



**QMSOFT**

**Software for gauge inspection**

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Notes for CD-ROM installation:

Insert the QMSOFT CD-ROM in your CD-Drive. Check the drive letter (in most cases is it „D:“). Use the Windows-File-Manager or the WINDOWS Explorer to execute the File "SETUP.EXE" in the directory "INSTALL" on the CD-ROM. See the users dialogue. You should confirm all of the default settings.

If you want to install the QMSOFT standard package choose the installation option  
**„GaugeMan (standard)“**.

To install special QMSOFT options (e.g. the QM-TORQ program or others) the option  
**“GaugeMan (custom)”** has to be used.

The option **„GaugeCal“** is installing only the program for the gauges nominal value calculation.

After finishing this first installation step you get a new program group on your desktop with the QMSOFT-Icon. Now start the QMSOFT program with a double click on the "Q"-Icon inside this program group. Enter the user name and the password.

**ATTENTION:** For both enter the word **"system"** !!

All QMSOFT programs may be executed in the DEMO mode with a restricted functionality (see also file „INFO061.TXT“ in the root directory of the CD-ROM).

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For fax support don't forget to inform us about your licence numbers and program versions of the software and about your computer and measuring device hardware. Use the „Help|FaxSheet“-Option of QMSOFT to print out a styled fax paper.

## **Hardware requirements for QMSOFT (Windows version)**

Your computer should fulfil the following **minimum** requirements:

- Processor Intel Pentium III, IV (or AMD K6, K7..), min. 266 MHz,
- CD-ROM-Drive
- 64 MByte RAM
- 300 MByte free space on the hard disk;
- SVGA graphic (minimum resolution 800x600)
- 1 parallel port, 1 serial port (if Online connection is desirable),
- printer (Laser printer is recommended),
- operating system MS-Windows 98, Windows ME or Windows NT, Windows 2000 or XP.

## About this manual

Your manual is divided into several parts each of which explains a particular component of QMSOFT. This information will provide you with all the necessary information of our program. If for some reasons the documentation you have received is not complete contact our distributor or us (our address can be found at the end of the first section). If you are interested in an upgrade service contact us directly.

The manual consists of the following:

- Part I:                Installation of QMSOFT modules
- Part II:              Introduction
- Part III:             The gauge data management system **QM-MANAG**
- Part IV:             The inspection program **QM-DIAL**  
(inspection of dial gauges, dial indicators)
- Part V:              The inspection program **QM-PLAIN** (inspection of plain gauges)
- Part VI:             The inspection program **QM-THREAD**  
(inspection of screw thread gauges)
- Part VII:            The inspection program **QM-MICRO** (inspection micrometers)
- Part VIII:           The inspection program **QM-CALIP** (caliper inspection)
- Part IX:             The inspection program **QM-BLOCK**  
(inspection of gauges blocks and -sets)
- Part X:              The inspection program **QM-PINS**  
(inspection of cylindrical pins and pin sets)  
(other programs are being developed)
- Appendix A:        General information about selling and delivering conditions of the software
- Appendix B:        The „EDITOR4W“ program - editing of calibration certificates
- Appendix C:        Interface programs for different machine types
- Appendix D:        Making the Online-connection of measuring machines
- Appendix E: Probe management program (TASTER4W)

It should be mentioned that, due to technical advancements some minor discrepancies may be found in your manual and which appears in the screen.

# QMSOFT

## Software for gauge inspection

### I. Installation and Program licences

#### I.1. QMSOFT-Installation



The software is delivered on a CD-ROM. The installation procedure starts automatically under Windows 95/98/NT, if the auto start property of the CD-ROM drive is enabled. If the installation does not start automatically, please execute "manually" the program file "\INSTALL\SETUP.EXE". Please follow the installation messages on the screen.

Please select the installation option "**GaugeMan**" if you want to install the complete QMSOFT system including the gauge management system and inspection programs. The "**GaugeCal**" package is a small program only for calculation of gauge nominal values. This functionality is also a part of the complete "**GaugeMan**" installation.

The installation of the program can be done in a few easy steps.

Make sure that your purchase of the program is done by a known dealer and distributor of L&W for software products (for licence agreements see Appendix A) !

If there are problems while installing the "**Borland Database Engine**" (BDE) you can install this engine manually by executing the file "SETUP.EXE" from the CD-ROM subdirectory "\INSTALL\BDE061". Please restart windows after the BDE installation.

Most of the QMSOFT programs (not the programs DABAQ4W, EMP4W, MEDRA4W !) you also can install without using the installation procedure. To do this please copy the directory/directories inside of the CD-ROM subdirectory "\INSTALL\QMSOFT4W" into the directory "C:\QMSOFT4W" of your hard disk (you have to create this directory manually). Please remove the read-only-attribute of the copied files.

Please try to use the setup procedure of the CD-ROM for installation, because many settings of the programs are done automatically depending of the installation options you select.

#### I.2. Program licences



After the installation all programs are running in a "DEMO" mode. In this mode some menu items are disabled and not all program features are usable.

If you purchase one or more programs a "**Hardlock**" is a part of the program package you get. This "Hardlock" has to be plugged into a parallel interface of your computer. The "Hardlock" acts as the registration number of the program.

**Attention:** Always plug the "Hardlock" in the direction of the arrow marked on it. Never plug it into a serial interface incorrectly, this will destroy it !

To remove the restrictions from a QMSOFT program you have to activate the "Hardlock" and to type in the a "Licence number" for each program which you have purchased. Please click onto the yellow key icon inside of the QMSOFT program window to initiate the licence procedure, then follow the messages being shown.

### I.3. Installation on a Windows NT / Windows 2000 system

If you use a Windows NT, Windows 2000 or Windows XP workstation with the software it is necessary to install a driver for the Hardlock being used. The automatic installation during the QMSOFT installation process does require that you are logged in your system as "system manager". If the installation fails you have to install this driver manually.

To install the driver you have to execute the program:

**HLDRV32.EXE** located on the QMSOFT CD-ROM in the directory  
**„\DRIVER\Hardlock\Hldrv32“**

The HLDRV32.EXE is very easy to use. You have only to follow the messages on your screen.

Pay attention, that you need „**system manager**“ rights to do this.  
 Otherwise the installation will not be successful.

For more information see the file „Readme.txt“ on the CD-ROM (directory „..\DRIVER\HARDLOCK“).

### I.4. Network Installation

For the QMSOFT programs the installation in a network means at first the installation of a **network access to the gauge stock** in the database DABAQ4W.

Using the inspection programs a local installation should be done.

Pay attention the following notes:

- install all inspection and indication programs on the local workstation; use the default installation procedure on the CD-ROM to do this;
- the gauge management program can be installed either on the local workstation or on the network server (we prefer a local installation); the database itself (the directory including the database tables) has to be installed on a network directory;

**ATTENTION:** Do not use a so called „Peer-to-Peer“ net like „Novell light“ or the functions in Windows for Workgroups or Windows 95. To guarantee a properly work of the system the installation of a „**Client/Server**“ network operating system is necessary (Windows NT or Novell server are recommended).

Steps for the network installation:

- at first install all components you want to use on the local workstations with the default installation program SETUP.EXE; if you want to use the database, then also install the Borland Database Engine (BDE) and the ReportSmith report generator (RS\_RUN)
- check the available network drive and create a directory to save the DABAQ4W database on the network; make sure that you have all rights on this network directory; if necessary consult your network system manager; (for example the used network directory is „**N:\DABAQ4W**“);
- copy the installed database directories from the local hard disk to the network directory; (use the Windows file manager or the Explorer), for example
  - copy the „**C:\QMSOFT4W\DABAQ4W\DB**“ directory to „**N:\DABAQ4W**“;
  - copy the „**C:\QMSOFT\IDABAQ4W\SYSTEM**“ directory to „**N:\DABAQ4W**“;

**ATTENTION: The following steps has to be done on the first workstation !!!**

- start the program „BDECFG.EXE“ for the configuration of the database engine, use the shown Icon located in the QMSOFT program shell:



- in the „BDECFG“ program window select the driver **„Paradox“** on the left side; then enter on the right side in the line **„NetDir“** the wished directory on the network (for example: „N:\DABAQ4W“); on all workstations the „NetDir“ has to be identical !
- now select the page „Aliases“; here you can find for each database alias (the internal name of a database directory) the related path;  
change the path names for the aliases **DABAQ\_DB** and **DABAQ\_SYSTEM** from the local path to the new network path (e.g.: change the path **„C:\QMSOFT4W\DABAQ4W\DB“** to **„N:\DABAQ4W\DB“**)
- save the configuration file with the menu command **"File | Save as..."** into a file on the network drive network (for example: „N:\DABAQ4W\IDAPI.CFG"). Answer with "Yes" to the question, if this saved file should be used as the new BDE configuration file.

**ATTENTION: The following steps has to be done on all other workstations !!!**

- start the program „BDECFG.EXE“ for the configuration of the database engine, use the shown Icon located in the QMSOFT program shell:



- load the configuration file with the menu command **"File | Load"** from the network drive network (for example: „N:\DABAQ4W\IDAPI.CFG"). All changes you made (see above) should be appear.
- save the configuration file with the menu command **"File | Save as..."** into a file on the network drive network (for example: „N:\DABAQ4W\IDAPI.CFG"). Answer with "Yes" to the question, if this saved file should be used as the new BDE configuration file.

That's all !

## II. Introduction

This section includes a short overview about the QMSOFT system philosophy.

### II.1. What is QMSOFT ?

Gauge data management is a vital element in any quality assurance system. It also plays an important role in connection with product liability as well as in highly technical fields (for example, in the defense industry or nuclear technology). When applying ISO 9000 to 9004 (and EN 29000 to 29004) standards the installation of a gauge data management system is indispensable. When working with these standards a complete inspection of all measurement and test gauges is required periodically.

Despite a rapidly growing interest in gauge data management, very few manufacturers of measurement devices can offer a system solution for this task. In other words, for the majority of measurement devices on the market, a suitable software supporting both gauge inspection and gauge data management was simply not available.

For this reason a variety of hardware-independent software solutions for the field of gauge data management have been developed. The majority of the systems currently on the market are limited only to the management of gauge data. In the field of gauge inspection, however, not only must gauge data be managed but, more importantly, the gauges also need to be inspected. These functions can be adequately supported by only a few systems. The result is that with many systems the input of gauge nominal values must be done manually. The possibility of entering data directly from the measurement device to the computer is not an option in most comparable software packages.

It is precisely this burdensome problem that the L & W concept seeks to resolve. The idea to develop the software first came from our own personal experience with this problem. As a state-of-the-art gauge inspection service, we are, from daily experience, well acquainted with the software options available in this field as well as what was lacking. We soon realized that the problem we were faced with was also being faced by many others in the measurement industry. Given that this was a relatively untouched aspect of quality assurance, we then decided to develop our concept into a marketable product. Our hypothesis has proven correct. Many companies who previously, like ourselves, were forced to do this tedious and time-consuming job manually have been very satisfied with the efficiency of our product.

Since 1990, under the product name **QM-SOFT (Quality Management SOFTware)**, a series of program components for gauge inspection has been developed to cover an extensive range of geometrical gauges such as thread gauges, dial gauges, plain plug gauges, plain ring gauges etc. These programs provide the ideal computer support for all aspects of gauge inspection.

QM-SOFT's features are:

- Computer supported management (evaluation, analysis and archiving) of any gauge data in a flexible data base; the parallel management of multiple sets of data is also possible.
- Automatic generation of nominal values (evaluation of gauge tolerances) for the most commonly used types of gauges (plain gauges, thread gauges etc.) according to a multitude of national and international standards.
- A system designed to be user-friendly, time-saving and virtually mistake proof making it possible for even non-experts to ensure that their work is strictly within the standards being applied.
- Integration of management and measurement, this means the gauge data can be directly transferred gauge data base.
- High flexibility and upgradability of the system through a solid modular structure; customization to individual needs (factory standards etc.) is always possible.

While developing QMSOFT we attempted to design the user dialog and the measurement procedures according to our own daily experience with the program in the laboratory. The result is that, in our client's opinion, we have successfully created a program which fulfills all of the aforementioned requirements.

## II.2. QMSOFT - different types of programs

This section gives you a short overview about the QMSOFT program system and some basic information for the system handling.

Starting the QMSOFT system you get the following screen:



You can see different groups of program symbols. Depending on its basic functions, they differ in the following types of QMSOFT program modules.

**ATTENTION:** The user manual for each program you can find, if you start the related program and select the menu command **"Help|User manual"** !

### Inspection programs:

There are different programs designed to carry out the gauge inspection for the different types of gauges. The programs are related to the standardized procedures for each gauge type.

### Data base:

Gauge management system to manage all gauge data, gauge histories; transfer of gauge data. Starting the database you get a dialogue "Open database". Here you can select between **"DB"** and **"DEMO"**. The **"DB"** database should be your "normal" working database. Open the **"DEMO"** database to see different samples. You can also use this database while doing the first steps with the database and to learn how to operate something.

### Miscellaneous (Help programs) :

Different programs for the program environment (Installation, Indication of measures; editing of record listings ...);

### Indication programs:

Indication programs are designed to realize the connection to the length measuring machines. Depending on the machine interface, you should use different indication programs.



The program **"RS232DRV"** is used to connect a length measuring machine with your computer using a serial interface. This program is supporting a wide range of different interface types. If you want to do an "Online" measurement set the parameters for the serial interface before.



The program **"IK102021"** is used to connect a length measuring machine with your computer using a Heidenhain PC interface card (IK 120 and IK 121). If you want to do an "Online" measurement set the parameters for the serial interface before.



The program "SIPDRV" is designed to support the measurement with a SIP 550M device. It is realizing the connection to the SIP LMC interface program.

The program „WinDHI“ is a special program designed by TRIMOS S.A., Renens Switzerland. This program will be used for the connection to the TRIMOS „Labconcept“ machines.

**Editor program:**



The EDITOR4W program is designed to get the functionality to show, edit, save and print record listings for all QMSOFT inspection programs.

Normally you do not use the EDITOR-program as a stand alone system. The EDITOR will be start up automatically by one of the inspection programs if you want to perform one of the above-mentioned actions.

The different programs are designed to get a complete tool for gauge data management and gauge inspection.

We would like to add that we would be very interested to hear your ideas, requests and criticism concerning the DABAQ system. We are constantly endeavoring to improve the program and welcome your feedback for use in future versions of the program. You can contact us by mail, by phone or by fax at:

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**E-Mail:** [support@lw-gmbh.com](mailto:support@lw-gmbh.com)

If you want to call or write us with questions about how to use the program, please include information about the configuration of your computer and your measuring equipment.

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### III. Gauge management system QM-MANAG

#### III.1. Introduction

Today, almost every company is faced with the task of adjusting to the requirements of the DIN-ISO 9000 standard, particularly in the fields of quality assurance and gauge inspection. This is usually accomplished using various gauge data base card index systems which are generally organised to meet the needs and technical capacity of each individual company. The QM-MANAG gauge inspection system has been designed to replace the need to create customised systems and contains many qualities that cannot be found in similar programs currently available on the market.

When applying ISO 9000 to 9004 standards, the installation of a gauge data management system is indispensable. When working with these standards a complete inspection of all measurement and test gauges is required periodically.

QM-MANAG characteristics include:

- free definitions of data structures;
- an unlimited number of user defined gauge types;
- configurable order processing, administration and documentation;
- a practically unlimited number of possibilities (nearly 2 billion !) for each kind of gauge;
- a practically unlimited capacity of gauge histories;
- free definition of database calling up operations
- the possibility of parallel administration of different stocks of gauge data (client capability);
- inclusion of nominal value generation (calculation of tolerances) for practically all common gauges for length inspection; it is possible to add other types of gauges without having to change the system;
- inclusion of on-line measurement through integration of separate measurement modules of any type of gauge;
- standardised user interface of the database system and the measurement programs;
- network and multi-user capability for almost all common network platforms;
- reasonably priced hardware basis (IBM compatible PC's).

These and other features are what make the QM-MANAG system a viable alternative to the other gauge inspection systems currently available on the market.

The QM-MANAG manual is divided into two principal sections:

- Section III.2. gives an general explanation of how to use the system;
- In Section III.3. you will find a more detailed explanation of the possibilities of program settings and internal data base activities; this section is mainly for the system manager of the QM-MANAG program;

**ATTENTION:** Before starting to work with the database and entering your gauge data enter your company specific data for "location(s)", "cost departments" and other specific catalogues. See the section "Program settings" for this. This settings can only be done by the "system manager"

When using the software, make sure that the license copy lock is properly connected and you have entered the correct license code. If not, the system will run on demonstration mode which contains only a limited number of the features of the complete QM-MANAG system.

## III.2. How to Use the Program (User Manual)

This section of your manual describes the "user dialog" of the QM-MANAG gauge management program. This section has been written to correspond with the dialog structure of the program so that even a non-specialist can use the system.

### III.2.1. Start and cancel the program

The QM-MANAG program can be opened by click on the QM-MANAG symbol in the QMSOFT program shell.

After your login name and password have been entered, the QM-MANAG program will be opened. If an incorrect or invalid login name or password has been entered, access to the program will be barred. Make sure that what you have entered corresponds exactly including spelling, spaces, capital and small letters. If you do not have a login name and password, make sure to ask the system administrator in your company responsible for your computer system to give you one.

**ATTENTION:** Starting the program for the first time you have to enter "**system**" for the user name and the password.

To leave the program use the menu option "**File|Cancel**". Never switch the computer off before leaving the program on a correct way. This may be cause the destroying of data.

### III.2.2. Open a database

To work with a gauge stock you have to open a database. Use the option "**File|Open**" and select one of the available databases. If you have the system newly installed you have two databases available, "**DB**" and "**DEMO**".

If you start, the "DB" database is empty. Use this database to enter your individual gauge data. The "DEMO" database includes different gauge data. Use this to demonstrate the database functions and to make your experiences in using of the system.

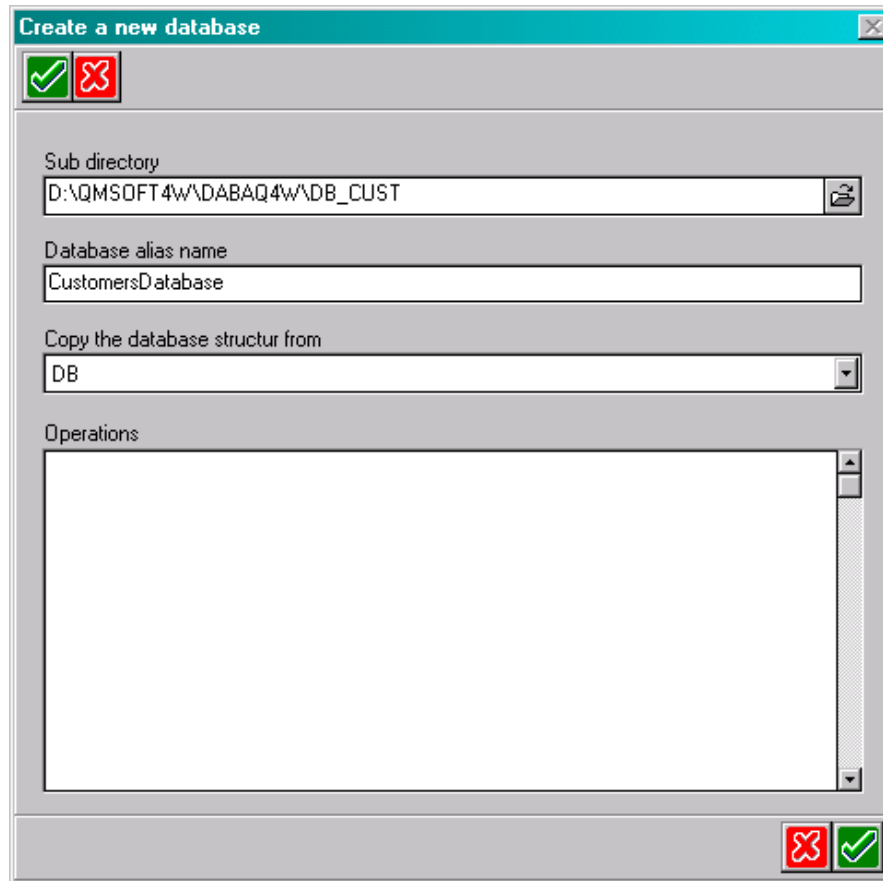
**Note:** *If the parameter "Check database automatically" is set (see section III.3) then before opening a database all database tables will be checked by the database repairing tool. We recommend to keep this option activ to avoid database problems may be caused by computer crashes !!!*

If you need to manage different gauge stocks use the option "**File|New**" to create a new database. If you create a new database you have to select the "source database" for creating the new one. Pay attention, that different databases may have different structures for the gauge data. Therefore select your "source database" carefully.

### III.2.3. Creating a new database

The program QM-MANAG is able to handle an unlimited number of databases. So you can manage different gauge stocks for different departments or for different customers or other purposes.

To create a new database use the menu „File | New“.



**Figure:** Creating a new database

At first enter the directory where you want to save the files for the new database. This may be an directory on your local hard disk or on any network drive. Make sure that you do not enter a directory which is already existing. The system will get you an „DEFAULT“ name and you have to change this ! Do not use directory names with more then **8 characters** !

Now enter the „Database alias name“ this is the name of the database which you will see in the „Open“ dialogue later. Here you can enter any text.

The last thing you have to do is to select the „Source“ database which should be used to create the new one. Select the „source“ in the field „Copy the database structure from“. The reason for this is, that the system enable you to work with different database structures (see section III.3.5 Settings|Gauge types).

### III.2.4. Working with a Gauge database

After opening a database, a window will appear on your screen with a list of gauges already stored in the data base (see Figure III-1). 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. See also section III.2.2.1.

QMSOFT / QM-MANAG gauge management system - [Gauge stock "DEMO\_USDatenbank" - "M:\APPLIK\QMSOFT4\WADABAQ4\WADBDEMO01\"]

File Edit Report Settings Help

Search a gauge / Gauge management / Gauge inspection / Gauge distribution / Expert mode

Gauge type	Identity number	Nominal size/Range	Gauge status	First entry on	Last inspection on	Inspecti
Caliper (inch)	00123	5.0 Inch	usable	18.02.1998	19.09.2002	
Caliper (inch)	124	6.0 Inch	not available (missing)	25.09.2000		
Depth caliper (mm)	0023	300.0 mm	usable	03.02.1998	03.02.1998	
GO plug gauge (ANSI B89.1.6M) - inch	0012_98	3.00000 "	not usable (spaced)	21.09.2000	16.09.2002	
GO plug gauge (ANSI B89.1.6M) - inch	888888	2.00000 "	usable	07.05.2000	07.05.2000	
NO GO plug gauge (B89.1.6M) - inch	8888888	4.00000 "	usable	07.05.2000	07.05.2000	
NO GO ring gauge (B89.1.6M) - inch	0899999	0.50000 "	usable	07.05.2000	07.05.2000	
GO/NO GO plain plug Gauge (ISO) - mm	0089999	39.0500 mm +0.05/0.0	usable	15.12.1999	16.09.2002	2 Year(s)
GO/NO GO plain plug (ISO) - inch	0012_97	1.00000 " / 1.02000 "	not available (out of house)	20.12.1996	25.05.1997	6 Month
GO plain Plug Gauge (ISO) - inch	001_BS_XXX	1.25160 " / 1.25315 "	usable	11.02.1995	09.11.1999	6 Month
NO GO plain Plug Gauge (ISO) - mm	0027_F	20H7	usable	25.08.1994	25.10.1996	1 Year(s)
Master ring (ANSI B89.1.6M) - inch	89000	1.20000 "	restricted usable	19.09.2000		
Master setting disk Style 1 - inch	088999	3.00000 "	usable	07.05.2000	07.05.2000	
Master setting disk Style 1 - mm	Test_001	[empty]	not usable (spaced)	08.10.2002		
Master setting disk Style 3 - inch	00899	2.00000 "	usable	07.05.2000	07.05.2000	
Depth micrometer (mm)	0895	25.0 mm	usable	01.05.1998	04.05.2000	1 Year(s)
External micrometer (inch)	0012_98	12.00 - 13.00 inch	usable	01.12.1998	12.12.2000	
External micrometer (mm)	0895	0 - 25 mm	usable	01.05.1998	04.05.2000	
Inside micrometer - Class 2&3 (inch)	894_12434	2.00 - 8.00 Inch	usable	16.09.2002	19.09.2002	6 Month
Inside micrometer - Class 2&3 (mm)	0893	100.00 - 125.00 mm	usable	04.05.2000	19.09.2002	6 Month
Inside micrometer with jaws (mm)	894_123	10.00 - 35.00 mm	usable	16.09.2002	19.09.2002	1 Year(s)
GO/NO GO plug f. minor diam. (mm)	0037_Test	M 12x1.75-6H	not available (missing)	15.06.1995	21.10.1996	1 Year(s)
GO / NO GO thread plug gage - inch	1213_978_XXX	BSW 3/8 med. BS 919	usable	02.01.1995	09.01.2000	1 Year(s)
GO / NO GO thread plug gage - mm	0012_Test	Whit. S. 0.86-12 med. BS 919	usable	10.03.1994	09.11.1999	1 Year(s)
solid GO Thread Ring (inch)	001_test_XXX	1/2 - 13 UNC -2A	usable	17.06.1994	04.05.2000	1 Year(s)
solid NO GO Thread Ring (inch)	002_Test	9/16 - 12 UNC -2A	usable	03.01.1996	09.11.1999	1 Year(s)
solid GO Thread-Setting Ring (mm)	89900	M 20x2.5-6H	usable	25.04.2000	25.04.2000	
solid HI Thread-Setting Ring (mm)	088977	M 12x1.75-6H	not available (out of house)	25.04.2000		
Special gauge type	0027_AB	Special gauge ABC	usable	26.02.1998	09.11.1999	
Steel square	001_Test	200x130 mm	usable	25.02.1998	09.11.1999	1 Jahr(e)
Straight edge	001_Test	300 mm	usable	26.02.1998	26.02.1998	
Gauge type for EXCEL connection	00123	300 mm	usable	06.01.2000	06.01.2000	12 Mon
Gauge type for WORD connection	123_test	12-50 m	usable	06.01.2000	06.01.2000	2 Jahr(e)

Gauges in the stock: 31/36

Figure III-1: Start screen of the database

To operate the database you can use the Buttons or the menu "Edit". If you open the menu "Edit" you can also see "Hot keys" for special functions.

On the top of the shown window you can find a toolbar including the Icons for the available functions. Pay attention, that you can select the functions shown in the toolbar by switching the „tabbed notebook“.



Page „Search a gauge“ (Sort order; Searching a gauge; Filters)

This functions should be used when you wish to locate a certain gauge from the data stock or to restrict the view according to specified parameters.



a) Sort the gauge stock (Creating “secondary keys”)

The functionality of both functions “Filter” the gauge stock and “Search” a gauge is depended of the sort order of the gauge stock. If you have a new database the gauge stock is sorted according to the parameters “Gauge type”, “Identity number” and “Basic size/designation”. This fields are the so called “Primary keys” into the database structure. If you want to change the sort order, at first you have to create a new “secondary key” for the database (except this was already done). To do this click the “Sort” button (see above). Now you will get the window shown in Figure III-3. In this window you can see the currently available sort orders. To create a new order click to the “Sort” button again and select the data field which you want to use. Changing the sort order select one of the available fields an press the “OK” button.

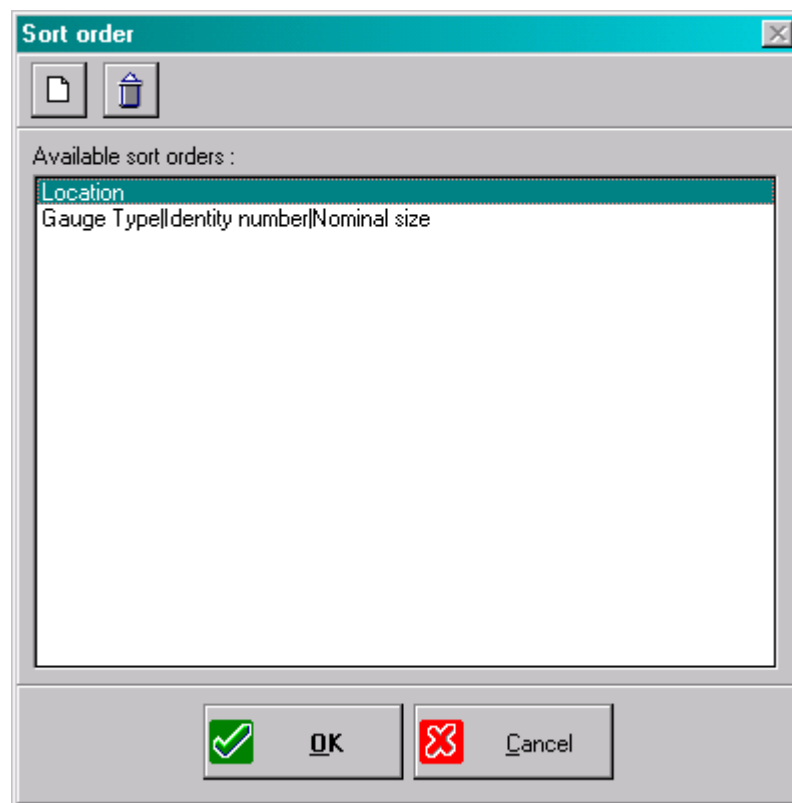


Figure III-2: Change the sort order (create new)



b) Filter (restrict the database view)

If you want to show only a special part of your gauge stock use the “Filter” function. The work of the filter is depended on the current sort order. For example: if you want to see only the gauge of a certainly “Location(s)” at first set the sort order to “Location”. Now use the “Filter” button to select the “Location(s)” you need.



c) Search function (**F3** key)

After pressing the **F3** key, a dialog box will appear where you can enter the gauge parameter you want to search. The searching possibilities are depended on the current sort order.

### III.2.4.1. Page „Gauge management“

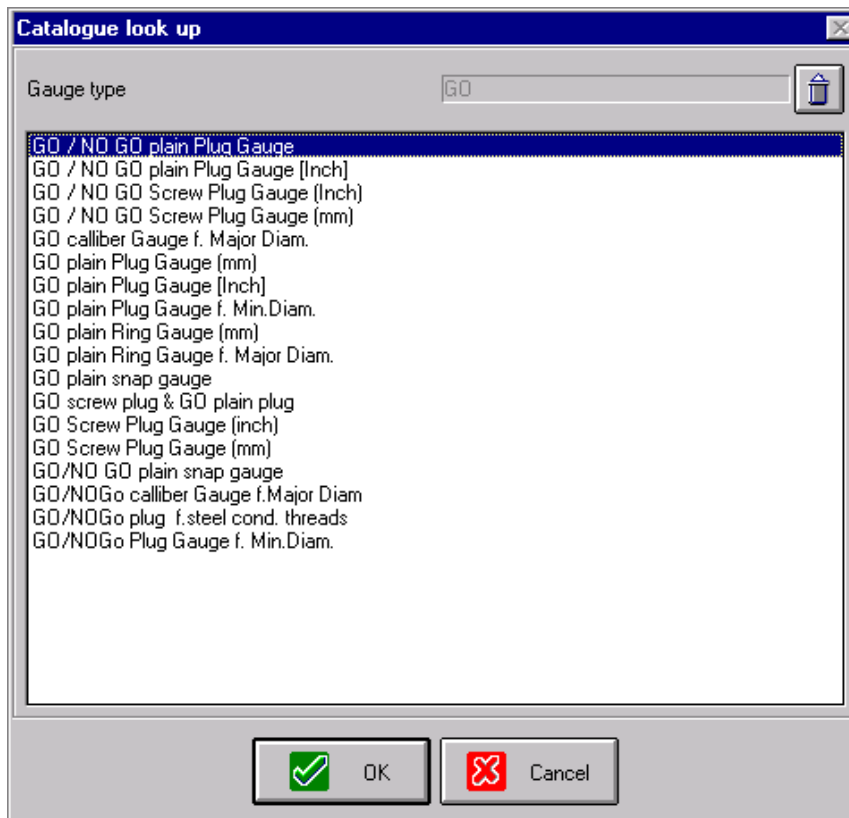
This page include the mostly used functions to manage the gauge stock.

#### III.2.4.2.1. Entering a New Gauge (“Ins” – Key)



By pressing the "Ins" key or 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 different types of gauges known to the system. Highlight the appropriate type of gauge and press "ENTER".

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



**Figure III-3: Selecting a gauge type**

*Note:* You can only enter a gauge of a “known” type. If you can not find the type of gauge you want to enter in the shown list you have to create at first the “gauge type definition”.

Please see **section III.3.5.** how to do this.

After selecting the gauge type a window will appear on your screen usable to enter the set of gauge basic data. This window is divided into two parts. The left side the “General basic data” include all data fields which are available for all the different types of gauges. The right side the “Type specific basic data” 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.

[Dial gauge acc. to BS/AS (mm)]. [001]. [10.0 mm]

**General basic data**

Gauge type  
Dial gauge acc. to BS/AS (mm)

Identity number  
001

Nominal size/Range  
10.0 mm

Gauge status  
usable

First entry on  
19.02.1998

Last inspection on  
24.03.1999

Inspection period  
14 Month(s)

Next inspection on  
07.04.1999

Location

Cost department

Manufacturer

**Type specific basic data**

Measuring range  
10.0 mm

Graduation  
0.010 mm

Standard  
BS 907

Tolerance Discrimination  
3.0 µm

Tolerance Repeatability  
2.0 µm

Tolerance (one-tenth)  
5.0 µm

Tolerance (any half revol.)  
7.5 µm

Tolerance (any one revol.)  
10.0 µm

Tolerance (any two revol.)  
15.0 µm

Tolerance (any larger)  
20.0 µm

Working force Fmax  
1.8 N

**Figure III-4: Enter a new Gauge into the database**

At first enter the gauge “*Identity number*”. Pay attention that it is not possible to change the identity number after saving this gauge.

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

*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 important. To avoid errors while entering this texts you can use different system “Catalogues”.

To use a catalogue for a special field make a double click with the mouse key or use the **F8** function key on the related field.

**Attention:** Before using “**Catalogues**” your system manager should be customised all entries in the catalogue list. See the section “*Settings|Catalogues*” for more information how to do this.

On the left screen side the titles of the fields will vary depending on the type of 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 gauge’s nominal values can be generated from those entered in the data dialog box. Use the **F7** key (or the related Button) to do this. The results will than 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”).

### III.2.4.2.2. Copy the Gauge Basic Data

If you have to enter more gauges with partly identical data, e.g. you have to enter five "Dial gauges" with identical ranges, graduations... use the "Clone a gauge" function to make your work more efficient. Pay attention to enter a new "Identity number" for the new gauge. If necessary you can change also the information in all other fields.



### III.2.4.2.3. Edit the Gauge Basic Data (ENTER-key)

In order to work on a set of gauge basic data, first choose which set of data you would like to work on by highlighting your choice and confirming it by pressing the ENTER key or click onto the "Edit" button. Making changes to a set of data works in basically the same way as entering a new one excepts that the identity number cannot be altered.



### III.2.4.2.3. Deleting a Gauge ( „Del“ – Key )

To delete a set of gauge basic data and all corresponding inspection data for a gauge, highlight the data you wish to be deleted and press the "Del"-key or the shown Button. Before a data, is deleted a warning box will appear on your screen. The data will then be deleted only when you have authorised it.

Attention: Once a gauge has been deleted it cannot be retrieved!



### III.2.4.2. Gauge history - Pages „Gauge inspection“, „Gauge distribution“

A "gauge operation" is any operation was done with a gauge during a gauges life. Each gauge action will be 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 execute is defined in the option "Settings|Gauge operations" (see also section III.3.1 in this manual).

To make a new gauge operation use the "Gauge history" button to open the "History screen" (see Figure III-5).

Date/Time	Event	Done by	From/To
19.02.1998 09:26:13	In house inspection	system	
24.03.1999 14:46:58	In house inspection	system	

Type specific basic data	
Measuring range :	10,0 mm
Graduation:	0,010 mm
Standard:	BS 907
Tolerance Discrimination:	3,0 µm
Tolerance Repeatability:	2,0 µm
Tolerance (one-tenth):	5,0 µm
Tolerance (any half revol.):	7,5 µm

In house inspection	
Date/Time	24.03.1999 14:46:58
Done by	system
Gauge status	usable
Certification-No.	990823-02
Inspection device	Dial gauge insp. device
Last inspection on	24.03.1999
Next inspection on	24.05.2000
Inspection period	14 Month(s)
Actual value - Discrimination	2.1 µm
Actual value - Repeatability	1.3 µm
Actual value - 1/10 rev.	3.2 µm
Actual value - half rev.	4.7 µm
Actual value - one rev.	4.9 µm
Actual value - two rev.	5.2 µm
Actual value - any larger	6.5 µm
Actual working force Fmax	1.7 N
Working force diff. Fdiff	0.0 N

Figure III-5: a gauge history

Here you can see all gauge operations was done with the gauge selected. Use the "Insert" – Button to create a new record for the history.

In the screen which appears now you can select the whished gauge operation from the shown list.

Making a "Gauge inspection" or a "Gauge distribution" you can also use the special Buttons for this functions to create the new history record immediate.

Doing a "Gauge inspection" the user has the option of entering the set of inspection data manually on the keyboard in the corresponding fields in the dialog box. However, this can be done automatically by opening the measurement program which corresponds to the gauge being inspected (for example the QM-PLAIN program designed to support the inspection of all types of plain gauges). By doing so, the inspection itself is supported by the measurement program and the results of measurement will be automatically entered into the QM-MANAG program system. The user then must only fix the gauge status (for example: "usable") and the time of the next inspection.

Once it has been installed, the measurement program can be opened by pressing the **F4** key (or the QMSOFT-Button). For further information on how the various measurement programs work please refer to the documentation of the measurement program being employed.



### III.2.5. Data Base Inquiries (Report(s))

The previous section described the functions needed for entering data in the gauge data base. The QM-MANAG main menu option "Report" allows you to access groupings of the stock of gauges using the search function. For example: select all plain ring gauges located in the "gauge store room".

#### III.2.5.1. Report | Gauge data card

Once you have selected a gauge, the menu option "Gauge data card" allows you to access the contents of the gauge's set of data as well as all the inspection data of the gauge. This is set up in order so that you can examine all information that has been recorded about the gauge.

Selecting the gauge is done by using the normal procedure. Either highlight the desired gauge or use the search function, using the F3 key, to locate the gauge.

#### III.2.5.2. Report | Gauge list

The menu option "Report|Gauge list" is used when you want to get a list of gauges regarding special defined parameters (e.g. to create a gauge recall list). For this, each field in the gauges "Global basic data" may be used to select the gauges from the stock.

If you open the menu "Report|Gauge list" you get the following screen.

**Figure III-6: define the parameters for a gauge list**

At first you can enter a name for the database inquiry which then appear on the printed list. Then select the sort order for the list. If the parameter you need is not available you have at first to create the sort order for this (see Section III.2.3.5 a).

Now you can cross all fields which you want to use as a search criteria to select gauges for the list. If you cross nothing you get a list with all gauges in the stock.

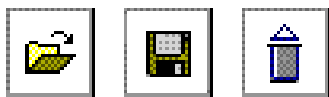
For feature specification option you cross you have to define the detailed feature specifications; use the "Green arrow" button do to this.

Here some examples:

- Gauge type:** If this field is crossed a dialog box will appear containing the names of all types of gauges known to the system. Type an "x" next to the name of the appropriate type of gauge.
- Identity number:** The identity number specification should only be used if your i.d.system is well organized. It is only necessary to enter the first and last number of the identification. So-called "joker" symbols are unreliable.
- Next date of inspection:** If this option is crossed, a dialog box will appear in which the day Date: **from / to** the next inspection should be entered. The gauges derived from this specification will then appear in a window showing those gauges whose next inspection is within the time entered.
- Gauge status:** If this option is crossed the „gauge status“ entry can be used as a criteria. To make your option simply cross the desired entry in the dialog box that will appear.
- Location:** Using this option, the location of the gauge can be used as a search criteria. Cross the appropriate entry in the dialog box.

