

IX. Inspection program QM-BLOCK



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

The inspection of gauge blocks and gauge block sets may be done according different evaluation methods. For example you can evaluate only the centre length deviation or the deviation range combined with the centre length deviation.

Basically the evaluation and the used tolerances are related to the ISO 3650 standard, the ANSI/ASME B89.1.9, the British standard BS 4311 or the Australian standard AS 1457. To define customised tolerance tables with user defined accuracy classes is also 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. These values have to been entered in the gauge management system QM-MANAG program. In the management 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 certificate layout files.

- ☛ ***The program QM-BLOCK does not contain the functionality for a gauge management or for the storage of the gauges history. These functions are an exclusive part of the program QM-MANAG. It means that the complete functionality for the management of gauge block sets, the monitoring of the calibration date and the handling of the gauge history does require an additional licence for the program QM-MANAG (either "Professional" or "Lite" version; the "Lite" licence is usually an essential part of the "QM-BLOCK" package).***

***The management of your reference gauge blocks and the input of the actual values of your used reference gauge blocks have to be done inside the program QM-MANAG!
You have to do this before starting the first calibration of a gauge block!***

IX.1. Program start

The QM-BLOCK program can be opened directly from the QMSOFT-command-Shell (click the corresponded symbol in the shell) or by starting a Gauge inspection through the gauge management program.

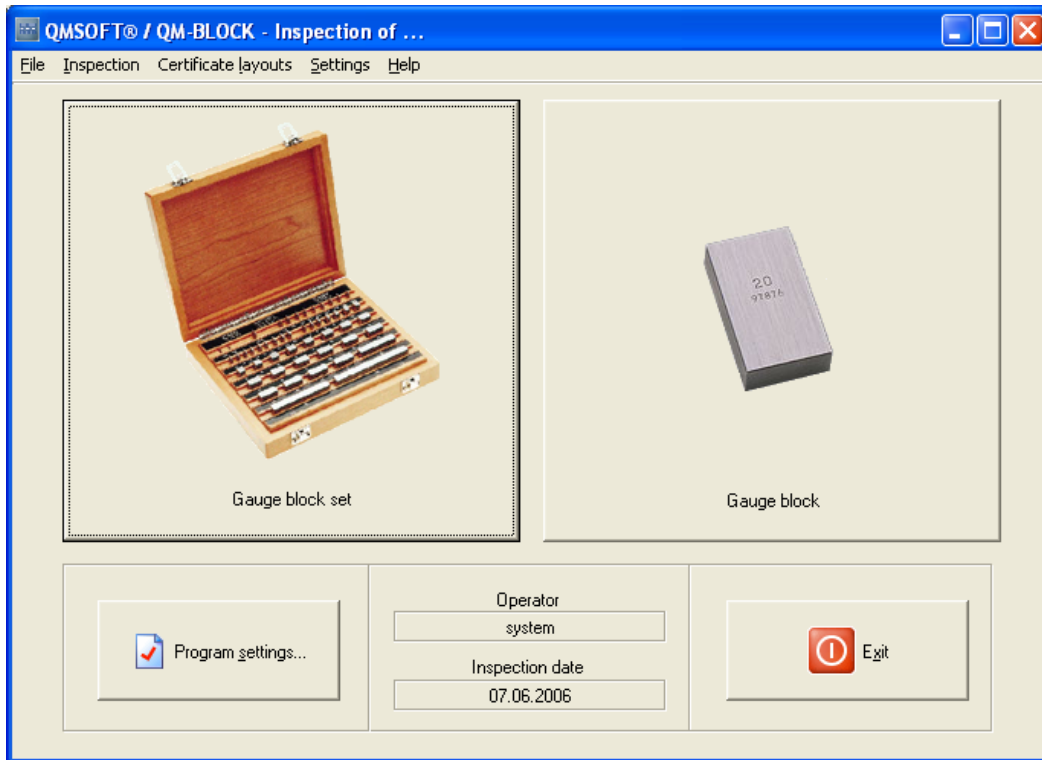


Figure: Start the program QM-BLOCK

Note: Starting the program at the first time you should check the settings for the indication program, the default certificate layout file and the link to the used tolerance file. Please see the section "Settings" for it.

IX.2. Entering the values of your reference gauges

Attention: To get correct results when inspection gauge blocks it is compellingly necessarily to enter the real values of your used reference blocks into the gauge management system QM-MANAG. Please read the following section very careful!

☞ The functions described here are not a part of the QM-BLOCK program. You has to start the QM-MANAG program to do this.

Usually you should manage all reference gauge blocks in a separated gauge stock in your database. When installing the QMSOFT system there will be created a database client with the name **"Reference Gauge Blocks / Masters"**.

