for a sub measuring range while the measuring plunger going into (partial measuring range at dial gauges: 0.1 mm, at others 10 or 5 graduations).
- f_u
  reversal measuring range as difference of indications for the same value of the measuring object while measuring with increasing or decreasing values of the indication
- f_{ges}
  total deviation range as distance between the maximum and the minimum value in the deviation graphic for both directions of the measuring plunger movement (includes reversal measuring range f_u).
- f_w
  repeatability as characteristic value of measured variation at n measurings (n>=5!) on one measuring position within the measuring range in the same direction of the measuring plunger movement.

When evaluating according to British or Australian standards, the deviation parameters evaluated depend on the type of gauge.

When evaluating according to KS and JIS standards, the evaluated deviation parameters depend on the selected standard and the gauge type.

For dial gauges, the errors of the long range (wide range), the retrace error and the repeatability are calculated. Depending on the scale division value, the error of the small range (narrow range) and the small range adjacent error are also calculated.

If all calculated errors are within the specified limits, the gauge's assessment is classified as "usable". If one or more parameters are outside the specified limits, the assessment is classified as "not usable". A special case is when the inspection results are printed out in the results list.

7.7 Inspection program QMSOFT®/QM-INSPECT

The program QMSOFT®/QM-INSPECT has been designed to create "Inspection schedules" to inspect special - usually non standardized - gauges (e.g. inspection fixtures) and to support the computer aided inspection of these gauges based on the created inspection schedules.

Generally, an "Inspection schedule" does consist of a consequence of gauge characteristics to be inspected. Such characteristics may be simple texts (e.g. the gauge designation), selection lists (for example a "Pass" / "Fail" decision for the gauge valuation) or numerical values. For "numerical values" you have the possibility to define "simple numerical characteristics" with its nominal value and the related tolerance limits or "extended numerical values" which can be used to defined a measuring row and the related limits.

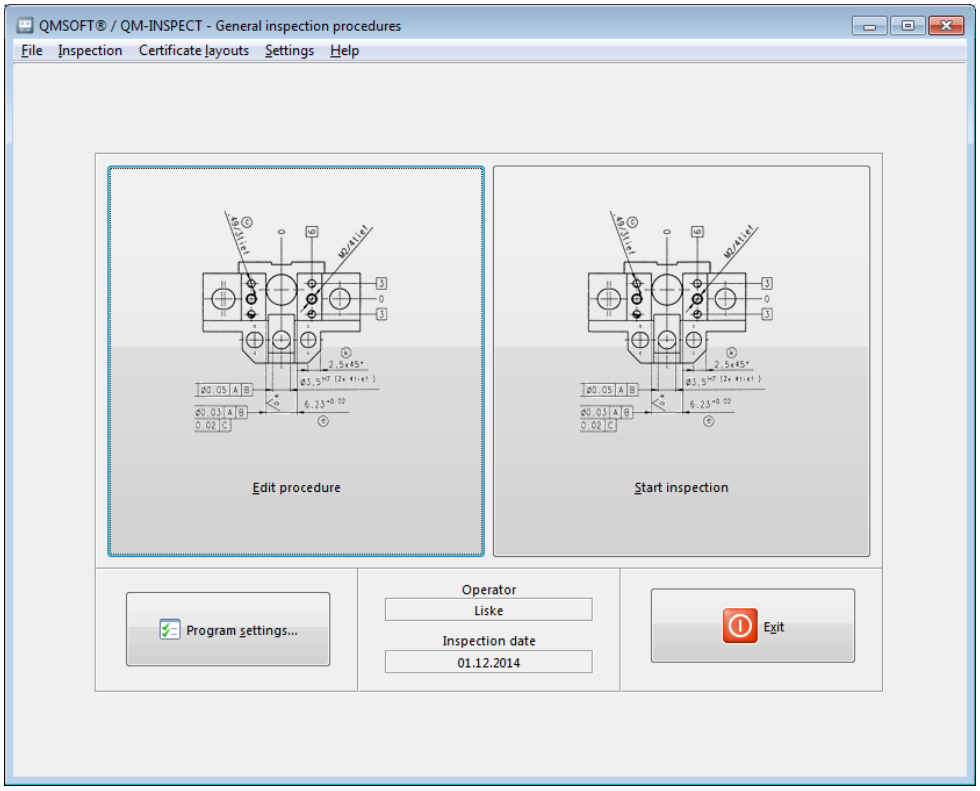


Fig. 7.7.1: QMSOFT®/QM-INSPECT start screen.

7.7.1 Settings > Program settings

The dialog form displays at the left side of the window a tree structure with the different categories, into which these program settings are divided. The appropriate fields in the right panel will be displayed by clicking on an appropriate tree branch.

7.7.1.1 Settings

Here you can specify a possible measuring device for the “online” acquisition of measured values. If such a device is available, you can use the setting “Transfer measuring values from” to force the automatic start of the measuring equipment connection.

7.7.1.2 Inspection conditions

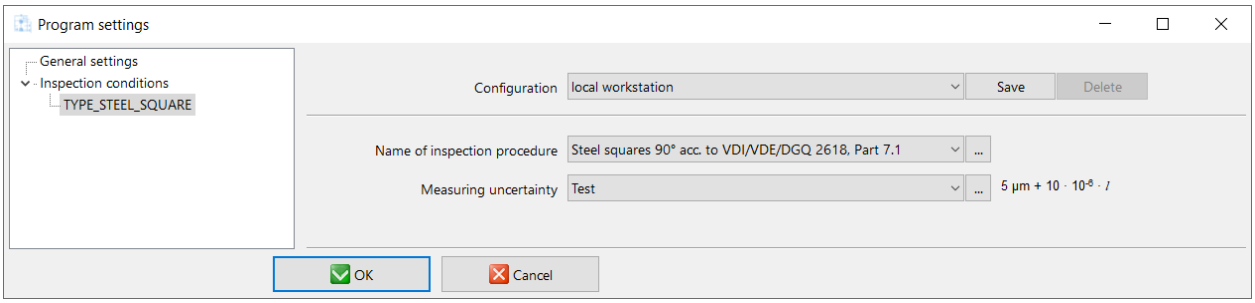


Fig. 7.7.2: Inspection conditions.

Here you can define a related inspection procedure and a measuring uncertainty for the currently selected type of gauge [Fig. 7.7.2]. Please note: a gauge type is only dispayed if the program was started by the gauge management program QMSOFT®/QM-MANAGE. Otherwise it will be named only “general”.

7.7.2 Creation / Editing of inspection schedules (procedures)

An inspection schedule consists of a list of propertiers. The following properties are exeisiting in principle, so there is no need to define it in addition:

- Type
  Describes the type of the inspected gauge as a text
- Identity number
  The identity number of the inspected gauge
- Description
  the nominal designation of the gauge (size, nominal value, measuring range etc.)

After finnishing an inspection, the follwoing fields are ready to use, which also have to be defined manually:

- Valuation
  a list with the valuation (“OK” / “not OK” valuation)
- Remark
  a multi-line tex to describe the inspection
- Traceability
  Information about all of the used ference normals,standards and the used equipment
- Additional Informations
  global informations, which are related to the gauge and to the inspection, for example manufacturer, calibration certificate number, inspection date, next inspection date etc.

In the programs main window of QMSOFT®/QM-INSPECT click onto the button `Edit procedure` to open the shown window [Fig. 7.7.3]. Here you can create a new schedule or load an existing one.

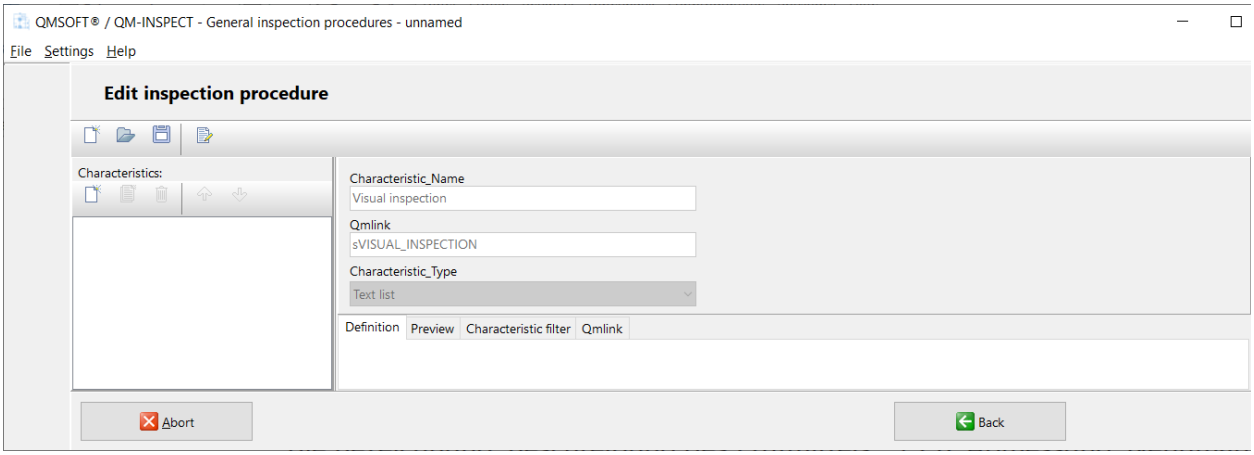


Fig. 7.7.3: Edit / Create an inspection schedule.

Use the shown icons to open existing procedures or to save a procedure after you have made changes on it. To create a new inspection schedule you have to define step by step the gauge characteristics (properties), which should be a part of your inspection. To create a new item, click the button `New characteristic`.

General properties [Fig. 7.7.5] of a characteristic are:

- Characteristic name
  Enter here the name of the characteristic.
- QmLink
  The "QmLink" is the internal used unique name of a characteristic. This name will be used to identify a characteristic when creating a certificate template for the inspection certificates and for the connection to gauge data stored into the QMSOFT®/QM-MANAGE database. The name of the QmLink can be selected at your own conceptions. We suggest to use it similar the characteristic name or use a sequential numbering like ("M_1", "M_2"…). Generally, it makes sense to use different identifiers for different types of characteristics. This will help you later when creating a certificate layout.
- Characteristic type
  Please select one of the characteristic types "Simple numeric value", "Row of numeric values", "Text" or "Text list".

Depended on the type of characteristic now you have to define further parameters.

Chracteristic "Text"

A text can be used to enter simple "Text" information. The properties of this type of characteristic are:

- Line number
  Define here the number of lines you want to use for your text field.
- Preview
  Here you can enter a preview text to define a "default" text, which will be filled in automatically when executing the inspection procedure.

Chracteristic "Text list" (attributive characteristic)

Text lists can be used to create simple "drop down lists" to select one item from this list when doing a gauge inspection [Fig. 7.7.4]. A simple example for it is the "Pass / Fail" decision for a visual or functional inspection to select an "OK" or "not OK" result.

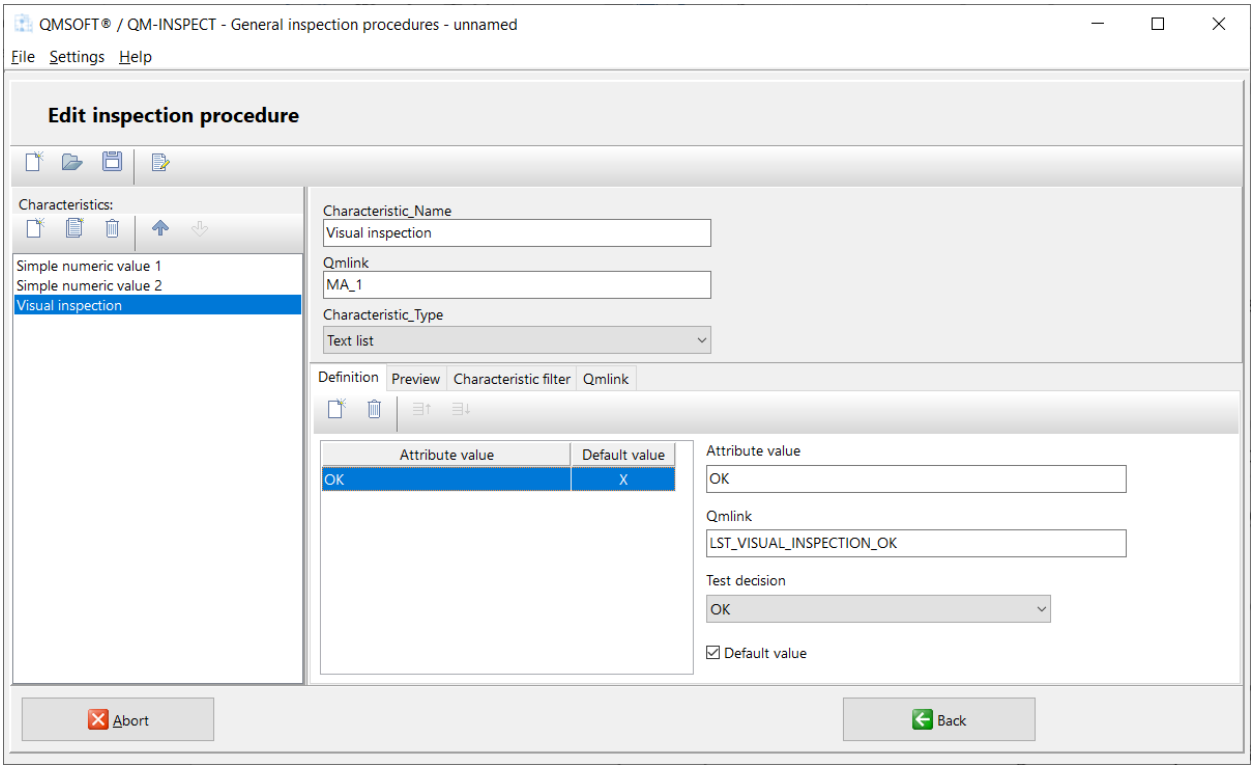


Fig. 7.7.4: Defining a text list for an attributive characteristic.

To create a new item for your text list use the button `New` and fill out the input fields of the appearing dialog form:

- Attributive value (Designation)
  This is the text, which will be shown in the drop-down-list (z.B.: “Inspection O.K.”).
- QmLink
  Define the QmLink identifier of the item (for example “LST_INSPECTION_OK”).
- Valuation
  Define here the influence of this list item for the global valuation of the gauge, for example means “no influence”, that there is no influence to the vauation of the gauge. If you select “in order” and you will select this item during the inspection, the valuation for this characteristic will be set to “in order” (OK).

> **Note**
>
> The total valuation of an inspection is only “in order”, if all defined characteristics will get the result “in order”.

- Default list value
  Activate this check box, if you want a pre-selection of this item as the default value.

If required you can use the buttons `Edit` and `Delete` to modify a text list.

Chracteristic “Simple numeric value”

Using numeric values, usually the mostly used characteristics, you define the different dimensions, diameters, lengths or other parameters which may be described with a “value” [Fig. 7.7.5]. Simple numeric values does have the following properties:

- Nominal value

Here you define the “Nominal value”, the “Unit” of this value and the number of digits.

- Number of values
  Define the number of measures you want to take for this characteristic when working with the procedure. If you enter more than one value the program will calculate automatically the maximum and the minimum value, the range, the mean value and the standard deviation.
- Incl. Valuation
  If you activate this check box the characteristic will be used for the valuation of the gauge and the fields to enter tolerance or limit values will be activated. If you do not activate it, the value will be used only for recording the actual value without checking of limits and without valuation.

Defining of tolerances or limits:

- Symmetric
  Activate it, if you want to use a “symmetric” tolerance. In this case you have to enter only the upper tolerance limit. The lower tolerance will be set automatically.
- Upper and lower limit
  Enter here your upper and lower tolerance values. With the selection “Tolerance values”, “Tolerance (%)” or “Limit” you can decide if you want to enter it as a tolerance value related to the nominal value, as a percent value related to the nominal value or if you want to enter the upper or lower limits of the size directly.

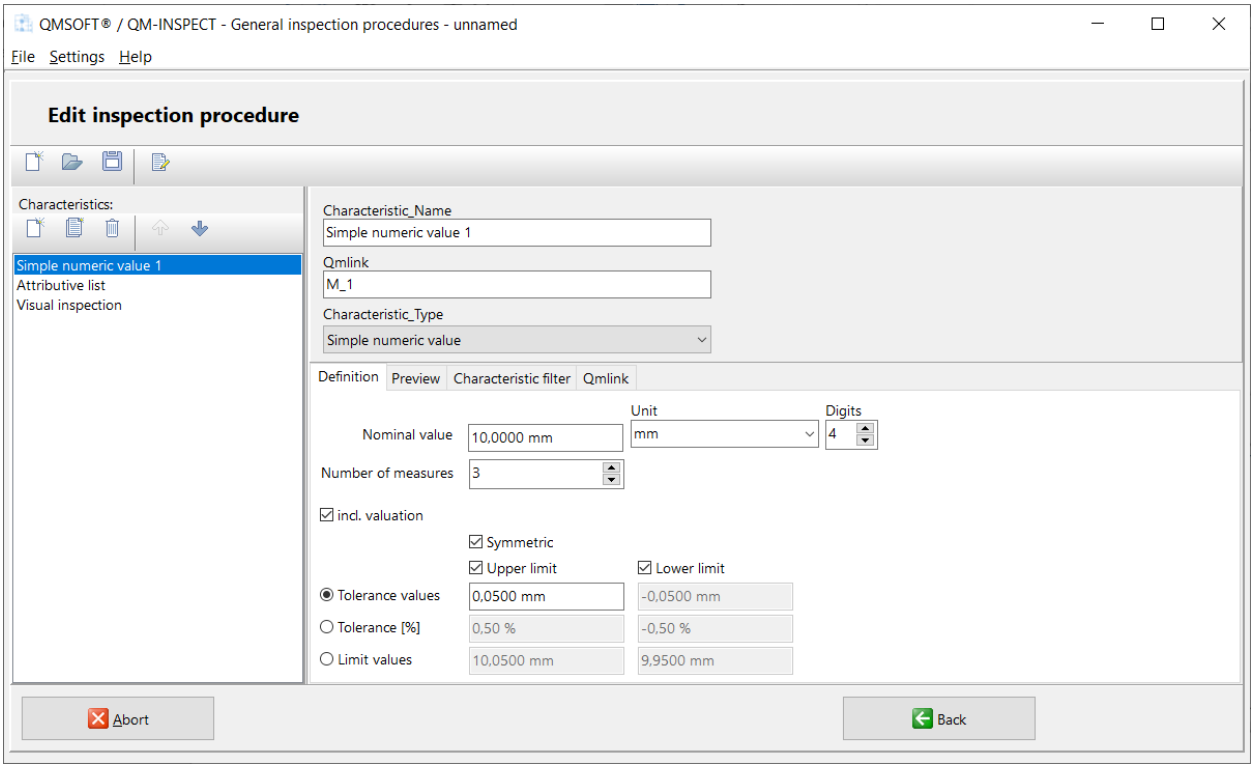


Fig. 7.7.5: Example for the definition of a numeric value.

Characteristic “Row of numeric values”

As can be seen from the name, this type of characteristic contains some extensions compared to the simple numerical characteristic [Fig. 7.7.6]. Basically, you can use this characteristic type also like the “simple” numerical characteristic. In this case, use the “simple value” property when defining the characteristic. The main change compared to the simple numerical characteistic is the feature that you can define measurement series with different nominal values here.

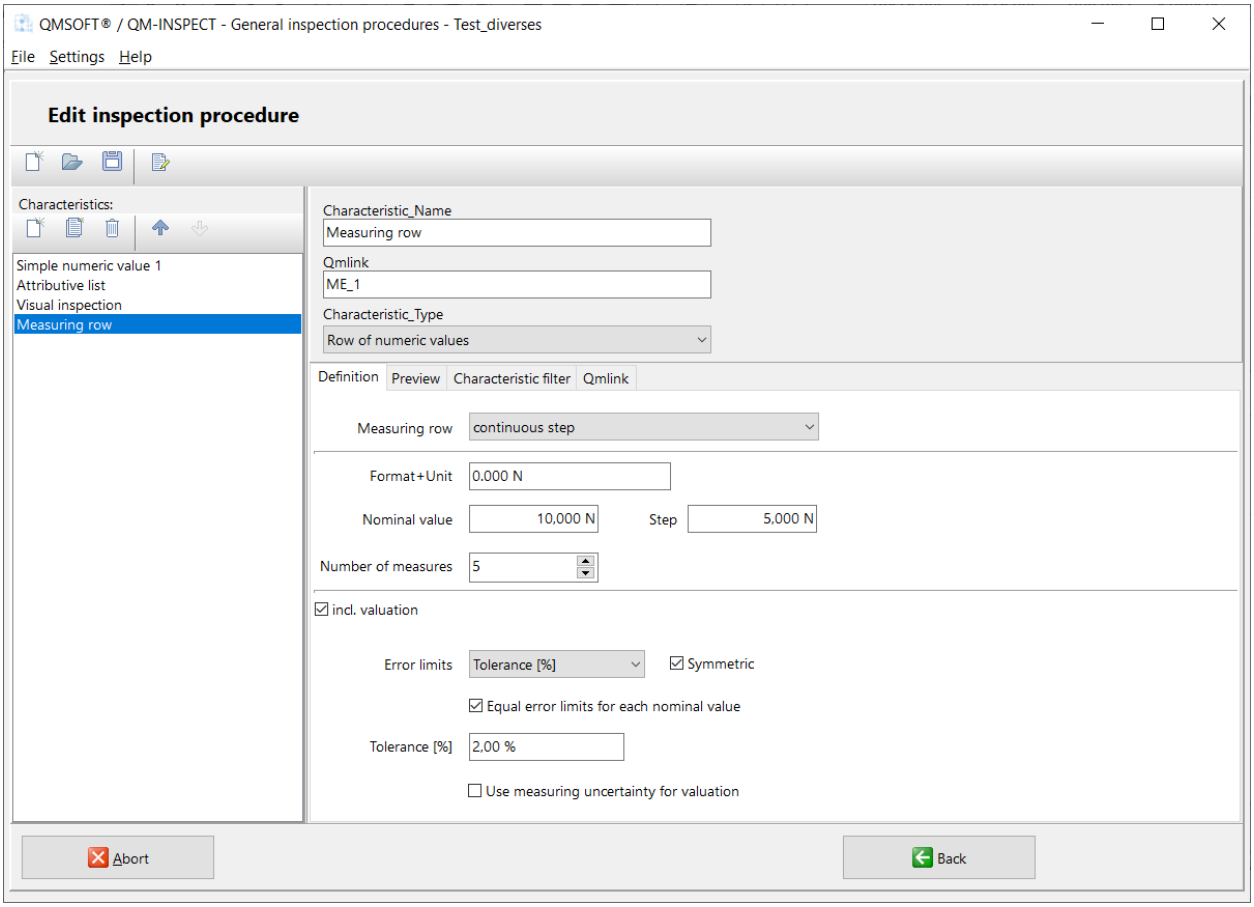


Fig. 7.7.6: Define a row of numeric values.

At first, use the parameter “Characteristic type” to define the type of your measuring row.

- Simple value:
  Largely corresponds to the previous “simple” numerical characteristic. All items in the series have the same nominal value.
- continuous step:
  Define a series of values with equal intervals (e.g .: “10, 20, 30, . . .). You use the formation rule of the series to define the “Nominal value” == the start value of your row, the step and the total number of values.
- free input:
  Enter all nominal values manually; define only the number of values in your row. The used nominal values can be entered when changing to the page “Preview” [Fig. 7.7.7].

Other options:

- Format + Unit
  Define the format (number of digits) and the unit. Using the “free input” option you can define a separate format and unit for each value. In this case activate the option “Different units”.
- Error limits
  Comparable to the simple numerical value, define here the error limits for the nominal values. Activate the option “Equal error limit for all values” if the error limit for all nominal values of the series is the same. In this case, enter the related values here. Otherwise, enter the error limits in the register page “Preview” [Fig. 7.7.7]

for each nominal value separately.

- USE MEASURING UNCERTAINTY FOR VALUATION
  If you activate this option you can enter values fort he measuring uncertainty for each nominal value. When entering a measuring uncertainty, you activate also the possibility to do a conformity check for each value.
- DEFINE ADDITIONAL TEXT COLUMNS
  Use this option to define additional text columns for the table with the measuring values. This can be used for additional comments and can be printed on the calibration certificate.

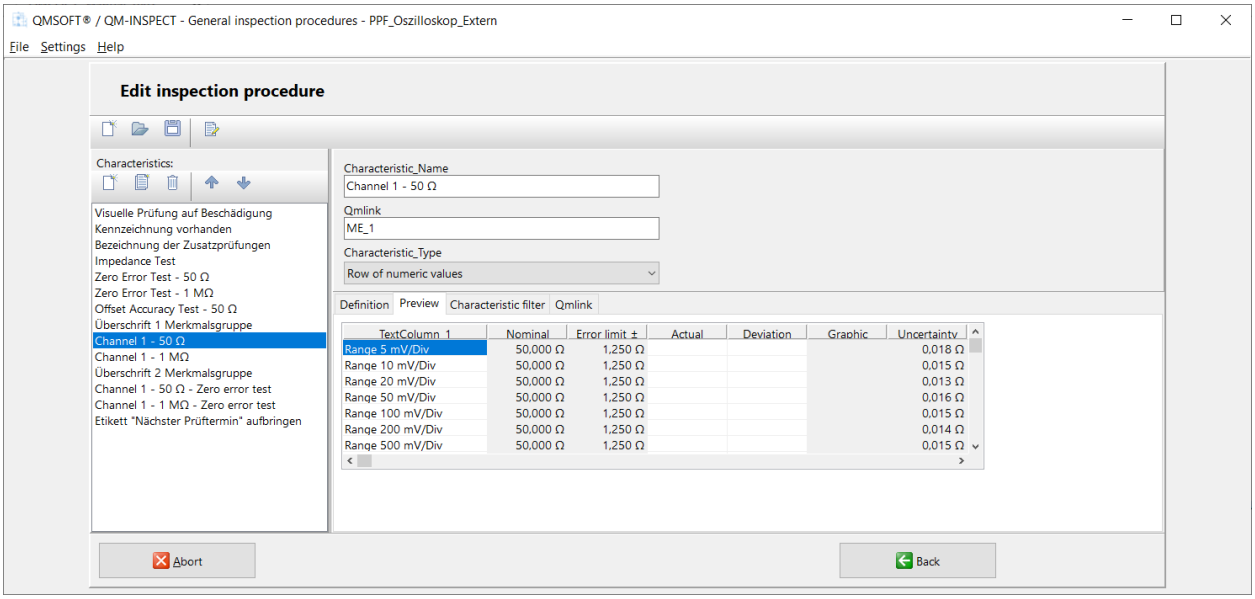


Fig. 7.7.7: Preview of a table for a measuring row.

7.7.3 The usage of characteristic filters

By defining characteristic filters, you can hide individual characteristics when processing an inspection plan [Fig. 7.7.8]. This allows, for example, a distinction to be made between incoming inspection and periodical inspections without having to create a separate inspection plan. The same applies if different features have to be tested for different types of the same kind of test equipment. To define a feature filter, activate the “Feature filter” tab page. Now use the `Add Filter` button to define the first filter. Enter a name and an internal QmLink for the filter.

In order for filters to be useful, you must of course define at least 2 filter criteria in order to be able to select different test options.

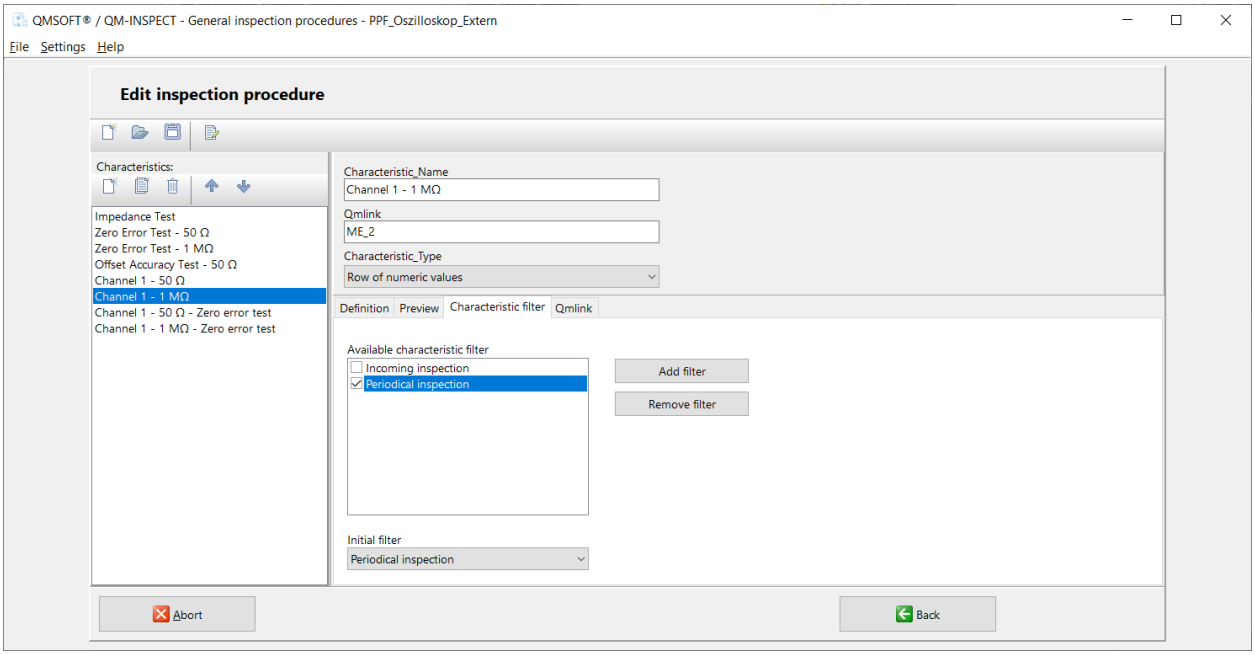


Fig. 7.7.8: Definition of a filter to distinct between kinds of inspection.

As soon as you have defined your required feature filter, set one of the filters as “Initial filter”. This means that this option is automatically set as a “start” filter when the inspection procedure is started. The list of defined filters options is generally available for all other characteristics of the inspection plan. You can now define, step by step, the respective filter for each characteristic of the schedule for which test option this is taken into account or can be skipped.

When the test plan is started, the filter set as the “Initial filter” is automatically activated. By switching the filter the associated characteristics are now activated or deactivated.

7.7.4 Other functions to edit inspection procedures

- `Copy` 
  You can use this function to copy existing characteristics. Please note that the name and the QmLink of each characteristic has to be unique for your defined procedure.
- `Delete` 
  Use this button to delete characteristics from your list.
- `Move up and down` 
  Change your list by moving up and down of the defined characteristics.

7.7.5 Certificate layouts

Naturally, a main part of the program is the creation of calibration reports to record the inspection results. Basically, for each protocol there is an appropriate report template file! The program gives you the possibility to customise the layout of your calibration certificate. The layout of the calibration certificate is based on a template a so called "Certificate layout file". This file contains all information about the form of the certificate and the values should appear in this.

Note

Basically, for each protocol there is an appropriate report template file! Generally, we recommend to create a certificate layout for each inspection procedure which you create.

But it is also possible to use a general layout file for different procedures (for example by using oft he same QmLink identifiers in the inspection schedules). The predefined layout file "Template_English" will give you an example for it.

Warning

Usually a certificate layout file does include information defined in a certain inspection procedure. This means that there exist links between the characteristics defined in the procedures and the information you can print out at your certificate. The link between the gauge characteristics and the fields to be filled in the certificate print out will be done by the QmLink identifier! To make sure that all required fields are available when you are editing the certificate layout file we recommend to open this file only if the related inspection procedure is already loaded! See the next figure for it!

Depending from the type oft he inspection schedule characteristic each characteristic item will have several fields available. The "field name" will be created from the QmLink identifier of the characteristic and the related property of the characterisitc.

Independing from the type of the characteristic the properties "Characteristic name" und Characteristic type" are available. For "text"- and "list"-characteristics the field "…_Value" contains the entered (or selected) text.

For "Simple numeric characteristics", the following properties (fields) are additionally available:

- the "Nominal size", the tolerance and limit values,
- the "unit"
- the "maximum", "minimum", "range", "mean value" (if you have several measured values for this characteristic)
- A list of all measured values including a sequential number, the actual value, the deviation to the nominal value, the excision of the given limits (if it is out of limits) and the tolerance graphic (if it is inside the tolerance limits)

For a "Row of numeric values" the field properties are summarized in a single editor field. In this case, click with the right mouse button on such a field and select the option "Properties" to get the list of all properties of this characteristic.

By "unfolding" of the menu "Fields" you will get an overview about the available text conditions [Fig. 7.7.9]. Once you have selected an item of the fields, the field name will be inserted into the corresponding field of the dialog form. Then define the condition, that must meet the inserted field. About the condition "exists" you can test for example, whether the corresponding feature exists.

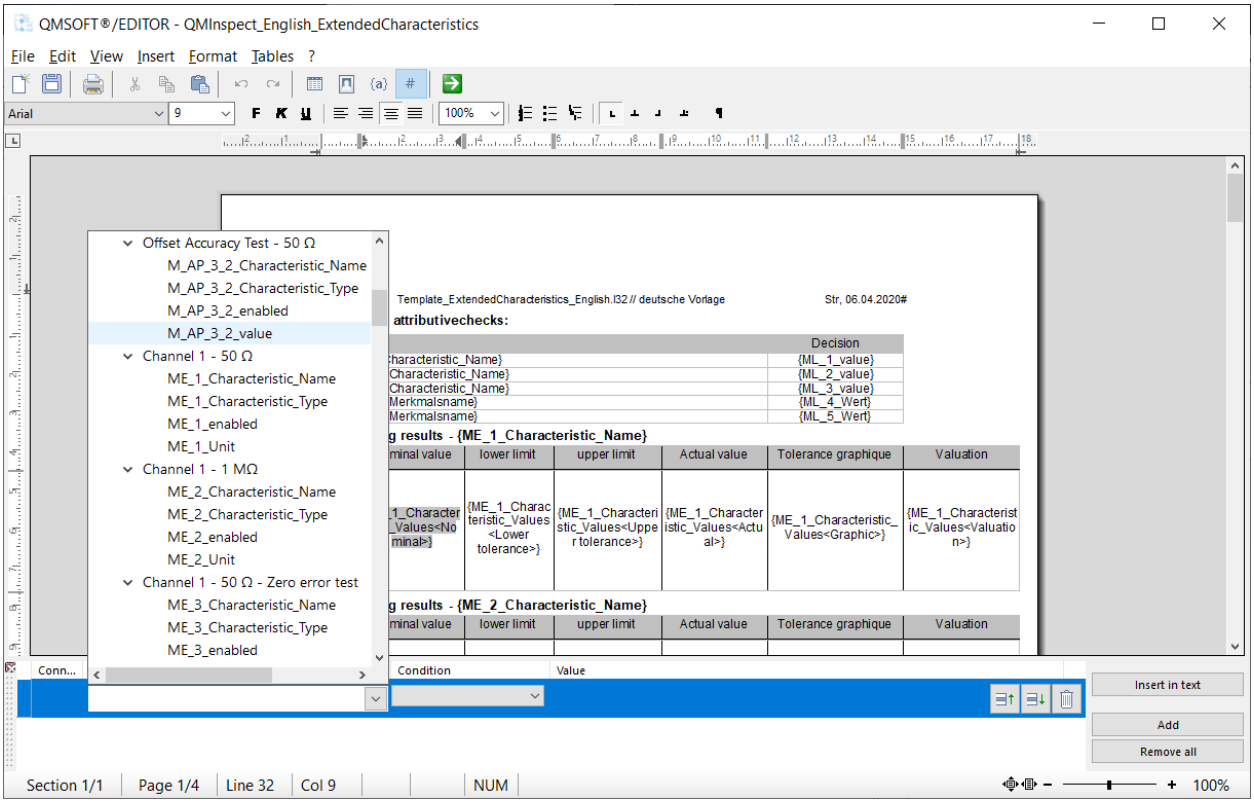


Fig. 7.7.9: The definition of text conditions.

Otherwise, the design options correspond to the options described instructions in section *Calibration certificates*.

7.7.6 Execution an inspection schedule (procedure)

Use the main menu “Start inspection”, to start a new inspection for a gauge [Fig. 7.7.10]. If you start the program from the gauge management system this screen will coming up automatically.

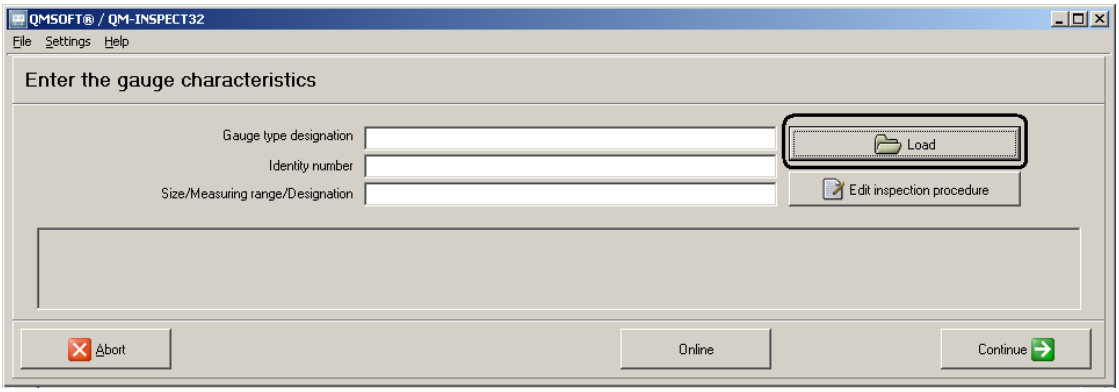


Fig. 7.7.10: Start an inspection.

Now enter the values for the “Gauge type designation”, “Identity number”, “Measuring range” so far necessarily [Fig. 7.7.11]. Calling from the database this fields are already filled in.

Now use the Load button to open the related inspection procedure. You will get the list with your defined characteristics on the screen. Now enter here all your actual values and/or texts for all defined parameters.

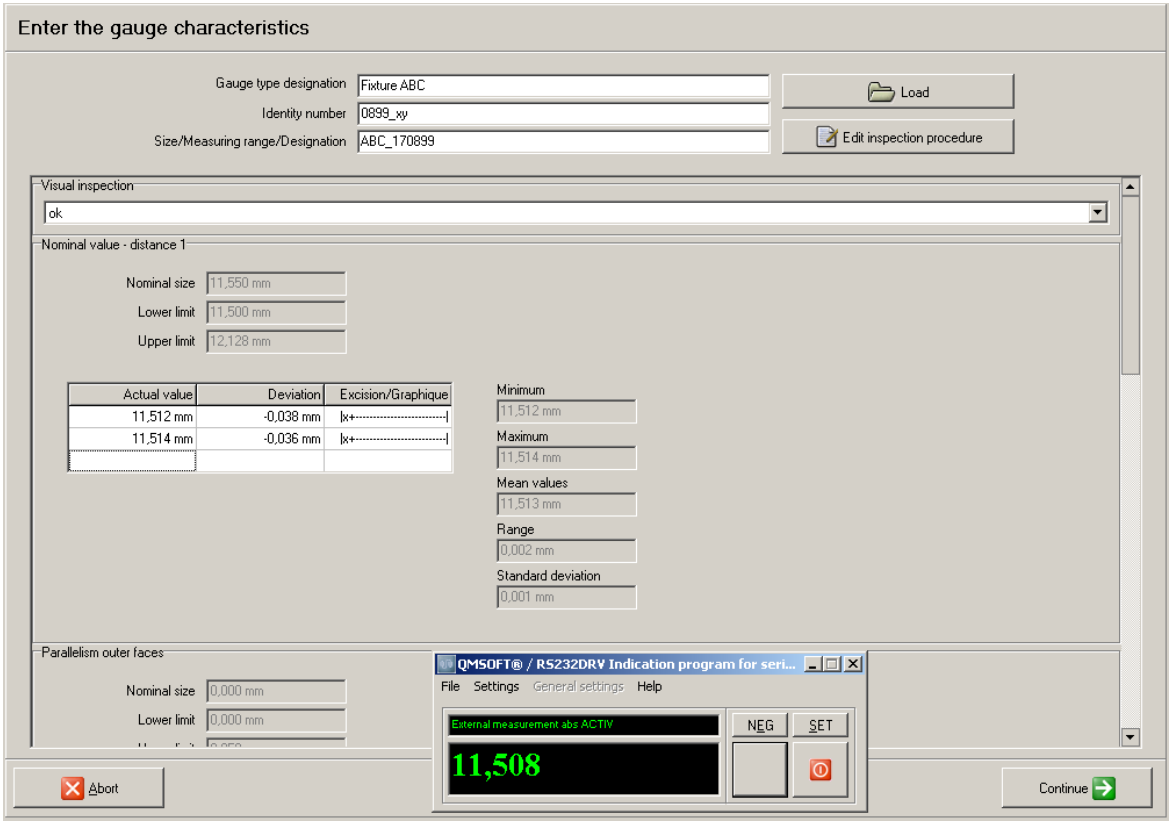


Fig. 7.7.11: Entering of inspection values and results.

After entering all required values, when you are reached the end of the “list of characteristics”, you can continue with the Continue button. Use the Cancel button, if you want to cancel the inspection.

7.7.7 Starting the inspection by gauge management program

In the most causes it is useful to start an inspection procedure directly by the gauge management software QMSOFT®/QM-MANAGE. The reasons are:

- Information about the gauge (which is already available in the gauge management system) has not to be entered again,
- After finishing the inspection process you will get all information (or all information you want to keep in the management system) back to the database automatically. This does also include the inspection certificate.

7.7.7.1 How to connect to the gauge management program

These conditions have to be fulfilled to start an inspection procedure from the gauge management system:

- of course, a related gauge type does exist in the management system,
- the action “Gauge inspection” of this type has to be connected with QMSOFT®/QM-INSPECT (see the next figure).
- you have to set links between the existing database fields and the related characteristics defined in your inspection procedure if you want to transfer nominal and/or actual data from the database to the QMSOFT®/QM-INSPECT program and back to the database when an inspection is finished (please note these links can be set only if you call the program QMSOFT®/QM-INSPECT directly from the database system).

Warning

The next step has to be done in the gauge management system QMSOFT®/QM-MANAGE!

The first two requirements, please refer to the section “VI.2 Configuration”. The figure below [Fig. 7.7.12] shows the corresponding method using the menu item *Settings* → *Types* of QMSOFT®/QM-MANAGE.

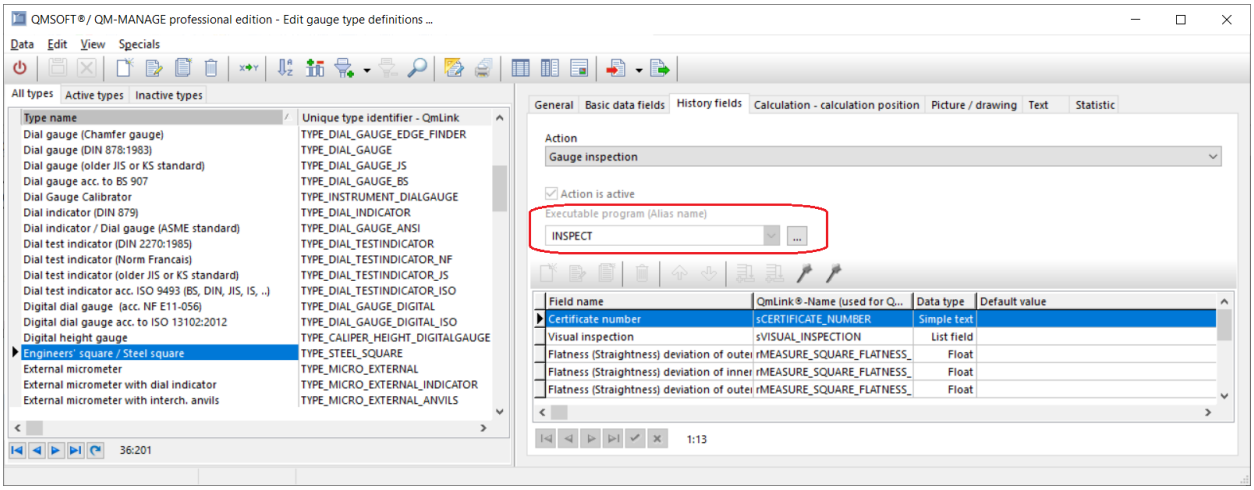


Fig. 7.7.12: Connect the “Gauge inspection” action of a gauge type with QMSOFT®/QM-INSPECT.

Note

Generally you can define for each characteristic, which is contained in your inspection procedure, a complementary field in the gauges “Basic data fields” and in the “History fields” related to the action “Gauge inspection”. The disadvantage of this method is, that you then need a separated gauge type for each modification of a fixture or other special gauge you have. Therefore, we suggest to define only some (general existing) characteristics as a field in the database and define all other fields in special designed inspection procedures only.

After finishing the definitions of the gauge type inside of the gauge management system QMSOFT®/QM-MANAGE, now you have to set the links between the database fields and the characteristics in the inspection procedure. To do this you have to start QMSOFT®/QM-INSPECT from the gauge management system. This means:

- insert a gauge item of the related type in the management system

- enter all related nominal values
- start a “Gauge inspection” for this gauge and start also the QMSOFT® inspection program

7.7.7.2 Start of the program

To start the program QMSOFT®/QM-INSPECT there are two possibilities:

- Start the program directly from the menu “Settings –> Types” by clicking onto the symbol “Inspection program” (see figure).
- Create at first a gauge item and execute an action “Gauge calibration” for this gauge.

After starting the program QMSOFT®/QM-INSPECT you will get the start-scrren again, click onto the button `Edit procedure`. After this use the `Open` button to load the related inspection schedule (procedure).

Now you can see again the characteristics defined in your inspection procedure. For each characteristic you have now an additional page with the name “QmLink” (see figure).

Open the “QmLink” page to set now the links between the single properties of an inspection characteristic and the database fields related with it. To do it, at first select the property shown in the list on the left side. Then select the database field on the right side and click the `Link` button to connect it.

Links you have done will be shown in the area “Linked fields” [Fig. 7.7.13]. In case that an inspection characteristic has a number of properties there can exist several links between one characteristic and different database fields. Multiple links are allowed.

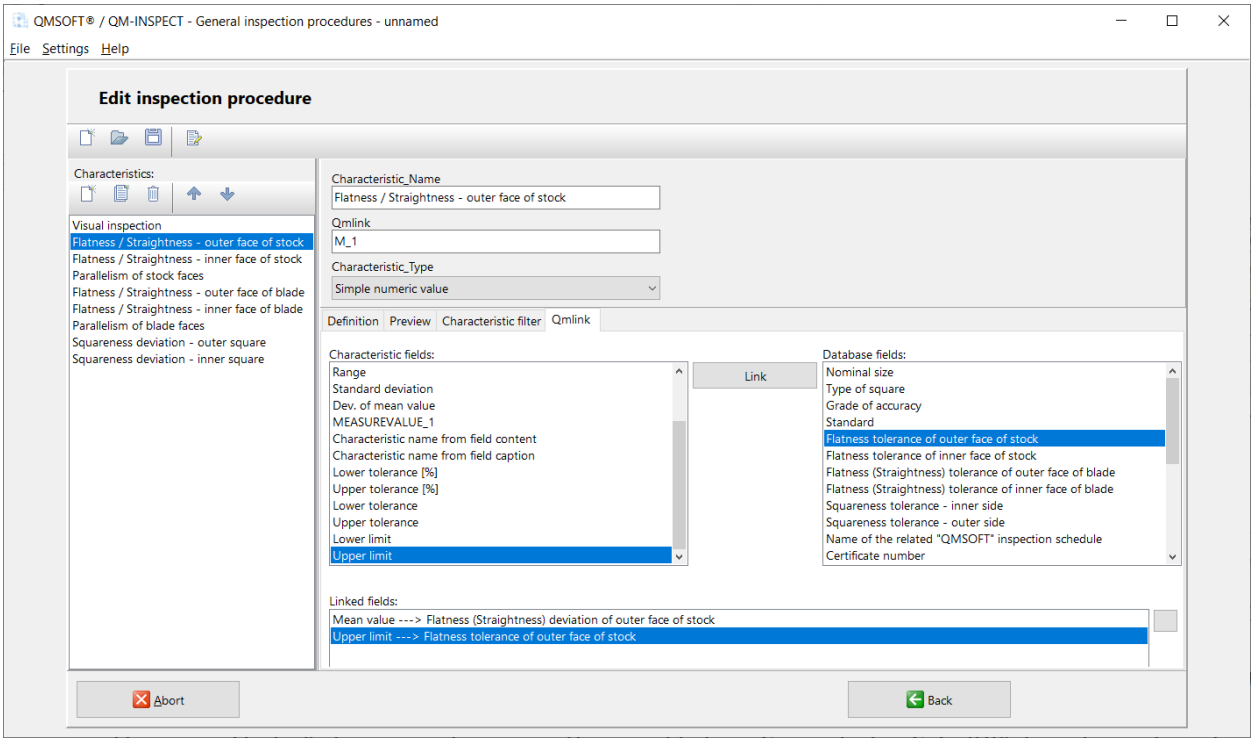


Fig. 7.7.13: Linking the characteristics of an inspection procedure to database fields.

To delete a link please click on the delete button on the right side beside the “Linked fields” area.

If you have set all required connections you should use the `Save` button to save your modified inspection procedure.

If you have started the program by executing an action "Gauge inspection" from the gauge management program, you can use the `Start inspection` button to continue immediately.

After completing the inspection, you will get back into the database program, and all the values of the linked fields will be inserted into the gauge history.

7.7.8 Quick Guide, Summary

7.7.8.1 Introduction

Inspection schedules (procedures) consist of a series of characteristics, which have to be inspected.

Characteristics can be:

- Simple text items,
- Lists of text items for handling atrributive inspection steps,
- Numerical items.

For numerical characteristics their nominal values and tolerance limits can be defined as properties of the characteristic. Please note in this case the limitations of the numerical characteristics:

- It is possible to define "simple" numercal items (nominal value, upper limit, lower limit) only. You cannot define a "series of values" with evaluation features (for example to evaluate in the same way as for dial gauges).
- It is not possible to combine a numerical characteristic and its properties (measures, mean value, measure value range) with another characteristic.

From all of the list characteristics and numerical characteristics the global valuation is detected.

The complete creation process of an inspection schedule (procedure) including the creation of a certificate consists of two steps:

- creation of the inspection schedule (procedure) as a list of characteristics,
- creation of a certificate layout as a basic for the certificate itself.

By using a universal layout style you can reduce the number of layouts.

7.7.8.2 Strategy to create an inspection schedule (procedure)

Analysis of the gauge

Before creating a new inspection schedule the first step should be an analysis of the technical parameters of the gauge, which you have to record on a certificate and to save as basic gauge data into the database. The second step is to analyse the characteristics, which you have to inspect and to record on the certificate and into the gauge history in the database.

The following characteristics are existing automatically, there is no need to creat it:

- TYPE
  Describes the type of the inspected gauge as a text.
- IDENTITY NUMBER
  The identity number of the inspected gauge.
- DESCRIPTION
  The nominal designation of the gauge (size, nominal value, measuring range etc.).

After finnishing an inspection, the follwoing fields are ready to use, which also have to be defined manually:

- Valuation
  A list with the valuation (“OK” / “not OK” valuation).
- Remark
  A multi-line tex to describe the inspection.
- Traceability
  Information about all of the used ference normals,standards and the used equipment.
- Additional Informations
  Global informations, which are related to the gauge and to the inspection, for example manufacturer, calibration certificate number, inspection date, next inspection date etc.

