



User manual

PC-DMIS CMM Check

Version: 2024.1

22 February 2024

Contents

1.	Information about this document	4
1.1.	Document history	4
2.	General	5
2.1.	Notes on the use of this user's manual	6
	• Find terms or functions that are not listed in the table of contents	6
	• Use Links	6
	• Used symbols	6
3.	Software licence agreement	7
4.	Operation	8
4.1.	Prerequisites	8
4.2.	Recommended Qualification	8
	• Installing the software	8
	• Configuration and use of the software	8
4.3.	Start "CMM Check"	9
4.4.	Overview of the user interface	10
4.5.	Additional Information	10
5.	Configuration of the software	11
6.	Menu item "File"	12
6.1.	Language	12
6.2.	Exit	12
7.	Menu item "Extras"	13
7.1.	Settings	13
	• "General" tab	14
	• Customer; Location; Operator	14
	• Theme	14
	• Artefact directory	14
	• Output directory	15
	• "Machine" tab	16
	• "Machine" area	16
	• "Other" area	18
	• "Sensor" area	18
	• "Rotary Table" area	19
	• "Specification" tab	20
	• Date of specification:	20
	• "Max. Length measuring error"	21
	• "Max. Scanning probing error" area	21
	• "Probing error" area	21
	• "4-axis error" area	23
	• "Artefact" tab	24
	• File name	24
	• Artefact Type	24
	• Artefact name	24

• „Sphere and Ring“ area	26
• "Sphere P/THP"; "Ring"; "Sphere A (RT)"; "Sphere B (RT)"	26
• „Step gauge“ area.....	27
• Serial number	27
• Material.....	27
• Cal. date	27
• Alpha [µm]	27
• Nom. Length	28
• Button: Import Artefact.....	28
• Button: Save Artefact.....	28
• "PC-DMIS" tab.....	29
• Start PC-DMIS automatically.....	29
• The wrist's A90B180 position of the points in the direction.....	29
• Probe file used with probe changer for "Unloading only"	30
• Machine interface.....	30
• Use Leitz CIR scan	31
• "Advanced" tab	32
• Start CMM Monitoring automatically while measuring	32
• Warning limit for the last saving of the external alignment (Minutes)	32
• Number of repeats	33
7.2. Parameters	34
• "Measurement parameters" dialog window.....	34
• Move speed	34
• Touch speed.....	34
• Prehit distance	34
• Scan speed.....	35
• Point density	35
• Filter	35
8. Menu item "Help"	36
8.1. User manual.....	36
8.2. License	36
8.3. Information about.....	36
9. User interface	37
9.1. Selection of the probe system and probe	38
• Probe	38
• „Scanning sensor“ checkbox	39
• "Refresh" button.....	39
9.2. Selection and sequence of tests.....	40
• Check sphere and ring gauge	40
• Tip 1	40
• Sphere single points (formerly: PFTU).....	41
• Sphere scanning (formerly: THP)	42
• Position of the test sphere.....	43
• Ring single points (formerly: RONt single points)	44
• Ring scanning (formerly: RONt Scanning)	45
• Step Gauge	46
• Rotary Table.....	49
• Multiple probe.....	51
• Output of measurement results.....	54

9.3.	Selection and position of the artefact	55
•	Artefact Type	55
•	Artefact Name	56
•	Position of the artefact	56
9.4.	Temperature compensation and manual alignment	59
•	Temperature Compensation	59
•	"Artefact manual alignment" checkbox	59
•	"Check sphere manual alignment" checkbox	62
9.5.	"Start measurement" button	63
10.	About Hexagon.....	65

1. Information about this document

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This document applies to version 2024.1 of the CMM Check.

1.1. Document history

Version	Date	Author(s)	Modifications / Remarks
1	19.02.2024	SR	Initial release

2. General

The aim of this manual is to support you in dealing with the PC-DMIS CMM Check software (referred to below as “CMM Check”).

We have tried to describe all options of this software as best as possible and in an understandable way. However, we ask for your understanding that all features may possibly not be described. This may be due among other things to technical innovations, new options or similar influences.

Knowledge of the PC-DMIS and CMM Monitoring software is helpful for using CMM Check. Contents of these software packages are not the subject matter of this user manual.

The CMM Check software is used among other things for the control of top-quality measurement technology. Settings in this software have a direct influence on the program sequence and therefore have to be selected carefully.

For this reason we point out by way of precaution that this manual cannot replace training. Should you be interested in a course in this respect, we look forward to hearing from you. You can find the corresponding data at the end of this text.

It cannot be ruled out even after careful examination that this manual is not free of errors.

For this reason we reserve the right to make typographical errors and mistakes.

Irrespective of this, we are thankful for suggestions, tips and proposals for improvements resulting from daily dealings with the CMM Check software.

If you need assistance, please contact your local Hexagon support.

2.1. Notes on the use of this user's manual

- Find terms or functions that are not listed in the table of contents

The terms used in this user manual for functions etc. are identical to those used in the software. If certain functions cannot be found via the table of contents, use the search function in the PDF. To do this, enter the desired term in the notation in which it is used in the user interface.

- Use Links

If text passages are related to other chapters, they are linked to each other. These links can be recognized by the underlined and blue colored text. Clicking on this text jumps to the corresponding passage.

In order to be able to find these passages in a printed operator's manual, the complete outline is preferably given.

Example:

Chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Artefact Type](#).

In principle, the last term will lead to the desired information (in the example above: point: [Artefact Type](#)).

The complete structure is not indicated if the linked passage is located in the immediate vicinity of the text (example: see [Example](#) above).

If the text passage to which you jumped does not contain a link to the original text, you can jump to the source text using the key combination "Alt" + "⇐" (To-Left).

- Used symbols



This symbol serves as a hint to read the corresponding text especially carefully.



3. Software licence agreement

The use of the software is subject to acceptance of all provisions contained in the software license agreement. For details, refer to the document "EN_EULA.pdf", which you will find in the same folder in which the user manual is located.

4. Operation

4.1. Prerequisites

In order to use the software, a correctly installed and approved CMM is required.

It is also assumed that PC-DMIS is set up and that the personnel is trained accordingly. The use of PC-DMIS is not a subject matter of this manual.

4.2. Recommended Qualification

- Installing the software

The installation of the software should be carried out by personnel with the following knowledge and authorization:

- PC skills
 - Windows knowledge
 - Installation of Windows – programs
 - Extraction of compressed files
 - Changing access permissions on the file system and registry
- Typical: Network administrators

- Configuration and use of the software

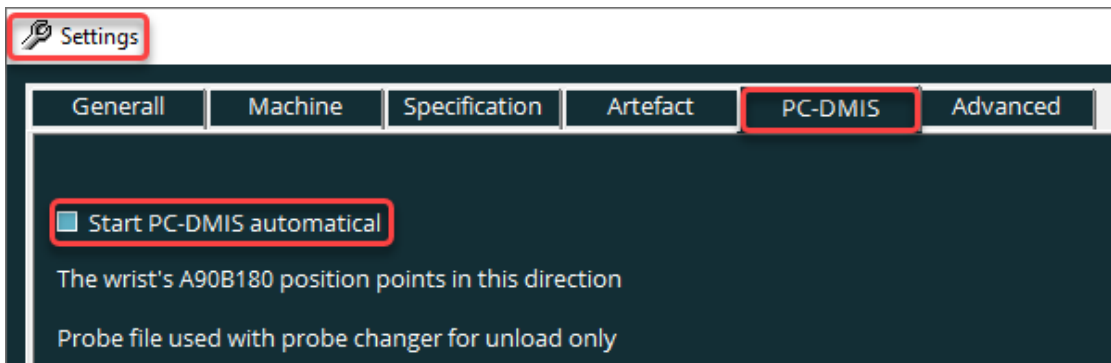
The installation of the software should be carried out by personnel with the following knowledge and authorization:

- PC skills
 - Knowledge of the "CMM Monitoring" software of "eumetron"
 - Windows knowledge
 - Detailed training by Hexagon application engineering
- Typical: Quality assurance staff

4.3. Start "CMM Check"

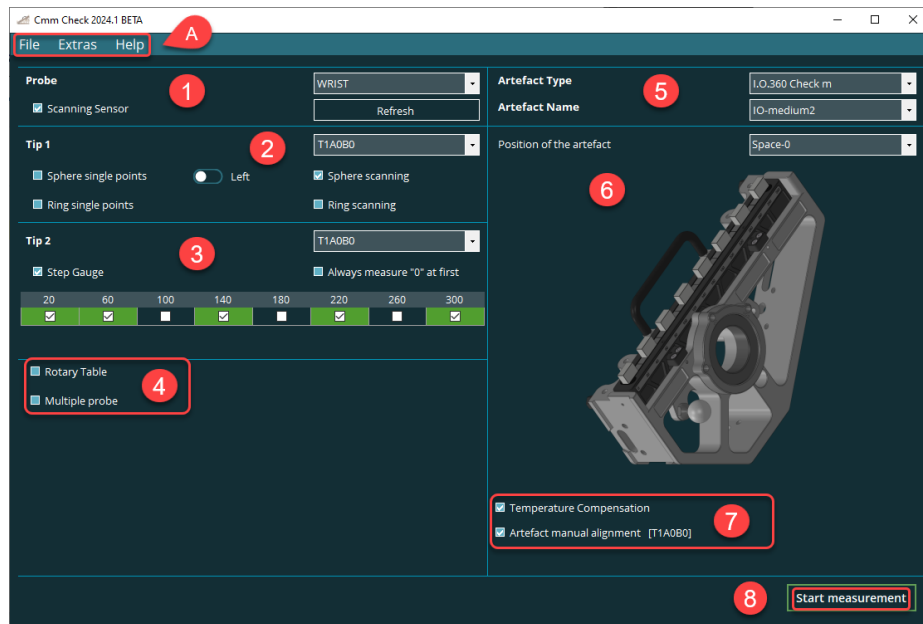
The software is started by clicking on the shortcut on the desktop.

If PC-DMIS is not started and the "[Start PC-DMIS automatically](#)" checkbox is deactivated in the "[PC-DMIS](#)" tab under the menu item "[Extras](#)" → "[Settings](#)", only rudimentary settings can be made. In this case, we recommend closing the software, starting PC-DMIS and then starting CMM Check.



If the checkbox (see above) is activated and PC-DMIS is not started, the last PC-DMIS version used is started. If PC-DMIS has already been started and the checkbox is activated, it is ignored.

4.4. Overview of the user interface



A: Menu option

Description of points 1-8 in the chapter: [User interface](#)

1. Probe selection
2. selection of the probe tip, position of the test sphere and selection of the tests for test sphere and ring gauge
3. Test for step gauge and choice of stylus tip to be used
4. Selection of tests for rotary table and multiple probe
5. Selection of the artefact
6. Selection and schematic representation of the position of the artefact
7. Selection of temperature compensation and manual alignment
8. button for starting the measurement

4.5. Additional Information

Before the installation, the cleanliness of the mounting face of the artefact and the CMM must be checked. Any contamination must be removed.

In order to avoid the risk of heat input and corrosion, it is recommended that you wear gloves when handling the artefact and other standards.

The temperature control times for the artefact, other standards and probes must be observed. The cleanliness of all components used (probe, gauge, test sphere etc.) must also be ensured.