At first open this database and you will get the following screen:

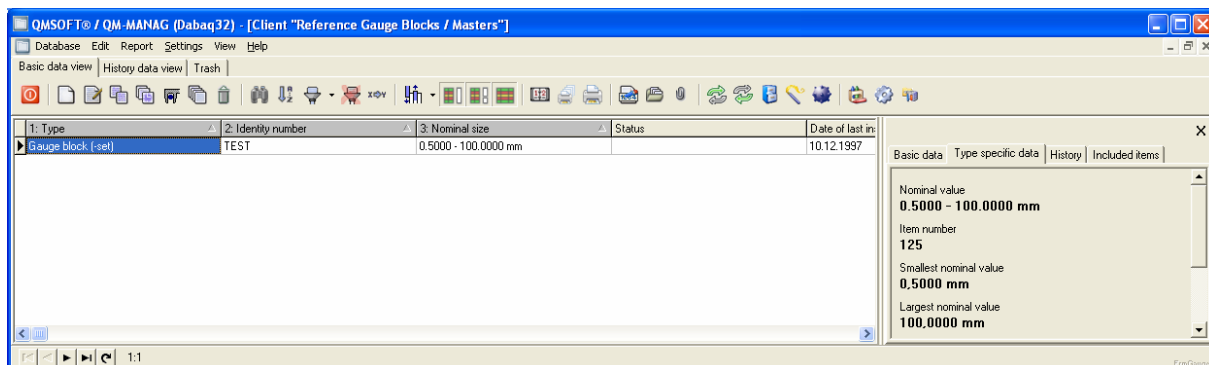


Figure: the database "Reference Gauge Blocks / Masters" after installing the programs

You can now use the existing "Test" set to enter your values or you insert a new gauge block set in your database.

If you insert a new set enter the identity number of the set and the other parameters to describe it. Use the function "Set configuration" to define the single gauge blocks which are contained in your set. Using the function "Load set configuration" you can load the pre-defined set configurations for different manufacturers.

- ☞ In the manual for the program QM-MANAG (section III.3.3.3) you will find more information about inserting gauge block sets into the database.

After defining the single gauge blocks you can set an identity number for each gauge block and its material. If all gauge blocks does have the same number you can use the function "Fill column" for it (see the figure).

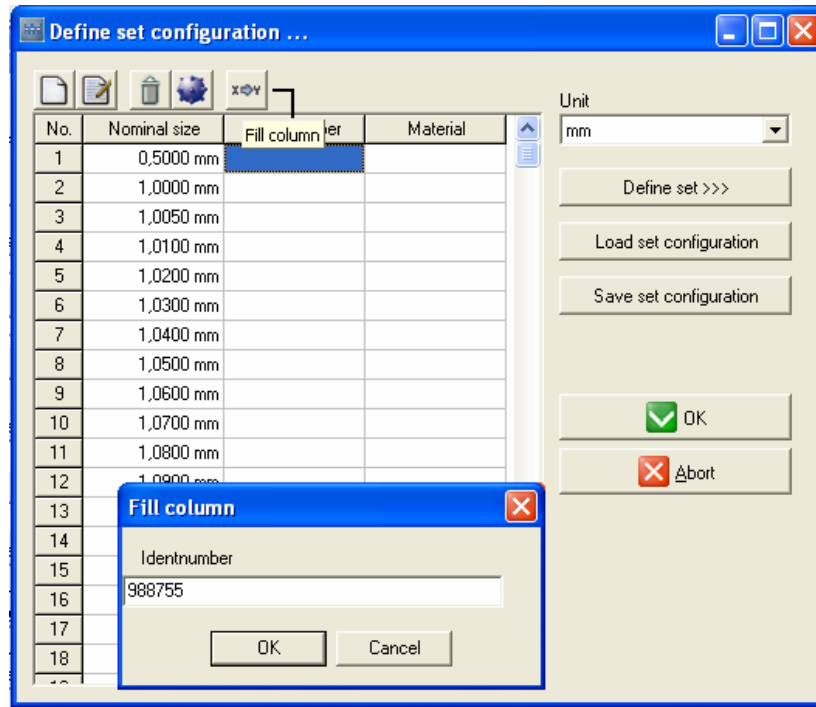


Figure: set the identity number for all gauge blocks

After inserting the gauge block set in your database you have now to enter the known measures into the database. Do to this click on the single gauge blocks inside the list and enter the value on the left side.

NOTE: you have to click the "Edit" button before to "open" the input fields.

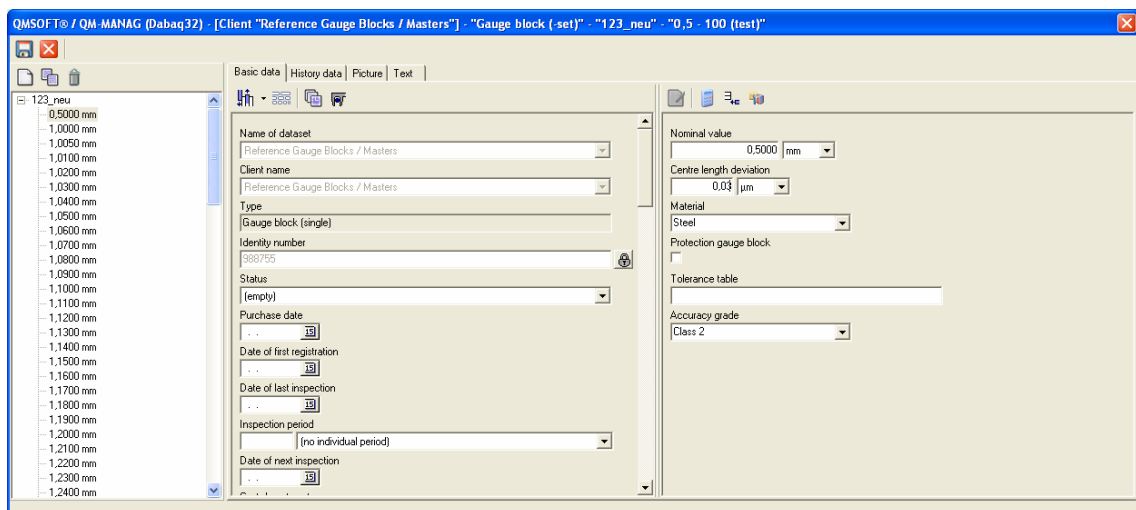


Figure: input of the "Centre length deviation" of your reference set

IX.3. Program settings

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); 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.3.1.Settings | Program settings