All gauges that do not fit the criteria entered in the dialog box will automatically be ignored. Therefore, if different search specification lines are entered only those gauges that meet all the criteria entered will „found“. If only the type of gauge is entered then all gauges of this kind will be accessed.

Using the shown buttons you can save all definitions you have made or you can restore a database inquiry you have stored before. With the "Delete" button delete all definitions.



Use the „OK“ (green hook) button to execute the creation of the gauge list. The report creation will be done by „ReportSmith“ from the Borland company. Use the integrated help of this tool if you need more information.

### III.3. Settings/Configuration for the program QM-MANAG

This QM-MANAG main menu option is accessible only to your system administrator.

**ATTENTION:** As a "normal" user of this program, do not attempt to make changes to certain system parameters go round of the configurations menu.

Direct settings: For the most settings you can change you have to open the related menu. This things you can set directly:

- Strict integrity for catalogue fields: If you activate this option the database system will be guarantee that any "text information" you insert in a "catalogue field" has to be inside the related catalogue list (e.g. if you enter the text "Fowler" in the "Manufacturer field" of any gauge the system will check if "Fowler" does exist in the catalogue "Manufacturer"; see section III.3.3. )
- Show tool tips: switch the showing of tool tips on/off;
- Check database automatically: decide if you want to check a database while opening;
- Check database ..now: here you can check the active database immediately.

#### III.3.1. Settings|Gauge operations

Here you can define all operations can be made with a gauge and should be saved in the gauges history( see section III.2.4). Opening this menu you get a list of all pre-defined operations. Use the related buttons to edit an existing entry or to create new or delete existing gauge operations. For each entry you have to enter a „Short designation“ to identify the operation, the name of the „Gauge operation“ and the „Result for the status“. To find out the correct designation for the „Status“ open the menu „Settings|Gauge status“ and print the status list using the „Report“ button.

Inserting a new gauge operation in the gauges history the status of the gauge will be set automatical to the defined „Result for the status“.

#### III.3.2. Settings | Gauge status

Using this option you can define a list of valid gauge status. The gauge status table is used to set pre-defined texts for the „Gauge Status“ field. The pre-defined texts are necessary when using the data base 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. For each entry you have to enter a „Short designation“ to identify the status and the name of the „Gauge status“.

#### III.3.3. Settings | Catalogues

Using this option you can manage and edit different lists related to the fields in the „Global basic data“ (see section III-2.3.1). This lists may be used to avoid errors while entering data in this fields (see also „Settings|Gauge status“). If you activate the option „Strict integrity for catalogue fields“ only text which corresponds with a entry in the related list can be entered in this fields.

### III.3.4. Settings|Inspection programs

Doing a gauge inspection you have the possibility to call an inspection program especially designed to support the inspection procedure of the related type of gauge. The same procedures will be used to call a "Nominal value generation program" for the calculation of nominal values.

Here you have the possibility to define a list of "Alias names" for all the programs will be used in the program system. For each program "Alias" enter the directory and the program name. You can use the "Search" button to find out a program on the hard disk. See the next section "Settings|Gauge types" to understand the function of this "Alias names".

### III.3.5. Settings|Gauge types

The QM-MANAG system 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 administration programs.

This functions: inserting new types of gauges, changing gauge type definitions, restructuring gauge basic- and inspection data files as well as to delete a gauge type will be done using the menu "Settings|Gauge types".

**Advice:** If you do not have a lot of experience with the QM-MANAG program we suggest that you make back up copy of your data before making any changes to the gauge type definitions (see DABAQ menu option "Saving and Retrieving Data").

**Types of gauges**

Short designation	Gauge type
ANSI_DIAL_INCH	Dial gauge acc. to ASME/ANSI (in)
ANSI_DIAL_MM	Dial gauge acc. to ASME/ANSI (mm)
BS_DIAL_INCH	Dial gauge acc. to BS/AS (Inch)
BS_DIAL_MM	Dial gauge acc. to BS/AS (mm)
BS_INDI_INCH	Dial test indicator - BS/AS (Inch)
BS_INDI_MM	Dial test indicator - BS/AS (mm)
CALIBER	Caliper (mm)
<b>CALIBER (INCH)</b>	<b>Caliper (inch)</b>
CALIBER_HIGHT	Height caliper (mm)
CALIBER_HIGH_IN	Height caliper (inch)
CALIPER_DEPTH	Depth caliper (mm)
CALIPER_DEPT_IN	Depth caliper (inch)
DIAL_GAUGE	Dial gauge (DIN/VDI)
DIAL_INDICATOR	Dial indicator (DIN/VDI)
DIAL_TESTINDIC	Dial test indicator (DIN/VDI)
GRAD_RULE	Graduated steel rule (mm)
L_GONOPUG_IN	GO/NO GO plug (ANSI B89.1.6M)
L_GONOPUG_MM	GO/NO GO plug (ANSI B89.1.6M)
L_GOPUG_IN	GO plug gauge (ANSI B89.1.6M)
L_GOPUG_MM	GO plug gauge (ANSI B89.1.6M)
L_GORING_IN	GO ring gauge (ANSI B89.1.6M) - i
L_GORING_MM	GO ring gauge (ANSI B89.1.6M) - i
L_NOGOPUG_IN	NO GO plug gauge (B89.1.6M) - n
L_NOGOPUG_MM	NO GO plug gauge (B89.1.6M) - n
L_NOGORING_IN	NO GO ring gauge (B89.1.6M) - n
L_NOGORING_MM	NO GO ring gauge (B89.1.6M) - n
L_PLUG_GO	GO plain Plug Gauge (ISO) - mm
L_PLUG_GONOGO	GO/NO GO plain plug Gauge (ISO) - mm
L_PLUG_GO_IN	GO/NO GO plain plug (ISO) - inch
L_PLUG_GO_IN	GO plain Plug Gauge (ISO) - inch
L_PLUG_NOGO	NO GO plain Plug Gauge (ISO) - mm
L_PLUG_NOGO_IN	NO GO plain Plug Gauge (ISO) - inch
L_RING_GO	GO plain Ring Gauge (ISO) - mm
L_RING_NOGO	NO GO plain Ring Gauge (ISO) - mm
L_SERING_IN	Master ring (ANSI B89.1.6M) - incl

**Short designation:** CALIBER (INCH)

**Gauge type:** Caliper (inch)

**Type for nom. gener. Type code Type of inspection program**  
 4 1 0

**Inspection program:** @MESCHI4W

**Nominal value generation program:** @MSCALTOL

**Inspection device:** Gauge Blocks

**Structure of gauge basic data**  
 Measuring range|Real:7.3|inch  
 Nonius Scale/Graduation|Real:7.5|inch  
 Form of construction|List:40|external, internal and depth (fixing screw)|external, internal and depth (clamp)|2x external jaws, 1x internal|2x i  
 Type of scale|List:20.3V|vernier scale|Dial scale|Digital  
 Standard|List:20.4|DIN 862|BS 887|AS 1964|Factory standard  
 Error Limit|G|String:25

**Structure of gauge inspection data**  
 Deviation for External measurement|Real:9.5|inch  
 Deviation for Internal measurement|Real:9.5|inch  
 Deviation for Depth measurement|Real:9.5|inch  
 Inspection result|List:20.2|Gauge inside of tolerance|Gauge outside of tolerance  
 Remark|String:35  
 Remark|String:35

**Basic data fields for data exchange**  
 Identnummer  
 Nennmass  
 \_Std, 2, 1, 10, 5 : Graduation  
 \_Std, 3 : Type of inspection  
 \_Std, 4 : Indication type  
 \_Std, 5 : Standard  
 \_Std, 6 : Error limit

Gauge types: 8:121

Figure III-7: Gauge type definition

Use this buttons to "Insert" new gauge types; "Copy" existing gauge types and "Delete" gauge types.



**Attention:** Existing gauge types you should not change !  
Use a copy to make your changes !

### III.3.5.1. Create a new Gauge type

Entering a new gauge type consists of three steps:

- filling out the general fields to define the gauge type;
- defining the structure of the set of gauge basic data;
- defining the structure of the set of gauge inspection data.

Before you begin this process, a precise plan of the data base file structure (gauge basic- and gauge inspection data) should be prepared. It is recommended that an outline be made in table form in order that a direct basis for the inputting of the structural definition is made.

**NOTE:** You can also "Copy" an existing gauge type and modify the "old" structure as required.

Creating a new "**Gauge type**" the following information should be entered, in the appropriate fields, for every gauge.

**Gauge type "Short designation":** No changes should be made to the field once a gauge from this type has been entered into the data base. Changes may result in loss of data integrity. This "Short designation" is used internally in the QM-MANAG program as a means of organizing the gauges within the system

**Gauge type name:** In this field the name of the gauge type (e.g.: dial indicator) should be entered in the form of a string. This name will be used in the system for display and output operations place of the gauge "Short designation".

**Type for nom. value generation:** Is only used for the connection to an external "Nominal value generation program". See the program internal help text.

**Type code:** The type code is used internally for using external programs are used for generating nominal values or for on-line measuring. The pre setted values should not be changed.

**Typ of inspection program:** Code "0" is used for windows programs; code "1" for DOS programs;

**Nominal Value Program:** If the "Generate Nominal Values" option is applied to the gauge type the "Alias" name (see III.3.3.4) of the nominal values calculation program should be entered here. (double click to show the list !)

**Inspection program:** If the "On-line Measurement" option is being applied to the gauge type, the Alias name (see III.3.3.4) of the inspection program should be entered here. (double click to show the list !)

**Inspection device:** The standard text for the pre set of inspection data field "Inspection device" should be entered into this field.

**Defining the “Structure of gauge basic data”:**

This text field give you the possibility for a free definition of the „Type specific basic data“. This means here you can enter all the field names for data fields should be saved in the database only for this special type of gauge. Pay attention, that you have to enter always one line for one data field: This line includes the „Field name“, the „Field type“ with the field format and (if necessary) the unit. See the pre-defined gauge types to understand the principle of this. Attention: the delimiter „|“ may be created while pressing the „AltGr“ key and the „>“ key.

**Examples for field definitions:*****Measuring range|Real:10:4|mm***

(Field name: „Measuring range“; it is a numerical field with ten signs and four decimal points; the unit is „mm“);

***Number|Integer:4|piece(s)***

(Field name: „Number“; it is a numerical field with four signs, no decimal points; the unit is „piece(s)“);

***Designation|String:20***

(Field name „Designation“; it is a alphanumeric field with at maximum 20 characters)

To define a list for a selection use the following syntax:

***Form of construction|List:20:3|Form A|Form B|Form C***

(Field name: „Form of construction“; it is a list of three alphanumeric fields, where you can select one of them; the texts are 20 characters long);

Please note, that you should not change generally things in the database structure after entering gauges of this type into the database. This may be cause the loss of data.

**Defining the “Structure of gauge inspecting data”:**

Here you can enter the type specific fields you want to save in the database while executing a „Gauge inspection“. The procedure to define this fields is the same as described before.

**III.3.5.2. Copy a gauge type definition**

The fastest way to create a new gauge type definition is to “Copy” an existing gauge type. Change the “Short designation” and the “Gauge type name”. Make all other changes necessary.

**III.3.5.3. Delete a gauge type definition**

This function should be used with extreme caution. The delete function is used to delete all the data of a gauge type e.g. the gauge type definition record, the basic data- and inspection data structure files, global sets of data and sets of gauge data. The deletion is irreversible.

In order to operate the delete function, first highlight the gauge type you would like to delete and, after having done so, press the "Del" key. Before it is deleted, a warning box will appear on your screen at which point you can choose to cancel or proceed with the deletion.

### III.3.6. Edit the User Data Base

The user data base contains the user names and passwords, access rights (reading, reading and writing, reading and writing and deleting), registration dates, as well as login and logout times. This only stays in indirect relation to the gauge data base.

Normally, the user base is only read. Writing in the user data base generally occurs when registering or unregistering a user, working on the user data table in the configuration program (inserting, changing or deleting a set of user data). The user name and password will be requested and should be entered via the keyboard at the start of the program. The combination of the user name and the corresponding password are used to identify the user. This means that allocating several passwords to one user or using the same password for several users is allowed if you prefer that the structure of your access hierarchy be flexible.

Only one set of data with the name "system administrator" can be given and may not be deleted.

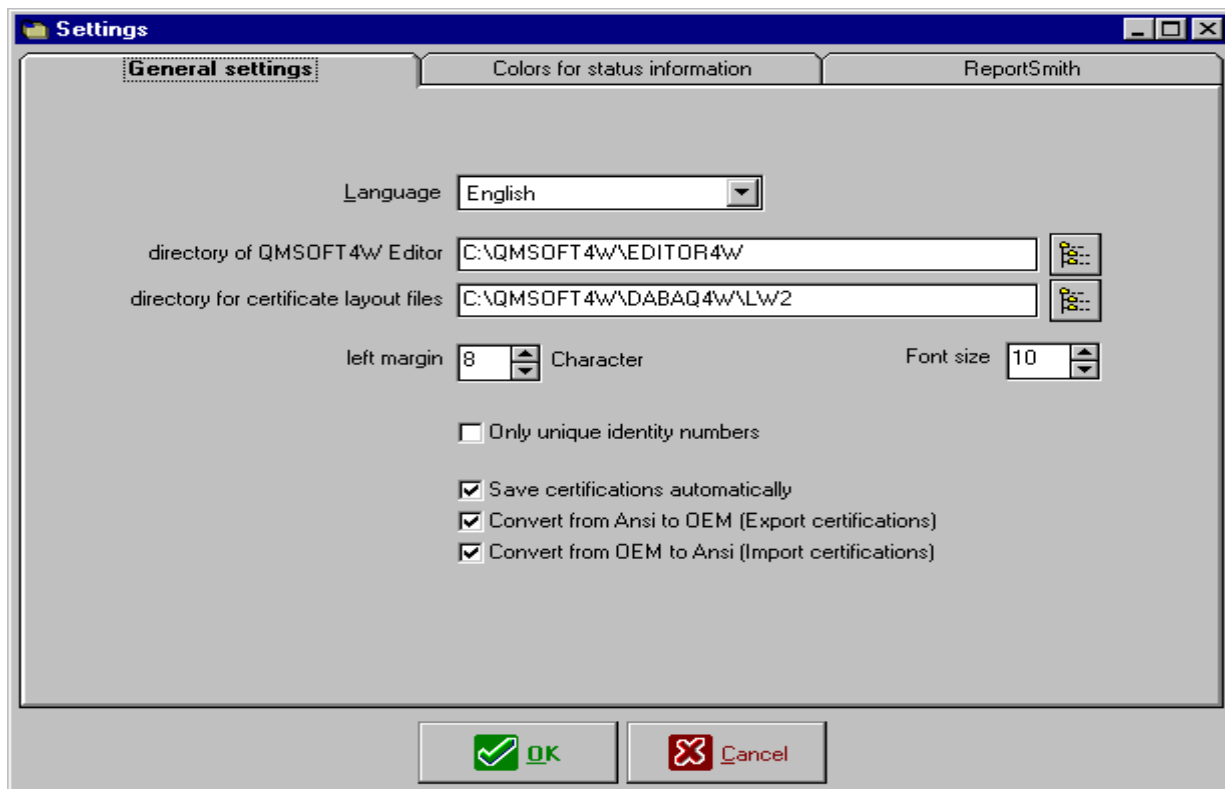
The user data table installed on the disks you have received contains two sets of data which allow for access into the system (see Figure III.14):

User	Password	Access Capabilities
system	system	system administrator
Demo	Demo	read, write and delete

The user data table is coded. You should, however, carefully secure user names and passwords. Without it you will lose all access to the configuration system.

After installing the system, the password and the user name of the system administrator should be changed.

### III.3.7. Settings | General settings



**Figure III-8: Program general settings**

The dialogue "General settings" consist of three different registers.

#### **General settings:**

Here you can change the program language and set some general parameters. Important switches are:

"Only unique identity numbers": activate this "button" only unique identity numbers can be entered; otherwise you can use the same identity number for different gauge types.

"Save certifications automatically": if this option is switched on, inspection certificates which has been created by an "inspection program" (e.g. the QM-DIAL program used to inspect a dial gauge) will be saved into the database; doing this you can show/print an inspection certificate when ever you want, if you select the related inspection in the gauges history and clicking on the "Editor" button.

The fields „directory of QMSOFT Editor“ and „directory of certificate layout files“ will be set by the installation procedure. Normally it is not necessary to change it.

#### **Colors for status information:**

Here you can define the colors for different gauge status informations.

#### **Report Smith:**

This register page includes different settings for the connection to the report creating tool „ReportSmith“. Normally no changes on this page are required. If you want to use different layouts to create gauge lists for special purposes you can change here the used report file (\*.RPT) for the related operation.

### III.4. Checking and repairing a database

While operating a database there may be different reasons (mainly by a computer crash) that your database, means the used Paradox tables, are corrupted.

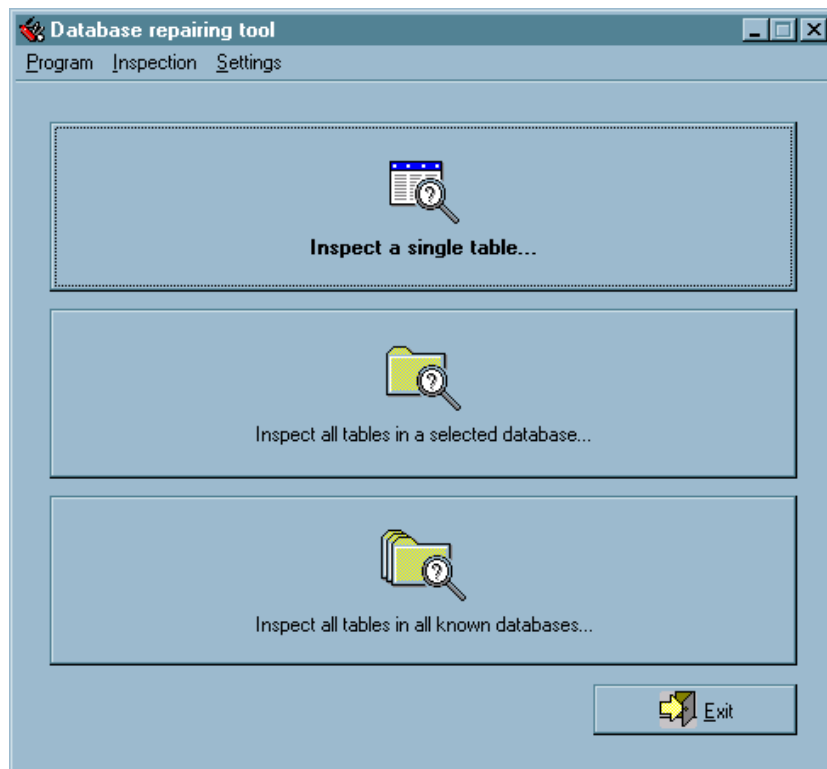
One possibility in this case is it to restore your database from a „Backup“ file, if you have an existing one. But doing this you will loose all database information entered in the meantime since the last update was made.

The database repairing tool (see the „Swiss knife“ Icon on the Qmsoft shell) give you a tool to repair corrupted dataabse tables.

**NOTE:** This tool is usefull to repair many things in the database, but it is not a wizard. Not in all cases it is possible to repair a table and to avoid the loss of data. Make backup files to keep your data !

If the option „Check database integrity automatically“ in the menu „Settings“ is switch on any database will be checked while opening.

If you start the repairing tool from the QMSOFT shell you will get the following screen:



**Figure:** Database repairing tool

The main functions are:

- Inspect a single table: this function will check only one table; use the „Open“ dialogue to select the table you want to check;
- Inspect ....database: this will be the most common function; it will check all tables related with the selected database; select the database and press „Ok“ to continue;
- Inspect all databases: inpect all known databases;

### III.5. Creating a Calibration certificate for a „Special“ gauge in the system QMSOFT

Calibrating a standard gauge in the system QMSOFT (e.g. a Dial gauge) the calibration certificate will be created by the related inspection program. For a Dial gauge the program QM-DIAL is doing this.

Often it is necessary to create a new type of gauges which can not be handled with the available inspection programs (for example: Squares or straight edges).

To create a calibrating certificate without an special inspection program different function was implemented in the gauge management system to do this.

This opportunities does exist:

- creating a calibration certificate for a „Special“ gauge type using an program internal „Calibration certificate layout“ saved in a „\*.LW2“ typed file; this files can only be edited with the QMSOFT internal editor program !
- creating a calibration certificate using the office program MS-WORD ® ;  
using this option a special defined macro will be executed to make the connection between the gauge managment system DABAQ4W and MS-WORD;  
the layout of the calibration certificate will be created as a WORD file; using a special "QMSOFT" toolbar in the MS-WORD program you can insert database fields in your document.
- creating a calibration certificate using the office program MS-EXCEL ® ;  
using this option a special defined macro will be executed to make the connection between the gauge management system DABAQ4W and MS-EXCEL;  
the layout of the calibration certificate will be created as a EXCEL spread sheet; using a special "QMSOFT" toolbar in the MS-EXCEL program you can insert database fields in your document.

#### III.5.1. Creating calibration certificates using an "internal certificate layout"

An "Internal certificate layout" is a file of a special format defining the layout of the calibration certificate and guarantee the inserting of the current database informations (e.g. identity number, inspection results..) into your certificate. This files have generally the extension "LW2". You can find this files in the folder "..\QMSOFT4WDABAQ4WLW2" on your hard disk.

**NOTE:** Do not open this files with any other editor program outside of the QMSOFT database management. You will loose the relations to the database fields !

How to create such "LW2" file:

##### Step I – create the new type of gauge

The first step is to create the new type of gauge. For the instructions how to do this please read section III.3.5. "Settings|Gauge types" of the gauge management systems user manual.

##### Step II – create the new „layout file“ and link it with the gauge type

In the database system the link between a Gauge type and the inspection program (the program which has to be called if a new inspection will made) is done by the entry in the field „Inspection program“ if you call the menue „**Settings|Gauge types**“ (see the figure).

Instead of the defining a link to an inspection program for "special gauges" a link to the internal certifiace will be defined (or to an WORD or EXCEL file; see the next sections).

For „Special“ gauges you define this link by doing the following steps:

Enter in the field „**Type of inspection program**“ the value „3“ !!!

This means that the internal QMSOFT Editor has to be used to create the certificate;

Do a mouse click on the Icon „Edit the default certificate layout“ (see also the figure); now the program is loading a general („\_Default“) layout file which you can change here if necessary; use now the menu „**File|Save as..**“ and save this default layout file with a new name; for the name use a text which is related with the gauge type name;

**Note:** all this layout files will get the file extension „**LW2**“ and will be saved in the directory „**..\QMSOFT4\WDABAQ4\W\W2**“ !

Now click to the Icon „Change/Edit the program links“ (the blue „Q“ Icon; see figure). After that use the „Insert“ icon (empty paper sheet) to insert a new line in the shown table;

Do a double click into the right field of this line (LW:\Path\Program) and select the certificate layout file from the directory „**..\QMSOFT4\WDABAQ4\W\W2**“ ;

Please note that you have to set the file type to „**\*.lw2**“ if you want to open the file !!. In the field „Alias“ the name of the file will be inserted automatically. Press the „ok“ button to save this settings. Now select the field „Inspection program“ (on the right side of the screen) and do a double click in this field; you get the list of all available program names in the database system. Select the Alias name of the certificate layout file;

Change/Edit the program links

Edit the „Default“ certificate layout file

Edit the certificate layout file for the selected gauge type

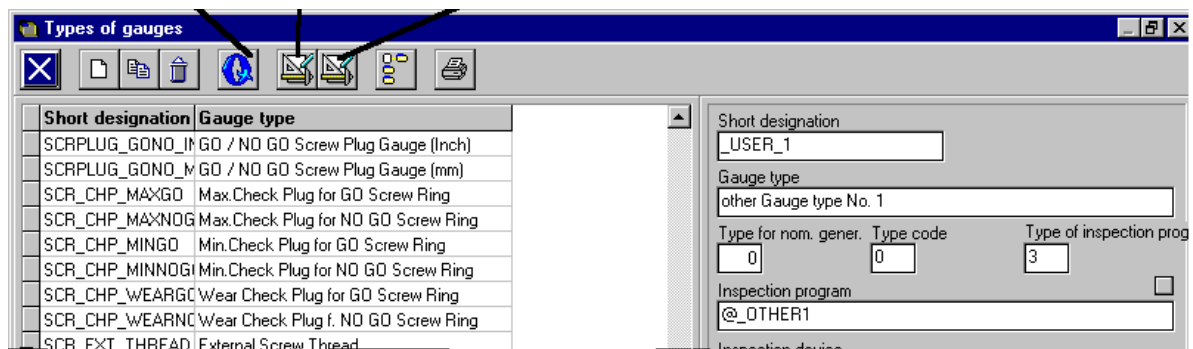


Figure: menue "Settings|Gauge types"

Now the link between a new layout file and the new gauge type is created. On your screen the Icon "**Edit the certificate layout file for the selected gauge type**" (see the figure) is now activated.

### Step III – edit the layout file for the new gauge type

Use the Icon "**Edit the certificate layout file for the selected gauge type**" to load the new certificate layout file into the editor. Now you can edit this in the same way as known from the certificate layouts for the „normal“ gauge types. Using the menue „**Insert|Fields**“ you can insert all the database fields available in the database for the related gauge type into the certificate. The names (or the description) of the fields you can see on the lower border of this window.

### The usage of the „internal“ Certificate layouts:

Now you can use the „internal“ Certificate layout to create „Calibration certificates“ for the special type of gauge. As usual make a „New gauge inspection“ which will insert a new record in the gauges history. In fact that you don't have an inspection program where you can enter the measurings results enter the results of the inspection directly in this screen (right side of the screen with the defined fields). If you have done this click to the Icon „Call the inspection program“ (blue „Q“). Instead of calling an inspection program like QM-DIAL the QMSOFT editor will open the related layout file and fill it with the results of the database. If required you can made changes on your certificate; print it ....

### III.5.2. Creating of calibration certificates with MS-WORD ®

**NOTE:** To use this function you need a licenced version of MS-WORD ®. The functions implemented was tested with WORD 97. L&W can not guarantee that it will work with other versions of MS-WORD.

The knowledge of the handling of MS-WORD is presupposed.

To create a certificate layout with MS-WORD and it's connection to the database do exactly the same steps as described in section III.4.1. (create the gauge type, do the link-up).

The only differences are:

- type into the field „**Type of inspection program**“ the value „4“ !!!  
this is the code for the program link to WORD;
- instead of using files with the extension "LW2" now Word files (extension "**DOC**") are used;  
examples will also found in the directory „...\\QMSOFT4\\DABAQ4\\LW2“;

If you have done this actions use the function "**Edit the certificate layout file for the current gauge type**" to edit your layout file.

The Word file, being set in your program link, will be opened now and can be edited in the same way as any "normal" word document.

**Note:** Starting WORD you may get an message regarding "Makro viruses". Continue the program with the button "Activate macros" !

The link to the database management system is shown by a new toolbar "QMSOFT". This toolbar (see the next figure) does include four fields and will be used to insert database fields into your certificate.

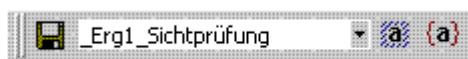




Figure: toolbar "QMSOFT" in MS-Word

This fields have the following functions:

- left Field "Disk icon": stop WORD and go back to the gauge management system;
- the "drop down list": shows the list of all available database informations which you can insert into your WORD document;
- field "Insert database field" : this function will insert the selected field to the current cursor position;
- field view on-/ off : toggle "Field view" on / off; use this button to show the inserted database fields; it may be necessary to press this button twice before you can see new inserted fields;

Using this functions you can insert all database fields available for this type of gauge in your certificate. Of course now you can use all the other functions available in MS-WORD (e.g. calculating of fields) to make your work more efficient.

### III.5.3. Creating of calibration certificates with MS-EXCEL ®

**NOTE:** To use this function you need a licenced version of MS-EXCEL ®. The functions implemented was tested with EXCEL 97. L&W can not guarantee that it will work with other versions. The knowledge of the handling of MS-EXCEL is presupposed.

To create a certificate layout with MS-EXCEL and it's connection to the database do exactly the same steps as described in section III.4.1. and 4.2. (create the gauge type, do the link-up).

Type into the field „**Type of inspection program**“ the value „5“ !!! This is the code for the program link to EXCEL. Now files with the extension "XLS" will be linked to the database system. Examples will found in the directory „...\\QMSOFT4W\\DABAQ4W\\LW2“;

Use the function "**Edit the certificate layout file for the current gauge type**" to edit your EXCEL sheet used as layout file.

The EXCEL file, being set in your program link, will be opened now and can be edited in the same way as any "normal" EXCEL working sheet.

**Note:** Starting EXCEL you may get an message regarding "Makro viruses". Continue the program with the button "Activate macros" !

The link to the database management system is shown by a new toolbar "QMSOFT". This toolbar (see the next figure) does include three fields and will be used to insert database fields into your working sheet.

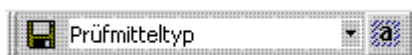



Figure: toolbar "QMSOFT" in MS-EXCEL

This fields have the following functions:

- left Field "Disk icon": stops EXCEL and go back to the gauge management system;
- the "drop down list": shows the list of all available database informations which you can insert into your EXCEL document;
- field "Insert database field" : this function will insert the selected field to the current cursor position (insert it into the selected cell);

Using this functions you can insert all database fields available for this type of gauge in your certificate. Of course now you can use all the other functions available in MS-EXCEL to make your work more efficient.

+++++



#### IV. Inspection program QM-DIAL

The program QM-DIAL is used for computer aided 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 QM-DIAL program does include a module to carry out the inspection according to the German standards (**DIN 878**, **DIN 879**, **DIN 2270**) inclusive the rules according to the **VDI/VDE/DGQ-standard**, the American standard **ANSI/ASME B89.1.10M-1987**, the British standards **BS 907 / BS 2795** and the Australian standard **AS 2103-1978**, the Korean and Japanese standards **KS B 5206**, **KS B 5207**, **KS B 5238**, **JIS B 7503**, **JIS B 7533** and the standard **JMAS 2001** and also the french standard **NF E 11-050**.

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.

Measure data input can be realized either by an on-line measuring device, by the computer keyboard or by a data file, thus a coordination with the individual situation of the user is possible. The contact between measuring device and computer can be realized by one of the serial ports of the computer (V.24, RS-232, see annex D) by the SIP LMC program, by the TRIMOS WINDHI program or with a Heidenhain Interface card (IK102021 or IK220) .

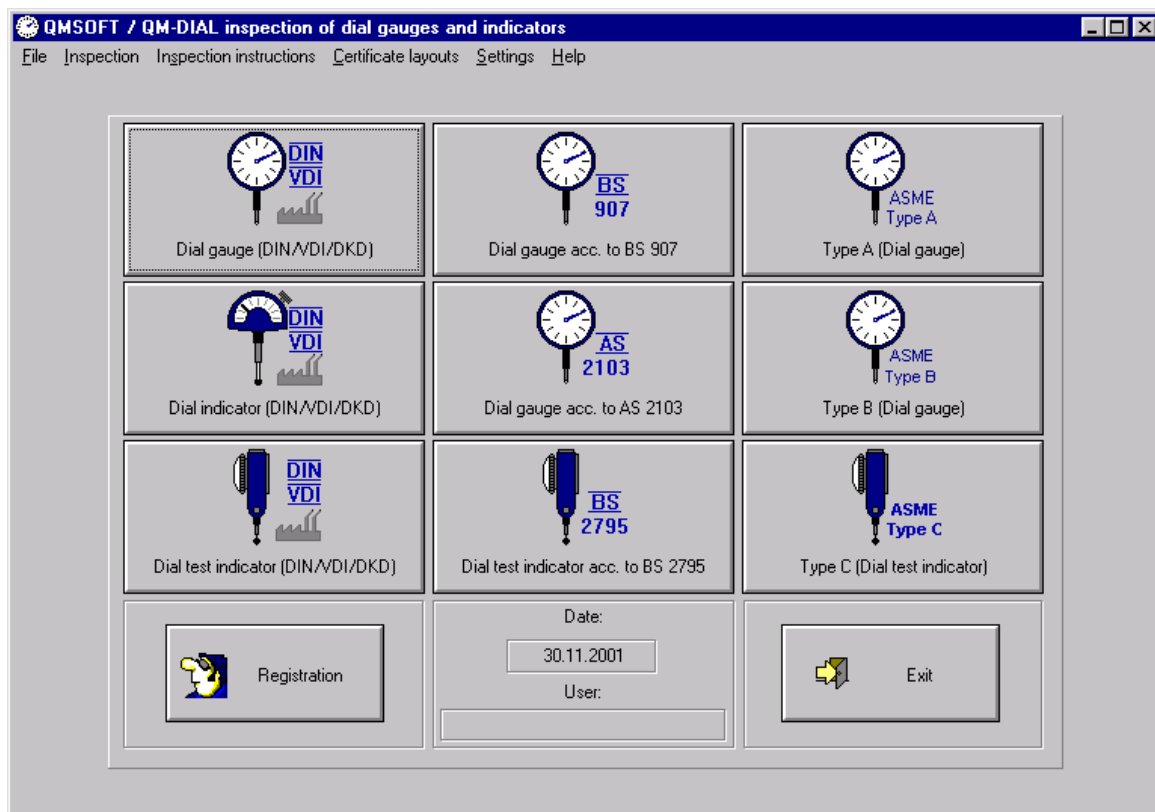
In coordination with the inspection strategy and the selected standard the program computes the deviation range  $f_e$ , the deviation range  $f_t$  of the sub measure range, the total deviation range  $f_{ges}$ , the repeatability  $f_w$  and the discrimination error  $f_u$ . For the evaluation according the British or Australian Standard the calibration errors over the several standardized intervals (e.g.: any one-tenth revolution, any half revolution ...) will be calculated. The input parameters necessary for the evaluation are inspected on plausibility according to the usage purpose of the standards.

The output of the inspection results are numerical data lists and graphics showing the deviation course - either on the screen or via a printer.

The program QM-DIAL can be started directly out of the database program QM-MANAG - also offered by L&W GmbH - and provided with initial data (such as ID-number, measuring range and graduation of the product to be inspected etc.), in this case the inspection results are directly transmitted back to the database.

## IV.1. Program start

You can start the QM-DIAL program directly from the QMSOFT-command-Shell (click the corresponded symbol in the shell). The other way is to start the program through the WINDOWS-file manager or explorer (WINDOWS 95).



**Figure:** QM-DIAL main screen

Starting the program you get the start screen with different buttons, where you can start the inspection related to the selected gauge type or standard directly. The reservation of this buttons depends on the installed language.

**ATTENTION:** If you want to change the function of a button selected, move the mouse cursor to it and press the **Right mouse key**; now you can select the wished function from the shown list of standards.

Especially at the first start of the program you should set different parameters for the program environment.

The following program settings you have to do:

### - Configuration of the On-line Interface:

If you use a direct linkage between the computer and your measuring machine to transfer measuring values, at first you should start the indication program required (RS232DRV, IK102021 or SIDDREV depended on the device and the interface connection you use) and set the correct parameters for the Online Interface (see also the manual of the used program).

### - Program settings and inspection conditions:

Here you can set some general things for the program environment; for example: the default way to transfer measuring values (machine or keyboard) or the unit used for the evaluation. See section V.3 for this.

## IV.2. Program settings

Working with the program you should make different settings to define the program environment and especially program conditions.

### IV.2.1. “Settings | General settings”

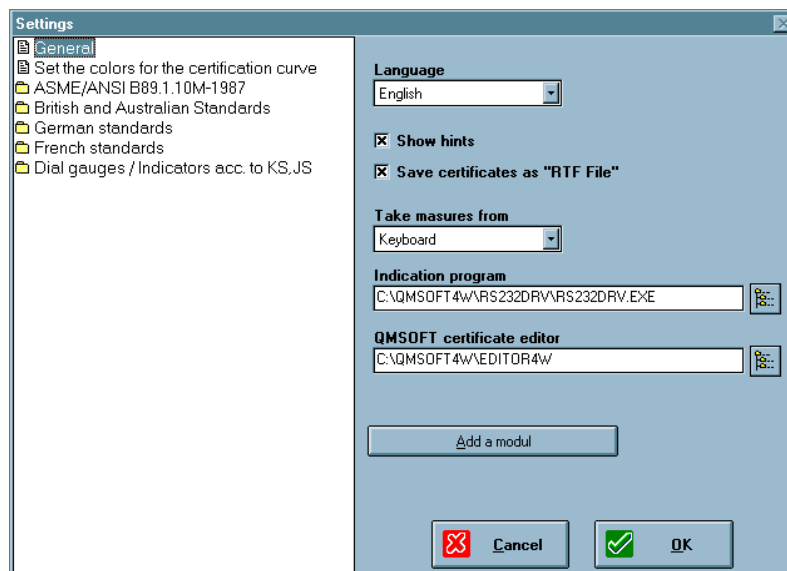


Figure: General settings

Using this option you have different registers (see the left side in Figure 2) to change program settings. Click to the wished function to open the special opportunities (see the right side in figure 2) :

#### **Register „General“**

Here you can choose the program language, the default source for the taking over of measuring values and the directories for the access to special programs (indicating of measuring values; creation and edit record listings). Normally ***you should not change this directories***.

Using the option “Save certificates as RTF file” the program will save the inspection certificate for each inspection automatically in a “RTF” formatted file. The file name will be created using the first 8 characters of the gauges identity number.

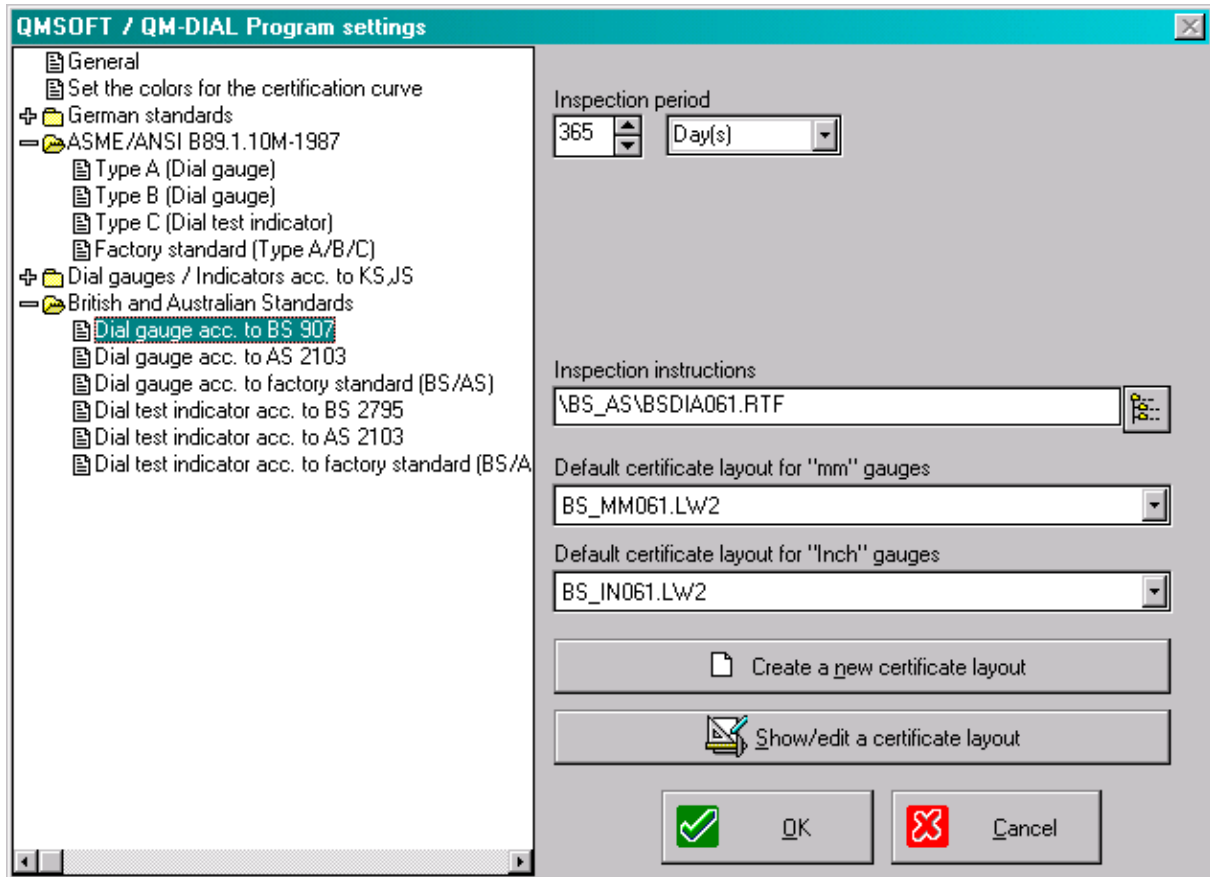
#### **Register “Set the colors for....”**

With this option you have the possibility to set different parameters for the representation of the calibration curve as well for the screen as the *print out*.