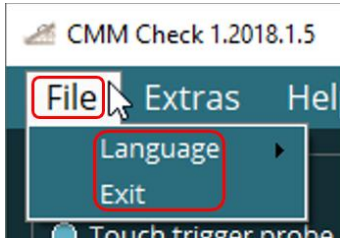
5. Configuration of the software

For the configuration of the software the knowledge and user rights recommended in chapter: [Operation](#), section: [Recommended Qualification](#), point: [Configuration and use of the software](#) are to be taken into account.

.

6. Menu item "File"

The "File" menu contains the options "Language" and "Exit".



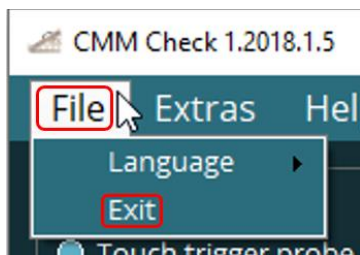
6.1. Language

The language of the supervisor can be changed.



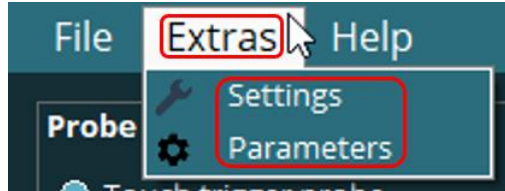
6.2. Exit

Closes the software. Alternatively, the software can be activated by left-clicking on the "x" symbol in the upper right corner.



7. Menu item “Extras”

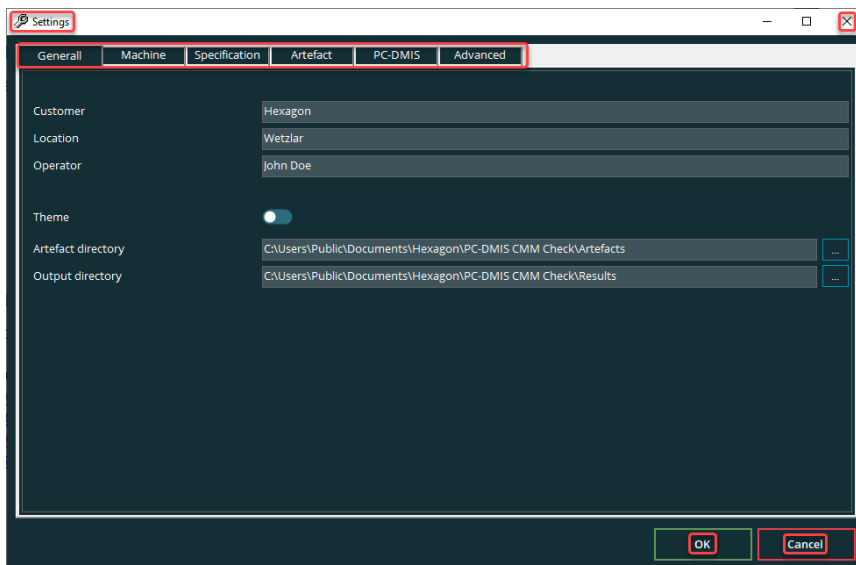
The following features are available under this menu item:



7.1. Settings

If this option is selected, the "Settings" window opens, in which various tabs are available. In these, you can define global values for the measurements to be performed and result files (see chapter: [User interface](#), section: [Selection and sequence of tests](#), points: [Check sphere and ring gauge](#), [Step Gauge](#), , [Multiple probe](#), [Rotary Table](#) and [Output of measurement results](#)). The data can be entered by left-clicking in the corresponding fields or can be selected from drop-down lists.

Any changes made can be applied with the "OK" button. Use the "Cancel" button or the "✕" symbol to discard the changes.



- “General” tab
- Customer; Location; Operator

By clicking with the left mouse button in the corresponding input fields, they can be filled with data. They will not be saved in the result file (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)).

Customer	Hexagon
Location	Wetzlar
Tester	John Doe

- Theme

You can set the user interface display to "Dark" or "Light". To do this, click on the slider and select the desired design. If the mouse pointer is moved over the slider, a tooltip appears with the message: "Theme (dark/light)".

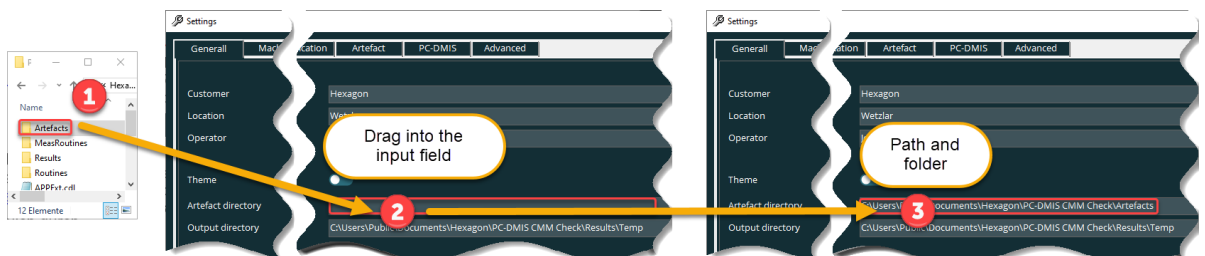


- Artefact directory

The path and folder for the "*.json" file created in the "Artefact" tab (see below) is defined. To do this, click on the "..." button on the right to open the file manager and select the folder.

Artefact directory	C:\Users\Public\Documents\Hexagon\PC-DMIS CMM Check\Artefacts	...
--------------------	---	-----

Alternatively, the folder can be defined by "drag and drop" as usual in Windows. To do this, select the folder in the file manager and drag it with the mouse into the input field in the "Artefact directory" line. After releasing the mouse button, the path and folder are adopted.

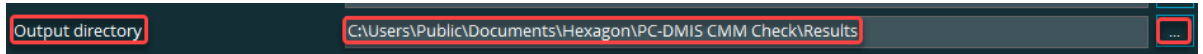


Another option is to specify the path and folder by clicking in the input field and then entering it.

The folder selected here is suggested for saving in the "Artefact" tab (see below: "Artefact" tab → [Button: Save Artefact](#)) of the *.json file.

- Output directory

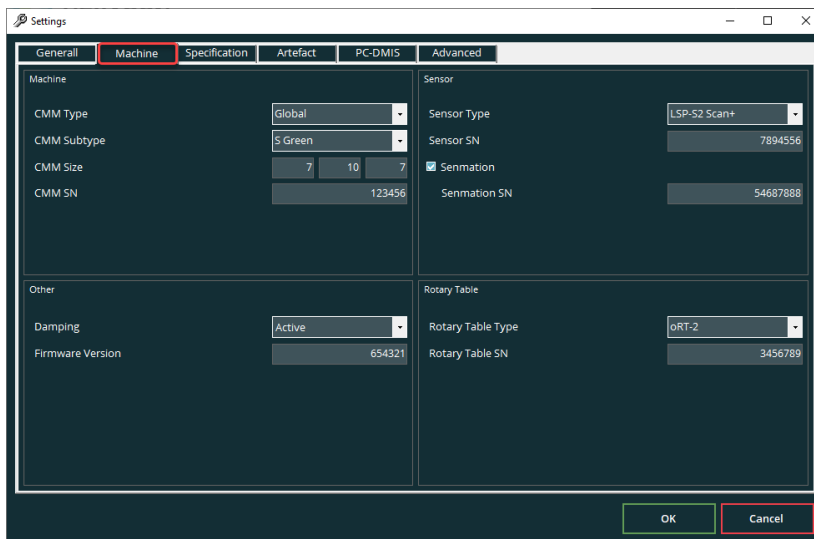
The path and folder for the results file (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)) is defined. The procedure for changing the directory is identical to the point "Test specimen directory" above.



The output directory selected here must match the directory defined in the "CMM Monitoring" software from "eumetron".

- "Machine" tab

Use the input fields or drop-down lists to enter data for the CMM in use. A part of them is saved in the result file (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)).

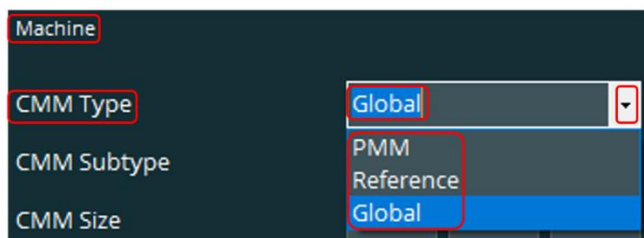


After installing the software, these fields are blank and must be filled in as described below.

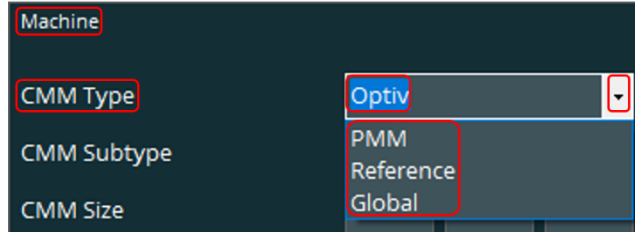
- "Machine" area

- CMM Type

This selection field is preset with the measurement machine currently in use. If necessary, this entry can be changed. To do this, click on the "▼" icon and select the machine type from the drop-down list.. The selected machine type influences the ["CMM Subtype"](#) options (see below).



If a CMM shall be used that is not available in the drop-down list, it can be inserted manually. You can enter the required machine type by clicking into the input field. The previously selectable entries will be still available.

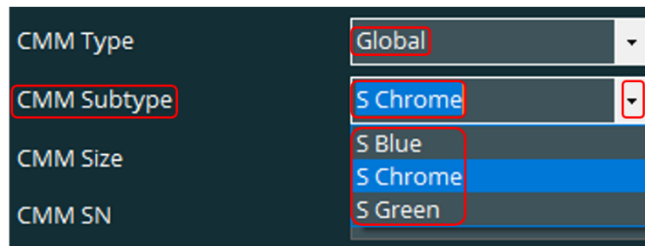


In "[CMM Subtype](#)" no entries are available for selection (see below).

You can remove an entry, by selecting and deleting it (e.g. with the "Del" key). Alternatively, an entry can be selected from the drop-down list.

- CMM Subtype

Depending on the machine selected in "[CMM Type](#)" (see above), additional information can be entered here. To do this, open the drop-down list by clicking on the "▼" symbol and select the required data.



If you entered a machine type manually in "[CMM Type](#)" (see above) or the entry has been deleted, no selection is available and the field can be filled in manually as described for "[CMM Type](#)" (see above).

- CMM Size:

The size of the machine in X, Y and Z can be entered (in decimetres).

- CMM SN:

The serial number of the measuring machine is entered.

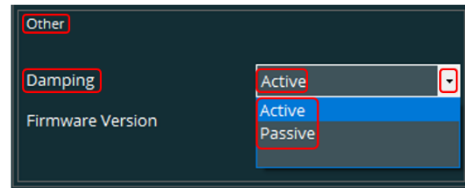


- "Other" area

- Damping:

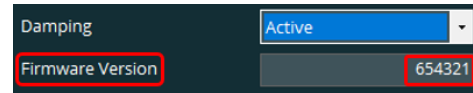
Clicking on the "▼" icon or the selection field opens a drop-down list from which the type of damping can be selected.