Consider, which characteristics you need:

- Characteristics to describe the gauge (text characteristics)
- Characteristics for attributive inspections (list characteristics)
- Characteristics for all of actual values, which have to be measured (numerical characteristics)

Implement gauge inspection schedule

Create an inspection schedule (procdure) according to your analysis result. You can do this by clicking onto the button `Edit procedure` in the main window of program QMSOFT®/QM-INSPECT. In the next dialog form you can use buttons to create a new and empty or to load an existing inspection schedule (procedure).

Step by step create new items for the gauge charactertics. Define the characteristic type and ther other properties of the characteristic. Some hints:

- QmLink
  if you create a self-defined characteristic the QmLink name can be entered absolutely free. For use as universal inspection schedule (procedure) it would be a good idea to use a uniform scheme (the simpliest way could be to number the QmLink names in combination with the type of the characteristic, for example all list-characteristics with “L_1”, “L_2”, “L_x” etc., all numeric characteristics with “M_1”, “M_2”, “M_x” etc., all text-characteristics with “T_1”, “T_2”, “T_x” etc.
- Numeric characteristics without upper/lower limit
  Often there is no upper / lower limit value existing for a numeric characteristic (for example, form deviation, repeatability). In this case it is suitably to set the nominal value to “0.00” and to remove the check for “lower limit”. The tolerance value / limit for the “upper limit” then defines the allowable limit of the characteristic.

Specifying the numerical values for numeric characteristics

When an inspection schedule (procedure) for multiple gauges of the same type but different degrees of numerical features (for example for different nominal values) is to be used, you will stand in the determination of reference values and limits for these numerical characteristics with the question, what value has to be used here. The answer is simple: use the numeric values of any test equipment of this type. The actual numerical values are provided later on the test equipment.

7.7.8.3 Create a certificate layout

Try to use your layout as universal as possible. Appropriate sample files are provided by L&W.

The easiest way to do this is to add the information to the features on the QmLink identifier in the layout. When using a same old scheme for the allocation of QmLink identifier (see previous section) is the "multiple use" of a layout easiest to achieve.

7.7.8.4 Linking inspection schedule and gauge management

In the most cases the program QMSOFT®/QM-INSPECT will not be used as so-calles stand-alone-software, it will be started by using the gauge management software QMSOFT®/QM-MANAGE.

In this case you have to…

- … define a gauge type in the database,
- … to link this gauge type to the inspection program QMSOFT®/QM-INSPECT.

To create the gauge type there could be useful two different strategies:

- **Strategy 1**
  You want to manage gauges by using a "gauge type name", that may have completely different characteristics.
- **Strategy 2**
  You have a number of gauges, which all have the same characteristics, which have to be inspected. The individual gauges differ from each other from each other only by different nominal and limit values.

In Scenario 1 the definition of the gauge type in the database is easy. Anyway if every individual gauge needs its own list of gauge characteristic, the corresponding gauge type is applied only to the few existing characteristics in common. At the minimum implementation can take a single box (for example "Description") to describe the type. It makes sense to use the existing type "Other Test Equipment" and to create a copy.

In Scenario 2 is a 1:1-definition of all of the characteristics useful. Since this is a lot more complicated, this procedure is recommended only for gauges with a manageable number of characterisitcs (max. 10 to 15).

> **Note**
>
> The QMSOFT®/QM-INSPECT program saves (when called from the database), only the most recently loaded inspection schedule (procedure). In the procedure according to scenario 2, which is typically characterized by a 1:1-mapping between gauge type and inspection schedule (procedure), it is not really nice to load manually in each calibration the associated inspection schedule (procedure) again. This can be avoided by an additional field "associated procedure" investing in the definition of master data fields of the type. This field MUST have the QmLink identifier "INSPECTIONPLAN"! Here then the name of the inspection schedule (procedure) for the next program call is saved.

Example for creating a gauge type:

When creating a new QMSOFT® database, there are already predefined types that illustrate the different strategies. The existing gauge types are named "Special gauge xxx" [Fig. 7.7.14].

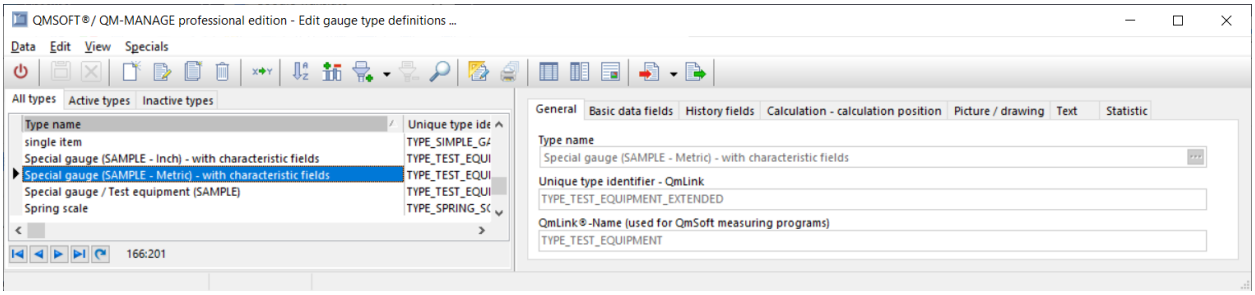


Fig. 7.7.14: Predefined gauge types in QMSOFT®/QM-MANAGE for use with the QMSOFT®/QM-INSPECT program.

7.8 Inspection program QMSOFT®/QM-MICRO

The QMSOFT®/QM-MICRO program serves as a computer support program for the inspection of micrometers according to

- DIN 863,
- VDI/VDE/DGQ guideline 2618 (parts 5, 6, 14, 15),
- the Federal specification GGG-C-105C,
- the British Standards:
  - BS 870 “External micrometer”,
  - BS 6468:1984 for depth micrometers,
  - BS 959 “Internal micrometers”,
- respective according to customised factory standards.

Therefore, it can be used to inspect all kinds of external micrometers, micrometer heads and internal micrometers.

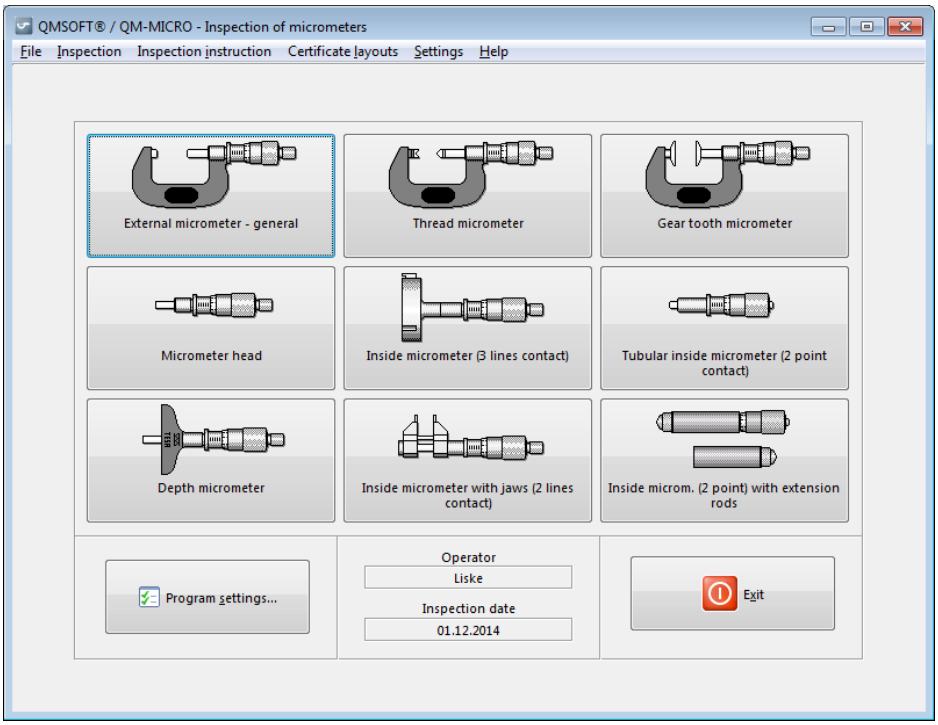


Fig. 7.8.1: QMSOFT®/QM-MICRO start screen.

The use of the program itself, however, requires only a little knowledge of computers.

Measurement data can be entered directly from an on-line connected measuring machine or from the keyboard. But note that the "Online" connection will be disabled if the type of inspection requires solid masters (for example inspection of 3-point contact internal micrometers which will be inspected with master setting rings).

Depending on the type of micrometer and the chosen evaluation (according DIN, VDI, British standard...) the program determines the total deviation range G, the deviation range of the micrometer thimble G_{Me} and the repeatability r. Additionally, the inspection of extension rods for internal micrometers can be made. The evaluation results can be re-produced on the screen and/or the printer. Tolerance excesses will be shown.

7.8.1 Settings > Program settings

Here you can set the specified inspection conditions for the different construction types of micrometers. Usually your configuration will be saved with the name "local workstation", but you can also assign different configurations to each type of gauge by saving the configuration with a new name.

7.8.1.1 General settings

In the category "General settings" you can select the connection to a measuring device from the list of all of the measuring devices, which are created with the help of QMSOFT®/QM-DeviceServer [Fig. 7.8.2]. Please choose also the default data input source (keyboard of the computer, on-line measuring machine). If you set "Online" as the default device the Online-connection will be started automatically as soon as a gauge measurement starts.

Note

Some types of micrometers are inspected by using fixed-size reference normals, an online data transfer from a measuring device is not supported in this case!

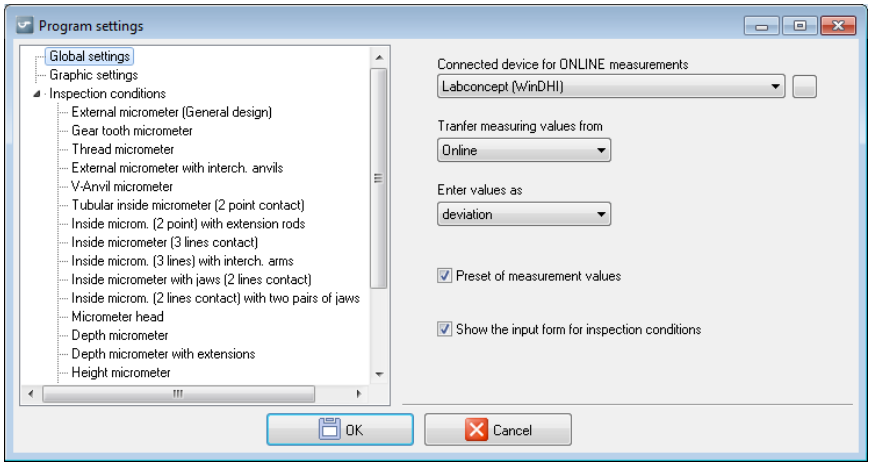


Fig. 7.8.2: General settings.

- ENTER VALUES AS
  Select if you want to enter the measures as direct readings or if you want to enter the "deviation". In the most cases if you use the key board to enter measuring values the option "deviation" is more convenient.
- PRESET OF MEASUREMENT VALUES
  Switch "on" this to fill the column "Measure" in the measuring table with the nominal values.
- SHOW THE INPUT FORM FOR INSPECTION CONDITIONS
  Usually this option will be switched on to see the "inspection conditions" window during a calibration. You can deactivate it, if you don't want to see this information evermore.

7.8.1.2 Inspection conditions

Here you can set the specified inspection conditions for the different micrometer types [Fig. 7.8.3]. Usually your configuration will be saved with the name "local workstation" but you can also assign different configurations to each type of micrometer by saving the configuration with a new name.

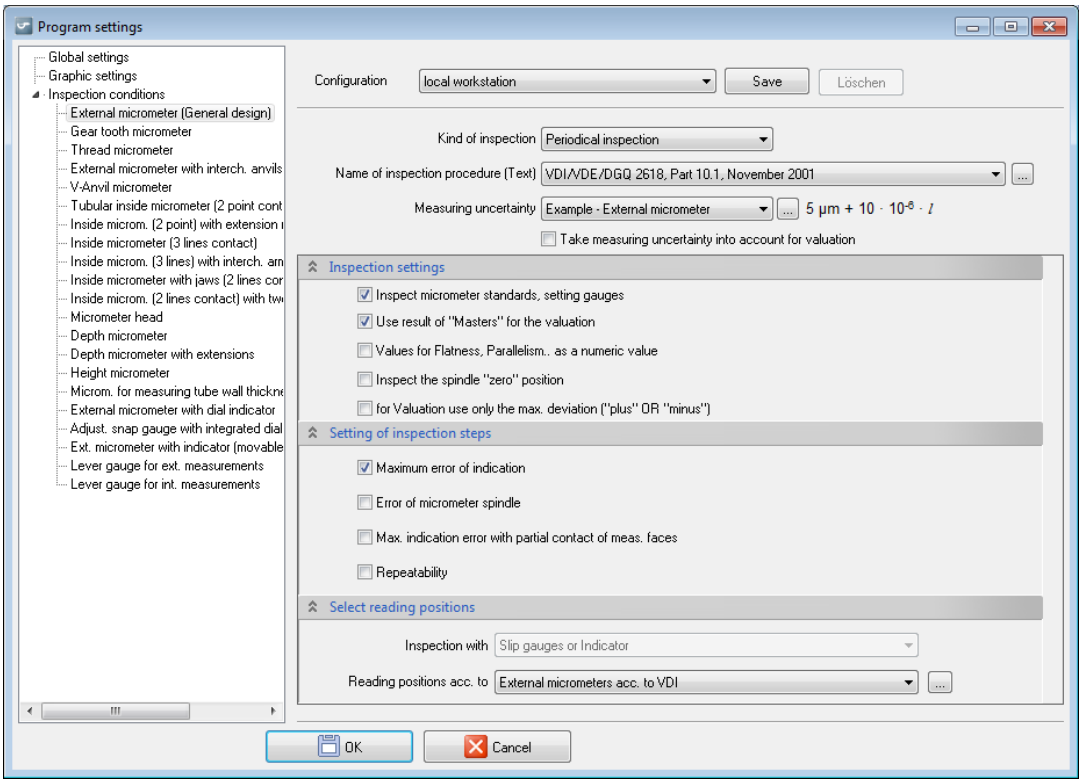


Fig. 7.8.3: Inspection conditions.

Preset the following common parameters:

- KIND OF INSPECTION

  Select “Periodical” or “Incoming inspection”. For an “Incoming inspection” some additional inspections (e.g. hardness inspection) have to be done.

- INSPECTION PROCEDURE (name of procedure)

  Here you can select the name of the used inspection procedure. This name will be recorded at the inspection certificate. Some of the predefined inspection procedures will cause fixed settings or restrictions for the inspection parameters.

- MEASURING UNCERTAINTY

  Select the measuring uncertainty which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate.

- TAKE MEASURING UNCERTAINTY INTO ACCOUNT ...

  The selection of the measuring uncertainty in the previous field is at first only used for recording purposes. If you want to use the calculated measuring uncertainty to prove the conformance or non-conformance of your inspected gauge with the defined error limits, then you have to switch on this option. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the “conformance zone” for the decision if the the inspected gauge is in or out of the defined specifications. If the calculated errors of indication are in the “uncertainty range” the valuation of gauge will be set to “restriced usable”. This means that neither conformance or non-conformance with the specifications can be proved.

Set now the following type specific parameters in the “Inspection settings” field (Note: not all parameters are available for each micrometer type):

- INSPECT MICROMETER STANDARDS, SETTING GAUGES

Often you have for a micrometer a standard or a master ring for the adjustment. If you activate this switch here you can enter the nominal sizes of this standards while entering the micrometer nominal data. The inspection of this standards will than be a part of the micrometer inspection.

- USE RESULT OF "MASTERS" FOR THE VALUATION
  Activate this option if the results of the "master" inspection has to be considered in the overall valuaton of the micrometer.
- INSPECT EXTENSION RODS...
  If you activate this switch here you can enter the nominal sizes of extension rods or interchangeable anvils. The inspection of this extensions will than be a part of the micrometer inspection.
- USE RESULT OF "EXTENSIONS" FOR THE VALUATION
  Activate this option if the results of the "extensions" has to be considered in the overall valuaton of the micrometer.
- VALUES FOR FLATNESS, PARALLELISM... AS NUMERIC VALUES
  If you inspect any type of micrometer you have also to check parameters like "Flatness of measuring faces", "Parallelism of measuring faces" and others. If you activate this option you can enter the results for this inspection as numerical values. Otherwise you have only a "Pass" / "Fail" decision for this parameters.
- INSPECT THE "SPINDLE ZERO POSITION"
  Especially while inspecting according to the German "DIN" standard the inspection does not start on the "Zero" position. In this case it is expected that the spindles "zero" position is exact on "Zero". Otherwise you have to adjust the spindle. Switch on this option if you want to start the inspection with the spindles "Zero" position. This option is ineffective for inside micrometers which will be inspected with master rings.
- FOR VALUATION USE ONLY THE MAX. DEVIATION ("plus" OR "minus")
  This option is only effective when you are working with factory tolerances. In this case you can set if the valuation will be based on the difference between the maximum points of the deviations or if you want to count in only the maximum deviation of plus or minus.

Setting of "inspection steps"

Activate with the related click-box the micrometer parameters you want to inspect. Usually there should be at least activated the option "maximum error of indication". The entering of measuring values is depended on the choosen options.

Defining the "reading positions"

- INSPECTION WITH
  Here you can select, how you want to do the inspection of internal micrometers with 2-Point contact. The standard give you the possibility to do this with setting rings or with an indication device (measuring machine). For other micrometer types this option is blocked when there is no choice how to do the inspection.
- READING POSITIONS ACC. TO
  The shown list is depended on the selected micrometer type. Select the reading positions proposed by the VDI rules or the BS or on your self defined positions. If you want to use your own self-defined positions make sure that you have insert the positions for the used measuring range.

If the inspection step "Repeatability" is activated you need to enter also...

- MEASURES FOR REPEATABILITY
  Type here the number of readings you want to enter if you inspect the repeatability r of a micrometer screw.

7.8.2 Settings > Edit inspection positions ...

The accuracy of readings of a micrometer is usually checked by taking readings on a series of slip gauges (gauge blocks) or by taking readings with an indication device on different positions [Fig. 7.8.4].

The German VDI, the British Standards and also other standards will give you recommendations about the readings you have to take. Otherwise the program does offer the possibility to define your own reading positions.

Use the option *Settings → Edit inspection positions ...* to define the related positions for different types of micrometers. The tables with all entered reading positions will be saved into the QMSOFT® database.

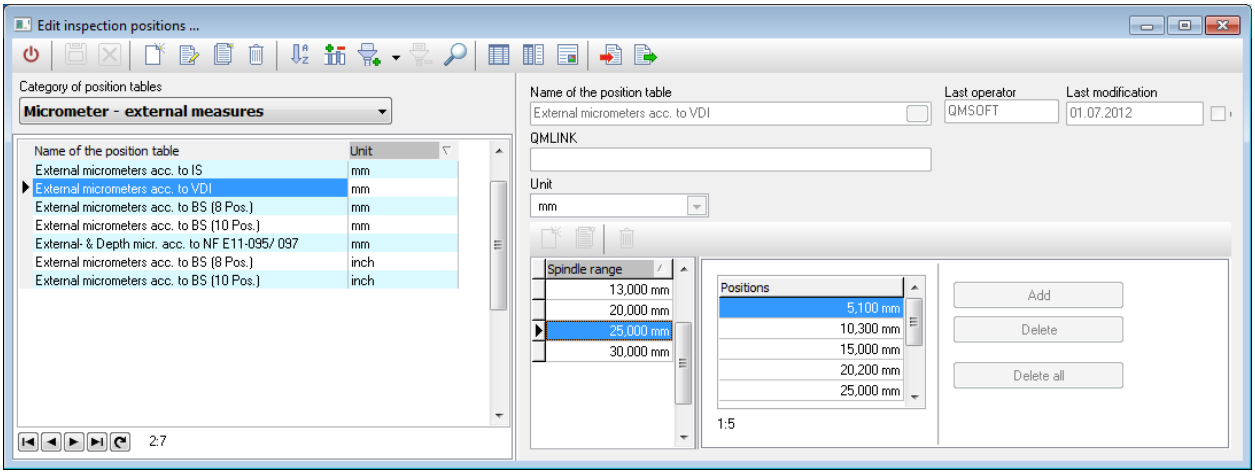


Fig. 7.8.4: Inspection positions.

Please note that the reading positions may depend exclusively on the “Spindle range” or - for example for internal micrometers to be checked with master rings - on the “Range start” and “Range end” parameters. For “Micrometer - external measures” then entered positions are always relative to the measuring range start. So you can use the same position list for a “0 - 25 mm” micrometer as well as for a “25 - 50 mm” micrometer. The reasons are:

- you avoid to enter a new position list for each micrometer range
- for micrometers where the range start is 25 mm or higher usually combinations of gauge blocks will be used by adding a gauge block with the micrometers range start.

The categories “Micrometer - ext. measures” and “Micrometer - int. measures”

For the inspection of external, depth micrometers and micrometer heads the DIN standard respective the VDI-guidelines or the BS standards gives a recommendation for the inspection positions should be used. These positions are pre-defined in the program in the related position tables.

In the shown table you can enter values for different spindle ranges. So you can also define reading positions for micrometers which does not correspond with a known standard. For an inspection according to factory standard you can define new tables with your customised positions.

Please note that the positions entered always refer to the start of the measuring range of the micrometer. Example: The start of the range is 25.0 mm, the inspection position 5.1 mm means that the absolute position is 30.1 mm.

The same procedure to assign the reading positions will be used for 2-Point micrometers when inspecting on a machine. In case that an indicating device can be set to “Zero” at the micrometers start of measuring range the entered positions are only related to the spindle range.

Master ring diameters to inspect internal micrometers:

The inspection of internal micrometers should be made on different positions of the applicable measuring range. For this, often (for example for inspection of 3-point contact micrometers) appropriated setting rings will be used. The readings you get on the inspected micrometers have to be compared with the sizes of your reference gauges. To make this comparison the program must be informed about the inspection positions you use. The entering of master ring values will be made as described above.

Make sure that the inspection positions can only be assigned to the micrometer inspected if the “Start” and the “End” of the measuring range match to an entry made in the table above.

The same procedure will be used for External micrometer with V-anvils where you usually will use a set of discs for the calibration.

Reading positions to inspect internal micrometer with an indicator

Some types of internal micrometers may be able to be inspected with an indicator. If you want to do this enter here the appropriate reading positions.

7.8.3 Settings > Management fof tables for error limits ...

All error limits you need to know when calibrating a micrometer and also the related extensions and masters are saved in database tables.

When you open the menu *Settings → Management fof tables for error limits ...* you will find the categories *Micrometer error limits*, *Tolerances for extension rods* and *Tolerances for setting masters* to manage all information you need for the valuation of micrometers [Fig. 7.8.5].

When you open the category *Micrometer error limits* you will see the list of the available standards for it.

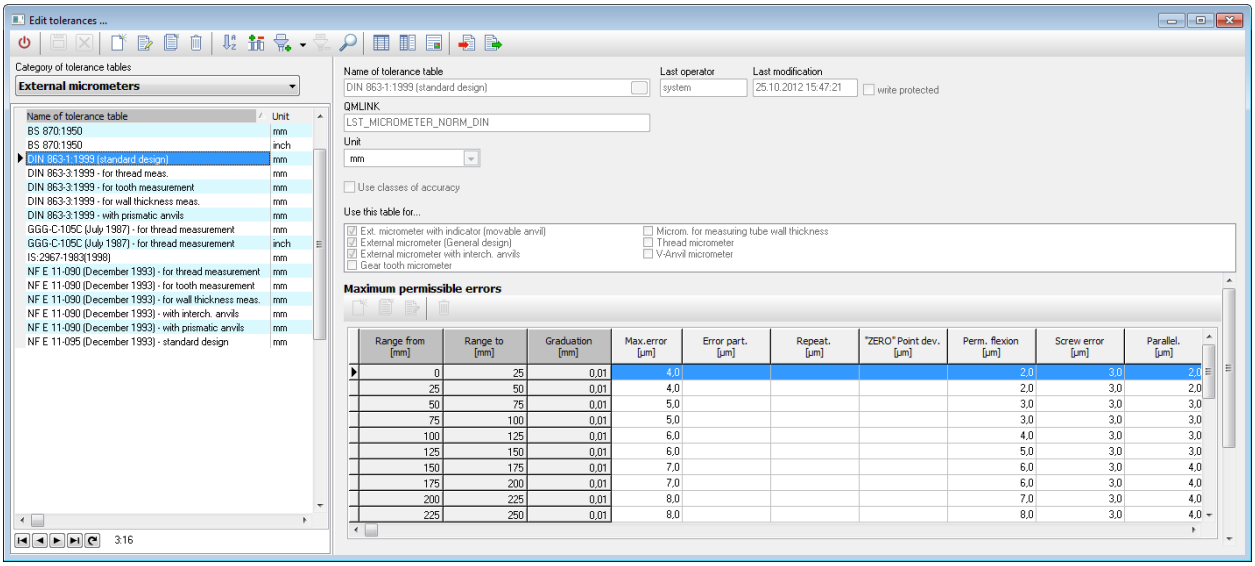


Fig. 7.8.5: Edit tolerance tables.

The predefined standards are usually “write protected”, so you can not change the values.

If you need special “factory tolerances” here you can insert new tables by using the functions “Copy a tolerance table” or “Create a new tolerance table”. Now you can modify the table according to your requirements.

The tolerance tables will be saved in the QMSOFT® database. When doing a micrometer inspection according factory standard this values are used for the valuation of the micrometer being inspected. The entered values are related to the type of micrometer, the “Measuring range up ..to” and the “Graduation”.

If you want to do a micrometer inspection acc. to “Factory standard” make sure that a corresponding tolerance entry is available. Otherwise the `Continue` button will be locked.

7.8.4 Doing a micrometer inspection

The program presents itself on the screen with a program window containing nine large buttons, each of which represents the inspection of a micrometer group (of a micrometer type).

7.8.4.1 Entering the micrometer nominal data

After selecting the type of micrometer in the main menu a series of parameters must be entered that describe the micrometer to be inspected. The input of these parameters is done in a separate dialog box with a corresponding number of input fields [Fig. 7.8.6]. Starting the program by the gauge management program QMSOFT®/QM-MANAGE the most parameters are already filled with the database information.

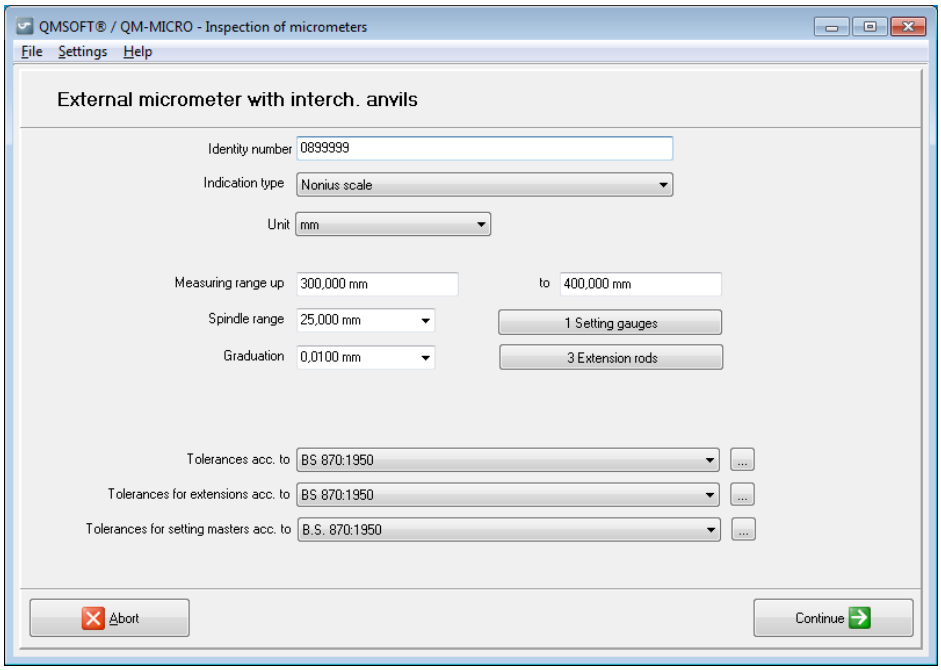


Fig. 7.8.6: Entering the micrometer nominal data.

- Identity number
  This field is used to establish an identity for the calliper by entering a number. This number will be noted in the record.
- Indication type
  Choose here, from the list provided, the type of the indication (Vernier scale, Dial, Digital). Depended on the chosen option you have to enter in the next field the vernier scale, the graduation or the resolution of the micrometer.
- Unit
  Select the “Unit” of the micrometer.
- Measuring range up
  Enter the start of the measuring range of the micrometer.

- [Meas. range] to
  Enter the end of the measuring range of the micrometer have to be inspected. The unit is "mm". For micrometer without extensions or interchangeable anvils it will be set automatically.
- Spindle range
  Select the range of the spindle from the shown list.
- Graduation
  Select the spindle graduation from the shown list.
- Tolerances acc. to
  The shown list is depended on the selected micrometer type. Select the standard you want to use for the micrometer tolerances. If you select "Factory standard" make sure that the required tolerances are entered in the tolerance table.

The buttons `Setting gauges` and `Extensions rods`

If you have activate an option "Inspect micrometer standards" or "Inspect extensions" (see section VII.2.3.) than you can here enter the nominal values of the micrometer standards or the extension or interchangeable anvils.

The inspection of this standards and/or extension will be a part of the inspection if these options are activated in the inspection conditions.

Note

If the `Continue` button is disabled check the following parameters!

- does the entered values for "Spindle range" and "Graduation" correspond with the standard selected; (for example the BS 870 standard is defining only a graduation of 0.001 inch or 0.01 mm); if you are not sure switch to "Factory standard"
- If you select the option "Reading positions according to: Factory standard" be sure that you have entered the positions required; otherwise use the function "Inspection conditions" to do it.
- If you select the option "Tolerances according to: Factory standard" be sure that you have entered the related tolerances for the "Measuring range" and the "Graduation"; otherwise use the function "Factory tolerances" to do it.

7.8.4.2 Inspection conditions

After all parameters of the micrometer to be inspected have been entered, the dialog for defining the inspection conditions is displayed after continuing by clicking on the `Continue` button.

7.8.4.3 Measurement

An important part of micrometer inspection is checking the general functionality and some other parameters that depend on the micrometer type and/or the standard selected. These parameters are:

- Functional and Visual inspection
- Flatness of measuring surfaces
- Parallelism of measuring surfaces
- Measuring force of the spindle friction
- Hardness

Depended on the measuring conditions you have selected you can do this as a “Pass” / “Fail” decision or you enter the results of the inspection in form of the actual numerical values.

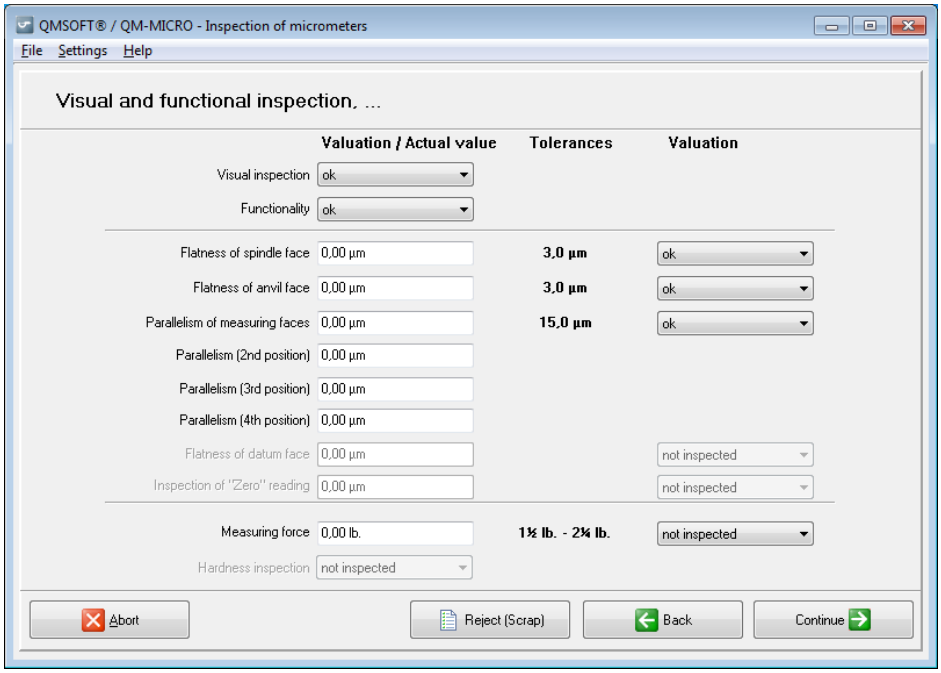


Fig. 7.8.7: Checking micrometer functionality and additional parameters.

To enter the inspection results, the input mask shown in the figure [Fig. 7.8.7] appears on your screen, including the corresponding tolerances for these parameters. Now you need to enter the inspection result for each parameter or, if the “Pass” / “Fail” option is selected, check whether the actual values of the inspected micrometer are within the displayed tolerance or not.

If you choose “not inspected” the related parameter will not be shown/printed in the calibration certificate.

The `Reject (Scrap)` button.

If the inspection of the functionality or of any other parameter fails it may be useless to inspect the traverse or spindle error of the micrometer. In this case you can use the `Reject (Scrap)` button to skip the following steps of the inspection. In this case you will go directly to the creation of the inspection certificate.

The input of the measuring values must be done in the order: measuring value 1 to n for increasing readings [Fig. 7.8.8]. The valid inspection position (depended on the VDI guidelines, the British standard or the entered inspection positions) is displayed. The measuring values are inspected on their plausibility.

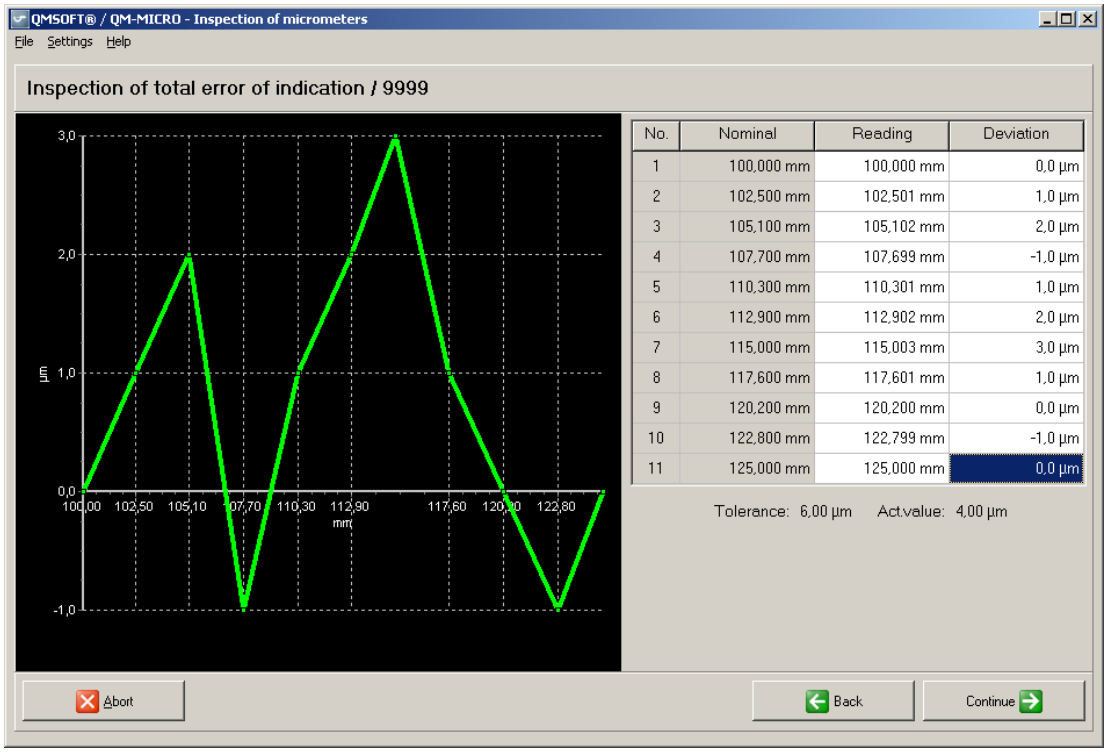


Fig. 7.8.8: Entering measuring values.

For such inspection steps, which could be executed with the help of a measuring device (for example it is not possible to use such a device to detect the measure deviations for a standard micrometer), you can start the online-device by using the button `Online`.

7.8.4.4 Output of results

The corresponding deviation ranges will be calculated from the measuring values received. The valuation of the micrometer inspected will be done according the following criteria:

- making a inspection for a micrometer according the DIN-standard (inspection can be made according DIN or VDI) or according the AS/BS-standards the standardised error limits will be used for the micrometer valuation,
- for a non standardised micrometer the tolerance assessment is done only if the type of micrometer and the start and end of the measuring range match the corresponding entry in the factory standard tolerance table,
- if neither of the above is filled in, no tolerance assessment will be made.

The result of the tolerance assessment will be noted in the record.

The output of all of the inspection results is described in chapter *Output of results*.

7.9 Inspection program QMSOFT®/QM-PIN

The QMSOFT®/QM-PIN program is used for computer-aided inspection of cylindrical measuring pins (as individual pins or pin sets), thread check wires and thread check wire sets for measuring external threads according to the “Three-wire-method”, feeler gauges or other gauge sets. In addition, it is also possible to inspect other types of gauges, which consist of a series of graduated length or thickness dimensions.

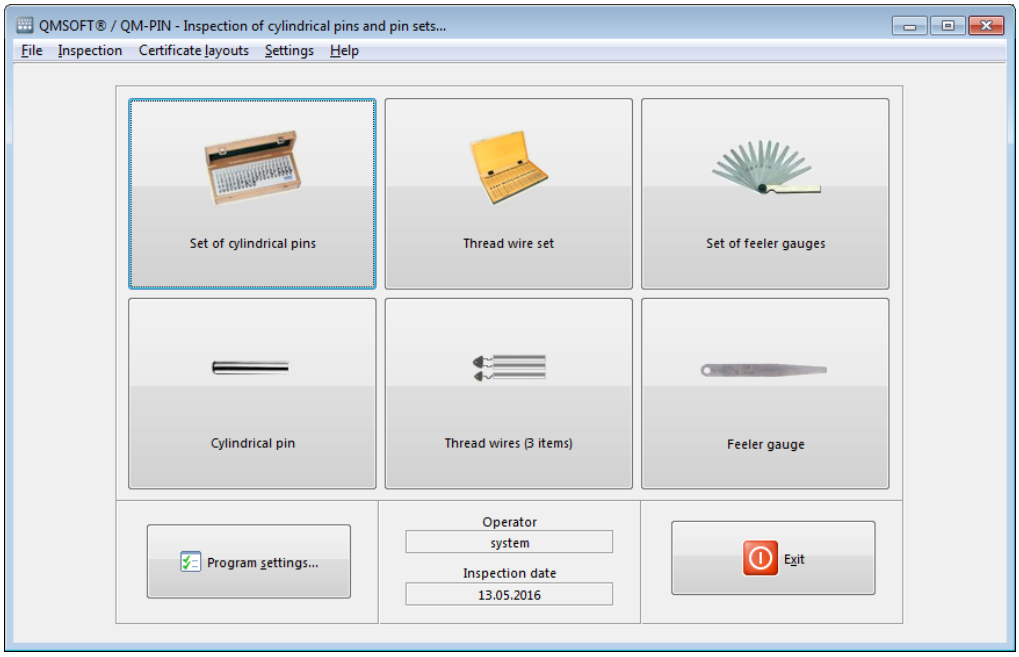


Fig. 7.9.1: QMSOFT®/QM-PIN start screen.

A complete set of thread check wires or measuring pins consists of a series of pins or wires with a defined gradation of the pin diameter. The program is able to manage all nominal sizes of a pin library and the measurement results including all measured values for each pin or wire.

When inspecting cylindrical pins, the program calculates the average value as well as the minimum and maximum values and tolerance excisions for each pin. The evaluation can be carried out according to DIN 2269 as well as according to your own factory standards.

Warning

The program QMSOFT®/QM-PIN does not include the functionality for a gauge management or for the storage of the gauges history. These functions are an exclusive part of QMSOFT®/QM-MANAGE. It means that the complete functionality for the management of pin sets, the monitoring of the calibration date and the handling of the gauge history does additional require a license for the program QMSOFT®/QM-MANAGE (either “professional edition “ or “lite edition”).

7.9.1 Settings > Program settings

The menu item *Settings → Program Settings* contains a collection of basic settings which are preset when QMSOFT® is installed in order to ensure that the program works as correctly as possible.

The dialog form shows a tree structure on the left side of the window with the different categories into which these program settings are divided. By clicking on a corresponding branch of the structure, the corresponding fields are displayed in the right-hand area.

7.9.1.1 General settings

Here you can define the connection to a length measuring device (if it exists) [Fig. 7.9.2]. Furthermore you can switch on or off the automatic connection mode of the device (measure input online or from the keyboard).

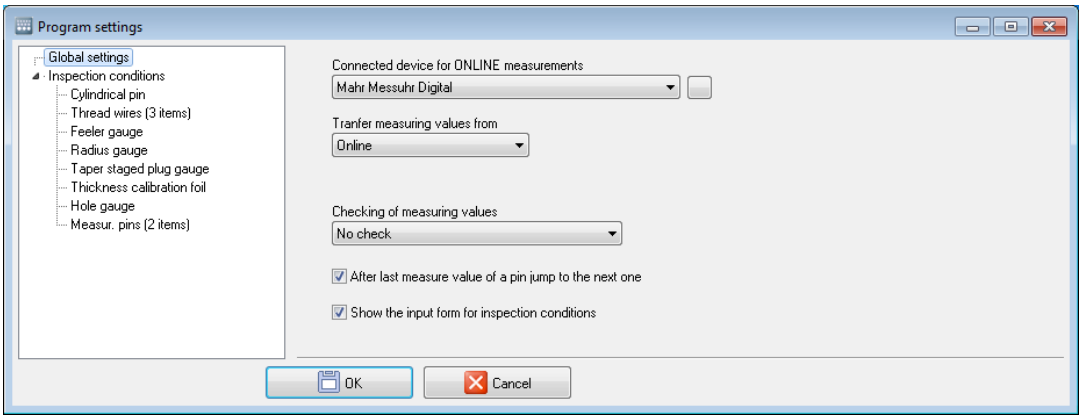


Fig. 7.9.2: General Settings.

- CHECKING OF MEASURING VALUES
  While entering the measuring values it may be useful to check the plausibility or correctness of the measures. Here you can set different options how to do this.
  Using the option "Warning if out of tolerance plus the entered limit", you can set your individual limits to get a warning. If the defined limits are exceeded during the measurement, you will receive a warning.
- AFTER LAST MEASURE... JUMP TO THE NEXT..
  When measuring sets of cylindrical pins, a large number of pins usually have to be measured one after the other. If you enable this option, you do not have to confirm the last measure before the program proceeds to the next pin.
- SHOW THE INPUT FORM FOR INSPECTION CONDITIONS
  Usually this option will be switched on to see the "inspection conditions" window during a calibration. In this case you will see the type dependent settings before starting the measuring process. You can deactivate it, if you don't want to see this information evermore.

7.9.1.2 Inspection conditions

Here you can set the specified inspection conditions for the different gauge types [Fig. 7.9.3]. Normally your configuration is saved under the name “Local Workstation”. However, you can also assign different configurations to each gauge type by saving the configuration under a new name. The inspection conditions are divided into groups depending on the gauge type. The possible settings of the different gauge groups differ only slightly between the groups.

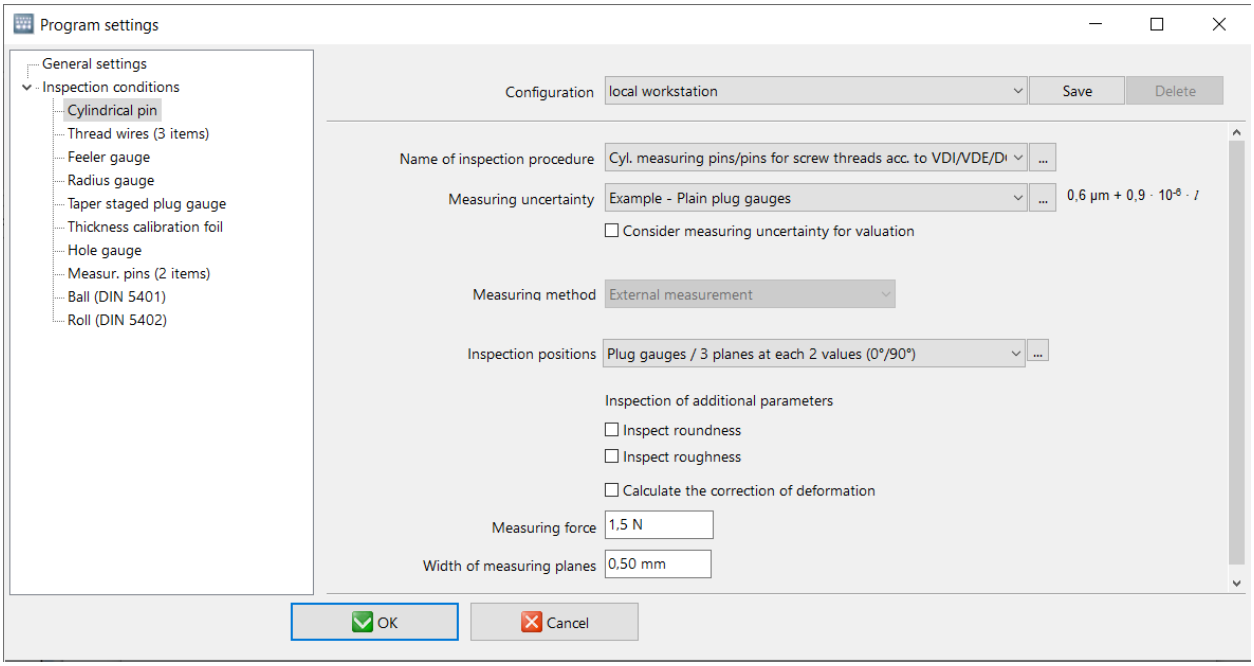


Fig. 7.9.3: Inspection conditions.

Common parameters are:

- Name of inspection procedure

  Here you can select the name of the used inspection procedure. This name will be recorded at the inspection certificate. The related field name in the layout is {Inspection procedure}.

  For defining customised procedures see also chapter “Laboratory management” of this manual.

- Measuring uncertainty

  Select the measuring uncertainty which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate. The definition and usage of measuring uncertainty is also described in chapter “Laboratory management” of this manual.

- Take measuring uncertainty into account..

  The selection of the measuring uncertainty in the previous field is at first only used for recording purposes. If you want to use the calculated measuring uncertainty to prove the conformance or non-conformance of your inspected gauge with the defined error limits, then you have to switch on this option. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the “conformance zone” for the decision if the the inspected gauge is in or out of the defined specifications. If the calculated errors of indication are in the “uncertainty range” the valuation of gauge will be set to “restriced usable”. This means that neither conformance or non-conformance with the specifications can be proved.

Set now the following type specific parameters (not all parameters are available for each type of gauge):

- Inspection positions

Select the list with the defined inspection positions.

Inspection of additional parameters:

Here you can switch on / off the inspection of “Roundness” and “Roughness”. Please note that you have to enter these values manually.

Special settings for “Thread wires”

Thread wires are used to measure external threads using the “Three wire method”. This means you always have three wires with the same nominal diameter available.

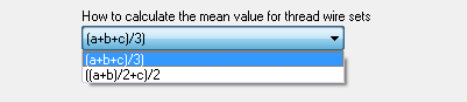


Fig. 7.9.4: Calculation methods.

For the evaluation of a thread measurement you need the “mean” or “effective” value of the three wire diameters. Select here the formula you want to use for the calculation of this “mean” value [Fig. 7.9.4].

7.9.2 Settings > Management of tables for error limits ...

The program gives you the possibility to manage factory tolerances for all of the supported gauge type groups. Here you can select the tolerance tables for the different gauge types and can edit it or you add new tolerance tables if required. It is also possible to change the requirements of DIN 2269 (cylindrical pins) and DIN 2275 (feeler gauges) if necessary.

All tolerance values are stored in the central QMSOFT® database [Fig. 7.9.5]. To show or edit the tolerance items please use the menu *Settings → Management of tables for error limits ...*.

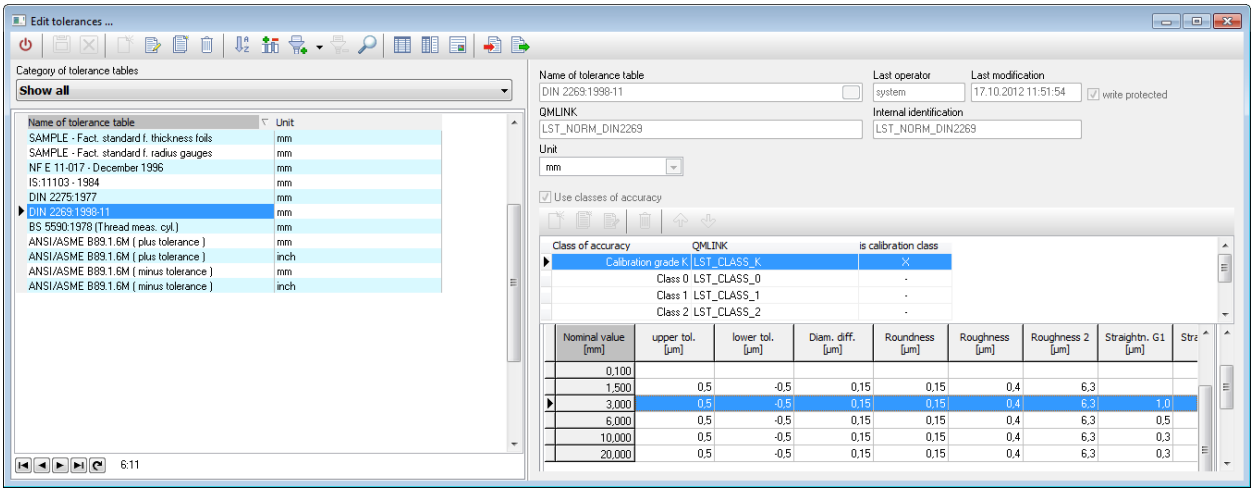


Fig. 7.9.5: Edit tolerance tables.

The value for “Nominal value” in the first column does mean that the related tolerance values are valid for pins with a nominal diameter which is less than or equal of this value.

7.9.3 Measurement of single pins and sets of pins

The following explanations are made with an example of a “Set of cylindrical pins”. You can use the same procedure too if you doing an inspection of “Feeler gauges” or other gauge types. During the examination of single pins or single feeler gauges, some processing steps accounts (such as setting the structure of the set).

7.9.3.1 Entering the gauge data

If you do not perform the measurement using the gauge management program QMSOFT®/QM-MANAGE, you must first enter the data describing the pin set here.

For the measurement of the gauge set please refer to the manual for QMSOFT®/QM MANAGE about the procedure for creating the gauge set as well as for calling the measurement procedure. The definition of the structure of a set is analogous to the procedure, which is described here.

At first select in the main window of QMSOFT®/QM-PIN the type of the gauge (set). Supported gauge types are set of cylindrical pins, single cylindrical pins, sets of thread measuring wires and individual thread measuring wires, feeler gauges and feeler gauge sets can also be measured. For thread measuring wires each nominal size is associated with three individual pins automatically. The following screen [Fig. 7.9.6] will appear after the type-selection.