*Pay attention*, that you set the parameters for the wished device, it is divided into the colors for the “screen” and the “print out”.

**Parameters for the different standards:**

Behind this two options you find a list enclosing all the implemented standards of the program. Make a **double click** on the standard you want to set more detailed parameters and you get an overview about the implemented functions (see figure).



**Figure:** Settings for a gauge type selected

For each group of standards (see the example “British and Australian standards” in the figure) implemented in the program you can set the following parameters:

**„Inspection period“**

Set the default “inspection period” for the selected gauge type. This may be used to calculate the next inspection date and to print it on the calibration certificate. If you start the dial gauge inspection from the QMSOFT database program the “inspection date” and “Inspection period” is taken over from the database will be used.

**„Inspection instruction“**

Here you can enter a reference to a corresponded text file including the inspection procedure as a text. You can use this function to refer to a text file including your individual inspection instruction.

**“Default certificate layout files”**

Here you can enter the name of the „Certificate layout file“ used to create your calibration certificate. This file includes all information about the layout and the content of the certificate being created. If the selected gauge type is available with „mm“ and „Imperial“ readings you have to enter two different file names.

**NOTE:** Because the program will be installed to support different languages you will find a lot of “LW2” files in the related directory. Note that the number in the file name (for example the “061” in the “METR\_061.LW2”) file does represent the used language (061 = English; 033 = French; 034 = Spanish; 039 = Italian; ...). Using the Windows-Explorer you can delete all certificate layout files you do not use.

#### IV.2.2. “Settings | Tolerances for factory standards”

The program QM-DIAL can define tolerance values of dial gauges, dial indicators and dial test indicators which do not correspond to the used standard. This can be the case if the inspection conditions mentioned in the standards (inspection range, inspection methods) can not be fulfilled or non-standardized quantities of the measuring devices that shall be inspected (measuring range, graduation), are to be taken into consideration.

For the valuation of gauges according your factory standard a tolerance table have to be created. The input of the tolerance values and their permanent saving will be supported by the option „Settings | Tolerances for factory standards“. Using this option you get a list with the related “basic standard” or program modul for which you want to enter the tolerance values. This is necessary because this standards define different gauge parameters.

After selecting the wished “basic standard” (for example you select “Dial gauge acc. to factory standard (BS/AS) ) a window appears on your screen containing all tolerance tables you have defined for this type of gauge. Now you can create new tables or change entries in an existing table.

If you press the Button “Change” you get the following screen:

The screenshot shows a software window titled "Tolerances (Dial gauge)". It contains a table with 9 columns: Measuring range, Graduation, 1/10, half rev., one rev., two rev., larger, discr., and repeat. The first row is highlighted in blue. Below the table are input fields for Unit (set to inch), Measuring force (max) (1.50 N), and Max. difference of measuring force (0.60 N). There are buttons for 'new' and 'delete' at the top right, and 'Cancel' and 'OK' at the bottom.

Measuring range	Graduation	1/10	half rev.	one rev.	two rev.	larger	discr.	repeat.
[Inch]	[Inch]	[thou.Inch]	[thou.Inch]	[thou.Inch]	[thou.Inch]	[thou.Inch]	[thou.Inch]	[thou.Inch]
0,010000	0,000100	0,050	0,100	0,150	0,250	0,700	0,040	0,020
0,015000	0,000050	0,020	0,060	0,080	0,100	0,120	0,020	0,010
0,015000	0,000100	0,050	0,100	0,150	0,250	0,700	0,040	0,020
0,020000	0,000100	0,050	0,100	0,150	0,250	0,700	0,040	0,020
0,025000	0,000100	0,050	0,100	0,150	0,250	0,700	0,040	0,020
0,025000	0,000250	0,120	0,300	0,300	0,500	0,800	0,200	0,100

Unit: inch

Measuring force (max): 1.50 N

Max. difference of measuring force: 0.60 N

Buttons: new, delete, Cancel, OK

**Figure:** Entering of factory tolerances

Pay attention to the field “unit”. If you change this to “inch” you get a second tolerance table where you can enter the values for the gauges with imperial readings.

The entered tolerance values will (divided for dial gauge, dial indicator; dial test indicator and gauges according) be saved. If you make a inspection according factory standard the corresponding values will be read. The entered values of measuring range and graduation of your inspected gauge should be corresponding a existing entry in the tolerance table. Otherwise a valuation of the gauge is not possible.

#### IV.2.3. Certificate layouts

The program gives you the possibility to customise the layout of your calibration certificates. The layout of these certificates is based on the so called "certificate layout file" (template). This file contains all information about the form of the certificate and the values that should appear in it. By editing this certificate layout file you can change the layout. Saving this file with another file name gives you the possibility to work with different record layouts.

All certificate layout files you have created will be saved in the working directory of the QM-DIAL program. The files have the extension ".LW2".

Using the option "**Certificate layouts | Show / edit a certificate layout**" you can load a certificate layout file into the editor program.

**ATTENTION:** Do not open a certificate layout file ("LW2" extension) directly with the QMSOFT editor or any other program. In this case the program dependent fields will be removed !!

A certificate layout file 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 the different text parameters;
- "Placeholders" ("Fields"): a "Field" is including a 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 use the menu "Insert | Fields". Using this menu you can also see all available "Fields" and the related information. For numerical fields you can set the number of decimal points using the menu "Insert | Fields".

"Line conditions": A line 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 printed 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 "Line conditions" available.

See „Appendix B“ give you the instructions how to work with the editor program „EDITOR4W“.

### IV.3. Inspection

After finishing the starting phase of the program and (optimal) the input of the user's name you get the program main window on the screen (see also section IV.1). Here you have nine different buttons with a gauge graphic usable to carry out the inspection for the related gauge type. For starting an inspection click the wished button. You can also use the menu "Inspection" to start the inspection of a gauge. See section IV.1. how to change the function of a button.

#### IV.3.1. Inspection of Dial Gauges and Dial Test Indicators according the British or Australian Standard

For the inspection of gauges according to the British or Australian standards you get the following screen to enter your gauge parameters:

Identity number: 012\_Test

Measuring range: 0,5000 Inch

Graduation: 0,0010 Inch

Movement per revol.: 0,1000 Inch

No. of repetitions: 5

☒ Measure plunger going out

☐ Measuring force

File to save measures: MESSUNG.DAT

**Tolerances acc. to BS**

Discrimination : 0,30 thou.Inch  
 Repeatability : 0,20 thou.Inch  
 1/10 revol. : 0,25 thou.Inch  
 any half revol. : 0,50 thou.Inch  
 any one revol. : 0,50 thou.Inch  
 any two revol. : 0,75 thou.Inch  
 any larger interval : 1,00 thou.Inch

Reading positions

Cancel    Inspection procedure    Continue

**Figure:** Dial gauge according BS 907 or AS 2103

Enter the following parameters:

**Identity number:**

Enter the identity number of the inspected gauge. The number may be printed in the inspection certificate.

**Measuring range:**

Enter the value of the measuring range.

**Graduation:**

Select the value for the graduation out of a given list. Only values available in the BS standard are listed.

**Movement per 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.

**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 made readings on all measuring positions used with incoming plunger. This values will be used to calculate the "Error of Discrimination". If you choose "no", you have to inspect the discrimination in a other way (see the BS or AS standard how to do this).

**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 this stored values using the menue "Inspection|Repeat an inspection".

The button "**Reading positions**":


Inspection a gauge according to British standard with more than three turns a special pattern for the reading positions is used. Press this button "Reading positions" to see the selected reading positions.


**Pattern of measuring positions**

	0	1	2	3	4	5	6	7	8	9
0,000	*	*	*				*	*	*	
0,100			*	*	*				*	*
0,200	*				*	*	*			
0,300	*	*	*				*	*	*	
0,400			*	*	*				*	*
0,500	*									

**Total number of measures** 27

☐ Measure at each 1/10 revol.

 **OK**

 **Cancel**

**Figure:** Setting of reading positions for BS inspection

In the shown window you can see the pre defined reading positions. For dial gauges with a larger range you can change the numbers of the "Read tree / miss three" cycles according to the recommendations of the British (Australian) standard.

#### IV.3.2. Inspection according german standards (DIN/VDI)

To inspect gauges according to the DIN standards there are three basic functions available: the inspection of “Dial gauges”, “Dial indicators” and “Dial test indicators” (lever type).

Selecting the option “Dial gauge” you will get the following screen (for Dial indicators and Dial test indicators this screen is similar):

The screenshot shows a software dialog box for entering inspection parameters for a dial gauge. The fields are as follows:

- Inspection acc. to:** A dropdown menu showing "Dial gauge acc. to DIN 878 (October 1983)".
- Factory tolerances:** A dropdown menu showing "Dial gauge acc. to DIN 878", with additional icons for a list and a calculator.
- Identity number:** A text input field containing "TEST\_123456790".
- Measuring range:** A dropdown menu showing "3,0000 mm".
- Graduation:** A text input field containing "0,0100 mm".
- Type of dial:** A dropdown menu showing "mechanical".
- Range / revolution:** A text input field containing "1,0000 mm".
- File to save measures:** A text input field containing "MESSUNG.DAT".

At the bottom of the dialog, there are two buttons: "Cancel" (with a red 'X' icon) and "Continue" (with a green arrow icon).

**Figure:** Enter the parameters for a Dial gauge – evaluation according to DIN

The following functions are available in relation with german standards:

##### ***Dial gauge according to DIN 878***

The inspection of the dial gauge is carried out exactly according to the DIN-standards given in the inspection conditions and chosen in the main menu. Besides this the dial gauge must correspond to standard values (measuring range, graduation, e.g. 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)***

The inspection of the dial gauge is carried out according to the VDI/VDG/DGQ-standards given in the inspection conditions and chosen in the main menu. Besides this the dial gauge must correspond to standard values (measuring range, graduation, e.g. 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 factory standard specifications***

The inspection course of the dial gauge is carried out corresponding to DIN-standards chosen in the main menu; the tolerance values, the inspection range and the special values (graduation, measuring range) can be put in differing from the standards.

***Dial indicator according to DIN 879***

The inspection of the dial indicator is carried out exactly according to the DIN-standards given in the inspection conditions and chosen in the main menu. Besides this the dial indicator must correspond to standard values (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***

The inspection of the dial indicator is carried out according to the VDI/VDE/DGQ-standards given in the inspection conditions and chosen in the main menu. Besides this the dial indicator must correspond to standard values (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 factory standard specifications***

The inspection course of the dial indicator is carried out corresponding to DIN-standards chosen in the main menu; the tolerance values, the inspection range and the special values (graduation, measuring range) can be put in differing from the standards.

***Dial test indicator according to DIN 2270***

The inspection of the dial test indicator is carried out exactly according to the DIN-standards given in the inspection conditions and chosen in the main menu. Besides this the dial indicator must correspond to standard values (measuring range 0.2, 0.24, 0.5, 0.8 or 1.6 mm, graduations 0.002 or 0.01 mm).

***Dial test indicator according to VDI/VDE/DGQ 2618 (part 20)***

The inspection of the dial indicator is carried out according to the VDI/VDE/DGQ-standards given in the inspection conditions and chosen in the main menu. Besides this the dial indicator must correspond to standard values (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 factory standard specifications

The inspection course of the dial test indicator is carried out corresponding to DIN-standards chosen in the main menu; the tolerance values, the inspection range and the special values (graduation, measuring range) can be put in differing from the standards.

Depending on the type of gauge and the choosen kind of inspection ( according DIN, VDI, ...) you have to enter the following fields:

- Identity number:** This field is to be used to identify the inspected gauge, for example by giving an inventory number. The number is printed in the result listing.
- Measuring range:** The value of the measuring range is to be selected out of a given list by moving the CURSOR keys or the mouse buttons. Only standard values are listed.
- Graduation:** The graduation corresponds to the distance the measuring bolt covers when the indicator moves for one scale line. Normally it is 0.010 at dial gauges, but it can be given independently (in reasonable ranges).
- Start of inspection:** The start of the inspection range corresponds to the value which must be adjusted (in mm) at the reading of the gauge to be inspected for the input of the first measuring value.
- End of inspection :** The end of the inspection range corresponds to the value which must be adjusted (in mm) at the reading of the gauge to be inspected for the input of the last measuring value.
- Inspection step:** The inspection step is the difference between two consecutive measuring values and the same direction of the measuring bolt for recording the deviation course (in mm).
- Number of repetitions:** The number of values to inspect the repeatability must be put in (min.: 5, max.: 999 values).
- Inspection of  $f_t$ :** The user has to decide wether the deviation of the sub measuring range  $f_t$  shall be inspected. If not, the inspection effort is reduced.
- Inspection of  $f_u$ :** The user has to decide wether the error of discrimination  $f_u$  shall be inspected. If not, the inspection effort is reduced.
- Inspection position:** The position of the gauge (vertical or horicontal) influences the result especially at small graduations. That is why the standard permits a tolerance expansion by 30% at graduations up to 1 micrometer. The selection of the position is carried out by the CURSOR keys and is finished by the "ENTER" key.
- File to save measures:** The name of the data file in which the values in combination with the parameters of the inspected gauge and the inspection parameters shall be saved must be given. That file makes a repeated evaluation possible without a new measuring. The file can also be selected out of the directory by using the keys "PgUp" or "PgDn" and the CURSOR keys.

If you have finished you input use the „Continue“ button to continue the program.

#### IV.3.3. Inspection according to ASME/ANSI B89.1.10M-1987

The inspection procedure according to the American standard is similar to the one according to DIN- or VDI-inspections. But the inspection of the sub measuring range is not carried out and the integration of the measuring devices to be tested is done according to other priorities. This is directly to be seen at the input mask (see Figure 6) including additional or different input fields.

**Figure:** Inspection according to ASME/ANSI B89.1.10M

Enter the following values:

**Identity number:**

This field is to be used to identify the inspected gauge, for example by giving an inventory number. The number is printed in the result listing.

**Type of gauge:**

Here the type of the scale must be given. The scales are divided into symmetric and continuous scales.

**Dial style:**

Select the style of the dial from the given list. This will be used to select the reading positions for the gauge inspection.

**Measuring range:**

Here the measuring range of the inspected gauge must be given. The measuring unit (mm or inch) depends on the graduation which is to be selected in the following field.

**Graduation:**

Here the graduation of the inspected gauge has to be selected out of the offered list. Doing this also the measuring unit for all other figures (measuring range, movement per revolution, tolerance values ...) and for the measuring itself is fixed. Possible values for the graduation are: 0.00005 inch, 0.0001 inch, 0.0005 inch, 0.001 inch, 0.001 mm, 0.002 mm, 0.01 mm and 0.02 mm.

**Movement per revolution:**

Here the distance the measuring bolt covers per revolution is to be given. The measuring unit depends (mm or inch) on the graduation which is to be selected later.

<b><i>Inspect at each .. grad.:</i></b>	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.
<b><i>Number of repetitions:</i></b>	The number of values to inspect the repeatability must be entered (min.: 5, max.: 999 values).
<b><i>Measure plunger going out:</i></b>	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 made readings on all measuring positions used with incoming plunger. This values will be used to calculate the "Error of Discrimination".
<b><i>Measuring force:</i></b>	Select this option if you want to evaluate the measuring force of the dial gauge.
<b><i>File to save measures:</i></b>	Here you can enter the name of a file which will store all your readings while inspecting the gauge. You can recall this stored values using the menue "Inspection Repeat an inspection".

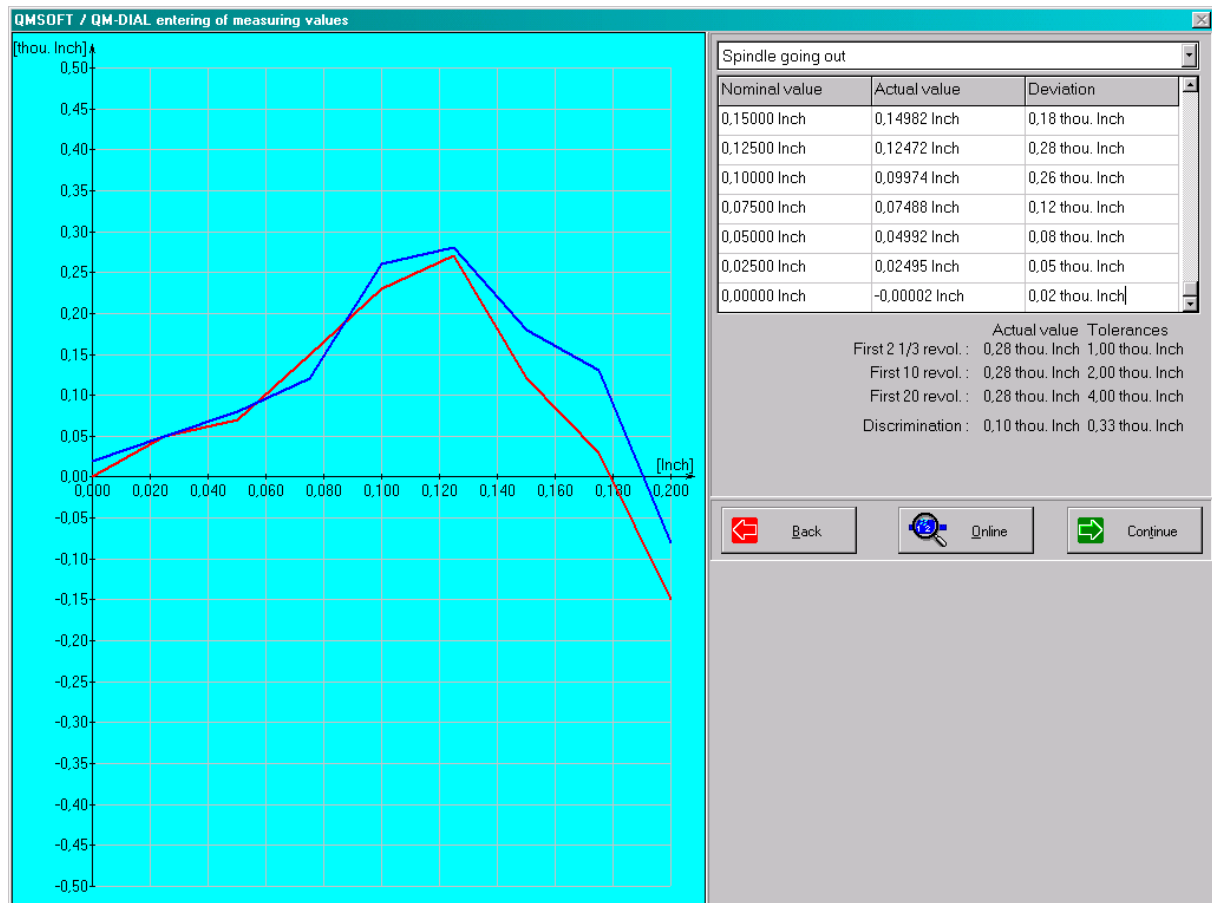
#### **IV.3.4. Inspection according to Korean and Japanese standards**

Depended on the type of gauge you have choosed, the input mask to specify the gauge parameters appears on the screen. The user now has to enter the nominal and evaluation parameters which describe the gauge to be inspected more exactly. This values and parameters are similar to the parameters described before. See for example section IV.3.1. for this.

#### IV.4. Input / taking over of measuring values

The input of the measuring values must be done in the order: measuring value 1 to n if the measuring bolt is going in and measuring value n to 1 if the measuring bolt is going out, measuring value 1 to t if the measuring bolt is going in at sub measuring range (if the sub measuring range is included in the inspection) and measuring value 1 to w for repeated measurements. The valid inspection position is displayed. The measuring values are inspected on their plausibility and rejected in case that the deviation is more than half of the value of the valid inspection step.

Input of measuring values using the keyboard will be done directly in the shown tables for the measuring values.



**Figure:** Entering of measuring values

More effective is the on-line data input via a measuring machine. Some handling actions depend on the used measuring machine (see the corresponding producer documentation). The program QM-DIAL receives the datas via the V.24 serial port (see also annex D). The transfer of the datas has to be started at the measuring device (handle or pedal).

You can repeat each measuring value by setting the cursor to the wished line in the table of measuring values. Using the „Back“ and „Continue“ - buttons you can switch between the different tables with data inputted.

## IV.5. Evaluation

The evaluation is depended on the choosen type of gauge respective the related standard.

For an evaluation according DIN, VDI or ASME/ANSI 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 or ANSI -standards:

- $f_e$  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 measure variations at  $n$  measurings ( $n \geq 5!$ ) of the same measuring object within the measuring range at the same direction of the measuring plunger movement.

For an evaluation according the **British or Australian standard** the evaluated deviation parameters are depended on the type of gauge.

For dial gauges will be calculated the errors of calibration over any one-tenth revolution, any half revolution, any one revolution, any two revolutions and (if the gauge has more than two revolutions) over any larger interval. For dial test indicators the errors over an interval of any one unit division, any five divisions and any half revolution will be calculated.

The repeatability and the error of discrimination will be checked for both types of gauges. If you have take readings for the plunger "coming-out" the value for the discrimination will be calculated otherwise you have to type in this value.

For an evaluation according the **KS and JIS standard** the evaluated deviation parameters are depended on the selected standard and the type of gauge.

For dial gauges will be calculated the errors of the long range (wide range), the retrace error and the repeatability. Depended on the scale interval also the small range (narrow range) error and the small range adjacent error will be calculated.

Wether the datas are inside the tolerance range is evaluated according to the following criterions:

- at inspections according to DIN-standards the standardized tolerance ranges are obeyed concerning measuring range, graduation, (position of the gauge to be inspected)
- at inspections according to BS/AS-standards the standardized tolerance ranges are obeyed concerning the graduation of the gauge;
- at inspections according to KS/JIS-standards the standardized tolerance ranges are obeyed concerning the chosen standard the measuring range and the graduation of the gauge;
- at inspections according to factory standard specifications the tolerance range is only evaluated if measuring range and graduation of the gauge to be tested correspond to the user defined tolerance table
- if none of the above mentioned conditions is fulfilled, no tolerance evaluation is carried out.

The result of the tolerance evaluation is printed in the result listing.

## IV.6. Output of results

After entry of the measurement data has been completed, the screen "End of inspection" will appear.

The summary result of the inspection is shown. Here you can enter the name of the customer, the date for the next inspection and also some remarks to the inspection.

**Figure:** End of inspection show / print certificate

Before creating the calibration certificate you can change the "certificate layout file" will be used. To start the output of the results press the "Show certificate" button.

All functions for the editing and the output of calibration certificates will be controlled by the EDITOR - program. See the manual of this program (Appendix B) to see how to operate this.

## IV.7. Repeating an evaluation

This item of the main menu is used for an uncomplicated repetition of an evaluation without a new measuring. For this purpose the data file which was produced during an inspection is put in and evaluated according to the type of the device to be inspected. The data file contents besides the measuring values also the inspecting conditions and the name of the user. The name of the data file must be put in by the user.

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## V. Inspection program QM-PLAIN

### V.1. Characteristic of the program QM-PLAIN

The QM-PLAIN program is designed the inspection of the following types of plain gauges:

- GO Plain ring gauge
- NO GO ring gauge
- Setting ring
- GO plain plug gauge
- NO GO plain plug
- GO/NO GO (double sided) plain plug gauge
- GO plain snap gauge
- NO GO plain snap gauge
- GO/NO GO (double sided) plain snap gauge
- Master setting disks (Style 1, 2 and 3)

The inspection itself runs in accordance with the guidelines 2618 of VDI/VDE/DGQ (page 2-4).

The user must first enter the type and size of the gauge being inspected. The program will, then, automatically evaluate the whole set of gauge nominal values. It is also possible to use customer specific gauge nominal data.

Measurement data can be entered through an on-line measuring machine or on the keyboard. When using an on-line measurement device, the connection between the device and the computer is realised by one of the serial ports of the computer (V.24, RS-232) or by a PC interface card (Heidenhain IK120/121, SIP interface unit or TRIMOS Labconcept with WINDHI software). For more information see the manual of the related indication program.

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 calibration certificates using the so called "certificate layout files" (F8 key).

The QM-PLAIN program can be started up directly from the QM-MANAG gauge data management system. In this case, QM-PLAIN will receive all necessary nominal data necessary directly from the data base. At the end of the inspection the results will automatically be transferred back to the QM-MANAG data base.

### V.2. Program start

You can start the QM-PLAIN program directly from the QMSOFT-command-Shell (click the corresponded symbol in the shell). The other way is to start the program through the Windows-file manager or the Windows95 Explorer. Before working with the program you have to customise some things according your individual needs and wishes. The following program settings you have to do:

#### **- Configuration of the On-line Interface:**

If you use a direct linkage between the computer and your measuring machine to transfer measuring values, at first you should start the indication program required (RS232DRV, IK102021 or SIDDRV depended on the device and the interface connection you use) and set the correct parameters for the Online Interface (see also the manual of the used program).

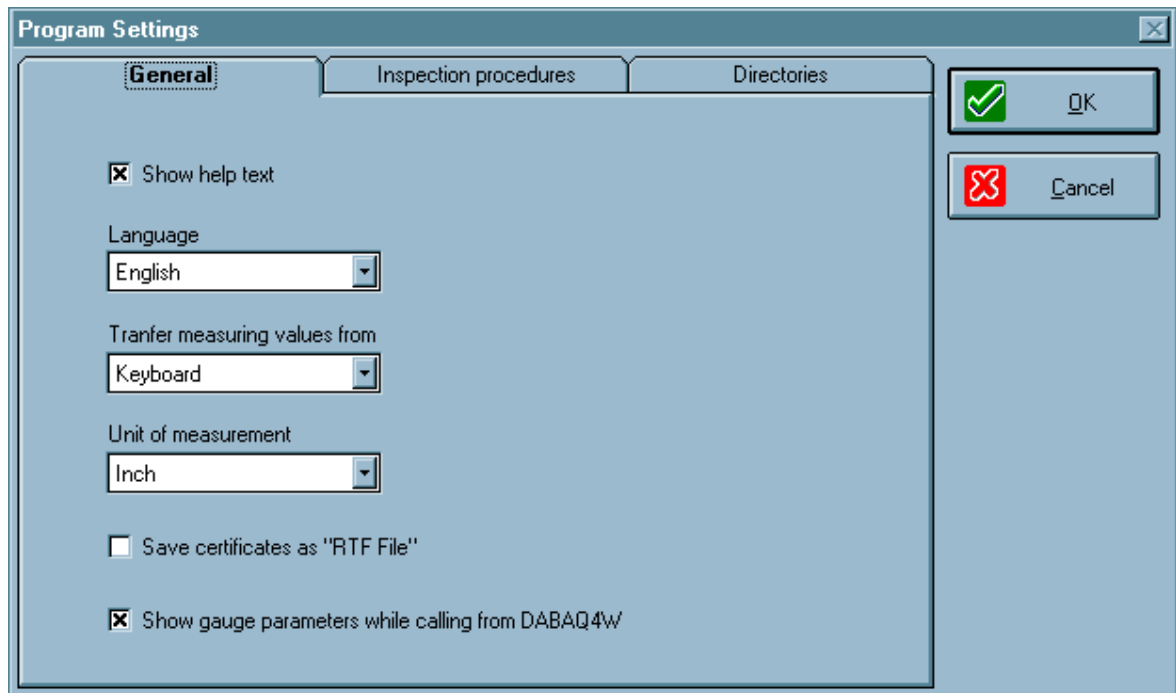
#### **- Program settings and inspection conditions:**

Here you can set some general things for the program environment; for example: the default way to transfer measuring values (machine or keyboard) or the unit used for the evaluation. See section V.3 for this.

### V.3. Program settings

Working with the program you should make different settings to define the program environment and especially program conditions.

#### V.3.1. "Settings | General settings"



**Figure:** Program settings

Using this option you have the following registers to change program settings:

#### Register "General"

Here you can choose the program language, set the default unit for the gauges and select the default data input device (keyboard of the computer, on-line measuring machine). If you set the "Keyboard" as the default device the Online connection will be started automatically if a gauge measurement will start.

Using the option "Save certificates as RTF File" any calibration certificate will be saved into the "Certificate directory" (see register "directories"). The file name will be created using the first 8 characters of the gauges identity number.

If the parameter "Show gauge parameter while calling from DABAQ" is not checked and you start a gauge inspection from the database the first program screen is switched off and you can start the measurement immediately

#### Register "Inspection procedures"

Here you can enter for each gauge type a reference to a corresponded text file including the inspection procedure. Note that this "inspection procedure" does not influence the inspection process. It will be set using the option "Inspection conditions".

#### Register "Directories"

For some functions (indicating of measuring values; creation and edit of calibration certificates) external programs will be used. Here you can enter the directory where the corresponded program can be found. Additionally you can set a directory to save your calibration certificates.

All directories will be set while doing the program installation to a correct value !

**ATTENTION:** Make sure that this entries are correct. A lot of errors happens while operating the program are caused by incorrect settings in the screen "Directories".

### V.3.2. "Settings | Inspection conditions"

Using this option you have the following registers to set "inspection conditions:

#### Register "General"

**Figure:** Inspection conditions – general parameters

#### **Type of inspection:**

According to VDI/VDE/DGQ guidelines, two different kinds of evaluation for the gauge inspection we have. The "incoming inspection" includes (beyond to the inspection of the gauge diameters) the inspection of hardness, roughness and cylindricity of the gauge. 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 of the gauge.

#### **Unit to show deviations on certificate:**

Select if you want to print out "Deviations" in "thou.Inch" (inch/1000) or in "microinch". This setting does only effect the format of the related "Placeholders (Fields)" in the certificate layout file.

#### **Default certificate layout file for...:**

Here, you can enter the name of the "Certificate layout file(s)" used to create the layout of your calibration certificate. This file includes all information about the layout and the content of the record list being created. For "mm" and "inch" measurements different files are used.

NOTE: Because the program will be installed to support different languages you will find a lot of "LW2" files in the related directory. Note that the number in the file name (for example the "061" in the "METR\_061.LW2") file does represent the used language (061 = English; 033 = French; 034 = Spanish; 039 = Italian; ...). Using the Windows-Explorer you can delete all certificate layout files you do not use.

**Register "Ring gauges"**

*Note:* You can not access to this page before selecting a "Ring gauge" in the main menu !  
The menu for the "Master ring gauges" is similar the shown dialogue.

**Inspection conditions**

General **Ring gauges** Master ring gauges Plug gauges Snap gauges

Method for int. measurement: measuring brackets

	GO	NO GO
Number of meas. planes	3	2
Meas. values for each plane	2	2
Inspection period	1	Year(s)

Cancel OK

**Figure:** Inspection conditions for ring gauges

**Method for int. measurement:**

Select the default measuring method for "GO" and "NO GO" ring measurements. Available methods are: "measuring brackets", "T-shaped ball probe" and "Single ball probe". If you work with a QMSOFT indication program for the Online connection to a measuring machine this program will be set to measuring mode selected in this field. Using ball probes make sure that the probes are calibrated before you use it ! See also section V.3.3. "Probes".

The following parameters are divided in "GO" and "NO GO".

You can set only the values for the gauge type selected.

**Number of meas. planes:**

Enter the number of planes where you want to measure the ring. A usual number is "3". In this case you take the first value near the top face of the ring, the second in the middle and the third near the bottom face.

**Meas. values for each plane:**

Enter the number of measures for each plane. A usual number is "2". This means after measuring one diameter in the given measuring planes you should turn the ring around 90 Degrees and repeat the measurements.

**Inspection period:**

Enter an "Inspection period" if you want to calculate a "Next inspection date" for the certificate. Starting the program through the QM database this parameter will not used because the "Inspection period" will be managed in the database system.

Press the "OK" button if you want to keep you changes !

**Register "Plug gauges"**

*Note:* You can not access to this page before selecting a "Plug gauge" or a "Master setting disk" in the main menu !

The screenshot shows the 'Inspection conditions' dialog box with the 'Plug gauges' tab selected. The 'Method for ext. measurement' is set to 'Direct measurement'. The 'Number of meas. planes' is 3 for 'GO side' and 2 for 'NO GO side'. The 'Meas. values for each plane' is 2 for both sides. The 'Inspection period' is 1 for 'GO side' and 'Year(s)' for 'NO GO side'. The 'Cancel' and 'OK' buttons are at the bottom.

**Figure:** Inspection conditions for plug gauges and master discs

**Method for ext. measurement:** Select the default measuring method for external measurements. Available are: direct measurement and differential measurement. Differential measurement means you will use a master to set your indication device and to expand your measuring range. If you work with a QMSOFT indication program for the Online connection to a measuring machine this program will be set to measuring mode selected in this field.

All the other fields are comparable to the settings for "Ring gauges".

**Register "Snap gauges"**

The screenshot shows the 'Inspection conditions' dialog box with the 'Snap gauges' tab selected. The 'Method for int. measurement' is set to 'measuring brackets'. The 'Number of meas. points' is 5 for both 'GO side' and 'NO GO side'. The 'Bending up compensation GO side' and 'Bending up compensation NO GO side' are both set to 'No compensation'. The 'Inspection period' is 1 for 'GO side' and 'Year(s)' for 'NO GO side'. The 'Cancel' and 'OK' buttons are at the bottom.

**Figure:** Inspection conditions for snap gauges

Inspect snap gauges the following fields will be appear additionally:

**Measurement values (snap gauges):** Enter here the number of measuring values for the measurement of snap gauges

**Bending up compensation :** If you use an snap gauge to inspect an outside diameter caused by the form of construction the gauge will be bent up. 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.  
Depended on the form of the gauge being inspected select the option "single sided" or "double sided". If you do not want to calculate this correction then select "no compensation".

### V.3.3. "Settings | Probes"

Using this option you can start the probe and masters management program TASTER4W. Here you can insert new probes to a list and calibrate this.

Remember that "T-shape ball probes" and "Single (stylus) ball probes" used for internal measurements should be calibrated before you can use it

See the manual for the probe management program for more detailed explanations.

### V.3.4. Certificate layouts

The program QM-PLAIN gives you the possibility to customise the layout of your calibration certificate. The layout of the calibration certificate is based on the so called "Certificate layout file". This file contains all information about the form of the certificate and the values should appear in this. By editing this certificate layout file you can change the layout. Saving this file with another file name give you the possibility to work with different certificate layouts.

All this certificate layout files you have created will be saved in the working directory of the QM-PLAIN program. The files have the extension ".LW2". The number in the file name (for example "Metr\_061.LW" is representing the language based on the windows language code; 061=English....).

Using the option "**Certificate layouts | Show/Edit a certificate layout**" you can load a certificate layout file into the editor program.

A certificate layout file 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 the different text parameters;
- "Placeholders" ("Fields"): a "Field" is including a 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 use the menu "**Insert | Fields**". Using this menu you can also see all available "Fields" and the related information. For numerical fields you can set the number of decimal points using the menu "**Insert|Fields**".
- "Line conditions": A line condition gives you the possibility to control the certificate layout in dependence of different program situations. A text or field following to an 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 "Line conditions" available.

## V.4. Doing a gauge inspection

### V.4.1. Entering gauge nominal data

After choosing the type of gauge to be inspected ( use the menu “Inspection” to select a “Master setting disc”), 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.

If the program is started up from the gauge data management system **QM-MANAG** the dialogue fields are blocked and the nominal values of the gauge will be transferred from the database.

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. The ID number will appear in the calibration certificate.
- Nominal size of gauge:** Enter here the basic size of the gauge or rather the product limits. See the next points to explain the meaning and the differences caused by different standards.

#### V.4.1.1. Entering gauge nominal data – ISO conform

Calculating the values according to ISO 286 or BS969 the product limits will determine the gauge sizes and tolerances. In case that the gauge tolerances are directly depended from the product tolerance the calculation requires the upper and the lower limit of the product.

The most simple way to enter the product limits is using a standard ISO designation. This will be done by entering the basic size and the tolerance class. A tolerance class shall be designated by the letter(s) representing the fundamental deviation followed by the number representing the standard tolerance grade. Examples: H7, G8 ....

If you have entered an ISO designation you can click on the “Nominal size” button (or press function key “F7”) to get the gauges deviation. Now you will get also the explicit deviations constituting the product limits.

Type of gauge: GO / NO GO plug gauge

Identity number

Nominal size of gauge

Nominal values according

Unit of measurement

Upper deviation

Lower deviation

Upper deviation - GO side

Lower deviation - GO side

GO side - wear limit

Upper deviation - NO GO side

Lower deviation - NO GO side

**Figure:** Entering a gauge designation according to ISO rules

If there is no ISO designation given you can also enter the explicit deviations.

For example if your gauge is marked as "100 -0,050 -0,100" then enter: the "Nominal gauge size" = "100"; the "Upper deviation" = "-50" [µm] and the "Lower deviation" = "-100" [µm]

#### V.4.1.2. 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 tolerances.

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. The program will calculate the gauge tolerances and give you also the "Upper" and "Lower" deviation in relation to the products basic size (in this case 10.00 ")

As described for the entering of ISO gauges you can also enter an ISO designation (for example 30K8) to calculate gauge tolerances.