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

Register „General“: Here you can choose the program language and switch the tool tips for the dialogue fields on or off.

The screenshot shows a software dialog box titled "Inspection of gauge block". It has a tabbed interface with the following tabs: "General", "Save automatically", "Files / Directories", "Default", and "Material". The "General" tab is selected. Inside the dialog, there are several configuration options:

- Language:** A dropdown menu currently set to "English".
- Show help texts:** A checkbox that is checked.
- Transfer measuring values from:** A dropdown menu set to "Online".
- Measuring values as:** A dropdown menu set to "mm (inch)".
- Probe length:** A text input field containing "0,000 mm".
- Database of reference gauge sets:** A dropdown menu set to "Reference Gauge Blocks / Masters".
- Warning limit for repeatability:** A checkbox that is checked.
- Warning limit:** A text input field containing "0,03 µm".
- Show grade of accuracy for each block:** A checkbox that is checked.

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

Figure: Program basic settings

Probe length: Usually a Gauge Block testing device does work with the method of "difference measurement". In most cases the measuring range of the used inductive probe is very small. Normally this means that you have a reference gauge block where the nominal size should be identically with the size of the inspected gauge block. In case that you have a testing device with a "long range" probe you can type in here the probe length (the measuring range of your probe) to give you the possibility to use reference gauge blocks with a difference size as your gauge block to be inspected.

Note: Important is the setting for "Database of reference gauge sets". If you usually does manage your reference Gauge Block Sets in this database (client data set) you should never change this setting.

Register "Save automatically": Here you can make settings for the automatic storage of measuring values in a file and/or for saving the inspection certificates automatically in a file.

Register "Files / 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 "Files" and "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 may occur when operating the program with incorrect settings in the screen "Directories".

Note: Usually 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 „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...“.

Register "Default"

Do some default settings here.

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.

Material	Expand.factor
Steel	11,5 E-6/K
Cemented carbid	4,2 E-6/K
Ceramics	9,5 E-6/K

Unit of reference gauge blocks: µm

Refer. / Gauge	Steel	Cemented carbid	Ceramics
Steel	0,00 µm	0,00 µm	0,00 µm
Cemented carbid	0,00 µm	0,00 µm	0,00 µm
Ceramics	0,00 µm	0,00 µm	0,00 µm

Determination of deformation factor

Figure: settings material

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!

IX.3.2. Settings | Import settings from EMP4W (16bit program)

☞ This function is only usable if you have done a program upgrade from the older 16bit version "EMP4W"!

IX.3.3. Settings | Edit tolerances...

The program give you the possibility to manage different tolerance tables. All tolerance values will be stored in a "XML" - file.

After installing the program it is the file "Tolerances.xml" which is located in the „...\QMSOFT32\QMBlock32_Settings“ directory. Here you can select the tolerance tables for the different gauge types and can edit it or you add new tolerance tables if required.