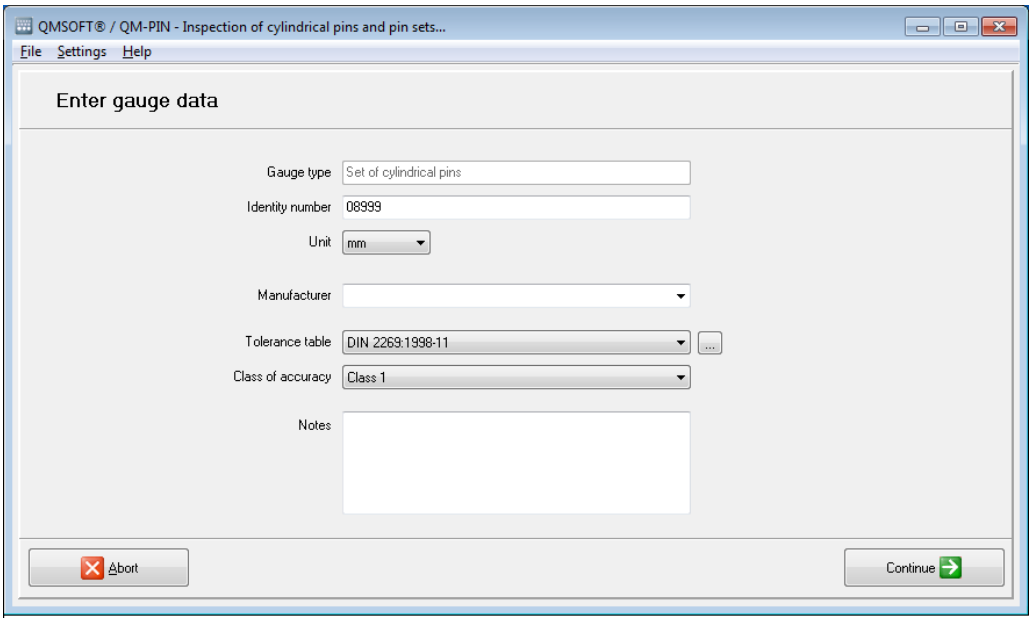


Fig. 7.9.6: Enter gauge data.

At first enter the identity number and select the measuring unit of the nominal values of the set of pins. Select the table of tolerances from the list of standards, and if the standard contains so-called “classes of accuracy”, please select it too. Click to button `Continue` to get the next screen.

7.9.3.2 Define the set configuration

> **Note**
>
> This step is not required if you are using the gauge management QMSOFT®/QM-MANAGE. In this case, the corresponding steps are performed in the gauge management system itself. At the start of the inspection, the nominal values of the individual pins are passed from QMSOFT®/QM-MANAGE to QMSOFT®/QM-PIN directly.

When doing the inspection of a "Set of Pins" in the next screen [Fig. 7.9.7] you have to define the single pins including in the set. You will get the following screen for it:

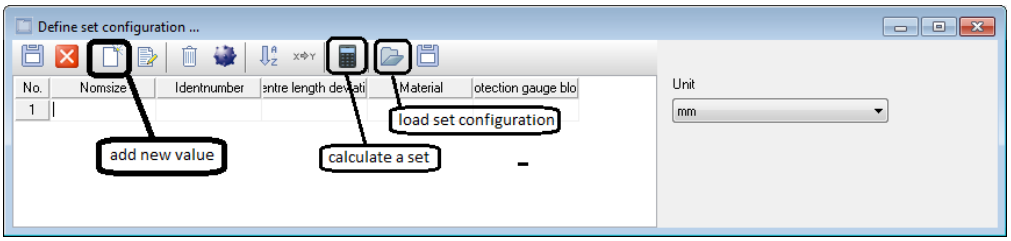


Fig. 7.9.7: Defining the elements of a set of pins.

At first select the unit. Using the button `Add value` you can now add the nominal values of the pins. Two more functions will support you to simplify this procedure:

- by using the `load set configuration` function you can open predefined sets,
- the function `calculate a set` does allow you to enter the values *`smalles value`*, *`largest value`* and *`step`* to calculated the items in the set.

Usually if you have to insert a set of pins the diameter difference between two pins follow one another is constant [Fig. 7.9.8]. In this case you can simplify the data input by using the `Calculate` function.

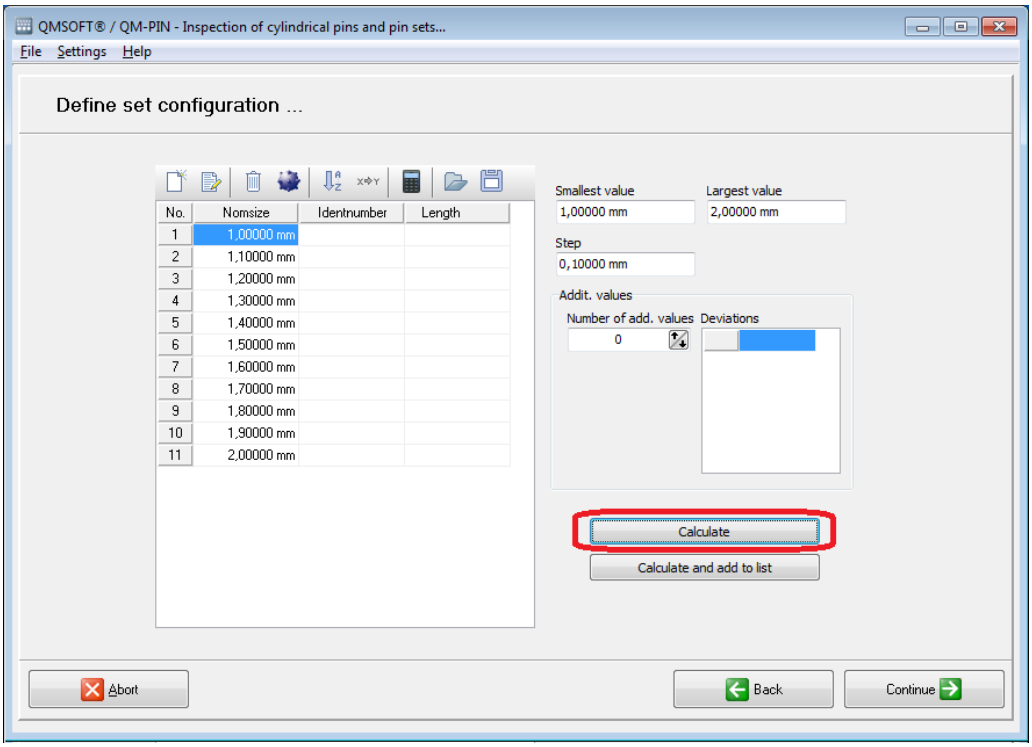


Fig. 7.9.8: Define a set with the help of the calculate feature.

To define a set please enter these data:

- SMALLEST VALUE
  Enter the first nominal size of your pin set (usually the smallest diameter).
- LARGEST VALUE
  Enter the last nominal size of your pin set (usually the largest diameter).
- STEP
  Enter the value of the diameter difference between two pins in the set.

If you have entered all required information, use the button `Calculate` to calculate the nominal sizes of all pins in your set. The list of pins will now be inserted, and the number of pins will be calculated.

If your pin set has no regular step you can use the function `Save set configuration` to save your set with a special name. Sets you have saved, can be reloaded by using the function `Load set configuration`.

Sometimes a pin set is created according to a defined structure. For example: you have a set with a basic step of 0,10 mm but for each pin in this serie you have additional a pin 2 µm smaller and another one 2 µm larger then the basic step. To define such a set use the features in the area “Addit. values”.

How to operate this: Enter the number of pins which there are between your “basic step”. After that, enter the deviations of these pins in relation to the “basic size” (“+2µm” and “-2µm”). Press the `Calculate` button to create the pin list.

If required, you can add or delete single pins after that operation from the shown list.

7.9.3.3 Doing a gauge inspection

After defining or loading your set configuration now the inspection can be started [Fig. 7.9.9]. Measurement values are always entered in a sequence of measurement values 1 to n corresponding to the entered number of measures per pin.

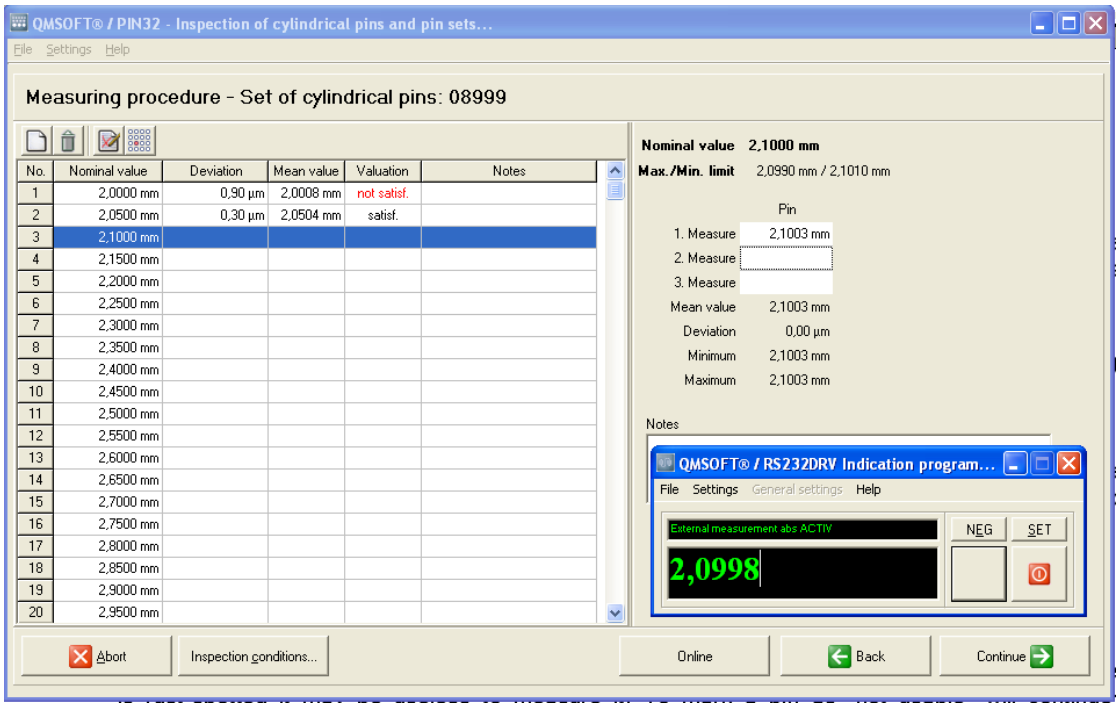


Fig. 7.9.9: Doing a gauge inspection.

You can use the function key F5 or the related button to mark a pin as “not usable”. For example if it is rust-spotted it may be useless to measure it. To mark a pin as “not usable” will continue the inspection with the next pin. You will get a related text for the marked pin on the certificate.

If a pin is missing in your set you can mark it as “Missing” with the F6 function key or the button. You will get the text “missing” on the certificate instaed of the measuring values.

In the shown pin list, you can repeat measures as you want. Click with the mouse in the related line do to this.

Reaction of measuring values - outside of the defined limits

QMSOFT®/QM-PIN has a built-in feature to define a “warning limit” for your measures. Ever if a measuring value is outside of this limit you will get a warning message. The reason may be, that the pin is really outside of tolerance, that you have made a fault while measuring (may be you have to check your indication) or that you have the fault pin (sometimes the pins are mixed up). Now you can decide, if you want to “Ignore” the warning, and the measure will be shown as “outside” (red colored), you can repeat the measurement or you can mark the pin as “Not usable” to continue with the next one.

7.10 Inspection program QMSOFT®/QM-PLAIN

The QMSOFT®/QM-PLAIN program is designed for the inspection of the following types of plain gauges:

- GO and NO GO Plain ring gauges acc. to ISO 1938-1:2015, DIN 7150-2:2007, BS 969:2008, ANSI/ASME B89.1.6M, NF E 02-202:1994
- GO and NO GO plain plug gauges acc. to ISO 1938-1:2015, DIN 7150-2:2007, BS 969:2008, ANSI/ASME B89.1.5, NF E 02-202:1994
- GO and NO GO (double sided) plain snap gauges acc. to ISO 1938-1:2015, DIN 7150-2:2007
- Check plugs for snap gauges acc. to ISO 1938-2:2017, DIN 7150-2:2007
- Rod gauges with spherical ends acc. to ISO 1938-1:2015 and DIN 7164:2017
- Master rings acc. to DIN 2250-1, BS 4064, BS 4065, ANSI/ASME B89.1.6M, NF E 11-011
- Master setting disks (Style 1, 2 and 3) acc. to ANSI/ASME B89.1.6M
- Setting standards for micrometers acc. factory standards

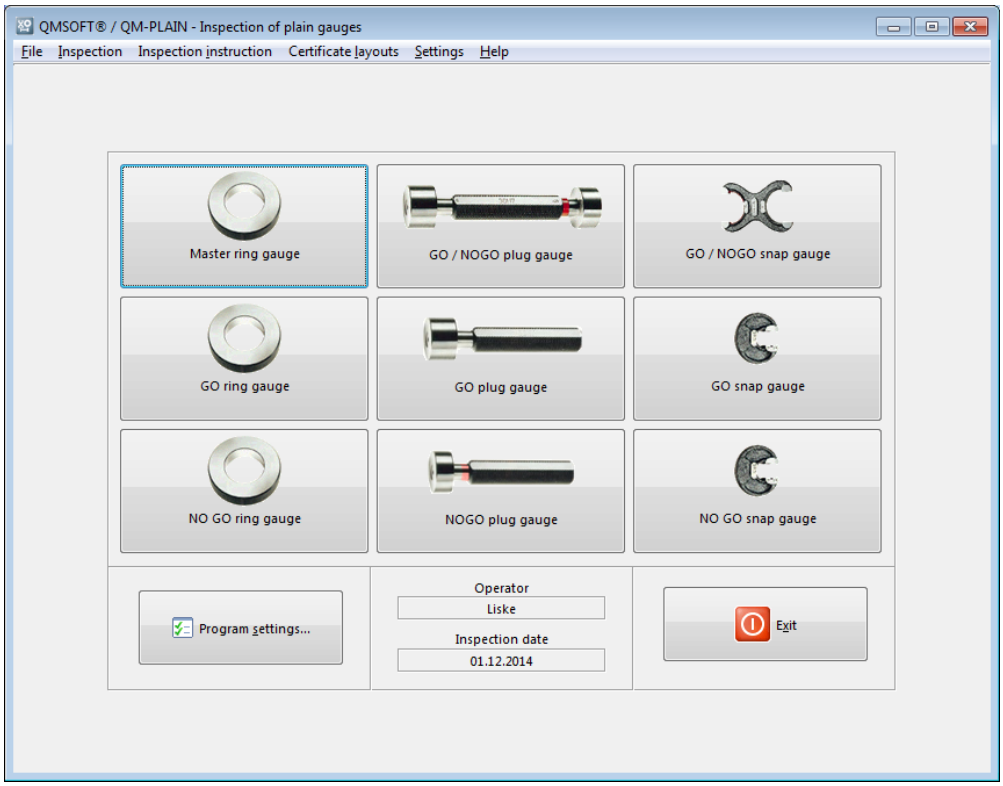


Fig. 7.10.1: QMSOFT®/QM-PLAIN start screen.

The user must first enter the type and the nominal size (e.g. “20 H7” or “20 +0 -21”) of the gauge being inspected. The program will evaluate the whole set of gauge nominal values automatically. It is also possible to use customer specific gauge nominal data.

7.10.1 Settings > Program settings

Here you can set the specified inspection conditions for the different types of gauges [Fig. 7.10.2]. Usually your configuration will be saved with the name “local workstation”, but you can also assign different configurations to each type of gauge by saving the configuration with a new name.

You can setup the following items:

- Kind of inspection

  Select “Periodical inspection” or “Incoming inspection”. For an “Incoming inspection” some additional inspections (e.g. hardness inspection) have to be done. However, the main difference is, that when making an “Incoming inspection” for the evaluation of gauge diameter the manufacturer tolerances of the gauge will be used without using the wear limit. For “periodical inspection”, the gauge evaluation will be done using the wear limits.

- Inspection procedure

  Here you can select the name of the used inspection procedure (default: “VDI/VDE/DGQ 2618”). This name will be recorded at the inspection certificate. The related field name in the layout is {Inspection procedure}. For defining customized procedures, you can use the ... button behind this field.

- Measuring uncertainty

  Select the measuring uncertainty, which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate. For defining customized measuring uncertainty items, use the ... button behind this field.

- Consider measuring uncertainty for valuation

  The selection of the measuring uncertainty in the previous field is at first only used for recording purposes. If you want to use the calculated measuring uncertainty to prove the conformance or non-conformance of your inspected gauge with the defined error limits, then you have to switch on this option. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the “conformance zone” for the decision, if the inspected gauge is in or out of the defined specifications. If the calculated errors of indication are in the “uncertainty range”, the valuation of gauge does depend on your defined “Acceptance rules”. See section V.7.9 for this.

- Method of measurement

  depending on the gauge type, different methods of measurement may be available select your desired method.

- Inspection positions

  For each gauge side to be inspected select the related position list;

  see also section V.7.6 “Inspection positions

- Bending up compensation

  If you are using a snap gauge to inspect an outside diameter the gauge will be bent up (caused by the form of construction). You can take this effect in consideration, if you calculate this “bending up” value with the program. In the certificate you will get the original measure and the measure including the “bending up” compensation.

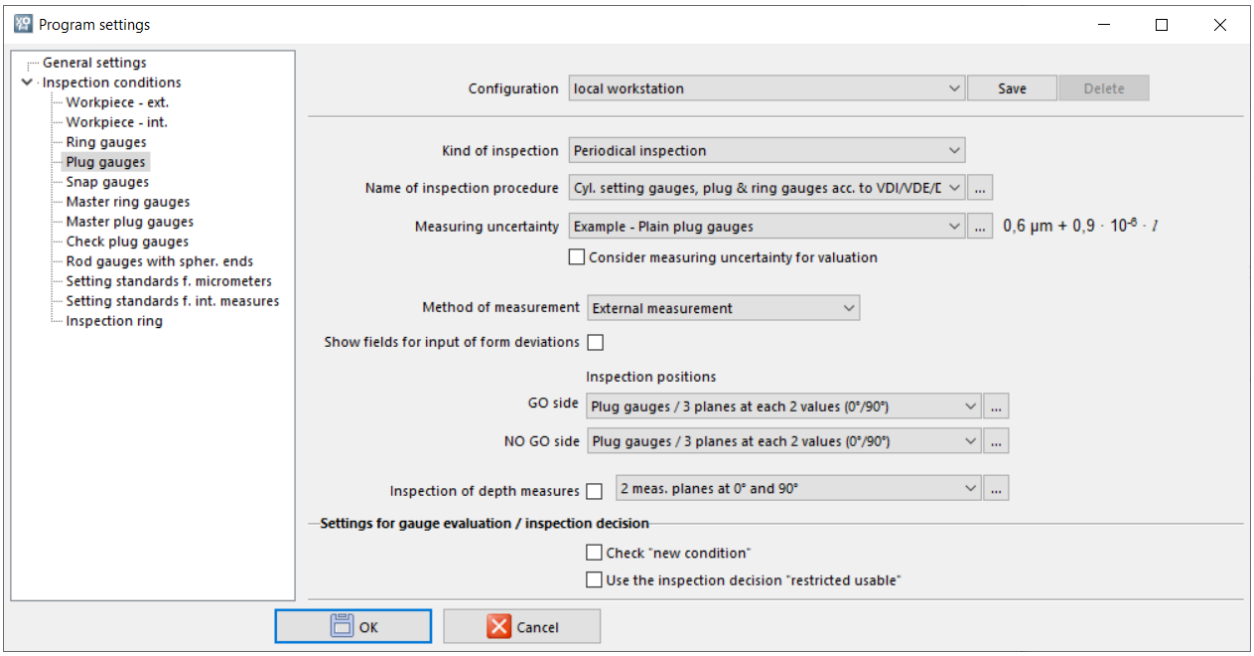


Fig. 7.10.2: Setup of the inspection conditions.

Additional settings to influence the “Inspection decision”

In the simplest case the program will decide between “usable” as soon as the measuring results are inside the permissible tolerances or limits or “not usable” if the measures are outside the related limits.

Depending on the current state of a gauge, the evaluation of the gauge can be done as “limited usable”. Here you specify whether you want to use this option and what criteria the classification has to be as “limited usable” [Fig. 7.10.3].

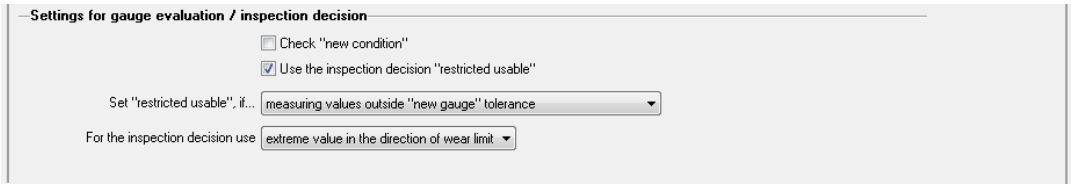


Fig. 7.10.3: Settings for the inspection decision.

You will now have these additional options:

- Check “new condition”
  Activating this option will set the inspection result to “usable / new condition”, if the measuring results are inside the manufacturing tolerances for a new gauge.
- Use the inspection decision “restricted usable”
  With this options you can determine a condition, where the result will be set to “restricted usable”. This will allow you to define a status between “usable” and “not usable” to get a warning, if a gauge will get worn before it is outside the limits.

Note

This additional decision rules are not active, if the option “Consider measuring uncertainty for valuation” was activated!

7.10.2 Settings > Factory tolerances

To calculate the gauge limits for non-standard gauges the program does offer the possibility to enter tables with “factory” or manufacturer tolerances”.

Use the *Settings* → *Factory tolerances* to create new tolerance tables or to edit existing tables. The tables with the “factory tolerances” are divided in “mm” and “inch” tables. Also the tables are related to the different types of gauges (“plug & ring gauges” or “master rings and setting standards”) and the different kinds of the tolerance calculation as listed below.

- **ISO conform** calculate with: [LST_NORM_FACTORY]
  is defining gauge-tolerances and methods for calculation of the gauge deviations based on ISO 1938-1:2015 (see figures in ISO 1938, section 7.2 and 7.3).
- **BS or ANSI conform** calculate with [LST_NORM_FACTORY_BS] or [LST_NORM_FACTORY_ANSI]
  is defining gauge-tolerances and methods for calculation based on “British Standard BS 969:1982” or ANSI standards B89.1.5/1.6.
- **Direct calculation** calculate with: [LST_NORM_FACTORY_ISO_SIMPLE]
  this kind of tolerance tables does allow the direct input of the upper and lower tolerance values for a gauge dependent on the form of gauge (Plug or Ring) the range of the nominal size and workpiece tolerance.

Depended on the kind of tolerance calculation you have to type in different values in the related tolerance tables.

ISO conform

For an “ISO - conform” tolerance you need the following information:

- the gauge manufacturing tolerance “H/2”
- the value to calculate the wear limit “y”
- the value “z” as the distance of the middle of the tolerance field of the new Go gauge to the Maximum Material Limit of the work piece
- for gauges over 180 mm there may exist an additional safety distance α. See the related figures for it [Fig. 7.10.4].

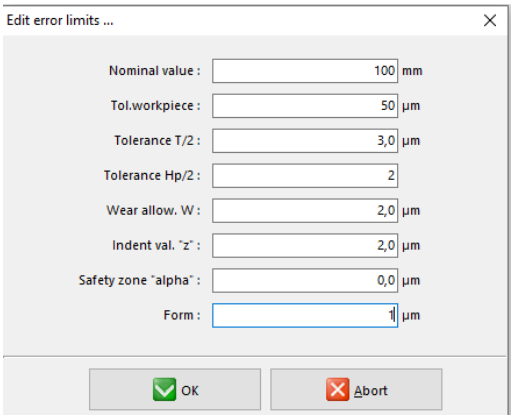


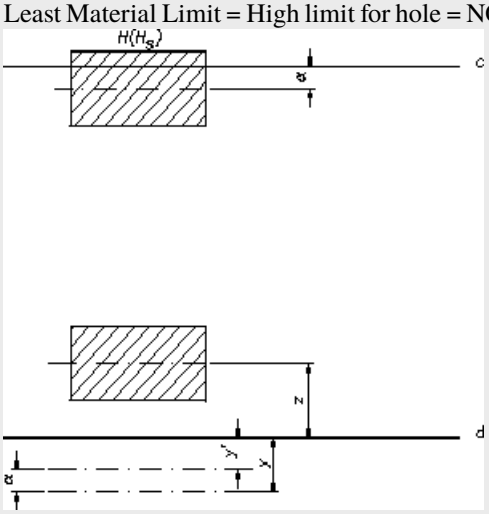
Fig. 7.10.4: Entering ISO conform tolerance values for a gauge.

The entered tolerance values are related to the nominal value (nominal size up to and including) and the related workpiece tolerance. The line marked in the above figure is valid for nominal values over 10 mm up to 30 mm and a tolerance until 21 µm.

Please note also the option "Use this table for …" to select the related types of gauges from the shown list.

The usage of the "ISO conform" tolerance tables:

Example calculation GO/NOGO plug gauge
Least Material Limit = High limit for hole = NO GO side



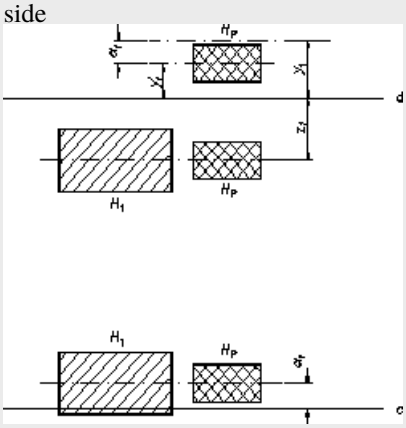
Maximum Material Limit = Low limit for hole = GO side

In the figure you can see the usage of factory tolerances for plug gauges:
The "GO plug gauge" controls the Max.-Material-Limit (Low limit) of the hole. The "NO GO plug gauge" controls the Least-Material-Limit (High limit) of the hole.
The "safety" range α will usually be used only for plug gauges over 180 mm. For plug gauges until 180 mm the value for α has to be entered as "0".

Basic deviations workpiece: The basic deviations of a hole "25H7" (based on ISO 286) are 0.0 µm und 21.0 µm, it will result the hole limits as 25.000 mm and 25.021 mm
GO plug gauge: The gauge limits of the "new" GO plug gauge has to be calculated by the low limit of the hole plus the "indention" value "z" plus / minus the half of the factoring tolerance "H".
NOGO plug gauge: The limit values of the NO GO plug gauge has to be calculated using the hole high limit plus / minus the half of the factoring tolerance "H" (the value α is "0"). The results are 25.023 mm and 25.019 mm.

The required tolerance values you will find in the tolerance table shown in the figure. See the marked line with the nominal value "$\leq$ 30 mm" and he related work piece tolerance $\leq$ 21 µm. The calculation is now:
25.000 mm + 0.002 mm $\pm$ 0.002 mm, the gauge limits for the "new" gauge are 25.000 mm and 25.004 mm.
The "wear limit" has to be calculated as: low limit of hole minus the wear limit "y", the result is 24.998 mm.

Example: calculation for ring or snap gauges
Maximum Material Limit = High limit for shaft. = GO side



Least Material Limit = Low limit for shaft = NO GO side

The figure will show the usage of ISO conform factory tolerances for ring and snap gauges (gauges for shafts). The "GO ring gauge" controls the Max.-Material-Limit (High limit) of the shaft. The "NO GO ring gauge" controls the Least-Material-Limit (Low limit) of the shaft. The "safety" range α_1 will usually be used only for ring gauges over 180 mm. For gauges until 180 mm the value for α_1 has to be entered as "0".
Note: The double hatched tolerance fields are valid for checking plugs for snap gauges.

BS conform

Using factory tolerances in the way of placing the gauge limits in accordance to the British Standard BS 969 only the values for the gauge tolerance "T" and the wear allowance "W" are required [Fig. 7.10.5].

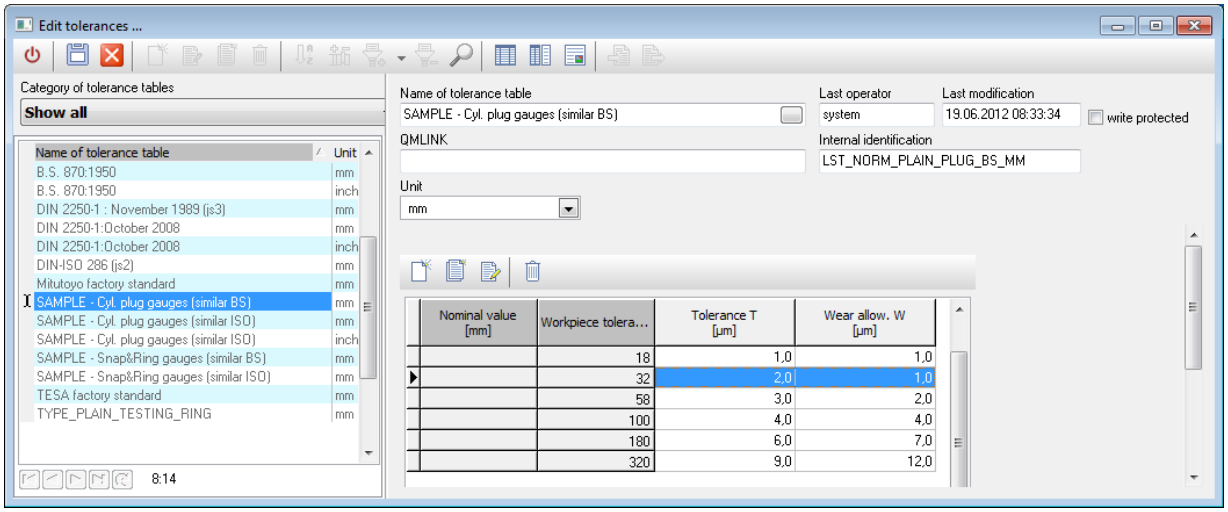


Fig. 7.10.5: Entering of factory tolerance placing the tolerance limits in acc. to British Standard.

Entering the tolerances similar to the BS standard the tolerances are only related to the workpiece tolerance. The nominal size of the workpiece does no matter for the assignment of the gauge tolerances.

7.10.3 Doing a gauge inspection

The program is presented on the screen with a main window, that contains nine large buttons, each representing the examination of a gauge type. In the menu item *inspection* you can find all supported gauge types with own submenu-items.

7.10.3.1 Entering nominal gauge data

After selecting the gauge type to be inspected, the dialog box shown in the figure will appear on your screen. Corresponding with your selection there are different fields showing the gauge parameters.

Here you will see it for a GO/NO GO plug gauge [Fig. 7.10.6].

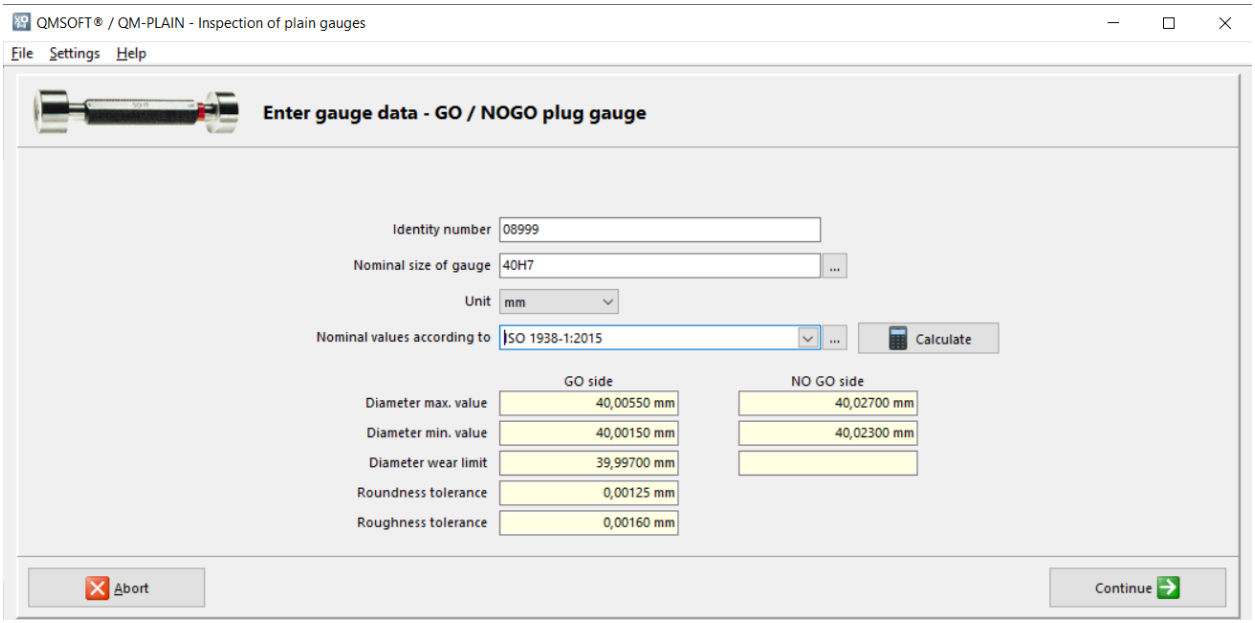


Fig. 7.10.6: Enter gauge data.

The following data fields are to filled out with the related information:

- IDENTITY NUMBER
  Enter an ID number for the gauge.
- NOMINAL SIZE
  Enter here the nominal size / designation of the gauge. You can enter it:
  - ISO conform in the form “Nominal value” + “Deviation” + “Class” (e.g. “40H8”) or
  - In the form “Nominal value”, “Upper product limit”, “Lower product limit” (e.g. “50 +0.050/+0.020”).
- NOMINAL VALUES ACC. TO
  Please select the standard (ISO, BS, factory standard) for the calculation of nominal values. You can use the selection “manual input”, to enter the values manually. Otherwise, the fields are disabled.

Now you can press the calculate button or the `F7` key, to calculate the gauge limits.

After filling out all of the data fields click the `Continue` button.

Note

If the program was called up from the QMSOFT®/QM-MANAGE gauge management module, all of the dialog fields are disabled, and the nominal values of the gauge will be transferred from the database.

Entering gauge nominal data for ANSI gauges

The tolerances of a gauge calculated according to the ANSI B89.1.6M standard are depended from the nominal size and the tolerance class. The product limits are not required to calculate the gauge limits.

Naturally for a double sided GO/NO GO gauge the entering of the product limits is useful, because it does not make sense to calculate both gauge sides for an identical diameter. For example, you can enter "10.0 / 10.04" for the "Nominal size" to define the product limits. Behind the nominal size enter the tolerance class.

Pressing the button on the right of the nominal size input, you will get a help dialog to enter the nominal size in the correct way [Fig. 7.10.7] [Fig. 7.10.8].

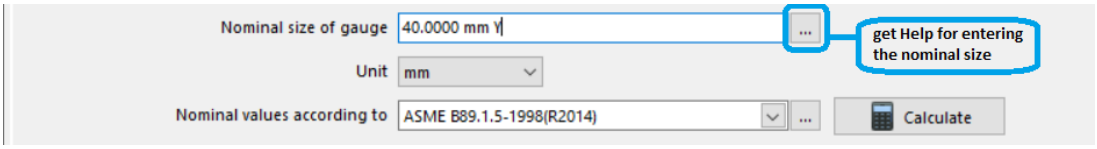


Fig. 7.10.7: Entering parameters for an ANSI/ASME gauge.

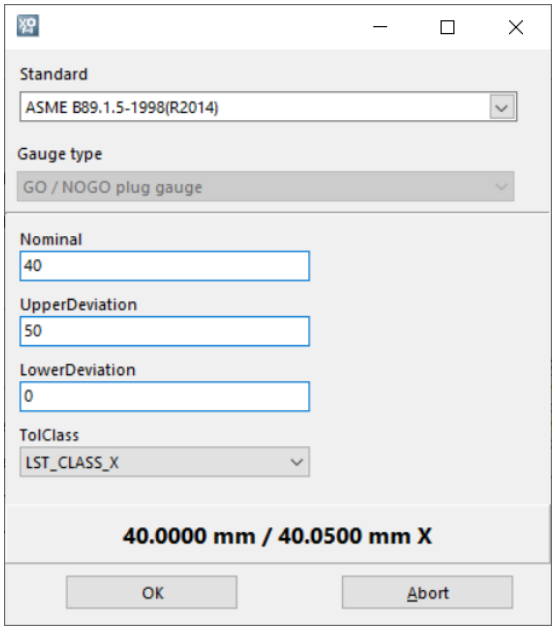


Fig. 7.10.8: Entering parameters for an ANSI/ASME gauge.

Please note, that the same mechanism can be used to enter the values for BS or NF master rings where also additional information about tolerance class and type is required.

7.10.3.2 Visual and functional test

Before the start of measurement and after the control of inspection conditions, a form appears to record the results of the visual and functional test of the gauge. Use the `scrap certificate` button to skip the measurement to lead you directly to finish the inspection to create a "scrap certificate" document.

7.10.3.3 Measurement

Measurement values are always entered in the order you have set in your position list [Fig. 7.10.9]. Measuring double sided GO/NOGO plain plugs or double sided snap gauges is done first on the GO side of gauge and then on the NOGO side. The measuring will be supported by a graphic display showing the measured value in the gauge tolerance field.

While inspecting snap gauges a number of measurement values will be received for each side of gauge. It is the responsibility of the software-user to meet the reading sequence corresponding to a uniform scheme.

Warning

If you want to take over measuring values from an online connected measuring machine, press the `Online` button to start the indication program. Use the menu option *Settings* → *General Settings* to set the TRANSFER MEASURING VALUES FROM... to the option *`Online`* permanently.

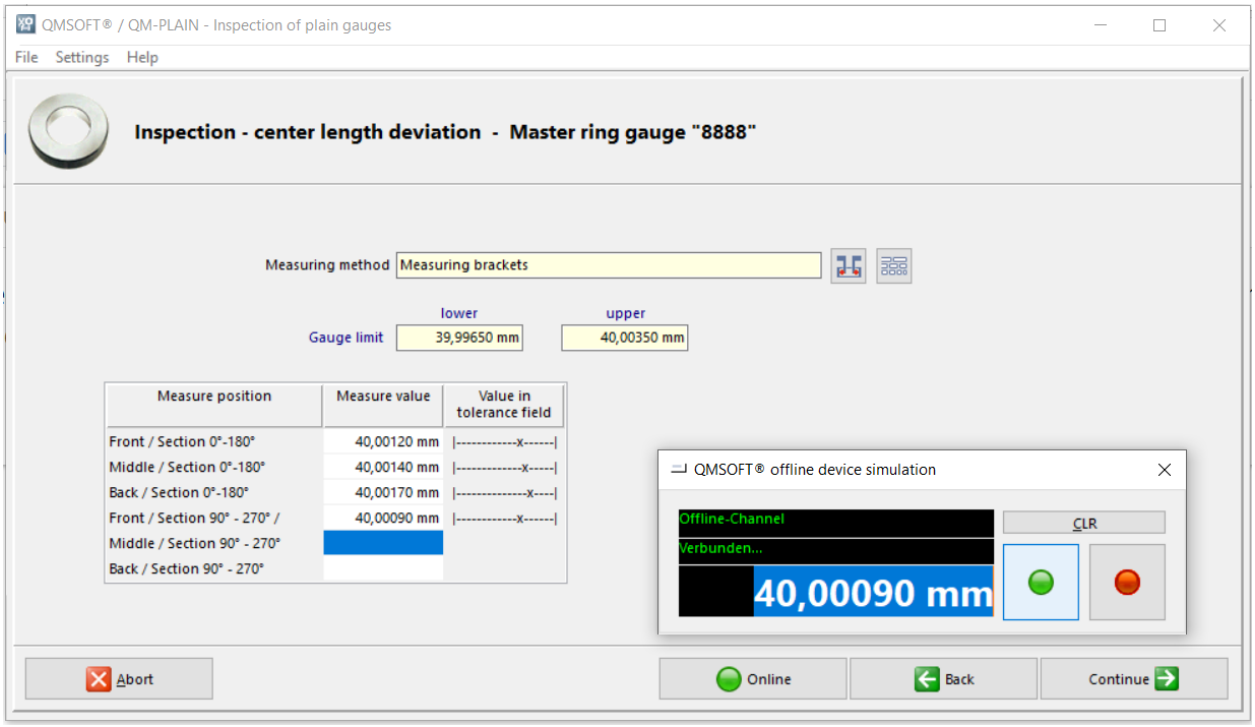


Fig. 7.10.9: Entering of measuring values.

If a measure reading was wrong and should be repeated, you can locate input focus by using the mouse (click on the measure value field) and re-trigger the measuring device or enter the value manually by keyboard. After completion of the gauge measurement click onto the `Continue` button to continue (or onto the `Back` button to go to the previous step).

Special settings when using T-probes or single ball probes for internal measures

Although the use of measuring brackets is the fastest way to measure inside dimensions, it will sometimes be necessary to use T-probes or single ball probes for the measurement. In this case you have to check the following settings [Fig. 7.10.10].

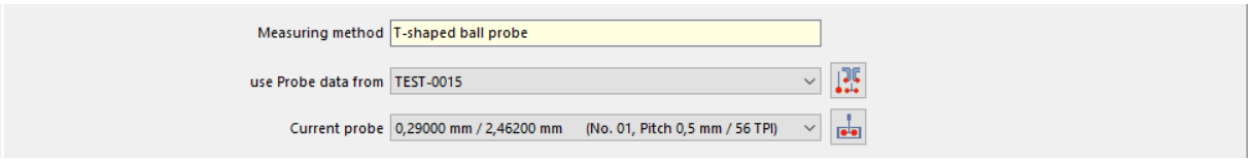


Fig. 7.10.10: Settings for T-Probe.

Use probe data from (the "Source of probe data")

If you execute an internal measurement on a ring or snap gauge with "T-Shape" or "Finger" probes you can select the "source" of the probe data. The right button beside it does allow you the access to the probe management program.

Current probe / probe selection

Select the probe you want to use for the measurement. The right button beside it will allow you to start the calibration procedure for the selected probe.

7.10.3.4 Output of inspection results

The output of all of the inspection results is described in chapter *Output of results*. Make sure that you have selected the correct certificate layout files before doing this.

7.11 Inspection program QMSOFT®/QM-PRESS

The program QMSOFT®/QM-PRESS is used for computer-aided examination of pressure gauges of various designs according to DIN EN 837-1 or according to appropriate factory standards. The program determined from the recorded measurement data the current measurement variations, corresponding to the shape of the pressure gauge. Accordance with the specified accuracy class the maximum tolerances are determined automatically, depending on the choice of the test method based on the values according to DIN EN 837 or according to factory standard specifications.

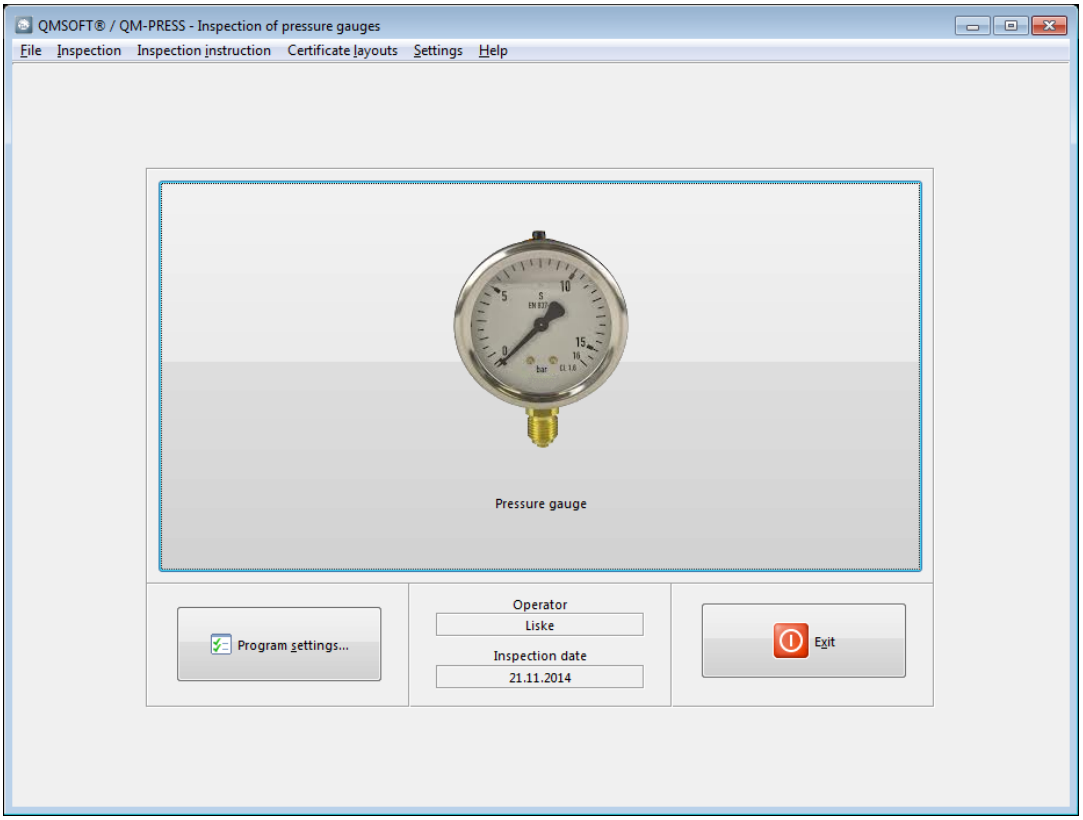


Fig. 7.11.1: QMSOFT®/QM-PRESS start screen.

7.11.1 Settings > Program settings

The menu item *Settings → Program settings* allows you to adjust various settings according to the present circumstances [Fig. 7.11.2]. The different categories of settings are described below.

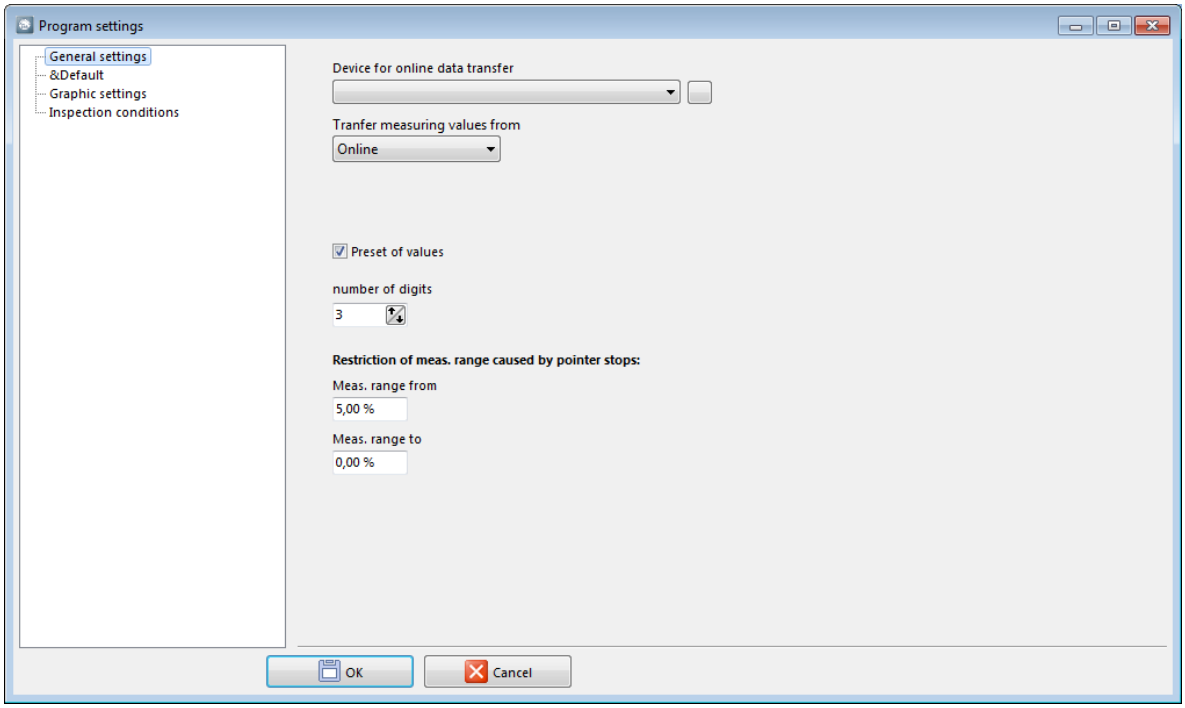


Fig. 7.11.2: General settings.

7.11.1.1 General settings

Here some basic settings you can pre-define:

- Preset of values
  If you activate this checkbox, the measure values in the tables of the inspection form are filled out to reduce the manual input effort while using the keyboard.
- Restriction of measuring range caused by pointer stops
  You can define two ranges at the start and the end of the measuring range of a pressure gauge, which should not be used for the calculation of nominal values of inspection positions.

7.11.1.2 Default

Here you can set the pre-selection of some attributive parameters of the tested pressure gauge (for example: inspection of overload). Selectable settings are “ok”, “not ok” or “not inspected”.

7.11.1.3 Inspection conditions

Here you can set the following parameters:

- Regular reading positions
  Choose whether you want to perform a “incoming inspection” or “periodical inspection”
- Inspection transm. medium
  Choose the medium, which you want to use for the inspection.
- Check hystere

Here you can specify whether one or two directions of pressure change to be tested.

- Read measured values
  Select the “source” of your measure values. The choices are “at gauge” or “at master”.
- Inspection temperature
  Please enter your current inspection temperature.
- Reference temperature for factory standards
  Please enter your actual reference temperature.

Warning

Observe the requirements of the standard on the permissible ambient temperature during the test!

7.11.2 Settings > Edit inspection positions ...

With the menu item *Settings → Edit inspection positions ...* you can configure the inspection positions of the gauge, which should be used while the inspection procedure. You can create different tables with different sets of positions, for example to map different severities.

7.11.3 Doing a pressure gauge inspection

The program is presented on the screen with a main window, that contains a large button, which is representing the examination of a pressure gauge, a click starts the inspection procedure.

7.11.3.1 Entering nominal gauge data

The gauge inspection starts with a dialog box shown in the figure [Fig. 7.11.3]. There are different fields showing the pressure gauge parameters, which you have to fill out. If the program was called up from the QMSOFT®/QM-MANAGE gauge management module, all of the dialog fields are write-protected, and the nominal values of the gauge will be transferred from the database.