Alternatively, the field can be manually filled in as described in "[CMM Type](#)" (see above), or any entries made can be deleted.



- Firmware version:

The currently used version number of the firmware is entered.

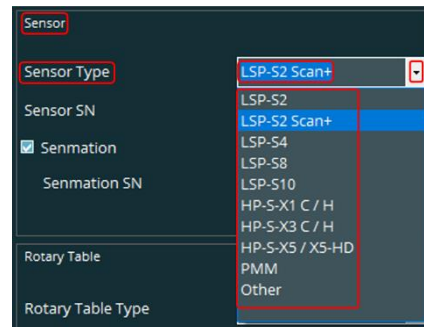


- "Sensor" area

- Sensor type:

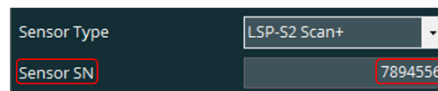
By clicking on the "▼" symbol a drop-down list opens from which the machine type can be selected.

If the sensor in the drop-down list does not exist and is not known, "Other" can be selected. If the sensor type is known, but is not shown in the drop-down list, the field can be filled in manually or deleted as described in "[CMM Type](#)" (see above).



- Sensor SN:

The serial number of the sensor selected under "[Sensor Type](#)" (see above) is entered.



- Senmation:

If the checkbox is enabled, the field "Senmation SN" is available, where you can enter the serial number of the Senmation adapter.

If this checkbox is disabled, the field is not available.



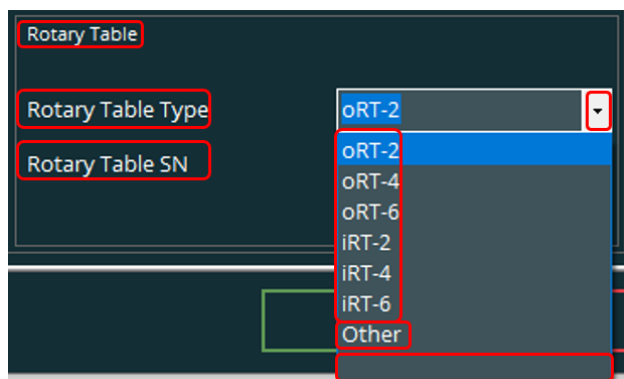
- "Rotary Table" area

This area is only available if a rotary table has been configured and activated in PC-DMIS. This procedure requires PC-DMIS knowledge and is not the subject matter of this user manual.

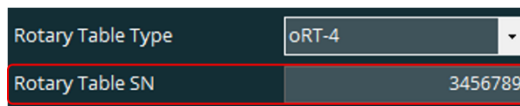
- Rotary table type:

By clicking on the ▼ symbol a drop-down list opens where you can select an existing rotary table.

If the rotary table is not shown in the drop-down list and is not known, "Other" can be selected. If the rotary table type is known, but is not shown in the drop-down list, the field can be filled in manually as described in "[CMM Type](#)" (see above).



If you have selected a rotary table, the field „Rotary table SN“ is available, where you can enter the serial number.



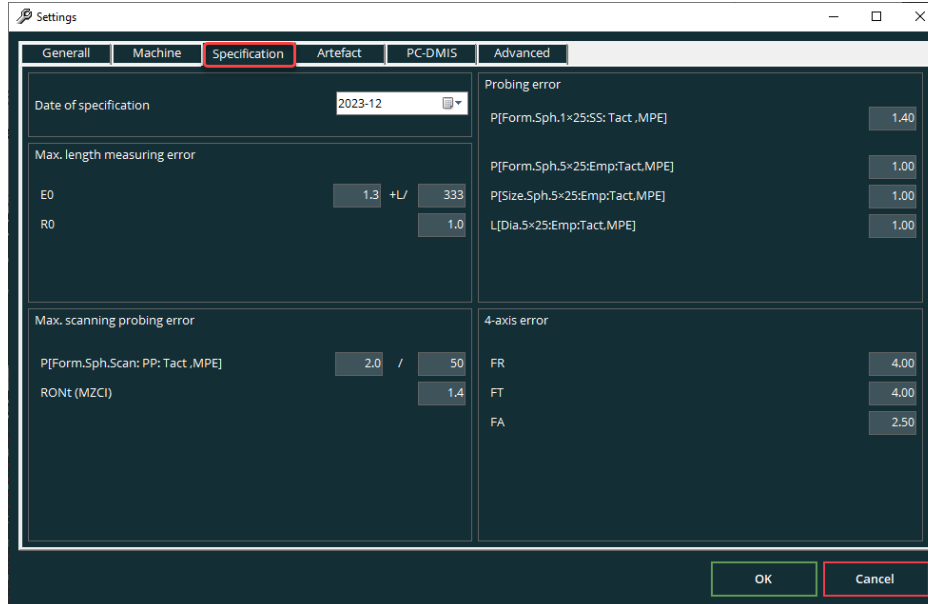
The "rotary table" checkbox is available in the user interface (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Rotary table](#)).

If the "Rotary table" checkbox is not available in the user interface, the empty field must be selected. Alternatively, a selected rotary table can be deleted as described under "[CMM type](#)"(see above).

In both cases, the input field "Rotary table SN" is not available.

- "Specification" tab

The input fields can be used to enter data on the CMM specification. The values can be taken from the data sheet.

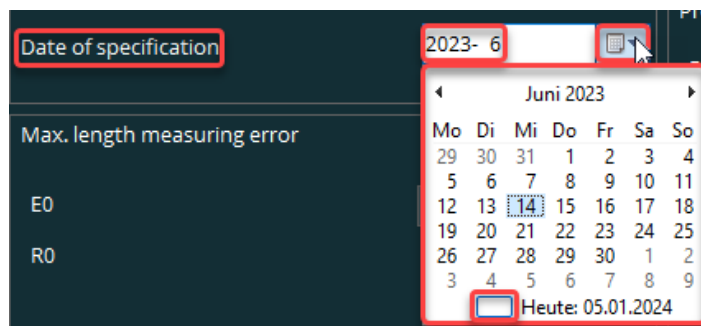


After installing the software, these fields are blank and must be filled in as described below.

- Date of specification:

By clicking on the "📅" symbol a drop-down list opens from which the date can be selected. The year and month are displayed and saved.

Alternatively, you can change the year and month manually. To do this, click on the respective value and overwrite it.

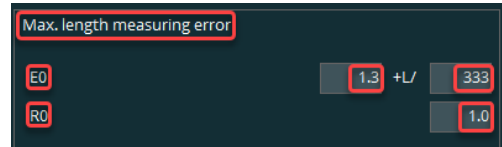


Click on the "📅" symbol to adopt the current date.

- "Max. Length measuring error"

- E0:

The maximum permissible error (limit) for the length measurement error is entered. More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Check sphere and ring gauge](#) → [Sphere single points \(formerly: PFTU\)](#) → [Length measurement deviation](#), as well as [Ring single points \(formerly: RONt single points\)](#) → [Length measurement error](#) as well as [Ring scanning \(formerly: RONt Scanning\)](#) → [Length measurement error](#) and [Step Gauge](#) → [Length measurement error](#).



In the first input field, the limit is entered in μm and in the second field, the measuring length is entered in mm.

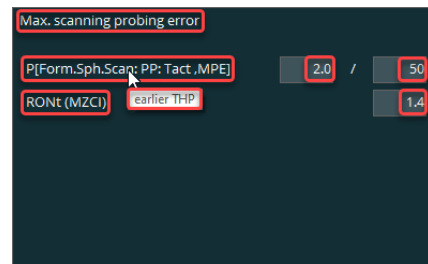
- R0:

The maximum permissible error for the repeatability range is entered in " μm ". More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Check sphere and ring gauge](#) → [Step Gauge](#) → [Repeatability range](#).

- "Max. Scanning probing error" area

- P[Form.Sph.Scan:pp:Tact.MPE]:

The maximum permissible error for the scanning probing error is entered. More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Check sphere and ring gauge](#) → [Sphere scanning \(formerly: THP\)](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlier THP".



In the first input field, the limit is entered in μm and in the second field, the time is entered in seconds.

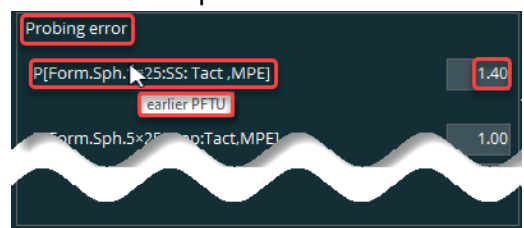
- RONt (MZCI):

The maximum permissible error for the form error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Check sphere and ring gauge](#) → [Ring scanning \(formerly: RONt Scanning\)](#) → [Scanning probing error](#).

- "Probing error" area

- P[From.Sph.1x25:SS:Tact,MPE]:

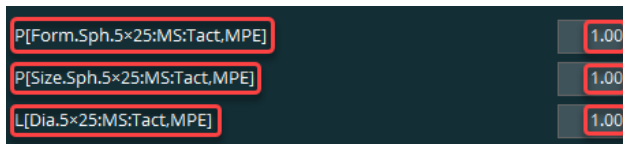
The limit for the single probe form probing error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Check sphere and ring gauge](#) → [Sphere single points \(formerly: PFTU\)](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlier PFTU".



If a fixed probe is selected in the user interface (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#)), the limit values for the following evaluations can be defined:

- P[Form.Sph.5x25:MS:Tact,MPE]:

The maximum permissible error for the multiple probing system form error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Multi probe](#) → [PFTj](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlyer PFTj".



- P[Size.Sph.5x25:MS:Tact,MPE]:

The maximum permissible error for the multiple probing system size error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Multi probe](#) → [PSTj](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlyer PSTj".

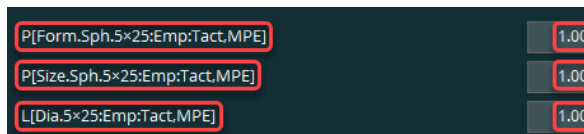
- P[Dia.Sph.5x25:MS:Tact,MPE]:

The maximum permissible error for the multiple probing system location error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Multi probe](#) → [PLTj](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlyer PLTj".

If a wrist is selected in the user interface (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#)), the limit values for the following evaluations can be defined:

- P[Form.Sph.5x25:Emp:Tact,MPE]:

The maximum permissible error for the multiple probing system form error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Multi probe](#) → [PFTj](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlyer PFTj".



- P[Size.Sph.5x25:Emp:Tact,MPE]:

The maximum permissible error for the multiple probing system size error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Multi probe](#) → [PSTj](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlyer PSTj".

- P[Dia.Sph.5x25:Emp:Tact,MPE]:

The maximum permissible error for the multiple probing system location error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Multi probe](#) → [PLTj](#). If the mouse pointer is moved over the name, a tooltip appears with the note: "earlyer PLTj".

- “4-axis error“ area

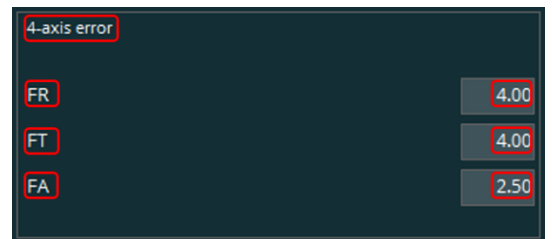
This area is only available, if a rotary table has been selected in the Machine tab (see chapter: [Menu item “Extras”](#), section: [Settings](#), point: ["Machine" tab](#) → ["Rotary Table" area](#)).