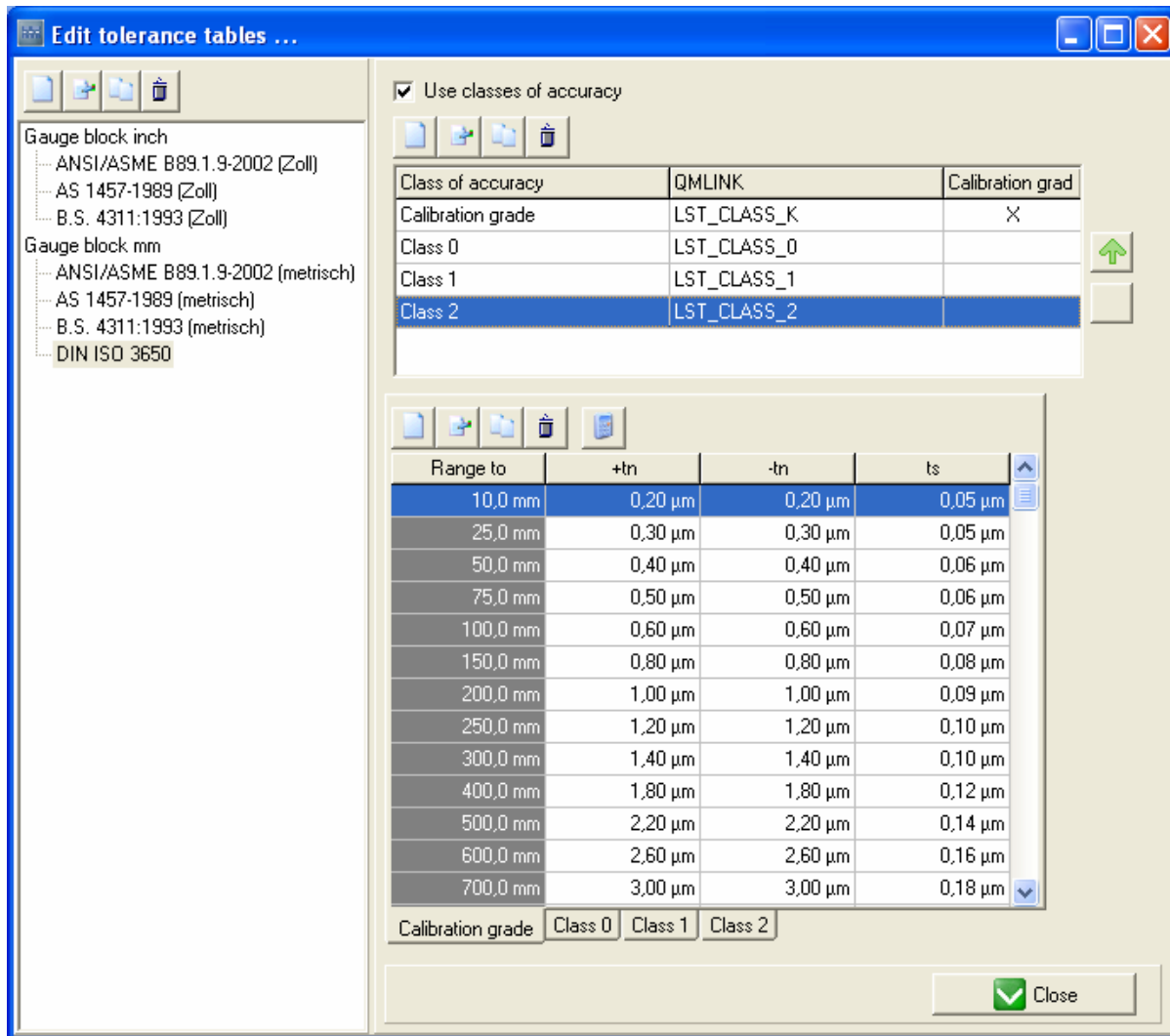


Figure: working with tolerance tables

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.

IX.3.4. 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.

Management for measuring point patterns

Measuring point pattern

- only Center deviation
- Deviation range**

Name of measuring point pattern

Deviation range

No. of repetitions:

1

Points

1
2
1
2
3
4
5
6
2

Remove point

Positions of measuring points

Reference gauge block

gauge block to measure

OK

Abort

Figure: define "measuring patterns"

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.3.5. 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". These 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.

IX.4. Certificate layouts | Edit certificate layouts..

The program QM-BLOCK gives you the possibility to customise the layout of your calibration certificate. The layout of the calibration certificate is based on a 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 certificate layout files have the extension ".L32". Usually these files are saved in the directory "..\QMSOFT32\QMBlock32_Templates"

☞ **NOTE:** Do never open a "L32" certificate file outside of the program. In this case you will loose all "placeholders" representing the "actual values" when the certificate will be created !

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 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.

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.