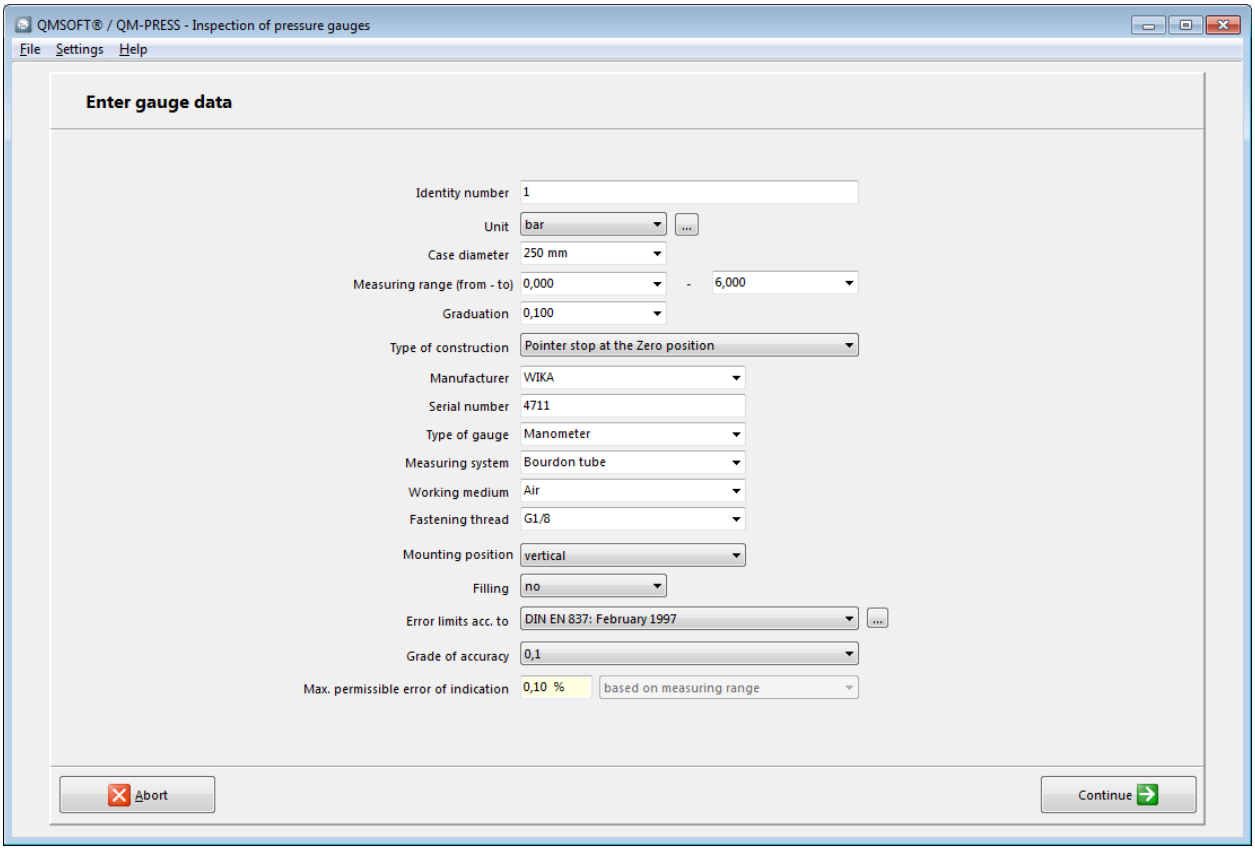


Fig. 7.11.3: Enter gauge data.

7.11.3.2 Inspection conditions

Now you have to define the inspection conditions [Fig. 7.11.4].

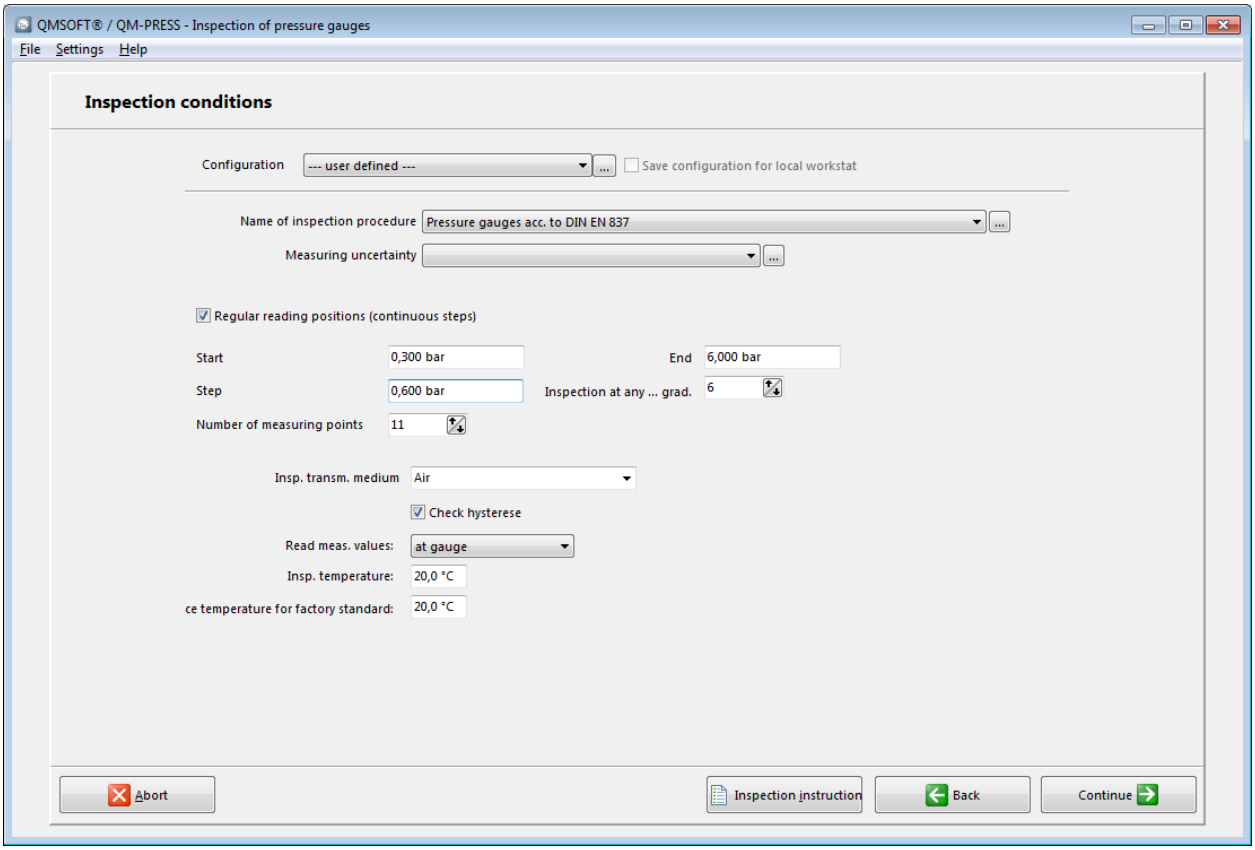


Fig. 7.11.4: Inspection conditions.

After filling out all required parameters you can use the `Continue` button to proceed. In the event, the important parameters are not specified, you will receive an error message. The continuation of the program is possible only after completion of all of the input fields.

7.11.3.3 Measurement

Measured values are entered into the measure table [Fig. 7.11.5]. In case of an online data acquisition the transmitted value is written into the currently active cell oft he measures table, the deviations between measure and nominal inspection position are shown on the screen as a graph. You can repeat a measure by a click into the corresponding table cell). After entering all values, the program can be continued with the `Continue` button.

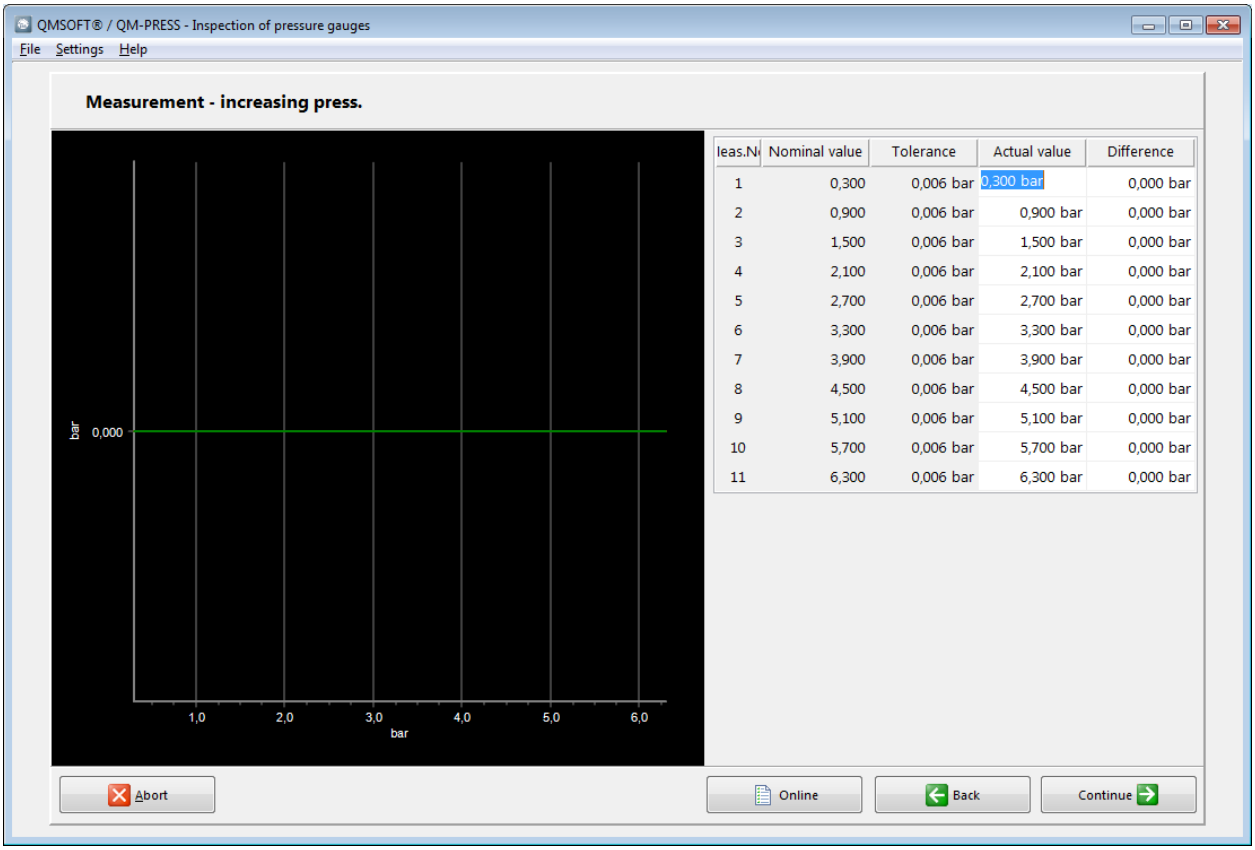


Fig. 7.11.5: Measurement (increasing pressure).

After the collection of all of the measures for increasing pressure the measurement is continued with the collection of measures with decreasing pressure.

At the end of the inspection procedure, you get an input box, where you can enter attributive inspection results as pass / fail statements [Fig. 7.11.6]. If you have not checked one or more of these parameters, simply set the corresponding entry to “not inspected”.

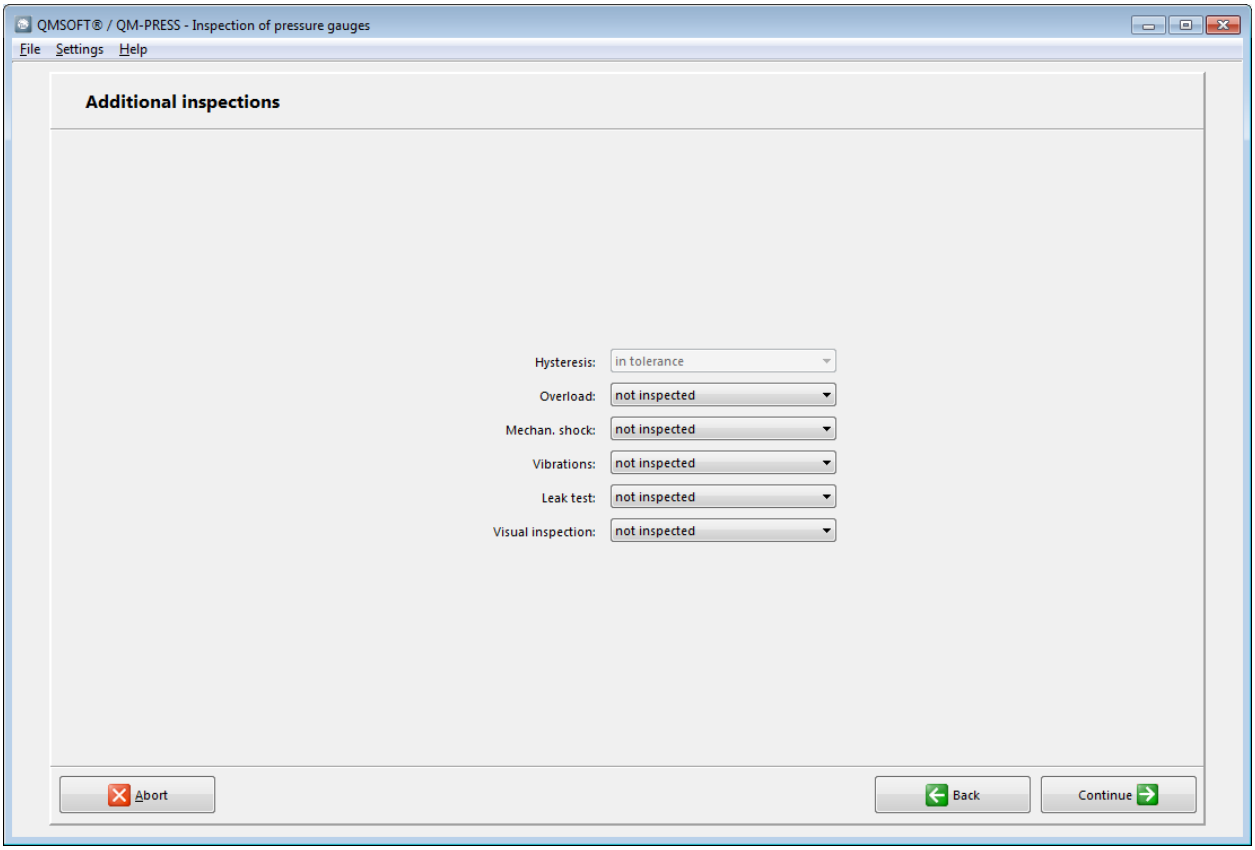


Fig. 7.11.6: Additional inspections.

7.11.3.4 Output of inspectio n results

The output of all of the inspection results is described in chapter *Output of results*.

7.12 Inspection program QMSOFT®/QM-SCALE

The QMSOFT®/QM-SCALE program was designed to support the inspection of graduated steel rules according to DIN 865, DIN 866, BS 4372 as well as the inspection of measuring tapes according to DIN and European standards. An inspection according to customised factory standards is also possible, special requests of the wrapping tapes are taken into account.

The following standards form the basis of the evaluation:

- Graduated steel rules acc. to DIN 865
- Graduated steel rules acc. to DIN 866 (Form A and B)
- Engineers steel measuring rules acc. to BS 4372
- Measuring tapes acc. to DIN 6403
- Measuring tapes, precision steel rule acc. to EU guideline 2004/22/EG
- Measuring tapes and steel rules acc. to OIML R 35-1:2011
- Wrapping tapes acc. to factory standard

The required tolerance values are calculated automatically for scales and measuring tapes, corresponding factory standard tolerance tables are presetted.

The measurement data can be entered via an online measuring device or via the keyboard. If using an online connection to the measuring device, the connection between this device and the computer is realised by one of the interface of the computer or by special driver software of the manufacturer of the device (f.i. TRIMOS - WINDHI, MAHR Monitor software, SIP LMC software). In the case, that the gauges to be measured are larger than the range of the reference measuring device, a sectional inspection can be realized.

The program determines from the measured values the deviation range f_{max} in the total measuring range and provides a graphical representation of the single deviations. For wrapping tapes the vernier scale can be inspected optionally, the distance between the diameter- or circumference-scale to the zero-point is determined separately. The evaluation results can be optionally output on screen and / or printer. Tolerance excisions will be labeled. The layout of the report can be adapted to the individual needs of the program user.

7.12.1 Settings > Program settings

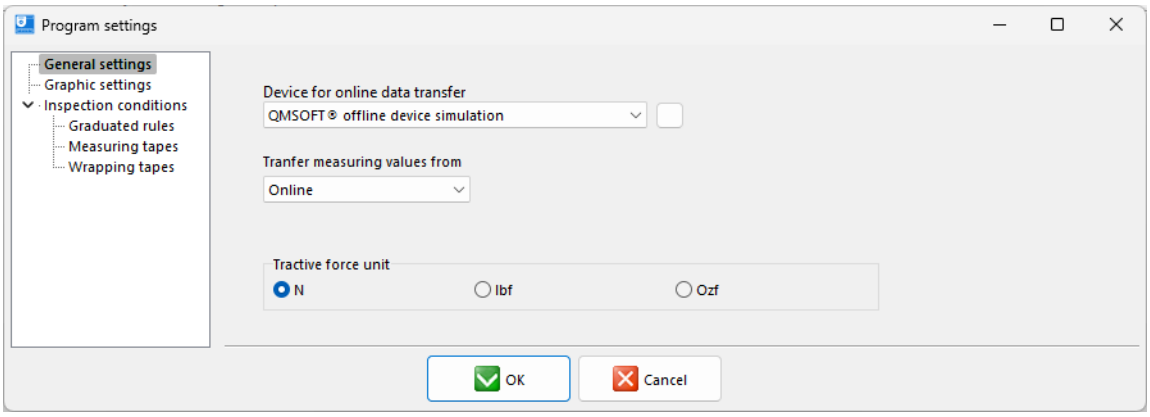


Fig. 7.12.1: Genral settings.

7.12.1.1 General settings

Here you can set the connection for online measuring data transfer and the unit for the tractive force [Fig. 7.12.1]. The setting parameter for the unit of the tractive force is used while inspections of wrapping tapes.

7.12.1.2 Inspection conditions

For each basic type of gauge which can be inspected with QMSOFT®/QM-SCALE you can here define the default behavior of the program [Fig. 7.12.2].

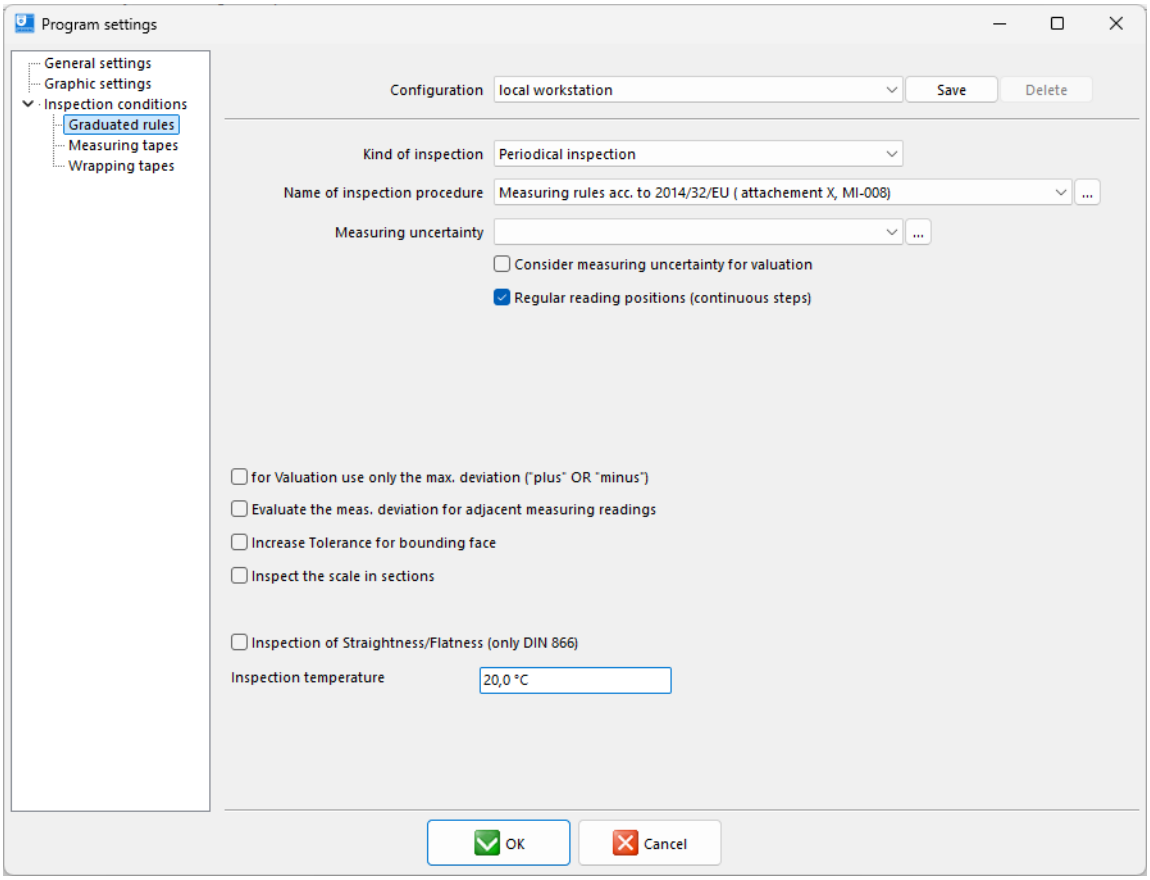


Fig. 7.12.2: Set the default inspection conditions.

Please note, that these are predefined "default" settings which has to be expanded by "Gauge depended" parameters when you execute a measurement. Naturally you can also adapt this settings during an inspection.

Set the following parameters:

- KIND OF INSPECTION
  Select "Periodical…" or "Incoming inspection". For an "Incoming inspection" some additional inspections (e.g. hardness inspection) have to be done.
- NAME OF INSPECTION PROCEDURE
  Here you can select the name of the used inspection procedure. This name will be recorded at the inspection certificate. Some of the predefined inspection procedures will cause fixed settings or restrictions for the inspection parameters.
- MEASURING UNCERTAINTY
  Select the measuring uncertainty which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate.
- REGULAR READING POSITIONS

activate this option when you want to take the readings during the inspection in continuous steps; when an inspection is active you need to complete the start and end point for the inspection and the inspection step; if this option is inactive then you have to select a "Position table" where you define your reading positions.

Note

When you intend to do an inspection according to OIML R 35-2 guideline then deactivate this option!

- For Valuation use only the max. deviation
  This option is used to set if the valuation will be based on the difference between the maximum points of the deviations or if you want to count in only the maximum deviation of plus or minus. The pre-selection of this option is depending on the selected standard. To change it is usually only allowed for user-defined "Factory standards".
- Inspect the scale in sections
  With the help of this option the inspection such rules/tapes can be executed also with reference measuring devices having a measuring range, which is smaller than the graduation length of the gauge.
- Section length (on reference measuring device):
  Here you have to type in the length of a section. Please note: use the reference length system (in the most cases the section length has the same value as the measuring range of the reference measuring device).
- Inspection temperature
  The temperature value is used to print it onto the certificate. It is NOT used to calculate any temperature compensation!

The following options are only available for tapes:

- Tractive force
  For tapes the tractive force can be recorded to print it onto the certificate.

The following options are only available for wrapping tapes:

- Inspect vernier scale
  If the wrapping tape has a vernier scale, here you can decide to inspect it or not.
- Inspection step (vernier)
  If you have activated the inspection of the vernier scale here you have to define the inspection step for this scale.

7.12.2 Settings > Management of tables for error limits ...

If you have chosen the option *Settings → Management of tables for error limits ...* a list of already existing tolerance tables [Fig. 7.12.3] will appear on the screen. Here you can insert new tolerance tables, delete existing tables and rename it. If you want to change existing tolerance entries select the wished tolerance table and press the `Edit` button.

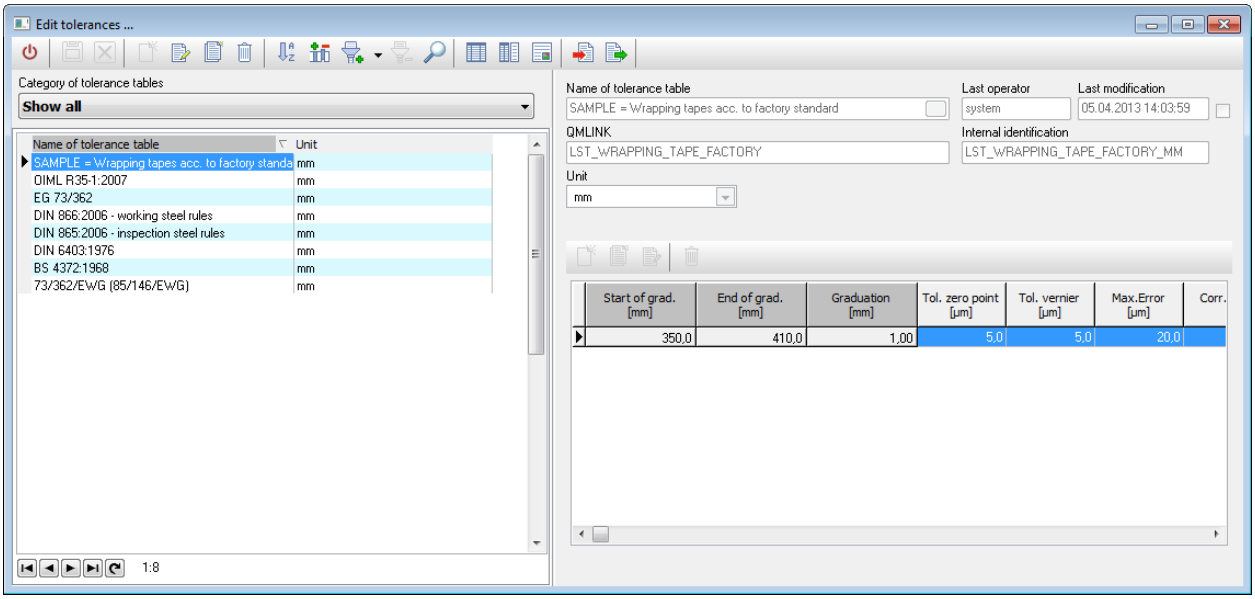


Fig. 7.12.3: Editing factory tolerances.

When doing an inspection according to a factory standard these values are used for the valuation of the scale rule or tape being inspected. The entered values are related to the “Total graduation length” and the “Graduation step” of the steel rule.

> **Note**
>
> If you want to do a steel rule or measuring tape inspection acc. to “factory standard” make sure, that a corresponding tolerance entry is available, otherwise the `Continue` button of the form “Enter gauge data” will be locked and an error message comes up to inform you about this.

7.12.3 Doing a scale/tape inspection

7.12.3.1 Enter the gauge data

After selecting the type of steel rule or tape in the main menu a series of parameters must be entered that describe the gauge and the inspection conditions. The input of these parameters is done into different forms with a corresponding number of input fields [Fig. 7.12.4].

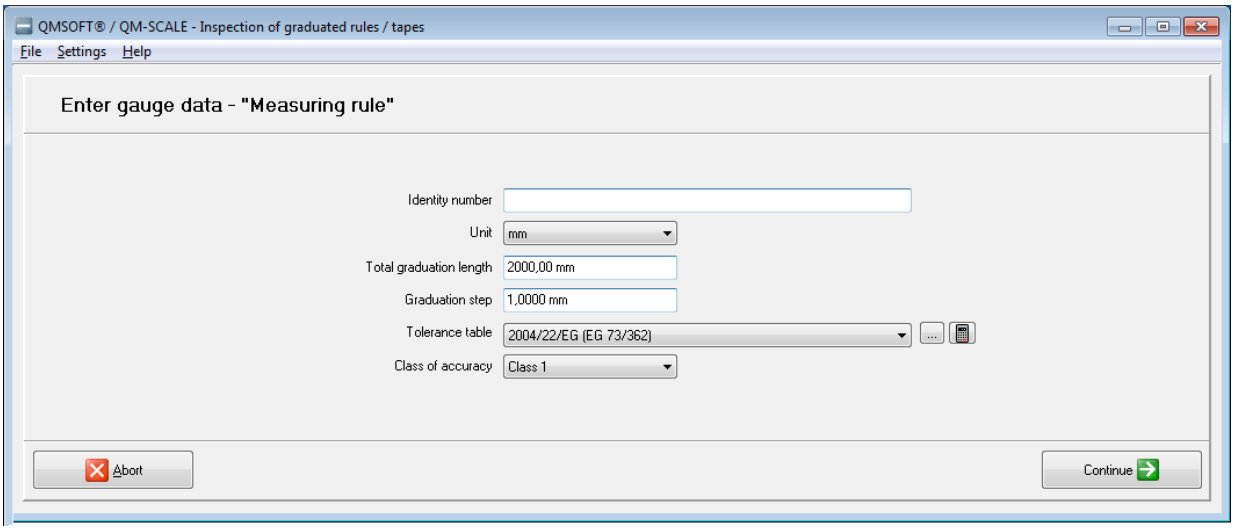


Fig. 7.12.4: Input of gauge data.

- Nominal range (for wrapping tapes only)
  Wrapping tapes can be designed for different application fields (internal-, external diameter, interior, exterior circumference).
- Total graduation length or Graduation start, Graduation end
  In this field the total length of the rule graduations (wrapping tapes: start and end value of the graduation) in "mm" or "inches" should be entered or chosen from the list of options provided. Make sure to check the validity of the norm selected.
- Graduation step
  In this field the distance between two successive graduations must be entered in "mm" or chosen from the list of options provided. Make sure to check the validity of the norm selected.
- Vernier scale (for wrapping tapes only)
  if the gauge has a vernier scale you should activate this item.
- Vernier accuracy (for wrapping tapes only)
  the vernier accuracy and the graduation step are fixing the number of vernier scale ticks, which is important for the inspection of the vernier scale.
- Tolerance table
  Depending from the gauge type the tolerance values can be determined from one of the tolerance tables. Select the table and check the tolerance value fields
- Wrapping tapes only
  The parameter "Correction constant" is used to correct the nominal measure positions with a constant value (default: 0 = no correction).
  The parameter "Correction factor" can be used to compensate stretching/shrinking effects. The nominal measuring positions are multiplicated with this factor (default: 1 = no stretching/shrinking).

Click onto the `Continue` button to save your input and proceed. Please remember that you can define the most of these parameters in the "Program settings".

7.12.3.2 Inspection conditions

Now proceed with the input of the inspection conditions [Fig. 7.12.5]. Please remember that you can define the most of these parameters in the program settings category *Inspection conditions*. Here you need to define the specific parameters for the gauge.

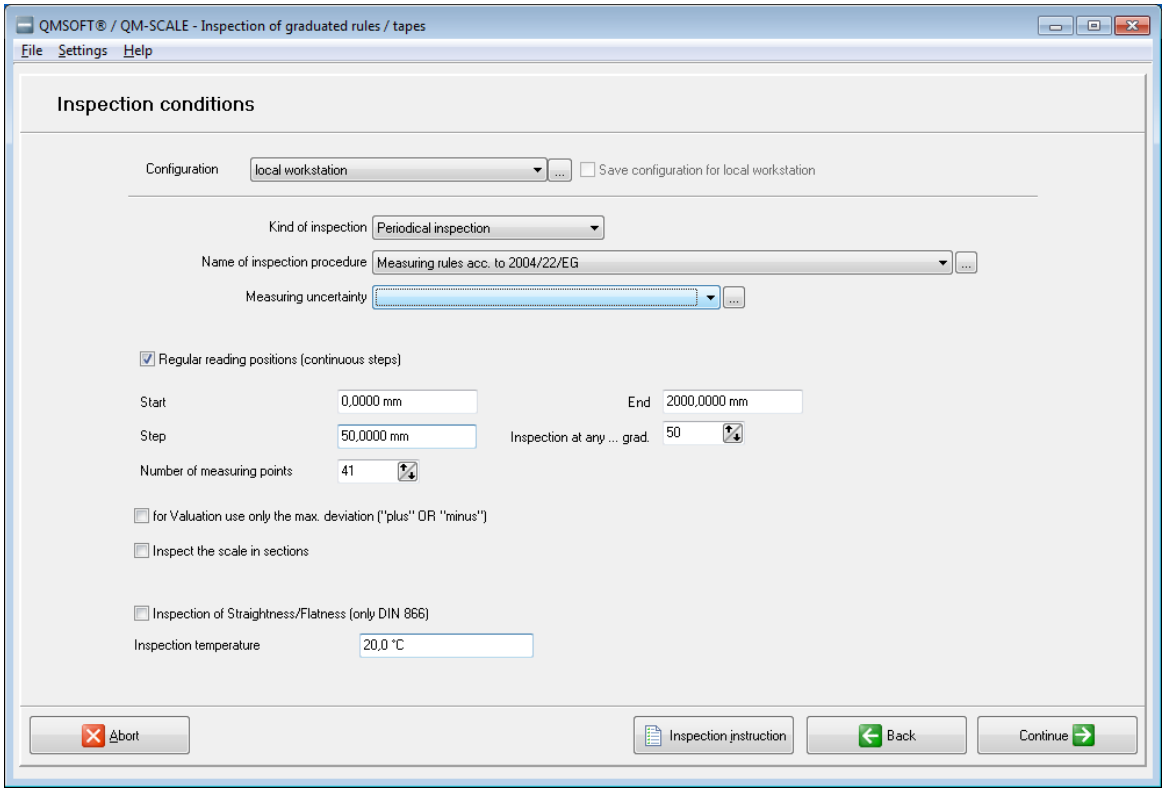


Fig. 7.12.5: Inspection conditions.

Parameters to be added:

- START
  The start of the inspection corresponds with the nominal values to be entered for the graduated steel rule to be inspected (in mm or inch) for the input/transfer of the first measurement value.
- END
  The end of the inspection area corresponds with the nominal values to be entered for the graduated steel rule to be inspected (in mm or inch) for the input/transfer of the last measurement value.
- STEP:
  The inspection step is the distance between two successive measuring values.
- INSPECT THE SCALE IN SECTIONS
  Using this function you can inspect pitch lengths, that are larger than the range of the reference measuring device.
- SECTION LENGTH (on reference measuring device)
  In the case, that the option “Inspect the scale in sections” was activated, you have to define here the length of the section. The base is the reference measuring system. In the most cases this parameter is the measuring range of the reference mesauring device.

- Inspect vernier scale (wrapping tapes only)
  As soon as a vernier exists, you can decide here, if the vernier should be inspected too.
- Inspection step
  If the inspection of the vernier scale is activated you have to enter the inspection step for the vernier inspection.
- Inspection temperature
  The temperature value is used for the calibration certificate only, there is no temperature compensation feature!
- Tractive force (wrapping tapes only)
  For wrapping tapes you can record the size of the tractive force, which is used for the inspection process.

If you deactivate the option “Regular reading positions (Continuous steps)” you have to select the name of the used position table which does define your reading positions.

Note

When you intend to do an inspection according to OIML R 35-2:2011 you need to select a related positions table (an example does already exist after installing the software). Please note that you has to define only the five positions A1, B1, C1, D1 and E3 (with E3 = nominal length of scale). The other positions will be inserted automatically in your “test point” list.

Click onto the `Continue` button to start the measuring procedure.

7.12.3.3 Measurement

For some types of rules the tolerances of flatness, straightness and squareness of the flat ends are defined in the standard. In this case, you must enter the actual values for these parameters using the keyboard [Fig. 7.12.6].

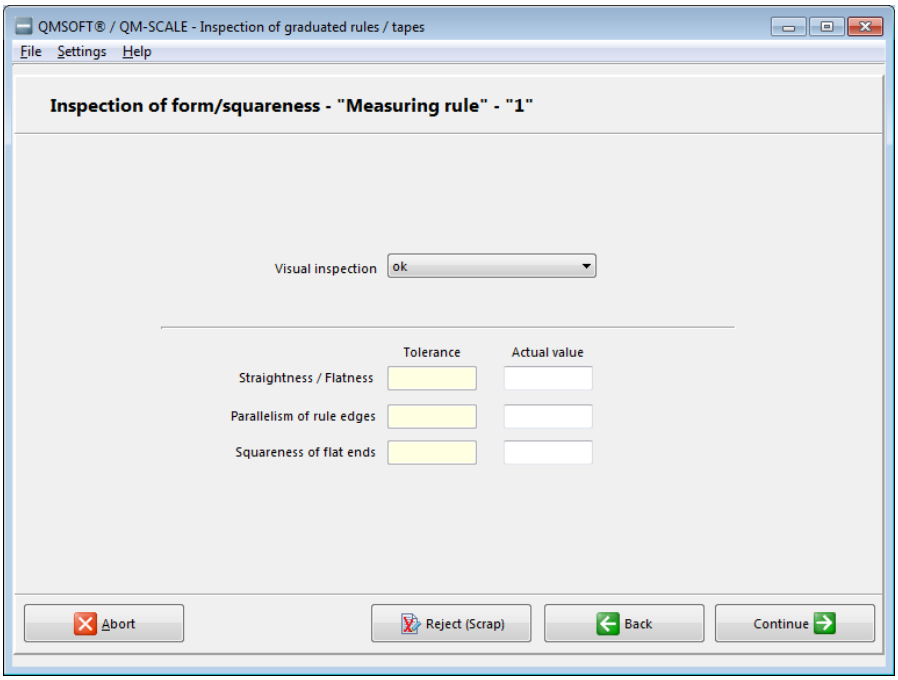


Fig. 7.12.6: Enter the form/squareness data.

The measured values must be entered in the following order: measured value 1 to n for ascending measured values [Fig. 7.12.7]. The valid inspection pace is displayed. The measured values are checked for plausibility and rejected if the deviation is more than half the value of the valid inspection step.

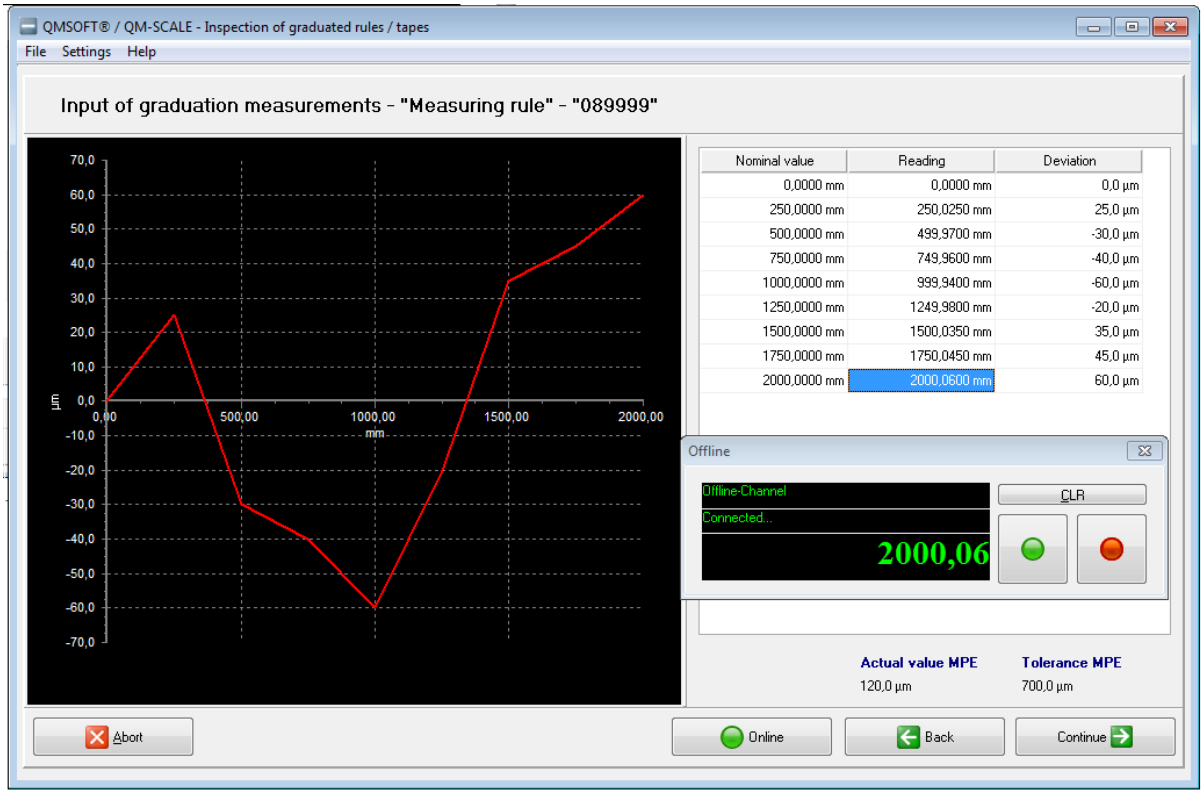


Fig. 7.12.7: Entering of measure readings.

Entering the measurement values using the computer keyboard

The measured values must be entered as a deviation value from the nominal values (incorrect-correct) in micrometers! This minimizes keystrokes. The measured values must be entered in a separate field, which is marked with a special input prompt.

Entering the measurement values using a measuring machine

Online data entry via a measuring machine is the most effective form of inspection. Some handling actions depend on the measuring machine used (see the corresponding manufacturer documentation). The data transfer must be started on the measuring device (handle or pedal).

7.12.3.4 Evaluation

The measured values are evaluated by comparing them with the corresponding tolerance parameters according to the definitions of DIN or other standards.

- Total deviation range / Scale accuracy (MPE)
  The "Total deviation range" is usually evaluated as the distance between the maximum and minimum values in the deviation graph. If you have activated the option *For Valuation use only the max. deviation ("plus" OR "minus")*, the entire deviation range is determined as the maximum deviation of the measured length in the plus or minus direction. For wrapping tapes, the evaluation area begins at the beginning of the

main division and ends at the end. The reference to the beginning of the band (zero) is an additional result parameter that is not included in the MPE!

- DEVIATION RANGE VERNIER SCALE (wrapping tapes only)
  It is evaluated as the distance between the maximum and minimum values in the deviation graph.
- ACTUAL ZERO POINT DISTANCE
  Will be calculated as the difference between nominal value (inspected wrapping tape) and actual measure (reference measuring system) of the distance between the start of the tape and the start of the main graduation.

Special parameters for inspection according to OIML R 35-2:2011

When doing an inspection according to OIML R 35-2:2011 the parameters SCALE INTERVAL ACCURACY and SCALE INTERVAL LINEARITY will be evaluated.

The result of the tolerance evaluation is printed in the result listing.

7.12.3.5 Output of results

The output of all of the inspection results is described in chapter *Output of results*.

7.13 Inspection program QMSOFT®/QM-SPLINE

The program QMSOFT®/QM-SPLINE is used for the inspection of involute and straight sided spline gauges according to different national standards, respective according to customised factory standards. The program was designed exclusively to measure and evaluate a "Two-point" measurement over or between pins for the different types of gauges for external and internal splines to check the gauges actual SPACE WIDTH or TOOTH THICKNESS. The measurement of FORM DIAMETER, MINOR DIAMETER or other gauge parameters is not a part of this program!

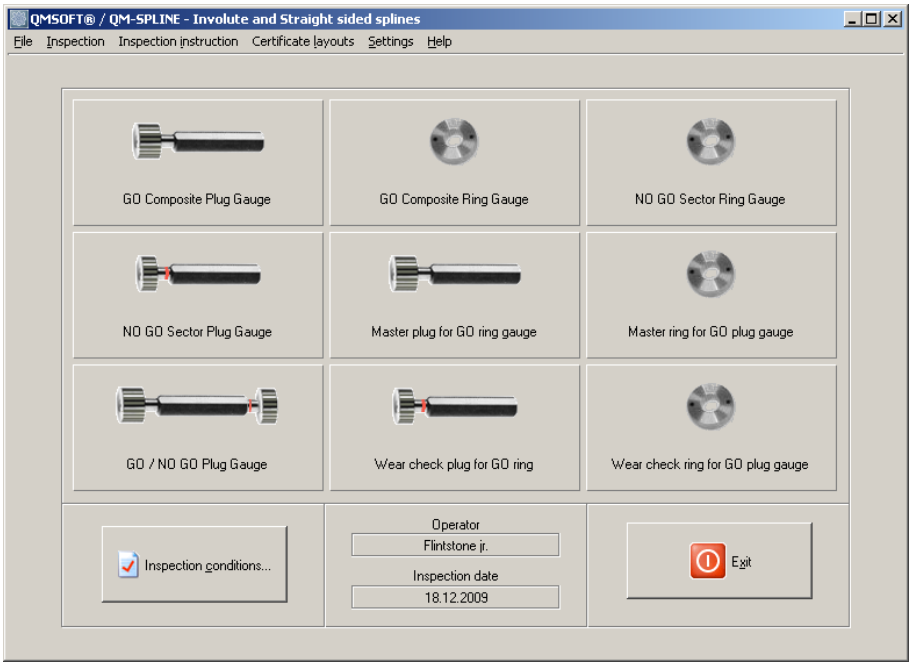


Fig. 7.13.1: Select the type of gauge you want to inspect.

The program calculates the nominal measures over or between two pins in dependence of the pin diameter and compares it with the actual measures.

This is based at the following standards.

- Involute spline gauges acc. to DIN 5480, October 1991 and DIN 5480, March 2006
- Involute spline gauges acc. to DIN 5482; March 1973
- Straight sided spline gauges acc. to DIN 5481-2005
- Straight sided spline gauges acc. to DIN 5481; January 1952
- Straight sided spline gauges (Serration shafts) acc. to DIN 5481:2019
- Involute spline gauges acc. to ANSI B92.1-1996
- Involute spline gauges acc. to factory standards (entering tooth thickness or space width).

The program QMSOFT®/QM-SPLINE can be started directly by the gauge manegement program QMSOFT®/QM-MANAGE and be provided with initial data (such as ID-number and Gauge designation). In this case the inspection results are directly transmitted back to the database.

7.13.1 Settings > Program settings

When working with the program, you should make various settings to determine the program environment and, in particular, the program conditions. Use the menu *Settings* → *Program settings* to do this.

7.13.1.1 General settings

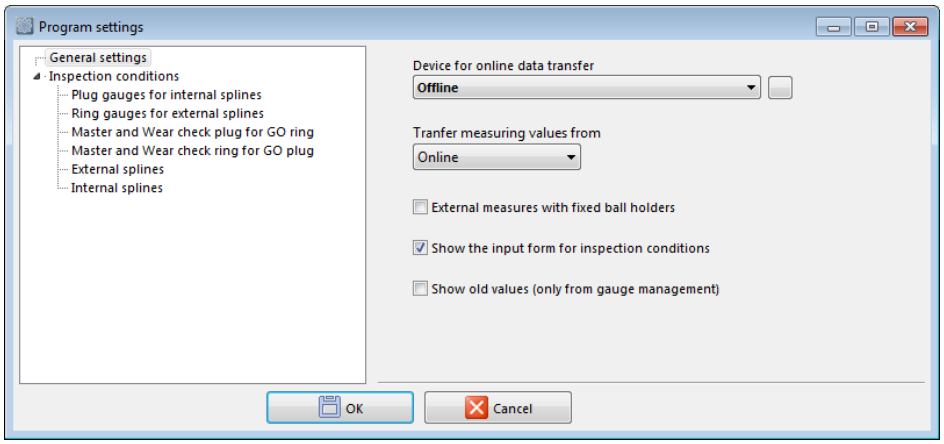


Fig. 7.13.2: General settings.

Here you can do the following program settings.

- DEVICE FOR ONLINE DATA TRANSFER
  If one (or more) Online Interface(s) for the direct transfer of measuring does exist, so you can select it here from the define list of your “Measuring Indication Program”. Please also note the chapter “QMSOFT®/QM-DeviceServer”.
- TRANSFER MEASURING VALUES FROM
  Please choose the default data input source (keyboard of the computer, on-line measuring machine).

- External measures with fixed ball holders
  If you are using holders where the measuring balls can not be removed to set the machine to the "Zero" position, activate this option to take the diameter of the measuring balls or rolls into account for the calculation.
- Show the input form for inspection conditions
  Usually this option will be switched on to see the "inspection conditions" window during a calibration. In this case you will see the type dependent settings before starting the measuring process. You can deactivate it, if you don't want to see this information evermore.
- Show old values (only from gauge management)
  If you are working with the gauge management, here you can show the values of an previous inspection if available.

7.13.1.2 Inspection conditions

Here you can set the specified inspection conditions for the different types of gauges. Normally your configuration is saved under the name "Local Workstation". However, you can also assign different configurations to each measuring device type by saving the configuration under a new name.

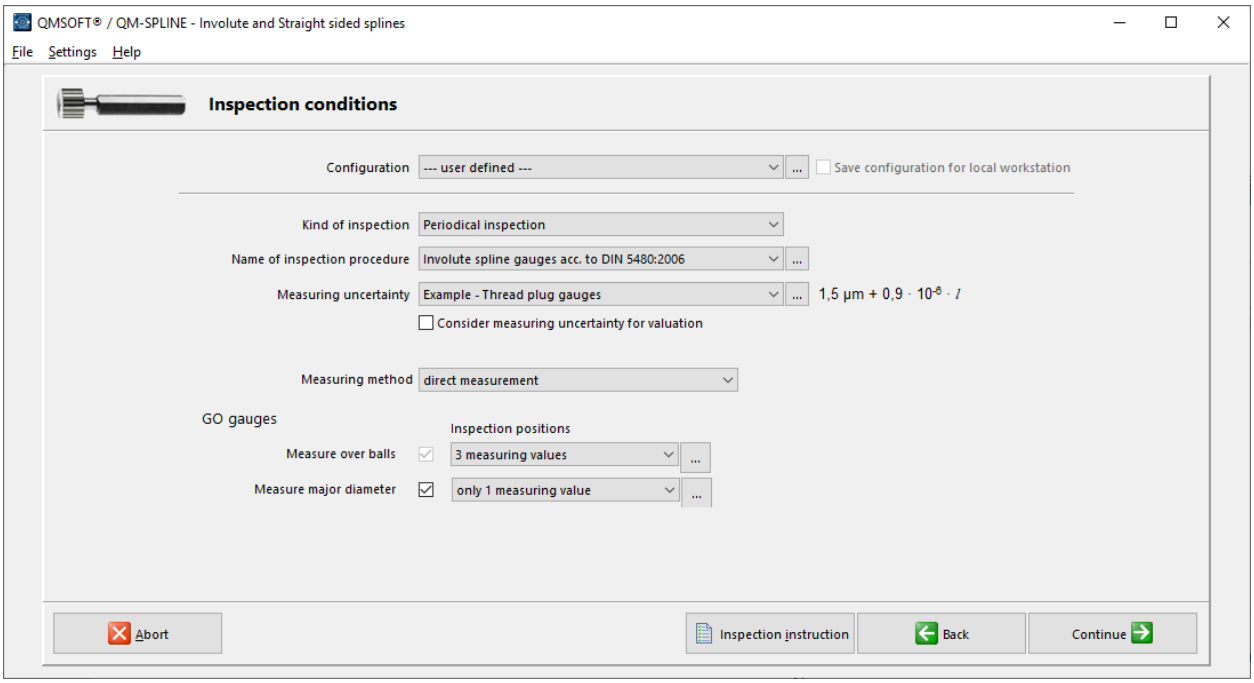


Fig. 7.13.3: Inspection conditions.

Common parameters - available for all gauge types.

- Kind of inspection
  Select "Periodical…" or "Incoming inspection". For an "Incoming inspection" some additional inspections (e.g. hardness inspection) have to be done. However the main difference is, that when making an "Incoming inspection" for the evaluation of gauge diameter the manufacturing tolerances of the gauge will be used without using the wear limit. For "periodical inspection", the gauge evaluation will be done using the wear limits.
- Inspection procedure
  Here you can select the name of the used inspection procedure. This name will be recorded at the inspection certificate.

- Measuring uncertainty
  Select the measuring uncertainty which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate.
- Take measuring uncertainty into account...
  The selection of the measuring uncertainty in the previous field is at first only used for recording purposes. If you want to use the calculated measuring uncertainty to prove the conformance or non-conformance of your inspected gauge with the defined error limits, then you have to switch on this option. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the "conformance zone" for the decision if the inspected gauge is in or out of the defined specifications. If the calculated errors of indication are in the "uncertainty range" the valuation of gauge will be set to "restricted usable". This means that neither "conformance" or "non-conformance" with the specifications can be proved.

The following settings are divided into the "GO" and "NO GO" side.

- Number of meas. planes
  Enter the number of planes where you want to measure the plug gauge.
- Meas. values for each plane
  Enter the number of measures for each measuring plane. A usual number is "2". This means after measuring one diameter in the given measuring planes you should turn the plug gauge around 90 Degrees and repeat the measurement(s).
- Measure major diameter
  Activate this option, if you want to measure the major diameter for the related gauge side.
- Number of measures for the major diameter
  If the measurement of then major diameter is activated. Enter the related number of measures.

7.13.2 Doing a spline gauge inspection

The program is presented on the screen with a main window, that contains nine buttons, each representing the examination of a several gauge group (a gauge type). In the menu item *Inspection* you can find all supported gauge types with own submenu-items.