- FR:

The maximum permissible limit value of the deviation from the radial form is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Rotary table](#) → [4-axis deviation](#) → [Rotary table error – Radial \(FR\)](#).

- FT:

The maximum permissible tangential error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Rotary table](#) → [4-axis deviation](#) → [Rotary table error - Tangential \(FT\)](#).

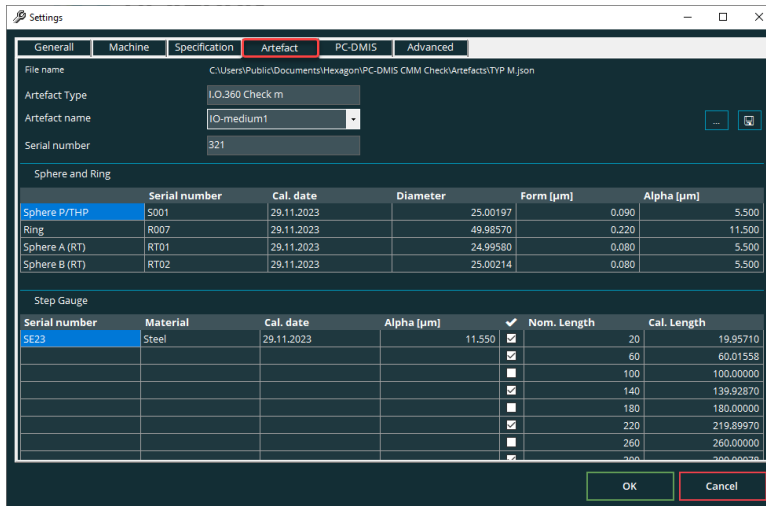


- FA:

The maximum permissible axial error is entered in μm . More detailed information is given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Rotary table](#) → [4-axis deviation](#) → [Rotary table error - Axial \(FA\)](#).

- "Artefact" tab

All data relevant to the test specimen can be defined here.



The screenshot shows the 'Artefact' tab in the Settings window. The 'File name' field contains 'C:\Users\Public\Documents\Hexagon\PC-DMIS CMM Check\Artefacts\TYP M.json'. The 'Artefact Type' is 'I.O.360 Check m'. The 'Artefact name' is 'IO-medium1'. The 'Serial number' is '321'.

The 'Sphere and Ring' table is as follows:

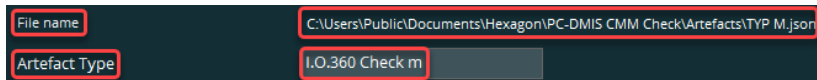
	Serial number	Cal. date	Diameter	Form [µm]	Alpha [µm]	
Sphere P/THP	S001	29.11.2023	25.00197	0.090	5.500	
Ring	R007	29.11.2023	49.98570	0.220	11.500	
Sphere A (RT)	RT01	29.11.2023	24.99580	0.080	5.500	
Sphere B (RT)	RT02	29.11.2023	25.00214	0.080	5.500	

The 'Step Gauge' table is as follows:

Serial number	Material	Cal. date	Alpha [µm]	Nom. Length	Cal. Length
SE23	Steel	29.11.2023	11.550	20	19.95710
				60	60.01558
				100	100.00000
				140	139.92870
				180	180.00000
				220	219.89970
				260	260.00000
				300	300.00000

- File name

The name of the currently loaded or used file is displayed.



- Artefact Type

The artefact type selected in the [user interface](#) → [Selection and sequence of tests](#) under [artefact type](#) is displayed. The entry cannot be changed. The artefact type comes from the file created with the CMM Monitoring software from eumetron. The "*.ACDX" file created with this software can be loaded, edited and then saved as a "*.json" file (see below: "[Button: Save Artefact](#)").

Currently 3 test specimen types are supported:

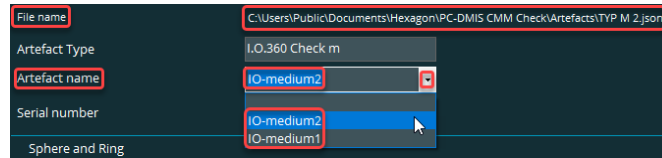
- CMM-Check 2.0
- IO360-m
- IO360-L

- Artefact name

Clicking on the "▼" symbol opens a drop-down list from which the desired artefact can be selected. This field is pre-assigned with the artefact name selected in the [User interface](#) → [Selection and sequence of tests](#) under [Artefact Name](#).

If an "*.ACDX" file is loaded, the test specimen name defined there is used..

If a "*.json" file is used, all artefact names belonging to this artefact type are displayed. If an artefact is selected, the corresponding path and name of the file is displayed under "File name" (see above).

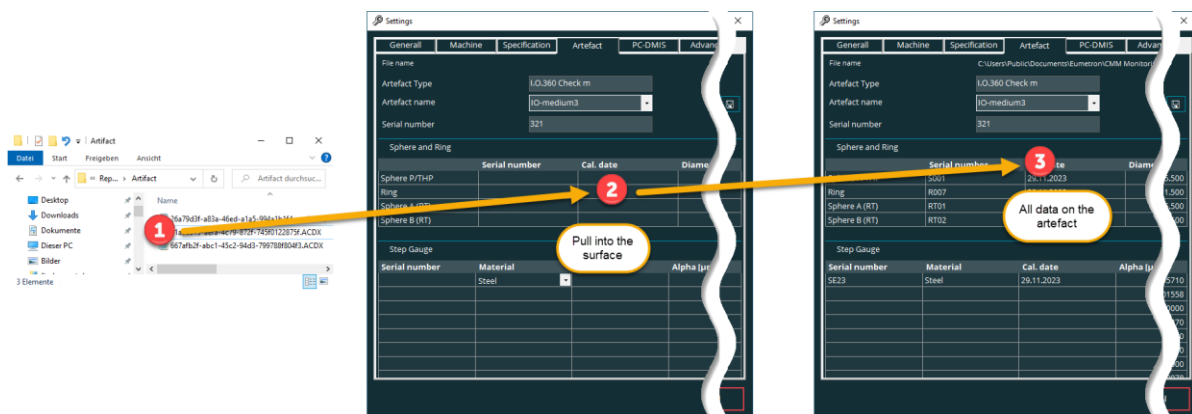


To assign a new artefact name, select the empty row above the displayed artefacts. The new name is then entered.

The tables in the "[Sphere and ring gauge](#)" and "[Step Gauge](#)" areas are emptied and can be filled with values manually. Once all values have been entered, the test specimen must be saved with "[Save Artefact](#)" (see below).

Alternatively, an existing "*.ACDX" file can be loaded and edited. To do this, click on the "📁" symbol on the right and select the desired file in the file manager. All data relating to this artefact is displayed and can be changed manually (see below: "[Sphere and ring gauge](#)" area" and "[Step gauge](#)" area).

It is also possible to load an "*.ACDX" file by "drag and drop" as usual under Windows. To do this, select the file in the file manager and drag it into the software with the mouse (area freely selectable). After releasing the mouse button, all data belonging to this artefact is displayed and can also be changed manually.



Once all values have been entered, the artefact must be saved with "[Save Artefact](#)" (see below). The selected artefact is used in the user interface (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Artefact Type](#) and [Artefact Name](#)).



If the changes are not saved, they are only temporary. This means that after restarting the software or changing the test specimen, the changes made are discarded.

- „Sphere and Ring“ area
- "Sphere P/THP"; "Ring"; "Sphere A (RT)"; "Sphere B (RT)"

Only numbers are permitted in the "Diameter", "Form [µm]" and "Alpha [µm]" columns. If something else is entered, a message appears and the entry must be corrected.

Sphere and Ring						
	Serial number	Cal. date	Diameter	Form [µm]	Alpha [µm]	
Sphere P/THP	S001	29.11.2023	25.00197	0.090	5.500	
Ring	R007	29.11.2023	49.98570	0.220	11.500	
Sphere A (RT)	RT01	29.11.2023	24.99580	0.080	5.500	
Sphere B (RT)	RT02	29.11.2023	25.00214	0.080	5.500	



Note: If values are changed at this point and the measurement results are evaluated using the "[CMM Monitoring](#)" software from company eumetron, it must be ensured that the values here match the values in "CMM Monitoring".

- **Serial Number:**
This field is pre-assigned with the artefact's serial number contained in the file of the "[CMM Monitoring](#)" software (see above). If necessary, you can change this value.
- **Calibration date:**
This field is pre-assigned with the artefact's calibration date contained in the file of the "[CMM Monitoring](#)" software (see above). If necessary, you can change this value.
- **Diameter:**
This field is pre-assigned with the artefact's diameter contained in the file of the "[CMM Monitoring](#)" software (see above).
- **Form [µm]:**
This field is pre-assigned with the artefact's form error contained in the file of the "[CMM Monitoring](#)" software (see above). If necessary, you can change this value (unit).
- **Alpha [µm]:**
This field is pre-assigned with the artefact's coefficient of expansion contained in the file of the "[CMM Monitoring](#)" software (see above). If necessary, you can change this value. Coefficients of expansion are applied in the measuring routine for the respective standards (sphere, ring, gauge).

- „Step gauge“ area

Only numbers are permitted in the "Alpha [μm]", "Nom. Length" and "Cal. Length" columns. If something else is entered, a message appears and the entry must be corrected.

Step Gauge						
Serial number	Material	Cal. date	Alpha [μm]	<input checked="" type="checkbox"/>	Nom. Length	Cal. Length
SE23	Steel	29.11.2023	11.550	<input checked="" type="checkbox"/>	20	19.95710
				<input checked="" type="checkbox"/>	60	60.01558
				<input type="checkbox"/>		100.00000
				<input type="checkbox"/>	260	260.00000
				<input checked="" type="checkbox"/>	300	300.00078
				<input type="checkbox"/>		



Note: If values are changed at this point and the measurement results are evaluated using the "[CMM Monitoring](#)" software from company eumetron, it must be ensured that the values here match the values in "CMM Monitoring".

- Serial number

This field is pre-assigned with the step gauge's serial number contained in the file of the "[CMM Monitoring](#)" software (see above). If necessary, you can change this value.

- Material

If no file is loaded (see below: [Button: Import Artefact](#)) or "empty" is selected for "[Artefact name](#)" (see above), a drop-down list can be opened by clicking on the "▼" button, from which "Steel" or "Nexcera" can be selected.

If an "*.ACDX" file is selected (see [above](#)), this field is pre-assigned with the material defined in it.

- Cal. date

This field is pre-assigned with the step gauge's calibration date contained in the file of the "[CMM Monitoring](#)" software (see above). If necessary, you can change this value.

- Alpha [μm]

This field is pre-assigned with the step gauge's coefficient of expansion contained in the file of the "[CMM Monitoring](#)" software (see above). If necessary, you can change this value. The coefficient of expansion is transferred to the measurement routine for the respective artefacts (ball, ring, step gauge block).


- **Nom. Length**

This field is pre-assigned with the step gauge's nominal length contained in the file of the "[CMM Monitoring](#)" software (see above).