The dialog box is titled "Type of gauge: GO / NO GO plug gauge". It contains the following fields and controls:

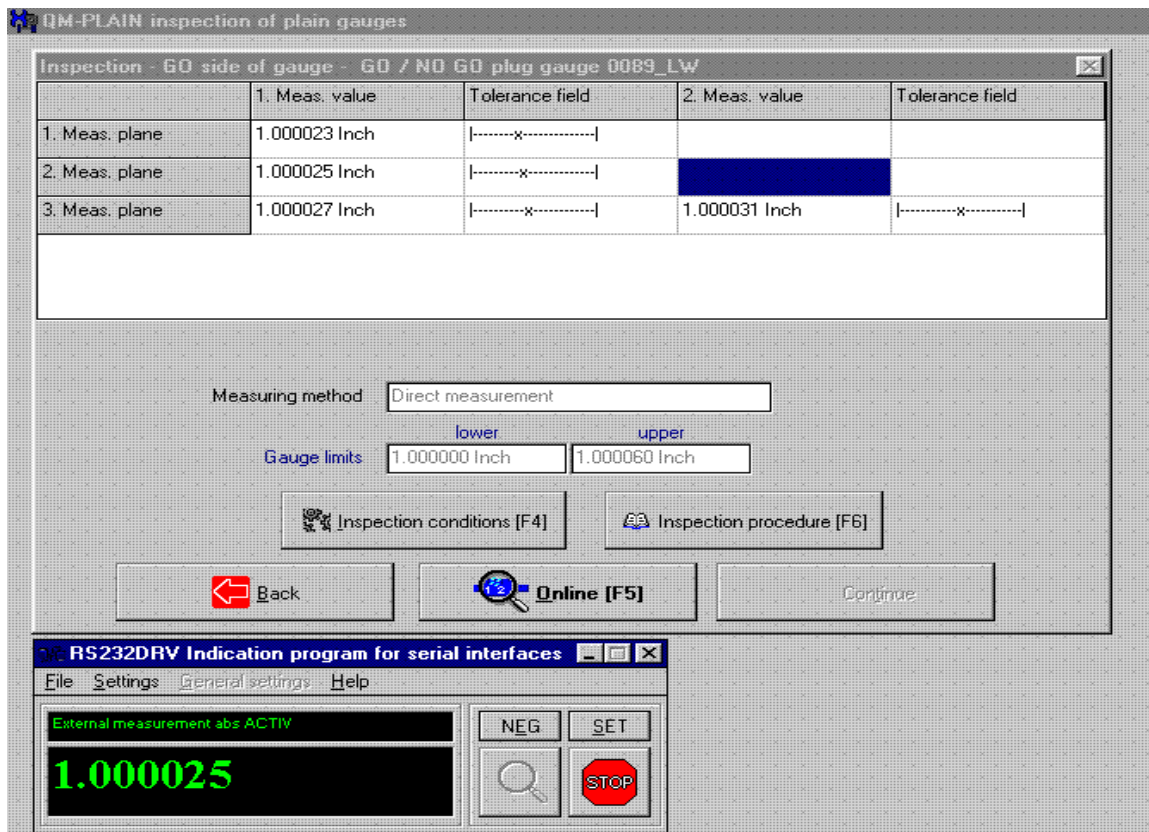
- Identity number: 00899
- Nominal size of gauge: 10.00000 '' / 10.00400 ''
- Tolerance class: X (dropdown menu)
- Nominal values according to: ANSI/ASME B89.1.6M (dropdown menu)
- Unit of measurement: Inch (dropdown menu)
- Upper deviation: 4,00 thou.Inch
- Lower deviation: 0,00 thou.Inch
- Upper deviation - GO side: 0,200 thou.Inch
- Lower deviation - GO side: 0,000 thou.Inch
- Upper deviation - NO GO side: 4,000 thou.Inch
- Lower deviation - NO GO side: 3,800 thou.Inch

At the bottom, there are three buttons: "Nominal values [F7]", "Inspection conditions [F4]", and "Inspection procedure [F6]". Below these are two larger buttons: "Cancel" and "Continue".

**Figure:** Entering parameters for an ANSI/ASME gauge

After you have completed your entries in the dialog box, press the "continue button."

## V.4.2. The measuring process



**Figure:** Entering of measuring values

Measurement values are always entered in a sequence of measurement values 1 to n for gauge position 1 (corresponding with measuring plane 1 to n), measurement value 1 to n for gauge position 2 etc. While inspecting snap gauges a number of measurement values will be received for each side of gauge. Measuring double sided GO/NO GO plain plugs or double sided snap gauges is done first on the GO - side of gauge and then on the NO GO side.

The measuring will be supported by a graphic display showing the measured value in the gauge tolerance field.

If you want to take over measuring values from an Online connected measuring machine, press the "Online" Button to start the indication program.

**ATTENTION:** Use the menu option "Settings | General Settings" to set the "Transfer measuring values from.." (Register "General") to the option "Online". Please check, that in the register "Directories" the correct "Indication device" is selected.

### The Button "Probes"

If you execute an internal measurement on a ring or snap gauge, here you have the access to the probe management program.

You can use this to calibrate probes before starting the measurement process. See the user manual of this program if you need more information about the handling of this.

### Selection of a probe

The usage of a special probe for internal measurements is related with the usage of an Online connection with a QMSOFT **indication program**. Therefore the probe selection have to be made in the indication program using the menu "**Settings**". See the user manual of the related indication program for this.

## V.5. Output of results

After entry of the measurement data has been completed, the screen "*End of inspection*" will appear.

**Figure:** End of inspection – show / print certificate

If the inspection is finished you get the screen shown above. The summary result of the inspection is shown. Here you can enter the name of the customer, the date for the next inspection and also some remarks to the inspection.

Before creating the calibration certificate you can change the "certificate layout file will be used. To start the output of the results press the "Show certificate button.

All functions for the editing and the output of calibration certificates will be controlled by the EDITOR - program. See the manual of this program to see how to operate this.

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## VI. Inspection program QM-THREAD

### VI.1. Characteristics of the program QM-THREAD

The QM-THREAD program has been designed as a support system for the computer aided inspection for screw threads and screw thread gauges.

All thread nominal values can be generated through this program in accordance with the following standards:

- Threads and thread gauges according to ANSI/ASME B1.1/ B1.2
- ISO metric screw threads according to DIN ISO 1502 (DIN 13)
- Gauges for Metric M Screw Threads according to ANSI/ASME B1.16M-1984
- NPSM pipe threads according to ANSI/ASME B1.20.1
- Screw taps according to DIN 802
- Pipe threads and gauges according to DIN ISO 228 (DIN 259)
- Steel conduit threads according to DIN 40431
- ISO metric trapezoidal screw threads according to DIN 103
- Parallel screw threads of Whitworth form according to B. S. 84 (BSW-and BSF- series)
- Metrical thread inserts according to DIN 8140 (EG threads)
- HELICOIL threads according to Boellhoff factory standard
- Knuckle threads according to DIN 405
- Buttress threads according to DIN 513 / factory standard
- Threads for valves according to DIN 7756 and ETRTO V.7

**Attention:** Some of the standards are optional available - call your local dealer!

The measurement process can be done according to VDI/VDE/DGQ 2618 guidelines 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.

Only a basic knowledge of computers is necessary in order to use the QM-THREAD program.

Measurement data can be entered through an on-line connection of the measurement device or on the keyboard. If the former is the case, the measurement device must be connected to the serial interface of the PC (V.24, RS 232) or by a PC interface card (Heidenhain IK121), TRIMOS WinDHI indication program or SIP LMC program including interface unit.

For more information see the manual of the related indication program.

The QM-THREAD program can be started directly from the gauge data management system QM-MANAG. 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 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.

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.

## VI.2. Starting the program QM-THREAD

You can start the QM-THREAD program directly from the QMSOFT-command-Shell (click the corresponded symbol in the shell). The other way is to start the program through the Windows-file manager or the Windows95 Explorer.

Before working with the program you have the possibility to customise some things according your individual needs and wishes.

The following program settings you have to do:

### - Configuration of the On-line Interface:

If you use a direct linkage between the computer and your measuring machine to transfer measuring values, at first you should start the indication program required (RS232DRV, IK102021 or SIDDRV depended on the device and the interface connection you use) and set the correct parameters for the Online Interface (see also the manual of the used program).

### - Program settings and inspection conditions:

Here you can set some general things for the program environment; for example: the default way to transfer measuring values (machine or keyboard) or the unit used for the evaluation. See section V.3 for this.

**Attention:** An incorrect selection of the parameters for the online connection (e.g. for the serial port) can produce a system crash while measure data input ! Make sure that you are informed about your computer system and the correct name of the serial port for on-line interface. For settings of the serial interface see also Appendix D.

## VI.3. Program settings

Before starting the measurement itself, you have to set few parameters to define the program environment and describing the inspection conditions.

### VI.3.1. "Settings | General settings"

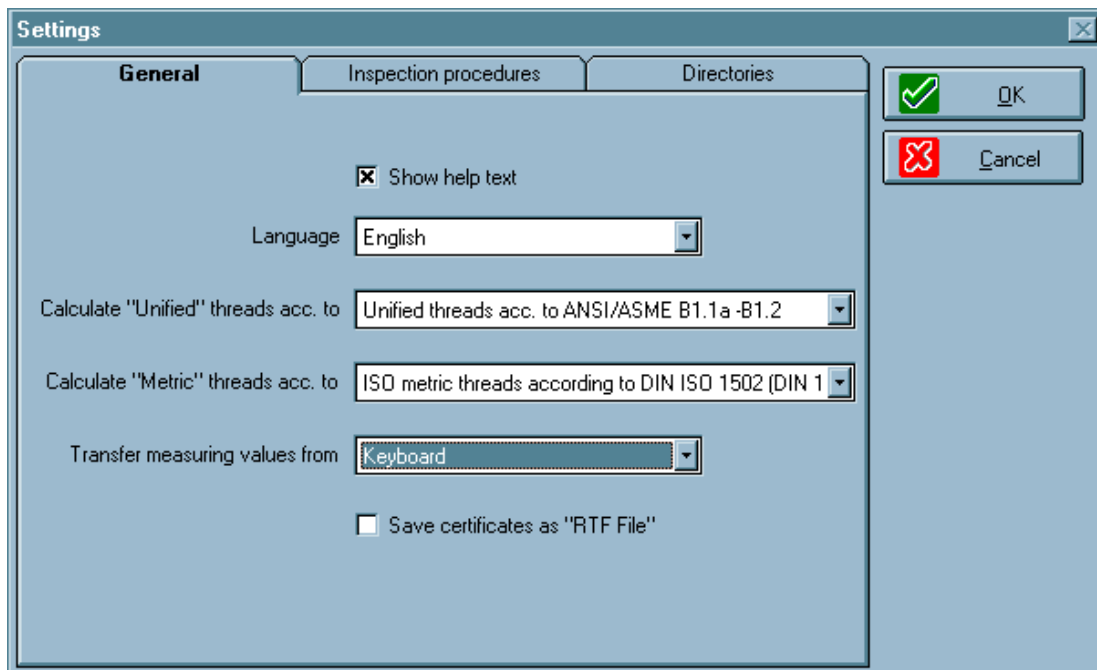
Using this option you have the following registers to change program settings:

#### **Register "General"**

Here you can choose the program language, set the default unit for the gauges and select the default data input device (keyboard of the computer, online connection to an indication device).

If you set "Online" as the default device the Online connection to the device installed (see page "Directories" – "Indication program") will be started automatically if a gauge measurement will start.

Using the option "Save certificates as RTF File" any calibration certificate will be saved into the "Certificate directory" (see register "directories"). The file name will be created using the first 8 characters of the gauges identity number.



**Figure:** General program settings

**IMPORTANT:** For unified threads and also for metric threads of each there are two options to calculate the gauge tolerances. For unified threads you can use the ANSI/ASME B1.2 or the BS919 standard. For metric threads the DIN ISO 1502 and the ANSI B1.16M are available. In case that the thread designation does not differ, please select here the default standard should be used to calculate the gauge tolerances.

### ***Register "Inspection procedures"***

Here you can enter for each gauge type a reference to a corresponded text file including the inspection procedure as a text. Note that this "inspection procedure" does not influence the inspection process. It will be set using the option "Inspection conditions".

### ***Register "Directories"***

For some functions (indicating of measuring values; creation and edit of calibration certificates) external programs will be used. Here you can enter the directory where the corresponded program can be found. Additionally you can set a directory to save your calibration certificates.

While doing the program installation all directories will be set to a correct value !

**ATTENTION:** Make sure that these entries are correct. Errors may happen while operating the program caused by incorrect settings in the screen "Directories"

### VI.3.2. "Settings | Inspection conditions"

Using this option you have the following registers to set "inspection conditions":

#### VI.3.2.1. General used conditions (Register "General")

**Figure:** Inspection conditions

#### **Type of inspection:**

According to VDI/VDE/DGQ guidelines, two different kinds of evaluation for the gauge inspection we have. The "incoming inspection" includes (beyond to the inspection of the gauge diameters) the inspection of hardness of the gauge. 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.

#### ***The setting of the "Algorithm of calculation" is very important !***

#### **Algorithm of calculation:**

Here, you can choose the algorithm used to calculate the effective diameter. The most common algorithm is the calculation with the "Classical method (Prof. Berndt)". This means the using of the general known formulas (see also the related ISO and DIN standards). Using this formula the compensation of deformation caused by the used measuring force is included !

In US often the "simplified formula for pitch diameter" is used.

If you want to use this option, make sure the following conditions:

- use only wires which are closed to the "best size";
- be sure that the wires diameter was measured under the recommended conditions (see ANSI B1.16M, section B4).

The "simplified formula" should only be used for external measures on 60 deg. threads

For some reasons, for example threads with large pitch, it may be better to choose the real three dimensional calculation called "*Vector method*". This method is based on research results of the University Dresden, Germany and is more accurate for such types of threads.

***Unit for evaluation:***

Select the wished unit for the gauge evaluation.

***Inspection of pitch, flank angles..***

Additional to the usual inspection of the threads diameter you can also enter and evaluate the values for pitch and flank angles. If you want to do this click into the related check box to activate this option.

***Unit for measuring force:***

Select the unit you will use for entering the measuring force. The "measuring force" value will be used to calculate thread corrections and to compensate deformations.

***Unit to show deviations on certificate:***

Select if you want to print out "Deviations" in "thou.Inch" (inch/1000) or in "micro inch (µin.)". This setting does only effect the format of the related "Placeholders (Fields)" in the certificate layout file.

***File name to save the certificate:***

Here you can enter a default file name to save the calibration certificate. Note, if the option "Save certificates as RTF-file" is switched on (see menu "Settings|General settings") the name entered will not be used. In this case the program will create the file name using the "Identity number" (*Note:* the file name consist of the, at maximum, first 8 characters of the identity number, the file extension is "RTF" );

***Default certificate layout file for..:***

Here, you can enter the name of the "Certificate layout" file used to create the layout of your calibration certificate. This file includes all information about the layout and the content of the record list being created. For "mm" and "inch" measurements different files are used.

NOTE: Because the program will be installed to support different languages you will find a lot of "LW2" files in the related directory. Note that the number in the file name (for example the "061" in the "METR\_061.LW2") file does represent the used language (061 = English; 033 = French; 034 = Spanish; 039 = Italian; ...). Using the Windows-Explorer you can delete all certificate layout files you do not use.

### VI.3.2.2. Gauge type depended settings

Before starting the measuring process a series of parameters you can change. The parameters you have to set are depended on the type of gauge you have to inspect. Use the related register screens to set the inspection conditions.

#### Register “Thread plug gauges”

*Note:* You can not access to this page before selecting a “Threaded plug” in the main menu !

The screenshot shows a software window titled "Inspection conditions" with a close button (X) in the top right corner. The window contains several tabs: "General", "Plain ring gauges", "Plain plug gauges", "Plain snap gauges", "Thread plug gauges" (which is currently selected), and "Thread ring gauges".

Under the "Thread plug gauges" tab, the settings are organized into two main columns: "Effect. diameter" and "Major diameter". Each column has sub-columns for "GO side" and "NO GO side".

	Effect. diameter		Major diameter	
	GO side	NO GO side	GO side	NO GO side
No. of meas. planes	2	2	2	1
Meas. for each plane	1	1	1	1

Below these tables, there are several other settings:

- Measuring method:** A dropdown menu set to "Three wires method".
- Used series of wire diameter:** A dropdown menu set to "Best size diameter".
- Inspection of major diameter:** A checkbox that is checked (indicated by an 'X' in the box).
- Order of measurements:** A dropdown menu set to "Effect.-Major-Major-Effect."
- Inspection period:** A field set to "1" followed by a dropdown menu set to "Year(s)".

At the bottom of the window are two buttons: "Cancel" (with a red 'X' icon) and "OK" (with a green checkmark icon).

**Figure:** Inspection conditions for thread plugs

The following two parameters are divided in “GO” and “NO GO” side of gauge.

**Number of measuring planes:** Type the number of measuring planes for the effective diameter and, if “Inspection of major diameter” is switched on, for the major diameter measurement.

**Measures for each plane:** Type the number of measuring values per each measuring plane.

**Measuring method:** Here, choose the measuring method for measurement of external threads. You can choose either the "Three-wire method" or the "Two-wire method".

**Used series of wire diameter:** Select the table with thread wires should be used for the automatically selection of a thread wire diameter. Measuring a 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. Using the "best wire" option the calculated "best wire" diameter will be set automatically.

**Inspection of major diameter :** Marking this field, you can decide if you want to measure the major diameter additionally to the effective diameter.

**Order of measurement:** If you want to inspect the major diameter, here you can select the wished order of the measurement.

**Inspection period:**

Enter an "Inspection period" if you want to calculate a "Next inspection date" for the certificate.  
Starting the program through the QM database this parameter will not be used because the "Inspection period" will be managed in the database system.

**Register "Thread ring gauges"**

*Note:* You can not access to this page before selecting a "Threaded ring" in the main menu !

The screenshot shows a software window titled "Inspection conditions" with a close button in the top right corner. It contains four tabs: "General", "Plain ring gauges", "Plain plug gauges", and "Thread ring gauges". The "Thread ring gauges" tab is selected and highlighted with a dashed border. Inside this tab, there are three columns of settings: "GO ring gauge", "NO GO ring gauge", and "Minor diameter". Each column has two spinners for "No. of meas. planes" and "Meas. for each plane". Below these are two dropdown menus: "Measuring method" (set to "Three balls" method (T-probe)) and "Used series of ball diameter" (set to "Table T-shaped ball probes"). There is a checked checkbox for "Inspection of minor diameter". At the bottom, there is an "Inspection period" spinner set to "1" and a dropdown menu set to "Year(s)". At the very bottom are "Cancel" and "OK" buttons with red and green checkmark icons respectively.

	GO ring gauge	NO GO ring gauge	Minor diameter
No. of meas. planes	2	1	1
Meas. for each plane	1	1	1

Measuring method: "Three balls" method (T-probe)  
 Used series of ball diameter: Table T-shaped ball probes  
☒ Inspection of minor diameter  
 Inspection period: 1 Year(s)

**Figure:** Inspection conditions for "Thread rings"

**Number of measuring planes:** Type the number of measuring planes for the effective diameter and, if "Inspection of minor diameter" is switched on, for the minor diameter measurement.

**Measures for each plane:** Type the number of measuring values per each measuring plane.

**Measuring method:** Here, choose the measuring method for measurement of internal threads. You can choose either the "Three ball method", the "Two-ball method" or the "Cone-V-method".

**Note:** In the program context the "Three ball" method means the internal thread measurement using a T-shaped ball probe and contacting three points on the threads surface to calculate an effective diameter. It is different from the "Three ball method" described in the ANSI/ASME standards. See also the section "VI.4.2.2 – Internal thread measuring" where the measuring methods are illustrated.

**Used series of ball diameters:** Choose here, from the list provided, the table with the balls should be used for the automatically selection of a ball diameter. Measuring an internal thread the ball diameter (or the related probe) will be selected from the chosen table. Otherwise you can enter a ball diameter manually if you set the specific measuring conditions.

**Note:** A “Three ball” measurement in the programs meaning can be done only with a “T probe”.

**Inspection of minor diameter :** Marking this field, you can decide if you want to measure the minor diameter additionally to the effective diameter.

**Inspection period:** Enter an “Inspection period” if you want to calculate a “Next inspection date” for the certificate. Starting the program through the QM database this parameter will not be used because the “Inspection period” will be managed in the database system.

### ***Other registers for the inspection conditions of plain gauges***

In case that the program does also support the inspection of plain gauges used for thread gauging there are additional registers to set the related parameters for this types of gauge.

The parameters are comparable the things described in the sections for “Thread plugs” and “Thread rings”.

### **VI.3.3. "Settings | Probes"**

Using this option you can start the probe and masters management program TASTER4W. Here you can insert new probes to a list and calibrate this.

Remember that “T-shape ball probes” and “Single (stylus) ball probes” used for internal measurements ***should be calibrated before you can use it !***

See the manual for the probe management program (Appendix E) for more detailed information.

#### VI.3.4. Certificate layouts

The program QM-THREAD gives you the possibility to customise the layout of your calibration certificate. The layout of the calibration certificate is based on the so called "Certificate layout file". This file contains all information about the form of the certificate and the values should appear in this. By editing this certificate layout file you can change the layout. Saving this file with another file name give you the possibility to work with different certificate layouts.

All this certificate layout files you have created will be saved in the working directory of the QM-THREAD program. The files have the extension ".LW2".

Using the option "**Certificate layouts | Show/edit..**" you can load a certificate layout file into the QMSOFT editor program.

#### NOTE:

- Do *never* open a "**LW2**" certificate file outside of the program. In this case you will loose all "placeholders" representing the "actual values" when the certificate will be created !
- If you want to open a certificate layout file you will see a lot of such files.  
The number in the file name (e.g. xxx**061**.LW2) is representing the Windows country code.  
"061" = English; "033" = French, "034" = Spanish; "039" = Italian ...  
Using the Windows-Explorer you can delete all "LW2" files you do not need.

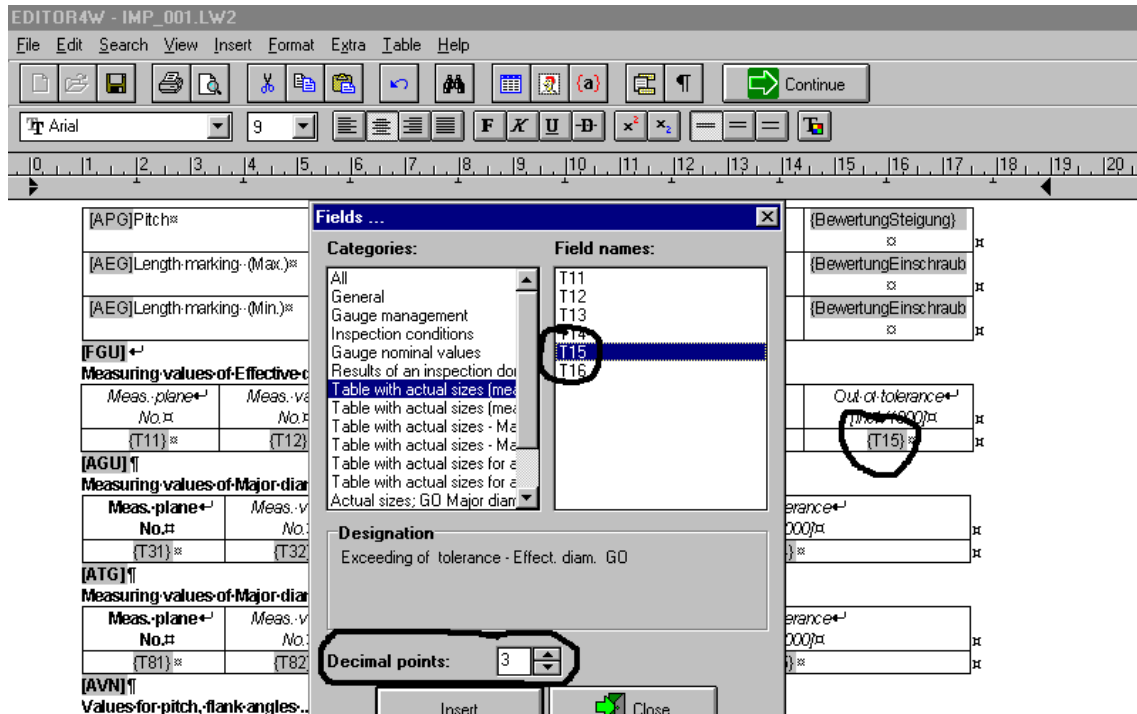
A certificate layout file is consisting of three different types of information:

- **standard text**: is text information just like in a known text processing application; you can change the text as you want and you can set the different text parameters;
- "**Placeholders**" ("**Fields**"): a "Field" is including a 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. 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".
- "**Line conditions**": A line condition gives you the possibility to control the certificate layout in dependence of different program situations. A text or field following to an 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 "Line conditions" available.

#### VI.3.4.1. The usage of “Place holders” (fields):

To insert a new "Place holder" in your certificate layout use the menu **"Insert | Fields"**. Using this menu you can also see all available "Place holders" (Fields) and the related information. The fields are grouped to different categories (e.g. Gauge nominal values). If you select a field (click on it) you can see the field designation.

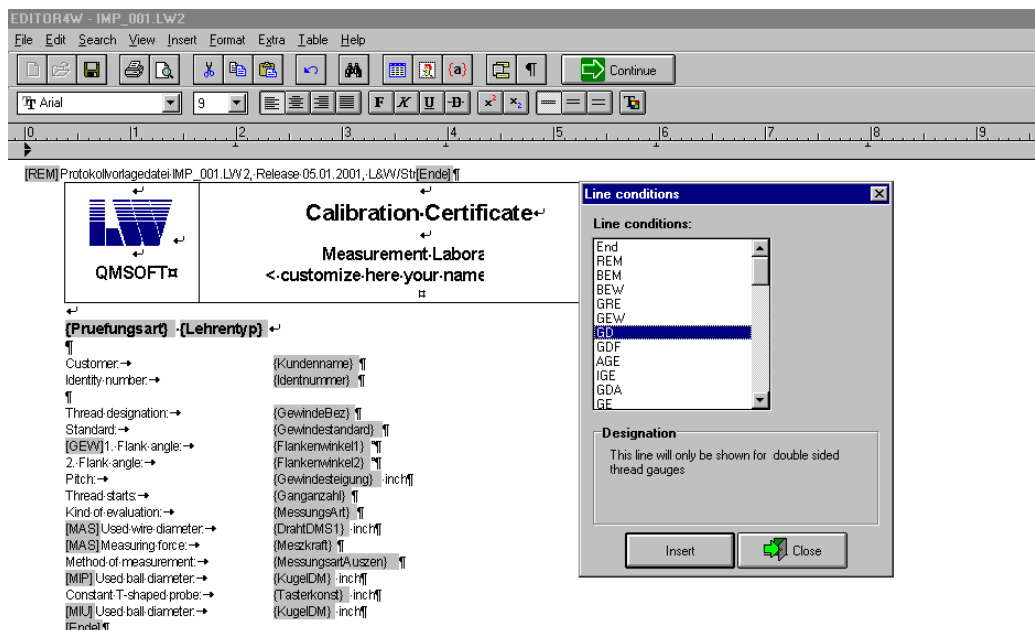
For numerical fields you can set the number of decimal points (see Figure).



#### VI.3.4.2. The usage of “Line conditions”:

Use the menu **"Insert | Fields"** to show the “Line conditions” available (see figure). Select a line condition in the shown list to get there description. Use the “Insert” button to insert the selected condition in your certificate layout.

Note: A “Line condition” is not restricted to one line in your layout. The condition is active until a new “Line condition” is defined or an “END” condition is set. The text after an “END” condition will appear on your certificate in any cases.



## VI.4. Doing a gauge inspection

### VI.4.1. Entering gauge nominal data

To create a measurement record it is necessary to take the measuring values of the thread and to compare this actual values with the thread nominal values and it's tolerances. This nominal values and tolerances can be generated in the QM-THREAD program for all Thread standards listed in section VI.1 of this manual.

After choosing the type of gauge to be inspected (using the related button **or the menu "Inspection"**), a dialog box will appear on your screen corresponding with your selection in which the gauge nominal values are to be entered (see Figure, dialog for a double sided GO/NO GO screw plug gauge).

The fields in this dialog box should be filled with the corresponding values. If the program is started up from the gauge data management system **QM-MANAG** this possibility is blocked and the nominal values of the gauge will be transferred from the database.

**GO / NO GO thread plug gauge**

Identity number: 00899\_LW

Thread designation: 1/2 - 13 UNC -2B

Automatic standard recognition: ☒

Thread standard: Unified threads acc. to ANSI/ASME B1.1a -B1.2

GO side		NO GO side	
Pitch	0,07692 inch	1st flank angle	30,000 °
Thread starts	1	2nd flank angle	30,000 °
Max. major diameter	0,50060 inch	Max. major diameter	0,48980 inch
Min. major diameter	0,50000 inch	Min. major diameter	0,48920 inch
Minor diameter	0,40566 inch	Minor diameter	0,40566 inch
Max. effect. diameter	0,45030 inch	Max. effect. diameter	0,45650 inch
Min. effect. diameter	0,45000 inch	Min. effect. diameter	0,45620 inch
Wear limit of effect. diameter	0,45000 inch	Wear limit of effect. diameter	0,45620 inch

Buttons: Calculate tolerances, Inspection conditions, Inspection procedure, Cancel, Continue

**Figure:** 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. In case that the designation is not valid for the standard selected it may be that you get back an different (but valid) designation. This may happen especially for Unified threads because there are only defined "diameter / pitch" combinations are allowed.

**Automatic standard recognition:**

Marking this option the program recognise the thread standard automatically based on the entered designation. Necessary for this is, that the designation includes the required characters

(e.g. "Tr" means trapezoidal thread acc. to DIN 103).

#### VI.4.2. The Measuring Process

Measurement values are always entered in a sequence of measurement values 1 to n for gauge position 1 (corresponding with measuring plane 1 to n), measurement value 1 to n for gauge position 2 etc. If the "1" is given as the number of measurement values in the inspection conditions, only one effective diameter will be determined. Measuring double sided GO/NO GO screw thread plugs is done first on the GO - side of gauge and then on the NO GO side. It is up to the program user to administer a measurement value sequence that fits into an overall scheme (it is not possible to check this through the program).

No. of plane	No. of meas.	Meas. value	Effective diameter	Tolerance field
1	1	0,51667 inch	0,45003 inch	x-----
2	1	0,51668 inch	0,45003 inch	x-----

Measuring method: Three wires method

"best" thread wire diam.: 0,04440 inch

Current wire diameter: 0,04440 inch

Measuring force: 1,50 N

min max

Reading limits: 0,51665 inch 0,51695 inch

Gauge limits: 0,45000 inch 0,45030 inch

Wires/Balls

Online

Back Continue

**Figure:** Entering of measurement values

While executing the measurement the current probe parameters are shown on the screen. If you want to change the probe or to calibrate or recalibrate it use the "Wires/Balls" button to do this.

The measuring will be supported by a graphic display showing the calculated effective diameter in the gauge tolerance field. The tolerance limits of the effective diameter as well as any limits of readings over wires/balls will also be shown. For the limits of the readings over wires/balls, known reference gauges or setting ring diameters are taken into consideration so that even before the measurement values are taken over, a check if the value is inside the tolerance is possible.

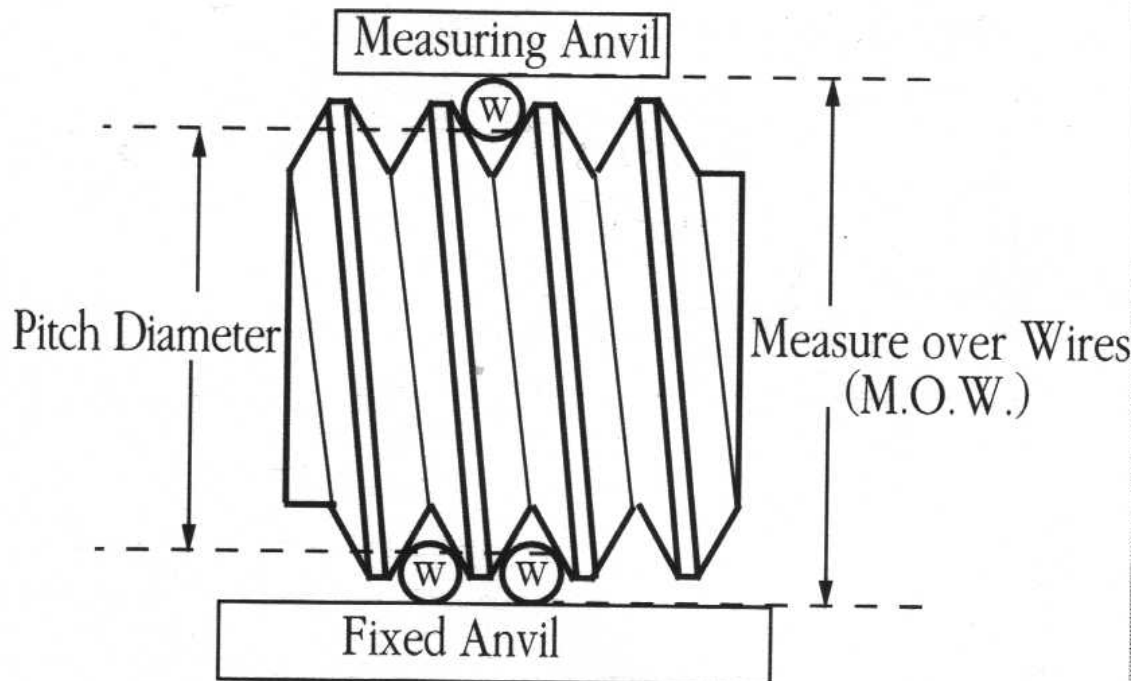
If you want to take over measuring values from an Online connected measuring machine, press the "Online" button to start the indication program.

**Note:** Use the menu option "**Settings | General Settings**" to set the "Transfer measuring values from.." (Register "General") to the option "Online".

Please check, that in the register "*Directories*" the correct "*Indication device*" is selected.

#### VI.4.2.1. External Thread Measurement

The measurement of the effective diameter of external threads is relatively simple. According to the known measurement procedure, three or two wires will be used. After searching the point of declination, the measurement value that is used for the effective diameter calculation can be transferred or entered. Depending on the chosen measuring force and the known wire diameter, the calculated effective diameter includes the compensation of deformation.



**Attention:** Depended on the selected list of thread wires (see the menu "*Settings | Inspection conditions*") the wire with the smallest difference to the calculated "best" wire diameter will be set automatically. This selection will also activated in the indication program. If you want to change the pre set values use the button "Wires/Balls" to select an other wire from the defined lists.

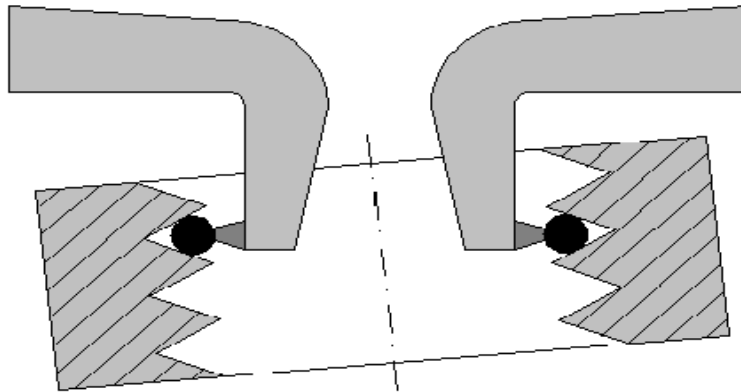
#### VI.4.2.2. Internal Thread Measurement

For the internal thread measurement, two measurement methods are applicable that are seen differently by the required measurement procedure. For two-point measuring requires only minimal technology and is a quicker measurement procedure. Three-point internal measuring requires a special measuring application and is commonly used for small Screw thread ring gauges in which a ball support bracket cannot be inserted. Additionally, with this procedure there is smaller room for errors (smaller measurement circle, no deformation of brackets, etc.).

**a) "Two Ball" - Internal 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.

Then the measuring values can be entered on the keyboard or transferred from your machine.

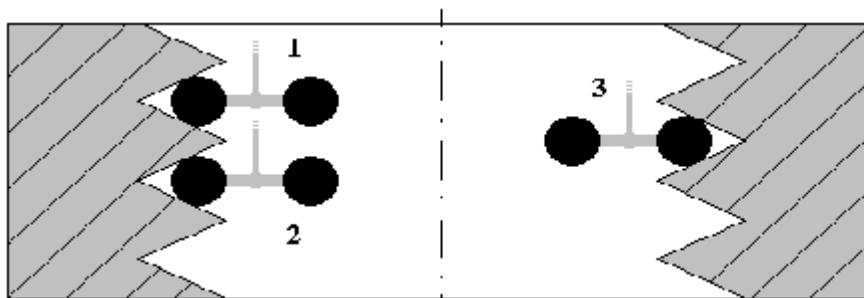


**Figure :** Two-ball-method for internal thread measurement

**b) "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 to program. Now all three measuring positions should be moved on and the corresponding values transferred. For the required measuring positions refer to shown figure. 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.



**Figure :** Three-ball-method for internal thread measurement

***Before using a T-shaped ball probe make sure that the probe is correctly calibrated.***

See also appendix E: Probe management.

### VI.4.2.3. Entering of additional thread parameters – pitch, flank angles ..

Additional to the inspection of the thread diameters sometimes the inspection of the pitch and/or the flank angles should be done. In this case use in the menu “*Settings | Inspection conditions*” the page “General” to activate the check box “Inspection of pitch, flank angles..” (see manual section VI.3.2). In this case after the inspection of the thread diameters the screen shown in the next figure will appear to enter the related parameters.

Using the “Check Boxes” you can switch off parameters you will not check.

Currently an Online connection to the measurement machine is not implemented because special hardware requirements has to be fulfilled for this.

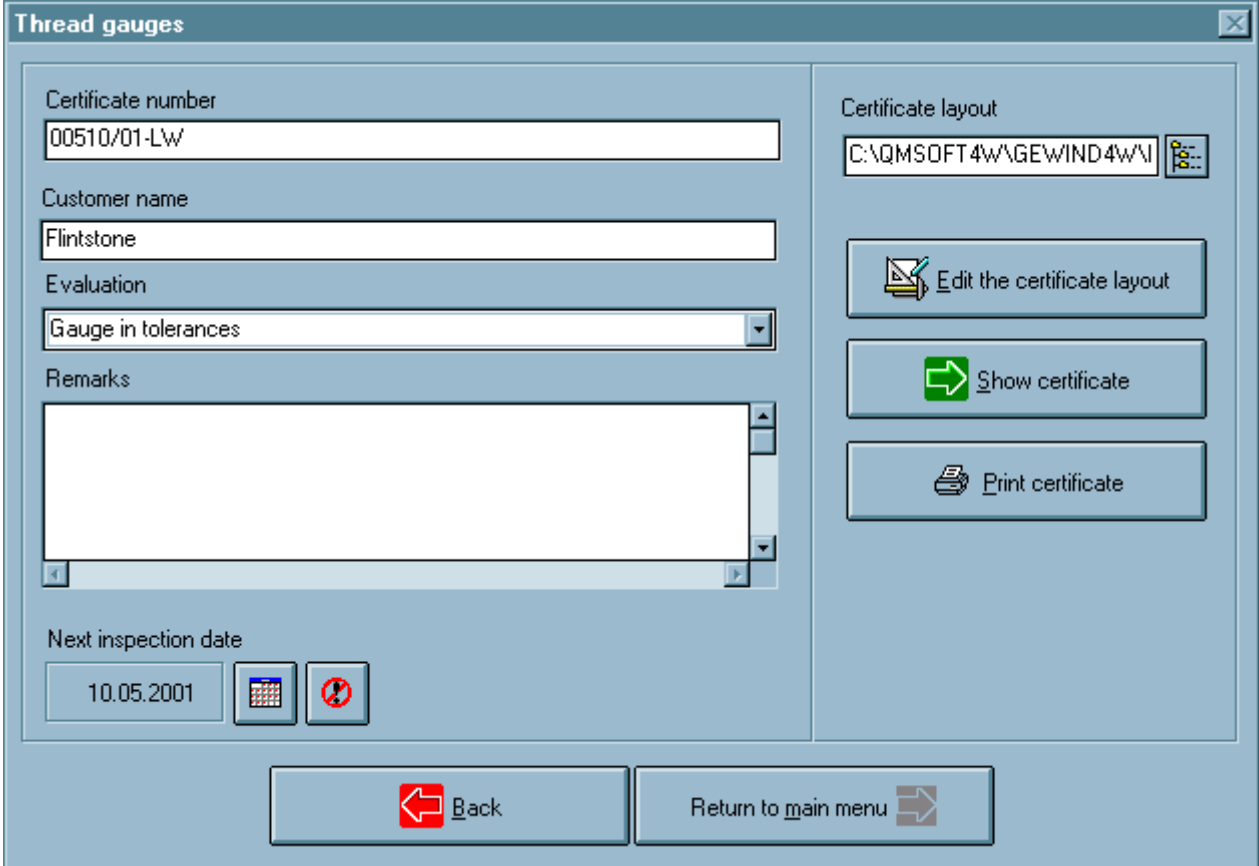
	Nominal value	Actual value	Valuation
<input checked="" type="checkbox"/> 1. Flank angle	30,000 °	30.012	in tolerance
2. Flank angle	30,000 °	30.017	in tolerance
<input checked="" type="checkbox"/> Pitch	1,7500 mm	1,756 mm	in tolerance
<input type="checkbox"/> Mark for screw length			
Max. value	0,0000 mm	0,0000 mm	no inspection
Min. value	0,0000 mm	0,0000 mm	no inspection

Back Continue

**Figure:** Entering of parameters for pitch, flank angles ...

## VI.5. Output of results

After entry of the measurement data has been completed, the screen "*End of inspection*" will appear.