> **Note**
>
> Normally, the spline parameters specified, especially the dimensions over or between pin measurements, are based on standard values and the recommended pin/roll diameters. In this case, the calculated measures shown in the input screen are basically based on the specified pin diameters, either according to the standard or according to a manufacturer's drawing.

In practice, however, the pin diameters you use may differ from the predefined diameters. For this reason, the program calculates a "pin correction factor" which is used to calculate a correction value for your over/between pin measurements. On the calibration certificates, the program always records the "original" measured values based on the "preset" ball diameters. The correction factor used is documented on the certificate.

7.13.2.1 Entering nominal gauge data

Before you start an inspection, you must first select the gauge type to be inspected and the associated standard.

> **Note**
>
> At the moment, not all known standards for involute or serration gauges are available. If the SPACE WIDTH or TOOTH THICKNESS of a gauge is known, you can use the "factory standard" option to calculate the dimensions "over pins" or "between pins" for it!

Before the actual inspection can begin, a number of parameters must be entered to describe the properties of the gauge properties. The parameters are entered in a separate dialog form.

When the program is started via the gauge management system QMSOFT®/QM-MANAGE, the parameters are adopted from there. Of course, in this case the parameters must be calculated beforehand.

Example DIN 5480

Select the required standard and enter the basic parameters [Fig. 7.13.4].

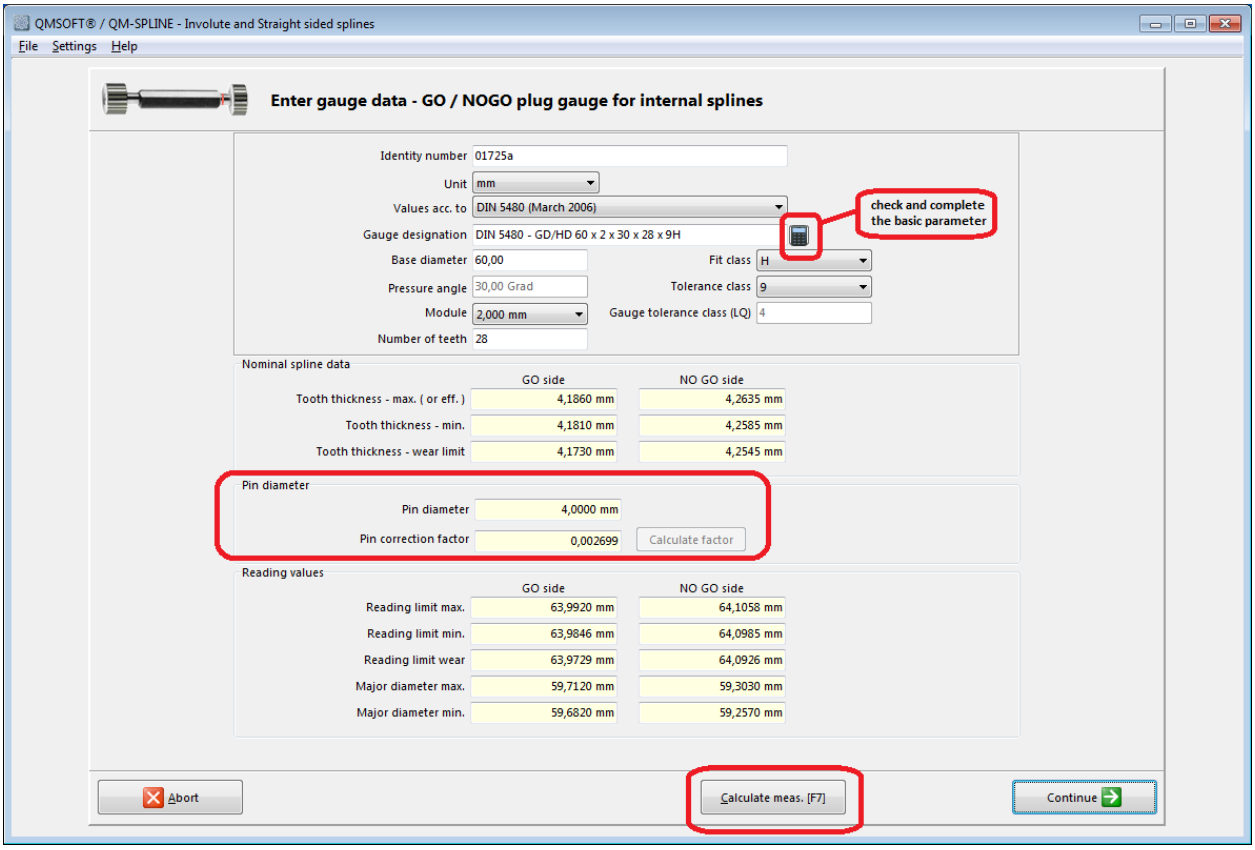


Fig. 7.13.4: Entering of spline gauge parameters acc. to DIN 5480.

- IDENTITY NUMBER
  This field is used to establish an identity for the gauge by entering a number. This number will be noted in the record.

- Unit
  Select the unit (“mm” or “inch”) for the measurement.
- Pressure angle
  The pressure angle is always 30 Degree for this standard.
- Base diameter
  Enter the gauges “Base diameter”. Usually you will find it at the gauges designation.
- Module
  Select a module from the shown list. The program will give you an error message if the module selected does not correspond with the entered base diameter.
- Number of teeth
  Usually the number of teeth is given by the combination of “Base diameter” and “Module”. Therefore after entering of these parameters the number of teeth will be set automatically. If you change the number of teeth the program will check if it is a valid number according to DIN 5480.
- Fit class
  Select the given class of fit.
- Tolerance class
  Select the product tolerance class. Class “9” is the default value.
- Gauge tolerance class
  Select the gauge tolerance class. Class “4” is the default value.

Now you have all the necessary parameters that you need to calculate the measured values using the pins. Alternatively, you can also enter the “gauge designation” according to the rules of DIN 5480.

Note

By pressing the button `Check and complete basic parameters`, the values you have entered are checked, the measurement name is created or the individual parameters are set, provided the name contains correct values. All values entered are checked for plausibility. Make sure that the “gauge designation” entered takes precedence over the individually set parameters.

The section “Pin diameter” will show you:

- Pin diameter (recommended diameter)
  This diameter can not be changed by the program user. It will show you, after the calculation, the pin diameter which is suggested by the DIN 5480 standard. This diameter will generally be used for the calculation of the measures over (or between) pins. If you do not enter a “Customer selected pin diameter”.
- Pin correction factor
  At the same time a pin correction factor is calculated, which will show you the resulting reading limits correction for each 0.001 mm difference between recommended and actually used pin diameter. If you want to use a pin diameter which does differ from the recommended diameter by the DIN standard, you can enter it in the following screen.
- Button “Calculate meas.” [F7]
  Press this button to finish the entering of data. Now the tooth thickness parameters and the reading values (measures over pins) will be calculated and you can continue to start the measurement.

Example ANSI B92.1 - 1996

To calculate a gauge according to the ANSI B92.1 is very similar to the procedure described for the DIN 5480. For the ANSI B92.1 standard you have to enter only a few parameters [Fig. 7.13.5]. Please select the PRESSURE ANGLE and the DIAMETRAL PITCH. Enter the NUMBER OF TEETH and select the desired TOLERANCE CLASS.

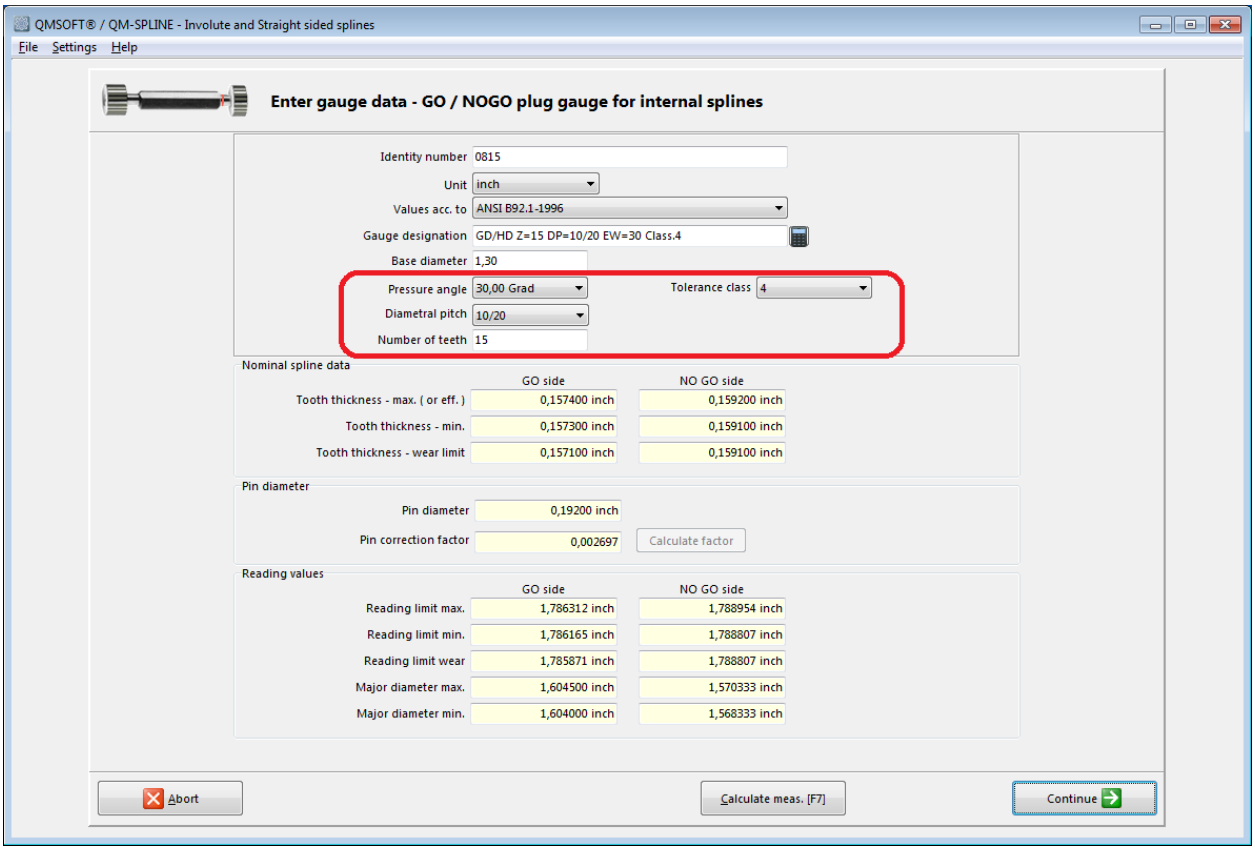


Fig. 7.13.5: Entering of spline gauge parameters acc. to ANSI B92.1

Use the `Calculate measures` button to get the reading values before you continue.

Example “Factory standard”

If you want to inspect a gauge whose parameters do not comply with any of the implemented standards, you can enter the existing parameters based on a drawing - or elsewhere - to calculate the measured values and perform the measurement [Fig. 7.13.6].

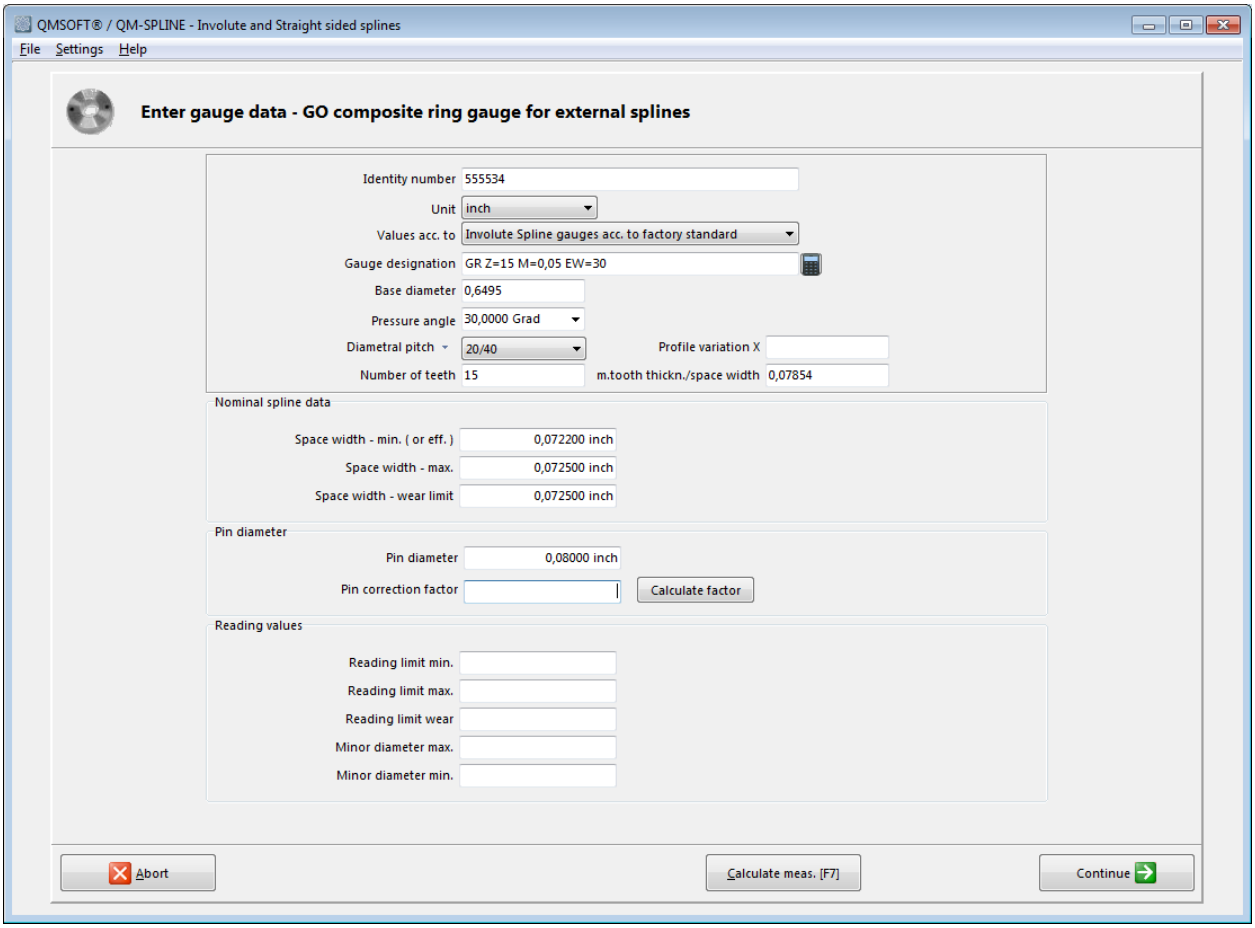


Fig. 7.13.6: Entering of parameters for involute spline gauges acc. to factory standard.

In case a spline gauge can be defined by different parameters, we have limited the number of parameters to the minimum required.

- Identity number
  This field is used to establish an identity for the gauge by entering a number. This number will be noted in the record.
- Gauge designation
  Enter the gauge designation at the same way as given on the gauge.
- Unit
  Select the unit (“mm” or “inch”) for the measurement.
- Pressure angle
  Enter the pressure angle.
- Number of teeth
  Enter here the number of teeth.
- Module or Diametral pitch
  Select here if you want to enter the “Module” or the “Diametral pitch”. If you enter the “Diametral pitch” the related module will be calculated automatically.

Note

By clicking on the “Module / Diametral pitch” button you can switch between the fields for entering “Module” or “Diametral pitch” [Fig. 7.13.7].

Fig. 7.13.7: Switch between “Module” and “Diametral pitch”.

- Module
  Enter the gauges “Module” if you enter the “Diametral pitch” the module will be set automatically.
- Diametral pitch
  Select the “Diametral pitch” from the list.
- Profile variation X
  If there is a known profile variation enter the value here.
- Valuation of basic parameters / Calculate “nominal tooth thickness”
  If you press the button right from the “Gauge designation” field you can check the entered parameters and the nominal tooth thickness, which is based on these parameters, will be calculated. The nominal tooth thickness may help you to determine the tooth thickness parameters of the gauge, if you do not have the required parameters.
- values for space width or tooth thickness
  Enter the limits for the gauges space width (or tooth thickness). You can also calculate only one measure between (or over) pins if you have only the maximum or minimum limit of the space width.

Pin diameters:

- Pin diameter
  Usually the pin diameter you have to use will be given from your data sheet. If you do not have any specification of the pin diameter, the program can calculate an “Recommended diameter” base on the data you have entered.
- Pin correction factor
  Show you the resulting reading limits correction for each 0.001 mm difference between recommended and actually used pin diameter. This value can - if your parameters are sufficient - be calculated or you can enter it manually, if your data sheet gives the value.

The `Calculate` button performs the calculation of the measurement in relation to the entered parameters. If the button is disabled (no green arrow is displayed), the parameters are not complete.

If a “calculation error” occurs, the entered pin diameter cannot be used for this gauge and/or the entered space with (or tooth thickness) does not match the diametral pitch (module) or the number of teeth. In this case, check the parameter and correct it.

Of course, if you only have the specified “Reading limits” based on a specific pin diameter and no other information about the gauge parameters, you can just enter the measurements and continue with the measurement process. In this case, no diameter correction can be made and you should only use the recommended diameter.

7.13.2.2 The measuring method

The most common method for determining the actual SPACE WIDTH or the actual TOOTH THICKNESS of a gauge is to measure with pins. These measurements provide us with a simple and effective way to analytically inspect splines.

> **Note**
>
> These measurements do not determine the fit between mating parts!

When starting a measurement, you first define the inspection conditions as described in the section *Inspection conditions*. After continuing the dialog by clicking the `Continue` button, you can first define the result of the "visual inspection" [Fig. 7.13.8]. Using the `Reject` button, you can skip the calibration process and go directly to creating a "Scrap record".

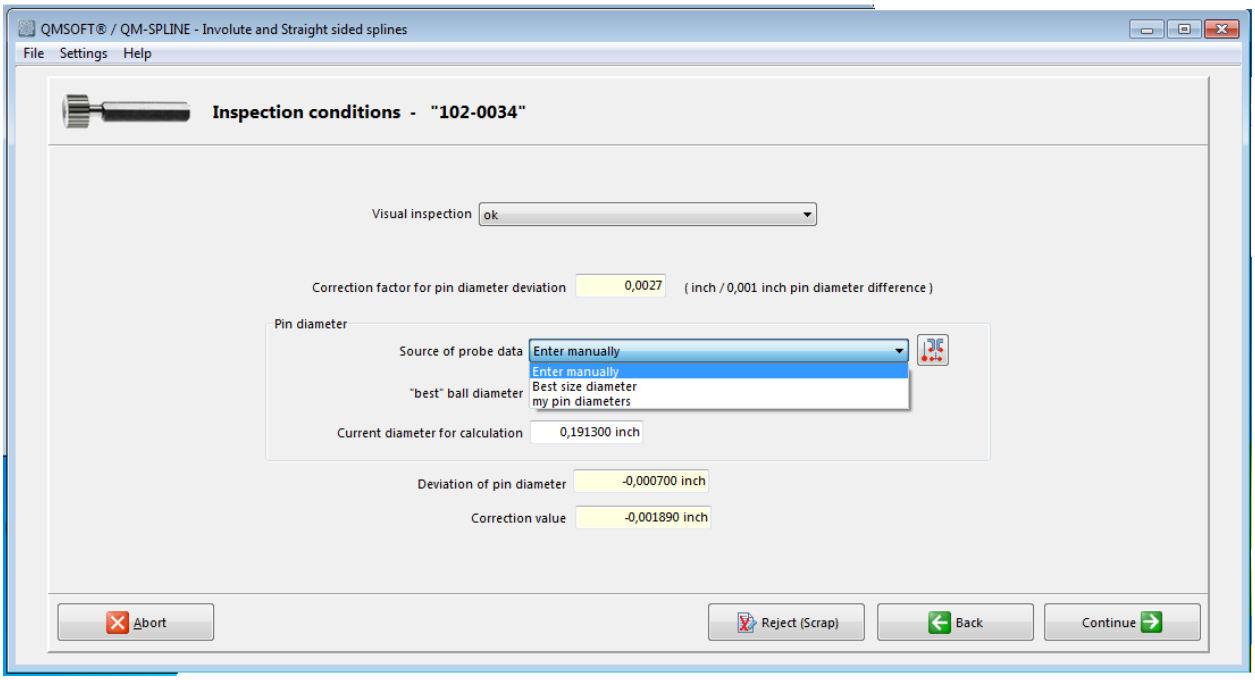


Fig. 7.13.8: Before start of measurement / Select the pin diameter.

If a pin correction factor is available and you want to use a different pin diameter than the recommended one, you can enter it here. The program will calculate the resulting correction value for the over/between pin values.

The certificate always records the original readings based on the given specifications.

External measurement “over pins”

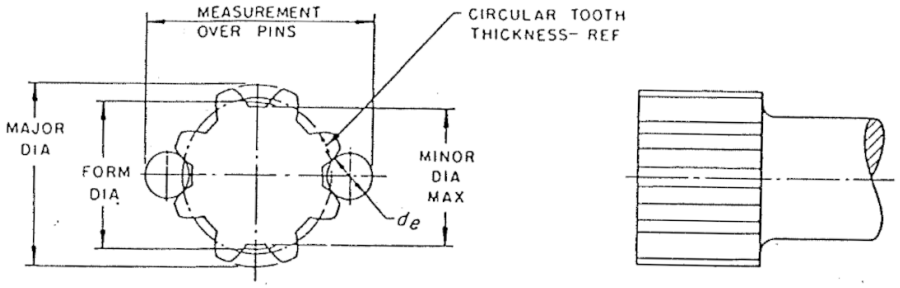


Fig. 7.13.9: Measurement over two pins.

Internal measurement “between pins”

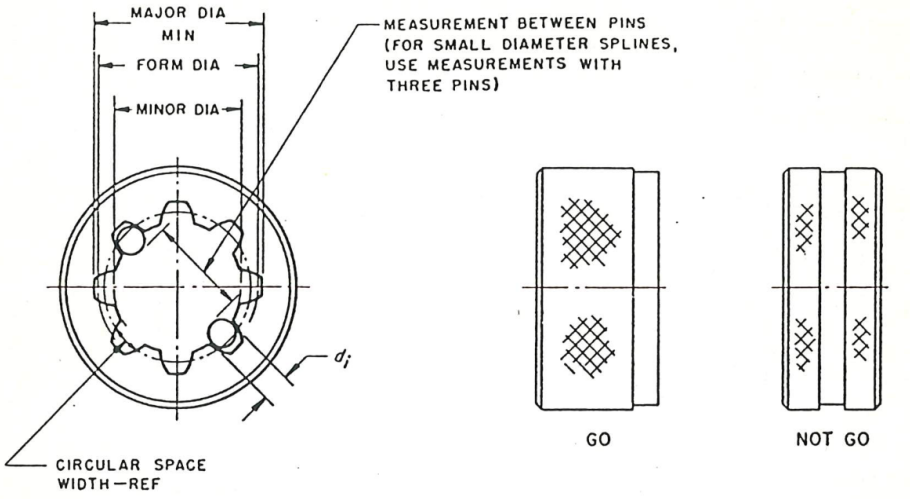


Fig. 7.13.10: Measurement between pins.

7.13.2.3 Measurement

The measured value is always entered in the order measured value 1 to n for measuring position 1 (corresponds to measuring plane 1 to n), measured value 1 to n for measuring position 2, etc. The measurement of double-sided GO/NO GO plugs is carried out first on the GO side of the gauge and then on the NO GO side.

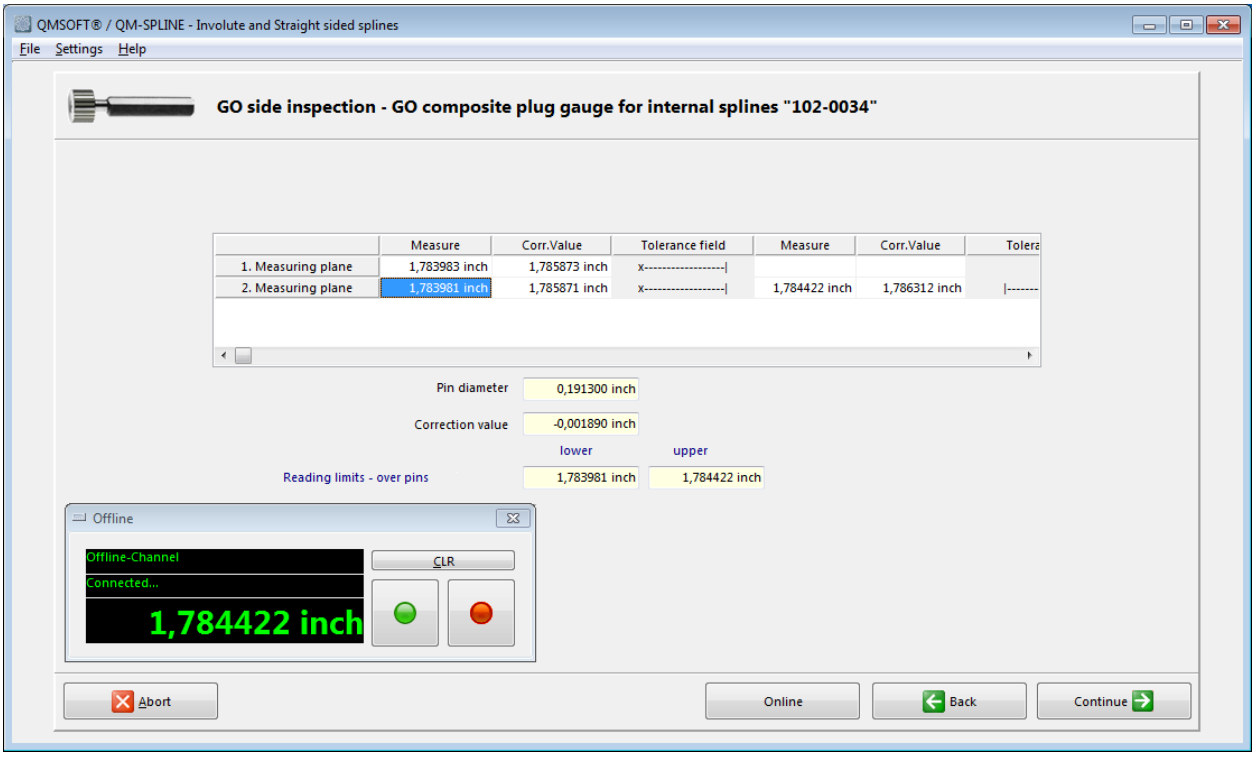


Fig. 7.13.11: Entering of measuring readings.

The program shows you the “reading limits” for the current measurement [Fig. 7.13.11]. This way you can see whether a measurement is within the tolerance before you accept the value from the measuring device.

When inspecting internal splines, the program shows you the reading limits between the pins and additionally the limits for the measured values over the pins (or balls).

The measurement is supported by a graphic display of the measured value in the tolerance field of the gauge. If you want to take measured values from a measuring device connected online, start the display program by pressing the `Online` button.

7.13.2.4 Output of inspection results

At the end of the inspection, you will receive the evaluation of your measures [Fig. 7.13.12]. Select the appropriate layout file for your report and show/print the inspection certificate.

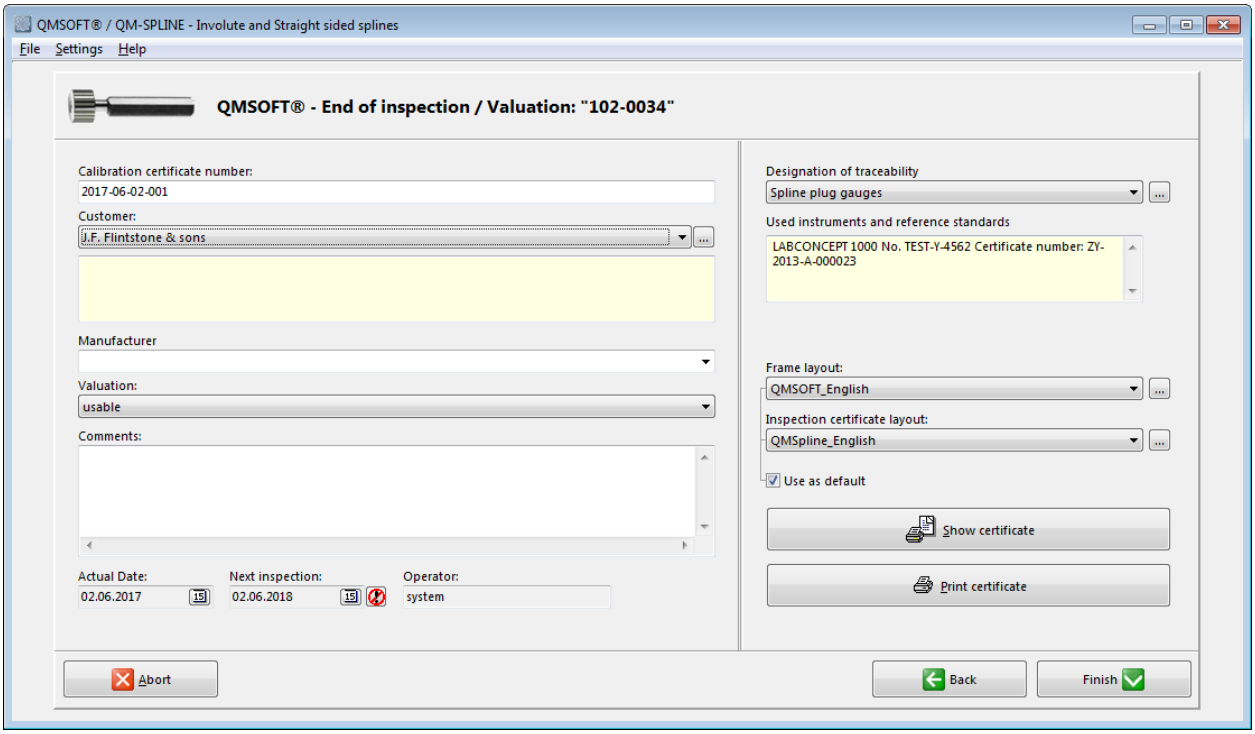


Fig. 7.13.12: Completion of the test and output of results.

For more information on reporting inspection results, see chapter *Calibration certificates*.

7.13.2.5 QMSOFT®/QM-SPLINE and QMSOFT®/QM-MANAGE

In the area of spline gauges, there are a variety of standards and different forms of gauges [Fig. 7.13.13]. To minimize the number of gauge types required to describe the different forms of gauges in the gauge management database, we decided to leave only a minimum of information in the gauge database to create a general description of the gauge.

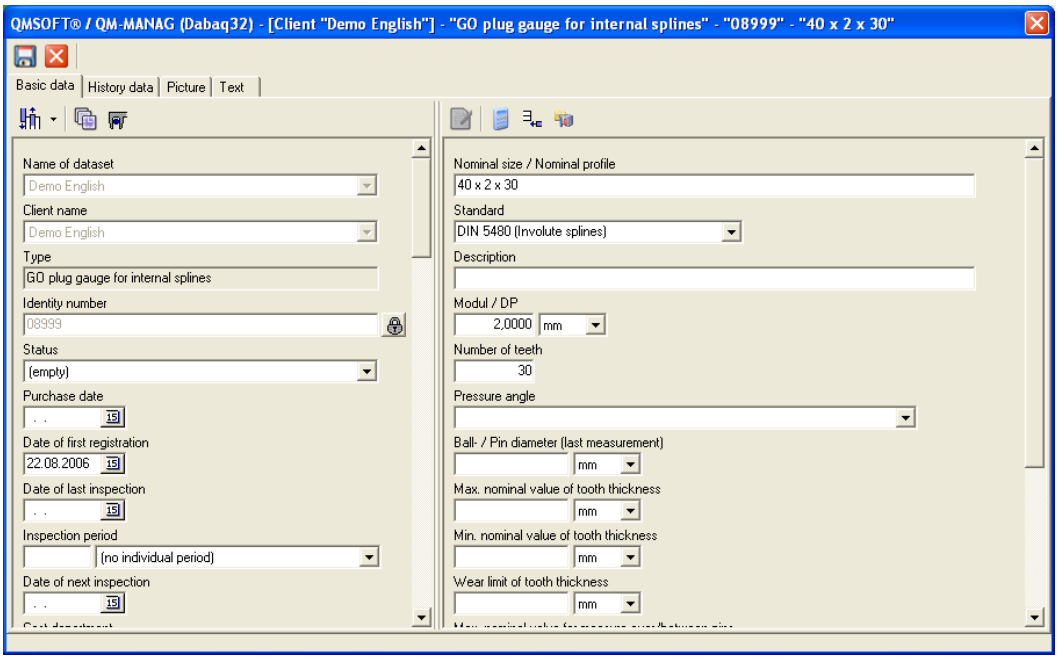


Fig. 7.13.13: Basic data for a Spline Gauge in the database.

These data (except the general data available for each gauge type) are:

- Nominal size or "Base diameter"
  For DIN 5481 and DIN 5482 it is the "Profil designation" (for example "17x20").
- Standard
  Most important information before to start the QMSOFT®/QM-SPLINE program
- Gauge designation acc. to the standard
  This information will be given back from the QMSOFT®/QM-SPLINE program when inspecting a gauge the first time (see the next figure).
- Ball/Pin diameter
  Usually the pin diameter has to be selected inside the QMSOFT®/QM-SPLINE program when you perform the first measurement. The diameter used for the measurement will be come back from the QMSOFT®/QM-SPLINE program and will be saved there

To perform an initial inspection for a spline gauge, proceed as follows:

- Enter the gauge into the database. The description information is only the "base diameter" and the "standard" (except the general information such as identity number...).
- Call the QMSOFT®/QM-SPLINE program by running a gauge.
- Enter all the specific data to describe the gauge inside the QMSOFT®/QM-SPLINE program and continue the measurement,
- Close the QMSOFT®/QM-SPLINE program and continue with the database.

You will now receive your measurement results back in the database. If the nominal "measurements over (or between) pins" depend on the pin diameter used, the measurements over (between) pins are also part of the "measurement results".

In addition to the measurement results, the program adds information about the "basic data" of the gauge, as shown in the next figure [Fig. 7.13.14].

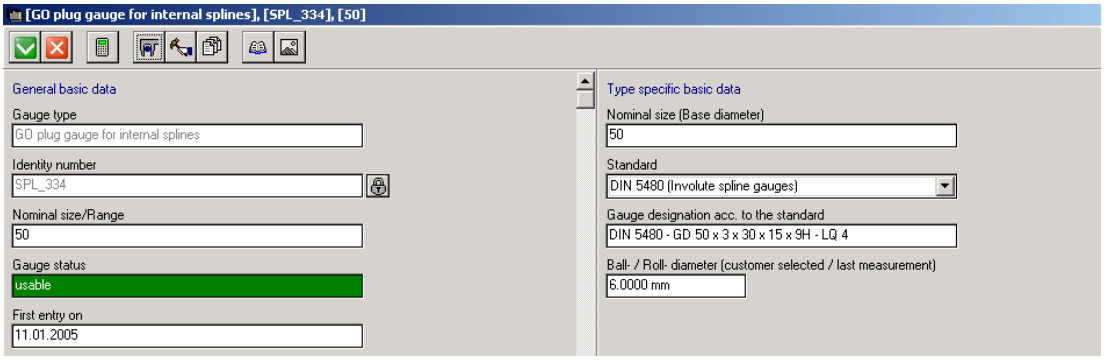


Fig. 7.13.14: Basic data for a Spline gauge after performing the first inspection.

You can see that the "Gauge designation acc. to the standard" is now filled in with the complete information describing the measuring device. At the next inspection, all information about the gauge such as "pitch", "number of teeth", "tolerance field"... will be available to you for the QMSOFT®/QM-SPLINE program.

The pin diameter used in the last measurement will also be used for the next measurement (unless you change it).

7.14 Inspection program QMSOFT®/QM-TAPERTHREAD

The QMSOFT®/QM-TAPERTHREAD program has been designed as a support system for the computer aided inspection for taper pipe threads and taper thread gauges. All thread nominal values can be generated through this program in accordance with the following standards.

- Pipe Threads, General purpose (NPT...) according to ANSI/ASME B1.20.1 - 1983
- Pipe Threads where pressure-tight joints are made on the threads acc. to DIN EN ISO 10226:2004 (identical to ISO 7-2)
- Pipe threads acc. to ISO 7/2 - 1982(E) - old standard
- Gages for Dryseal Pipe Threads (e.g. NPTF...) according to ASME B1.20.5-1991
- Dryseal Pipe Threads (e.g. NPTF...) according to ASME USAS B2.2 - 1968
- ANPT - Taper pipe threads, Aeronautical form acc. to AS71051:2007
- Pipe threads for tubes and fittings according to BS21:1985
- Gauges for taper pipe threads acc. to JIS B 0253-1985
- Metric External Taper Screw Threads according to DIN 158
- Whitworth Pipe threads for threaded pipes and fittings acc. to DIN 2999 - July 1983
- Taper thread gauges for gas cylinder valves acc. to ISO 11363-2:2018
- Whitworth pipe threads acc. to DIN 3858:2005

In case that the thread diameter is defined in a special gauge plane, for the measurement a second axis is required to get the readings for the "Gauge plane distance". Generally: One axis "X" will be used to measure the gauge diameter and the second one "Y" to determine the distance to the gauge plane.

Warning

The program QMSOFT®/QM-TAPERTHREAD does support only a limited choice of measurement methods which usually require special hardware equipments. The most common methods are:

- "Two axis measurement with T-Probes" which will be exclusively used together with horizontal measuring machines including a special "Taper Thread Measuring" hardware kit (TRIMOS Labconcept machines together with the LABC80 accessory and TRIMOS WindDHI software);
- "Evaluation of contour data file": using this method you can evaluate data files recorded by contour measuring devices;

Nevertheless the program QMTaperThread does also support two additional methods of the Taper Thread Inspection:

- The conventional "Two-Wire-Measurement" for Taper Plug Gauges and "Two-Ball-Measurement" for Taper Plug Rings. In both cases the distance from the measuring position (measuring plane) to the defined Gauge plane has to be entered manually by the program operator. It is basically in the responsibility of the program operator to use a qualified procedure to determine this distance.

Before starting up the program, the user should be familiar with the guidelines being applied as well as the measurement procedure for the inspection of screw thread gauges.

The QMSOFT®/QM-TAPERTHREAD program can be started directly from the gauge data management system QMSOFT®/QM-MANAGE. The primary function of the program is to calculate all of the required gauge sizes and tolerances according to the thread standards and type of gauge being applied (for example: Screw thread GO ring gauge). Any limitations of the applied standard will be pointed out.

After selecting the standard, the gauge type (e.g. screw thread GO ring gauge) and entering the thread designation (e.g. "R1"), all required gauge nominal values and tolerances are calculated automatically. The limits and restrictions of the standards applied are pointed out.

The program supports the nominal value generation and the measurement process for all types of thread gauges being standardised and also for all types of plain gauges used to check the minor or major diameter of screw threads.

The results of the evaluation can be produced on the screen and/or on the printer and/or in a file. The nominal values of the gauge will be processed in the calibration certificate according to the inspection requirements and the measurement results. Tolerance excesses will be noted and identified.

7.14.1 Standards and gauge types (the "Gauge plane")

In case that the Gauges (the most of them) which are be handled with this program are tapered. The calculated diameter values are only valid for the related Gauge Plane. This related plane does depend from the standard and the gauge type. Here you will find a description which reference planes are used in the program to calculate the nominal and actual pitch diameter.

7.14.1.1 Taper-threaded plugs

a) NPT taper-threaded plugs and NPTF L1 plug gauge

The calculated diameters refer to the "small end" of the plugs. In the standard, this plane is referred to as the E_0 plane.

b) NPTF L3 plug

The calculated diameters refer to the "small end" of the plugs. For L3 plugs, this plane is called the E_3 plane.

c) BS21 taper full-form plug gauge

The diameters are related to the "Gauge plane". For System A the gauge plane is located at the gauging notch. For System B gauges the gauge plane is located at the distance s (the "datum dimension") from the "end" face (marked "+") of the gauge.

d) ISO 7-2:2000 (also older release ISO 7-2:1994) full form threaded plug gauge

It is similar to BS 21 System B, the gauge plane is located at the distance $l1$ from the "end" face (marked with "+") of the gauge.

e) DIN 2999 full form threaded plug

It is similar to BS 21 System B, the gauge plane is located at the distance $l3$ from the "end" face of the gauge.

f) DIN 158 (only threaded "Check Plug" does exist)

In case that this standard does define external taper threads only. There is only a "check plug" for the "parallel thread ring gauge" is defined. The diameters are related to the "Gauge plane" which is located at the gaging notch.

7.14.1.2 Taper-threaded rings

a) NPT taper threaded rings and NPTF L1 rings

The calculated diameters refer to the "large end" of the ring. In the standard, this plane is called the E_1 plane.

b) NPTF L2 ring gauge

The calculated diameters refer to the "large end" of the ring. For L2 rings, this plane is called the E_2 plane.

c) BS21 System A ring gauge and ISO 7-2:1994 (old)

The calculated diameters refer to the "large end" of the ring. This plane is called the "Gauge plane".

d) BS21 System B ring gauge

The diameters are related to the "Gauge plane"; The gauge plane is located at the distance m (the "datum dimension") from the "small end" (marked "+") of the gauge.

e) other standards (DIN 2999, ISO 7-2:2000 and DIN 158)

Other standards do not define taper threaded rings or do not specify nominal sizes for them. In this case, only gaging with the "taper check plug" is permitted to inspect these gauges.

7.14.2 Settings > Program settings

Before you start measuring, you need to set some parameters to define the program environment and describe the inspection conditions.

7.14.2.1 General settings

Here you can select the default data input device (computer keyboard, online connection to a display device for 1D and 2D measurements) [Fig. 7.14.1]. If you set “Online” as the default device, the online connection to the installed measuring device is automatically established as soon as a measurement is started.

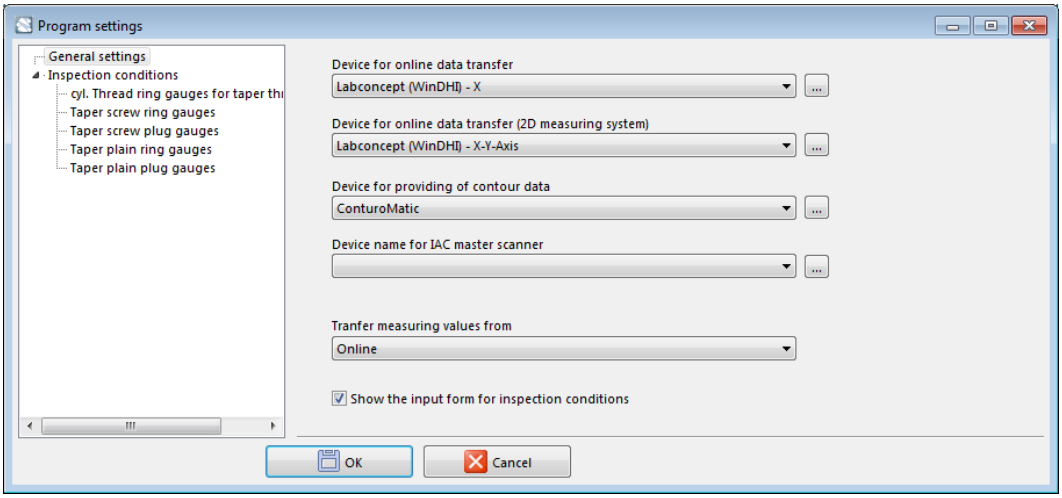


Fig. 7.14.1: General settings.

7.14.2.2 Inspection conditions

Before starting the measurement process, the program shows you the options for setting the corresponding “inspection conditions”. The parameters to be set depend on the type of measuring device to be inspected.

Taper screw plug gauges

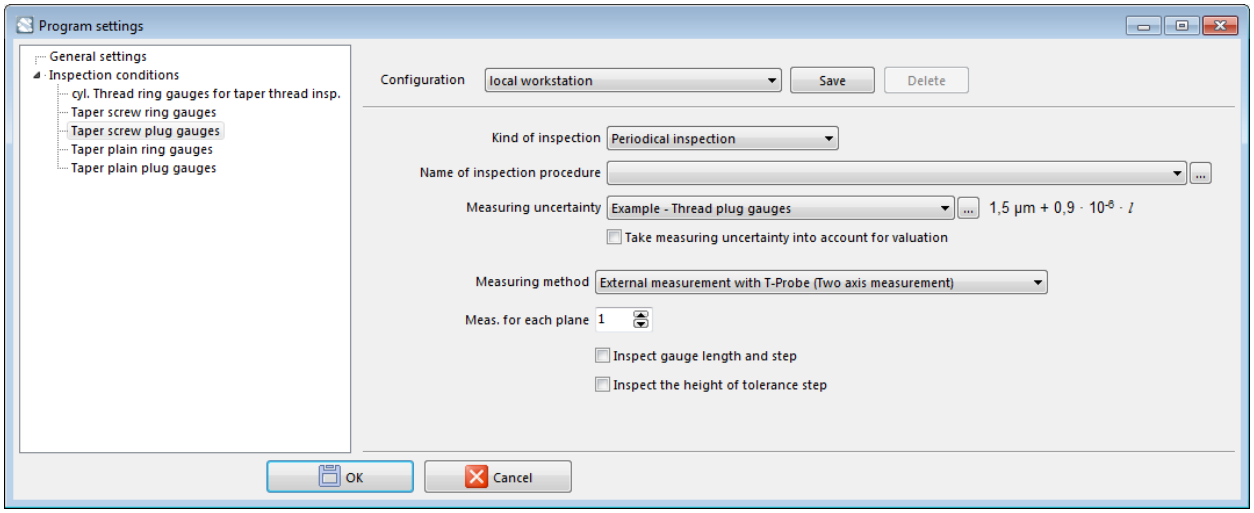


Fig. 7.14.2: Inspection conditions for taper thread plugs.

- KIND OF INSPECTION
  According to VDI/VDE/DGQ guidelines, two different kinds of evaluation for the gauge inspection we have. For the evaluation of gauge diameter, the manufacturing tolerances of the gauge will be used. For “periodical inspection”, the gauge evaluation will be done using the wear limit.
- MEASURING METHOD
  Here, choose the measuring method for measurement of external taper threads. Currently there is only the “Two-Ball-measurement” method implemented. This can be done only on a machine with a two axis measurement capability!
- NUMBER OF MEASURES
  Type the number of measures for the effective diameter.

Taper screw ring gauges

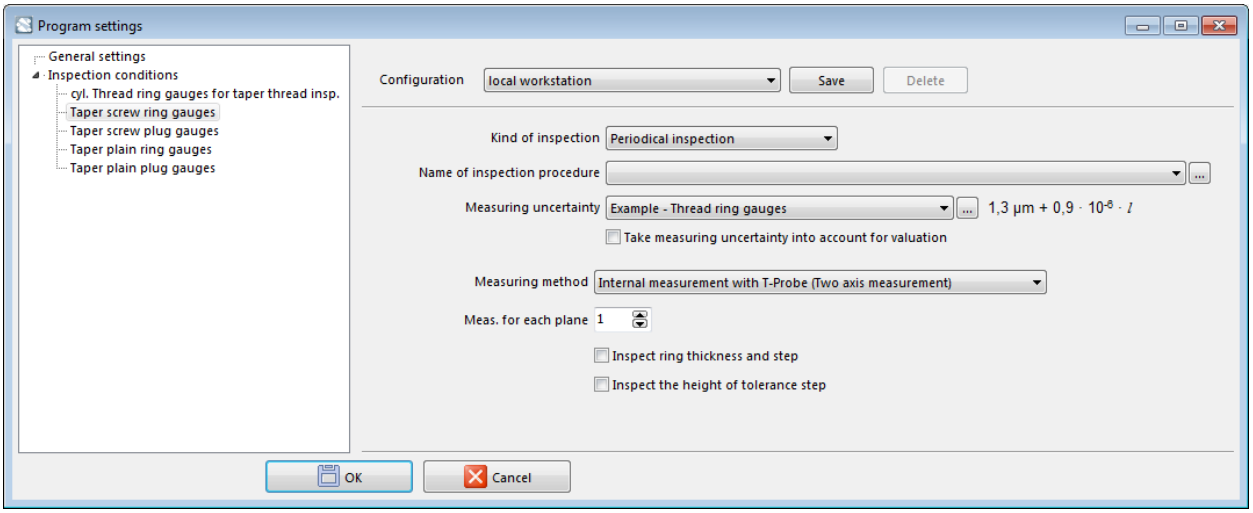


Fig. 7.14.3: Inspection conditions for taper threaded rings.

- MEASURING METHOD
  Select the measuring method for measuring external taper threads here. Currently only the "Two-Ball-measurement" method is implemented. This is only possible on a machine with two-axis measuring capability!
- NUMBER OF MEASURES
  Enter the number of measurements for the effective diameter.

Parallel thread rings and Taper plain gauges

If the program also supports the inspection of "parallel thread ring gauges" and taper plain gauges used for thread gauging, there are additional settings for the corresponding parameters for these gauge types.

7.14.3 Doing a gauge inspection

To create a measurement report, it is necessary to record the measured values of the thread and compare these actual values with the thread nominal values and the associated tolerances.

7.14.3.1 Entering nominal gauge data

After selecting the gauge type to be inspected (via the corresponding button on the start screen or the menu item *Inspection*), a dialog form corresponding to your selection appears on your screen in which the gauge nominal values must be entered [Fig. 7.14.4].

If the program is started from the gauge data management system QMSOFT®/QM-MANAGE, the nominal values of the gauge are taken from the database.

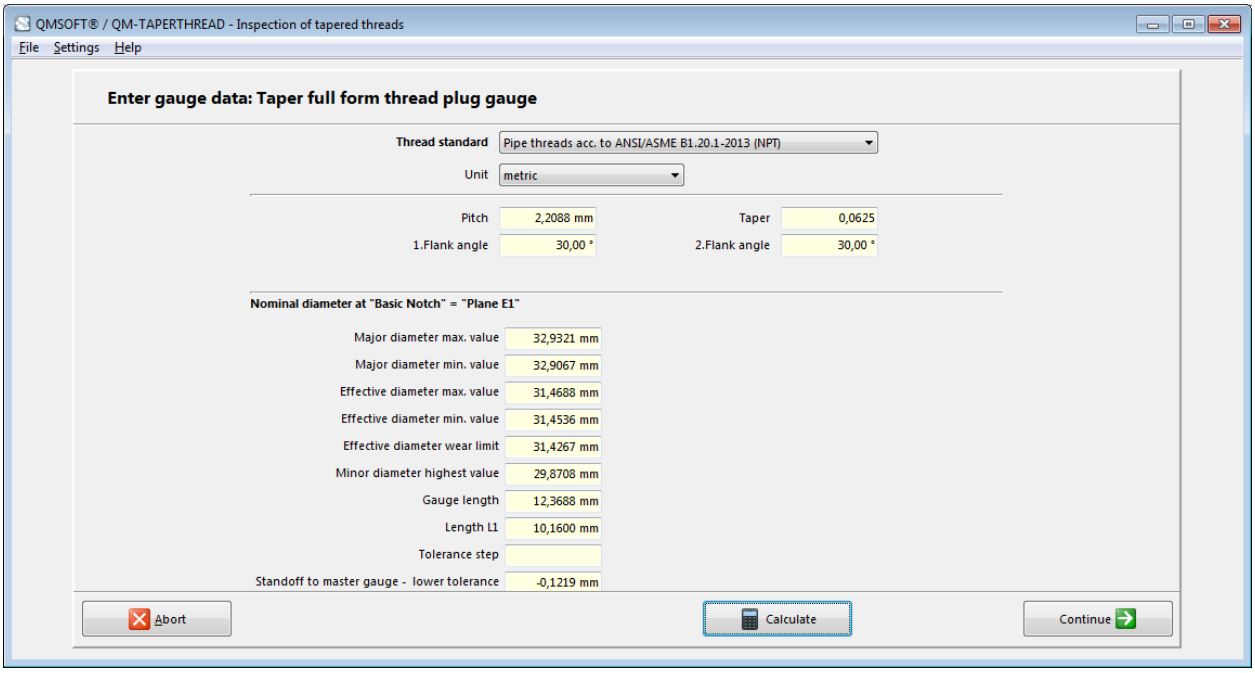


Fig. 7.14.4: Entering of gauge designation, calculation of gauges nominal values.

