



## 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. To define customised tolerance tables with user defined accuracy classes is possible.

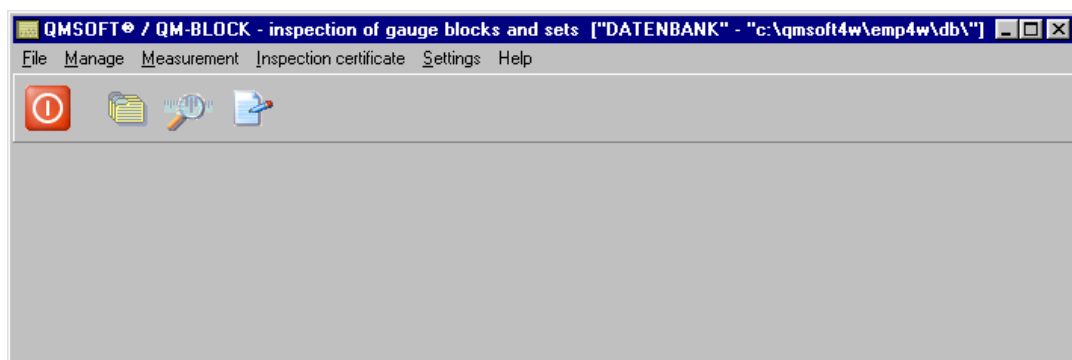
Mostly a gauge block inspection instrument does work with the method of "difference measurement". This means that you have a reference gauge block with a well known actual size which have to be compared with the size of the gauge block should be inspected. Normally, the nominal size of the used reference 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® GaugeMan (click on the QM-BLOCK-icon) or directly with the WINDOWS-file manager or the WINDOWS95 -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 IX.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.

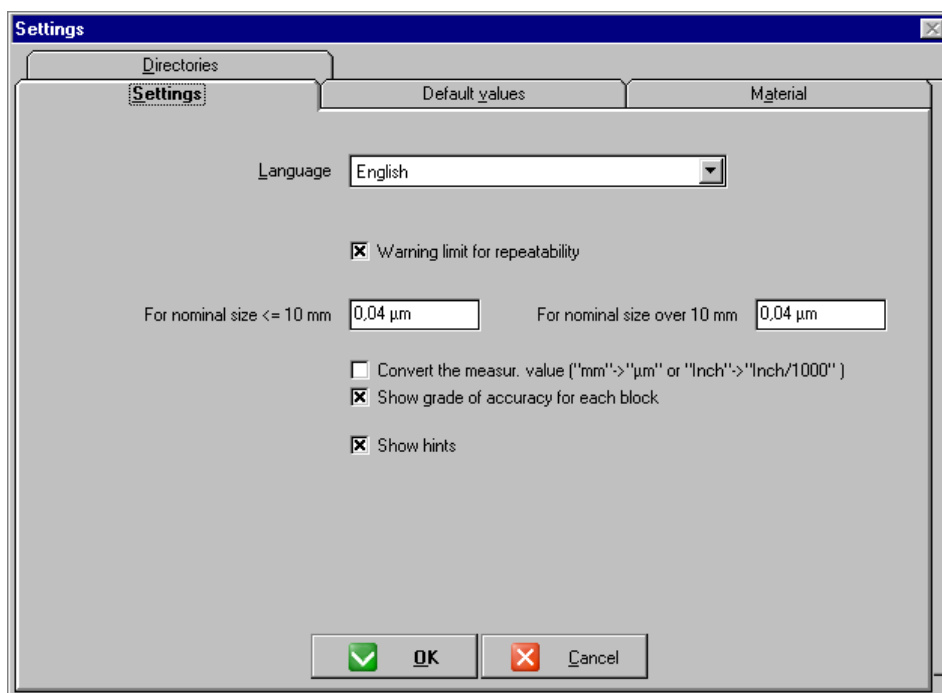
*Please, pay attention* that the program does only correct work if all settings are correctly - otherwise the most things will work at once with the default settings.

### IX.2.1. Settings|General settings

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

#### **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).

**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 the 'Settings' dialog box with the 'Default values' tab selected. The settings are as follows:

- Unit: Millimeter
- Tolerance table: ISO 3650 (metric)
- Used reference gauge block set: TEST
- Used measuring point pattern: Abweichungsspanne/Mittenmaß
- Material: Steel
- Gauge type: Single gauge block
- Measur. direction: ☒ downward