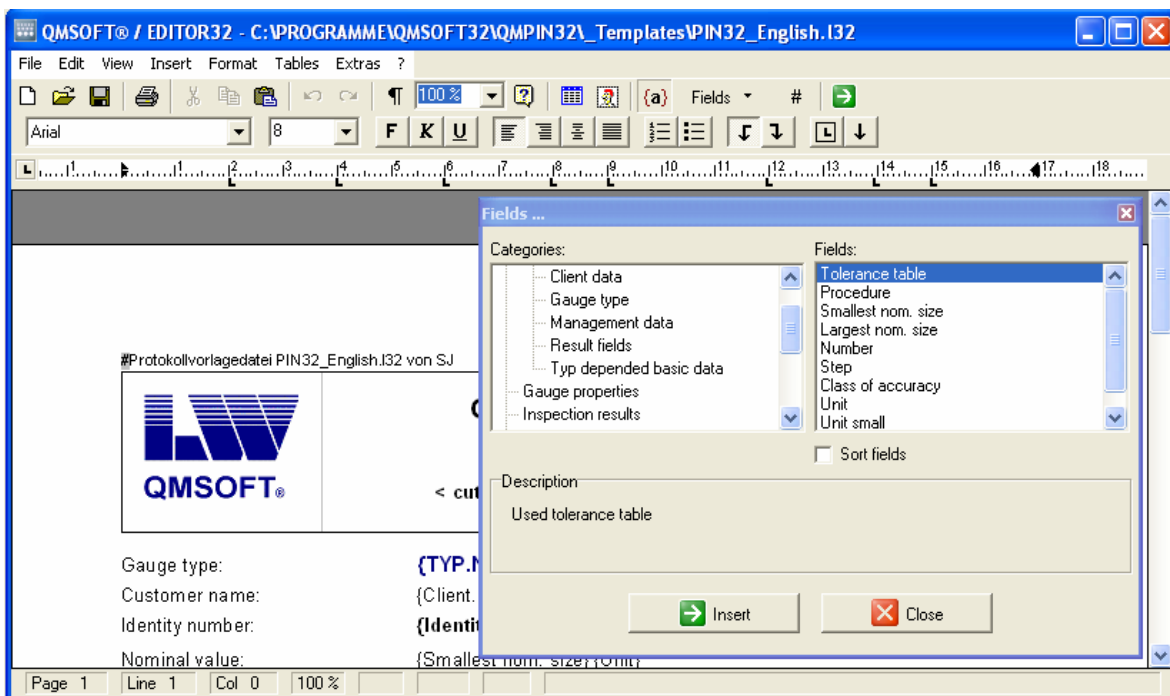


Figure: Inserting of fields into a Certificate layout file

Note: Fields which does contain text information can have an property "Language". To open the "Field property" dialogue click the right mouse key on the related field. If this dialogue have an field "Language" (see figure) you can change it to create "Multilingual" certificates.

The usage of "Text conditions":

Use the menu " **View / Text conditions** " to show the "Text conditions" available (see figure).

Select a text condition in the shown list to get there description. Then use the "add to list" button to move a selected condition to the "condition list". Using this list you can combine several text conditions.

Use the "Insert" button to insert the selected condition in your certificate layout.

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

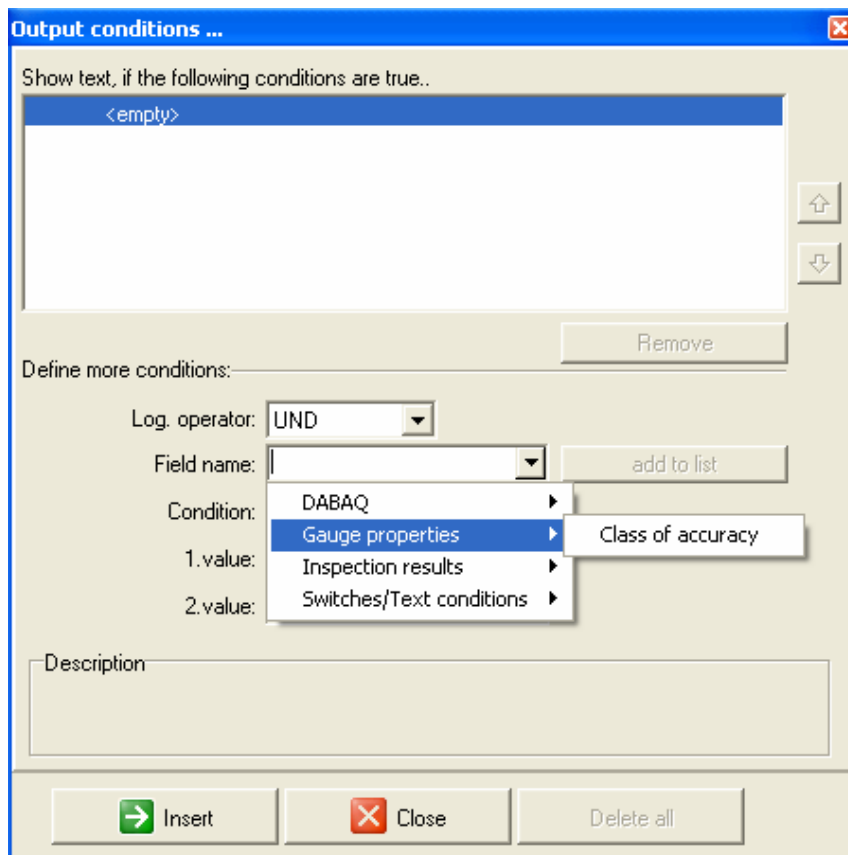


Figure: Inserting of fields into a Certificate layout file



IX.5. Gauge block inspection

Start the inspection by clicking the related button on your main screen. Usually you should start the measuring through the gauge management program. In this case you will come directly to the shown screen.

NOTE: Usually the inspection of a Gauge block set will be done through the Gauge Management system. That's why only the Gauge Management system is able to store the set configuration, to manage the general data of the set (like the checking of the inspection dates) and to handle the Gauge block set's history. Please refer for these points the manual of the **QM-MANAG program** section **III.3.3.3 Inserting a new "Set of Gauges"** and section **III.5.2. Inspection of Gauge sets!**

IX.5.1. Entering the gauge data

If you do not execute the measurement through the gauge database, at first you have here to enter the data to describe the pin set.

QMSOFT® / QM-BLOCK - Inspection of ...

File Settings Help

Enter gauge data

Gauge type : Gauge block set

Identity number :

Define gauge block set

Manufacturer :

Manufacturer designation :

Tolerance table : DIN ISO 3650 ...

Class of accuracy : Class 0

Notes :

Abort Continue

Figure: enter the gauge block set data

These fields are to be filled out:

Identity number: Enter an identity number of the gauge.

Manufacturer: Enter the name of the manufacturer.

Tolerance table: You can select a tolerance table ("DIN 2269" or "Factory standard") from the list of defined tolerances.

Class of accuracy: If you select a tolerance table which does contain different classes of accuracy (e.g. "DIN ISO 3650") then you have to select the "Class of accuracy".

Notes: Field to enter notes.