Following is a description of the fields in the nominal data dialog box:

- IDENTITY NUMBER
  This field is used as a label for the gauges using an identity number. This ID number will appear in the calibration certificate.
- THREAD DESIGNATION
  Enter here the standardised designation of the thread you want to inspect. The program is checking this designation and will calculate all related sizes and tolerances according to the chosen standard (see the next field).
- THREAD STANDARD
  Select the thread standard from the list provided.

After entering this information use the `Calculate tolerances` button to calculate the gauge nominal sizes.

Note

The calculated diameters are related to the used “Gauge plane”. The position of this “Gauge plane” does depend from the selected standard and the gauge type!

7.14.3.2 The implemented inspection procedures

Parallel threaded ring gauges / Method “Gauging”

Few standards (ISO 7-2:2000, DIN 2999 and DIN 158) does define “Parallel threaded ring gauges” to check the Taper external product thread. The pitch diameter of this gauges will be controlled by the related “Taper thread form check plug gauge” only!

The figure will illustrate it for an ISO 7-2:2000 Parallel threaded ring gauge.

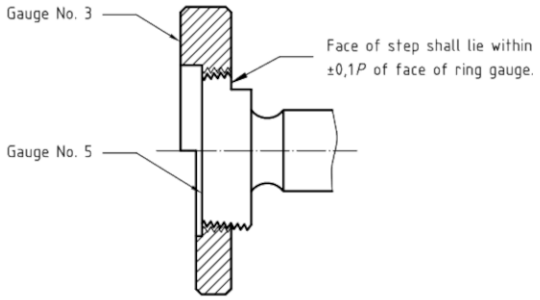


Fig. 7.14.5: Gauging of a Parallel threaded ring gauge acc. to ISO 7-2:2000.

If you select a “Parallel threaded ring gauge” in the program only the “Inspection method” item “Gauging with Master Gauge” is permissible. The program will give you the limits for the engagement as shown in the figure [Fig. 7.14.6].

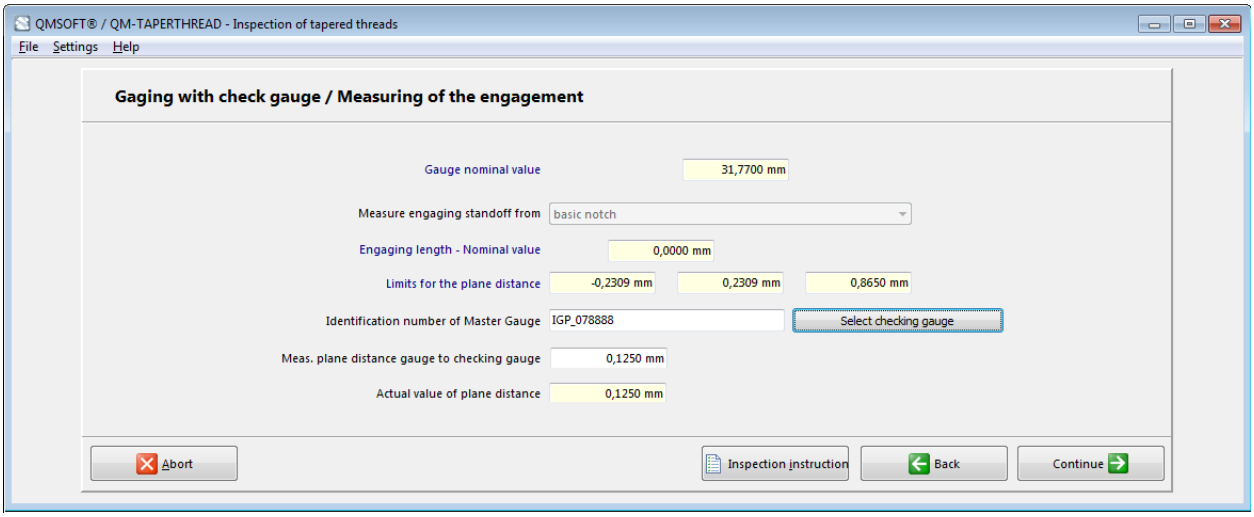


Fig. 7.14.6: Entering the “engagement” length when testing a gauge with a “Check gauge”.

Note

The method “Gauging with Master Gauge” is generally working in a similar way as described here and can be used also for other types of Taper Threads.

Using a “Two-axis” measuring device

The measurement process depends on the selected “Measuring method”. Currently there is only the “Two ball measurement” method implemented which requires a two axis measuring machine! The measuring process for internal and external taper thread gauges is quite similar if this method is used.

a) Determine the “Gauge end” reference (using a “Two-axis” measuring device)

Simplified is the procedure to measure the effective diameter of a taper thread similar the measuring of a parallel thread. The main difference is that the taper threads effective diameter is only defined in the gauge plane. Therefore, a definite position at which the measurement is to be made must located.

To get this definite position we have now to set our “Y-Axis” reference on the front end of the taper gauge. It may be helpful if you set your “Y-axis” reading on the machine to “Zero” before taking over the value.

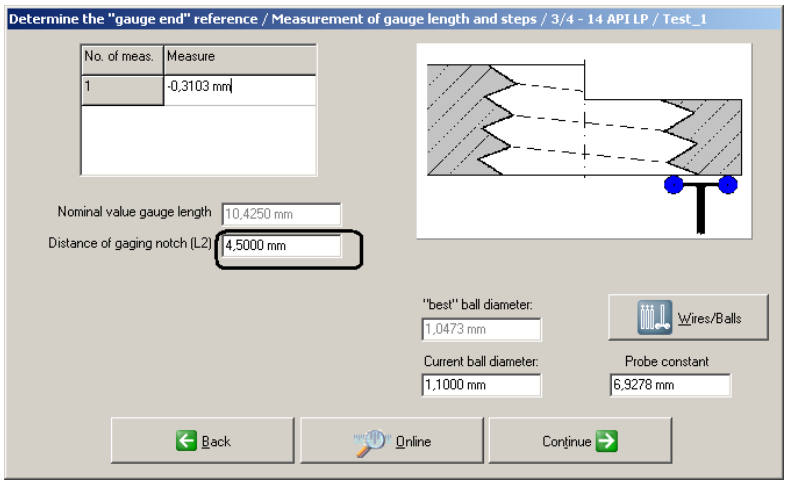


Fig. 7.14.7: Define the reference for the “Y-Axis”.

Before starting the measurement, you should make sure that the correct probe parameters (Ball diameter and Probe constant) are selected and that the probe is correctly calibrated (see also appendix E: Probe management). The program will be made an automatically pre-selection from your stored probe table. The “best” ball diameter is shown to check if the selected “Current ball diameter” is useful.

If you want to change the probe or to calibrate or recalibrate it use the `Wires/Balls` button to do this. Please note that you can not change the probe later.

b) Measuring the effective diameter

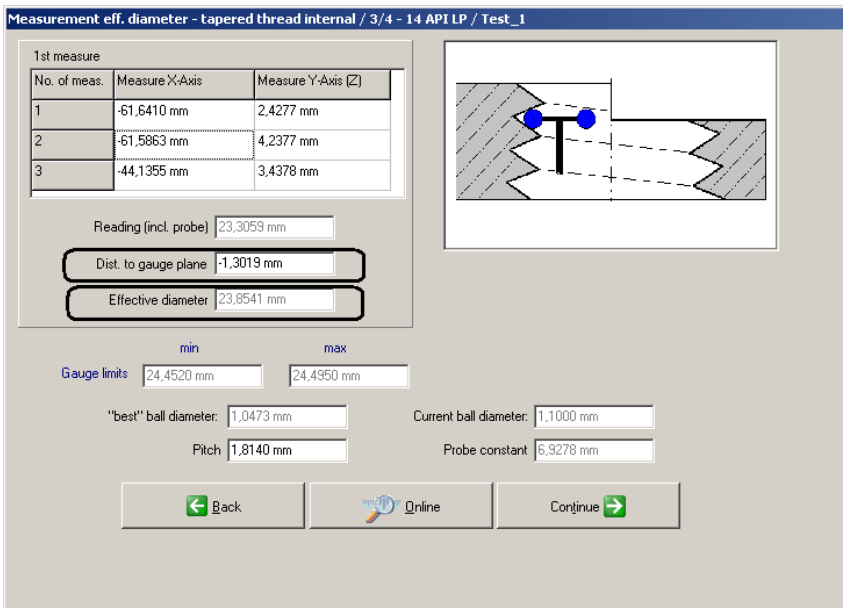


Fig. 7.14.8: Measuring the effective diameter on a “Two-Axis” machine.

After setting the “Y-reference” value the measuring of the effective diameter will be started [Fig. 7.14.8].

The measurement has to be done by probing the gauge on three positions - two on the left and the third on the right side of the gauge. During the inspection you get a picture of the probe position on the screen. Make sure that the second probe position is placed in the next thread groove related to the first probe position. The third probe position on the opposite side has to be placed in the thread groove between the both positions on the left side.

The average of the two readings “Position1 to Position3” and “Position2 to Position3” will give the “Reading over balls” (shown in the related field on the screen) which will be used to calculate the effective diameter.

The “Y-value” of the third measure will give us the distance L from the gauge plane used to calculate the effective diameter at the gauging notch.

Using the “Evaluation of contour file” method

In addition to classic thread measurement methods, the program QMSOFT®/QM-TAPERTHREAD also allows the evaluation of complete thread contours, which were taken with special contour scanning devices (e.g. T+S Contouro-Matic or IAC Master Scanner).

In contrast to the classical thread measuring methods with wires/balls a complete analysis of all thread parameters such as thread pitch diameter, flank angles, outside or inner diameters, pitch is possible. In order to perform evaluations with such a device, please define a suitable “inspection device” in the QMSOFT®/QM-DeviceServer. In the properties of this device object you can set the default directory, where the contour-files are stored (see device manual of the manufacturer).

If the inspection method “Measuring of contour data file” is selected, you will receive the following screen [Fig. 7.14.9] where you must select your saved contour file.

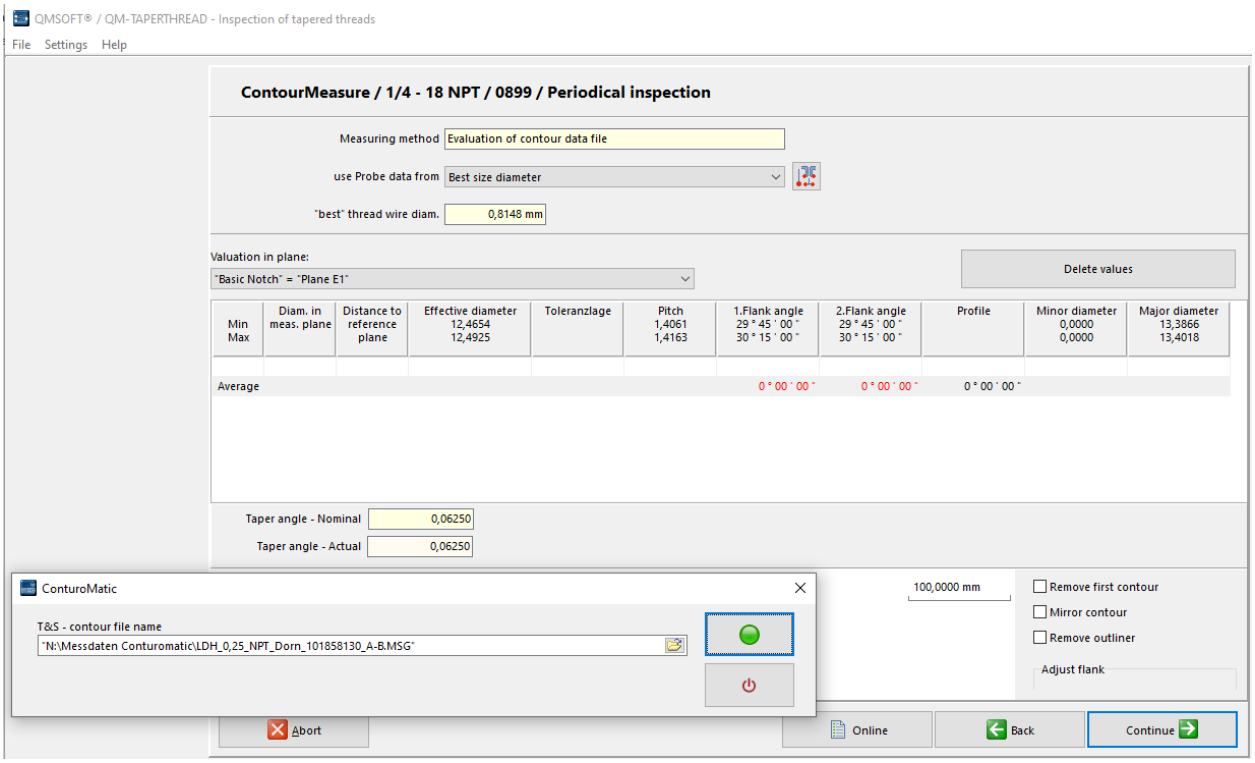


Fig. 7.14.9: Open the contour scan file to evaluate measures.

You will now receive a list with all evaluated parameters [Fig. 7.14.10]. The checkboxes - preselected depending on your item list - are used to select the values that should be output on the inspection certificate.

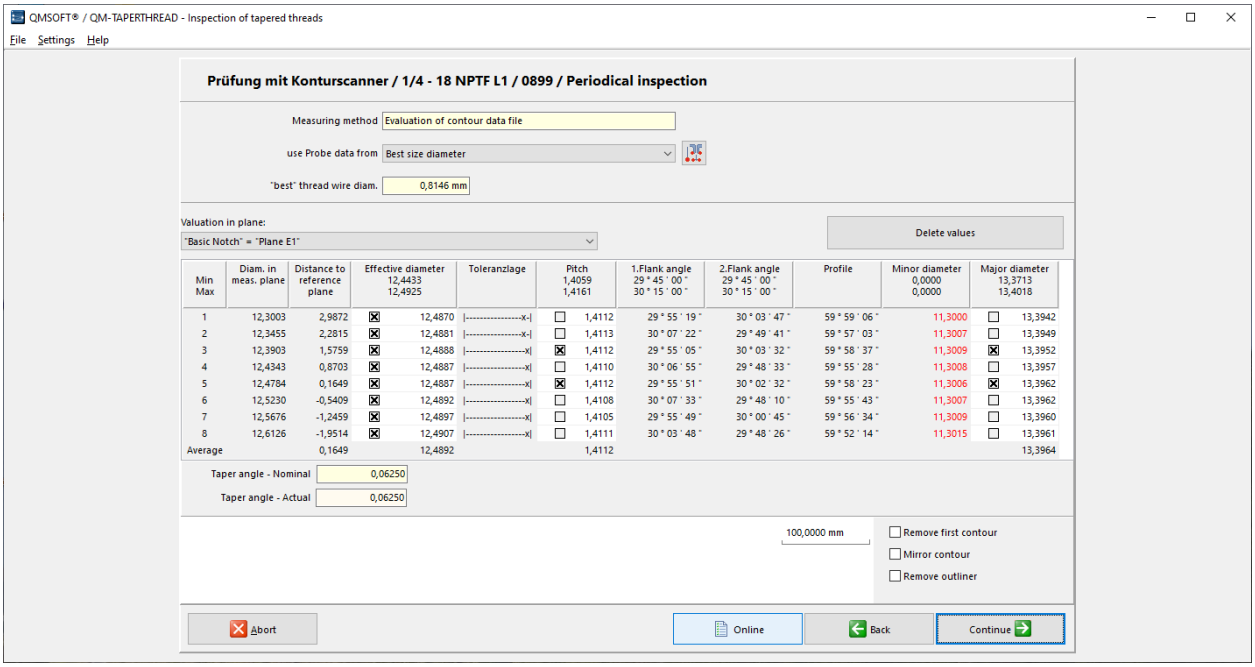


Fig. 7.14.10: Evaluation of a contour file, inspection results.

With the help of the button `Continue` you will come to the dialogue form for the output of the results of the gauge inspection.

Conventional measurement procedures

The "conventional" methods to measure taper thread gauges are very similar the measuring methods which will be used for cylindrical thread gauges.

For example, the so called "Two-Wire method" for external threads is working with the following steps:

- The thread gauge will be measured two times with each 2 wires. The wire on the right (comparable to the 3rd wire for a common 3 wire measurement) will keep the position in the same pitch [Fig. 7.14.11].
- The mean value of these two readings will be used to calculate the effective diameter on the "Y" position of the 3rd wire (distance L from the end) [Fig. 7.14.12].
- At least the distance L from the end or from the related gauge reference plane has to be measured and to be entered for the software. Using the nominal taper angle we can now calculate a diameter correction to get the effective diameter at the gauge plane which we can now compare with the gauge nominal values.

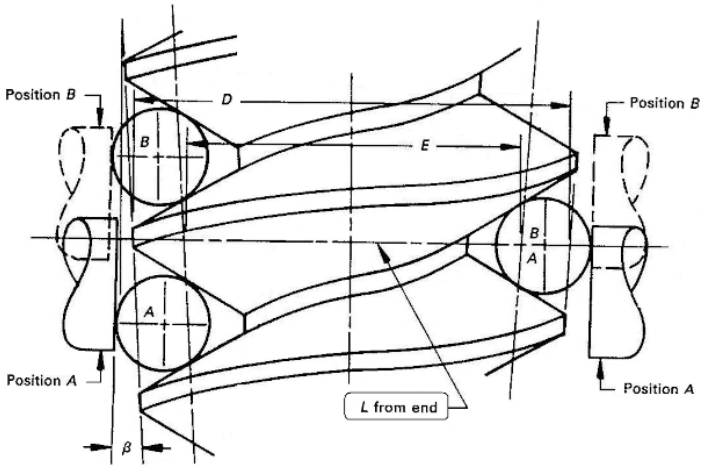


Fig. 7.14.11: Two-Wire measurement of a taper thread plug gauge.

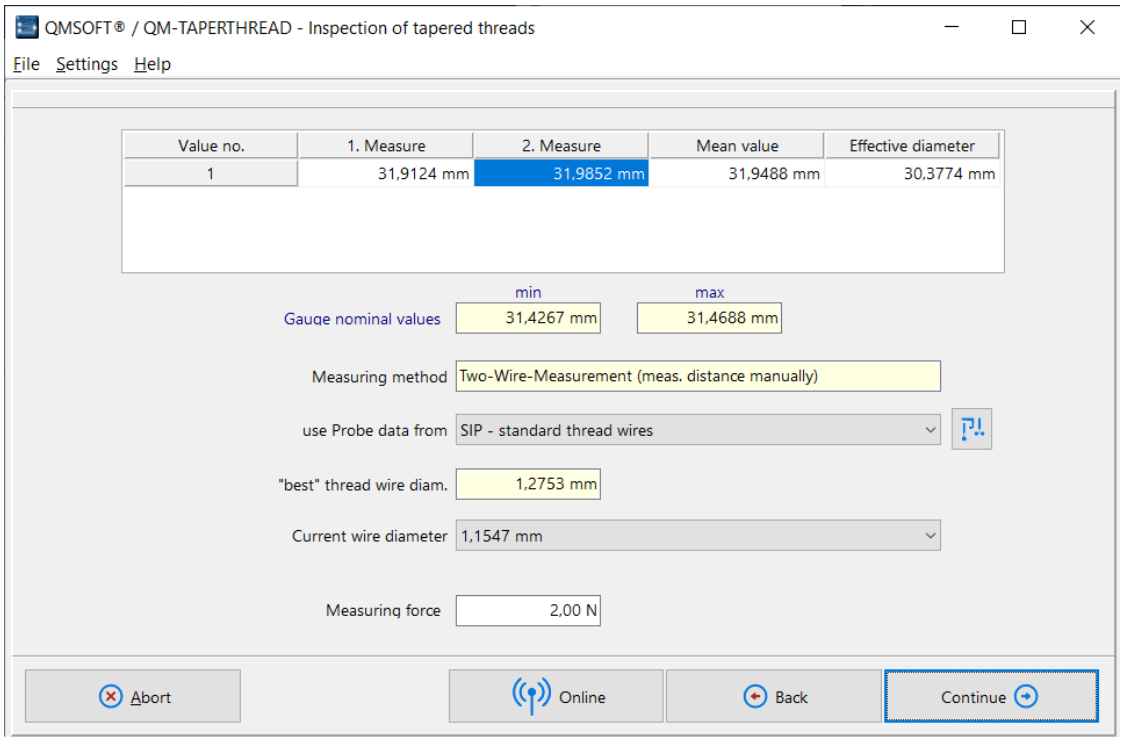


Fig. 7.14.12: Entering of the Two-Wire readings in the QMSOFT®/QM-TAPERTHREAD program.

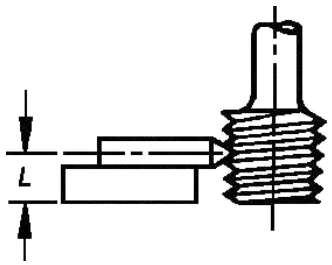


Fig. 7.14.13: Measuring of the Distance to the Gauge end.

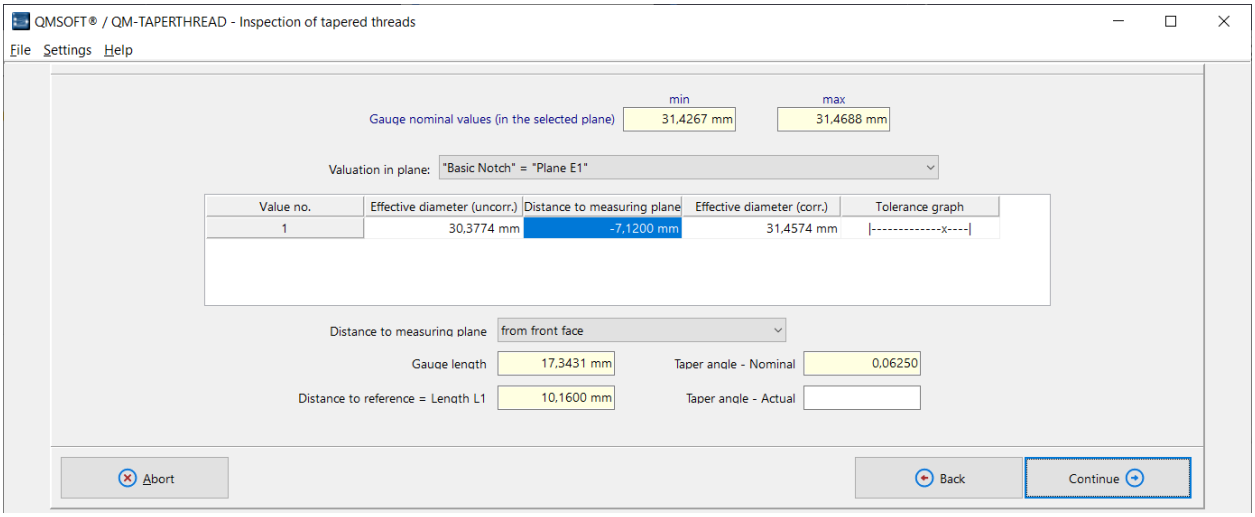


Fig. 7.14.14: Entering the measured distance to the reference gauge plane.

After entering the gauge plane distance manually, the program will calculate the resulting effective diameter and compare it with the gauge nominal values defined in the related gauge plane.

If you now continue the program you can create the inspection certificate.

The measuring of taper thread ring gauges does work in a very similar way. The variation is, that you are using T-Probes to get the two diameter readings. Please note that it is much more difficult to measure the correct distance of your measurement plane to the defined gauge plane compared with the measurement of a taper thread plug.

Therefore, we do not recommend using this method for the measuring of taper thread rings.

7.14.3.3 Output of results

The output of all of the inspection results is described in chapter *Calibration certificates*.

7.15 Inspection program QMSOFT®/QM-THREAD

The QMSOFT®/QM-THREAD program has been designed to support the computer aided inspection of screw threads and screw thread gauges.

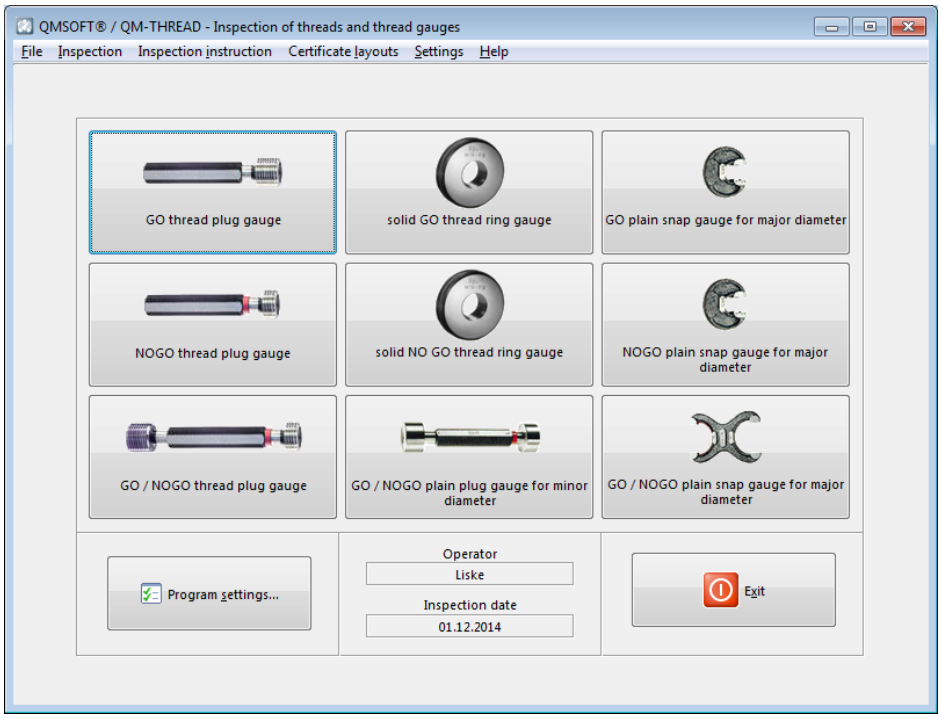


Fig. 7.15.1: QMSOFT®/QM-THREAD launch.

All thread nominal values can be generated through this program in accordance with the following standards:

- ISO metric screw threads according to ISO 1502:1996 (DIN ISO 965:1998)
- Unified threads and thread gauges according to ANSI/ASME B1.1-1989(R2001)/ B1.2-1983
- Unified threads and thread gauges acc. to ANSI/ASME B1.1-2003 / ASME B1.2
- Gauges for unified threads (ANSI/ASME B1.1-1989) according to BS 919-1:2007
- Gauges for Metric M Screw Threads according to ANSI/ASME B1.16M-1984
- Gages for ISO metric threads acc. to BS919-3:2007
- NPSM pipe threads according to ANSI/ASME B1.20.1-1983
- Screw taps according to DIN 802:1982
- Pipe threads and gauges according to ISO 228:2000 (also the older DIN 259:1979)
- Steel conduit threads according to DIN 40431:1972
- ISO metric trapezoidal screw threads according to DIN 103:1997
- Parallel screw threads of Whitworth form according to BS 84:2007 / BS 919-2:2007
- ISO metric threads less 1 mm acc. to DIN 14-1987
- Metrical thread inserts according to DIN 8140:1999 (EG threads) and Boellhoff factory standard
- Unified HELICOIL threads acc. to MS 33537-1994 and Boellhoff factory standard
- Knuckle threads according to DIN 405:1997
- Buttress threads according to DIN 513:1985 (factory standard for gauge values)
- Buttress threads acc.to DIN 20401:1984 / Fact. Standard

- Threads for valves according to DIN 7756:1979 and ETRTO V.7
- ACME Threads according to ASME / ANSI B 1.5 - 1988
- Stub ACME Threads according to ASME / ANSI B 1.8 - 1988
- “BSC” Bicycle threads acc. to BS 811:1950 / BS 919-2:2007
- Thread gauges according Swiss Standard NIHS 60-30/-40, 60-02/-05, 60-03/-06 (and a series of other standards)

The measurement process can be done according to VDI/VDE/DGQ 2618 guidelines 2618 (part 4.8 and part 4.9). or any other you wish to apply. Before starting up the program, the user should be familiar with the guidelines being applied as well as the measurement procedure for the inspection of screw thread gauges.

After selecting the QMSOFT®/QM-THREAD standard, the type of gauge, (for example: Screw thread GO ring gauge) and entering the thread designation, for example: M20x1, all of the required gauge nominal values and tolerances will be calculated automatically. The limitations and restrictions of the norms being applied will be indicated.

The program supports the nominal value generation and the measurement process for all types of thread gauges being standardised and also for all types of plain gauges used to check the minor or major diameter of screw threads.

7.15.1 Settings > Program settings

Here you can set the specified calculation and inspection conditions for the different types of gauges. Usually your configuration will be saved with the name “local workstation”, but you can also assign different configurations to each type of gauge by saving the configuration with a new name. The program flow is based on this correct settings, please read the following chapters carefully!

7.15.1.1 General settings

In the “General settings” category, you can set the connection to the length measuring device that is used for thread calibration [Fig. 7.15.2]. If you would like to use a contour scanning device that can provide contour measurement values or an IAC master scanner instead of a classic length measuring device, set the appropriate connection to this device here. The device itself must be created in the QMSOFT®/QM-DeviceServer!

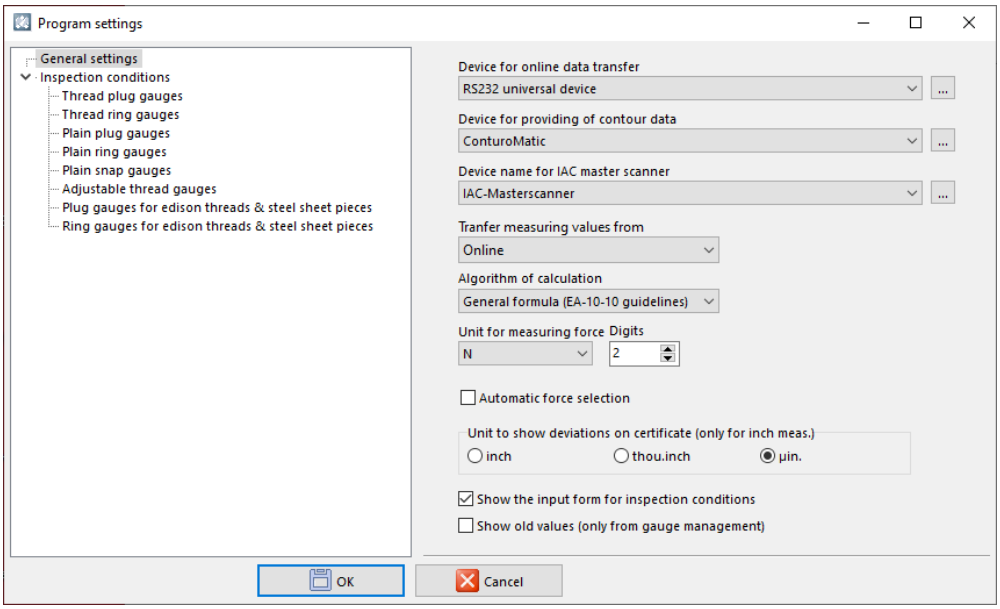


Fig. 7.15.2: QMSOFT®/QM-THREAD: General program settings.

More settings are:

- Algorithm of calculation

  Here you can select the algorithm used to calculate the effective diameter. The most common algorithm is the calculation using the "General formula (EA-10-10 guidelines)". This means that the calculation of the effective diameter is based on the document "EA-10/10 EA Guidelines on the Determination of Pitch Diameter of Parallel Thread Gauges by Mechanical Probing". When using these formulas, the compensation of the deformation by the measuring force used is taken into account!

  For customers in the US and Canada, it may be useful to use the corresponding ANSI formulas.

  If you want to use these options, ensure the following conditions:

  - Only use wires that are close to the "best size".

  - Make sure the wire diameter was measured under the recommended conditions (see ANSI B1.16M, Section B4).

  Setting the "Algorithm of calculation" correctly is very important!

- Unit for measuring force

  Select the unit in which you enter the measuring force. The "measuring force" value is used to calculate thread corrections and to compensate for deformations.

- Automatic force selection

  The ANSI standard specifies a recommended measuring force for measuring external threads with measuring wires, depending on the thread pitch. With this option you can activate the automatic setting of this force specification. Please note that this option is only effective for external thread measurements.

- Unit to show deviations on certificates...

  Choose whether you want to view and print "Tolerance excisions" in "Inch", "thou.inch" (inches/1000), or "microinches" (µin.).

7.15.1.2 Default norm selection for calculation

Normally, the program uses the "Automatic standard recognition" mode when calculating the nominal values of a gauge. This means that the corresponding thread standard is automatically determined based on the thread designation. So, for example, if you enter the designation *M10*, the "ISO 1502 / ISO 965" standard is normally used for the calculation.

However, there are now many different standards implemented in the program, so that it is not immediately possible to clearly assign the standard. This applies in particular to the metric ISO threads and the so-called "uniform" threads (UNC, UNF, etc.). For this reason, the calculation procedure first shows you a list of the applicable standards [Fig. 7.15.3].

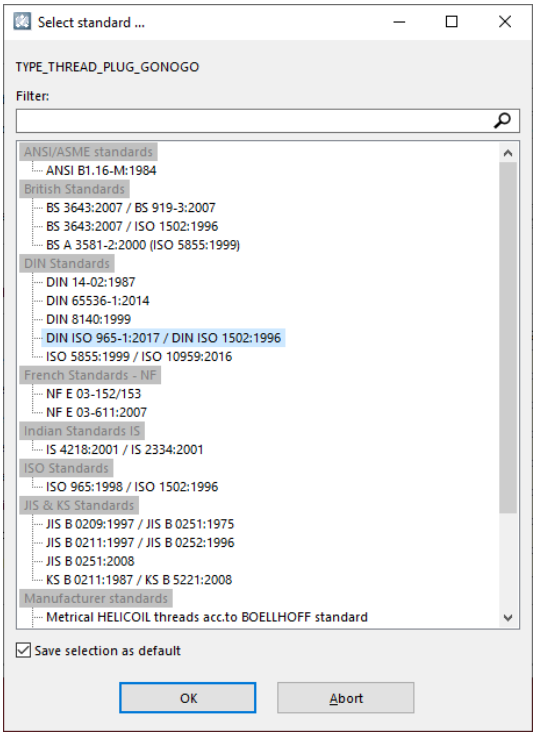


Fig. 7.15.3: List of standards which are applicable for threads denoted by “M”.

Select your favorite standard from the list and activate the option “Save selection as default” to save it as your default standard for “metric” threads.

7.15.1.3 Inspection conditions

The inspection conditions setup is divided for the different thread gauge types [Fig. 7.15.4]. Depending on the gauge type selected, it is possible that not all of the parameters described are available.

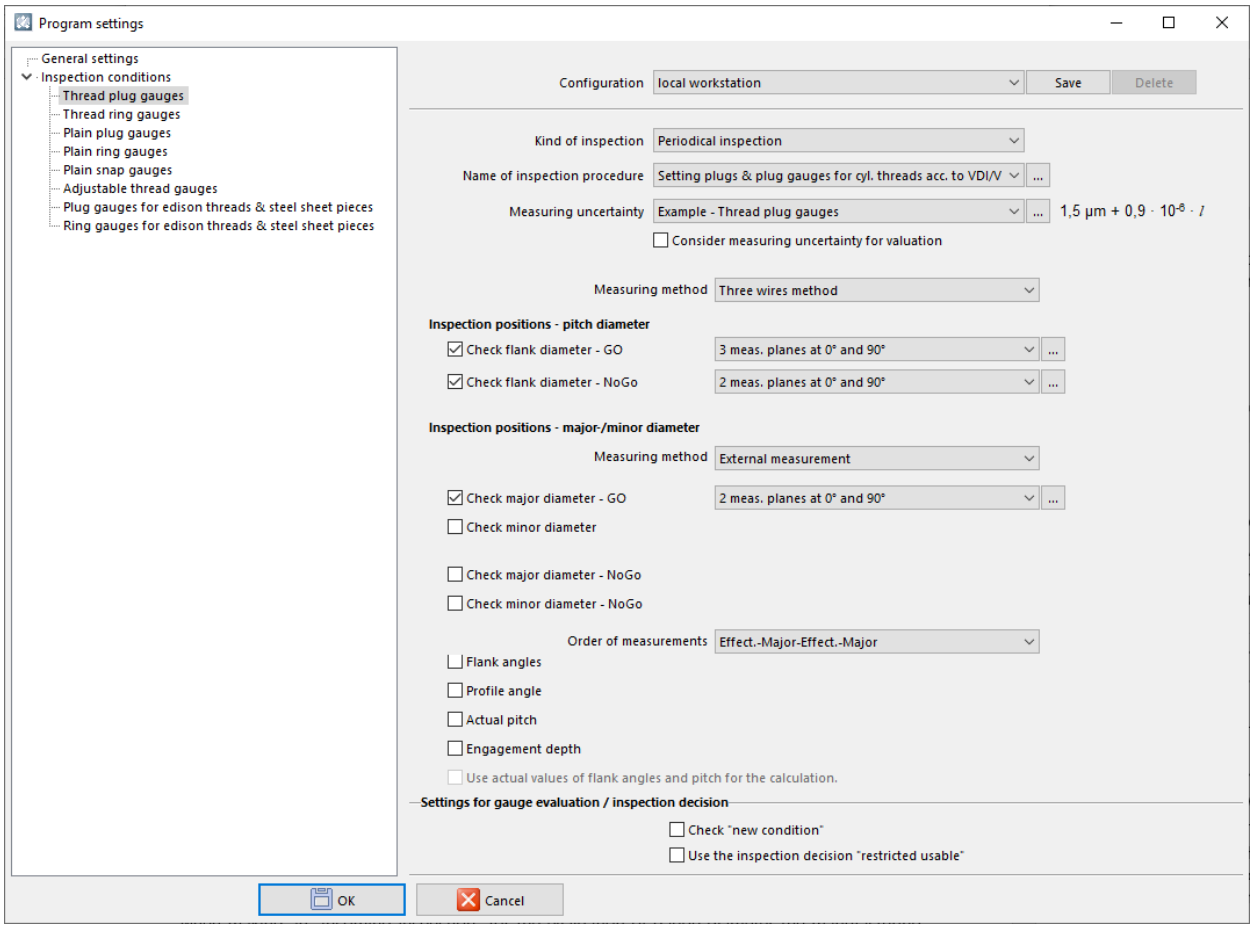


Fig. 7.15.4: Inspection conditions (example: Thread plug gauges).

- KIND OF INSPECTION
  Select “Periodic inspection” or “Incoming inspection”. In an “Incoming inspection” some additional inspection steps (e.g. hardness inspection) must be performed. The main difference, however, is that in an “Incoming inspection” the manufacturing tolerances of the measuring instrument are used to evaluate the measuring diameter without using the wear limit. In the “Periodic inspection” the measuring instrument is evaluated based on the wear limits.

- NAME OF INSPECTION PROCEDURE
  Here you can select the name of the inspection procedure used. This name will be noted in the inspection certificate. The corresponding field name in the layout is *{Inspection procedure}*.

- MEASURING UNCERTAINTY
  Select the measuring uncertainty which will be applied for the selected procedure. The shown formula for the measuring uncertainty will be recorded at your inspection certificate.

- CONSIDER MEASURING UNCERTAINTY FOR VALUATION
  The selection of the measuring uncertainty in the previous field is at first only used for recording purposes. If you want to use the calculated measuring uncertainty to prove the conformance or non-conformance of your inspected gauge with the defined error limits, then you have to switch on this option. Based on the decision rules of the ISO 14253-1 the measuring uncertainty will be used to calculate the “conformance zone” for the decision, if the inspected gauge is in or out of the defined specifications. If the measuring values are in the “uncertainty range”, the valuation of gauge does depend on your defined “Acceptance rules”. See also “QMSOFT® Manual - Laboratory management - Acceptance Rules”

- Method of measurement
  Depending on the gauge type, different measurement methods may be available. Select the desired method.
- Inspection positions
  For each measurement side to be inspected, select the appropriate position list. See also “QMSOFT® Manual - Laboratory management - Inspection Positions”

Settings for gauge evaluation / inspection decision

In the simplest case the program will decide between “usable” if the measuring results are inside the permissible tolerances or limits or “not usable” if the measures are outside the related limits. Depending from the actual state of a gauge the inspection decision could be “restricted usable”. Here you can define, that you want to use this feature, and also how to handle the decision “restricted usable” [Fig. 7.15.5].

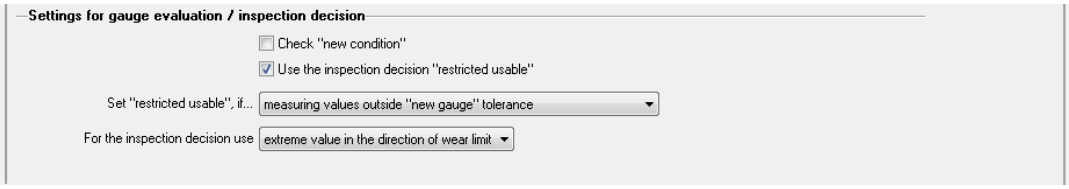


Fig. 7.15.5: Settings for the inspection decision.

You will have these additional options:

- Check “new condition”
  By activating this option, the inspection result is set to “usable/new condition” if the measurement results are within the manufacturing tolerances for a new gauge.
- Use the inspection decision “restricted usable”
  This option allows you to set a condition where the result is set to “restricted usable”. This allows you to define a status between “usable” and “not usable” to receive a warning when a gauge is worn out before it exceeds the limits.

> **Note**
>
> These additional decision rules are not active if the option Take measuring uncertainty into account for evaluation has been activated!

On the “Thread plugs” and “Thread rings” pages, you can also specify the measurement method. You can activate the inspection of the major- or minor diameter (for thread plugs, also the order of measuring the major diameter).

More parameters are:

- Inspection of pitch, flank angles...
  In addition to the usual inspection of the thread diameter, you can also enter and evaluate values for pitch and flank angles here. To do this, activate the corresponding option by clicking in the corresponding checkbox.
- Use actual values for flank angles and pitch for calculation
  If the actual values of the flank angle and/or the pitch have been determined, you can use these values as actual values to calculate the pitch diameters. If this option is deactivated, the nominal values of the flank angles and the pitch are used.

On the “snap gauges” page, you specify the type of bending up modification for the conversion between measured value and effective dimension when using a snap gauge.

7.15.2 Doing a gauge inspection

The program is presented on the screen through a main window that contains nine large buttons, each of which represents the inspection of a single gauge group (a gauge type). In the menu item *Inspection* you will find all supported measurement types with their own submenu items.

7.15.2.1 Entering nominal gauge data

After selecting the gauge type of the gauge to be inspected (e.g. selecting a "GO/NOGO thread plug gauge" from the *Inspection* menu), the dialog box shown in the figure [Fig. 7.15.6] appears on your screen. Depending on your selection, there are different fields that display the gauge parameters. Here you can see it for a GO/NO GO thread plug gauge. If the "Thread standard" field is set to one of the predefined standards (e.g. "DIN", "ANSI" or "BS", etc.), you can calculate the gauge deviations by pressing the `F7` function key or clicking the `Calculate` button. If the program was called from the QMSOFT®/QM-MANAGE gauge management module, all dialog boxes are read-only and the gauge target values are taken from the database.

Please ensure that a standardized thread designation is used. Missing values in the thread designation, such as pitch or tolerance class and accuracy class, are supplemented (if possible) by preferred values from the relevant standard.

Please also note the button `Help for nominal size input` to the right of the thread designation input.

By turning off the "automatic standard detection" option, you can force the calculation according to the selected standard. Please note that the "Default" value can be set separately for each gauge group (thread plugs, rings, . . .).

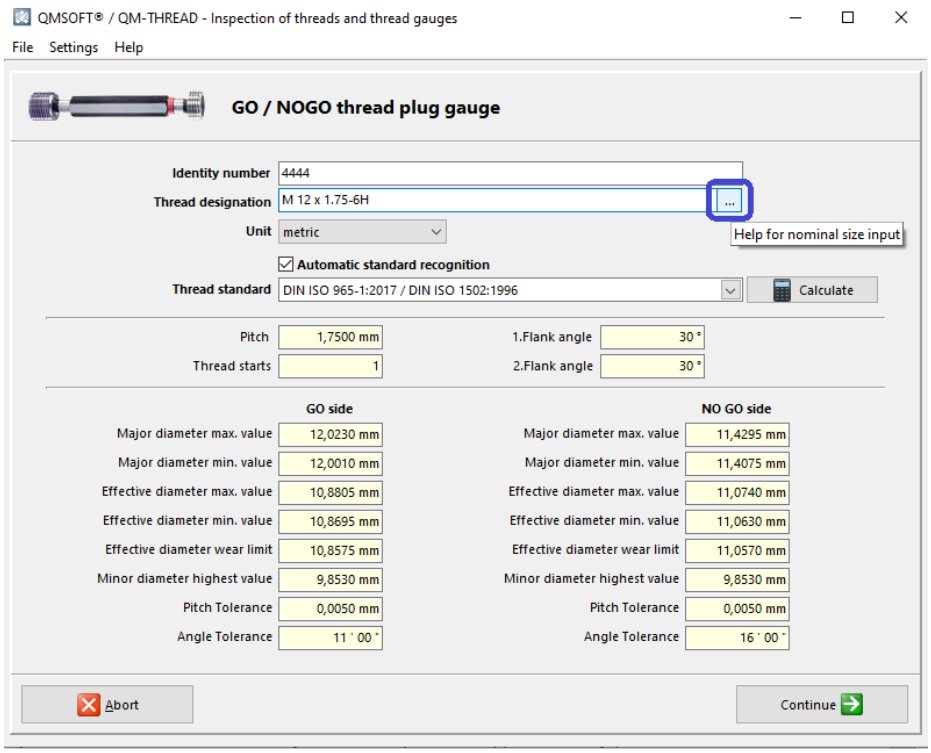


Fig. 7.15.6: Gauge designation, calculation of gauges' nominal values.

After filling out all of the data fields click the `Continue` button.

Input format of thread designation

Use the button `Help for nominal size input` if you are unsure about the correct specification of the thread designation [Fig. 7.15.7]. Depending on the selected standard, the dialog shows you all the parameters that are relevant for a complete and standard-compliant designation. If you change a parameter, the designation is created immediately.

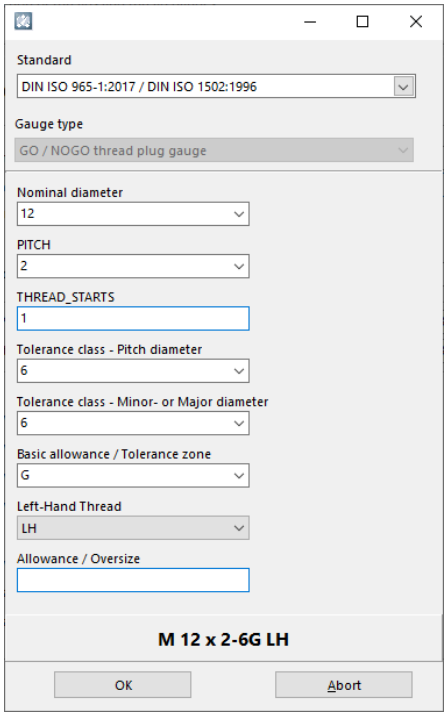


Fig. 7.15.7: Selection of thread properties for a Metric thread.

7.15.2.2 Measurement

Measurements are always entered in the order you specified in your position list [Fig. 7.15.8]. Measurement of double-sided GO/NOGO plug gauges is done first on the go side of the plug gauge and then on the NOGO side. Each side of the plug gauge and each property inspected is handled in separate screen forms.

When measuring the pitch diameter, the input table contains columns for the recorded measured values and the calculated pitch diameters. The measurement is supported by the display of tolerance and dimension limits as well as a graphic display of the calculated effective diameter in the gauge tolerance field. The tolerance limits of the effective diameter and any limits of the measured values via wires/balls are also displayed. These measured values are calculated based on the selected wire or ball diameters.

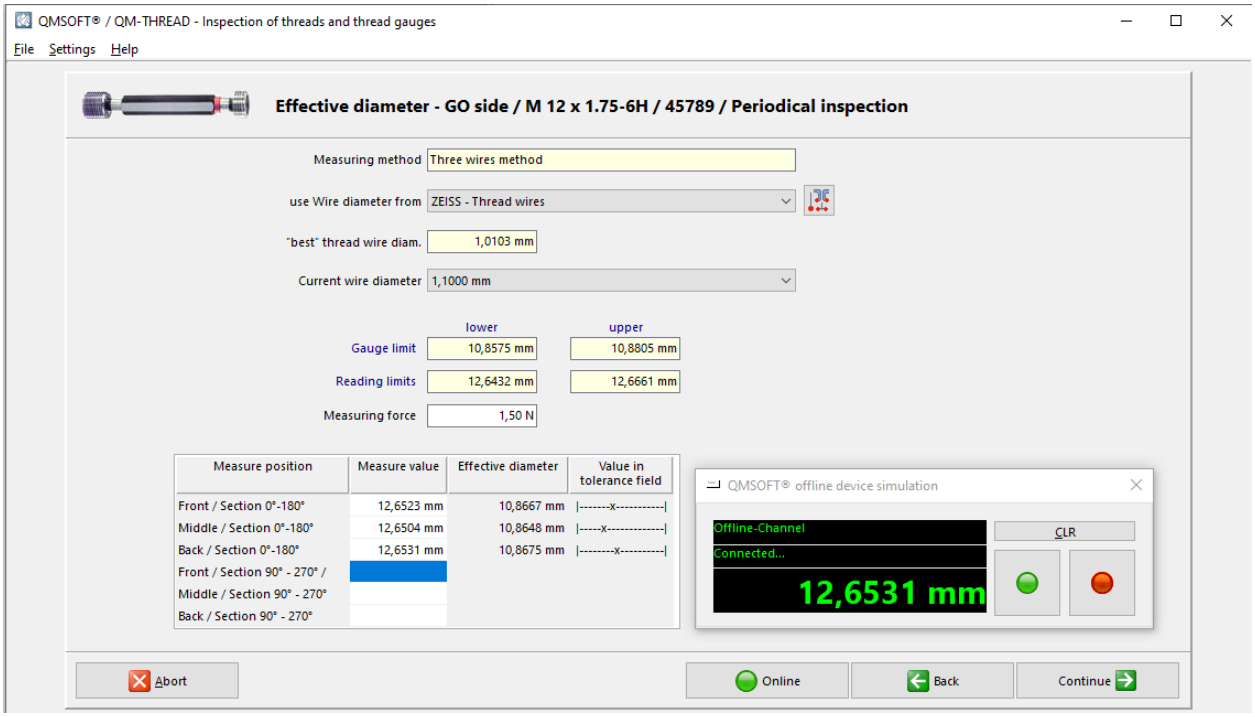


Fig. 7.15.8: Entering of measurement values.

When measuring internal threads, the known probe parameters or setting ring diameters are also included in the measuring limits between the balls. This means you can check whether the value is within the tolerance before the measured value is transferred.