**Figure:** End of inspection / show certificate

If the inspection is finished you get the screen shown above. The summary result of the inspection is shown. Here you can enter the name of the customer, the date for the next inspection and also some remarks to the inspection.

Before creating the calibration certificate you can change the "certificate layout file" will be used. To start the output of the results press the "Show certificate" button.

All functions for the editing and the output of calibration certificates will be controlled by the EDITOR - program. See the manual of this program (Appendix B) to see how to operate it.

### VI.5.1. Saving of certificate files

After completing a measurement you can save the inspection certificate into a file. The file extension is always „RTF“. This file format is compatible to the most common text programs (e.g. MS Word).

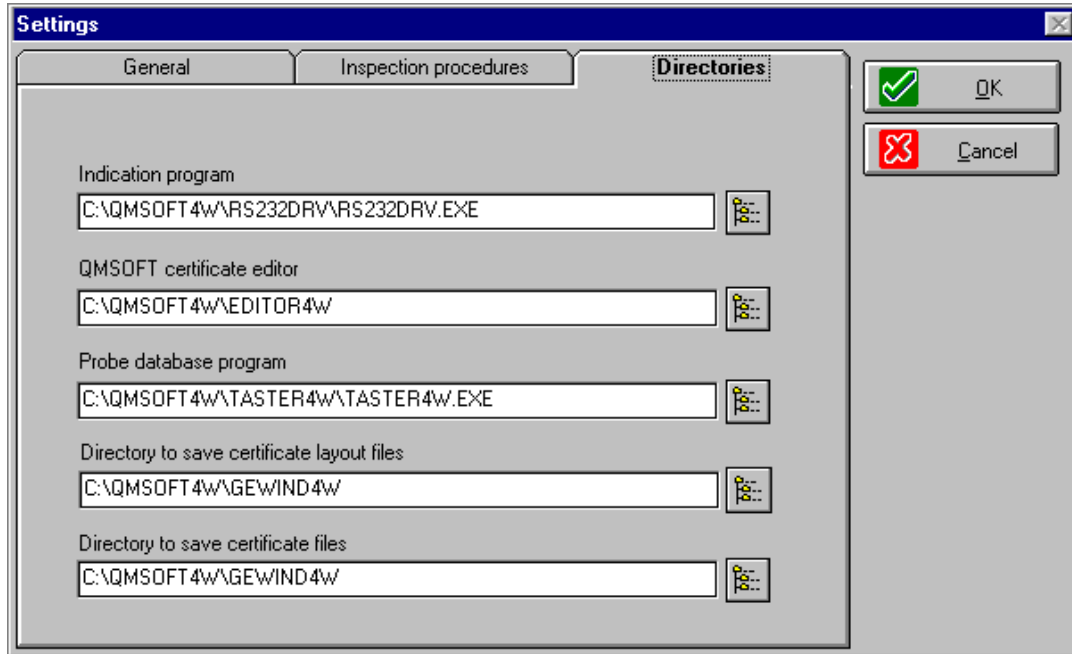
If you use the "**Save to..**" option you can select the directory where you want to save the file and you can enter the file name.

Using the **"Save"** Icon the directory and the file name will be set by the programs default values.

To change the default values see the following section.

### 1) the directory to save certificates

You can set the directory where you want to save your certificate files using the menu "Settings|General settings" in the page "Directories" (see figure / last line ! )



### 2) the used file name

there are two options for the default setting of the used file name:

a) using a fixed file name:

the name of this file is set in the menu **"Settings | Inspection conditions"** in the page "General"; there is a field **"File name to save certificate:"**. For the QM-THREAD program the default name is "GEWIND4W.RTF". Note: if you use the fixed file name the "save" dialogue will overwrite the existing certificate !

b) creating a new file name for each measurement:

using the menu **"Settings | General settings"** you will find in the page "General" a click box named

**"Save certificates as RTF file"** (see figure). if you activate this option the program will save the certificate automatically. The file name will be created either by using the first 8 characters of the gauges identity number or of the entered certificate number. You have to select the wished option.

++++



## VII. Inspection program QM-MICRO

The QM-MICRO program serves as a computer support program for the inspection of micrometers according to DIN 863, VDI/VDE/DGQ guideline 2618 (pages 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.

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 or GGG) the program determines the total deviation range  $f_{\max}$ , the deviation range of the micrometer thimble  $f_{me}$  and the repeatability  $f_w$ . 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.

The program QM-MICRO can be started directly out of the database program QM-MANAG - also offered by L&W GmbH - and provided with initial data (such as ID-number, measuring range and graduation of the micrometer to be inspected etc.), in this case the inspection results are directly transmitted back to the database.

### VII.1. Program start

You can start the QM-MICRO program directly from the QMSOFT command Shell (click the corresponded symbol in the shell). The other way is to start the program through the WINDOWS file manager or the explorer (WINDOWS 95, 98 ..).

Before working with the program you have the possibility to customise some things according your individual needs and wishes.

The following program settings you have to do:

- **Configuration of the Online Interface:**

If you use a direct linkage between the computer and your measuring machine to transfer measuring values, at first you should start the indication program required (RS232DRV, IK102021 or SIDDRV depended on the device and the interface connection you use) and set the correct parameters for the Online Interface (see also the manual of the used program).

- **Program settings and inspection conditions:**

Here you can set some general things for the program environment; for example: the default way to transfer measuring values (machine or keyboard) or the unit used for the evaluation. See section V.3 for this.

**Attention:** An incorrect selection of the parameters for the online connection (e.g. for the serial port) can produce a system crash while measure data input ! Make sure that you are informed about your computer system and the correct name of the serial port for on-line interface. For settings of the serial interface see also Appendix D.

## VII.2. Program settings

Working with the program you should make different settings to define the program environment and especially program conditions. Use the menu “Settings” to do this.

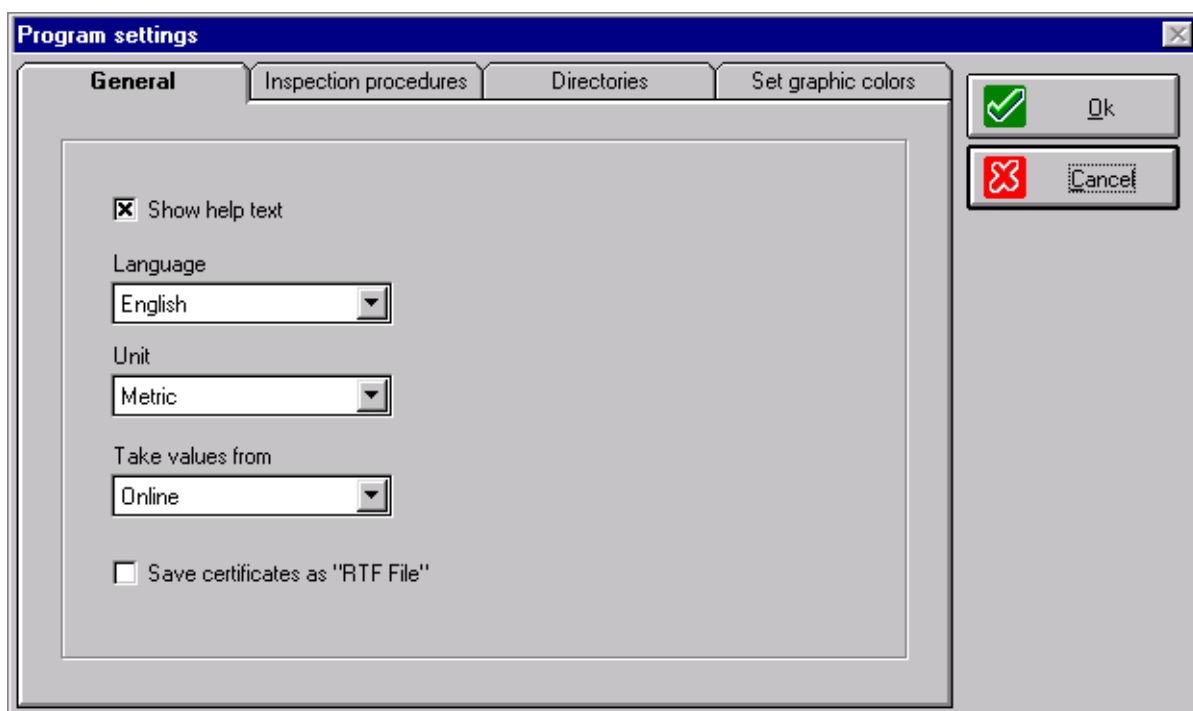
### VII.2.1. Settings | General settings

Using this option you have the following registers to change program settings:

#### **Register „General“**

Here you can choose the program language, switch on/off the help text and select the default data input device (keyboard of the computer, on-line measuring machine). If you set “Online” as the default device the Online connection will be started automatically if a gauge measurement will start and “Online” measurement is possible for the type of inspection.

Using the option “Save certificates as RTF File” any calibration certificate will be saved into the “Certificate directory” (see register “directories”). The file name will be created using the first 8 characters of the gauges identity number.



**Figure:** General program settings

#### **Register „Inspection procedures“**

Here you can enter for each gauge type a reference to a corresponded text file including the inspection procedure as a text. Enter your own text for the procedures here. Note that this “inspection procedure” does not influence the inspection process. The measuring positions will be set using the option “Inspection conditions”.

**Register „Directories“**

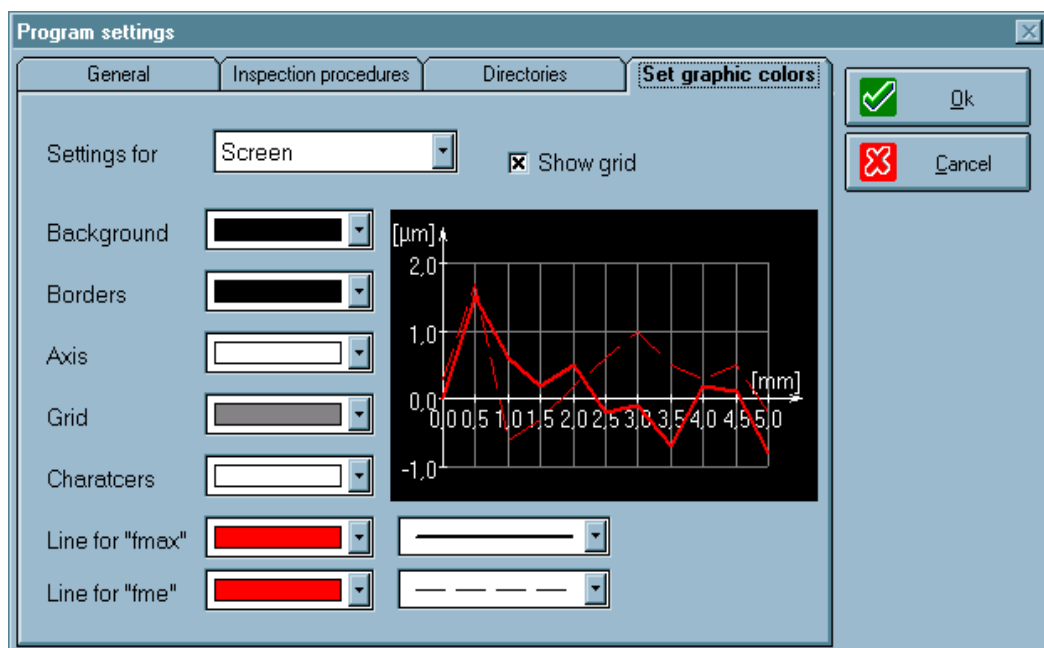
For some functions (indicating of measuring values; creation and edit of certificate layouts) external programs will be used. Here you have to enter the directory where the corresponded program can be found.

While doing the program installation all directories will be set to a correct value !

**ATTENTION:** Make sure that this entries are correct. Errors while operating the program may be caused by incorrect settings in the screen "Directories".

**Register „Set graphic colours“**

Inspecting a micrometer you will get a calibration curve on the screen which you can also print out on your certificate. Here you can set the colours for the graphic elements. Please note that you can made this settings different for the "Screen" and the "Print".



**Figure:** Set graphic colors

## VII.2.2. Settings | Inspection conditions

Here you can set some general conditions for the micrometer inspection and also the reading position you want to use.

### VII.2.2.1. Inspection conditions | General settings

Figure: Inspection conditions - general

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.

**Unit:**

Chose the unit for the micrometer.

**Enter measuring 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 keyboard to enter measuring values the second option is more convenient.

**Inspection period:**

Enter a default "Inspection period" to calculate the date for the next inspection. This can be print on the certificate. If the program is called from the database the "Next inspection date" value given from the database will be used.

**Measures for repeatability:**

Type here the number of readings you want to enter if you inspect the repeatability  $f_w$  of a micrometer screw.

**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.

**Pre set of measuring values:** Switch "on" this to fill the column "Measure" in the measuring table with the nominal values.

**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.

**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.

**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.

**Default certificate layout file(s):** Enter here the name and directory for the certificate layout files you want to use to create your calibration certificates. For "mm" and "inch" measurements different files are used.

**NOTE:** Because the program will be installed to support different languages you will find a lot of "LW2" files in the related directory. Note that the number in the file name (for example the "061" in the "METR\_061.LW2") file does represent the used language (061 = English; 033 = French; 034 = Spanish; 039 = Italian; ...). Using the Windows-Explorer you can delete all certificate layout files you do not use.

#### VII.2.2.2. Inspection reference gauges

Here you can enter the names and serial numbers for the used masters and reference gauges. This text can be print out on the certificate to record the traceability of your inspection

### VII.2.2.3. Inspection positions for external, depth micrometers and micrometer heads:

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.

For a inspection according to factory standard you can use customised positions.

**Figure:** Entering inspection positions for “external” measurements

Pay attention, that the entered positions are always related to the start of the micrometers measuring range (for example: start of range is 25 mm the inspection position 5.1 means absolute position is 30.1 mm).

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.

Using the program you will get “tool tips” for each button available.

### VII.2.2.4. 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.

#### VII.2.2.5. 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. Similar to the external micrometers should these positions correspond with the spindle range. The entered positions are always related to the start of the micrometers measuring range.

**The tables with all entered reading positions will be saved into the file "PRUEFPOS.DAT" in the programs working directory after pressing the "OK" button.**

#### VII.2.3. Settings | Factory tolerances

If you have chosen the option "Factory tolerances" a list of already existing tolerance entries (see Figure ) will appear on the screen.

For each type of micrometer (external, internal..) you have a separate list to enter factory tolerances.

up	to	Grad.	fmax	fme/tw	Flatness	Parallelism
0,000 mm	25,000 mm	0,005 mm	4 µm	3 µm	2 µm	2 µm
0,000 mm	25,000 mm	0,010 mm	4 µm	3 µm	2 µm	2 µm
100,000 mm	125,000 mm	0,001 mm	3 µm	2 µm	3 µm	3 µm
100,000 mm	125,000 mm	0,002 mm	2 µm	3 µm	2 µm	0 µm
100,000 mm	125,000 mm	0,010 mm	2 µm	2 µm	2 µm	0 µm
100,000 mm	125,000 mm	0,050 mm	99 µm	88 µm	0 µm	0 µm
100,000 mm	150,000 mm	0,001 mm	4 µm	4 µm	2 µm	2 µm
100,000 mm	150,000 mm	0,010 mm	0 µm	0 µm	0 µm	0 µm
100,000 mm	150,000 mm	0,020 mm	5 µm	5 µm	3 µm	3 µm

**Figure:** Entering of factory tolerances

Here you can insert new tolerances, delete existing tolerances or change it. With the functions "Copy list" and "Insert new list" you can copy a tolerance list from one micrometer type to another. Working with this function you will get tool tips for each button available.

**Pay attention:** If you want to insert tolerances for "Inch" micrometers use the option "Inspection conditions – general settings" to switch the unit to "Inch". In this case you will get the "Inch" tolerance table on the screen.

The tolerance table will be saved in the file „WERKSTOL.DAT" in the programs working directory and is available at any time. When doing a micrometer inspection according to factory standard these 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.

### VII.3. Certificate layout files

The program gives you the possibility to customise the layout of your calibration certificates. The layout of these certificates is based on the so called "certificate layout file" (template). This file contains all information about the form of the certificate and the values that should appear in this. By editing this certificate layout file you can change the layout. Saving this file with another file name gives you the possibility to work with different record layouts.

All certificate layout files you have created will be saved in the selected directory (see program settings). The files have the extension ".LW2".

Using the option "**Certificate layouts | Show / edit a certificate layout**" you can load an existing certificate layout file into the editor program.

**ATTENTION:** Do not open a certificate layout file ("LW2" extension) directly with the QMSOFT editor or with any other program! In this case the program dependent fields will be removed!!

A certificate layout file 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 the different text parameters;
- "Placeholders" ("Fields"): a "Field" is including a 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 use the menu "Insert | Fields". Using this menu you can also see all available "Fields" and the related information. For numerical fields you can set the number of decimal points using the menu "Insert | Fields".

"Line conditions": A line 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 printed 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 "Line conditions" available.

See „Appendix B“ give you the instructions how to work with the editor program „EDITOR4W“.

## VII.4. Micrometer inspection

### VII.4.1. Entering of parameters

After selecting the type of micrometer in the main menu a series of parameters must be entered that describe the micrometer and the inspection conditions. The input of these parameters is done in a separate dialog box with a corresponding number of input fields.

The screenshot shows a software dialog box titled "External micrometer". It contains several input fields and buttons:

- Identity number:** A text box containing "08999".
- Reading positions acc. to:** A dropdown menu showing "BS ( 8 reading posit.)".
- Tolerances acc. to:** A dropdown menu showing "BS 870:1950".
- Indication type:** A dropdown menu showing "Vernier scale".
- Measuring range up:** Two text boxes, the first containing "0,0000 Inch" and the second containing "1,0000 Inch", separated by the word "to".
- Spindle range:** A dropdown menu showing "1,0000 Inch". To its right is a button labeled "0 Setting gauges".
- Graduation:** A dropdown menu showing "0,0010 Inch".
- Inspection of:** A dropdown menu showing "Total error of indication - fmax".
- Inspection with:** A dropdown menu showing "Slip gauges or Indicator".
- At the bottom, there are three buttons: "Inspection conditions" (with a gear icon), "Factory tolerances" (with a gear icon), and "Inspection procedures" (with a document icon).
- Below these are two large buttons: "Back" (with a red left arrow) and "Continue" (with a green right arrow).

**Figure:** Entering parameters for the micrometer inspection

***Identity number:***

This field is used to establish an identity for the caller by entering a number. This number will be noted in the record.

***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 positions (factory standard) make sure that you have insert the positions for the used measuring range (see also section VII.2.3).

***Calculate 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.

***Type of indication:***

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.

<b>Start of meas. range:</b>	Enter the start of the measuring range of the micrometer. The unit is "mm". For micrometers according a given standard make sure the validity of this standard.
<b>End of meas. range:</b>	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 the „End of measuring range“ will be set automatically.
<b>Spindle range:</b>	Select the range of the spindle from the shown list.
<b>Graduation:</b>	Select the spindle graduation from the shown list.
<b>Inspection of:</b>	Here you can select, from the list provided, the micrometer parameters you want to inspect. The entering of measuring values is depended on the chosen option.
<b>Inspection with:</b>	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).

**NOTE:** To change the Unit from "inch" to "mm" or back – press the button "Inspection conditions". Then select the page "General"; here you can change the gauges unit (see also section VII.2.2)

#### **VII.4.2. The buttons „setting gauges“ and „extensions“**

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.

**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;

### VII.4.3. Inspection of functionality, “Flatness”, “Parallelism” and more

An important part of a micrometer inspection is it to check the general functionality and some other parameters depended on the type of micrometer and/or the selected standard.

These are the:

- Function and Visual inspection;
- Flatness of measuring faces;
- Parallelism of measuring faces;
- Measuring force of the spindle friction;
- Hardness

Depended on the measuring conditions you have selected (see section VII.2.2) you can do this as a “Pass” / “Fail” decision or you enter the results of the inspection in form of the actual numerical values.

	Valuation / Actual value	Tolerances	Valuation
Visual inspection	ok		
Functionality (friction drive...)	ok		
Flatness of spindle face	0.03 thou.Inch	0.05 thou.Inch	ok
Flatness of anvil face	0.06 thou.Inch	0.05 thou.Inch	not ok
Parallelism of measuring faces	0.04 thou.Inch	0.10 thou.Inch	ok
Parallelism (2nd position)	0.03 thou.Inch		
Parallelism (3rd position)	0.03 thou.Inch		
Parallelism (4th position)	0.00 thou.Inch		
Flatness of datum face	0.00 thou.Inch		not inspected
Inspection of "Zero" reading	0.00 thou.Inch	0.05 thou.Inch	ok
Measuring force	0.00 lb.	1 1/2 lb. - 2 1/4 lb.	ok
Hardness inspection	not inspected		

Back reject it; "scrap" Continue

**Figure:** Checking micrometer functionality and additional parameters

To enter the inspection results the input mask shown in the figure will appear on your screen including the corresponding tolerances of this parameters. Now you have to enter the inspection result for each parameter or if the “Pass” / “Fail” option is selected to check, if the actual values of the micrometer inspected are inside the shown tolerance or not.

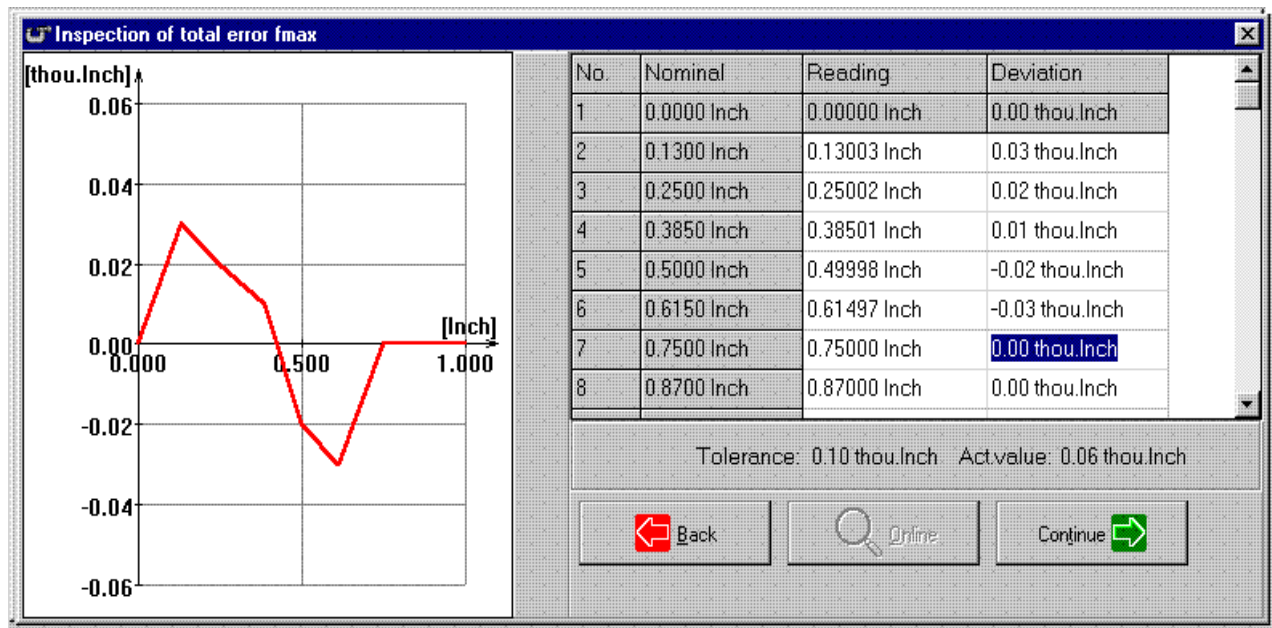
If you choose "not inspected" the related parameter will not be shown/printed in the calibration certificate.

### The “Reject” 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” button to skip the following steps of the inspection. In this case you will go directly to the creation of the inspection certificate.

#### VII.4.4. Entering measuring values

The input of the measuring values must be done in the order: measuring value 1 to n for increasing readings. The valid inspection position (depend on the VDI guidelines, the British standard or the entered inspection positions) is displayed. The measuring values are inspected on their plausibility.



**Figure:** Entering measuring values

Depended on the current program settings, the input of measuring values will be done directly by an indication device or by the keyboard. Pay attention, that the inspection with gauge blocks or setting rings always needs a data input by the keyboard.

#### a) Input of measuring values using the computer keyboard

The input of the measuring values has to be given as deviation values from the nominal values (incorrect-correct) in micrometers! This minimises the keystrokes. The measuring values must be put into a separate field, which is marked with a special input request. If the input shall be interrupted the ESC key must be used.

#### b) Input of measuring values via a measuring machine

The on-line data input via a measuring machine is the most effective form of inspection. Some handling actions depend on the used measuring machine (see the corresponding producer documentation. The transfer of the data has to be started at the measuring device (handle or pedal).

#### **VII.4.5. Evaluation and working with the results**

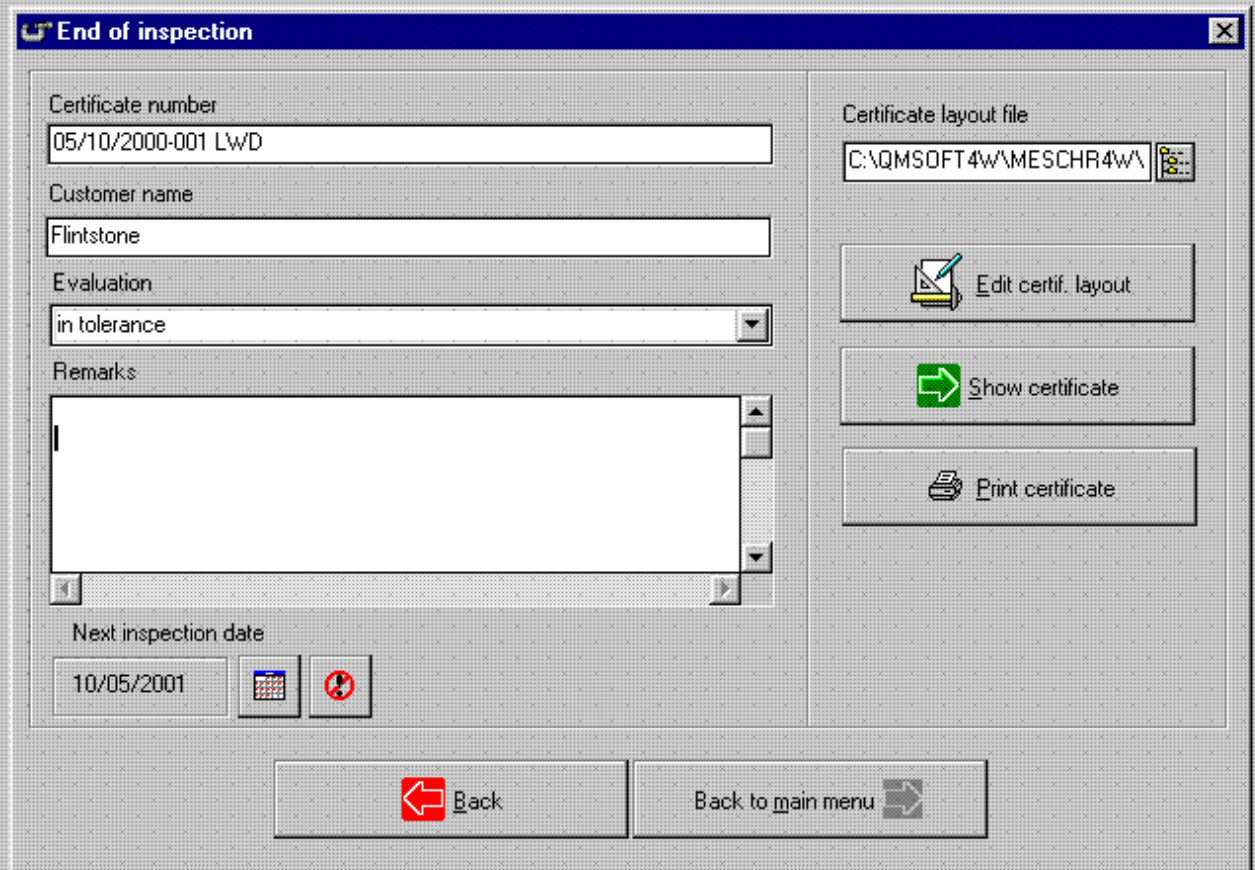
The corresponding deviation ranges will be calculated from the measuring values received. The valuation of the micrometer inspected will be done according the following criteria:

- 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.

## VII.5. Output of results

After entry of the measurement data has been completed, the screen "End of inspection" will appear.



**Figure:** End of inspection – show / print certificate

If the inspection is finished you get the screen shown above. The summary result of the inspection is shown. Here you can enter the name of the customer, the date for the next inspection and also some remarks to the inspection.

Before creating the calibration certificate you can change the certificate layout file will be used.

To start the output of the results press the "Show certificate" button.

All functions for the editing and the output of calibration certificates will be controlled by the EDITOR - program. See the manual of this program ("Appendix B") to see how to operate this.

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## **VIII. Inspection program QM-CALIP**

### **VIII.1. Introduction**

The QM-CALIP program serves as a computer support program for the inspection of callipers according to different national standards (see the list ), respective according to customised factory standards.

The use of the program itself, however, requires little knowledge of computers. An extensive help text as well as the integration of thorough safety measures ensures quick a simple operation of the program.

Measurement data can be entered directly from the calliper (if the calliper have a RS 232 interface) or from the keyboard. From the measured data the program determines the errors of external, internal and depth measurement of the inspected calliper. The evaluation results can be re-produced on the screen and/or the printer. 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

The program QM-CALIP can be started directly out of the database program QM-MANAQ - also offered by L&W GmbH - and provided with initial data (such as ID-number, measuring range and graduation of the product to be inspected etc.), in this case the inspection results are directly transmitted back to the database.

### **VIII.2. Program start**

You can start the QM-CALIP program directly from the QMSOFT-command-Shell (click the corresponded symbol in the shell). The other way is to start the program through the WINDOWS-datei manager or explorer (WINDOWS 95, 98 ...).

Especially at the first start of the program you should check some basic parameters of the program. See the next section for this

### VIII.3. Program settings

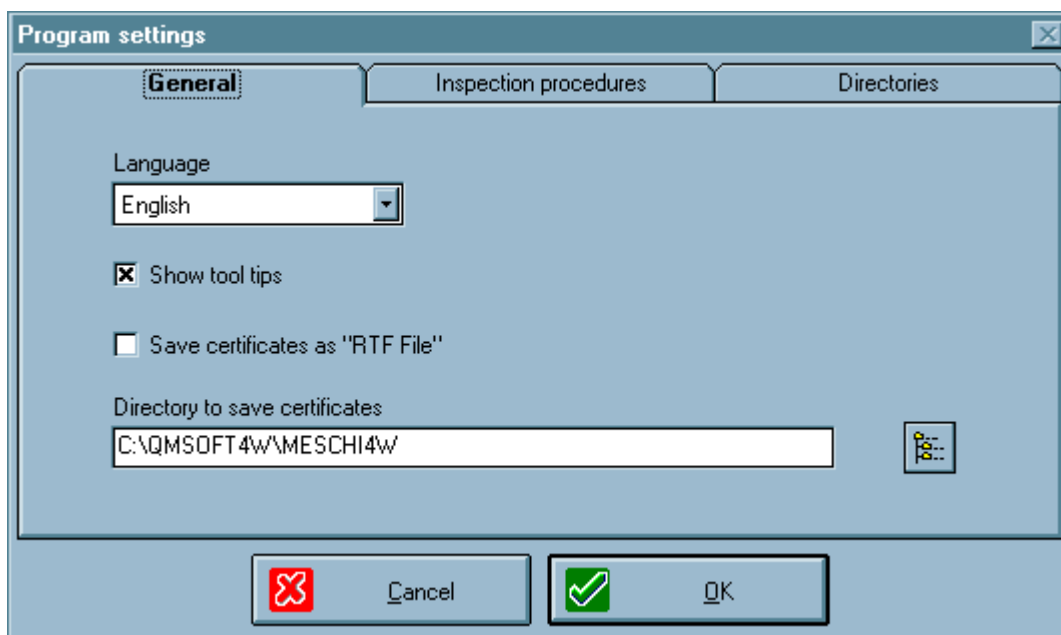
Working with the program you should make different settings to define the program environment and especially program conditions. Use the menu "Settings" to do this.

#### VIII.3.1. Settings | General settings

Using this option you have the following registers to change program settings:

##### **Register „General“**

Here you can choose the program language, switch on/off the help text and set the directory to save calibration certificates.



**Figure:** general program settings

##### **Register „Inspection procedures“**

Here you can enter for each gauge type a reference to a corresponded text file including the inspection procedure as a text.

Enter your own text for the procedures here.

##### **Register „Directories“**

For some functions (indicating of measuring values; creation and edit of certificate layouts) external programs will be used. Here you have to enter the directory where the corresponded program can be found.

While doing the program installation all directories will be set to a correct value !

**ATTENTION:** Make sure that this entries are correct. Errors while operating the program may be caused by incorrect settings in the screen "Directories".

### VIII.3.2. Settings | Inspection conditions

Here you can set some general conditions for the caliper inspection and also the reading position you want to use.

#### VIII.3.2.1. Inspection conditions | General settings

**Figure:** Inspection conditions – general settings

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.

***Unit:***

Chose the unit for the Caliper.

***Enter measuring 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 the second option is more convenient.

***Inspection period:***

Enter a default “Inspection period” to calculate the date for the next inspection. This can be print on the certificate. If the program is called from the database the “Next inspection date” value from the database will be used.

- 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).
- Pre set of measuring values:** Switch "on" this to fill the column "Measure" in the measuring table with the nominal values.
- 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".
- Default certificate layout file:** Enter here the name and directory for the certificate layout files you want to use to create your calibration certificates. For "mm" and "inch" measurements different files are used.
- NOTE:* Because the program will be installed to support different languages you will find a lot of "LW2" files in the related directory. Note that the number in the file name (for example the "061" in the "METR\_061.LW2") file does represent the used language (061 = English; 033 = French; 034 = Spanish; 039 = Italian; ...). Using the Windows-Explorer you can delete all certificate layout files you do not use.

#### VIII.3.2.2. Define reading positions for External (Internal, Depth, Hight ) measures

The inspection of a caliper can be made on different positions of the applicable measuring range of the caliper inspected. For this, appropriated 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.

If you have choosen a inspection according VDI/VDE... the positions of inspection will be given by the VDI/VDE/DGQ guidelines page 8.

For a inspection according DIN, AS 1984 or factory standard you have to define the related inspection positions.

You can enter positions for „External“, „Internal“, „Depth“ and „Hight“ measures.

To switch from the „mm“ tables to the „inch“ readings change the „Unit“ on the register „General“.

**Settings for external measures**

Measuring range		Reading positions for complete meas.		Reading positions for reduced meas.	
5 inch		Reading pos.	on	Reading pos.	on
6 inch		1	1,200 inch	1	1,000 inch
8 inch		2	2,300 inch		
12 inch		3	3,500 inch		
18 inch		4	4,200 inch		
20 inch		5	5,700 inch		
24 inch					
36 inch					
48 inch					

Buttons: insert, edit, delete, copy (for each section)

Buttons: Cancel, OK

Tab bar: General, External measures, Internal measures, Depth measures, Hight measures

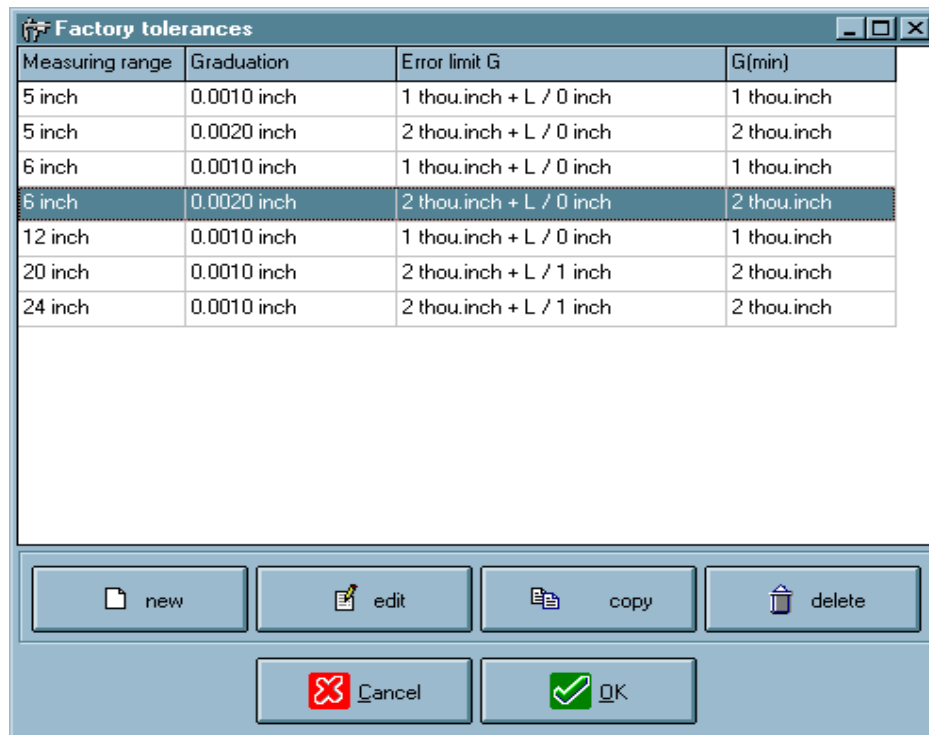
**Figure:** Entering of reading positions

The reading positions entered are always in relation to the measuring range of the caliper should be inspected. For each measuring range you have two different lists for the positions.

The list on the left side 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 left list will be used. This positions will also be used for the internal measures if a inspection according to „VDI/VDE..“ is selected.

### VIII.3.3. Settings | Factory tolerances



Measuring range	Graduation	Error limit G	G(min)
5 inch	0.0010 inch	1 thou.inch + L / 0 inch	1 thou.inch
5 inch	0.0020 inch	2 thou.inch + L / 0 inch	2 thou.inch
6 inch	0.0010 inch	1 thou.inch + L / 0 inch	1 thou.inch
6 inch	0.0020 inch	2 thou.inch + L / 0 inch	2 thou.inch
12 inch	0.0010 inch	1 thou.inch + L / 0 inch	1 thou.inch
20 inch	0.0010 inch	2 thou.inch + L / 1 inch	2 thou.inch
24 inch	0.0010 inch	2 thou.inch + L / 1 inch	2 thou.inch

new edit copy delete

Cancel OK

**Figure:** Entering of factory tolerances

If you have chosen the option "Factory tolerances" a list of already existing tolerance entries (see Figure) will appear on the screen.

Here you can insert new tolerances, delete existing tolerances or change it.

The tolerance table will be saved in the file „MESCHI4W.TOL" in the programs working directory and is available at any time. 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 „Measuring range" and the „Graduation" of the caliper.

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.

#### VIII.4. Certificate layout files

The program gives you the possibility to customize the layout of your calibration certificates. The layout of these certificates is based on the so-called "certificate layout file" (template). This file contains all information about the form of the certificate and the values that should appear in it. By editing this certificate layout file, you can change the layout. Saving this file with another file name gives you the possibility to work with different record layouts.

All record model files you have created will be saved in the working directory of the QM-CALIP program. The files have the extension ".LW2".

Using the option "**Certificate layouts | Show / edit a certificate layout**" you can load a certificate layout file into the editor program.

**ATTENTION:** Do not open a certificate layout file ("LW2" extension) directly with the QMSOFT editor or with any other program.

In this case the program-dependent fields will be removed !!