IX.5.2. Start an inspection / Inspection options

Before starting an inspection you should set the following parameters:

Used point pattern: select the measuring point pattern should be used for the inspection;

Direction: select the wished direction (increasing or decreasing nominal sizes) for the set inspection.

Reference block sets: select the reference gauge set(s) used for the inspection;

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.

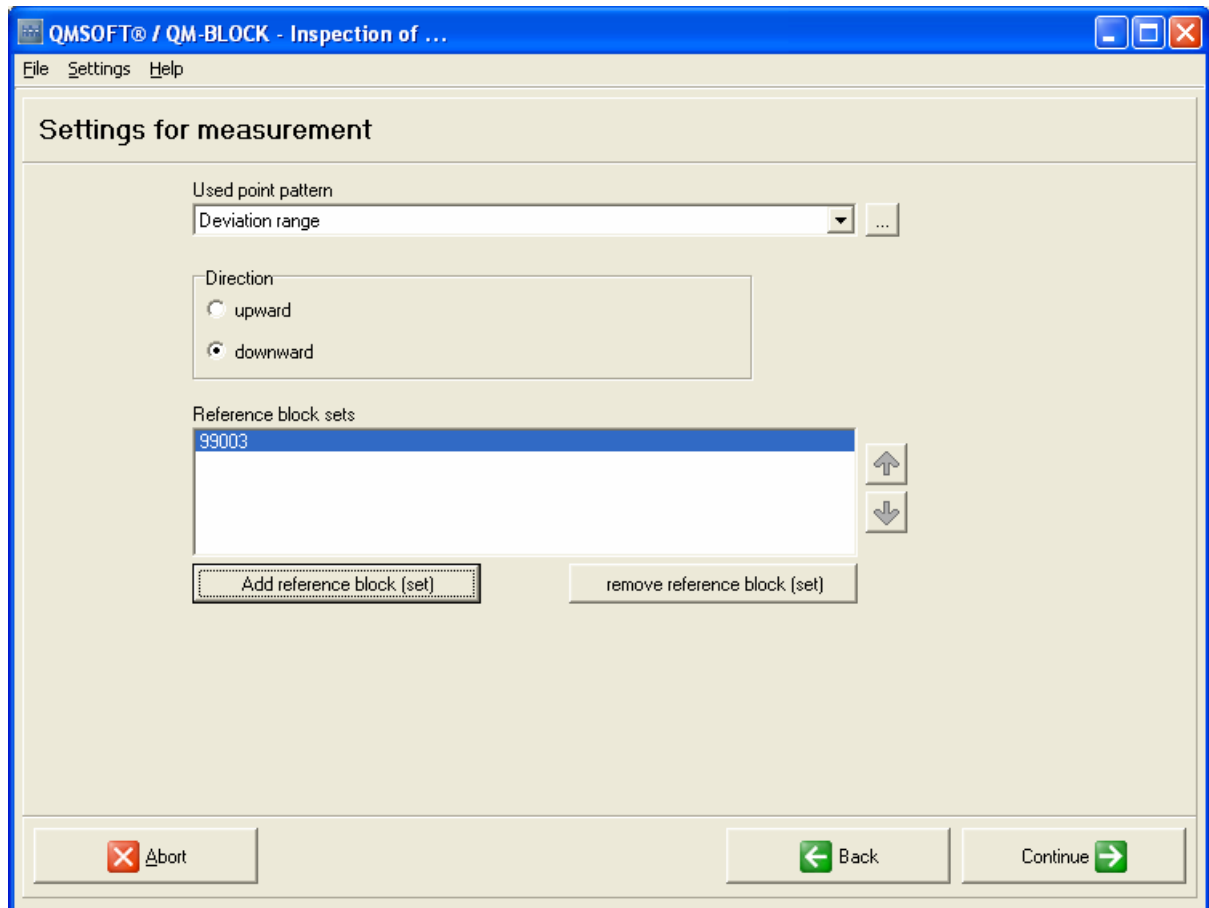


Figure: inspection options

Press "Continue" to start the measurement.

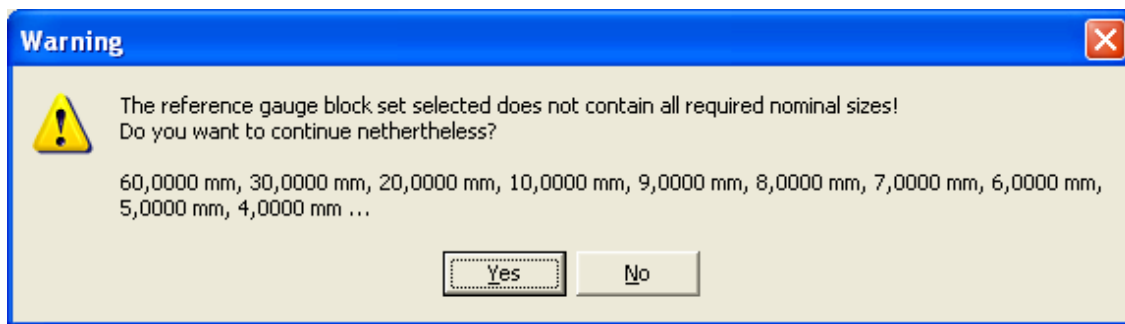


Figure: warning, if your reference gauge set does not contain all required gauge sizes

NOTE: this message will also appear if you did not enter the actual “Centre length deviation” for all reference gauge blocks you need to carry out your measurements. In this case open the related reference gauge block set inside the gauge management system and enter the deviation values!