The lengths to be measured on the artefact are defined by activating the checkboxes in the left-hand column "✓". These are also preset with the values from the "[CMM Monitoring](#)" software file.


If the last checkbox is activated, a new empty line is created. If no values are defined for the lengths, these lines are not saved when the "*.json" file (see [below](#)) is saved.

- **Button: Import Artefact**

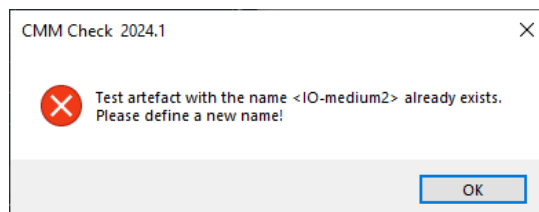
By clicking on the "" symbol at the top right, the file manager is opened and an "*.ACDX" file created with the "[CMM Monitoring](#)" software can be loaded.

All relevant data contained in this file is transferred. If this data is to be used permanently, a "*.json" file must be created using the "Save test object" button.

- **Button: Save Artefact**

By clicking on the "" symbol at the top right, the file manager is opened and a "*.json" file can be created after assigning a name. As CMM Check works exclusively with this file format, all changes made without creating the "*.json" file are only temporary. If a different e.g.: [artefact name](#) (see above) is selected, another "*.ACDX" file is loaded or the software is restarted, any changes made are discarded.

If the artefact name (see above: [Artefact name](#)) is available, an existing file can be overwritten. However, a new file cannot be created. The following message appears:



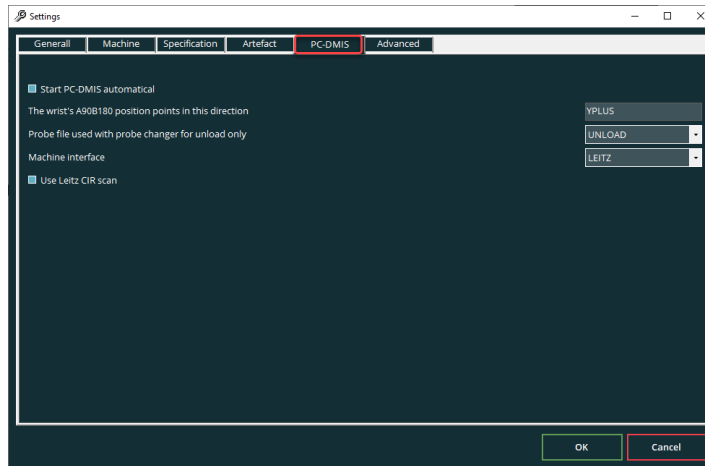
In this case, a new artefact name must be assigned or an existing file must be overwritten.



Note: If values are changed at this point and the measurement results are evaluated using the "[CMM Monitoring](#)" software from company eumetron, it must be ensured that the values here match the values in "CMM Monitoring".

- "PC-DMIS" tab

Settings relevant to PC-DMIS can be made here.



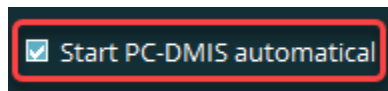
- Start PC-DMIS automatically

- Checkbox activated

If the checkbox is activated and PC-DMIS has not been started, the last PC-DMIS version used will be started. If PC-DMIS has already been started and the checkbox is activated, it is ignored.

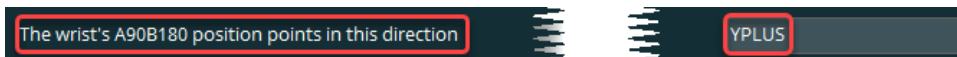
- Checkbox deactivated

If the checkbox is deactivated and PC-DMIS has not yet been started, only rudimentary settings can be made. In this case, we recommend closing the software, starting PC-DMIS and then starting CMM Check.



- The wrist's A90B180 position of the points in the direction

This value is for information only and is read directly from PC-DMIS. It is assumed that PC-DMIS is set up correctly and the machine's acceptance test was successful. The entry cannot be changed. If this is necessary, the change must be made in PC-DMIS and CMM Check restarted.



- Probe file used with probe changer for “Unloading only”

This field is pre-assigned with the file defined in PC-DMIS for storing the probe in the probe changer rack. If necessary, this entry can be changed. To do this, click on the ▼ symbol or the selection field and select the required probe from the drop-down list.



If the first letter is entered using the keyboard, the first value with that letter is selected. By entering this letter again, the next value is selected, etc. Doing this, you can quickly find the desired entry in a long drop-down list.

Example (drop-down list in the image above):

1. Keyboard entry: P -> Selection: PRESET
2. Keyboard entry: P -> Selection: PRESET _1
3. Keyboard entry: P -> Selection: PRESET_A0B0

- Machine interface

This selection field is pre-assigned with the controller connected to the measurement machine. If necessary, this entry can be changed. To do this, click on the "▼" icon or the selection field and select the existing controller from the drop-down list.



Caution: The machine interface set here has direct influence on the sphere scan.



Select “other”; if the controller is not known.

By entering the letters "L", "F", "I" or "O", the respective entry starting with this letter is selected.

If you select I++, the input field "CTSServer (IplusPlus)" is available, in which the corresponding value is automatically entered. For example, a value of "205" means that a rotary table is present. If "207" is output, there is no rotary table. At this point, the value cannot be changed.



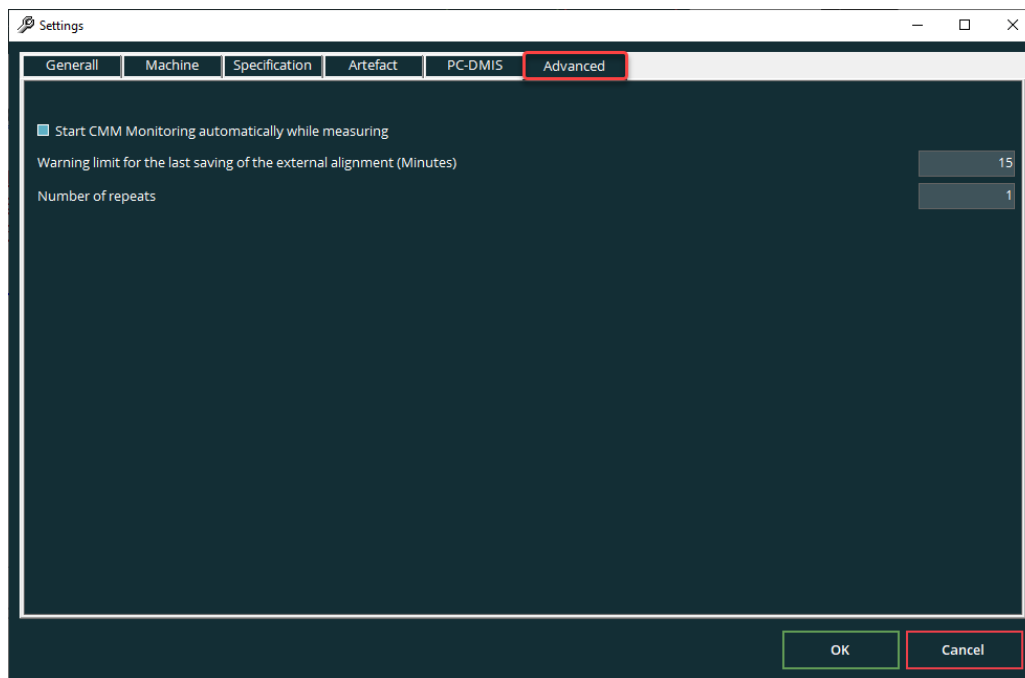
- Use Leitz CIR scan

Depending on the connected controller of the measuring machine, you can enable or disable this checkbox to determine whether or not the Leitz Circular scan shall be used.



- “Advanced” tab

You can enter additional data using the input fields.



- Start CMM Monitoring automatically while measuring

If this checkbox is enabled, the "CMM Monitoring" software from eumetron is started automatically during the measurement (see section: [User interface](#), section: "[Start measurement](#)" button) for the evaluation of the generated files (see section: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)). After the measurement has been completed, it is closed, but the evaluation file (PDF) remains open.

Start CMM Monitoring automatically while measuring

If the checkbox is disabled, the software must be started manually.

- Warning limit for the last saving of the external alignment (Minutes)

At this point, a time window is set in minutes. If the "CMM Check manual alignment" checkbox is disabled in the user interface and the time window is exceeded, a corresponding message is issued (see chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: "[CMM Check manual alignment](#)" checkbox).

Warning limit for the last saving of the external alignment (Minutes) 15

- Number of repeats

The number of measurement runs is defined. If a number greater than "1" is entered, the input fields "Restart PC-DMIS after (repeats)" and "Delay time after PC-DMIS restart (seconds)" will be available.

Number of repeats	1
-------------------	---

- Restart PC-DMIS after (repeats)

To prevent data from increasing in the background, an interval is defined after which number of measurement routine starts PC-DMIS is closed and restarted. If the time window is exceeded, PC-DMIS restarts before the next measurement starts and CMM Check waits for the end of the time window set under "[Delay time after PC-DMIS restart \(seconds\)](#)" before carrying out the next action.

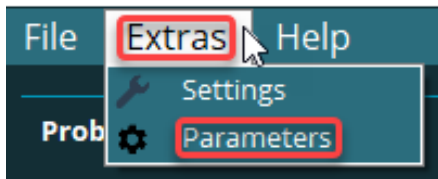
Number of repeats	100
Restart PC-DMIS after (repeats)	30
Delay time after PC-DMIS restart (seconds)	2

- Delay time after PC-DMIS restart (seconds):

To ensure that PC-DMIS is started in full and all necessary settings have been loaded, a time window in seconds is defined. CMM Check does not carry out any actions in this time window after the PC-DMIS restart (see also point: [Restart PC-DMIS after \(repeats\)](#)).

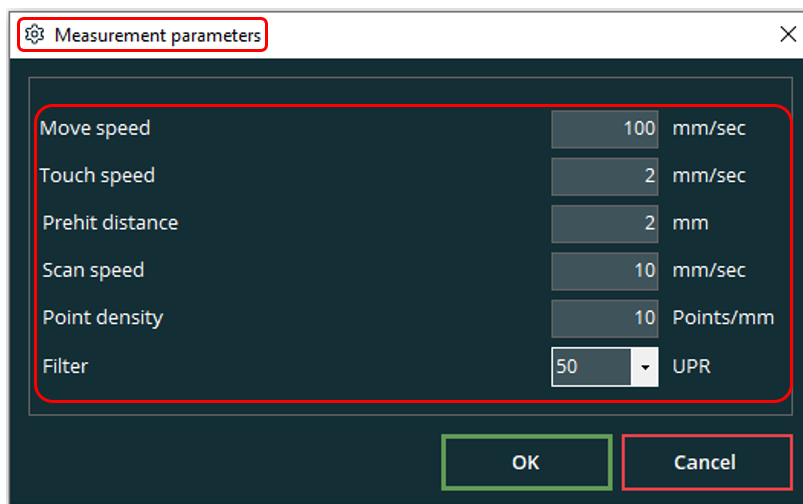
Number of repeats	100
Restart PC-DMIS after (repeats)	30
Delay time after PC-DMIS restart (seconds)	2

7.2. Parameters



If this option is selected, the "Measurement parameters" dialog window opens, in which global settings for the measurements can be made (see section: [User interface](#); section: [Selection and sequence of tests](#)).