A certificate layout file 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 the different text parameters;
- "Placeholders" ("Fields"): a "Field" is including a 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 use the menu "Insert | Fields". Using this menu you can also see all available "Fields" and the related information. For numerical fields you can set the number of decimal points using the menu "Insert | Fields".

"Line conditions": A line 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 printed 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 "Line conditions" available.

See „Appendix B“ give you the instructions how to work with the editor program „EDITOR4W“.

## VIII.5. The calibration process

### VIII.5.1. Entering of parameters

Before starting the inspection, a series of parameters must be entered that describe the. The input of the parameters is done in a separate dialog box with a corresponding number of input fields.

The screenshot shows a Windows-style dialog box titled "Form of construction". It contains several input fields and buttons. The fields are: "Identity number" with the text "089\_abc"; "Reading positions acc. to" with a dropdown menu showing "Factory standard"; "Calculate tolerances acc. to" with a dropdown menu showing "BS 887 : 1982"; "Form of construction" with a dropdown menu showing "external, internal and depth (fixing screw)"; "Indication type" with a dropdown menu showing "Vernier scale"; "Graduation" with a dropdown menu showing "0.001 inch"; and "Measuring range" with a dropdown menu showing "5 inch". To the right of these fields is a small graphic of a vernier caliper. At the bottom of the dialog, there are three buttons: "Inspection conditions", "Tolerances factory standard", and "Inspection procedure". Below these are two larger buttons: "Cancel" (with a red X icon) and "Continue" (with a green right-pointing arrow icon).

**Figure:** Entering of caliper parameters

- Identity number:** This field is used to establish an identity for the caliper by entering a number. This number will be noted in the record.
- Reading positions acc. to:** Select if you want to inspect the caliper with reading positions proposed by the VDI rules or on your self defined positions. If you want to use your own positions (factory standard) make sure that you have insert the positions for the used measuring range (see also section VIII.2.3).
- Calculate tolerances acc. to:** Select the standard you want to use for the caliper tolerances. If you select „Factory standard“ make sure that the required tolerances are entered in the tolerance table.
- Form of construction:** Select the "Form of construction" of the caliper from the list of options provided. The contents of this field will be entered into the record.
- Type of indication:** 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.
- Scale, graduation....:** Choose from the list provided, the scale graduation or resolution of the caliper.

**Measuring range:**

Enter the measuring range of the caliper have to be inspected. The unit is "mm". For calipers according the DIN or BS standard make sure the validity of this standard.

**NOTE:** If the "continue" Button is disabled check the following parameters:

- 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;

**VIII.5.2. Entering measuring values**

The entering of measuring values is divided in the measurement of external, internal and depth measuring values. 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.

No.	Nominal	Limit	Measure	Deviation	Out of tol.
1	1,2000 inch	0,0010 inch	1,2003 inch	0,0003 inch	—
2	2,3000 inch	0,0010 inch	2,3012 inch	0,0012 inch	0,0002 inch
3	3,5000 inch	0,0010 inch	3,5004 inch	0,0004 inch	—
4	4,2000 inch	0,0010 inch	4,2000 inch	0,0000 inch	—

Buttons: Back, Online, Continue

**Figure:** Entering of measuring readings

Enter the readings for the related nominal values via keyboard or pressing the corresponding button 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.

### **VIII.5.3. Entering of additional parameters**

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:

- Function 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 a input mask will appear on your screen (see Figure VIII-9) including the corresponding tolerances of this paramaters. 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 appropriate list entry. If you choose "not inspected" the related parameter will not be shown/printed in the calibration certificate.

### **VIII.6. Evaluation of the measurement**

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.

### VIII.7. Output of results

After entry of the measurement data has been completed, the screen "*End of inspection*" will appear.

**Figure:** End of inspection – show/print certificate

If the inspection is finished you get the screen shown above. The summary result of the inspection is shown. Here you can enter the name of the customer, the date for the next inspection and also some remarks to the inspection.

Before creating the calibration certificate you can change the "certificate layout" file will be used. To start the output of the results press the "Show certificate" button.

All functions for the editing and the output of calibration certificates will be controlled by the EDITOR - program. See the manual of this program to see how to operate this.

+++

## IX. Inspection program QM-BLOCK



The program QM-BLOCK (EMP4W) is designed to the computer supported inspection of gauge blocks used as single gauge blocks or as gauge block sets.

The program includes a database to manage all entered gauge blocks and gauge block sets and to save all inspection results of this gauge blocks. The inspection itself 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. To define customised tolerance tables with user defined accuracy classes is possible.

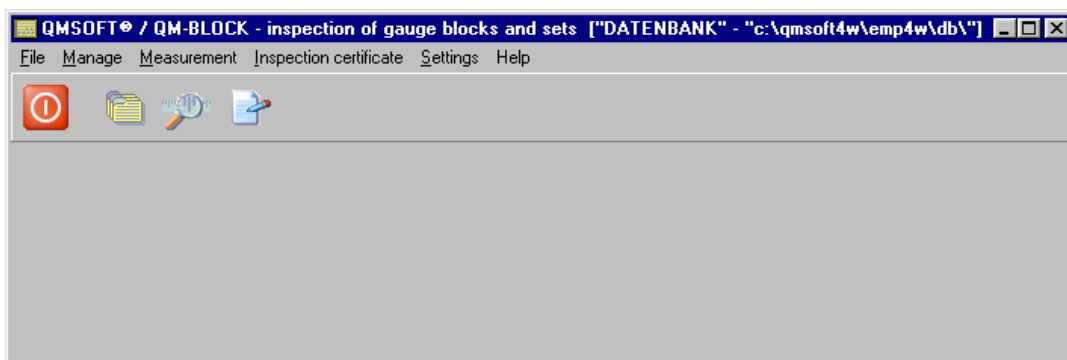
Mostly a gauge block inspection instrument does work with the method of "difference measurement". This means that you have a reference gauge block with a well known actual size which have to be compared with the size of the gauge block should be inspected. Normally, the nominal size of the used reference gauge and the inspected gauge block should be identically - a difference of only few micrometers 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. This values have to been entered in the QM-BLOCK program. In the program you can manage the data of different reference gauge block sets.

To inspect a gauge block, normally you should 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. When using an On-line measurement device, the connection between the device and the computer is made on the serial interface of the PC.

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 the so called "record model files" .

### IX.1. Program start

You can start the program using the QMSOFT-Shell (click on the QM-BLOCK-icon) or directly with the the WINDOWS -Explorer - execute the file **EMP4W.EXE**.



**Attention:** If you are starting up the EMP4W program for the first time, there some entries that will have to be made that are described in section VIII.2 "Configuration"(such as; configuring the on-line interface, choosing the used record model file(s); etc.).

## IX.2. Configuration

Using the program QM-BLOCK the menu **"Configuration"** give you the possibility to change different internal parameters. Such parameters are: used directories; references to used external programs (On-line connection; Editor program); tolerance tables etc.

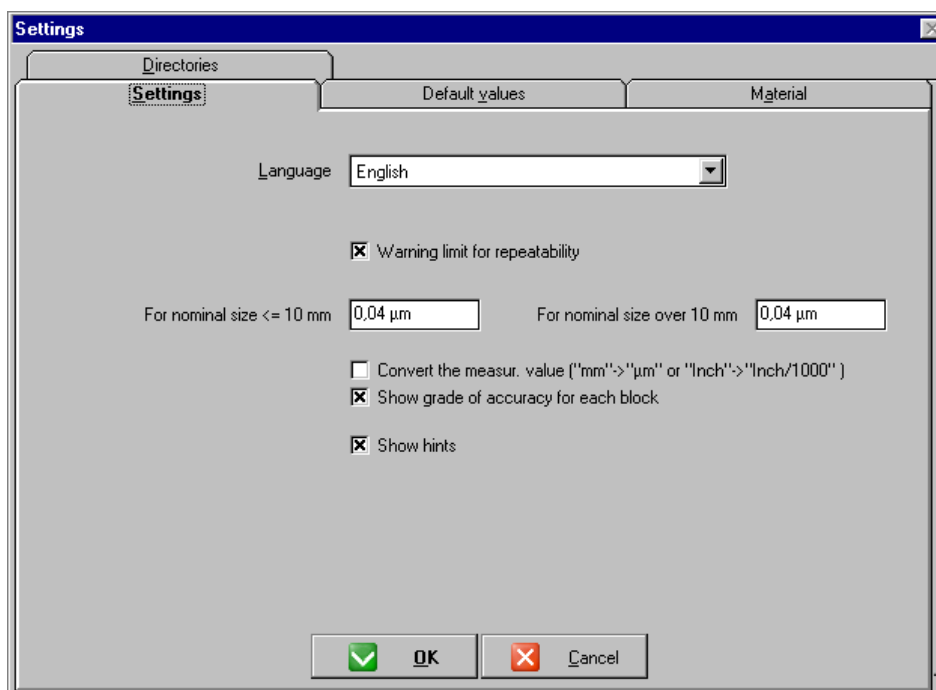
*Please, pay attention* that the program does only correct work if all settings are correctly - otherwise the most things will work at once with the default settings.

### IX.2.1. Settings|General settings

The Menu **"Settings|General settings"** may be used to change the following groups of parameters

#### IX.2.1.1. Register "Settings"

Here the basic settings (language etc.) can be modified:



**Remarks:** Here you can also set "Warning limits" for the repeatability of the measures. If you touch a block gauge several times on the same position the software will "watch" the repeatability of your measures.

**Important:** Normally the gauge block inspection is executed with the help of special measuring devices (gauge block comparator). In this case the measures from the device are coming in the length unit „µm“ or „mil“ (inch/1000). The measures are the difference between the "Reference" measure and the inspected gauge block. If the measuring device will serve the measures as „mm“ or „inch“ values (as ordinary horizontal measuring machines are doing), so you have to activate the option „Convert the measur. Value..." (see picture above).

### IX.2.1.2. Register "Default values"

Here you can set or change some basic parameters like: the used unit; tolerance table; used reference gauge block set and others. Inserting a new single gauge block or gauge block set into the database this values will be used as default parameters for this gauge.

The screenshot shows a software window titled "Settings" with a tabbed interface. The "Default values" tab is selected. It contains the following settings:

- Unit:** Millimeter
- Tolerance table:** Tolerances acc. to ISO 3650
- Used reference gauge block set:** TEST
- Used measuring point pattern:** Range and centre length
- Material:** Steel
- Gauge type:** Gauge block set
- Measur. direction:**
  - ☒ upward
  - ☐ downward

At the bottom of the dialog are two buttons: "OK" (with a green checkmark icon) and "Cancel" (with a red X icon).

The important parameters you have to set are:

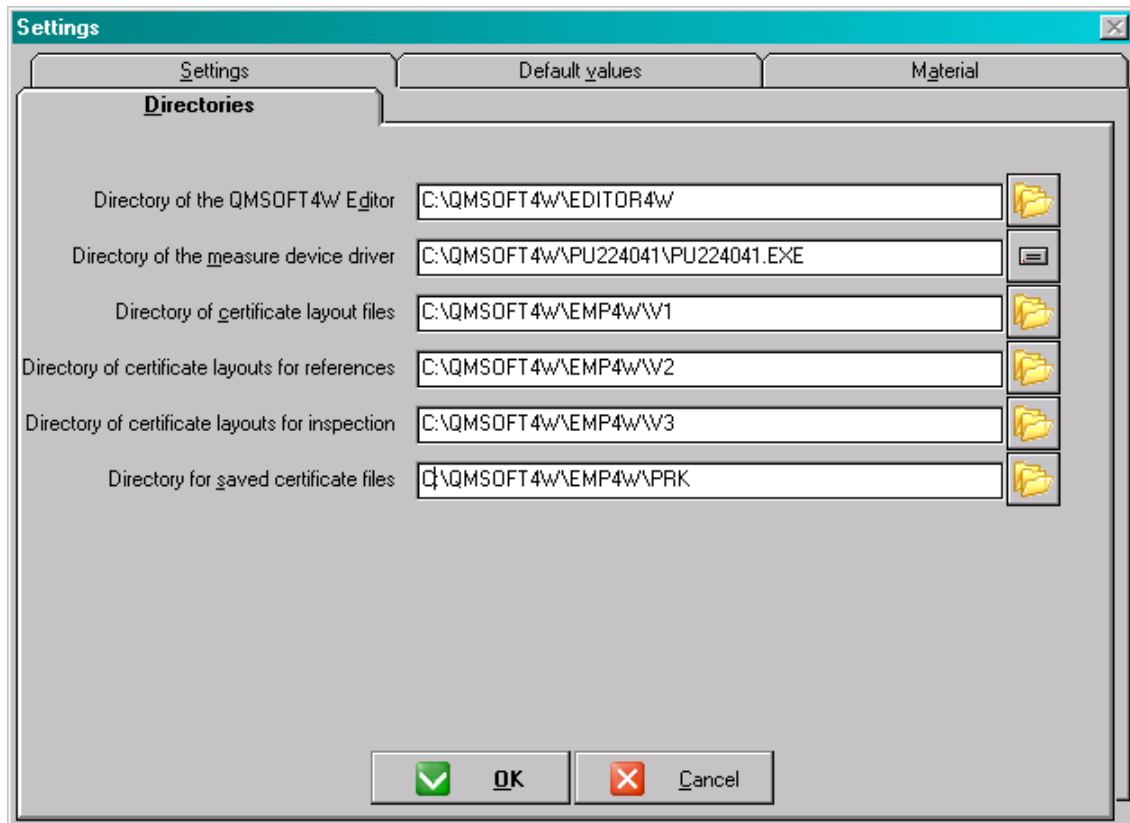
**Tolerance table:** Defines the default tolerance table being used for the tolerances of gauge blocks should be inspected.

**Used reference gauge block set:** Select the name of the gauge block set which should be used as the reference for the gauge block inspection. See section "IX.2.4. Settings|Reference gauge block sets" how to enter this reference sets.

**Used measuring point pattern:** A "measuring point pattern" is defining the measuring points you have to touch while calibrating a gauge block. Select here the name of a pre defined measuring point pattern. See section "IX.2.3. Settings|Patterns of measuring points" how to enter this reference sets.

### IX.2.1.3. Register "Directories"

Different functions available in the program will be carry out by external programs. This programs are the "Editor-program" used to create the calibration certificates and the "Indication program" controlling all functions for the On-line connection to the measuring instrument. Here you should enter the directories where this programs are located on your hard disk. Additionally you can change the directories where the used certificate layout files are located.



**Remark:** Installing the program QM-BLOCK this entries will be set to default values. In the most cases it should not be necessary to change anything.

#### IX.2.1.4. Register "Material"

In this register you can set and/or calculate some parameters related to the material of the gauge blocks. These parameters will be used for temperature corrections or for the compensation of deformation if reference gauge and inspected gauge have different materials.

**NOTE:** For the compensation of deformation the reference gauges you use to determine the deformation value have to have exactly the same material parameters as the gauge blocks you want to inspect.

**Settings**

Directories | Settings | Default values | **Material**

☐ Compensation of temperature    ☐ Compensation of different deformations

Material	Expand.factor
Steel	0.0 E-6/K
Cemented carbide	0.0 E-6/K
Ceramics	0.0 E-6/K

Reference gauge	Nom. size	Deviation
Steel	0.0000 mm	0.00 µm
Cemented carbide	0.0000 mm	0.00 µm
Ceramics	0.0000 mm	0.00 µm

Refer. / Gauge	Steel	Cemented carbide	Ceramics
Steel	0.00 µm	0.00 µm	0.00 µm
Cemented carbide	0.00 µm	0.00 µm	0.00 µm
Ceramics	0.00 µm	0.00 µm	0.00 µm

Determination of deformation factor

☒ OK    ☐ Cancel

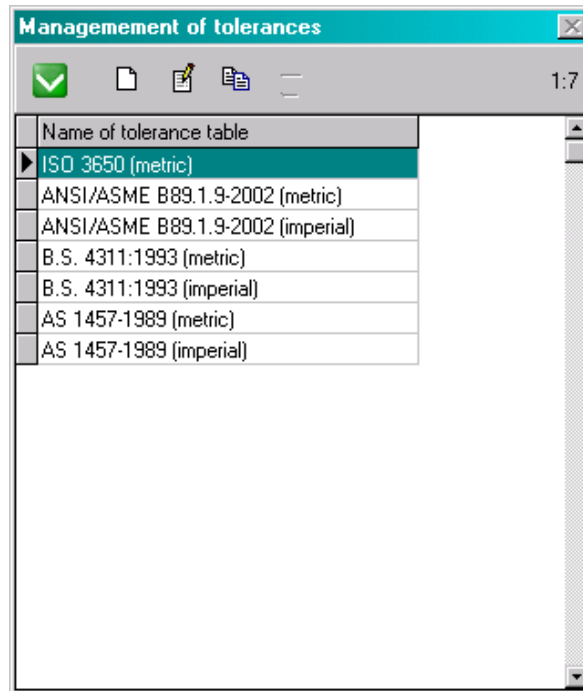
**Compensation of temperature:** Here you have to enter only the "Head expanding factor" of the used materials. If the compensation is "On" you have to enter the gauges temperature while executing the measurement.

**Compensation of deformation:** If you inspect a gauge block or a gauge block set consisting of a material different from the material of your reference gauge then you have to compensate the different deformations while touching the gauge. You can determine the differences of the deformation if you carry out a test measurement on reference gauges having different materials. At first you have to enter the nominal size and the known deviation of the reference gauge block being used.

#### IX.2.2. Settings | Tolerance tables

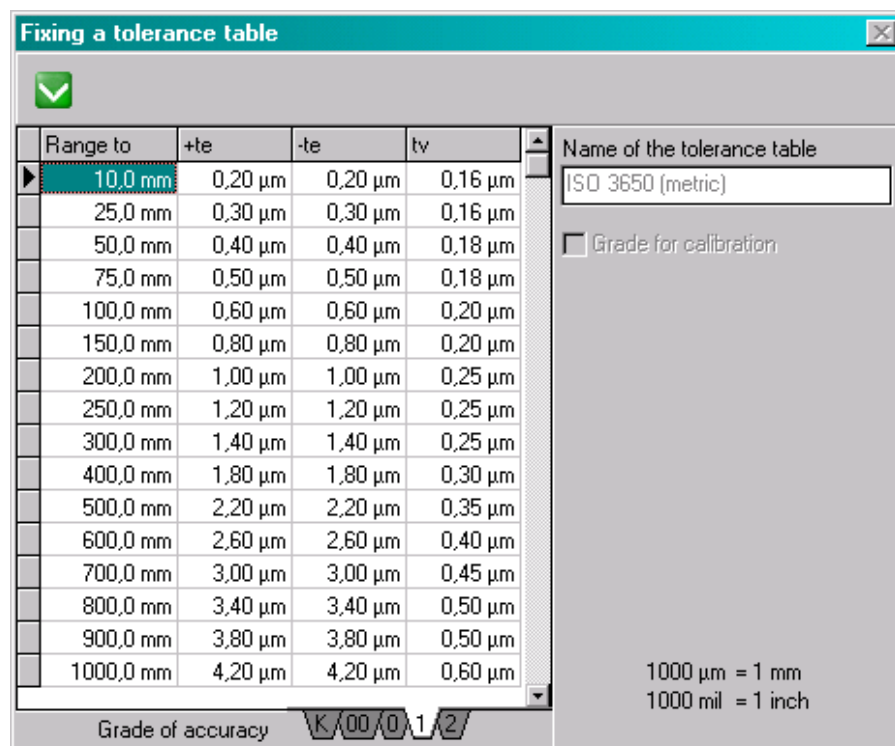
The program gives you the possibility to work with customised tolerance tables. This means you can define your own factory standards with different classes of accuracy.

Starting the program the tolerance tables related to the ISO 3650, ANSI/ASME B89.1.9, BS 4311 and AS 1457 are available (see the figure).



**Figure:** Pre-defined tolerance tables

A tolerance table consist of (at minimum one) different pages. Each page is describing the tolerances for the related “class of accuracy” - compare the functions of the “Create a new tol. class” Button while editing a tolerance table.



**Figure:** the ISO 3650 tolerance table

You can create a new tolerance table using the “Copy” Button and making the wished changes in this new table.

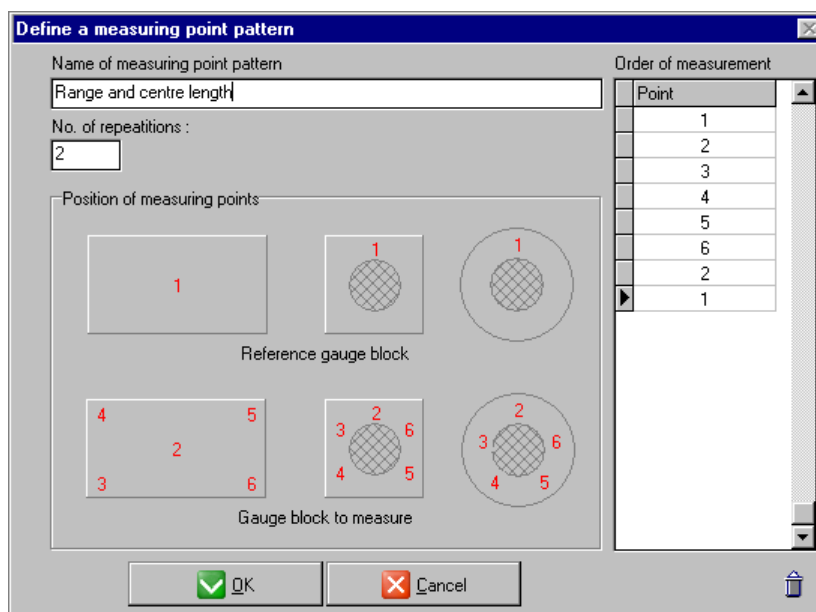
The tolerance values may be entered but you can also calculate this using the ISO 3650 formulas. To do this press the "Calculate tol. acc. to DIN" Button.

### IX.2.3. Settings | Pattern of measuring points

Depended on the users evaluation strategy it is possible to define an optional number of "Measuring point patterns". This patterns define the order of the measuring points have to been touched while inspecting a gauge block.

Additionally, with the parameter "Repetition" you can define the number of repetitions should be done for the defined measuring points. This may be used to decrease the accuracy of your measuring result.

For each "Measuring point pattern" you should enter a significant name.



To add a new "Measuring point" to the list shown on the left side click on the related button in the fields "Position of measuring points". To delete a point use the "Delete.." Button.

### IX.2.4. Settings | Reference gauge block sets

Here, you can define all reference gauge blocks and -sets you use to carry out a gauge block calibration. At first you have to define the nominal sizes of the gauge blocks existing in your set. Doing this you can use a pre-defined list with standard set compositions (sets produced from TESA, MAHR; MITUTOYO ...). In a second step you have to enter the know deviation of each reference gauge block.

The program gives you also the functionality to create a "Certificate" from this entered data.

### IX.2.5. Settings | Predefined gauge block sets (nominal sizes)

Before inspecting a gauge block set, you have to enter all nominal sizes of the gauge blocks including in this set - see also section IX.4.1. To minimise the required work the program manage any pre-defined "Gauge block set compositions". This compositions are related to the offered standard sets of different producers like TESA, MAHR and MITUTOYO. Inserting a new gauge block set you can now select a pre-defined set and create all nominal sizes for your gauge block set automatically. You can also create new compositions of gauge block sets using the "Add" or "Copy" - functions.

### IX.3. Certificate layout files

The program QM-BLOCK gives you the possibility to customise the layout of your record listing (Calibration certificate). The layout of the calibration certificate is based on the so called "Certificate layout file". This file contains all information about the form of the certificate and the values should appear in this. By editing this layout file you can change the layout. Saving this file with another file name give you the possibility to work with different layouts.

All certificate layout files you have created will be saved in the working directory of the EMP4W program. This files have the extension **".LW2"**.

Using the option "Inspection certificate" you can load the certificate layout file into the editor program. See "Appendix B" give you the instructions how to work with the editor program "EDITOR4W".

A certificate layout file 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 the different text parameters;
- "Placeholders" ("Fields"): a "Field" is including a 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 use the menu "Insert | Fields". Using this menu you can also see all available "Fields" and the related information.

## IX.4. Manage (gauge blocks and gauge block sets)

Using the option "Manage" you get all functions for the management of gauge block and gauge block set data including the measuring history.

### IX.4.1. Manage | Gauge blocks and -sets

To carry out the inspection of a gauge block or a gauge block set at first you should insert this in the program internal database. Additional to the function "Insert" a new gauge also the functions "Copy", "Edit" and "Delete" are available.

Starting the option "Manage" you get a screen window shows all gauges included in your database. Please note, that is not possible to change anything for a gauge being in inspection.

#### Insert a new gauge

The "Add"-Button will be used to insert a new gauge in the database. Please note, that you at first should select the wished "Gauge type" -single gauge block **or** gauge block set - before using the "Add"-Button.

**Gauge block set**

Details to the gauge block set

Gauge block set number: 08912

Designation: Master set 001

Customer name: Flintstone Company

Remark:

Tolerance table: Tolerances acc. to ISO 3650

Nominal grade of accuracy: 2

Parts: 87

Type of block: Gauge blocks

Gauge material: Steel

	Nominal size	Identity number	Remark	Status
▶	0.5000 mm			activ
	1.0000 mm			activ
	1.0010 mm			activ
	1.0020 mm			activ
	1.0030 mm			activ
	1.0040 mm			activ
	1.0050 mm			activ

Buttons: OK, Cancel, Gauge block set..., Add a gauge block, Delete the gauge block, Enter ID numbers, Gauge block is missing

After the selecting of the Unit you have to enter the following information (see figure):

#### **Identity number**

Enter the identity number of the gauge block set or the single block. In relation with the "Customer name" this identity number will be used for the clear identification of a gauge.

<b>Designation</b>	Enter a text for the further designation of the gauge.
<b>Customer name</b>	In connection with the identity number the customer name will be used for the identification of a gauge.
<b>Remark</b>	Used for any text to describe the inserted gauge.
<b>Tolerance table</b>	Using the "..."-Button on the right side of this field you can select the tolerance table should be used for the evaluation of the current gauge.
<b>Class of accuracy</b>	Related to the selected tolerance table you have to choose the nominal class of accuracy for the gauge.
<b>Parts</b>	The number of parts (gauge blocks) will be inserted automatically by the program. It is depended on the created list of gauge blocks.
<b>Type of block.</b>	In a gauge block set the single gauge blocks will be distinguished into "normal" gauge blocks and "protection gauge blocks". Using this switch you can select the wished type of the gauge blocks.
<b>Material</b>	Enter the gauge material each for the "normal" and the "protection" gauge blocks.
<b>Gauge block set ...</b>	Using this Button you get a pre-defined list of gauge block set compositions. Selecting one of this sets all nominal sizes of the included gauge blocks will be insert in your "Gauge block list" - see the lower part of the screen. Pay attention, that all gauge blocks already inserted in this list will be overwritten.
<b>List of gauge blocks</b>	The list with all gauge blocks included in your current set may be created manually or automatically using a pre-defined set. Additionally you can enter a identity number and/or a remark for each gauge block.
<b>Gauge block is missing</b>	If a gauge block, which should normally be included in the set, is missing, you can mark this gauge block using the "Gauge block is missing" button,
<b>"Delete" and "Add" a gauge block</b>	Using this buttons your can "Add" or "Delete" a gauge block from your list.

Please enter all values carefully. If the gauge block or the -set is already in inspection it is difficult to change faulty values.

## Other management operations:

### Edit a gauge

Using the "Edit" Button you can edit data of gauge blocks or gauge block sets already in the database.

**Attention:** After finishing the first measurement for this gauge the most values are not be able to change!

### Copy a gauge

The copy function may be used for a quick inserting of a new gauge. Pay attention that you insert a new identity number for this new gauge.

### Delete a gauge

By clicking on the "**Delete**"-Button the marked gauge will be deleted out of your database. Before deleting the gauge a confirmation is necessary.

**Attention:** A deleted gauge can not made undeleted.

### Search a gauge/Change the sort order

To search a gauge from your database use the "*Searching for..*" field and enter the wished value. Using the switch "Sort order" you can change between "Identity number" and "customer" for the entry should be searched.

## IX.4.2. Manage | Inspections

The management of inspections includes only the possibility to delete one ore more inspections of a gauge - and all related data.

**Attention:** If a gauge is currently in inspection it is not possible to delete a inspection.

## IX.5. Measurement

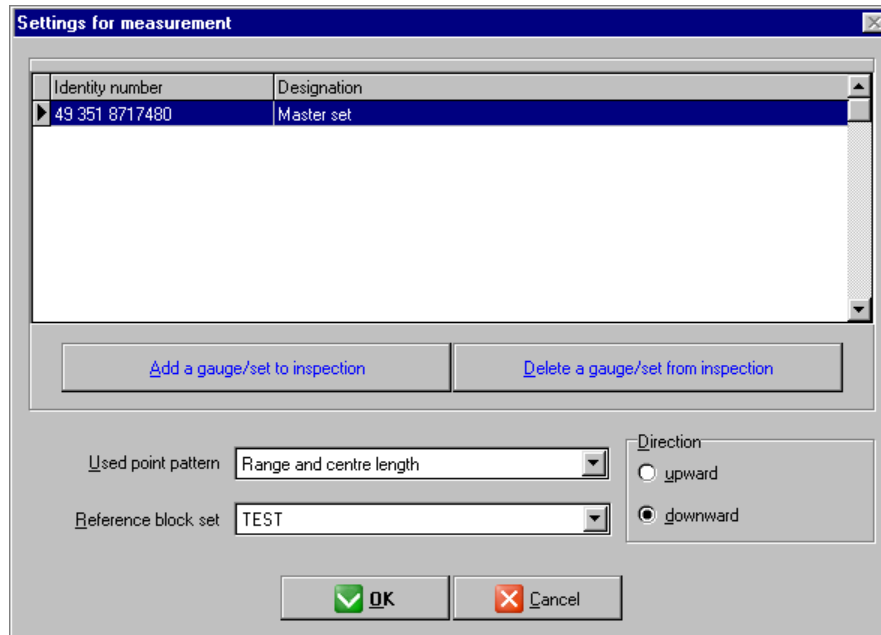


Doing a inspection with the program QM-BLOCK it is possible to define any gauge block or -sets should be inspected at the same time using the same reference gauge block set. To do this is very useful because you can minimise the required work - the necessary settings on your inspection instrument for a new reference gauge block size can be used for several gauge blocks with the same nominal size.

To give you the possibility to break the calibration at any time and continue it later, the menu "**Measurement**" include two different options: "**Start a new inspection**" and "**Continue an inspection**".

### IX.5.1. Start a new inspection

Using this option you can start a new inspection for several gauge blocks and/or gauge block sets included in your database. Activating this option, at first the content of your database -single gauge blocks or sets - is shown on your screen. Select now the first gauge you want to inspect - mark it with a mouse click and press the "**OK**" - Button. In the following screen "Settings for measurement" you get now the list of all gauges being selected for the new measurement. Using the buttons "**Add..**" and "**Delete..**" you can now add more gauges to this list or delete a gauge out of this list.



**Figure:** Start a new inspection

Before leaving this screen you should set the following parameters:

- **Used pattern** - select the measuring point pattern should be used for the inspection;
- **Reference set** - select the reference gauge set used for the inspection;
- **Direction** - select the wished direction (increasing or decreasing nominal sizes) for the set inspection.

Pressing "**OK**" to start the measurement.

**Attention:** If the used reference gauge set does not include all nominal sizes of the gauges you have selected, an error message will appear on the screen. The start of the measuring process will only be possible, if you have all required nominal sizes in your reference set.

### IX.5.2. Continue an inspection

If an inspection was not finished, you can continue it using this program option. The operation steps are the same as described before, but you can only select gauges where a inspection was started.

Press the "**OK**"-Button to continue the inspection.

### IX.5.3. Carry out a gauge block inspection

Doing a inspection of gauge block you have to do always the following operations:

- Select -from the shown list- the gauge block should be inspected now; this selection will be done automatically depended on the used "Direction" with decreasing or increasing nominal sizes but you can choose another gauge block at any time;
- Doing the "Inspection" of the gauge block press the "Inspection" button **or** mark the block with the "Replace" - Button (a replaced block will be inspected at once) **or** mark it as a "Missing block";
- taking over the required measuring values for the current gauge block - depended on the active program settings, enter a remark if necessary and continue the inspection with the next gauge block.

Touching on	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8
1. Repeat:	0,0010	0,0009	0,0008	0,0009	0,0010	0,0011	0,0010	0,0010
2. Repeat:	0,0011	0,0010						
Average	0,00105	0,00095						




Figure: Inspection of a gauge block

Doing the measurement always the measuring position which you should touch is shown on the screen (see figure). If the measurement of the selected block is finished the calculated parameters of this gauge block are shown. Now you can go back to the gauge block list or continue with the next gauge block.

Using the keyboard to enter the measuring values, the measures will be inserted directly in the shown table. If you use an **On-line**- connection to your inspection instrument, please refer to **Appendix C** of this manual - including the operation instructions for the different interface instruments.

The position of the next measuring point have to been touched will always shown on your screen. If you have taken over a faulty measure, click with the mouse to the related position in the table and repeat the measurement of this point.

If the measurement of your gauge block set is finished (or if you want to break the measurement) than you get the screen shown in the next figure.

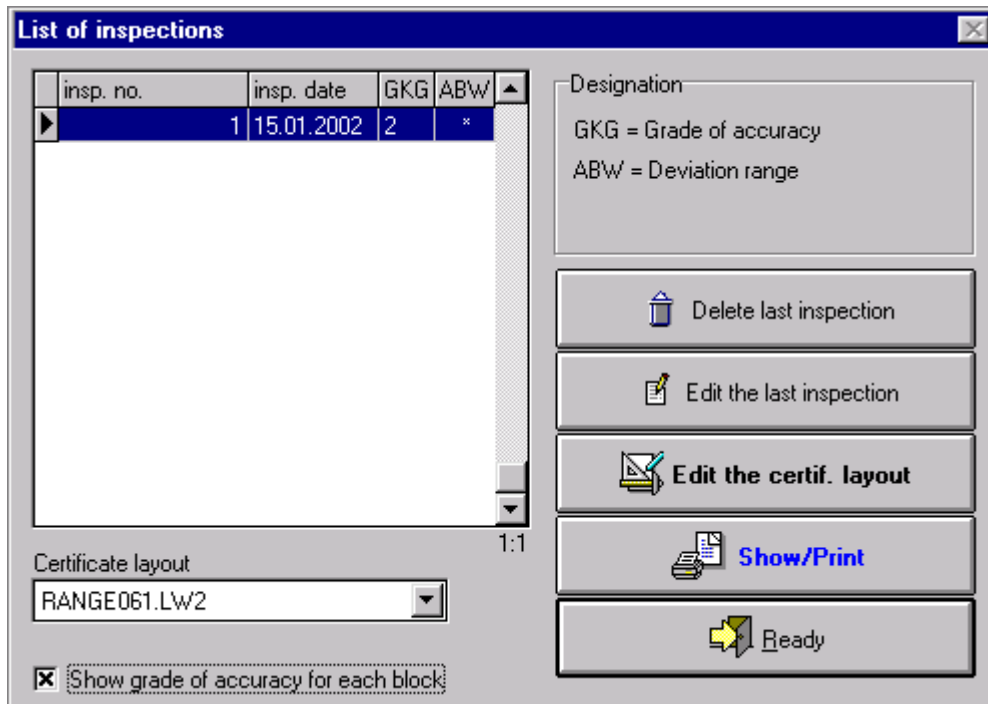
Information about the inspection		
Details about the gauge block set	Grade of accuracy	
Identity number: <b>00</b>	Parts: <b>7</b>	
Details about the inspection	missing: <b>0</b>	
Number of calibration certificate	not inspected: <b>7</b>	
<input type="text" value="2002-01-33"/>	inspected: <b>0</b>	
Operator	out of tolerance: <b>0</b>	
<input type="text" value="Smith"/>	Actual grade of accuracy	
Inspection date	<input type="text" value="K"/>	
<input type="text" value="15.01.2002"/>	Nominal grade of accuracy	
	<input type="text" value="2"/>	
 Cancel	 Save all values	 End the inspection

Here you can enter a number for the calibration certificate. Finish the inspection procedure with the related button.

## IX.6. Calibration certificate| Show/Print

The output of the results and the creation of a "Calibration certificate" will be done with the option "**Inspection certificate|Show/Print**". At first you should select the wished gauge block set out of your database.

Now the screen shown in the next figure appears:



Here you will get a list of all inspections which was done with the selected gauge block set or single gauge block. Select the wished inspection, normally the last one .

Before activating the "**Show/Print**" - Button to create the certificate and start the EDITOR-program you should check the selected certificate layout file.

All functions for the editing and the output of the record listing will be controlled by the EDITOR - program. See Appendix B - describing the handling of this program.

**Attention:** To continue the program QM-BLOCK in a correct way, please leave the EDITOR program exclusively with the green "**Continue**" - Button.

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## **X. Inspection program QM-SCALE**



### **X.1. Introduction**

The QM-SCALE program serves as a computer support program for 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.

The use of the program itself, however, requires little knowledge of computers. An extensive help text as well as the integration of thorough safety measures ensures quick a simple operation of the program.

Measurement data can be entered through an on-line measuring machine or on the keyboard. When using an on-line measurement device, the connection between the device and the computer is realised by one of the serial ports of the computer (V.24, RS-232) or by a PC interface card.

The following standards form the basis of the evaluation:

- Graduated steel rules acc. to DIN 865
- Graduated steel rules acc. to DIN 866
- Engineers steel measuring rules acc. to BS 4375
- Measuring tapes acc. to DIN 6403
- Measuring tapes acc. to EG 737/362

The program QM-SCALE can be started directly out of the database program QM-MANAQ - also offered by L&W GmbH - and provided with initial data (such as ID-number, measuring range and graduation of the product to be inspected etc.), in this case the inspection results are directly transmitted back to the database.

### **X.2. Program start**

You can start the QM-SCALE program directly from the QMSOFT-command-Shell (click the corresponded symbol in the shell). The other way is to start the program through the WINDOWS-datei manager or explorer (WINDOWS 95, 98 ...).

Especially at the first start of the program you should check some basic parameters of the program. See the next section for this

### X.3. Program settings

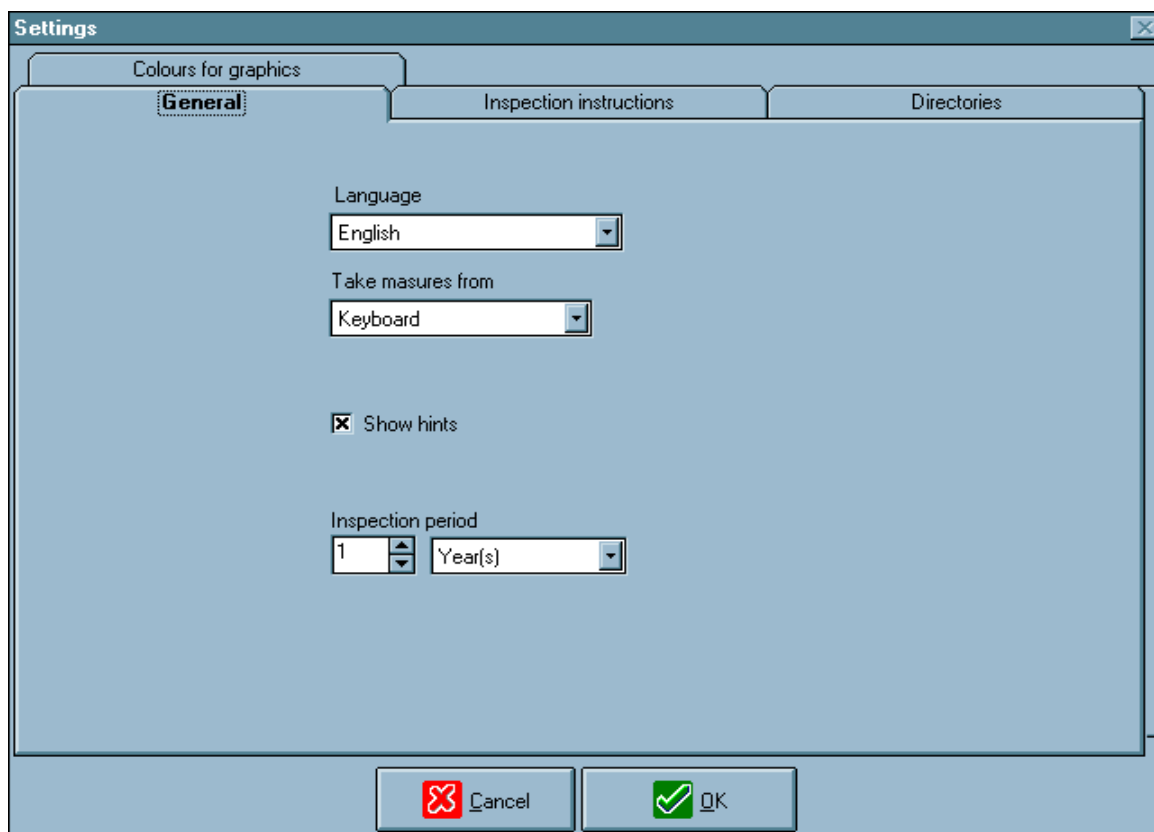
Working with the program you should make different settings to define the program environment and especially program conditions. Use the menu "Settings" to do this.