IX.5.3. Doing a gauge inspection

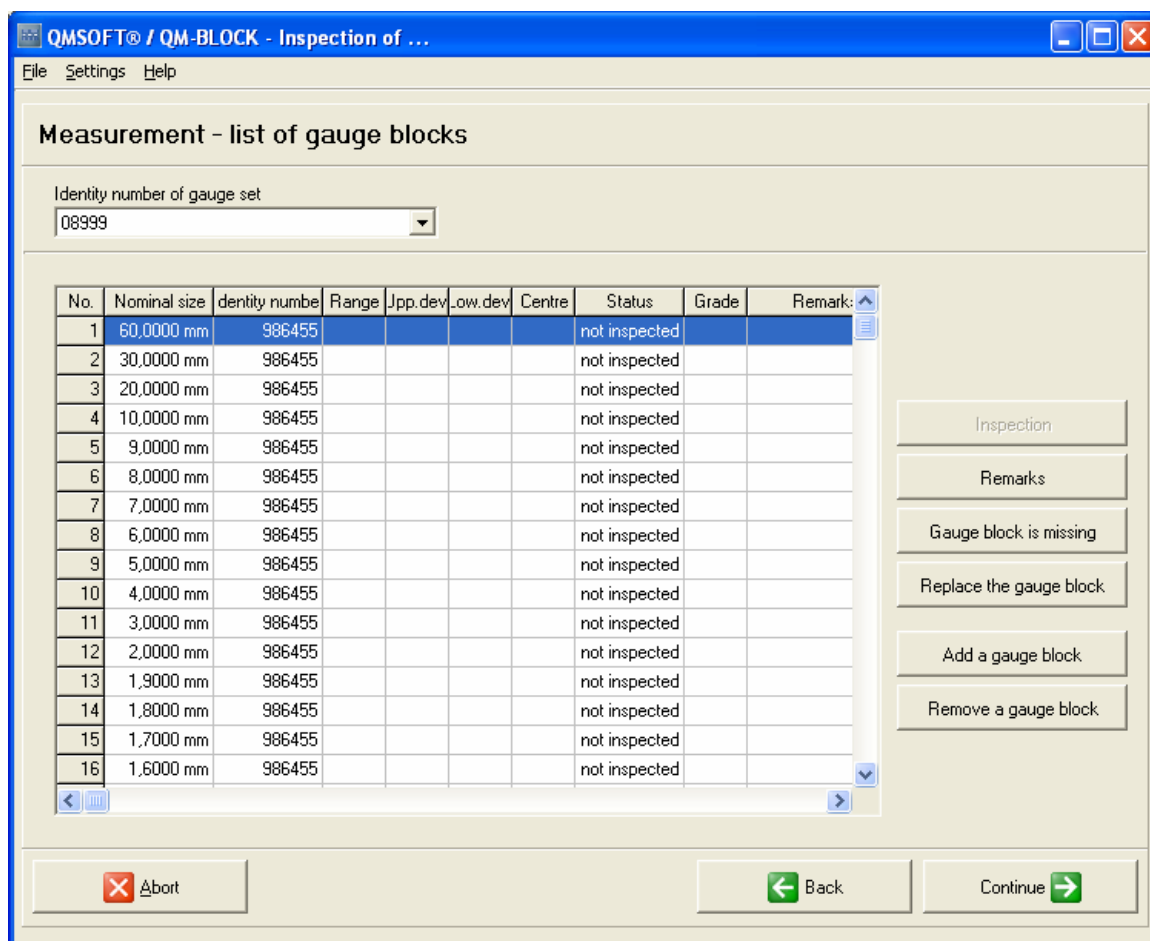


Figure: start measurement / list of gauge blocks

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 one.

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 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.

Inspection of gauge block - Gauge block set: 08999

Gauge block

Set: 08999
 Identity number: 986455
 Nominal value: 10,0000 mm
 Visual inspection: not inspected
 Inspection of wringing (adhes): not inspected

Reference gauge block

Set: 31826-DKD
 Identity number:
 Nominal value: 10,0000 mm
 Deviation: -0,05 µm

Points

Gauge block: 4, 5, 3, 6 (Point 2 is highlighted in red)
 Reference gauge block: 1

Measure values

Touching on	Point 1	Point 2	Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 2
1. Repeat.	-0,02 µm	0,03 µm	-0,03 µm						

Results

Deviation of central length = 0,01 µm
 Deviation at any point of face =
 Deviation range (fs) =
 maximum deviation (fs) =

QMSOFT® / RS232DRV Indication program...

External measurement abs ACTIV
 0.0000 µm
 NEG SET
 → ⏻

Buttons: Abort, Online, Back to the list, Next gauge block

Figure: inspection of a single gauge block



IX.6. Output of results

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

QMSOFT® / QM-BLOCK - Inspection of ...

File Settings Help

QMSOFT® - End of inspection / Valuation

Customer:
Flintstone Ltd.