These parameters are applied directly in the respective measurement routine before each measurement.



- "Measurement parameters" dialog window

After installation, this area is pre-populated with default values. The values can be entered by left-clicking the mouse button or selecting them from a drop-down list.
- Move speed

The speed before and after the measurement is entered.
- Touch speed

The speed during the measurement is entered.
- Prehit distance

The distance to the part before the measurement is set. Up to this distance, the measuring machine moves at [move speed](#) (see above). Starting from this value, the measuring machine moves at [touch speed](#) (see above).

- Scan speed

The speed at which the scan is performed is set.

- Point density

The number of scan points taken per millimetre is set.

- Filter

The cut-off length (undulations per revolution = UPR) for determining the tolerance of form is defined. This tolerance is used in the "Sphere scanning" and "Ring scanning" tests (see section: [User interface](#), section: [Selection and sequence of tests](#), point: [Sphere scanning \(formerly: THP\)](#) and point: [Ring scanning \(formerly: ROnT Scanning\)](#)).

By clicking on the "▼" symbol a drop-down list opens where you can select the required value.

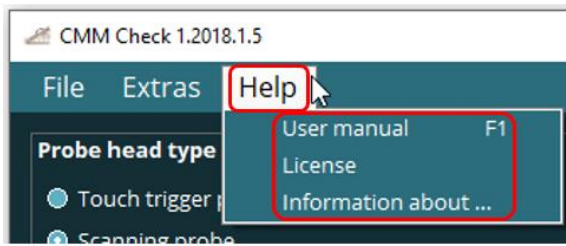


If a cut-off length shall be used that is not available in the drop-down list, it can be inserted manually. You can enter the required value by clicking into the input field. The previously selectable entries will be still available.



You can remove an entry, by selecting and deleting it (e.g. with the "Del" key). Alternatively, an entry can be selected from the drop-down list.

8. Menu item “Help”



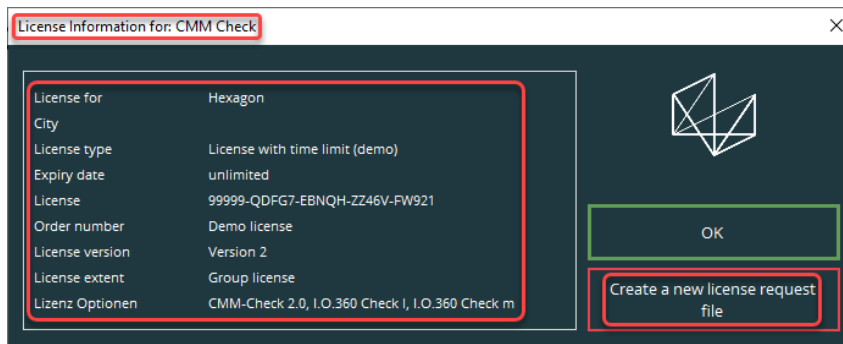
8.1. User manual

This opens the user manual. Alternatively, this can also be opened with the function key "F1" at any point in the user interface.

8.2. License

"License" opens the information about your software license in the following window (e.g.: license type and expiry date).

A new license request can be created using the "Create a new license request" button.



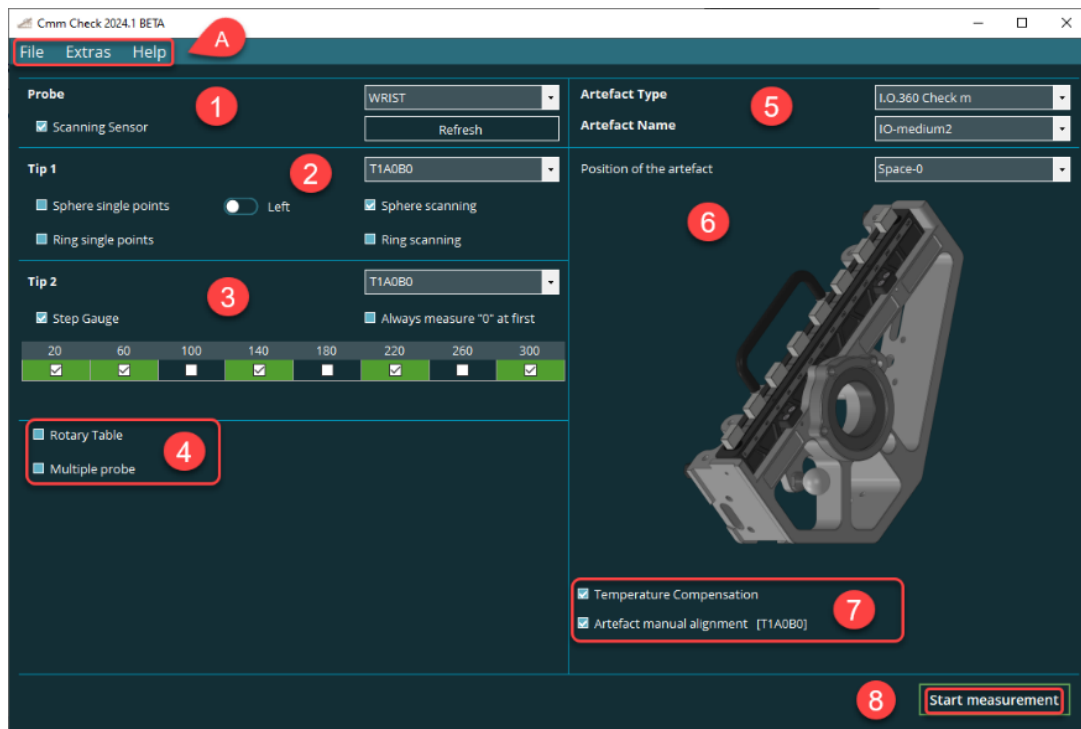
8.3. Information about...

With "Information about" you receive further information (e.g. version number of the software).

9. User interface

Various settings can be made in the user interface and tests can be selected and started.

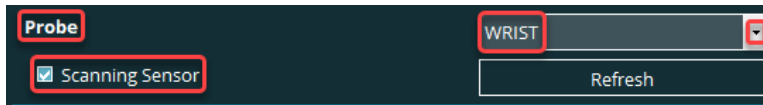
The settings made under the "Extras" menu must be taken into account (see section: [Menu item "Extras"](#), section: [Settings](#) and section: [Parameters](#)).



A: Menu option

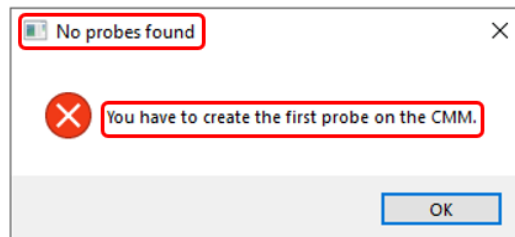
1. Probe selection
2. selection of the probe tip, position of the test sphere and selection of the tests for test sphere and ring gauge
3. Test for step gauge and choice of stylus tip to be used
4. Selection of tests for rotary table and multiple probe
5. Selection of the artefact
6. Selection and schematic representation of the position of the artefact
7. Selection of temperature compensation and manual alignment
8. button for starting the measurement

9.1. Selection of the probe system and probe



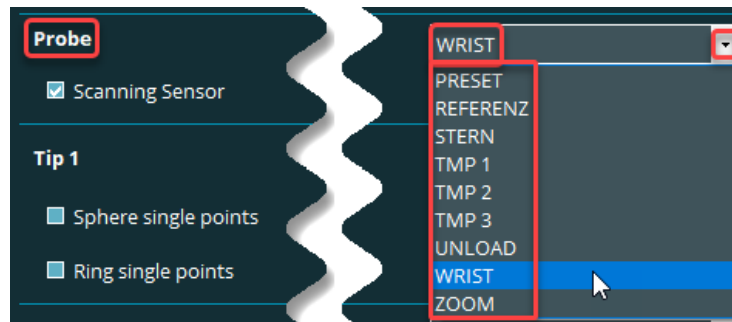
- **Probe**

At least 1 probe must have been created and calibrated. If this is not the case, the following message is shown when starting CMM Check (see section: [Operation](#), section: [Start "CMM Check"](#)):



After confirming this message with OK, the software is closed and a probe must be created in PC-DMIS.

Then, by clicking on the "▼" icon or the selection field, a drop-down list can be opened in which all the probes defined in PC-DMIS are included and the desired entry can be selected.



If the first letter is entered using the keyboard, the first value with that letter is selected. By entering this letter again, the next value is selected, etc. Doing this, you can quickly find the desired entry in a long drop-down list.

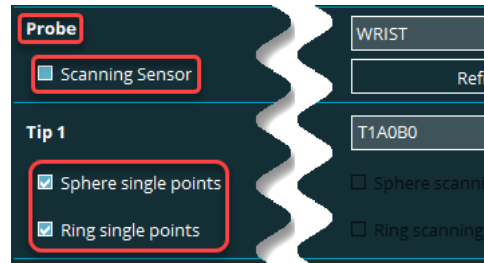
Example (drop-down list in the image above):

1. Keyboard entry: T -> Selection: TMP 1
2. Keyboard entry: T -> Selection: TMP 2
3. Keyboard entry: P -> Selection: TMP 3

- „Scanning sensor“ checkbox

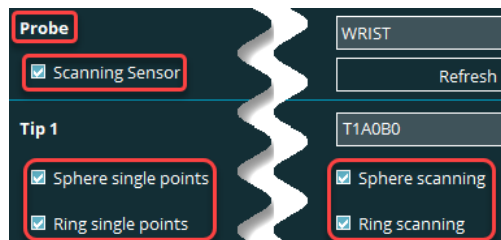
- Checkbox deactivated

If a touch trigger probe is present on the measurement machine, this checkbox must be deactivated. As only single points can be recorded, only the checkboxes for "[Sphere single points](#)", "[Ring single points](#)" and "[Step Gauge](#)" (see below) are available for "Tip 1".

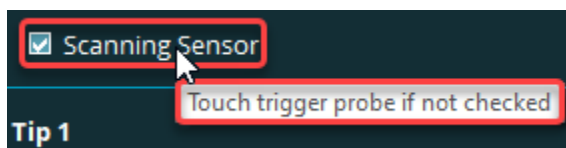


- Checkbox activated

If a scanning touch probe is present on the measurement machine, the checkbox must be activated. As the measurement points can be recorded both individually and by scanning with this touch probe, the "[Sphere scanning](#)" and "[Ring scanning](#)" checkboxes (see below) can be selected in addition to those mentioned [above](#).



If the mouse pointer is moved over the name, a tooltip appears with the note: "Touch trigger probe if not checked".

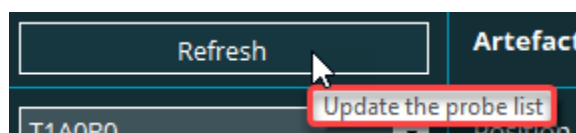


- "Refresh" button

If the application is opened and a probe required for the measurement is created and calibrated in parallel in PC-DMIS, it cannot yet be selected in the [Probe](#) drop-down list (see above). This function updates the drop-down list and the probe can be selected. CMM Check is not available during the update. When the operation is completed, the user interface is shown again.