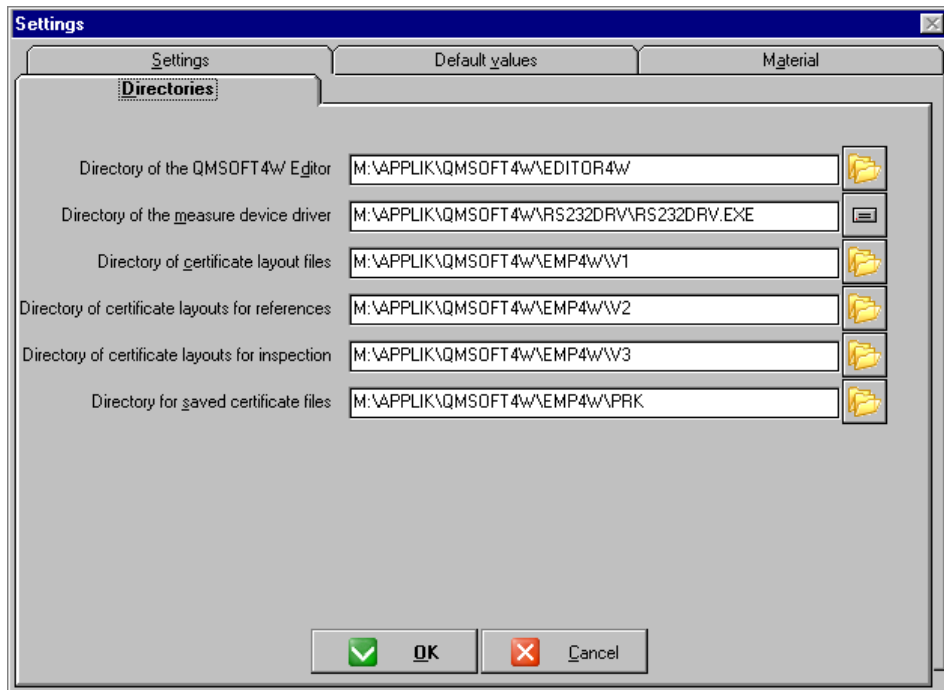
At the bottom, there are 'OK' and 'Cancel' buttons.

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.2.1.1. 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 something.

### IX.2.1.2. 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.

The screenshot shows the 'Settings' dialog box with the 'Material' tab selected. It contains two checkboxes: 'Compensation of temperature' and 'Compensation of different deformations'. Below these are two tables.

Material	Expand. factor
Steel	0,0 E-6/K
Cemented carbid	0,0 E-6/K
Ceramics	0,0 E-6/K

Reference gauge	Nom. size	Deviation
Steel	0,0000 mm	0,00 µm
Cemented carbid	0,0000 mm	0,00 µm
Ceramics	0,0000 mm	0,00 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

Below the tables is a button labeled 'Determination of deformation factor'. At the bottom are 'OK' and 'Cancel' buttons.

**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 a tolerance table related to the ISO 3650 is available. You can create a new tolerance table using the "Copy" Button and making the wished changes in this new table.

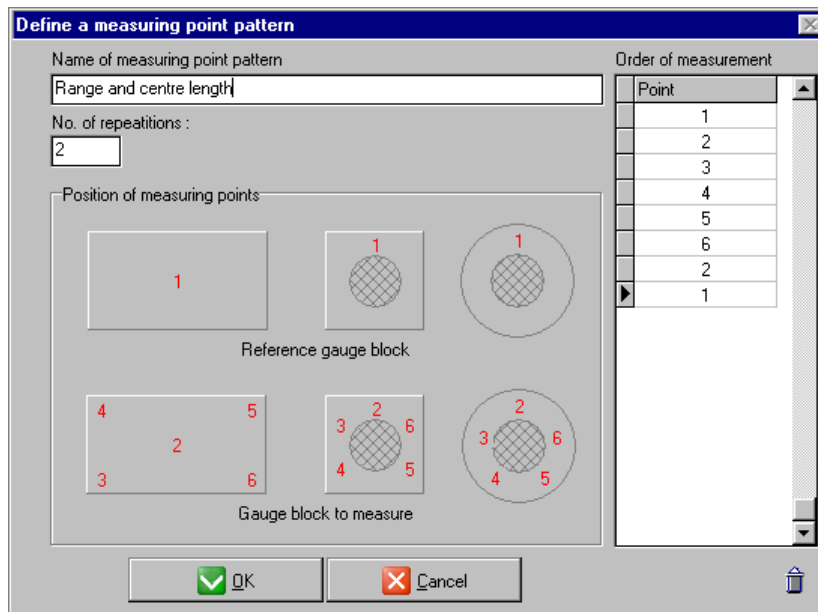
A tolerance table consists of (at minimum one) different pages. Each page is describing the tolerances for the related "class of accuracy" - compare the functions of the "Create a new tol. class" Button while editing a tolerance table. The tolerance values may be entered but you can also calculate this 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 QM-BLOCK 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 it 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: 49 351 8717480

Designation: Master set

Customer name:

Remark:

Tolerance table: ISO 3650 (metric)

Nominal grade of accuracy: 2

Parts: 3

Type of block: Gauge blocks

Gauge material: Steel

Nominal size	Identity number	Remark	Status
0,500000 inch			activ
1,000000 inch			activ
2,000000 inch			activ

Gauge block set ...