#### X.3.1. Settings | General settings

Using this option you have the following registers to change program settings:

##### **Register "General"**

Here you can choose the program language, switch on/off the help text and select the default source to enter measuring values.



**Figure:** general program settings

##### **Register "Inspection procedures"**

Here you can enter for each gauge type a reference to a corresponded text file including the inspection procedure as a text. Enter your own text for the procedures here.

##### **Register "Directories"**

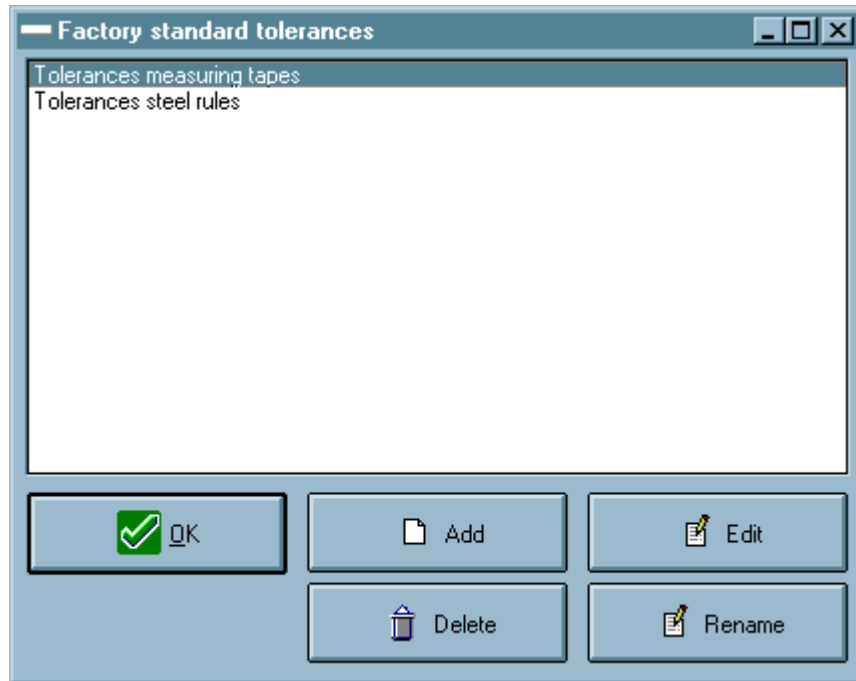
For some functions (indicating of measuring values; creation and edit of certificate layouts) external programs will be used. Here you have to enter the directory where the corresponded program can be found.

While doing the program installation all directories will be set to a correct value !

**ATTENTION:** Make sure that this entries are correct. Errors while operating the program may be caused by incorrect settings in the screen "Directories".

**Register “Colors for graphic”**

Inspecting a steel rule or a measuring tape you will get a calibration curve on the screen which you can also print out on your certificate. Here you can set the colors for the graphic elements.

**X.3.2. Settings | Factory tolerances**

**Figure:** Entering of factory tolerances

If you have chosen the option "Factory tolerances" a list of already existing tolerance tables (see Figure) 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.

The tolerance table will be saved in the file "**MASTAB4W.TOL**" in the programs working directory and is available at any time. When doing a steel rule inspection according factory standard this 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.

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 will be locked.

## X.4. Certificate layout files

The program gives you the possibility to customize the layout of your calibration certificates. The layout of these certificates is based on the so-called "certificate layout file" (template). This file contains all information about the form of the certificate and the values that should appear in it. By editing this certificate layout file, you can change the layout. Saving this file with another file name gives you the possibility to work with different record layouts.

All record model files you have created will be saved in the working directory of the QM-SCALE program. The files have the extension ".LW2".

Using the option "**Certificate layouts | Show / edit a certificate layout**" you can load a certificate layout file into the editor program.

**ATTENTION:** Do not open a certificate layout file ("LW2" extension) directly with the QMSOFT editor or with any other program.

In this case the program-dependent fields will be removed !!

A certificate layout file 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 the different text parameters;
- "Placeholders" ("Fields"): a "Field" is including a 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 use the menu "Insert | Fields". Using this menu you can also see all available "Fields" and the related information. For numerical fields you can set the number of decimal points using the menu "Insert | Fields".
- "Line conditions": A line 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 printed 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 "Line conditions" available.

See "Appendix B" gives you the instructions how to work with the editor program "EDITOR4W".

## X.5. The calibration process

### X.5.1. Entering of parameters

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 in a separate dialog box with a corresponding number of input fields.

Steel rule according to BS 4372:1968

Identity number: 0812

Type of gauge: Steel rule according to BS 4372:1968

Total graduation length: 500,0 mm

Graduation step: 1 mm

BS 4372:1968

Tolerance fmax: 200 µm

Start of inspection: 0,0 mm

End of inspection: 500,0 mm

Inspection step: 10 mm

Number of measures: 51

File to save measures: C:\QMSOFT4w\MASTAB4w\MASTAB4w.DAT

Buttons: Cancel, Inspection instruction, Continue

**Figure:** Entering of parameters

- Identity number:** This field is used to establish an identity for the steel rule / tape by entering a number. This number will be noted in the record.
- Type of gauge:** Shows you the selected type of gauge.
- Total graduation length:** In this field the total length of the rule graduations in "mm" 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.

***Start of inspection :*** The start of the inspection corresponds with the nominal values to be entered for the graduated steel rule to be inspected (in mm) for the input/transfer of the first measurement value.

***End of inspection :*** The end of the inspection area corresponds with the nominal values to be entered for the graduated steel rule to be inspected (in mm) for the input/transfer of the last measurement value.

***Inspection step:*** The inspection step is the distance between two successive measuring values in "mm".

***File to save measures:*** The name of the data file in which the measuring values shall be saved must be given. That file makes a repeated evaluation possible without a new measuring. The file can also be selected out of the directory by using the keys "PgUp" or "PgDn" and the CURSOR keys.

**NOTE: If the "continue" Button is disabled you will get a message about the reason for it. In this case correct the related parameters.**

### X.5.2. Entering measuring values

The input of the measuring values must be done in the order: measuring value 1 to n for increasing readings. The valid inspection pace is displayed. The measuring values are inspected on their plausibility and rejected in case that the deviation is more than half of the value of the valid inspection step.

#### a) Input of measuring values using the computer keyboard

The input of the measuring values has to be given as deviation values from the nominal values (incorrect-correct) in micrometers! This minimizes the keystrokes. The measuring values must be put into a separate field, which is marked with a special input request.

#### b) Input of measuring values via a measuring machine

The on-line data input via a measuring machine is the most effective form of inspection. Some handling actions depend on the used measuring machine (see the corresponding producer documentation). The transfer of the datas has to be started at the measuring device (handle or pedal).

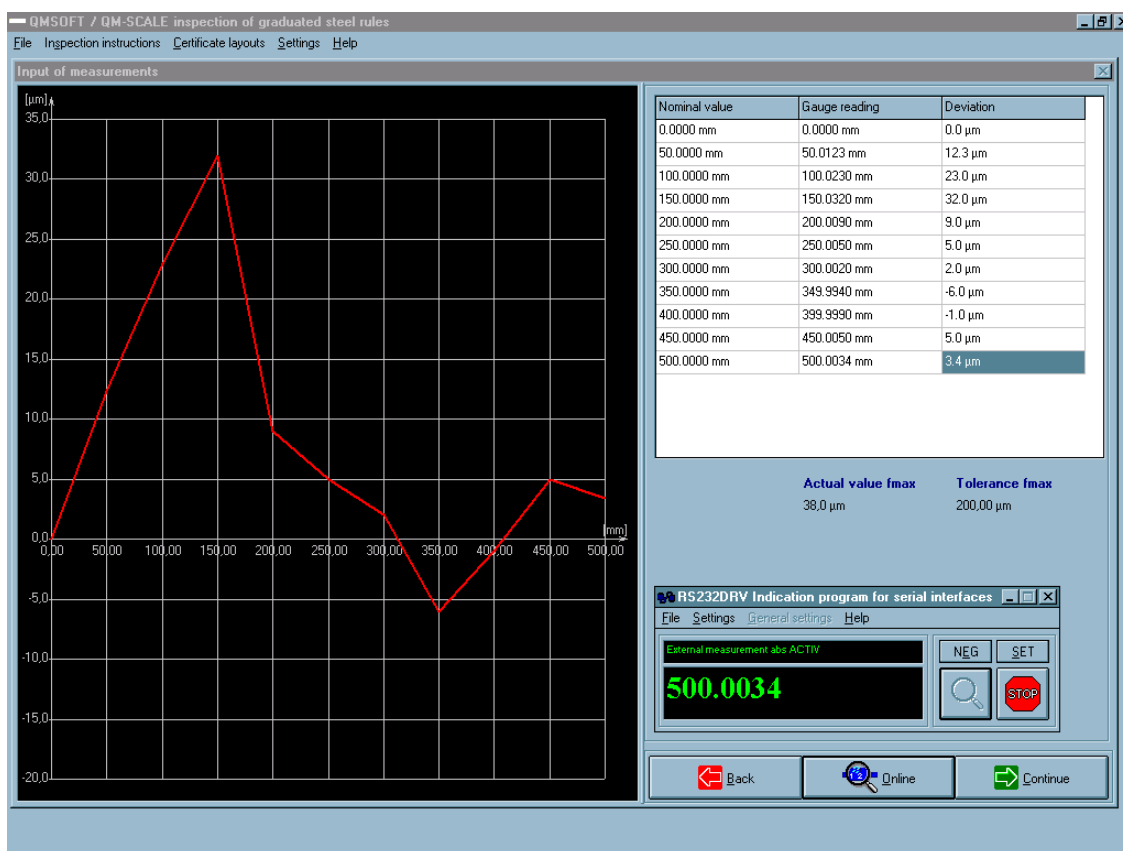


Figure: Entering of measuring readings

### X.5.3. Evaluation of the measurement

The evaluation of the measuring values includes the computing of the parameter  $f_{\max}$  according to the definitions given in the DIN-standards:

$f_{\max}$  total deviation range as distance between the maximum and the minimum value in the deviation graphic.

Whether the data is inside the tolerance range is evaluated according to the following criteria:

- at inspections according to DIN 865 / 866-standards the standardized tolerance ranges are obeyed concerning total deviation range and graduation step;
- at inspections according to factory standard specifications the tolerance range is only evaluated if total deviation range and graduation step of the inspected rule correspond to an entry of the user defined tolerance table (see Function F7);

The result of the tolerance evaluation is printed in the result listing.

## X.6. Output of results

After entry of the measurement data has been completed, the screen "End of inspection" will appear.

**Figure:** End of inspection – show/print certificate

If the inspection is finished you get the screen shown above. The summary result of the inspection is shown. Here you can enter the name of the customer, the date for the next inspection and also some remarks to the inspection.

Before creating the calibration certificate you can change the "certificate layout" file which will be used. To start the output of the results press the "Show certificate" button.

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## **XI. Inspection program QM-PINS**

### **XI.1. General**

The program QM-PINS is used for computer aided management and inspection of cylindrical measuring pins (used as single pins or pin libraries), thread check wires and thread check libraries used for the measurement of external threads according the "Three-wire-method".

Only a basic knowledge of computers is necessary in order to use the QM-PINS program. The integration of thorough safety measures ensures the safety of your data and makes working on the quick, efficient and simple.

A complete set of thread check wires or measuring pins consist of a series of pins or wires with a defined step of the pins diameter. The program is able to manage all nominal sizes of a pin library and also the results of a unlimited number of measurements including all measuring values for each pin or wire. It is also possible to create the calibration certificate for all measurements stored in the programs database at each time.

While inspecting cylindrical pins, the program is calculate for each pin the average, minimum and maximum values and tolerance excisions. The evaluation may be done according to the DIN 2269 standard as well as according your own factory standards.

Measurement data can be entered through an on-line measuring machine or on the keyboard. When using an on-line measurement device, the connection between the device and the computer is made on the serial interface of the PC (V.24, RS 232C, see appendix D).

It is possible to customise your inspection certificates using the so called "Certificate layout files". The output of the results are in a tabular form - either on the screen or via a printer.

### **XI.2. Program start**

The QM-PIN program can be opened directly from the QMSOFT-command-Shell (click the corresponded symbol in the shell). The other way is to start the program through the Windows-file manager or the Windows95 Explorer.

Note: The program start requires a "User name" and a "Password". As long as you have not change this enter **"system"** for both.

Before working with the program you have to customise some things according your individual needs and wishes. The following program settings you have to do:

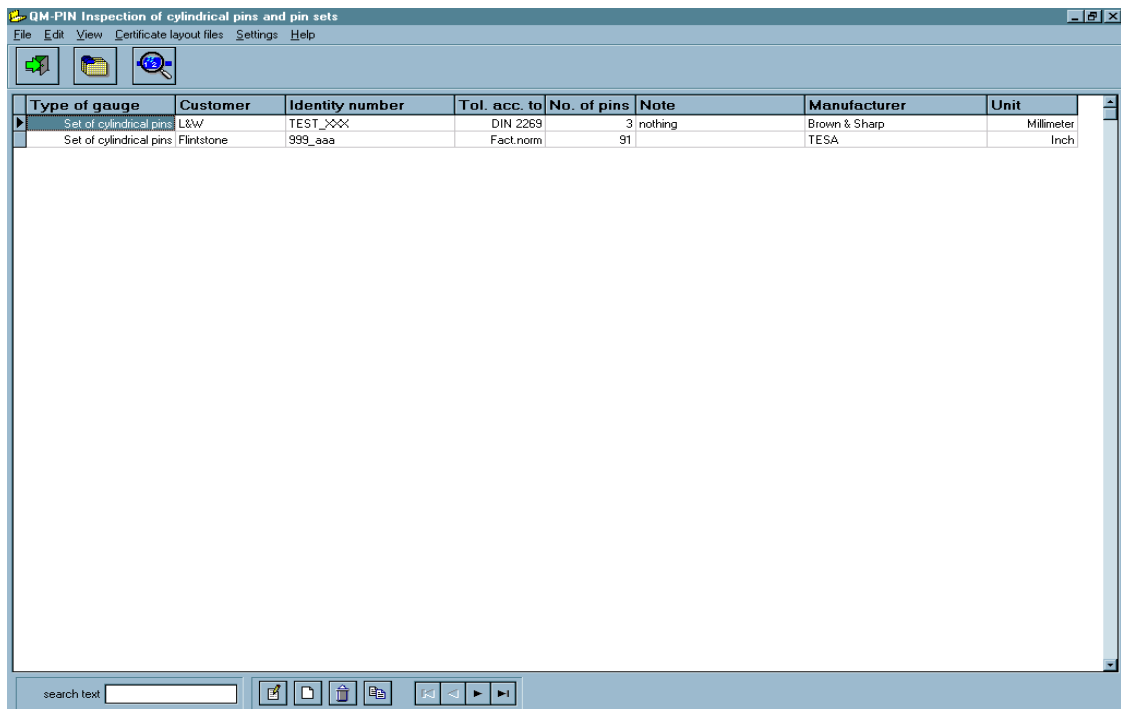
#### **- Configuration of the On-line Interface:**

If you use a direct linkage between the computer and your measuring machine to transfer measuring values, at first you should start the indication program required (RS232DRV, IK102021 or SIDDRV depended on the device and the interface connection you use) and set the correct parameters for the Online Interface (see also the manual of the used program – Appendix C for RS232 connection).

#### **- Program settings and inspection conditions:**

Here you can set some general things for the program environment; for example: the default way to transfer measuring values (machine or keyboard) or the unit used for the evaluation. See section V.3 for this.

After the start of the program you get the following main screen:



**Figure:** Main screen program QM-PIN

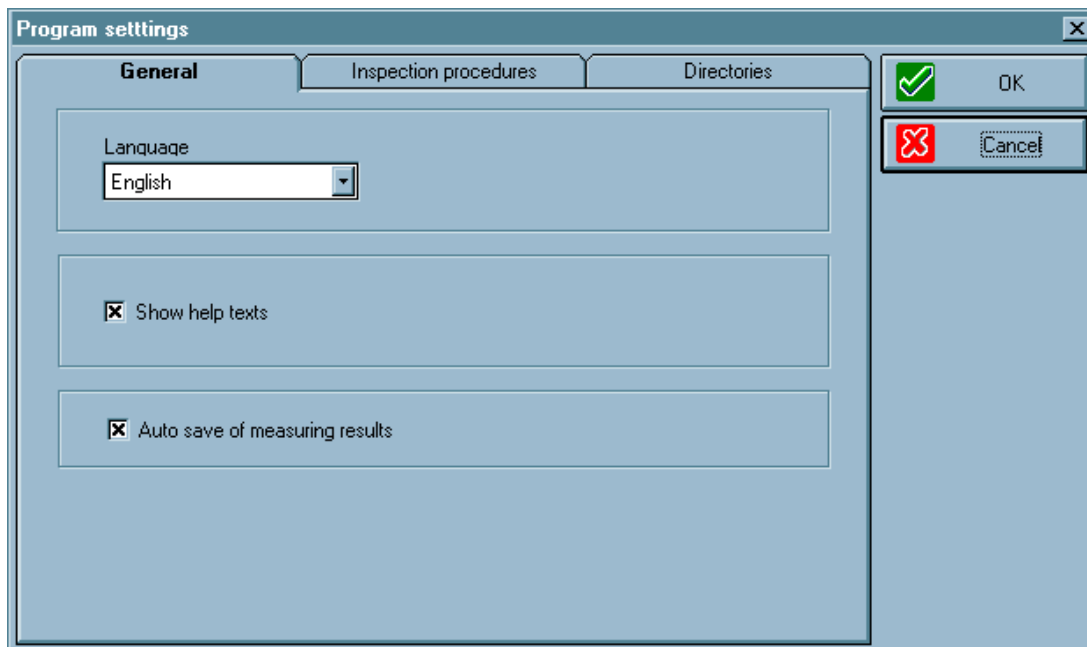
In the main screen you will see all the pin sets and pins you have entered in your “Pin database”. Using the menu functions or the function buttons you can start the different program functions.

The “Sort” and “Search” functions will allow you a fast management of your existing stock.

### XI.3. Menu „Settings“

#### XI.3.1. Menu “Settings | General”

**Register „General“:** Here you can choose the program language and switch the tool tips for the dialogue fields on or off. The option “Auto save of measuring results” will saving your measurements automatically while inspection a pin set after each third pin.



**Figure:** Settings – general settings

#### *Register "Inspection procedures"*

Here you can enter for each gauge type a reference to a corresponded text file including the inspection procedure. Note that this “inspection procedure” does not influence the inspection process. It will be set using the option “Inspection conditions”.

#### *Register "Directories"*

For some functions (indicating of measuring values; creation and edit of calibration certificates) external programs will be used. Here you can enter the directory where the corresponded program can be found. Additionally you can set a directory to save your calibration certificates.

All directories will be set while doing the program installation to a correct value !

**ATTENTION:** Make sure that these entries are correct. A lot of errors happen while operating the program are caused by incorrect settings in the screen "Directories".

### XI.3.2. Settings | Inspection conditions

Using this option you have the following registers to set "inspection conditions":

#### **Register "General"**

**Figure:** Inspection conditions – general settings

Enter the parameters:

- Take values from:** Select the default data input device (keyboard of the computer, on-line measuring machine). If you set "Online" as the default device the Online connection will be started automatically if a pin measurement will start.
- Inspection device:** Here you can enter the name of the inspection device you use for the pin measurement. This text may be print out on your inspection certificate.
- Number of measures.. :** Enter the number of measures you want to take for each pin. Note: the maximum number is „10“.
- 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 limits entered will be exceed while measurement you will get a „Warning“ on the screen.
- Default certificate layout file for..:** Here, you can enter the name of the "Certificate layout file(s)" used to create the layout of your calibration certificate. This file includes all information about the layout and the content of the record list being created. For "mm" and "inch" measurements different files are used.  
NOTE: Because the program will be installed to support different languages you will find a lot of "LW2" files in the related directory. Note that the number in the file name (for example the "061" in the "METR\_061.LW2") file does

represent the used language (061 = English; 033 = French; 034 = Spanish; 039 = Italian; ...). Using the Windows-Explorer you can delete all certificate layout files you do not use.

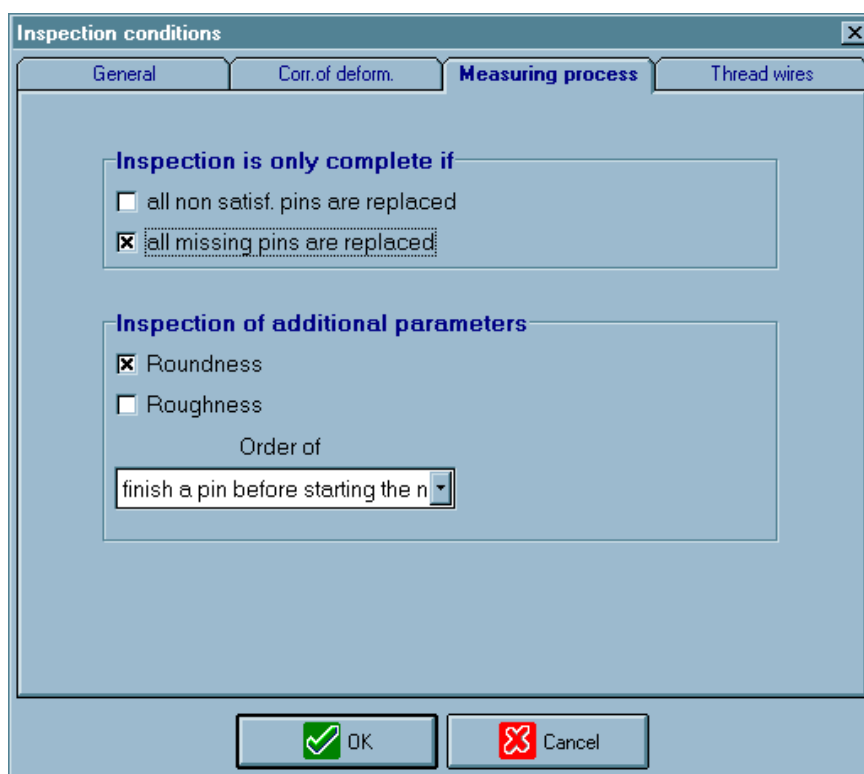
### **Register "Correction of deformation"**

Measuring of cylindrical pins normally you use a measuring force. This force will cause a deformation of the pins. To get an exact diameter of the pins diameter it is necessary to correct the pin deformation.

Here you can switch on a correction of this deformation value. If the correction is „on“ please enter the measuring force and the with of the used measuring forces. In the data base and on the certificate listing you have always the corrected values.

*Note:* If you will use a „Master pin“ to set your indicator before starting the measurement do not use this correction !

### **Register "Measuring process"**



**Figure:** Settings to control the measuring process

Measuring a pin set it may be happen that pins are out of tolerance or that pins are missing. Depended on your internal procedures or on your agreements with an customer you can make the following decisions:

*Inspection is only complete if:*

*All non satisf. pins are replaced:* Set this option means that an inspection will only marked as "finished" in the database if all pins are inside the tolerance. Pins which will be outside of tolerance has to be replaced by a new one.

*All missing pins are replaced:* Set this option means that an inspection will only marked as "finished" in the database if all "missing pins" are replaced.

With the option "*Inspection of additional parameters*" you can switch on or off the the inspection of

“Roundness” and “Roughness”. If one of these options is “on” you can set the order of the measurements. The option “finish a pin before start the next” means that all measures have to be finished for one pin before start to measure the next. If you set “Measure all pins before...” then at first the diameter measurement for all pins will be finished before the next measurement (may be roundness) will be started.

### ***Register "Thread wires"***

Remember that the program includes the possibility to measure sets of thread wires. Thread wires will be used to measure external threads according to the “Three wire method”. Caused by this you have always three wires with the same nominal diameter.

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.

With the option “Show/print each single wire” you can decide if you want to record only the mean value or the results of each single wire on your certificate.

### **XI.3.3. Settings | User**

The user data base contains the user names and passwords and the access rights (reading, reading and writing, reading and writing and deleting).

The user name and password will be requested and should be entered via the keyboard at the start of the program. The combination of the user name and the corresponding password are used to identify the user.

This means that allocating several passwords to one user or using the same password for several users is allowed if you prefer that the structure of your access hierarchy be flexible.

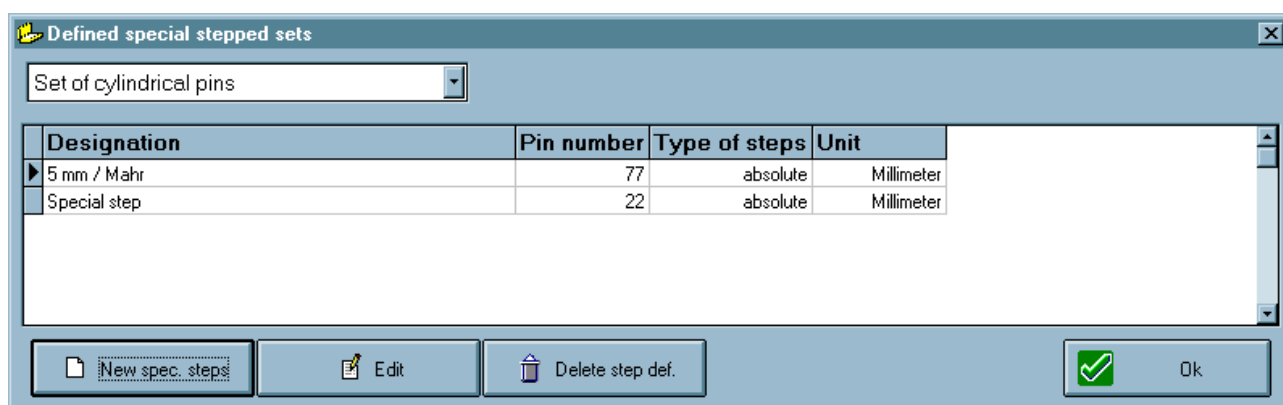
### XI.3.4. Configuration | Special pin sets

In section XI.5.1. the way to insert a new pin set in your data base is described. If you have to insert a pin library or a thread check library where the diameter differences between two pins follow one another is not constant it is required to enter all nominal sizes of the pins including in this library.

You know, if you have always the same libraries it is not efficient to do this. Therefore the program offers you the possibility to define such libraries and to call up the definition while insert a new gauge in the data base.

If you have select the related menus in the "Configuration | Special pin sets" you get shown a window with all special step definitions available in the data base (see Figure). In the upper left corner you can switch the table from „pin sets“ to „wire sets“.

Now you have the options to insert new definitions, change an existing definition or to delete one.



**Figure:** Overview about all defined "special pin sets"

Defining a new "special set" you have to enter the following parameters:

**Designation:** Enter a characteristic designation for the special step definition. Pay attention, that you should know the use of this definition if you have to select it.

**Unit:** Choose the unit "mm" or "Inch".

**Type of steps:** Select the type of the nominal sizes you want to enter for the definition of special steps. Select "absolute" (it should be the most common case) means that the values you will enter here are identical to the pin diameters in a library. Select "relative" means the values entered here will be add to a reference value. This reference value has to be typed in while insert a new pin library in the data base using this special step definition. Both the "relative value" and the reference will result the pins diameter in the library.

**Define a new or edit a special stepped set**

1	0,9980 mm
2	1,0000 mm
3	1,0020 mm
4	1,0980 mm
5	1,1000 mm
6	1,1020 mm
7	1,1980 mm
8	1,2000 mm
9	1,2020 mm
10	1,2980 mm
11	1,3000 mm
12	1,3020 mm
13	1,3980 mm
14	1,4000 mm
15	1,4020 mm
16	1,4980 mm
17	1,5000 mm
18	1,5020 mm

Designation: Special steps III

Unit: Millimeter      Type of steps: absolute

Calculate values:

Smallest pin diam.: 1,0000 mm      Number of extra pins: 2

Largest pin diam.: 3,0000 mm      Deviations: +2,00 µm, -2,00 µm

Step: 0,1000 mm

Create

Add a pin      Delete pin      OK      Abbruch

**Figure:** defining a special pin set (library)

Now you can use the button “Add a pin” to enter all nominal sizes for the library.

Often such pin libraries are created according to a defined structure. For example you have a set with a basic step of 0,100 mm but for each pin in this “0.1 row” you have additional a pin 2µm smaller and another one 2µm larger then the basic. Inserting this use the “*calculate values*” function.

How to operate this (see the right section in the figure):

Enter the following parameters:

**Smallest pin diameter:** Enter the smallest diameter of your basic row. For example if you have : 0.998, 1.000, 1.002 1.098, 1.100, 1.102 1.198, 1.200, 1.202 .... then the “smallest” diameter you should enter is “1.00” (not 0.998)

**Largest pin diameter:** Enter the smallest diameter of your basic row. (compare the value for the smallest)

**Step:** Enter the basic step.

**Number of extra pins :** Enter the number of pins which there are between your “basic step”. After that enter the deviations of this pins in relation to the “basic size”. See the example given in the figure.  
There are two additional pins each +2µm and – 2µm.

If you now press the “Create” button the program will create your pin library.

If required you can add or delete single pins after that operation from the shown list.

## XI.4. Certificate layouts

The program QM-PINS gives you the possibility to customise the layout of your calibration certificate. The layout of the calibration certificate is based on the so called "Certificate layout file". This file contains all information about the form of the certificate and the values should appear in this. By editing this certificate layout file you can change the layout. Saving this file with another file name give you the possibility to work with different certificate layouts.

All this certificate layout files you have created will be saved in the working directory of the QM-PINS program. The files have the extension ".LW2". The number in the file name (for example "Metr\_061.LW" is representing the language based on the windows language code; 061=English....).

Using the option "**Certificate layouts | Show/Edit a certificate layout**" you can load a certificate layout file into the editor program.

A certificate layout file 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 the different text parameters;
- "Placeholders" ("Fields"): a "Field" is including a 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 use the menu "Insert | Fields". Using this menu you can also see all available "Fields" and the related information. For numerical fields you can set the number of decimal points using the menu "Insert | Fields".
- "Line conditions": A line condition gives you the possibility to control the certificate layout in dependence of different program situations. A text or field following to an 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 "Line conditions" available.

## XI.5. Managing of pins and pin sets in a database

### XI.5.1. Edit the pin set library

Here the functions to insert, change and delete pin sets, single pins, thread wires and thread wire sets are described. Note that for thread wires each nominal wire size does represent three wires.

All functions listed can be called using the menu "Edit" in the programs main menu or by clicking the right mouse key if your cursor is in the gauge list.

#### XI.5.1.1. Inserting a new gauge (pin or pin set..) into the database

Calling the function "Edit | New pin/set" you can insert a new gauge into the database. To enter all parameters required the shown dialogue (see figure) will appear on your screen.

**Insert and edit measuring pins and sets**

**General**

Type: Set of cylindrical pins

Identity number: 000999

Customer name: Flintstone

Unit: Millimeter

Length: 70 mm

Manufacturer:

Note:

**Tolerances**

Tolerance acc. to: Tolerances acc. to DIN 2269

Tolerance grade: 1

**Nominal values**

☐ Special steps

First nom. size: 1,0000 mm To: 3,0000 mm

Step: 0,0500 mm Pin number: 41

1	1,0000 mm
2	1,0500 mm
3	1,1000 mm
4	1,1500 mm
5	1,2000 mm
6	1,2500 mm
7	1,3000 mm
8	1,3500 mm

create

new pin

delete pin

OK Cancel

**Figure:** Insert a new pin set

***This fields are to be filled out for management informations :***

**Type of gauge:** Here you have to select the type of gauge should be inserted into the data base. You can insert single measuring pins, set of pins (pin libraries), thread check wires (three wires with identical diameter) or thread check libraries (sets of thread check wires - three wires for each diameter).

**Identity number:** Enter an identity number of the gauge. Attention: The identity number cannot be changed later.

**Customer name:** Here you can enter a customer name. You can print it on the certificate.

**Unit:** Select the unit for the pin / pin set.

**Length:** Here you can enter the pin length. You can print it on the certificate.  
**Manufacturer:** Enter the name of the manufacturer.  
**Note:** Field to enter a note.

***This fields are to be filled out to describe the nominal sizes and tolerances :***

**Tolerance acc. to:** You can select "DIN 2269" or "Factory standard". If the unit "Inch" is selected only "Factory standards" can be used. If you select "DIN 2269" then you have to set the "Tolerance grade" otherwise enter the values for the diameter tolerances.

To define the nominal sizes enter:

**Special steps:** Normally, if you have a set of cylindrical measuring pins, you have a constant step for the pin diameters. This means that the diameter difference between two pins follow one another is constant. If you have no constant step (mostly by thread check libraries) choose "yes". All nominal sizes of pins will now be read from a pre-defined "special step definition" (see section XI.3.4 how to define it) .

**Select a special step definition:** If the „Special Step“ option is switched on you have to select the „Special Stepp definition“ you want to use. Use this button to do it.

If no spezial step is used then enter:

**First nominal size:** Enter the first nominal size of your pin library (usually the smallest diameter). If you want to insert a single pin enter the nominal diameter

**Last nominal size:** Enter the last nominal size of your pin library (usually the largest diameter).

**Step:** Enter the value of the diameter difference between two pins in your library follow one another. If there is no constant diameter difference choose the option "Special steps"

If you have entered all required information use the button

Use the button „Create“ to calculate the nominal sizes of all pins in your set. Using the button "New pin" you can insert a new pin in the list; the "Delete" button will delete the selected pin from the list.

#### **XI.5.1.2. Copy a pin/set**

Using this function you can copy the data set for the selected pin or pin set. You have only to change the "Identity number".

#### **XI.5.1.3. Edit pin/set data**

Making changes to a set of data works in basically the same way as entering a new one excepts that the identity number cannot be altered. In case that you have already made "Inspections" for the selected gauge you can not change the pin nominal sizes.

#### **XI.5.1.4. Delete a pin/set**

The selected pin or pin set will be deleted from the database including all related inspections.

### **XI.5.2. Database view; sort order and searching of gauges**

#### ***Sort the database and search***

Using the menu "View | Sort order" you can select one of four possibilities to sort your gauge stock. Otherwise you can also click with the left mouse button into the header line of any column of the gauge list shown to sort according this parameter.

Using the field "search text" in the lower left corner of the screen you can directly search a gauge. For example, if you enter a special "Identity number" in this field the cursor will jump directly to this item.

#### ***Screen***

Using the menu „View | Screen“ you can decide which database fields you want to show on the screen (click it on to select or deselect the related field). You can change the position of a column on the screen if you click with the right mouse button on the top of this column and move it to the wished position.

#### ***Show all inspections***

Using the menu "View | Show all inspections" you will get a list with all inspections done independent of the gauge ID number.

You can select any inspection from the list to recall the inspection certificate are to show or edit the single measures.

## XI.6. Doing a gauge inspection

### XI.6.1. Entering of measuring values

Select the pin / pin set from your gauge library and use the menu „Edit | Do a new inspection“ to start the inspection of the selected gauge. If the previous inspection was not finished you will get a message on the screen and this unfinished inspection will be reloaded from the database to continue.

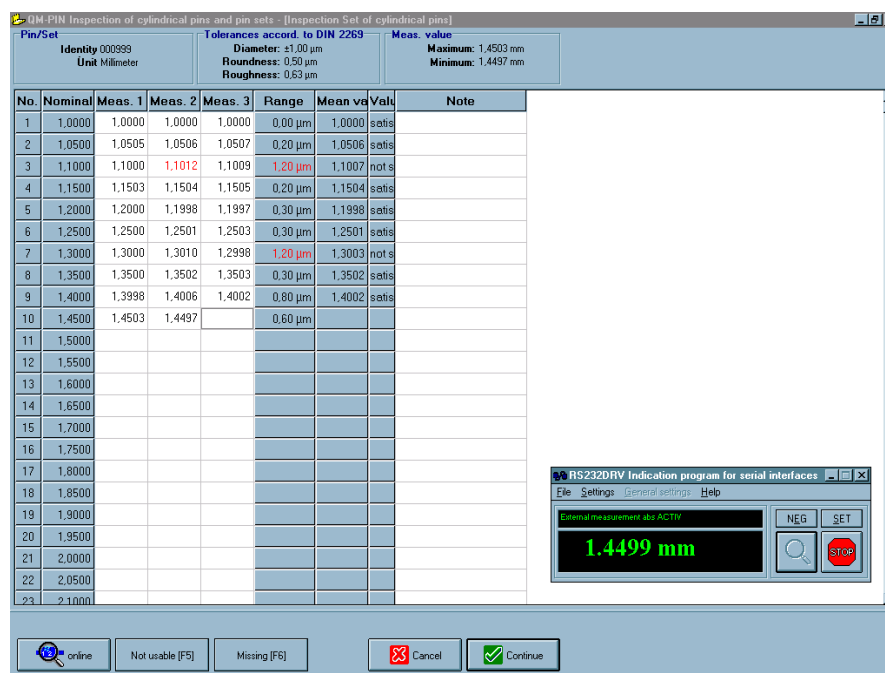
If you have to inspect a pin or pin set which is not in the database then you have to insert it first.

Now an screen will appear which is showing you all the current settings related with the inspection. Using the “Inspection conditions” button you can change it otherwise start the inspection with “Continue”.

<b>Gauge</b>	
Type: Set of cylindrical pins	Unit: Millimeter
Identity number: TEST_XXX	Customer name: L&W
Manufacturer: niemand	Pin number: 3
Pin length:	Note: nur als Test
<b>Tolerances</b>	
Tolerances acc. to: Tolerances acc. to DIN 2269	
Tolerance grade: 2	Roundness tol.: 1.00 µm
perm. deviation: ±2.00 µm	Roughness tol.: 1.00 µm
<b>Nominal values</b>	
Pin number: 3	Smallest val.: 1.0000 mm
Step: 0.2500 mm	Largest val.: 2.0000 mm
<b>Inspection conditions</b>	
Meas. per pin: 3	Corr. deformation: nein
Inspect roundness: nein	Measuring force: 1.50 N
Inspect roughness: nein	Width of meas. 2.0000 mm
Measuring device: Längenmessgerät Nr.: 123	
<input type="button" value="Inspection conditions"/> <input checked="" type="button" value="Continue"/> <input type="button" value="Cancel"/>	

**Figure:** Checking of the inspection conditions

Now the inspection can be started. Measurement values are always entered in a sequence of measurement values 1 to n corresponding to the entered number of measures per pin. This has to be done for each pin or wire in a given library.



**Figure:** inspection of a pin set

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 instead 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.