Calibration certificate number:
20060606-001

Valuation:
still in inspection

Comments:

Inspection certificate layout:
QMBLOCK_English

Edit certif. layout

Show certificate

Print certificate

Actual Date: 07.06.2006 Next inspection: . Operator: system

Abort Back Finish

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.

IX.7. Connection to an “Temperature sensor” to use the option “Temperature correction”

The program QM-BLOCK give you the possibility to make a „Temperature correction“ if your environmental conditions does not guarantee a 20° temperature. You can either enter the temperature values of the inspected gauge block and the used reference gauge block via keyboard or you can use a direct connection to a temperature sensor.

Please note: even if you want to enter the temperature values via the keyboard -> the temperature correction can only be done if you use an **Online connection to the gauge block inspection device** to get your measuring values for the gauge block length! If you enter the length values via keyboard NO temperature correction is carried out!

IX.7.1. Usage of the Almemo - temperature sensor unit

The connection to the ALMEMO temperature sensors will be done by an additional software which is executing the taking over of measuring values from the ALMEMO unit using the PC's serial interface. The temperature values will be stored into a special text file and the QM-BLOCK gauge inspection software will read out these values at any time when a length measuring value is taking over from the Gauge block inspection device.

☛ *The program „AlmemoDrv“ has to be started manually from the QMSOFT shell before starting an gauge inspection.*



Figure: the program "AlmemoDrv"

Before you can use the temperature compensation you have to check and/or set some parameters in the ALMEMO communication program.

Click the menu „Settings“ and check the parameters for:

- The serial interface of the ALMEMO unit (the used COM port, the Baud rate);
- The assignment of the ALMEMO temperature sensors to the reference gauge block and to the gauge block which is currently inspected (for example: the setting 1/2 does mean that the Almemo channel „1“ is used for the temperature of the reference gauge block and the channel „2“ is used for the temperature of the gauge block currently inspected).

If you need more assistance for this please read the user manual of the ALMEMO device.

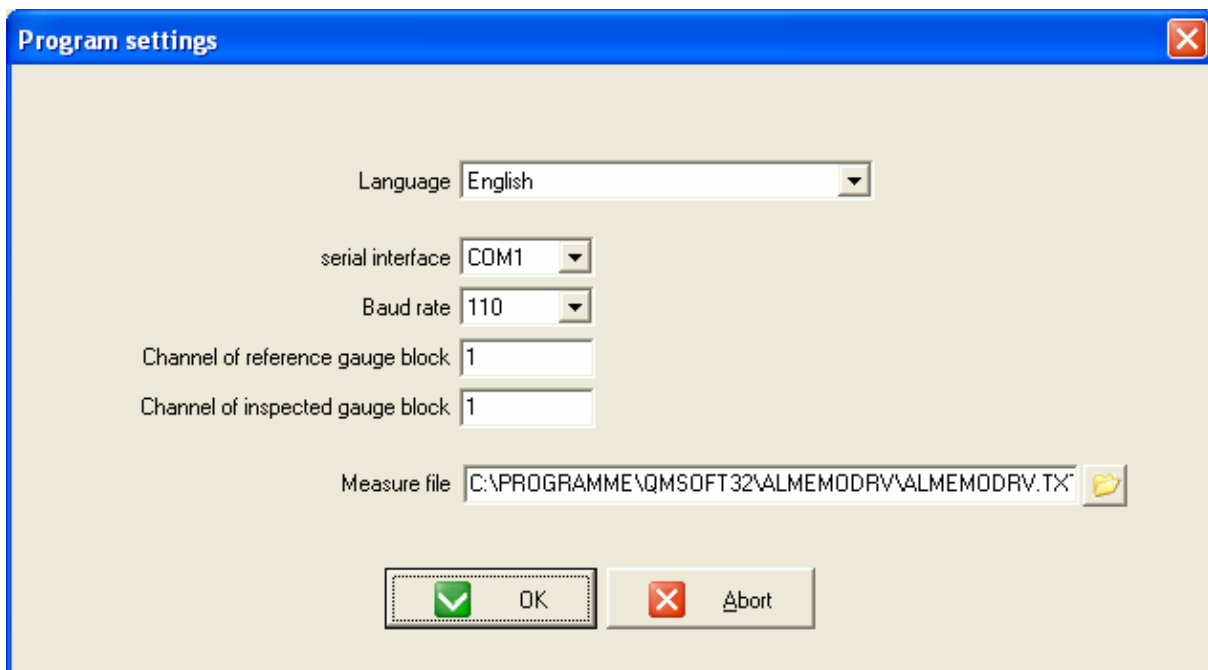


Figure: settings for the "Almemo" communication

Leave the „Settings“ menu with the OK-Button and **test** if **the communication** to the ALMEMO unit does correctly work.

Do to this click at the GREEN (Online) button in the „**AlmemoDrv**“ program. The text „Offline“ should change to „Online“ and in the fields „**Tp**“ and „**Tn**“ the temperatures of the sensors has to be shown for about one second.

Note: If there are no temperature values are shown please check the serial connection to the ALMEMO unit and all settings – described in the text before!

If all settings are done and the communication to the ALMEMO device does properly work you can start the QM-BLOCK program to start the calibrating of gauge blocks.

Please note that the temperature compensation does only work if you do an „Online“ taking over of measuring values from your Gauge block inspection device.

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