Add a gauge block

Delete the gauge block

Enter ID numbers

Gauge block is missing

OK Cancel

After the selecting of the Unit you have to enter the following information (see figure above):

#### 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.

#### Designation

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 gauge block 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 are 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.

Identity number	Designation
49 351 8717480	Master set

Used point pattern: Range and centre length  
 Reference block set: TEST  
 Direction: ☐ upward ☒ downward

**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						

Deviation of central length:  
 Deviation at any point of face:  
 Deviation range:  
 maximum deviation (fu):  
 minimum deviation (fi):  
 Grade of accuracy:

remark:

Back to the list   Online   Next gauge block

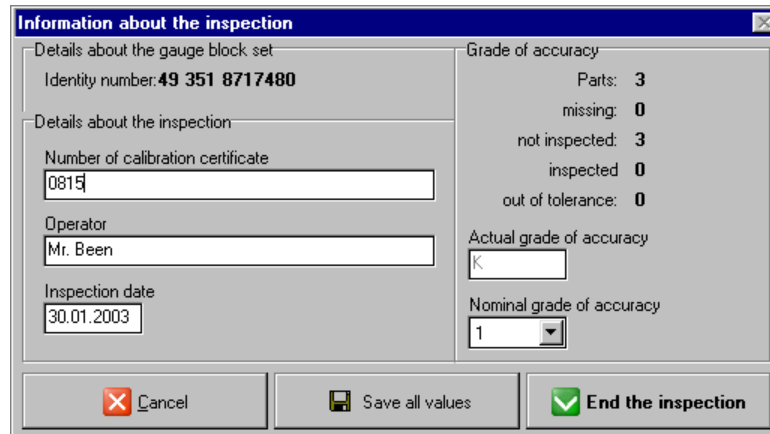
**Figure:** Inspection of a gauge block

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  
Identity number: **49 351 8717480**

Details about the inspection  
Number of calibration certificate  
0815  
Operator  
Mr. Been  
Inspection date  
30.01.2003

Grade of accuracy  
Parts: **3**  
missing: **0**  
not inspected: **3**  
inspected: **0**  
out of tolerance: **0**

Actual grade of accuracy  
K  
Nominal grade of accuracy  
1

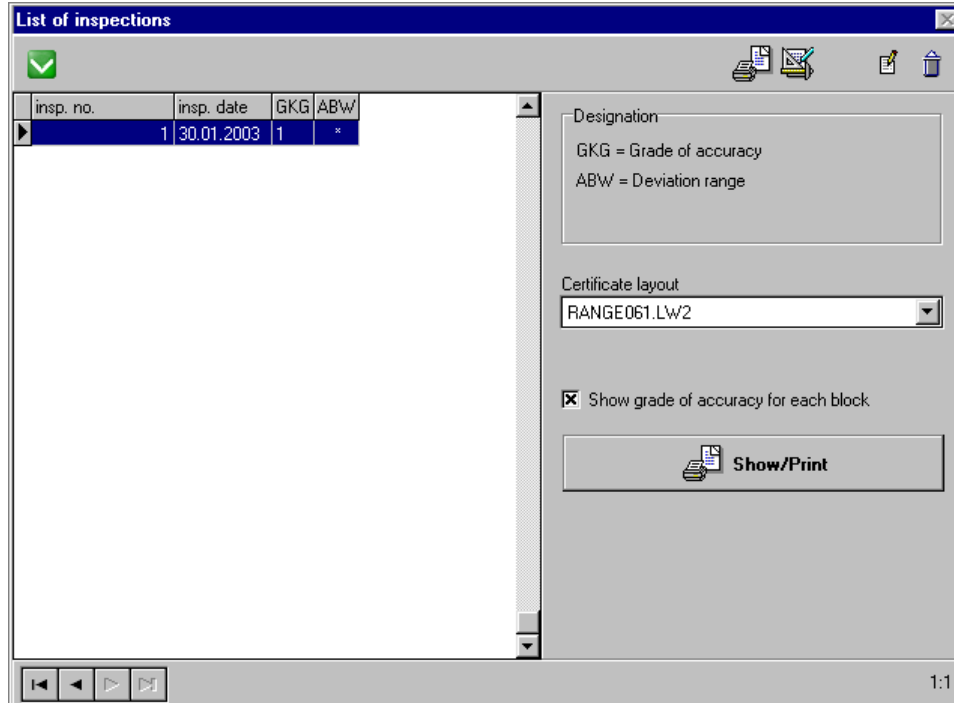
Buttons:  Cancel  Save all values  End the inspection

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:



**List of inspections**


insp. no. insp. date GKG ABW

1	30.01.2003	1	*
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Designation  
GKG = Grade of accuracy  
ABW = Deviation range

Certificate layout  
RANGE061.LW2

☒ Show grade of accuracy for each block

 Show/Print

1:1

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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