#### **XI.6.2. Reaction of measuring values – outside of the defined limits**

Remember section IX.3.2 “Settings | Inspection conditions” . There you have the possibility to define a “warning limit” for your measures. Ever if a measuring value is outside of this limits you will get the shown dialogue (see the right side of the window). The reason may be that the pin is really outside of tolerance, that you have made a fault while measuring (maybe 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; 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.

QM-PIN Inspection of cylindrical pins and pin sets - [Inspection Set of cylindrical pins]

**Pin/Set**  
Identity 000999  
Unit Millimeter

**Tolerances accord. to DIN 2269**  
Diameter:  $\pm 1.00 \mu\text{m}$   
Roundness:  $0.50 \mu\text{m}$   
Roughness:  $0.63 \mu\text{m}$

**Meas. value**  
Maximum: 1.1120 mm  
Minimum: 1.1000 mm

No.	Nominal	Meas. 1	Meas. 2	Meas. 3	Range	Mean va	Valu	Note
1	1.0000	1.0000	1.0000	1.0000	0.00 $\mu\text{m}$	1.0000	satis	
2	1.0500	1.0505	1.0506	1.0507	0.20 $\mu\text{m}$	1.0506	satis	
3	1.1000	1.1000	1.1120	1.1120	12.00 $\mu\text{m}$	1.1080	not s	
4	1.1500							
5	1.2000							
6	1.2500							
7	1.3000							
8	1.3500							
9	1.4000							
10	1.4500							
11	1.5000							
12	1.5500							
13	1.6000							
14	1.6500							
15	1.7000							
16	1.7500							
17	1.8000							
18	1.8500							
19	1.9000							
20	1.9500							
21	2.0000							
22	2.0500							
23	2.1000							

**Measuring error**

Ignore

Repeat measurement

Not usable / next pin

RS232DRV Indication program for serial interfaces

File Settings General settings Help

External measurement abs ACTIV

1.1120 mm

NEG SET

STOP

online Not usable [F5] Missing [F6] Cancel Continue

**Figure:** measure out of the defined „warning“ limit

## XI.7. Output of results

After entry of the measurement data has been completed, the screen "End of inspection" will appear.

**Figure:** End of measurement – show/print the certificate

If the inspection is finished you get the screen shown above. The summary result of the inspection is shown. Here you can enter the name of the customer, the date for the next inspection and also some remarks to the inspection.

Before creating the calibration certificate you can change the "certificate layout file will be used. To start the output of the results press the "Show certificate button.

All functions for the editing and the output of calibration certificates will be controlled by the EDITOR - program. See the manual of this program [Appendix B] to see how to operate this.

If you leave this screen with the "Save inspection" button. You get the following screen shown in the figure. Save the measures or leave the inspection without saving.

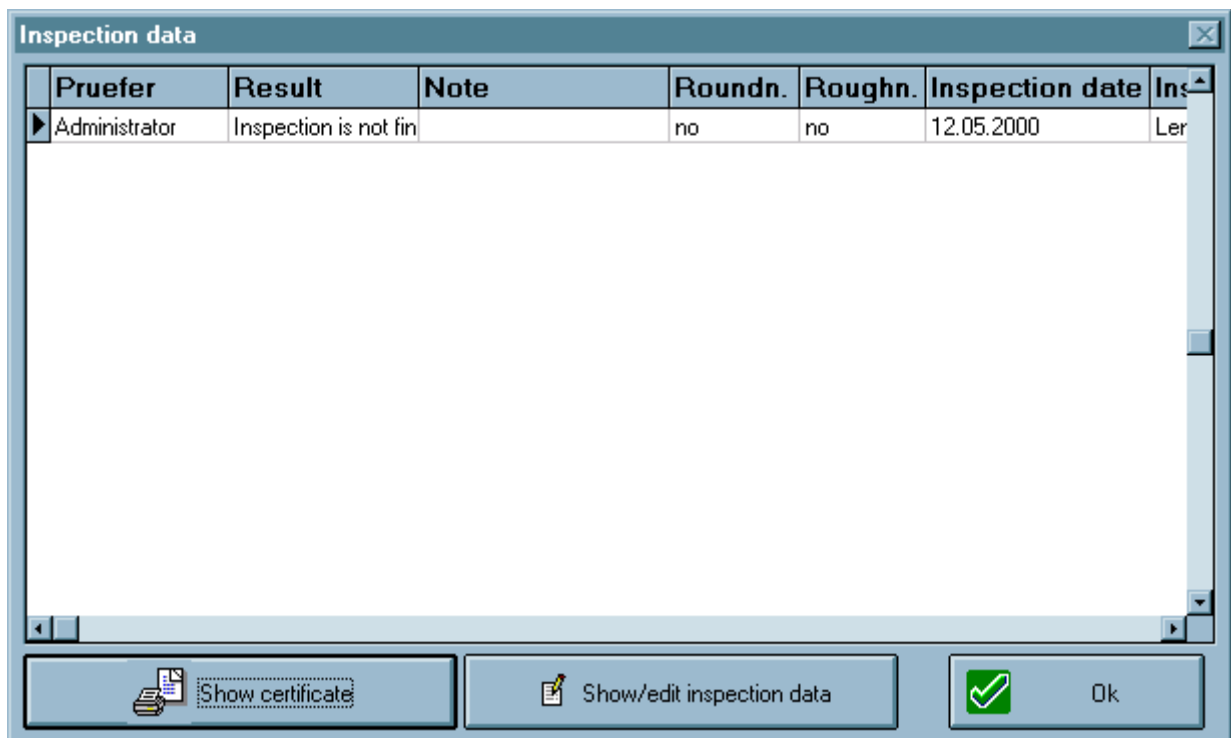
**Figure:** Saving the inspection or cancel it

## XI.8. Inspection history

Related with the gauge management in a database the inspection of a gauge will represent a new data set for the related gauge. This data set will include all information related with the gauge inspection including all measuring values. All existing data sets will build a gauges history.

Using the menu "Edit | Show gauge history" you will get the access to the history of the gauge selected. If no inspection is available for this gauge you will get a related message.

Now you have either the possibility to show the stored calibration certificate for any inspection in the list or to show and edit all the measures stored for the pin or pin set.



**Figure:** Gauge history

You can also use this function if you want to create an inspection certificate with a different layout for an inspection was already finished.

## XI.9. Database backup and restore / compromise the database

Because accidents do happen and computers do, occasionally, crash resulting in lost data, a function has been integrated into the QM-PINS program which allows for the entire data base to be saved on a disk and reproduced on the computer from a disk.

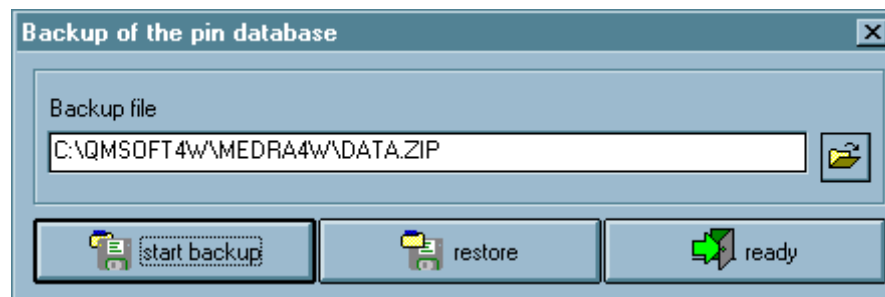
All function to backup and restore data you will find in the menu "File".

### Backup of the "pin database"

*This should be done regularly by your system administrator on a weekly, or better, daily basis!*

***We can guarantee you that you will be very happy for having done this when you do not have to re-enter all lost data manually via the keyboard!***

Use the menu "File | Save data" to get the following screen:



**Figure:** Database backup and restoring

To make the "Backup" you have only to enter a name for the backup file. Using the "Open" dialog you can select a file name and the destination (the drive and or the directory).

Start the backup with the related button.

### Restoring of the "pin database"

You will use the same dialogue as shown before enter or select the name of your backup file and start the restoring operation with the "Restore" button.

### Compress database

With this function you are able to reorganise your database. This may be useful sometimes even if you often delete gauges from your stock.

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## **Appendix A**

### **General Terms and Conditions for Sale and Delivery of Software Products of L & W GmbH**

#### **A.1. General Information**

A.1.1. These "General Terms and Conditions" are valid for any delivery of software by L & W GmbH (the vendor).

A.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.

#### **A.2. Right of Use**

A.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.

A.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.

A.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.

A.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.

A.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.

#### **A.3. Prices and Terms of Payment**

A.3.1. Without special agreement our prices are not quoted ex point of sale, packing not included.

A.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.

#### **A.4. Warranty and Liability**

A.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.

A.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.

A.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.

A.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.

A.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.

#### **A.5. Place of Performance and Place of Jurisdiction**

A.5.1. Place of performance is the location of the vendor's head office.

A.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.

A.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, January 2003

## Appendix B

### EDITOR4W - editing of certificates and certificate layout files

#### B.1. General

The EDITOR4W program is designed to get the functionality to show, edit, save and print record listings for all QMSOFT inspection programs.

Normally you do not use the EDITOR-program as a stand alone system. The EDITOR will be start up automatically by one of the inspection programs if you want to perform one of the above-mentioned actions.

Working with the EDITOR-program there are two different modes. The first mode is the so called „**certificate layout mode**“. This mode will be used to edit „certificate layout files“ (templates) including the definition for the calibration certificate layout.

On the other hand the „**calibration certificate mode**“ will be used to edit, show or print the certificates created for a gauge inspection.

#### B.2. Working with the program

The operation of the program is similar to some other well known editor programs used with MS-Windows (e.g. Notepad, Write). There are different possibilities to set text parameters (font types, font sizes and parameters).

**The most important editor options are:**

##### ***Option "File"***

Using the option „File“ you can „Open“, „Save“ and „Print“ record listings. This function will only be used if you want to start this program seperately.

##### ***Option "Edit"***

Here you get all functions to edit an existing text - normally a record listing. It includes common functions like „Delete“, „Insert“, „Copy“ of text. This command works in relation to marked text sections. For this you can also see to the „MS-WINDOWS“ documentation. Also you have a function to set „Tab-stop“ positions.

##### ***Option "Search"***

This functions can be used to „Search..“ and „Search and replace..“ text.

##### ***Option "Insert"***

Here you can insert some things in your record listings. Available options are „FormFeed“ to insert a compulsory form feed in your record and „Graphic“ to insert a Bitmap-graphic (\*.BMP) in the record listing.

##### ***Option "View"***

Using this option you can show different things on your page - margins, ruler and other.

### B.3. Special things using the „certificate layout mode“

This mode will be used to create and edit the so called „certificate layout file(s)“. Such a „certificate layout file“ (template) does exist for each inspection program and includes the definition for the calibration certificate layout.

**Note:** After the program installation you can find a lot of such files (extension \*.lw2) on your hard disk. The reason is, that this files was created for the different available languages. The file names include the Windows country code to recognize the files you need (e.g. for english language a „061“ is inside the file name). If you change anything in a certificate layout file please save this with a new name. So you make sure that your changes will not overwritten if you install an update of the software.

Different to the normal mode for the editing of the certificate listings itself you have two additional things to edit. You can show this using the option „View“.

#### **View|Place holders**

The first are so called „Place holders“. This „Place holders“ will be used to insert actual values in the record listing while creating this. Each „Place holder“ consist of a special sign to describe the type (e.g. \$xxxx\$ describe a set of characters; #xxx# for a number; additional a „\$“ means a table ) and the name. You can insert a place holder on each place in the record model file. To do this you can open the list of place holders and make a double click on the wished place holder. This place holder will now inserted on the current position of the cursor in your record model file.

#### **View|Line conditions**

The second thing are „line conditions“. With such a „line condition“ you can define a condition for the output of the related line. This means the line where you insert this „line condition“ on the left margin will only be shown/print if this condition will be fulfilled. For example: values for a GO side of a gauge will only be shown or print if the inspected gauge have a GO side.

Using the option „View|Line conditions“ you get a list with all currently available „Line conditions“. To insert such a line condition in your record model file make a double click on the wished entry.

### B.4. Special things using the „certificate mode“ - standard mode

In the standard mode used to show, print and edit a record listing you get no line on conditions on the left margin. The text includes only lines which are in agreement wit the defined line conditions and the place holder are changed to the current values generated by the inspection program. The shown record listing may be edit in a optional way. To print it the common WINDOWS settings are used. With the option „File/Printer setup“ you may check and change the printer settings.

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## Appendix C

Indication programs  
(RS232DRV, IK102021, GPIBDRV, PU204041, SIPDRV, WINDHI)

### C.1. General

The connection between the length measuring machine and the computer can be made by different types of interfaces. The type of the interface to be used depends on the used hardware.

To design machine independent programs we have unite all functions for the taking over off measuring data and the management of different tools (measuring pins, measuring balls, master rings and reference gauge blocks) in a QMSOFT indication program. For each type of interface one special QMSOFT does exist.

All of this programs include the following main functions:

- indication of the machines „X-axis“ and additional of an „Y-axis“;
- support for External- and Internal measurement; both as directly or differential measurement;
- change of indicated sign; set and pre-set of values; Bar-graph modus; searching of Maximum and Minimum values while measurement;
- correction of rule errors (optional);

Some functions are different depended from the used interface type. See the next pages for this. Note the relations between the QMSOFT indication programs and the supported interface types:

**RS232DRV** several serial interfaces (Heidenhain ND 281 and compatible; HELIOS Unitron; Mahr Millitron und Memux; STEINMEYER Feinmess Suhl; Kroepelin, SIP Karte Systeme, SYLVAC (D80, D100, Optoface), CARY; TESA Modul, MitutoyoDMX interfaces )

**IK102021** and

**IK220** PC interface card IK121 and IK 220 (Dr.-Johannes-Heidenhain)

**PU224041** display devices PU22, PU40 and PU41 (STEINMEYER Feinmess Suhl GmbH) for use with the gauge block inspection program EMP4W

**GPIBDRV** GPIB (IEEE)-Interfaces  
(e.g. CARYLABOR to connected to CARY gauge block inspection device)

**SIPDRV** SIP length measuring machine with LMC display program (Windows version) (see also the SIP user manual for the LMC program)

**WINDHI** TRIMOS LabConcept machines  
(see the TRIMOS user manual for the WINDHI program)

**WINCIM** Interface for Mahr 828 CIM Machines

Please contact us to ask for other interface types can be supported from QMSOFT display programs.



## C.2. Indication program IK102021 / IK121NT / IK220DRV

The indication programs IK102021 / IK121NT and IK220DRV as a part of the QMSOFT installation is realising the reading and displaying of measures from a PC counter card IK121 or IK220 of the Dr.-Johannes-Heidenhain company, to which a length measuring device is connected. The program supports the following features:

- display of measure coordinate "X" and an additional coordinate "Y" (height display)
- support of different measuring strategies (external, internal, absolute, differential measurements)
- different display and measuring settings (display value, change sign, pre-set, bar graph display, maximum, minimum value etc.)
- rule deviation correction, temperature compensation (with the ALMEMO measuring device)

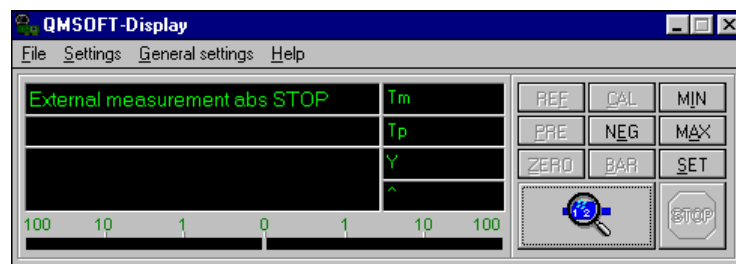
The design of the program surface is similar an indication device. This guarantees an easy and intuitive use.

### C.2.1. General settings

Before working with the indication program you should set some general parameters. For this open the dialogue „General settings“ and enter the parameters to the registers „General“ and „measuring system“. See also the producer manual for the measuring device.

### C.2.2. Operation field-functions

The program window contains a display area to show the measures and some Buttons to activate special functions:



#### **NEG-Button**

Here you can change the sign of the measuring value.

#### **KAL-Button**

With this button you can start a reading of the temperature and length measures of the setting normal for differential measurements (works only with enabled temperature compensation). The display value will be set to the value of the setting normal.

#### **REF-Button**

This button starts the reference mark reading. You have to move the machine to reference point position (see manual of the machine).

#### **BAR-Button**

This button resets the bar graph position to the display value.

#### **MIN-Button**

This button switches to the measure minimum search.

#### **MAX-Button**

This button switches to the measure maximum search.

#### **NULL-Button**

This button sets the display value to Zero.

#### **SET-Button**

Here you can set the used measuring method (extern, intern), select the used references, thread wires etc.

**PRE-Button**

Here you can switch to an additional preset value calculation: generally the preset value will be added to the display value as a constant.

**START-Button**

Starts the indication of measuring value or take over the indicated value if the indication is already active.

**STOP-Button**

Stops the indication. Now you can make different settings which are not possible whether the indication is active.

**C.2.3. SET-Function**

Using the „SET“ - button you get the functions to change different program settings and to select references and/or probes used for the measurement.

If „click on“ the „SET“-Button the indication will be stopped and you get the screen shown in the figure.

The following parameter fields are available:

**Measuring method**

Choose here the used measuring method.

**Thread measuring**

Making a thread measurement you should cross this field to activate the required functions.

Calling the indication program from the QM-THREAD thread measuring program this will be activated automatically.

**Master for external meas.**

If you make a „External measurement - differential“ you can here enter or choose the value of the used reference.

**Master for internal meas.**

If you make a „Internal measurement - differential“ you can here enter or choose the value of the used reference.

**Probe (ball diameter, constant)**

Making a „Internal measurement - directly“ you need a special probe for this. You can use either a „T-shaped“ ball probe or a „Single ball probe“. If the field „T-shaped ball probes“ is crossed such type of probe will be used. You can select from the related table the ball diameter and the probe constant. For a single ball probe the probe constant is not used. (see Appendix E probe management).

***Thread wires***

Making a „External measurement - Thread measurement“ select the used wires. Using the „SIP“ or „ZEISS“ button you get pre-defined tables with thread wires.

***Measuring ball***

Making a „Internal measurement - Thread measurement“ select the used balls.

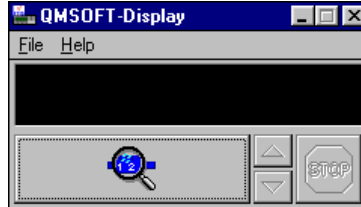
Use the „Probes/Wires“ button to call the probe management program.

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### C.3. Indication program PU204041



The indication program „**PU204041**“ is realising the connection between the computer which run the QMSOFT-system and one of the following indication devices: **PU22**, **PU40** and **PU41** produced by the STEINMEYER Feinmess Suhl GmbH. This indication devices are mostly used with the **QM-BLOCK (EMP4W) program** which is designed for the gauge block inspection.



The design of the program surface is similar an indication device. This guarantees an easy and intuitive use.

#### C.3.1. General settings

Before working with the indication program you should set some general parameters. For this open the dialogue „*File/General settings*“ and enter the wished parameters to the registers „*General*“ and „*serial connection*“.

See also the producer manual for the indication device.

#### C.3.2. Operation field-functions

In the program window you get four Buttons to activate the following functions:

##### **Cursor-Buttons (up, down)**

Using this Buttons you can decrease or increase the resolution of the measuring value shown on your indication device. This function is especially useful while making the set up of the measuring instrument for a new nominal size.

##### **START-Button**

Starts the indication of a measuring value or take over the indicated value if the indication is already active. To do this, the indication device **PUxx** will be switched to the „**Remote**“-Mode (on the indication device the „REM“ display will be switched on).

##### **STOP-Button**

Stops the indication. Now you can make different settings which are not possible whether the indication is active.

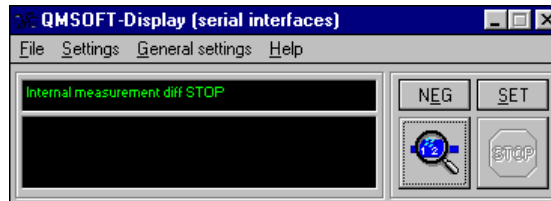
The indication device **PUxx** will be switched back to the „**Normal**“-Mode.

## C.4. Indication program GPIBDRV for IEEE interfaces



### Indication program for serial interfaces RS232DRV

The indication programs "GPIBDRV" and „RS232DRV“ are releasing the connection between a optional type of a measuring machine which have an GPIB- or a serial RS232-interface and the computer which run the QMSOFT-system.



The design of the program surface is similar an indication device. This guarantees an easy and intuitive use.

#### C.4.1. General settings

Before working with the indication program you should set some general parameters. For this open the dialogue „General settings“ and enter the wished parameters to the registers „General“ and „serial connection“. (See also „**Appendix D**“ for the required parameter or use the machines manual.

#### C.4.2. Operation field-functions

In the program window you get four Buttons to activate this functions:

##### **NEG-Button**

Here you can change the sign of the measuring value.

##### **SET-Button**

Here you can set the used measuring method (extern, intern), select the used references, thread wires etc.

##### **START-Button**

Starts the indication of measuring value or take over the indicated value if the indication is already active.

##### **STOP-Button**

Stops the indication. Now you can make different settings which are not possible whether the indication is active.

#### C.4.3. SET-Function

Using the „SET“ - button you get the functions to change different program settings and to select references and/or probes used for the measurement.

If „click on“ the „SET“-Button the indication will be stopped and you get the screen shown in the figure.

The following parameter fields are available:

**Measuring method**

Choose here the used measuring method.

**Thread measuring**

Making a thread measurement you should cross this field to activate the required functions.

Calling the indication program from the QM-THREAD thread measuring program this will be activated automatically.

**Master for external meas.**

If you make a „External measurement - differential“ you can here enter or choose the value of the used reference.

**Master for internal meas.**

If you make a „Internal measurement - differential“ you can here enter or choose the value of the used reference.

**Probe (ball diameter, constant)**

Making a „Internal measurement - directly“ you need a special probe for this. You can use either a „T-shaped“ ball probe or a „Single ball probe“. If the field „T-shaped ball probes“ is crossed such type of probe will be used. You can select from the related table the ball diameter and the probe constant. For a single ball probe the probe constant is not used. (see Appendix E probe management).

**Thread wires**

Making a „External measurement - Thread measurement“ select the used wires. Using the „SIP“ or „ZEISS“ button you get pre-defined tables with thread wires.

**Measuring ball**

Making a „Internal measurement - Thread measurement“ select the used balls.

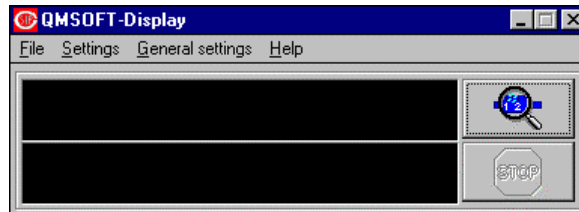
Use the „Probes/Wires“ button to call the probe management program.

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## C.5. Indication program SIPDRV for SIP machines with SIP-LMC



The indication program „**SIPDRV**“ is realising the connection between the SIP-LMC program and the QMSOFT-system.



The design of the program surface is similar an indication device. This guarantees an easy and intuitive use.

### C.5.1. General settings

Before working with the indication program you should set some general parameters. Important is the parameter „SIP data file“ which is set the parameter for the RAM-Drive is currently used to take over the measures from the SIP-LMC program.

### C.5.2. Taking values

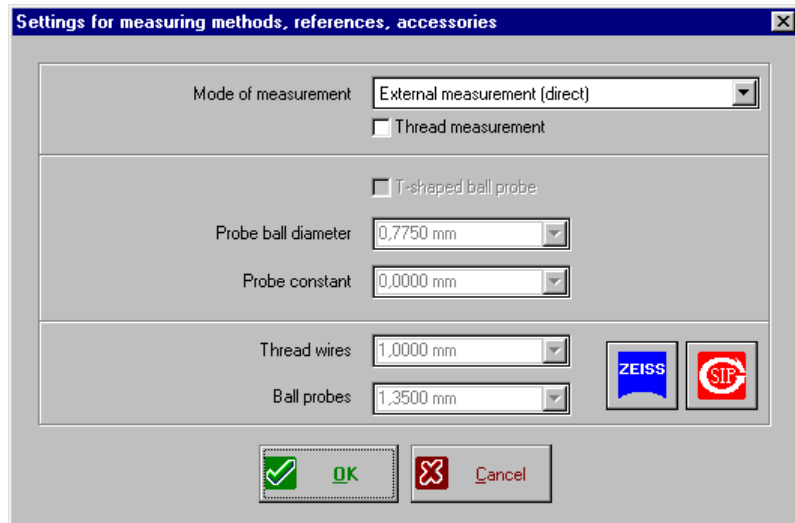
#### **START-Button**

Starts the indication of measuring value or take over the indicated value if the indication is already active.

#### **STOP-Button**

Stops the indication. Now you can make different settings which are not possible whether the indication is active.

### C.5.3. Menu „Settings“



Use the menu „Settings“ you get the functions to change different program settings and to select references and/or probes used for the measurement.

**NOTE:** If the indication program will started up from an QMSOFT inspection program in the most cases the required parameters will be set automatically.

The following parameter fields are available:

<b>Measuring method</b>	Choose here the used measuring method.
<b>Thread measuring</b>	Making a thread measurement you should cross this field to activate the required functions. Calling the indication program from the QM-THREAD thread measuring program this will be activated automatically.
<b>Probe (ball diameter, constant)</b>	Making a „Internal measurement - directly“ you need a special probe for this. You can use either a „T-shaped“ ball probe or a „Single ball probe“. If the field „T-shaped ball probes“ is crossed such type of probe will be used. You can select from the related table the ball diameter and the probe constant. For a single ball probe the probe constant is not used. (see Appendix E probe management).
<b>Thread wires</b>	Making a „External measurement - Thread measurement“ select the used wires. Using the „SIP“ or „ZEISS“ button you get pre-defined tables with thread wires.
<b>Ball probes</b>	Making a „Internal measurement - Thread measurement“ select the used balls.

Use the „**Probes/Wires**“ button to call the probe management program.

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## Appendix D

### Connecting the Measuring machine to the Computer On-line

#### D.1. General Information

The connection between the measuring machine being used and the computer is always done through a serial interface of the PC and the interface of the measuring machine. Make sure you read the documentation about the machine interface before connecting the computer (for example: position of DIP switches on the Interface device).

The following devices are always supported:

- **SIP** - length measuring machine with interface card "SYSTEME" 254186 and SIP 550M
- **HELIOS** - length measuring machine with Interface HELIOS-Unitron or with Heidenhain interface card IK 120/121
- **Universal Length Measuring** machine ULM 01-600 C (**ZEISS** Jena) with Interface Heidenhain VRZ 480, Heidenhain PC counter card IK 121, Indicating Unit AE 101 with Woineck-Interface
- **MAHR** measuring machine 828a via MEMUX-interface or Mahr PC interface card
- **TRIMOS** length measuring machine with SYLVAC or Heidenhain - interface
- Universal Gage Inspection Machine UMP and length measurement machine KLM 60.01 (**Steinmeyer** Feinmess Suhl)
- Dial gauge inspection system MPG 30 - **Kroeplin** GmbH

Below you will find the inspection program with the following parameters:

Interfacetyp	Baud-Rate	Datenbits	Stopbits	Parity
AE 101 (+ Woineck Interface)	4800	8	1	NONE
STEINMEYER Feinmess Suhl	9600	7	1	ODD
Heidenhain ND 281 / VRZ 480 / TRIMOS TELMA	4800	7	2	EVEN
Kroeplin Systembus I	300	8	2	NONE
Helios Unitron 2CHA	4800	7	1	EVEN
Helios Unitron	4800	8	1	NONE
CARYLABOR	9600	8	1	NONE
SIP control box	2400	8	2	SPACE

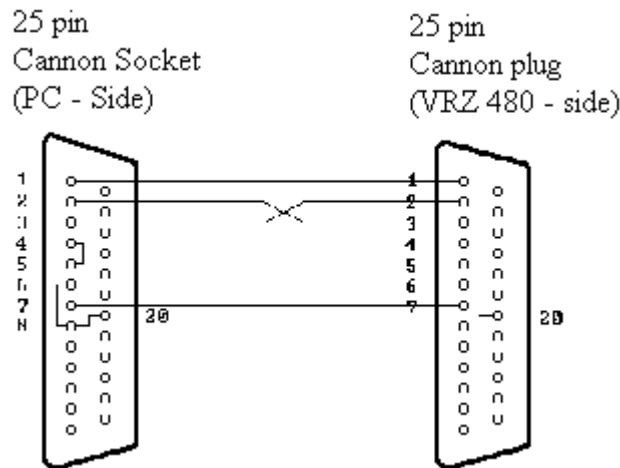
These parameter are in the program before (!) the first on-line taking over of measuring values takes place. To do this start the indication program for the serial interface and use the program option "**General settings|Serial connection**" to set this parameter.

If a connection for you measuring machine is not listed here please contact us and L&W for further information about connections in our software. We have tried to incorporate into the software a maximum of connection possibilities in order to accommodate for just about any kind of measuring machine and would be happy to help you with any difficulties you might have in this process.

## D.2. Special features of some interfaces

### D.2.1. Measurement machine with Measurement value indicator VRZ 480 or ND 281(Heidenhain)

Due to the varying designs of the V.24 connection on the measurement value indicator, a modified connection cable will need to be used. This must have on the computer side a 25-pin Cannon socket and on the side of the Measurement value indicator a 25-pin Cannon plug. The following diagram shows the design of this cable.



**Fig. D-1:** cable connection for the VRZ 480 indicator

When installing the indicator two device parameter should be entered, P0 and P6. Check the the documentation of the VRZ 480. The perimeter **P0** should be inserted into the **value 0**. The perimeter **P6** sets the Baud rate: Here the **value 2** should be entered. If required, a lower Baud rate can be chosen. Make sure that the Baud rate registert on the VRZ 480 indicator is the same as entered in the measurement program.

### D.2.2. Measurement machine with AE 100 Measurement value indicator and a Woineck Interface Converter

In order to ensure a proper function of the on-line connection a minor modification of 25 pin Cannon socket is necessary. Cable bridges need to be inserted between the pins 6 and 8 as well as between 6 and 20 (see diagram B-2 below).

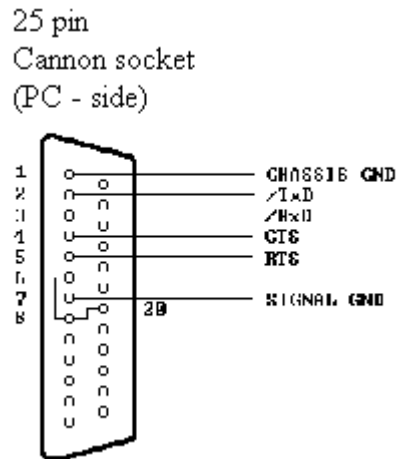


Fig. D-2: modified Cannon socket

### D.2.3. MPG 30 Dial gauge inspection device with Kroeplin-Sytsebus I

The Dial gauge inspection device is to be connected using the manufacturers connection cable "KSB-PC V.24 (DB 25-socket)" (Order number 2482/75). Make sure you read the label attached to the connection cable. Those in the connection cable integrated DIP-switches are like the following to be inserted:

<b>Terminal (KSB)</b>	1 bis 10 OFF
<b>Computer (PC)</b>	1 OFF
	2 ON
	3 ON
	4 OFF
	5 OFF
	6 OFF
	7 ON
	8 OFF
	9 ON
	10 ON

**D.2.4. Measurement machines with a SIP control box**

In Order to connect a SIP control box to an IBM compatible PC, a SIP card "SYSTEME 254186" is necessary. The following switch positions will need to be set up this card:

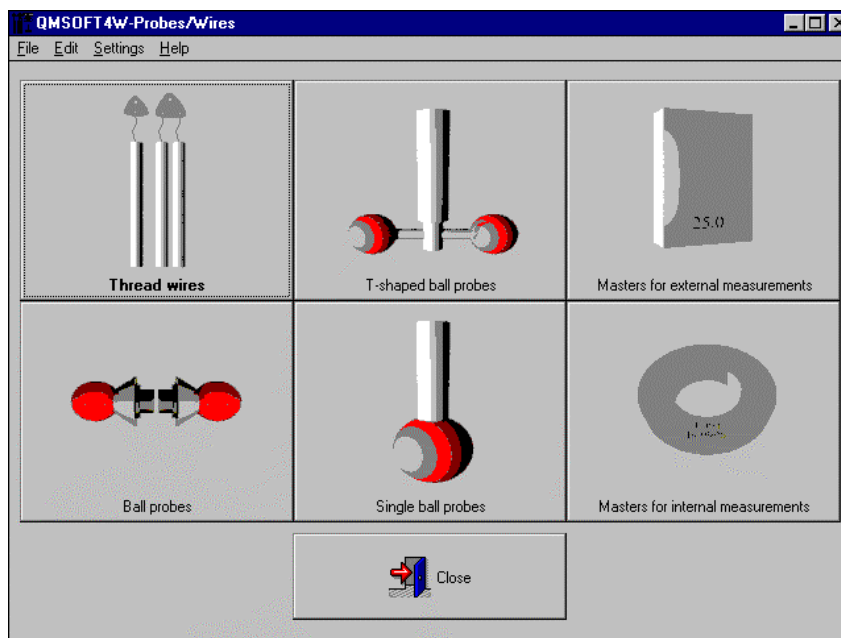
SW2-1: ON	SW3-1: ON
SW2-2: OFF	SW3-2: OFF
SW2-3: OFF	SW3-3: ON
SW2-4: OFF	SW3-4: OFF
SW4-8: OFF	SW3-5: OFF
	SW3-6: ON
	SW3-7: ON
	SW3-8: OFF

Transferring the measurement values to the computer is done by pressing the "PRINT"-key on the control box.

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## Appendix E

### The probes and masters management program (TASTER4W)



#### E.1. General

For a lot of measurements (differential measurements, all kind of internal measurements, thread measurements) you need a probe, wires or any other references to execute the measurement. For this purpose the program „TASTER4W“ was designed which manages all the external and internal references, the wires and probes for the thread measurement and probes and balls for internal measurements.

#### E.2. Settings

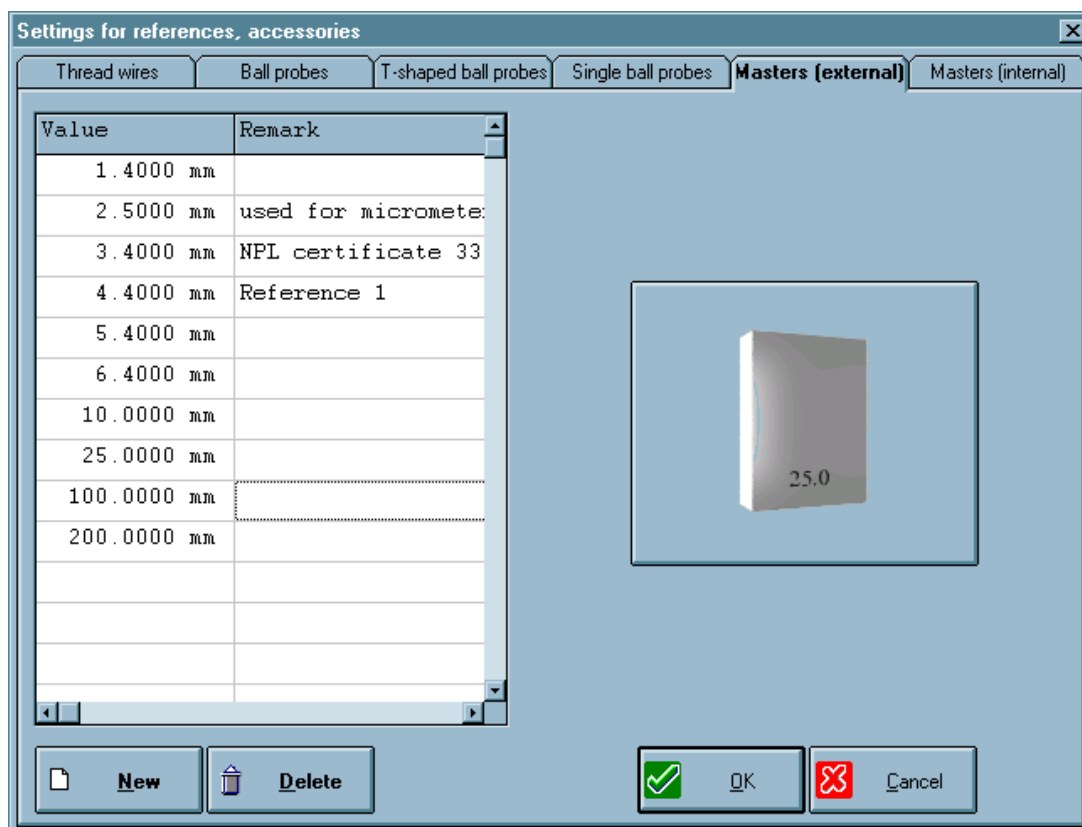
Here you can set or change the program language and the directories for the access to the indication program and the QMSOFT editor program. This parameters will be set while installing the program so that it normally not necessary to change it.

Using a serial interface for the Online connection to a measuring machine you should make sure, that all parameters in the indication program are set correctly.

### E.3. The Master and Probe management

Press one of the shown buttons in the programs start screen or use the „Edit“ to select the wished action.

#### E.3.1. Masters for „External“ and „Internal“ measurement



If you select this options you get shown a list with the available external or internal references. Here you can insert new references, change the values or delete references from the list.

#### E.3.2. Thread wires

Here you can enter the diameters of the thread wires you want to use. The diameters will be stored in a list which you can access as „Customised wires“ in the thread measurement program QM-THREAD.

Using the button „Calibrate“ you can measure the wires to get the real diameter. This is important for the thread measurement because differences of the wire diameters will have an important influence to your measuring result.

#### E.3.3. Ball probes (Balls for measuring brackets)

Here you can enter the diameters of balls you want to use for internal measurements. This balls will be used with measuring brackets for the measurement of plain rings or snap gauges an for thread rings (two ball measurement).

Using the button „Calibrate“ you can measure the ball diameter. Using the correct diameter it is unimportant while measuring plain gauges because you have to calibrate your brackets on a Master ring.

For thread measurement it is very important to use the exact ball diameters because differences of this diameters will have an important influence to your measuring result.

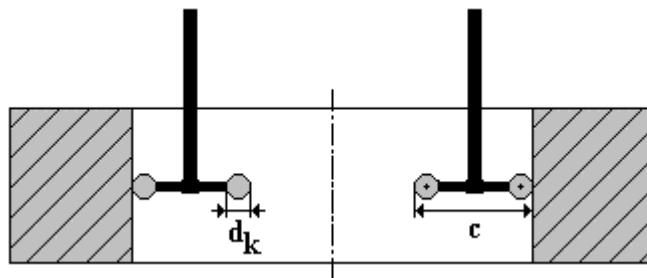
### E.3.4. T-shaped ball probes

T-shaped ball probes may be used for the measurement of internal threads (Three ball method) or for plain rings.

Working with „T-shaped“ ball probes you need two values to describe the probe. At first the diameter of the measuring balls  $d_k$  (both balls should have the same diameters; normally you get this value from the probe manufacturer) and as second value the „Probe constant“  $c$ . This probe constant is defined as the measure over both balls.

The probes should be calibrated before every measurement or at least before the first use. Entering probe values in the table use the „New“ button. To calibrate the probe using a master ring press the „Calibrate“ button. Be sure to check that the correct ball diameter  $d_k$  has been entered.

Figure: Calibration of a "T-shaped" ball probe



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 above.

### E.3.5. Single ball probes

Such type of probes will mostly be used for the measurement of small ring gauges. While contacting the probes surface with the gauge should be measured you have a deflection of the probe. Therefore the probes have to be calibrated before use it to get the „virtual“ (effective) diameter of the probe. See section E.3.4. how to calibrate it.

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