For external thread measurements, the limit values via wires and the calculated effective diameters also include the deformation compensation depending on the selected measuring force and the known wire diameter. You can use the `Settings Master/Manage wires/probes` button to change the predefined wire or probe diameters. To support the selection of a suitable wire set or probe, the “best diameter” is displayed, which was calculated from the pitch and flank angle values of the actual gauge.

When inspecting snap gauges to check external diameters, a fixed number of values are measured (specified in the inspection conditions). It is the responsibility of the program user to adhere to the reading sequence according to a uniform scheme (it is not possible to check this using the program!).

External thread measurement

Measuring the effective diameter of external threads is relatively simple. According to the known measuring procedure, three or two wires are used [Fig. 7.15.9]. After finding the declination point, the measured value used to calculate the effective diameter can be transferred or entered. Depending on the selected measuring force and the known wire diameter, the calculated effective diameter includes the deformation compensation.

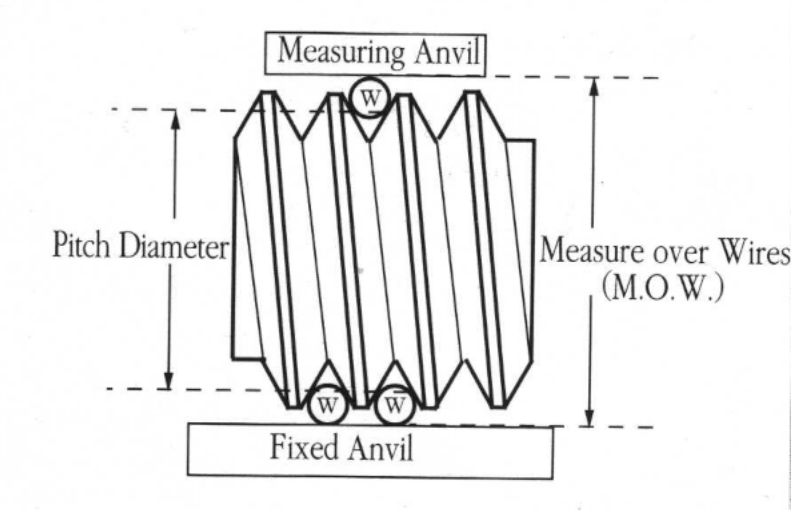


Fig. 7.15.9: Three-wire-method for external threads.

Depending on the selected list of thread wires, the wire with the smallest deviation from the calculated “best” wire diameter is automatically set.

- SOURCE OF WIRE/PROBE DATA

  Select the table with thread wires should be used for the automatically selection of a thread wire diameter. Measuring an external thread, the wire will be selected from the chosen table. You can also select a thread wire diameter manually if you set the specific measuring conditions. With the “Best Wire” option, the calculated “best wire diameter” is automatically set.

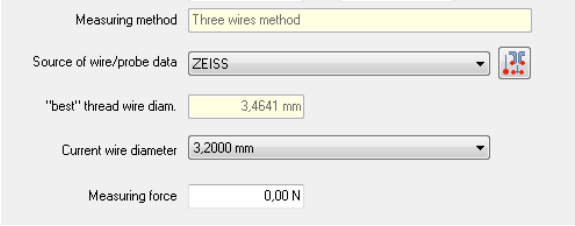


Fig. 7.15.10: Selection of wires.

Internal thread measurement

Two measuring methods can be used for internal thread measurement, which differ in the required measuring process. The two-point measurement requires only minimal technical effort and is a faster measuring procedure. The three-point internal measurement requires a special measuring technique and is often used for small screw thread ring gauges in which no ball support bracket can be inserted. In addition, the scope for error is smaller with this method (smaller measuring circle, no deformation of the bracket, etc.).

a) Three Ball" - Internal Measurement

"Three-ball" internal measuring is done using a special internal measuring application and "T-shaped" ball probes. The corresponding values of the probes (ball diameter d_k and probe constant c) must be known by the program. Now all three measuring positions should be moved on and the corresponding values transferred. For the required measuring positions refer to shown figure [Fig. 7.15.11]. Once the third measurement value has been transferred, the effective diameter will be calculated and the graphic display of the results will be shown. According to the configured number of the inspected diameter value, the measurement should be repeated.

Be sure to have presetted the measuring method to "Three balls method (using T-probe)" in the dialogue form "Inspection conditions". If there are T-probe items in the management of the reference standards are defined, the program will search the T-probe with the nearest diameter value to the best size diameter. You can handle the T-probes also in the dialogue form for the measurement.

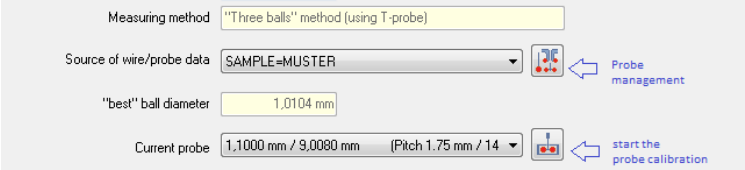


Fig. 7.15.11: Selection of T-probe.

The probe diameter and the probe constant are checked for applicability and reasonableness. A warning message [Fig. 7.15.12] appears as soon as one of these values does not match the thread size.

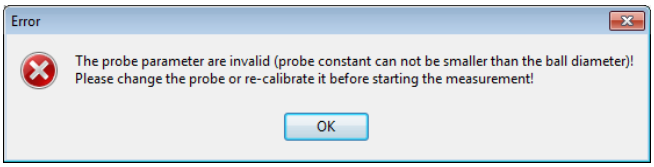


Fig. 7.15.12: Warning message.

If you get this message window on your screen, the probe data are incorrect. You have to confirm this message by using the `OK` button. Change the probe and/or calibrate it by using the button `Probe calibration`.

The probes should be calibrated before every measurement or at least before the first use.

To calibrate the probe using a master ring press the `Calibrate` button. The calibration takes place after entering the diameter of the used setting ring. Carry out two measurements (left side / right side) on the setting ring as shown in the figure below [Fig. 7.15.13].

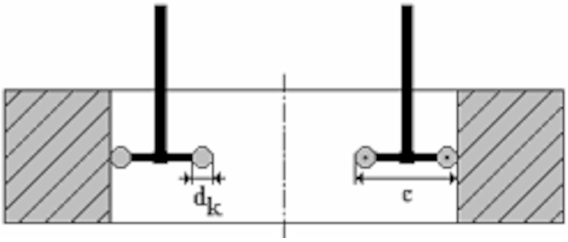


Fig. 7.15.13: Calibration of a T-porbe by using a setting ring.

To determine the pitch diameter, a total of three measuring points must be probed (hence the name three-ball method) and the corresponding values adopted. The location of these measuring points can be found in the figure below [Fig. 7.15.14]. After adopting the third measured value, the pitch diameter is calculated and the result is displayed graphically in the tolerance field. The measurement must be repeated according to the configured number of diameter values to be inspected.

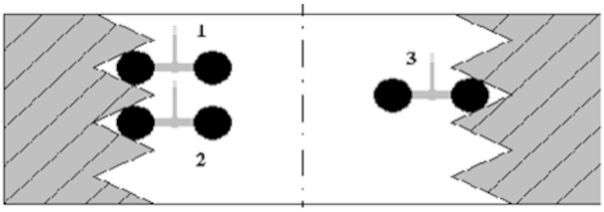


Fig. 7.15.14: Three-ball-method for internal threads.

b) Two ball internal thread measurement

As we have already mentioned, this measurement is done between two ball support brackets and is analogous to the measurement of a plain ring gauge. You should make sure, that both brackets have suitable thread balls with comparable diameters for the thread inspection (depending on the pitch). Before measuring the Screw thread ring, the brackets have to be calibrated on a plain master setting ring. Normally, the indication device of the measuring machine (check the machine specific operation instructions) should be set to “Zero” or to a “Preset” value equal the master rings size.

Be sure to have presetted the measuring method to “Two balls method (using brackets)” in the dialogue form “Inspection conditions”. If there are thread ball items in the management of the reference normals defined, the program will try to find the ball-set with the nearest diameter value to the best size diameter. You can handle the ball-sets also in the dialogue form for the measurement, see figure below [Fig. 7.15.15].

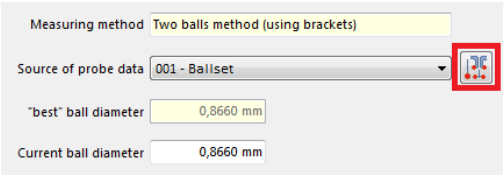


Fig. 7.15.15: Selection of ball-diameters from a ballset “001”.

Then the measuring values can be entered on the keyboard or transferred from your machine.

Warning

For the fixing of the threaded ring gauge on the measuring table the free movement of the ring must be ensured, so that the measuring balls may have a good contact in the respective opposite threaded holes. This is what we usually ensured by the use of a so-called “floating table”.

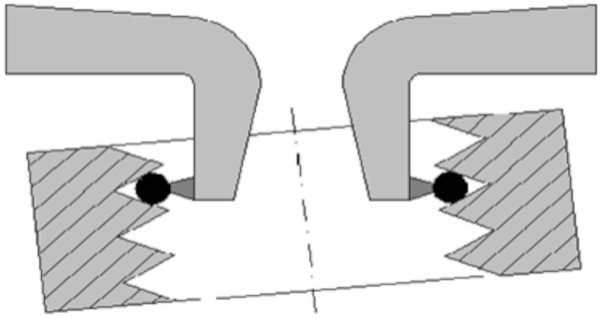


Fig. 7.15.16: Two-ball internal thread measurement.

Measuring of additional parameters (pitch, flank angles)

In addition to measuring the flank diameter, you can also measure the actual values of the pitch and the flank angles (e.g. for a inspection according to VDI 2618, Part 4.8/4.9, options 2, 3 and 4). To do this, activate the option in the *Program Settings* → *Inspection conditions* menu to check the desired parameters for the corresponding gauge type groups. You can also set whether the determined actual values should be used to measure and calculate the pitch diameter. If this is not activated, this calculation is carried out using the nominal values of the thread.

If the corresponding option for specifying/calculating the thread designations is activated, the following screen [Fig. 7.15.17] is displayed for entering the current values.

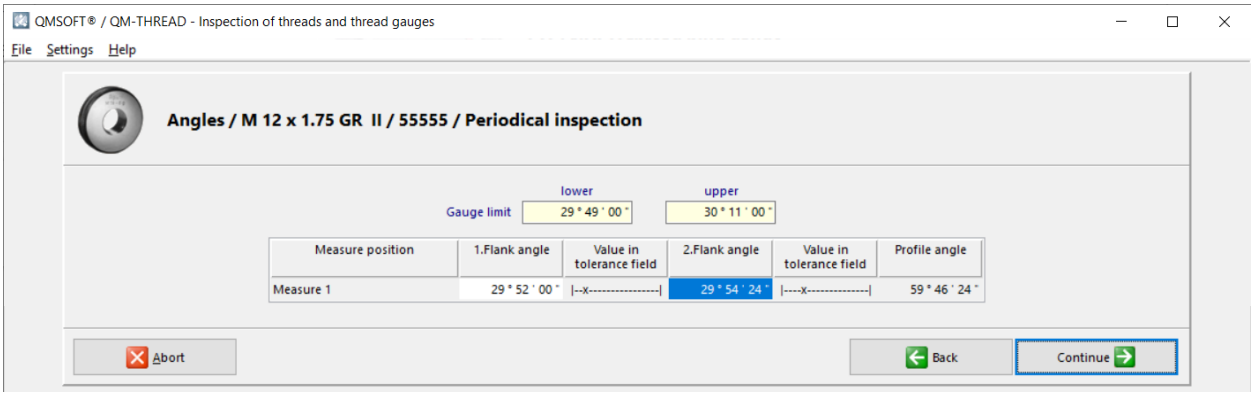


Fig. 7.15.17: Manually enter the actual flank angles.

7.15.2.3 Output of results

The output of all of the inspection results is described in chapter *Output of results*. Make sure that you have selected the correct certificate layout files before doing this.

7.15.2.4 Hints for use of contour scanning devices

In addition to classic thread measurement methods, the program QMSOFT®/QM-THREAD also allows the evaluation of complete thread contours, which were taken with special contour scanning devices (eg T+S ConturoMatic, IAC Master Scanner).

In contrast to the classical thread measuring methods with wires/balls a complete analysis of all thread parameters such as thread pitch diameter, flank angles, outside or inner diameters, pitch is possible. In order to perform evaluations with such a device, please observe the following points.

- To evaluate contour measurements, a suitable "inspection device" must be set up in the QMSOFT®/QM-DeviceServer. In the device properties of this device object (right mouse button) you can specify the default directory in which the contour files are saved (see the manufacturer's device manual).
- Set up the connection to the contour device object in the program settings dialog of QMSOFT®/QM-THREAD.
- The measurement method (see inspection conditions) must be set to "Evaluation of contour data file" [Fig. 7.15.18].
- Also note: If you define a position list that contains measurements in different sections, you need a contour scan for each section. The same applies to double-sided plug gauges. Here, separate contour files are required for the GO- and NOGO-side.

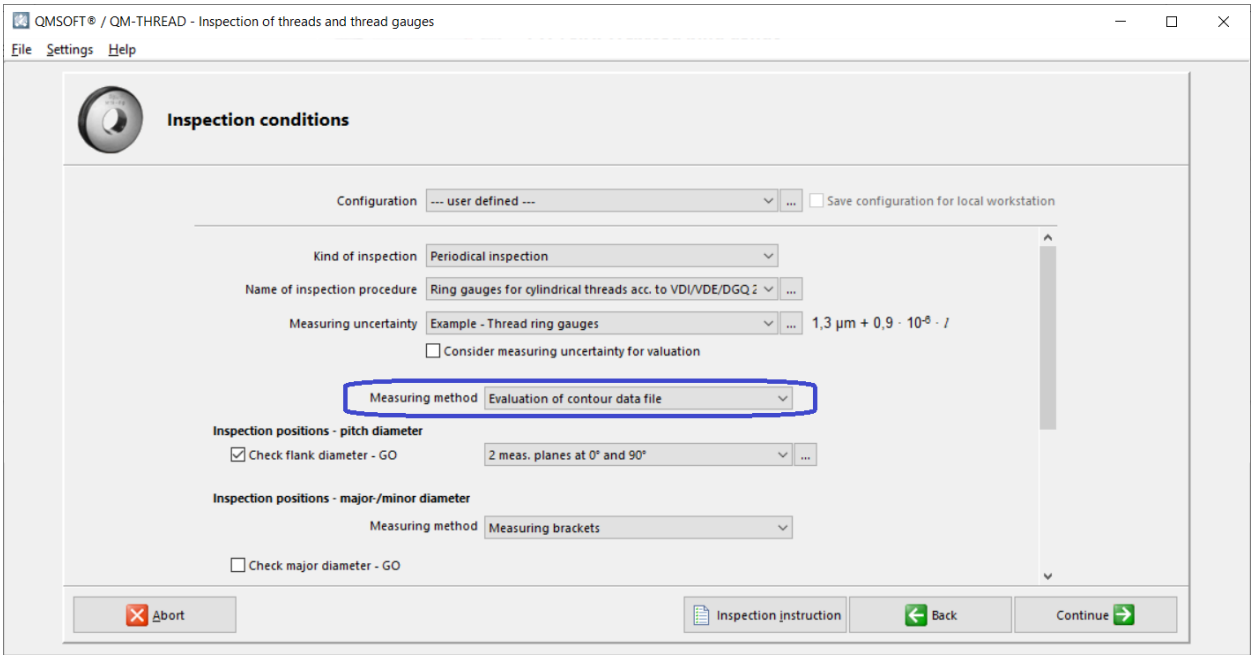


Fig. 7.15.18: Inspection conditions for contour scanning.

After entering the inspection conditions, the program window for reading the measured values from the contour file appears. Select the contour file for your current evaluation [Fig. 7.15.19].

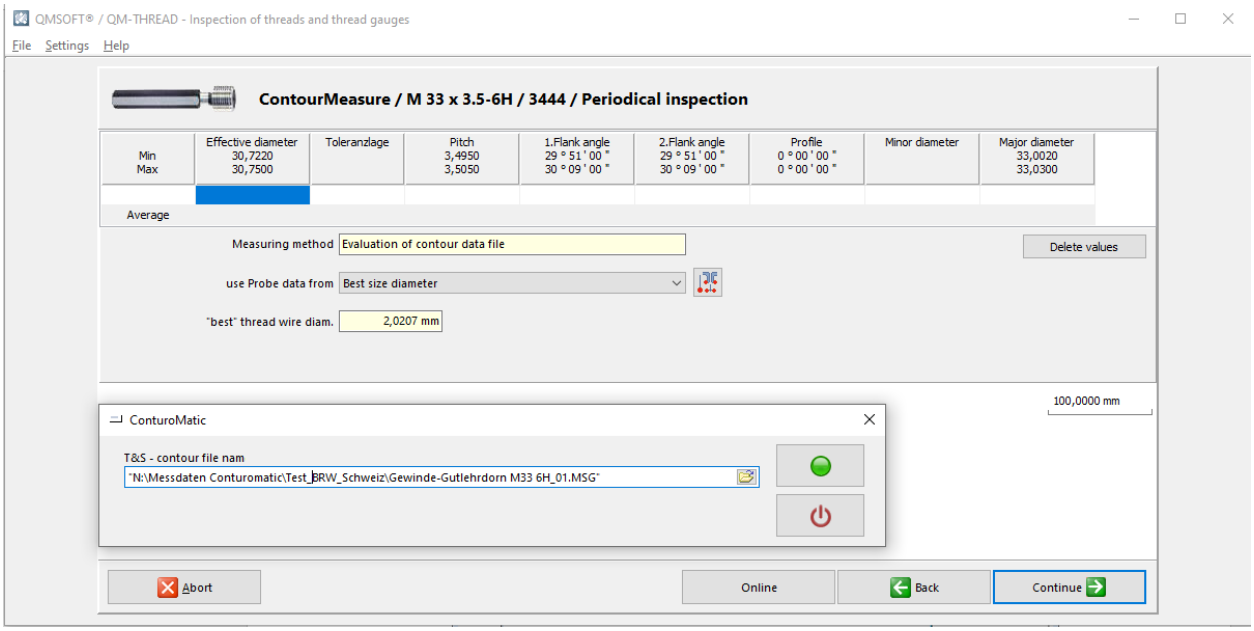


Fig. 7.15.19: Select the contour data file.

After selecting the contour file, click on the trigger button with the “green dot” symbol to start the evaluation of the contour data.

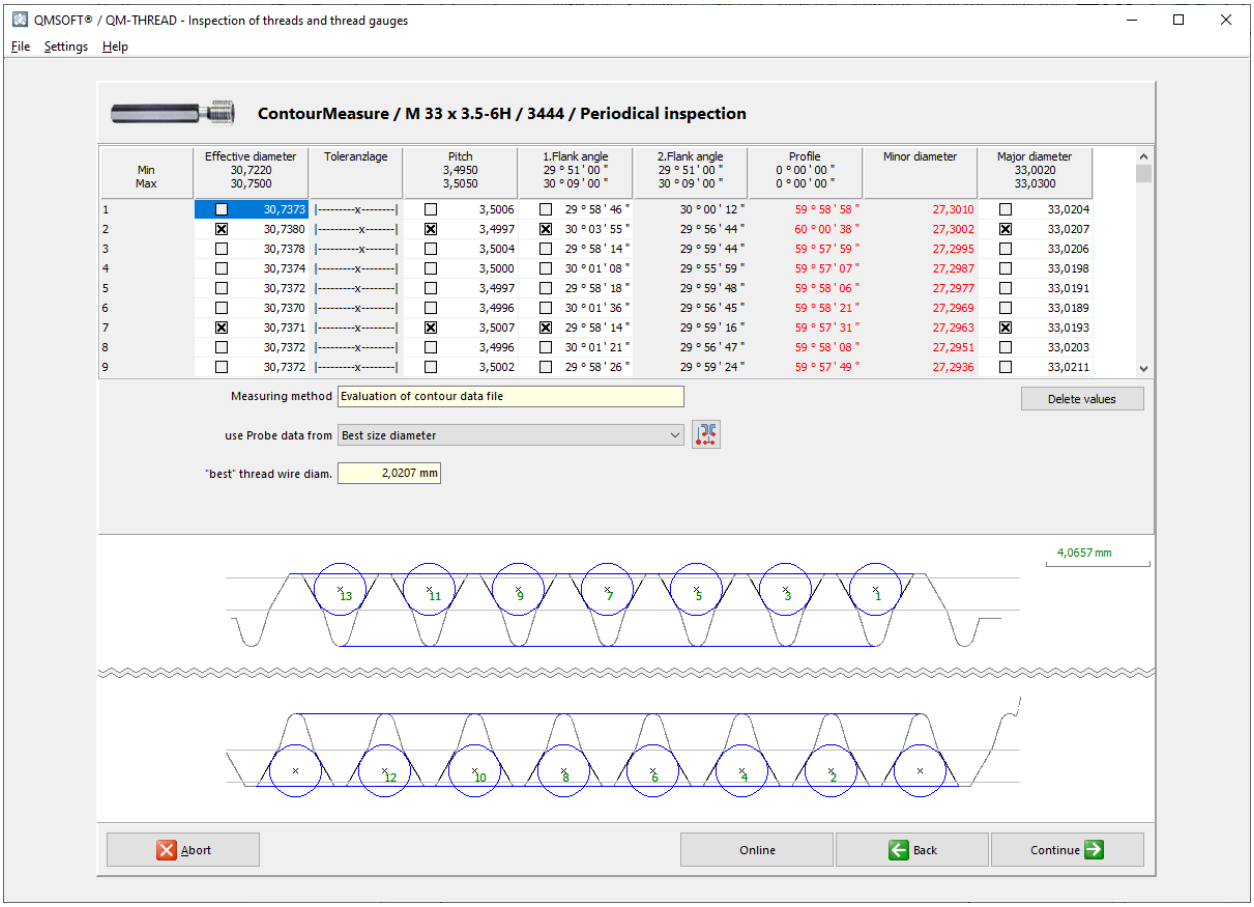


Fig. 7.15.20: Evaluation of contour file.

You will now receive a list with all evaluated parameters [Fig. 7.15.20]. The checkboxes - preselected depending on your position list - are used to select the values that should be output on the inspection certificate.

By clicking on the button `Contiinue` you can access the dialog form for outputting the results of the gauge inspection.

7.16 Inspection program QMSOFT®/QM-TORQUE

The program QMSOFT®/QM-TORQUE was designed to support the inspection of indicating and setting hand torque tools according to DIN ISO 6789 or self defined factory standards. The permissible tolerances will be determined according to DIN ISO 6789 or according to your own factory standards. The program does provide the functions necessary to define your own tolerance values and to set the evaluation method. Depending from the type of the torque tool the program calculates the deviation range of the inspected gage.

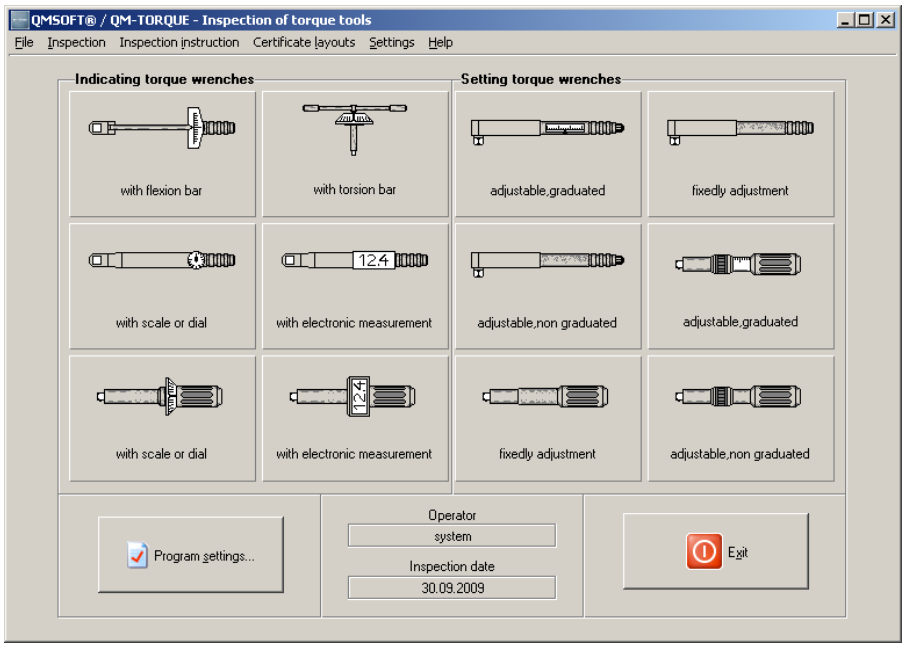


Fig. 7.16.1: QMSOFT®/QM-TORQUE start screen.

7.16.1 Settings > Program settings

The menu item *Settings* → *Program settings* allows you to adjust various settings according to the present circumstances. The different categories of settings are described below.

7.16.1.1 Default

Here some basic settings you can pre-define as the connection to a torque inspection device or default result values for attributive inspection steps [Fig. 7.16.2].

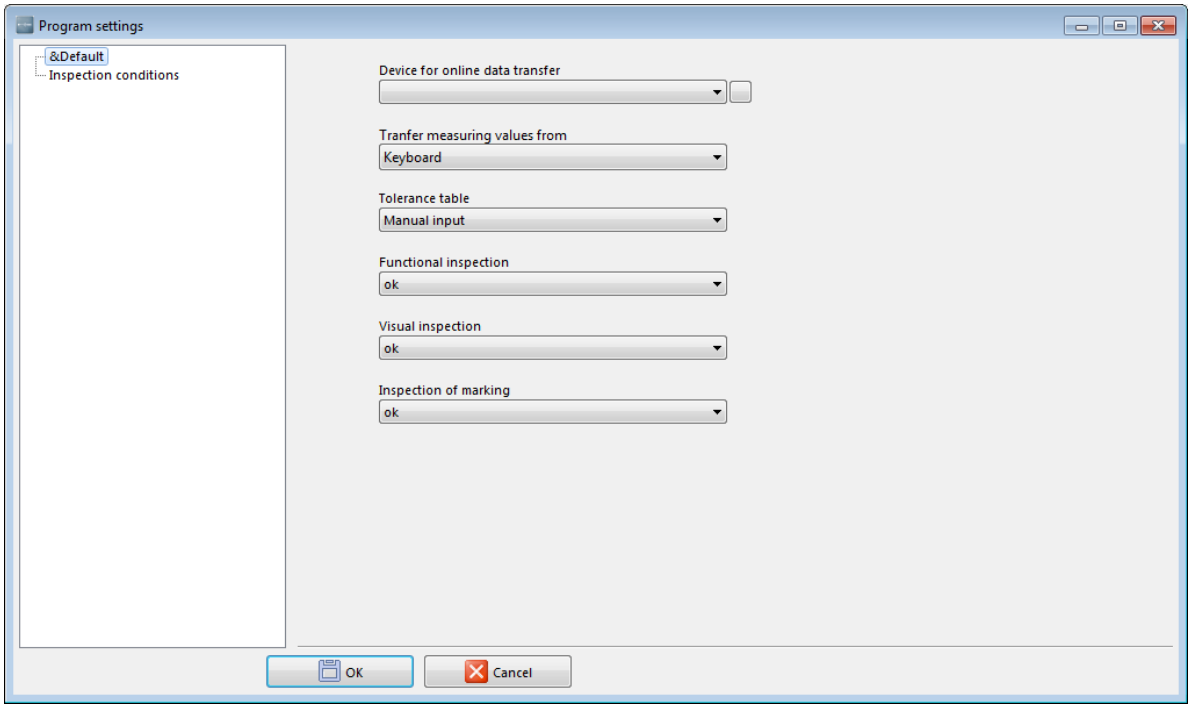


Fig. 7.16.2: *Program settings → Defaults*.

Defaults for the results of “Visual inspection”, “Functional inspection” and “Inspection of marking”.

For this parameters you can preset the default values: “ok”, “not ok” and “not inspected” are possible values. While inspection of a torque gauge you can change this values of course.

7.16.1.2 Inspection conditions

By selecting the inspection procedure, you can preselect the distribution and the number of inspection positions [Fig. 7.16.3]. If you select the standard DIN EN ISO 6789, you will get three positions with 5 measurement values at each position. If you select “factory standard”, the number of inspection positions and measurements you can specify “free”.

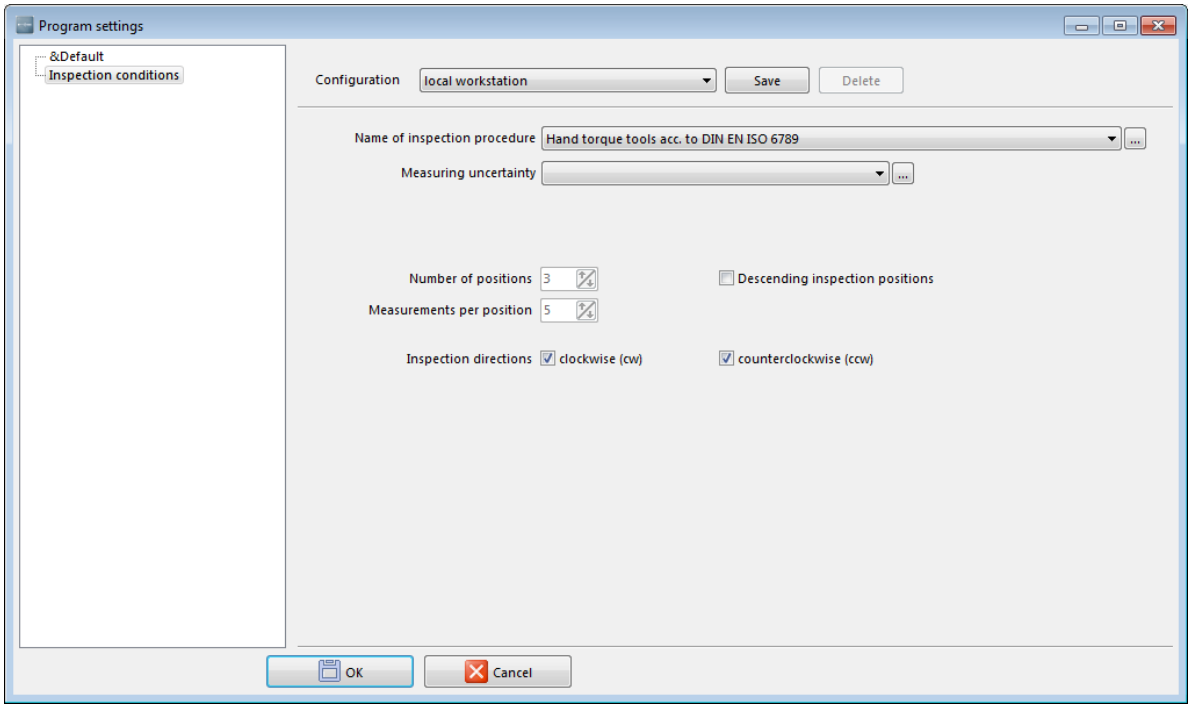


Fig. 7.16.3: *Program settings → Inspection conditions*.

7.16.2 Settings > Management of tables for error limits ...

Additional to the usual inspection of a torque tool according to DIN ISO 6789 the program offers the possibilities to enter your own tolerances into a so-called “tolerance table” [Fig. 7.16.4]. These tolerances are to be entered separately for each combination of type and class. To reduce the input effort you can copy existing tolerance tables.

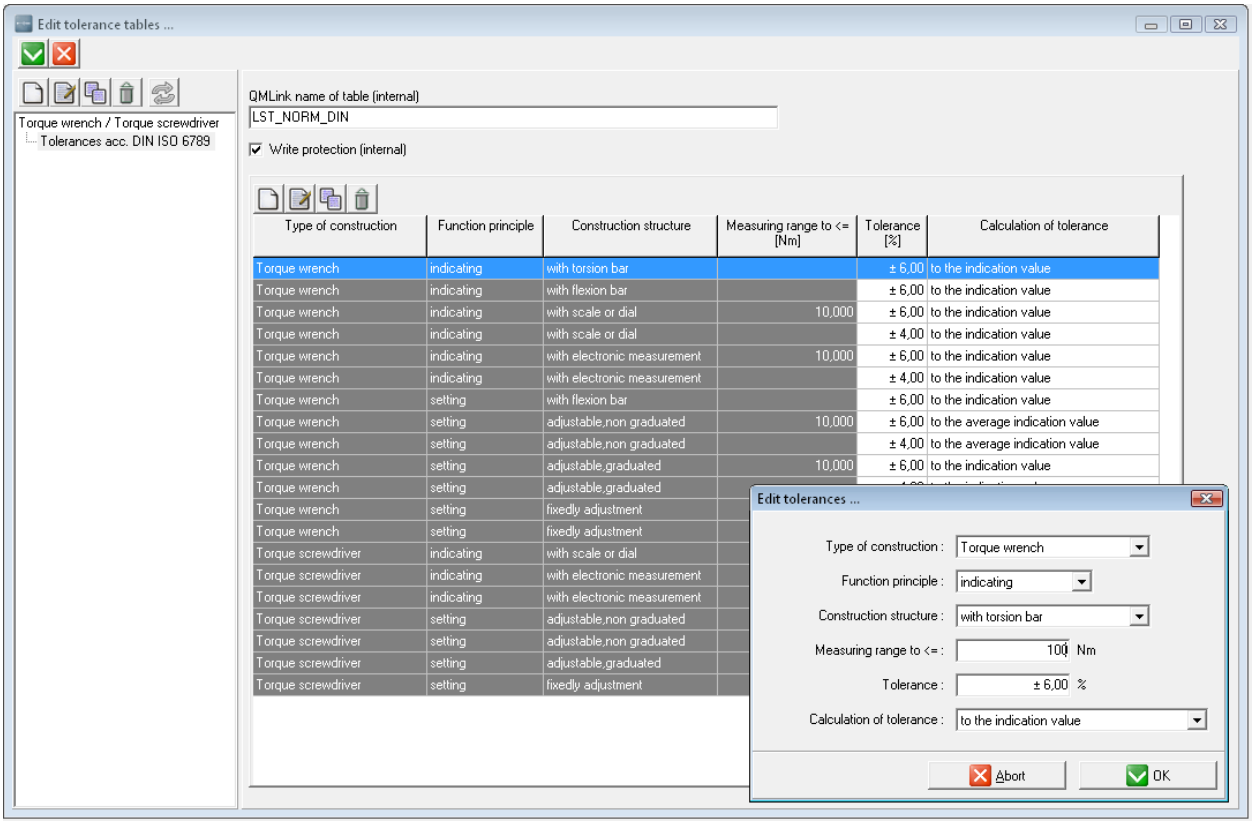


Fig. 7.16.4: *Settings → Management of tables for error limits ...*.

When entering values for the permissible deviations please note the reference of the tolerance calculation. This can be (depending from the design of the torque gauge and from the inspection conditions) the current display value (set value), the torque peak (measuring range) or the average of the recorded measure values.

7.16.3 Doing a torque gauge inspection

7.16.3.1 Entering nominal gauge data

After choosing the type of the torque gauge to be inspected (use the menu “Inspection” to select a type), the dialog box shown in the figure [Fig. 7.16.5] will appear on your screen. Corresponding with your selection there are different fields showing the toque gauge parameters.

If the program is started up from the gauge data management system QMSOFT®/QM-MANAGE, the dialog fields are blocked, and the nominal values of the gauge will be transferred from the database.

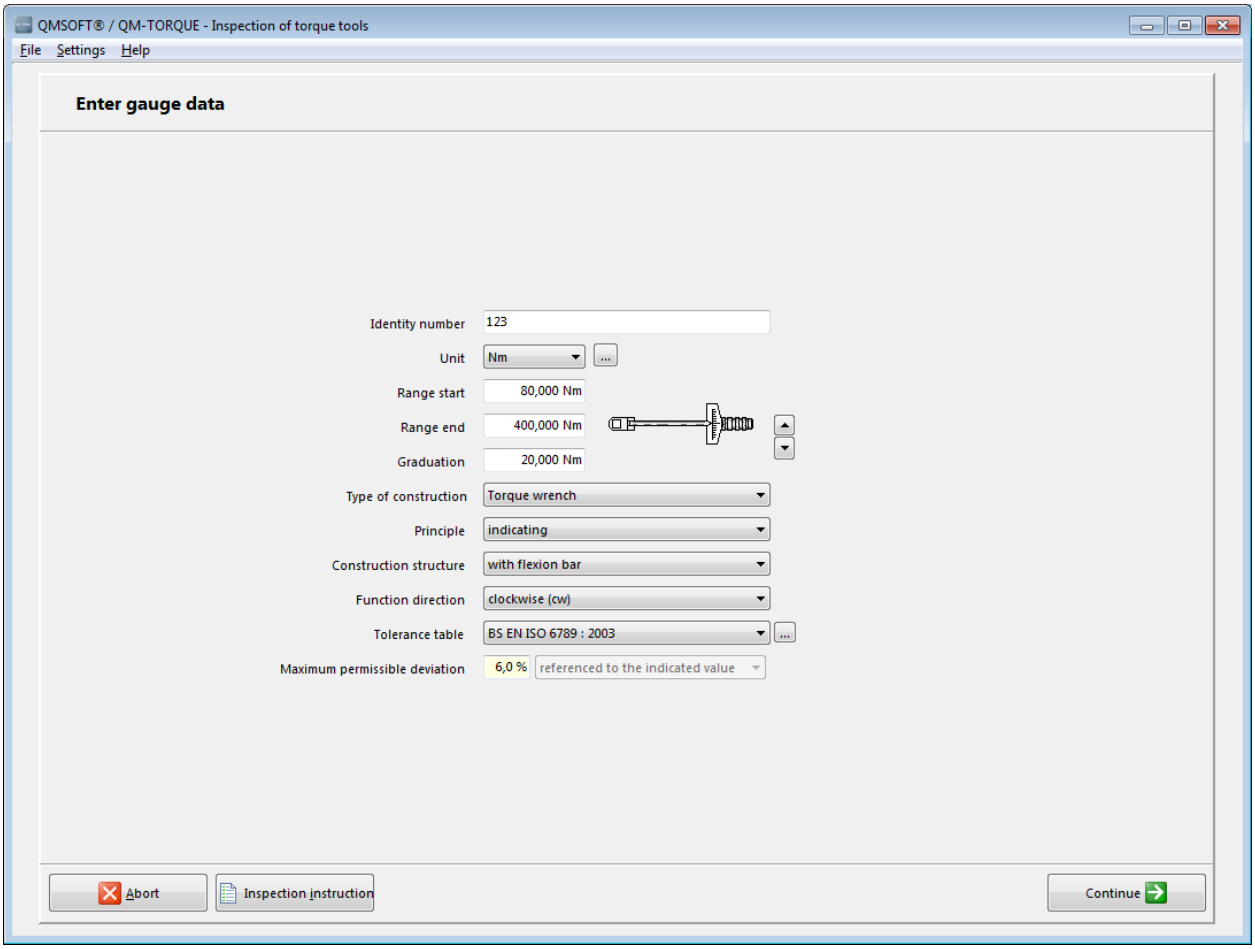


Fig. 7.16.5: Enter gauge data.

- UNIT
  Select the unit from the list.
- RANGE START
  Here you have to enter the value of the start of the measuring range.
- RANG END
  Here you have to enter the value of the end of the measuring range.
- GRADUATION
  Select the graduation of the torque gauge from the offered list.
- TYPE OF CONSTRUCTION
  Select an item from the offered list. Note, that DIN ISO 6789 allows only valid combinations of Bauart, “Type of construction”, “Principle” and “Function direction”.
- PRINCIPLE
  Select an item from the offered list (see type of construction).
- CONSTRUCTION STRUCTURE
  Select an item from the offered list (see type of construction).
- FUNCTION DIRECTION
  Select an item from the offered list (see type of construction).

- Tolerance table
  Here you can define, that you want to use tolerances from the standard DIN ISO 6789 or self-defined tolerance values (factory standard).
- CW - CCW
  Select the direction(s) of rotation (clock wise, counter clock wise), which you want to inspect.

After entering all oft he values use the `Continue` button to proceed.

> **Warning**
>
> If the `Continue` button is blocked, one ore more informations are incomplete, or the combination of parameters does not fit to the requirements of the standard DIN ISO 6789.

7.16.3.2 Visual and functional test

Before the start of measurement, a form appears to record the results of the visual and functional test of the gauge. Use the `Reject (Scrap)` button to skip the measurement to lead you directly to the finnishing of the inspection to produce a "scrap certificate" document.

7.16.3.3 Measurement

Before starting to enter (take over) the measuring valuess you can check and modify your pre-setted inspection conditions, may be you want to modify the default settings for the inspection of the actual gauge. [Fig. 7.16.6]

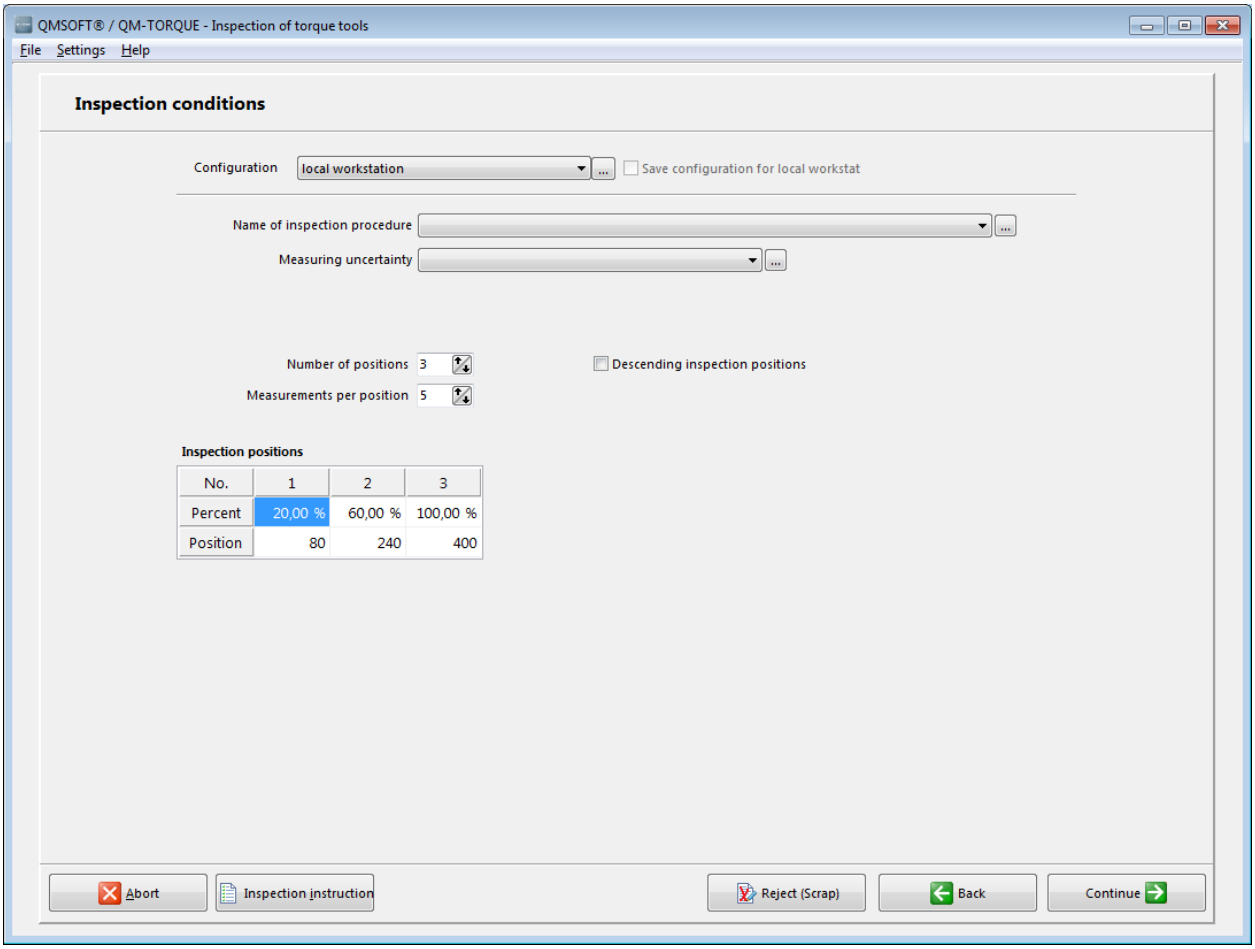


Fig. 7.16.6: Inspection conditions.

If you have used the inspection procedure DIN EN ISO 6789, you cannot change most of the inspection parameters (exception: parameter “Descending inspection positions”). If you have selected a factory standard, you can modify the number and the value of the inspection positions.

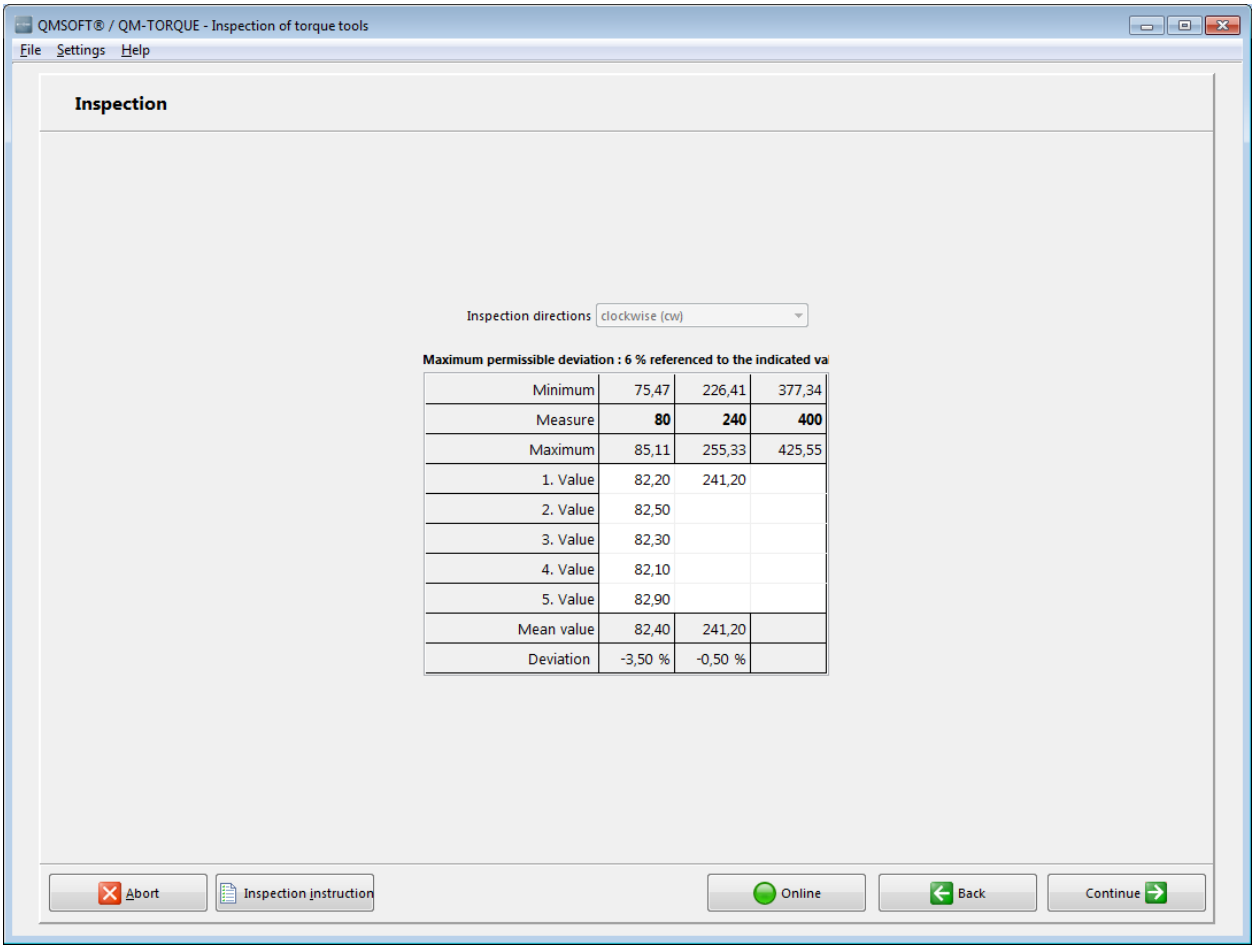


Fig. 7.16.7: Entering the measures.

Doing an Online-measurement the values will be taken over directly into the active “Cell” of the measure table at your screen [Fig. 7.16.7]. If you have entered a measure value, the color of the frame around the cell in the measure table will switch to red as soon as a tolerance excition was detected. After entering all oft he measures the program calculates the maximum measure deviation in percent.

7.16.3.4 Output of results

The output of all of the inspection results is described in chapter *Output of results*.

CHAPTER 8

QMSOFT®/QM-DeviceServer

The QMSOFT®/QM-DeviceServer is used for the technical integration and visualization of different components of (in most cases: measuring) hardware devices such as universal length measruing machines, temperature measuring devices, pressure measuring devices, torque calibration stands etc. into the QMSOFT® system. QMSOFT®/QM-DeviceServer can be used not only in combination with original equipment, but also for retrofitting of older (length) measuring machines (for example from the manufacturers Helios, Mahr, SIP, TRIMOS, Zeiss/OKM etc.) to transmit readings and other data directly and without unnecessary manual interventions into QMSOFT®.

The QMSOFT®/QM-DeviceServer offers

- unified and centralized functions to configure, start and operate the measuring device user interfaces,
- features for linking diverse reading sources to a complex measurement equipment,
- central storage of all of the configuration settings in the QMSOFT® database,
- the protection of all of the configuration settings against unauthorized changes by using the QMSOFT® user management,
- the supply of the measurements and data via a TCP/IP communication interface (client/server principle), so that proprietary hardware can also be integrated into a QMSOFT® terminal server environments,
- the transfer of the measurements to the QMSOFT® inspection programs (the licenses for these modules are not a part of the QMSOFT®/QM-DeviceServer-license),
- features to import and export device settings for easy porting device configurations.

Warning

Please read this manual carefully (before using the software!) to avoid damage of interfaces and measuring instruments by incorrect configuration settings and operations!

8.1 Starting the QMSOFT®/QM-DeviceServer

The QMSOFT®/QM-DeviceServer will be normally started automatically, if QMSOFT® is started, and it will be anchored as an icon in the “Tray”-area of the Windows-Taskbar (also called as “System Tray”, “Systray” or “Info-area”), where the program can be opened with a click of the right mouse-button onto the icon as shown in the figure below.

Fig. 8.1.1: Icon DeviceServer in Systray.

The item “QMSOFT®/QM-DeviceServer show” of the context-menu will open the main window of the QMSOFT®/QM-DeviceServer onto the screen.

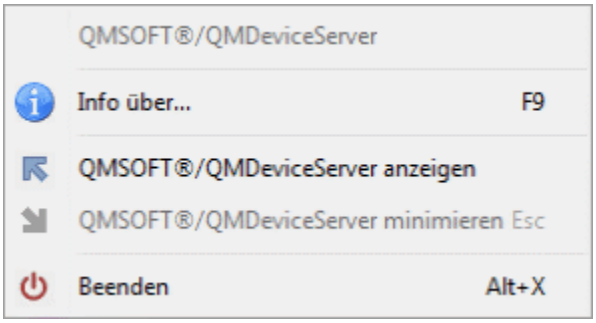


Fig. 8.1.2: Context-menu in the tray.

Alternatively, the QMSOFT®/QM-DeviceServer can always be accessed by clicking onto the icon in QMSOFT®/GaugeMan program of course:

Fig. 8.1.3: QMSOFT®/QM-DeviceServer-icon in QMSOFT®/GaugeMan.

Before the QMSOFT®/QM-DeviceServer can be used for the first time, it must be setted up once. After this setup step the QMSOFT® inspection programs can access the measuring device(s) and receive any data.