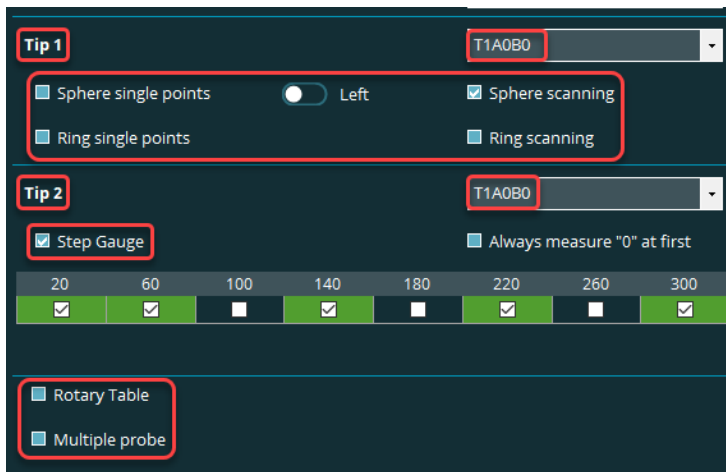


If the mouse pointer moves the button, a tooltip appears with the note: "Update the probe list".



When CMM Check is started, the drop-down list is automatically updated.

9.2. Selection and sequence of tests



The settings under the menu item "[Extras](#)" → "[Settings](#)" in the "[Artefact](#)" tab (see above) must be taken into account.



The position of the artefact (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Position of the artefact](#)) on the measurement machine must be taken into account.



The procedures described below refer to the [artefact type](#) "I.O.360 Check m" (see below). If a different artefact type is used, these procedures may differ.

- **Check sphere and ring gauge**

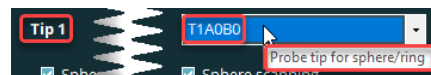
By enabling the corresponding checkbox, the desired test is selected and run by pressing the "Execute" button (see section: [User interface](#), section: ["Start measurement" Button](#)).

If multiple checkboxes are enabled, the selected tests are executed one after the other.

- **Tip 1**

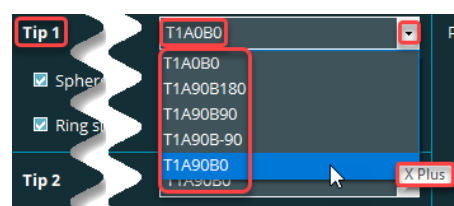
Depending on the probe selected under "Probe" (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#)), the probe tip can be selected for the tests to be carried out. This is used for the tests to be carried out on the check sphere and the ring gauge.

If the mouse pointer is moved over the "▼" symbol or the selection field, a tooltip appears with the note: "Probe tip for sphere/ring".



on the "▼" symbol or the selection field opens a drop-down list with all available probe tips. If the mouse pointer is moved over a probe tip, a tooltip appears. If a nickname has been assigned to the probe tip in PC-DMIS, it will be displayed. If this is not the case, the probe ID appears.

The desired entry can then be selected.



If a manual alignment is to be carried out (see section: [Temperature compensation and manual alignment](#), point: "[Artefact manual alignment](#)" checkbox), the probe tip selected here is used. The prerequisite is that at least one test (see [below](#)) is selected. If *no* test is selected, the tip selected in the [step gauge](#) → [tip 2](#) (see below) is used. Different rules apply for the "[Multiple probe](#)" test (see below). Details on manual alignment for the multiple probe test are described in section: [Temperature compensation and manual alignment](#), point: "[Check sphere manual alignment](#)" checkbox.

By activating the corresponding checkbox, the desired test is selected and executed using the "Start measurement" button (see chapter: [User interface](#), section: "[Start measurement](#)" button). If several checkboxes are activated, the selected tests are carried out one after the other.

Before carrying out the tests, the tip selected for "[Tip 1](#)" (see above) should be checked and changed if necessary.

- Sphere single points (formerly: PFTU)



The position of the test sphere (see [below](#)) must be taken into account.

If the "Artefact manual alignment" checkbox is enabled, the measurement starts with the manual alignment. This operation is described in detail in chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: "[Artefact manual alignment](#)" checkbox. The measurement is then carried out as described below.

If the "[Artefact manual alignment](#)" checkbox is disabled, the measurement is carried out in the CNC mode as follows:

- The position of the check sphere is determined with 5 measuring points. Then, 25 evenly distributed points are taken.

After the measurement, the measuring machine moves by a fixed value in the vector direction of the location selected under "Position of the artefact" (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Position of the artefact](#)).

The following values are output according to DIN EN ISO 10360-5 (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)):

- Single probe form error:

The form error is determined from the range of the 25 radial distances ($R_{\max} - R_{\min}$). The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Specification](#)" tab → [P\[From.Sph.1x25:SS:Tact,MPE\]](#)).

- Length Measurement error:

In addition, the length measurement error is determined. The difference between the measured value and the nominal diameter of the check sphere is output. The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → [E0](#)).

This test is not part of a standard or guideline. It provides additional information about the accuracy of the measuring system.

- Sphere scanning (formerly: THP)



The position of the test sphere (see [below](#)) must be taken into account.

This checkbox is only available if the checkbox for „[Scanning sensor](#)“ (see above) under „[Probe](#)“ (see above) is enabled.



If the "[Artefact manual alignment](#)" checkbox is enabled, the measurement starts with the manual alignment. This operation is described in detail in chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: "[Artefact manual alignment](#)" checkbox. The measurement is then carried out as described below.

If the "[Artefact manual alignment](#)" checkbox is disabled, the measurement is carried out in the CNC mode as follows:

- 4 defined paths are scanned on the check sphere. The point density and scan speed are defined under "Extras" → "Parameters" (see chapter: [Menu item "Extras"](#), section: [Parameters](#), point: "[Measurement parameters](#)" dialog window → [Scan speed](#) and [Point density](#)).

After the measurement, the measuring machine moves by a fixed value in the vector direction of the location selected under "Position of the artefact on the CMM" (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Position of the artefact](#)).

The following values are output according to DIN EN ISO 10360-5 (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)):

- Scanning probing error:

The probing error is determined from the range of all scan radii ($R_{max} - R_{min}$). The filter defined under "Extras" → "Parameters" is used for this purpose → (see Section: [Menu item "Extras"](#), section: [Parameters](#), point: "[Measurement parameters](#)" dialog window → [Filter](#)).

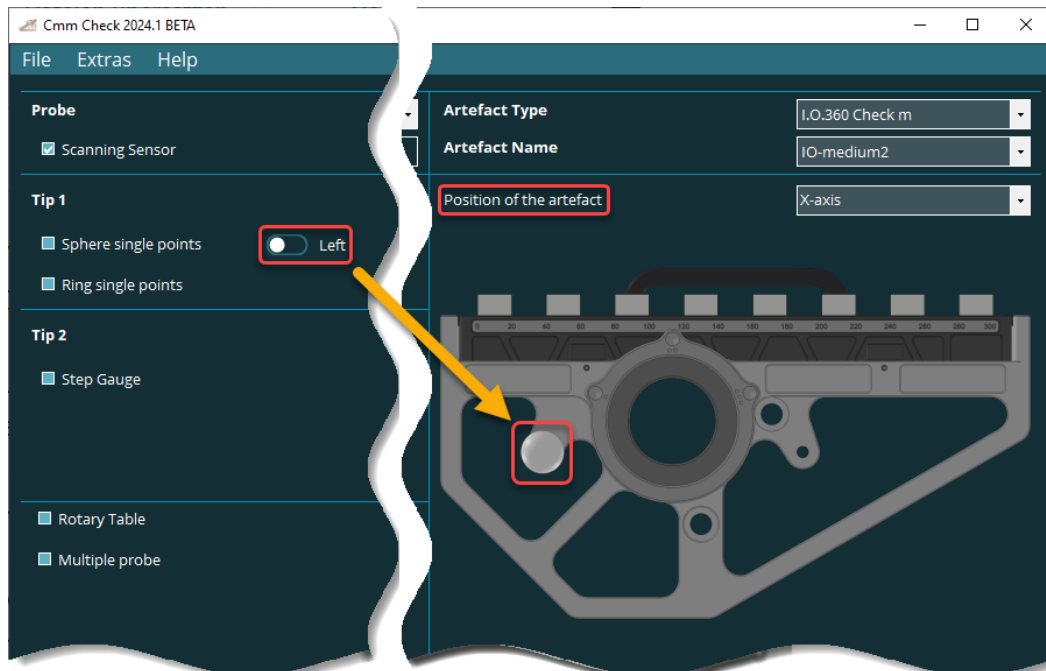
In addition, the maximum deviation of a scanned point to the radius of the reference sphere and the measuring time are determined. The measuring time must not exceed the time defined under [menu item "Extras"](#) → "[Settings](#)" → "[Specification](#)" tab.

The limit value and measuring time are defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Specification](#)" tab → [P\[Form.Sph.Scan:pp:Tact.MPE\]](#)).

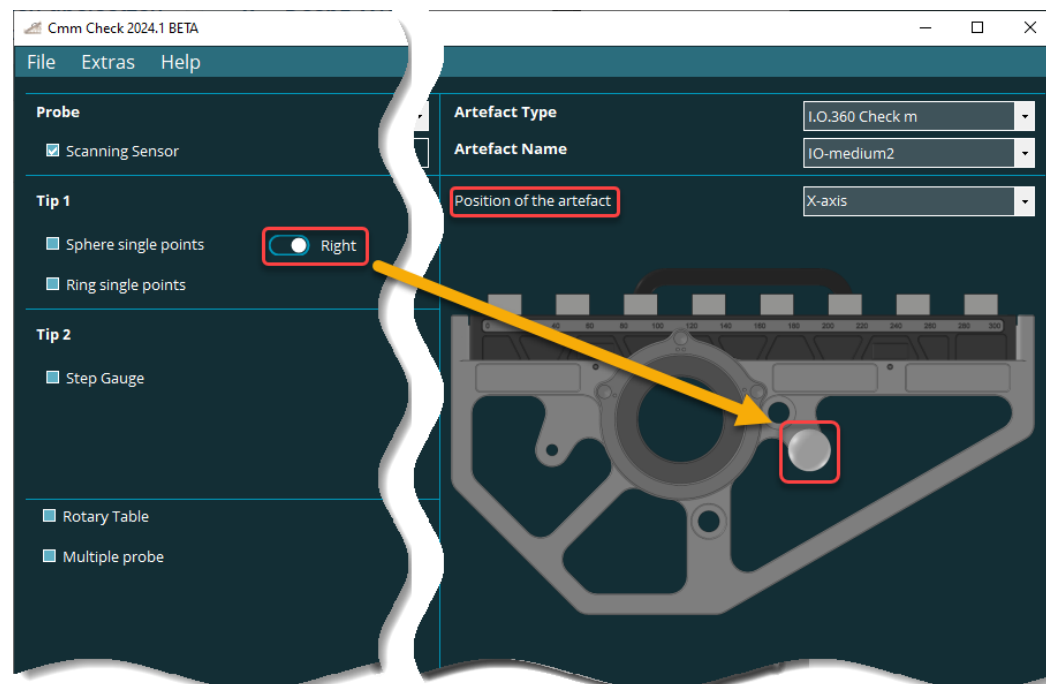
- Position of the test sphere

The test sphere on the artefact can be located to the right or left of the ring gauge. To ensure that the test sphere can be found during the "[Sphere single points](#)" and "[Sphere scanning](#)" tests (see above in each case), the position must be defined. To do this, click on the slider. "Left" or "Right" is displayed next to the slider. The selected position is also displayed schematically in the "Position of the artefact" area.