For all of the workplaces, which never need to use any device connections, the automatic startup of QMSOFT®/QM-DeviceServer after calling QMSOFT®/GaugeMan can be disabled in the preferences. Please make sure, that the use of proprietary hardware, the corresponding hardware drivers are installed correctly before accessing the device interfaces with QMSOFT®. With related problems, you should first contact the hardware manufacturer!

Please note that due to the rapid developments in the field of computer technology, of the interfaces and in particular of the operating systems, on which you are running QMSOFT® programs, as well as, of course, through the development

of QMSOFT® programs by the L&W GmbH can occur differences between the figures of dialogue forms and captions may appear between this document and the installed QMSOFT® software. Please do not interpret these differences as failures in the software!

8.2 Management of measuring device objects

Start the QMSOFT®/QM-DeviceServer.

During a first installation of QMSOFT®, it is recognized immediately after booting that no device object definition has been created yet and the function for adding a device is therefore executed automatically. If you would like to add additional devices later, you can do so using the menu function `Add Device` or by clicking on the corresponding toolbar icon.

8.2.1 Create a measuring device object

First, a dialog appears with drop-down-lists for equipment manufacturers and the manufacturers description of the corresponding device types. Either select one of the listed device manufacturers (you will receive a list of all supported devices from this manufacturer) or select the entry "(all device manufacturers)" if you want to see the full list of supported devices (from all device manufacturers). In the dialog form [Fig. 8.2.1], select a device name from the right list and click the `Continue` button.

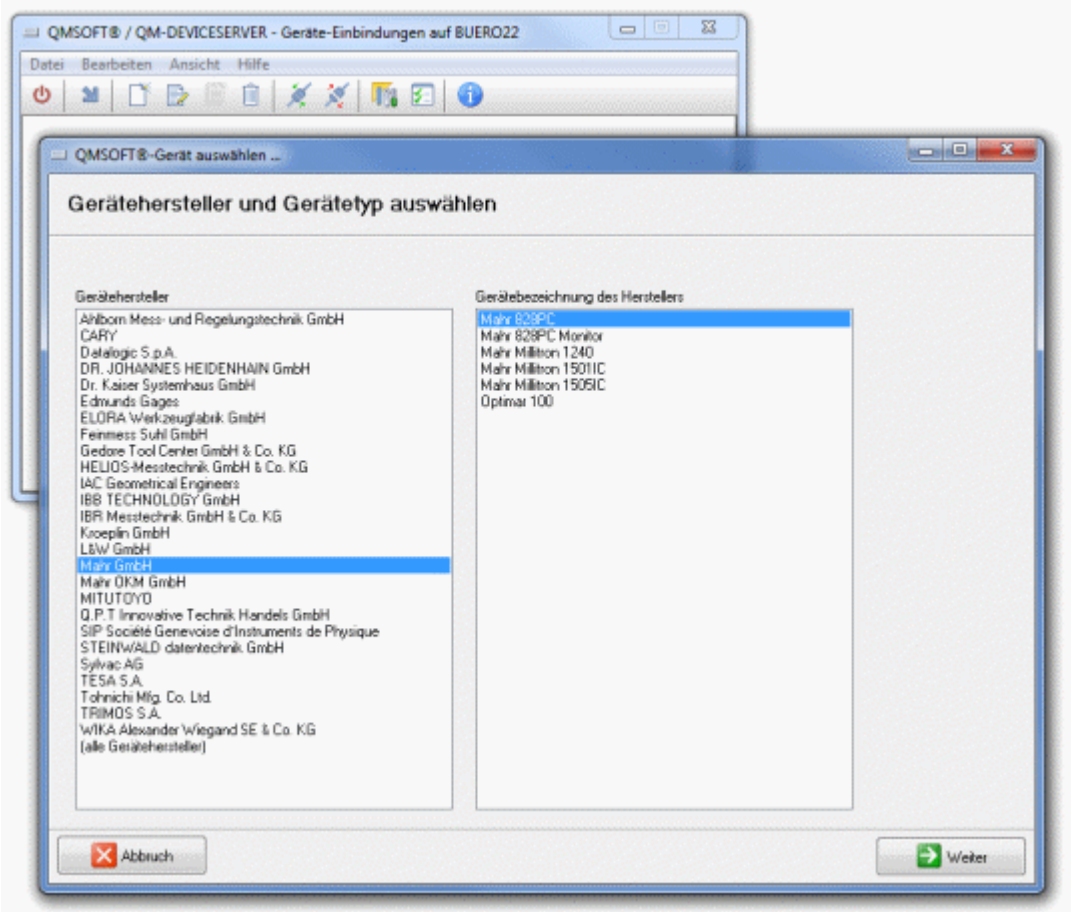


Fig. 8.2.1: Select manufacturer and device type.

In the next input form, please enter a meaningful name for this device object. The default name can usually be used unchanged. The name of the device object is only used to distinguish between several device objects within the QMSOFT®/QM-DeviceServer. It can be assigned arbitrarily, but must be absolutely unique.

If the newly created device is a so-called composite device (and therefore has to access other device components, for example special hardware interfaces that function as pure data sources without their own user interface) and the device object required for this has not yet been defined, a dialog box for selecting the so-called secondary device automatically appears. The device object used in the example of a "Mahr 828 PC" length measuring device accesses two such secondary devices: One device for reading the incremental values of the machine's main axis (e.g. via an IK220 counter card from Dr. Johannes Heidenhain GmbH) and another device for processing the inductive measurements of the opposite bolt of the measuring machine (e.g. via the G4.5 interface card from Dr. Kaiser Systemhaus GmbH).

The dialog form [Fig. 8.2.2] and the procedure are identical to the steps for selecting the primary device, only the selection of available devices is limited to those data source types that are required by the primary device object (for example, inductive measuring systems, incremental measuring systems):

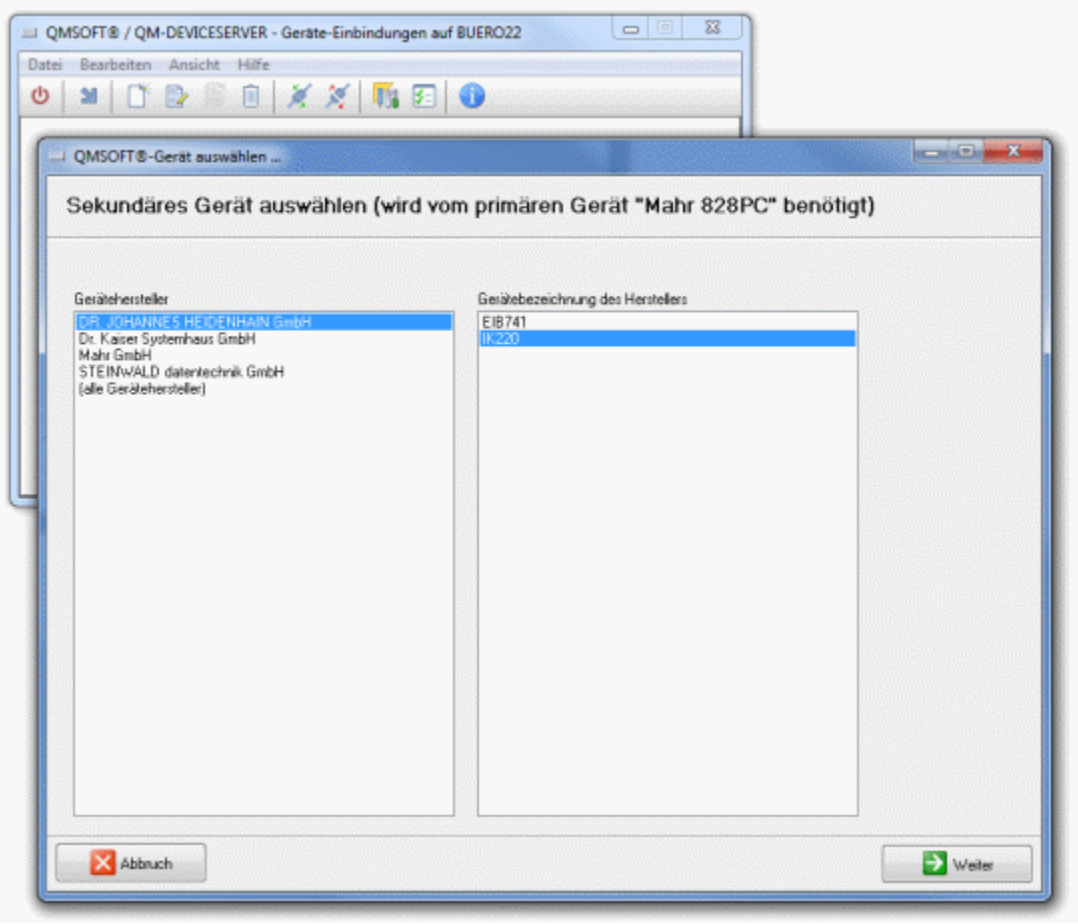


Fig. 8.2.2: Select type of secondary device.

Continue with the `Continue` button and in the next dialog form again enter a unique name for the secondary device object. The main window of QMSOFT®/QM-DeviceServer should now look something like the following figure [Fig. 8.2.3]:

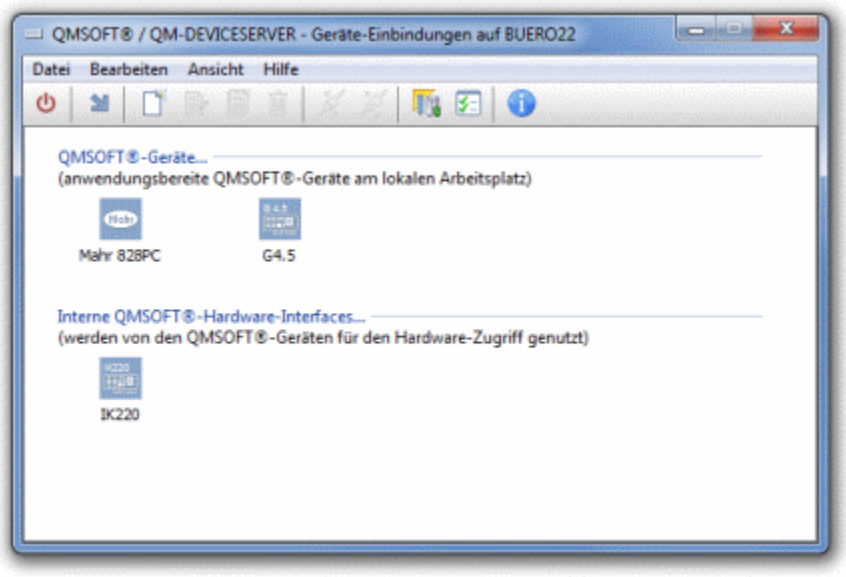


Fig. 8.2.3: Created measuring device objects.

The device object items are always assigned to the current computer workstation and stored in the QMSOFT® database. Please note that when switching to another profile (in most cases this means accessing another QMSOFT® database) the device definitions are not automatically transported! If necessary, the required measuring device object item(s) must either be created manually or exported/imported using an LWX transfer file.

The devices of other workstations can only be viewed via the menu item *Edit → QMSOFT® Devices*.

If the category *Internal QMSOFT® hardware interfaces...* is not visible as in the figure above [Fig. 8.2.3], you can switch its visibility on and off using the menu item *View → Show internal QMSOFT® hardware interfaces*.

8.2.2 Configurate a measuring device object

Each of the device object items displayed in the main form has its own collection of configuration settings that depend on the technical characteristics and hardware and must be set before the device object is used for the first time in QMSOFT®. To do this, please select the device object in the main form and open its settings dialog via the menu item *Edit → Change device properties* in the main menu or the context menu (when right-clicking on the device object entry). The following figure [Fig. 8.2.4] refers to our first example “Mahr 828 PC”:

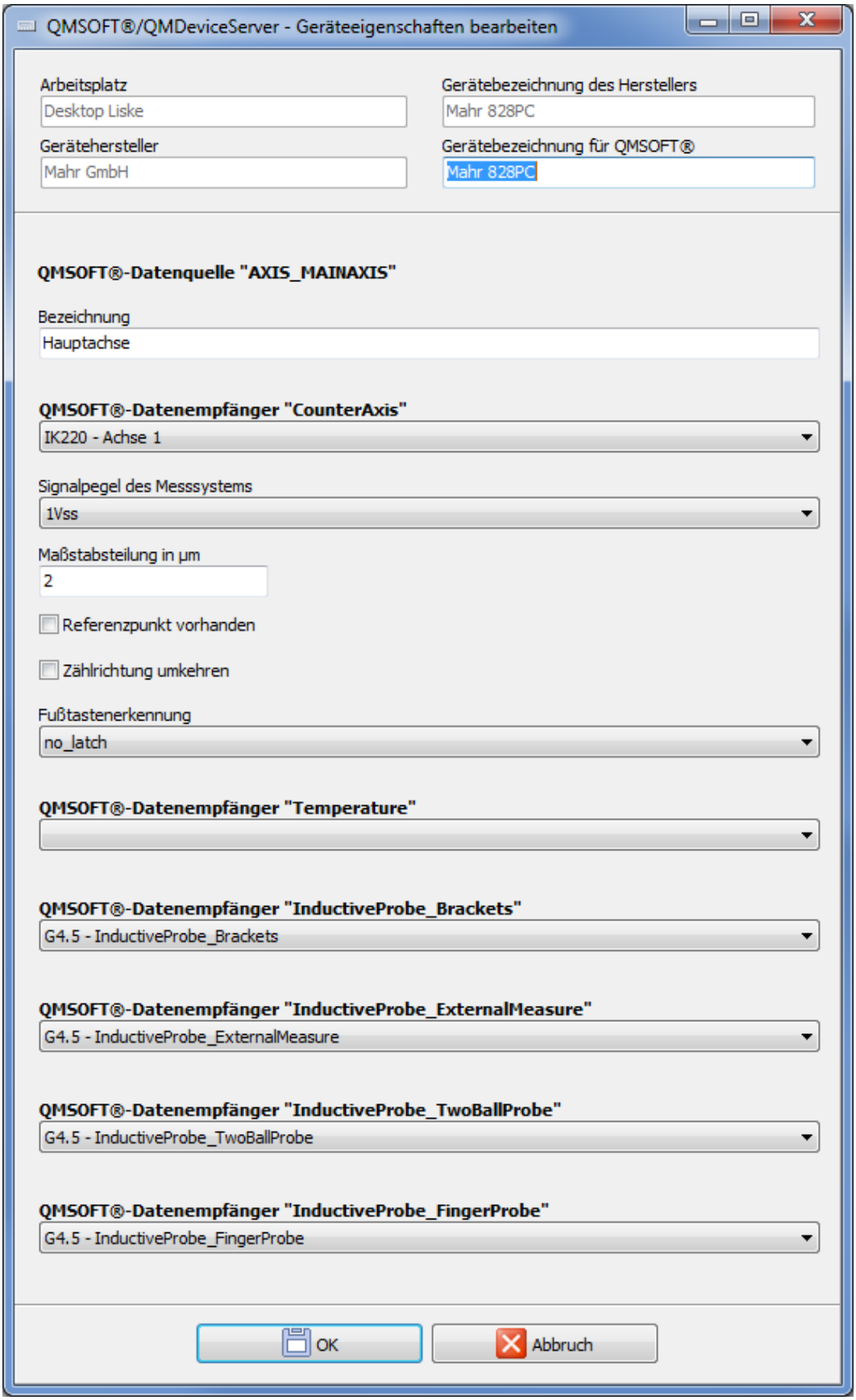


Fig. 8.2.4: Device configuration.

It would go beyond the scope of this documentation if we were to list the relevant configuration parameters for all known measuring device types. Most settings are self-explanatory due to their name in the configuration form; we only describe the most important categories here.

- **QMSOFT® data output channel**
  A QMSOFT® data source represents a logical channel for transferring data values (usually these are values that have been read from a hardware interface into the QMSOFT®/QM-DeviceServer) to the QMSOFT® inspection programs. As part of the configuration, the inspection programs only searches for channels that can deliver the values in the desired unit system (length, torque, pressure, etc.). A QMSOFT® data source should be labeled with a descriptive name (for example: "major axis") to make it easier to distinguish between multiple entries; in the simplest case, you can use the default setting.
- Depending on the hardware, there may be additional technical configuration features, but this is not the case in our example.
- **QMSOFT® data input channel**
  A QMSOFT® data input channel is used to link QMSOFT® data output channels of other device objects to the current device object instance. In the above example you can see, that the QMSOFT® data input channel "CounterAxis" is linked to the QMSOFT® data output channel "Axis 1" of the secondary device "IK220". Corresponding link settings are in the sample for the different channels of inductive card G4.5, however, a temperature gauge is not involved, so the corresponding field remains empty here.

This linking technology allows you to easily create complex measuring devices and device object elements. In the example above, we combine the readings of the length measuring machine's incremental scale with the dimensions of the inductive probe into a single measurement, which is then transferred to the QMSOFT® data input channel for use in the QMSOFT® inspection programs.

8.2.3 Special features of interface types

However, the following sections provide some tips to avoid common errors when connecting measuring devices to QMSOFT®. In any case, first read the manufacturer documentation for the respective hardware interfaces and make sure that you have installed the appropriate hardware drivers for your Windows operating system. Nowadays, most manufacturers offer corresponding download options on their websites.

In the "Additional" folder of the QMSOFT® installation medium you will find driver versions from selected manufacturers. These may contain outdated or no longer suitable driver versions. Be sure to ask the hardware manufacturer about the required driver version. Unfortunately, L&W GmbH cannot give any performance guarantee here!

8.2.3.1 Serial interfaces (RS232)

A defined device object with a serial hardware interface can function correctly in QMSOFT if ALL of the following conditions are met:

- All parameters of the serial hardware interface are known and checked (baud rate, number of data and stop bits, parity, terminator, etc.).
- The serial cable corresponds to the pin and wire assignment required by the interface (cable layout, especially older Heidenhain interfaces require special wiring of the handshake lines, see manufacturer documentation).
- The serial interface of the computer in use is operational (NO yellow exclamation mark appears in the Windows Device Manager).
- The number of the COM port to which the serial cable is connected is known and configured in the properties of the corresponding device object element in QMSOFT®.

Using a so-called terminal program (such as HyperTerminal under Windows XP or other available freeware programs for Windows Vista/7/8), you can check the communication between the computer and the device outside of QMSOFT® (independently of a potentially faulty device object).

8.2.3.2 USB-interfaces

Many interfaces that connect to the computer via a USB port try to emulate so-called virtual serial ports in their driver software; the actual number of this port (often referred to as the COM port number) can be found in the Windows Device Manager.

Make sure that you always use the same USB connector when changing the USB cable, otherwise the number of the emulated COM port will change! The current port number (see Windows Device Manager) and the corresponding setting in QMSOFT®/QM-DeviceServer must always match!

If possible, do not use a USB extension cable or use a very short one and make sure that the maximum permissible load capacity of the USB port on the power supply used is not exceeded. Remove any unnecessary USB devices to reduce the load on the USB controller.

8.2.3.3 Heidenhain counter-card IK220

For the correct operation of the device object items you need to know, what kind of signal level the incremental measuring system provides, and which graduation the scale has. Both informations are not configured in the card object item itself, but in the "parent" device (that accesses the channels of the board, in the example "Mahr 828 PC", "signal level of the measuring system" and "scale graduation in microns").

Make sure, that the PCI slot in the computer has the specification "PCI Local Bus Spec.Rev.2.1" and has an internal supply voltage of 5 V, the energy-saving 3 V models can not be used! You also need to consider, that the size of the card (100 x 190 mm) does not lead to collisions with other components inside the computer.

Note

If you cannot find the device object item IK220 after creating this obeject in QMSOFT®/QM-DeviceServer, you can make all of the device object items visible by using the menu item "View | Show internal QMSOFT® hardware interfaces".

8.2.3.4 Heidenhain EIB741

This type of hardware interface requires connection via an Ethernet network cable. Please refer to the supplied driver CD-ROM for further information on the initial configuration of this device type. Furthermore, you need to know which signal levels the incremental measuring system delivers and which graduation the scale has. The configuration of both pieces of information is not done in the card object itself, but in the "parent" device (see previous chapter).

To connect an EIB741 device to the computer, please follow these steps:

- Connect the EIB741 to the same hub as the computer using a network cable. We recommend temporarily disconnecting all other network connections to avoid address conflicts.
- Set the TCP/IP properties of your computer's network hardware to the following values:
  IP-address 192.168.1.9
  Subnetmask 255.255.255.0
  Standardgateaway 192.168.1.1
- Check the connection between computer and EIB741 using the command line
  "ping 192.168.1.2"

The device should respond to this ping command. If the connection failed, please contact your network administrator or the manufacturer of the EIB741 (in this case WE CANNOT help you).

- On the Heidenhain driver CD-ROM you will find the tool `Networksettings.exe`, which you can use to change the IP settings of the device. The manufacturer's specifications are:
  IP-address 192.168.1.2
  Subnetmask 255.255.255.0
  Standardgateaway 192.168.1.1
  DHCP-Client deaktivated

In QMSOFT®/QM-DeviceServer you must perform the following steps:

- Make all device object items visible using the menu item *View → Show internal QMSOFT® hardware interfaces*.
- Create a new device object item "EIB741".
- Edit the settings of the EIB741 device object item and enter the IP address in the corresponding "IP" field (e.g. "192.168.1.2").
- Rename the measurement channels used according to the use of these channels.

The device object item can now be used as a data source for other device object items.

8.2.3.5 Prodasafe G4.5 interface card

The statements about the installation of the card and the specification of the required PCI slot are the same as for the IK220 counter card (PCI slot, 5V power supply, card height).

Please note, that the various inductive probes of the length measuring device are plugged into the correct input-slots of the supplied cable adapter, they are different input connectors for the linear probe (in Gegenpinole the machine and the button for the internal measurement!

The test program, which is included on the Prodasafe driver-CD-ROM can be used to verify the functions of the card and the use of the correct connectors (a probe deflection by hand should cause display values between -2047 and +2047 increments).

The connected inductive probe(s) have to be calibrated prior to their first use in QMSOFT®.

8.2.4 Special features of measuring device types

This section describes the characteristics of some specific devices and their integration into QMSOFT®/QM-DeviceServer.

8.2.4.1 Ahlborn temperature measuring device ALMEMO

The device-series of the manufacturer Ahlborn are able to support different temperature sensors and to deliver their meaures by using a serial connection (often via a seriell-to-USB-adapter) to a computer.

8.2.4.2 QMSOFT® measure display programs via DDE

Older versions of the QMSOFT®-system (version 2 upt to 5) are using a communication technology, which is based on “Dynamic Data Exchange” (DDE, an old Windows-internal technology). The QMSOFT®/QM-DeviceServer can “map” such old DDE-compatible programs into the actual QMSOFT®-world. Please use this feature only in that case, that you cannot find a device object type in QMSOFT®/QM-DeviceServer!

8.2.4.3 Software TRIMOS WINDHI

The horizontal length measuring devices of the manufacturer TRIMOS usually comes with its own measurement display program, which is called “WinDHI”. This software has a DDE-interface through which it can be controlled remotely. The DDE interface is identical to older DDE-compatible measure display programs from the QMSOFT® versions 2 to 5.

In addition, a part of the communication is dealt with a direct read/write access to the file `WINDHI.INI`.

Warning

The actual Windows user has appropriate access privilegues to read and write the file `WINDHI.INI`.

While setup the basic configuration in WINDHI the parameters of the page “DDE Channel” has to be configured as you can see in the following figure:

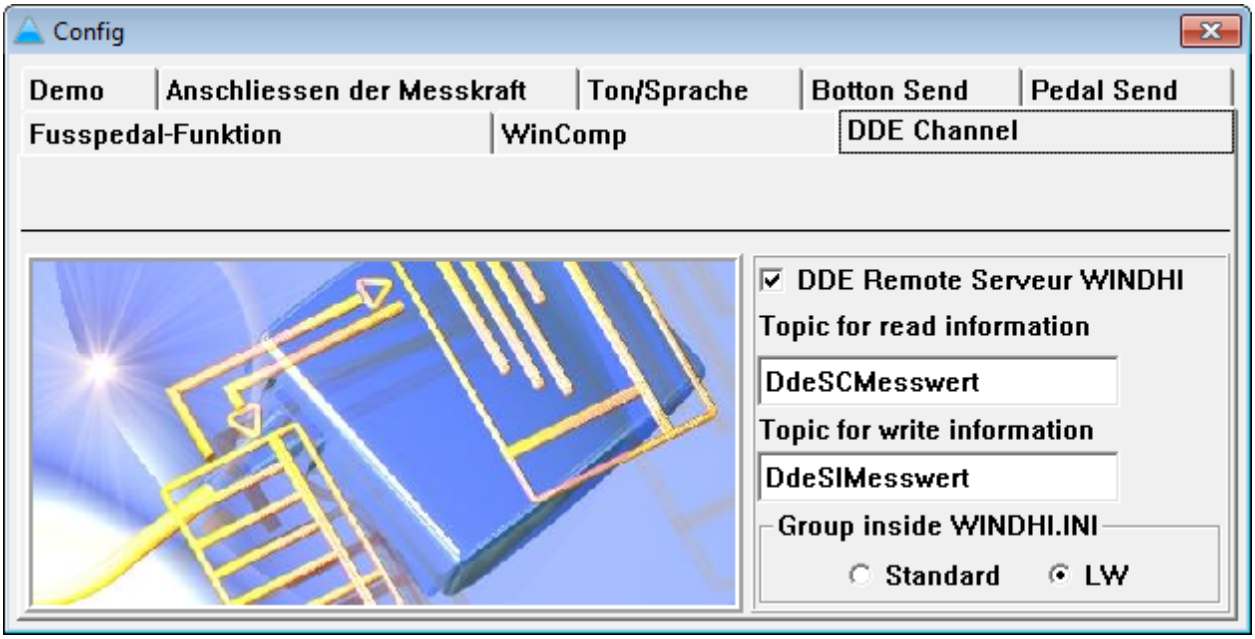


Fig. 8.2.5: WINDI settings for DDE-communication.

The WINDHI configuration settings are accessable after typing in a password, please contact your TRIMOS-dealer or service partner to get this password.

A description of all of the features and the handling of the WINDHI software is not a part of this document, please read the manual of the measuring device to learn more about WINDHI.

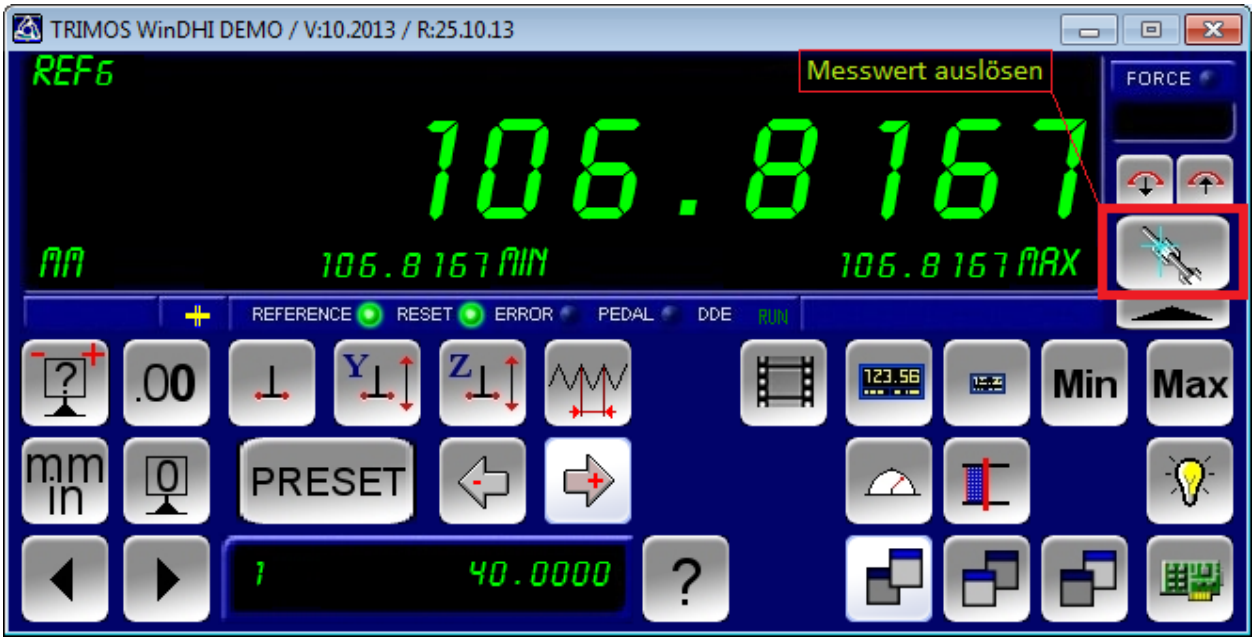


Fig. 8.2.6: Trigger button to send a measure.

To trigger a measure (to send it to QMSOFT®) please click onto the button `Transfer of value to the DDE Server o to the keyboard` (right behind the measure display).

8.2.4.4 Software Mahr-Monitor-828

The horizontal length measuring devices of the manufacturer Mahr GmbH usually comes with its own measurement display program, which is called “828MON”. This software has a DDE-interface through which it can be controlled remotely.

8.2.5 Device correction methods, device calibration

The accuracy of some kinds of measuring device types, which are supported by the QMSOFT®/QM-DeviceServer, can be increased by appropriate correction and compensation methods. The correction settings are accessible via the `SETUP` button, which is located in the measure display window of the respective device object.

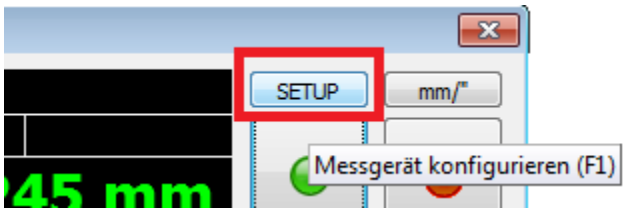


Fig. 8.2.7: `SETUP` button.

The actual QMSOFT®-user should be assigned to the access right for the device configuration feature, otherwise the `SETUP` button is disabled.

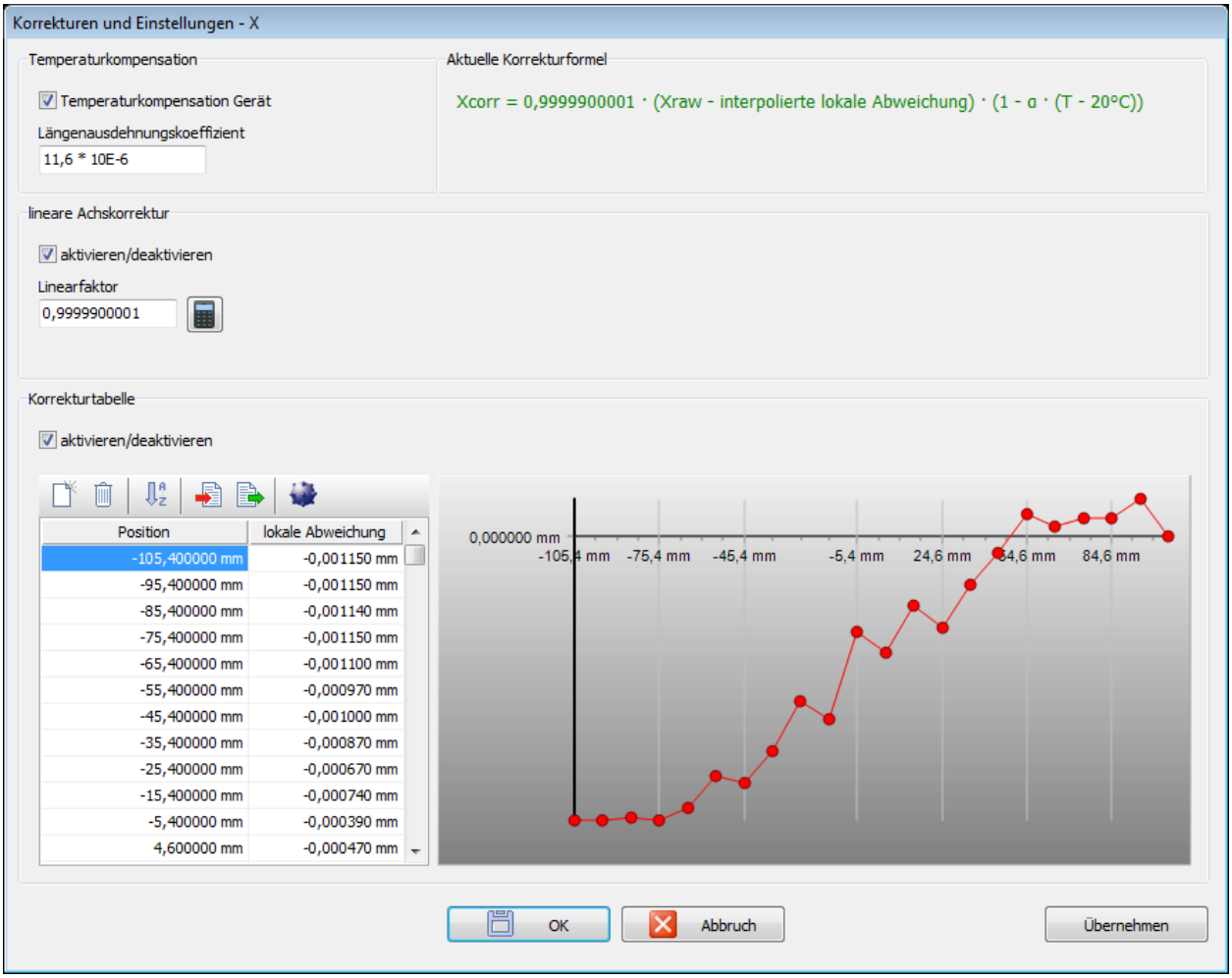


Fig. 8.2.8: Correction settings.

The correction process components can be switched on or off separately, their results will be overlayd. The correction sequence consists of

- pointwise correction of scale errors by linear interpolation between two points of a correction table,
- linear correction by linear factor,
- temperature compensation.

The following sections provide some information for a better understanding of the correction process.

Warning

Be very careful with changing the correction settings, as they directly affect the accuracy of the device!

8.2.5.1 Linear correction

The linear correction is calculated according to the following formula:

$$X_{\text{corr}} = b \cdot X_{\text{RAW}} \tag{8.2.1}$$

symbol	description
b	linear factor
X_{corr}	uncorrected measure
X_{RAW}	corrected measure

In that case, that the manufacturer of the measurement system has provided a linear factor, you can enter the value into the appropriate field and switch on the linear axis correction. If you want to determine the factor itself during a machine inspection and -recalibration, please use the `Calculator` button right beside of the input field to calculate the linear factor:

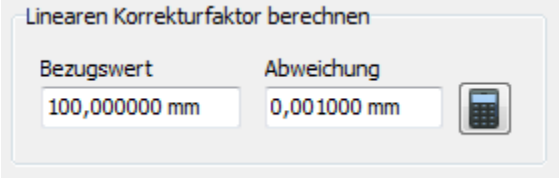


Fig. 8.2.9: Calculation of the linear factor.

Enter the determined deviation and the used reference length into the two input fields and press the `Calculator` button again (it is located after the first operation right beside of the input field for the deviation. The linear factor is calculated with the correct sign, the calculation tool disappears.

8.2.5.2 Correction table

The use of a correction table allows the compensation of local errors of the scale graduation, which do not follow to a linear model.

$$X_{\text{corr}} = X_{\text{RAW}} - X_{\text{dev}} \tag{8.2.2}$$

symbol	description
X_{dev}	locale deviation at position X_{RAW}, is calculated by interpolation between two points with known deviations at this points
X_{RAW}	uncorrected measure
X_{corr}	uncorrected measure

Warning

In most cases the determination of the local deviations is possible with sufficient accuracy at the device manufacturer loaction only, because there you have laboratory conditions!

If the use of the correction table is activated, various control buttons for creating, deleting, sorting and to export and import correction data can be used. A graphical representation of the "correction curve" can immediately recognize entry errors. You can also see immediately, how good in determining the correction values the reference measurement device was aligned with the inspected measurement device (or as is well aligned with the measurement system within the device).

8.2.5.3 Temperature compensation

The temperature compensation of a measuring device is a very delicate problem. It follows the known physical facts, and therefore it is based on the following formula:

X_{comp}

$$X_{comp} = X_{\text{RAW}} \cdot (1 - \alpha_{\text{mess}} \cdot (T_{\text{mess}} - T_{\text{base}})) \tag{8.2.3}$$

symbol	description
X_{RAW}	uncompensated measure
α_{mess}	thermal expansion coeffizient of the measuring system
T_{mess}	actual temperature of the measuring system (in °C)
T_{base}	reference temperature (20 °C)
X_{comp}	compensated measure

In that case, that the manufacturer of the measuring device has provided a coefficient of thermal expansion for the measuring system, you can enter the value into the appropriate field and switch on the temperature compensation.

Warning

Before you can use the temperature compensation, you have to connect the measuring axis to a corresponding temperature channel in the configuration settings of the corresponding measuring device object, which can provide the temperature of the measurement system!

Temperature processes are time-dependent: a measurement procedure with the use of temperature compensation methods will require more time as a procedure without temperature compensation. Stable and balanced climate conditions in the laboratory are therefore very important for the accuracy of a measurement procedure as minor (but stable) deviations from the standard reference temperature (20 °C).

Warning

Inaccurate the thermal expansion coefficients degrade the accuracy or increase the uncertainty, flat details from table books are a guideline only and have nothing to do with the properties of your measuring device!

The temperature compensation of the measuring device itself is only ONE component at a complete compensation of a measurement process. Caused by variations in temperature expansions of the used reference normals and of course the measured gauges itself also affect the measurement result, both components initially follow the same mechanisms in the above formula, act depending on the measure, however, in different directions. We cannot describe the whole basic calculation model for the various measurement strategies, important for the user in this context is the fact, that he has to know in addition to the temperature characteristics of the measuring device (see above) of course also should know the relevant temperature-related properties of the reference normals and of the inspected gauge (and provide this information for QMSOFT®):

symbol	description
α_{ref}	thermal expansion coefficient of the reference normal
α_{p}	thermal expansion coefficient of the inspected gauge
T_{ref}	actual temperature of the reference normal (in °C)
T_{p}	ctual temperatur of the inspected gauge (in °C)

At least now is pretty clear, that a temperature compensation does NOT lead you automaticaly to an improvement of the measurement result:

- temperature sensors measure values at a single point on the surface, a temperature distribution over the volume of the measuring system/reference normal/device can not be reliably estimated,
- knowledge of the exact thermal expansion coefficients of the inspected gauges (and in some cases of the reference normals) is not guaranteed, to be exact, the user knows approximated values from tables of books,
- executing a measuring procedure requires a certain amount of time, where variations of the temperature of ALL or the three components (measuring system in the device, reference normal, gauge) will occur, which is why we will endeavor to measure as soon as possible.

However, this is contrary to the fact, that temperature transients require much time, so a compromise must be found which is an individual in every case. The best investment in the accuracy of a measurement method with respect to the temperature compensation exists in our view, in the creation of a stable temperature state with the smallest possible deviations from the reference temperature. In these cases, the temperature-related properties of the components do NOT play essential role!

Note

Manufacturer-specific compensation methods, such as those found in ULM device series of Mahr GmbH (additional temperature sensor on the body of the machine) are not been implemented in QMSOFT®, because the underlying theory is not published by the machine manufacturer. When using the device's own display software of the manufacturer (Mahr-Monitor software), the temperature compensation is realized, however, already there.

8.2.5.4 Calibration of inductive probe for use with G4.5 interface card

This part of the manual is under construction, we ask for your understanding!

8.3 Using the QMSOFT®/QM-DeviceServer

The user interface of the visualization of a hardware device was designed similar to known hardware display devices, so that metrologists can find their way fairly quickly. The figure below shows the example, which was used in this manual to define and configure a composite device (Mahr 828 PC), which uses two different measuring systems to combine it to one result (in this case a counter card IK220 for the incremental main axis of the machine and a G4.5-card for the inductive probe in the opposite bolt of the device).

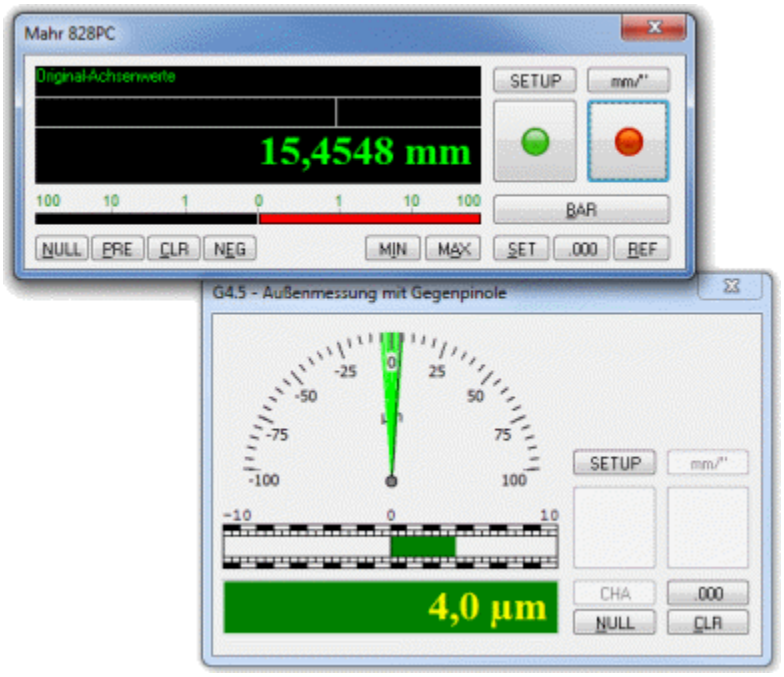


Fig. 8.3.1: Visualisation of a device object item.

The visualization of a device can either be started manually by double-clicking the device object item in QMSOFT®/QM-DeviceServer or fully automatically from one of the QMSOFT® inspection program. Dependet on the device object type there appears one or more screen-windows.

The visualization window contains different controls and indicators, which are specific to each device type. Their function you can find out very quickly by moving over it with the mouse cursor: the indicated yellow note texts explain their functionality. Here the main elements at a glance:

Trigger a measure

The button `Trigger GREEN` is used to trigger the actual measure. This measure will be sended by the QMSOFT®/QM-DeviceServer to all of the connected client programs (normally one of the QMSOFT® inspection programs).

Close visualisation window

The button `Trigger RED` will stop the device visualisation and closes the related screen-window.

Settings for measure correction features

The button `SETUP` is used to show/edit all of the settings, which are related to device corrections (linear correction, error compensation table, temperature compensation). To access this settings you need the related QMSOFT®-privilegue (to avoid changes by “Normal” users).

Change unit system

The button `mm/"` can be used to switch between “mm” and “inch” unit system.

NULL Set “Null”

The button NULL is used to set the measure display onto the numerical value “0”. This is realized by using an internal “offset”-value, which is calculated with the actual “device” value automatically.

CLR Reset the offset

The button CLR (clear) resets the internal “offset”-value to “0”, which means, that the original measure from the device is shown in the native reference system (for example the distance to the device-internal reference point). This feature is often used while an inspection of the hardware device itself, while using the device normally this funktion is not neseccary.

SET Setup mode

The button SET is used in the so-called “Setup mode” of a device, which is used to set the device (normally with the help of a reference normal) to a reference value.

In addition, it is possible to switch on/off any existing temperature compensation quickly (this rapid switchover is required while an inspection procedure of the device itself).

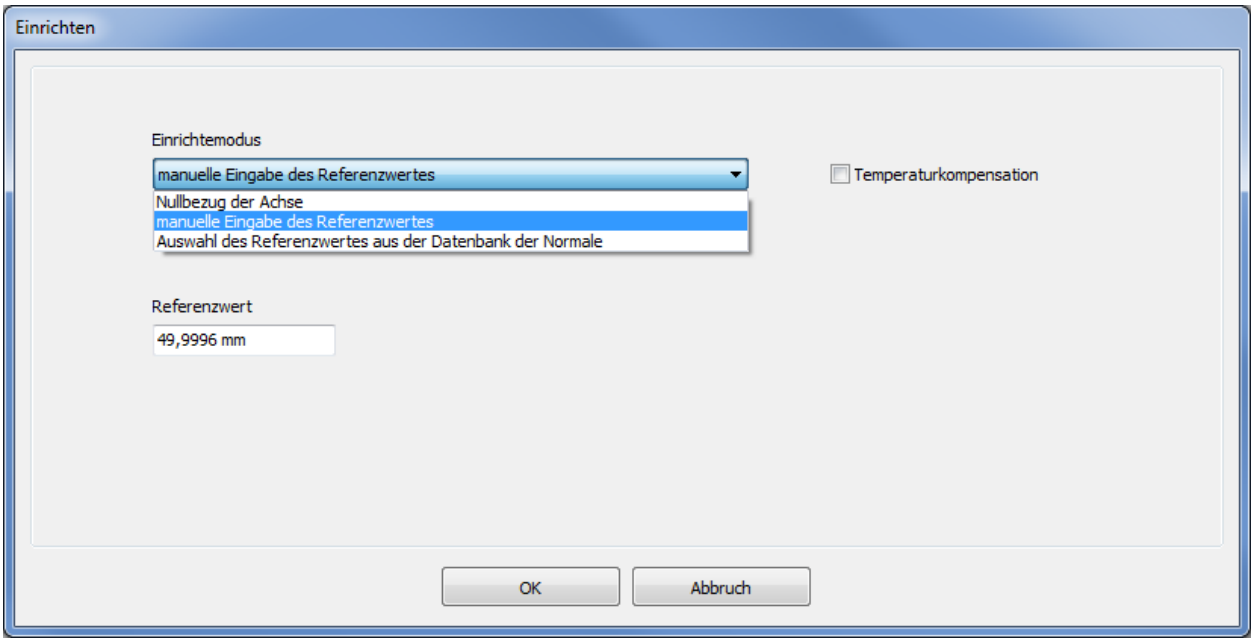


Fig. 8.3.2: Setup a device to a reference value.

The items for “Setup mode” are distinguished as follows:

- **“ZERO” reference of the axis** This type of “Setup mode” is required when the measuring device shall be set to “zero” (the “ZERO”-button will ultimately lead to the same result), for example to realize a classic external measurement for a plug gauge.
- **Manual input of reference value** Manual entry of the reference value is in many cases the fastest way to setup the measuring device for “non-zero” values, but requires that you have the actual size of the standard used in your mind.
- **Select the “reference value” from the database** The selection of the reference value from the list of reference normals, which is stored in the QMSOFT®-database, is relieving the user, since he does not have to keep in his mind the stored actual reference values.

PRE Preset

The button PRE (preset) can be used to set the measure display immediatelly to a reference value, which you have defined before (see description of the “SET”-button).

NEG Change sign

The button NEG (negation) allows a reverse the counting direction of the device display (change sign) for certain applications on certain types of measuring devices, where the direction of motion must be made opposite to the count direction (e.g. for calibration of dial gauges on a length measuring machine Mahr 828 PC). By default, this feature should be turned off.

MIN MAX Search the reversal point

The buttons MIN and MAX enable the search of the reversal point while measuring any property of a gauge. From the displayed measures minimum or maximum value is determined, a trigger event will send this minimum/maximum value instead of the actual measure value, which is visible in the display.

.000 Decimal digits

The button .000 allows you to change the number of decimal places. Please note that in most cases the default number of decimal places, which is used dependet on the respective measuring task and is therefore determined by the QMSOFT® inspection program, which is connected to the device object item.

REF Execute the seacrh for the reference point

The button REF enforces the search of the reference point for all relevant measuring axes. This is useful only in very exceptional cases, as the searching of reference point is already initiated automatically, when you first use the device object item.

BAR Reset deviation bar display

The button BAR. Devices, that provide permanent readings, allow a live display of measured values on the screen. In these cases the adjusting of reversal points can be made much easier with the help of deviation bar, because the user do not have to watch flickering numerical values, he can have a view onto the color and the size of a simple deviation bar.

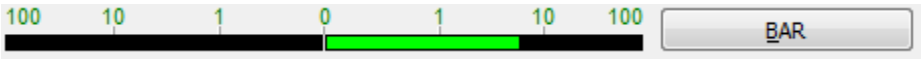


Fig. 8.3.3: Deviation bar.

The BAR button is used to set the current position of the measuring deivce as a reference point for the bar graph. The more the current measured position is deadjusted to this reference point, the greater will be shown the bar deviation. As soon as the bar deflection exceeds a value of 100 µm the bar is changed to red, a pressing of the BAR button is needed again to follow the trend of deflection further. The bar has three zones of different sensitivity (0.1 µm, 1 µm, 10 µm), so that you have a good sensitivity.

CHAPTER 9

General Terms and Conditions for Software Products of L&W GmbH

9.1 1. General Information

1.1. These “General Terms and Conditions” are valid for any delivery of software by L&W GmbH (the vendor).

1.2. The vendor will deliver only on the basis of these “General Terms and Conditions”. Other terms and conditions, especially those defined by the purchasing conditions of the buyer, will not become part of the contract even if such conditions are not explicitly rejected by the vendor.

9.2 2. Right of Use

2.1. The buyer is entitled to use the software for an unlimited period of time. He has no exclusive right to use the software.

2.2. The right to use the software is limited in the same way the use of a book is limited: The software is allowed to be passed on to another person to be used in different places and on different machines of the same type running the same operating system. Just as it is impossible for a book to be read at the same time in different places by different people, the software may not be used by different people in different places on different machines.

2.3. The buyer is not entitled to make copies of the software - except for backup purposes. It is not allowed to make copies of the documentation.

2.4. If the buyer acts as a reseller of the software, he is entitled to transfer to a third party his non-exclusive right to use the copies of the software delivered to him. At the same time he forfeits his right of use. Only the right of use, not the right to transfer the right of use, may be sold to the enduser.

2.5. Complete payment is the prerequisite for the right of use. The delivered software remains the property of the vendor until all open bills between buyer and vendor have been settled.

9.3 3. Prices and Terms of Payment

3.1. Without special agreement our prices are not quoted ex point of sale, packing not included.

3.2. Full payment is due immediately upon receipt of the goods. The vendor reserves the right to deliver only against cash on delivery or cash in advance.

9.4 4. Warranty and Liability

4.1. The vendor only accepts liability for defects which significantly affect capabilities of the software as stipulated in the contract. Excepted from any kind of warranty are defects caused by improper installation, use, and operation or by repairs and changes not explicitly authorized by the vendor.

4.2. The vendor will correct significant software errors (according to point 4.1.) either by installing an improved version of the software or by informing the buyer of a workaround. The correction will be provided in a timely manner and the method of correction will be chosen by the vendor. The buyer does not have the right to request a change of the contract or a reduction of the price.

4.3. The vendor does not guarantee the uninterrupted or error free operation of the software. The vendor does not guarantee that every combination of functions a customer might chose will work. The suitability of the software for any particular purpose is not guaranteed by the vendor.

4.4. Any liability for direct and indirect damages, for consequential damage, or for damages suffered by third parties is excluded if legally permissible. Liability in the case of severe negligence, whether accidental or intentional, remains unaffected. In any case, however, liability is limited to the purchasing price of the software.

4.5. The warranty is limited to 6 month from the time of shipment or pick-up of the software. This is the limitation period for all warranty claims including the ones named in point 4.4.

9.5 5. Place of Performance and Place of Jurisdiction

5.1. Place of performance is the location of the vendor's head office.

5.2. The exclusive place of jurisdiction for any present or future dispute stemming from any business relationship with the vendor is the location of the vendor's head office.

5.3. The above place of jurisdiction applies if the buyer has no general place of jurisdiction in the Federal Republic of Germany, if the buyer moves his place of residence out of Germany after signing the contract, or if the buyer's place of residence is unknown at the time of the institution of legal proceedings.

L&W GmbH, March 2022