Example "Left":



Example "Right":



- Ring single points (formerly: RONT single points)

If the "[Artefact manual alignment](#)" checkbox is enabled, the measurement starts with the manual alignment. This operation is described in detail in chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: "[Artefact manual alignment](#)" checkbox. The measurement is then carried out as described below.



If the "[Artefact manual alignment](#)" checkbox is disabled, the measurement is carried out in the CNC mode as follows:

- A point is measured on the face of the ring gauge (reference for the depth of the following measurement). A cylinder with 2 circles (4 points each) is determined in the ring gauge. Then 12 measuring points are taken on the ring gauge, evenly distributed around the circumference.

After the measurement, the measuring machine moves by a fixed value in the vector direction of the location selected under "Position of the artefact" (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Position of the artefact](#)).

The following values are output based on the DIN EN ISO 12181 standard (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)):

- Single probe form error:
The form error is determined from the range of the 12 radial distances ($R_{max} - R_{min}$). The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → [RONT \(MZCI\)](#)).
- Length Measurement error:
The difference between the measured value and the nominal diameter of the reference ring is output. The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → point: [E0](#)).

- Ring scanning (formerly: RONt Scanning)

This checkbox is only available if the checkbox for „[Scanning sensor](#)“ (see above) under “[Probe](#)“ (see above) is enabled.

If the "[Artefact manual alignment](#)" checkbox is enabled, the measurement starts with the manual alignment. This operation is described in detail in chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: "[Artefact manual alignment](#)" checkbox. The measurement is then carried out as described below.



If the "[Artefact manual alignment](#)" checkbox is disabled, the measurement is carried out in the CNC mode as follows:

- A point is measured on the face of the ring gauge (reference for the depth of the following measurement). A cylinder with 2 circles (4 points each) is determined in the ring gauge. A circle is then scanned on the ring gauge. The point density and scan speed are defined under "Extras" → "Parameters" (see chapter: [Menu item "Extras"](#), section: [Parameters](#), point: "[Measurement Parameters](#)" dialog window → [Scan speed](#) and [Point density](#)).

After the measurement, the measuring machine moves by a fixed value in the vector direction of the location selected under "Position of the artefact on the CMM" (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Position of the artefact](#)).

The following values are output according to DIN EN ISO 12181-1 (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)):

- Scanning probing error:
The form error corresponds to the roundness error of the scanned circle. The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Specification](#)" tab → [RONt \(MZCI\)](#)).
- Length Measurement error:
In addition, the length measurement error is determined according to DIN EN ISO 10360-2. The difference between the measured value and the nominal diameter of the reference ring is output. The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Specification](#)" tab → [E0](#)).

- **Step Gauge**

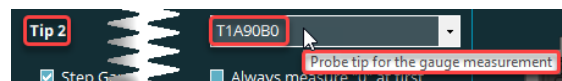
If the checkbox is activated, [tip 2](#) can be selected and the [inspection lengths](#) defined. The checkbox "[Always measure "0" at first](#)" (see below in each case) is also available.



- **Tip 2:**

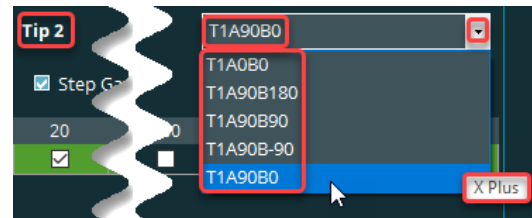
Depending on the probe selected under "Probe" (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#)), the probe tip can be selected for the tests to be carried out. This is used for the tests to be carried out on the step gauge. The position of the artefact on the measurement machine must be taken into account (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Position of the artefact](#)).

If the mouse pointer is moved over the "▼" symbol or the selection field, a tooltip appears with the note: "Probe tip for the gauge measurement".



Clicking on the "▼" symbol or the selection field opens a drop-down list with all probe tips available for the selected probe (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#)).

If the mouse pointer is moved over a probe tip, a tooltip appears. If a nickname has been assigned to the probe tip in PC-DMIS, it will be displayed. If this is not the case, the probe ID appears.



The desired entry can then be selected.

If manual alignment is to be performed (see section: [Temperature compensation and manual alignment](#), point: ["Artefact manual alignment"](#) checkbox), and *no* test is selected for "[Check sphere and ring gauge](#)" (see above), the stylus selected here is used. Different rules apply for the "[Multiple probe](#)" test (see below). Details on manual alignment for the multiple probe test are described in section: [Temperature compensation and manual alignment](#), point: ["Check sphere manual alignment"](#) checkbox.



The procedures described below refer to the [artefact type](#) "I.O.360 Check m" (see below). If a different artefact type is used, these procedures may differ.

If the "Artefact manual alignment" checkbox is enabled, the measurement starts with the manual alignment. This operation is described in detail in chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: ["Artefact manual alignment" checkbox](#). The measurement is then carried out as described below.

If the "[Artefact manual alignment](#)" checkbox is disabled, the measurement is carried out in the CNC mode as follows:

- A measuring point is taken on the "0-space" of the gauge. Then 4 measuring points are taken on the front surface between the gauges and 2 measuring points on the upper surface between the gauges.

Subsequently, the defined test lengths (see: [Define inspection lengths](#) below) are determined at the gauge one after the other with 3 measurements each.

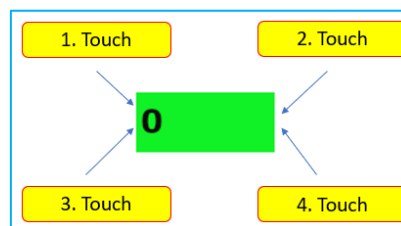
The sequence of touch points is defined with the checkbox "[Always measure "0" at first](#)" (see below).

After the measurement, the measuring machine moves by a fixed value in the vector direction of the location selected under "Position of the artefact" (see chapter: [User interface](#), section: [Selection and position of the artefact](#) , point: [Position of the artefact on the CMM](#)).

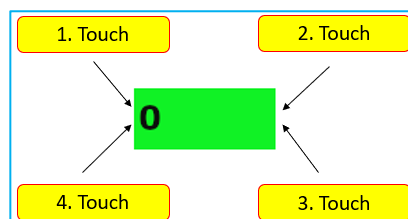
- Always measure "0" at first:

This checkbox is used to define the order of touches for determining the distances. If this checkbox is enabled, each measurement starts with a touch point on the left side of the gauge ("0-space").

- **Checkbox enabled:**
Each [measurement](#) (see above) starts with a touch point on the left side of the gauge (in the picture below illustrated by the example of the first four touches).

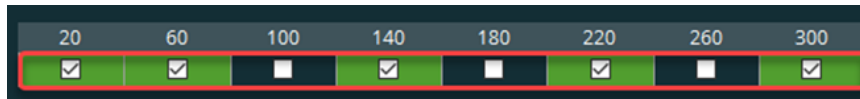


- **Checkbox disabled:**
Each [measurement](#) (see above) starts with a touch point on the then current side of the gauge (in the picture below illustrated by the example of the first four touches).



- Define inspection lengths:

The test lengths can be defined by activating and deactivating the checkboxes in the lower area. If the checkbox is activated, the field is highlighted in green.



The test lengths are pre-assigned with the test specimens selected under "[Artefact Type](#)" and "[Artefact name](#)" (see below in each case).

The following lengths are active by default:

- CMM-Check 2.0
 - Material: Steel
20 mm, 100 mm, 220 mm, 300 mm und 420 mm
 - Material: Nexera
20 mm, 120 mm, 220 mm, 320 mm und 420 mm
- I.O.360 Check I (abhängig vom eingesetzten Endmaß)
20 mm, 140 mm, 220 mm, 300 mm, 460 mm und 620
- I.O.360 Check m
20 mm, 60 mm, 140 mm, 220 mm und 300 mm



Changing the test lengths only makes sense with the "I.O. 360 Check I" artefact, as the position of the gauge blocks on the artefact can be flexibly selected.

If the test lengths are changed here and are to be used permanently, they must be changed and saved under the menu item "[Extras](#)" → "[Settings](#)" in the "[Artefact](#)" tab in the "✓" column.

If the evaluation is to be performed by means of "CMM Monitoring" (see above), at least 5 test lengths must be selected.

Since the evaluation may be carried out independently of "CMM Monitoring", fewer than 5 test lengths can be defined in CMM Check.

The selected test lengths are saved after a single measurement run.

The following values are output according to DIN EN ISO 10360-2 (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)):

- Length Measurement error:
For each length, the largest deviation of the three measurements is determined. The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → [E0](#)).
- Repeatability range:
In addition, the repeatability range is determined from the measurements. The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → [R0](#)).

- Rotary Table

This checkbox is only available if a rotary table was selected under “Extras” → “Settings” in the “Machine” tab (see chapter): [Menu item “Extras” section: Settings](#), point: [“Machine” tab](#) → [“Rotary table” area](#)).

If the checkbox is enabled, no further tests are available and the “Full coverage” checkbox can be selected.



- “Full coverage” enabled:
The [measurement](#) (see below) is carried out over the entire rotation range.

- “Full coverage” disabled:
The rotation range for the [measurement](#) (see below) is limited by a fixed value.

“Rotary table” is displayed under “Position of the artefact” (see chapter [User interface](#), section: [Selection and position of the artefact](#) , point: [Position of the artefact](#)). This setting cannot be changed.

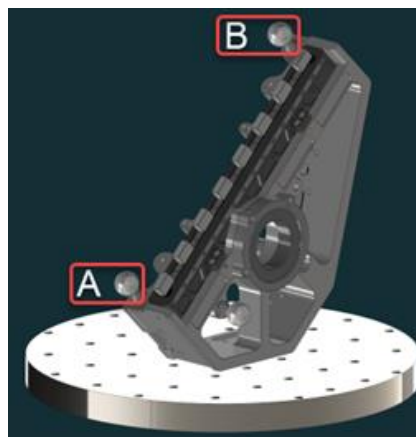


The procedures described below refer to the [artefact type](#) “I.O.360 Check m” (see below). If a different artefact type is used, these procedures may differ.

If the [“Artefact manual alignment”](#) checkbox is enabled, the measurement starts with the manual alignment. This operation is described in detail in chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: [“Artefact manual alignment” checkbox](#) → [Rotary table](#). The measurement is then carried out as described below.

If the [“Artefact manual alignment”](#) checkbox is disabled, the measurement is carried out in the CNC mode as follows:

- The position of both spheres (“A” and “B”) is determined with 5 measuring points each. Both spheres are then measured with 5 measuring points at different angles.



After the measurement, the measuring machine moves by a fixed value in Z+ direction.

The following values are output according to DIN DIN ISO 10360-3 (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)):

- 4-axis deviation:

- Rotary table error – Radial (FR):

The maximum range of centre point errors in X corresponds to the radial 4-axis deviation (FR).

The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → [FR](#)).

- Rotary table error – Tangential (FT):

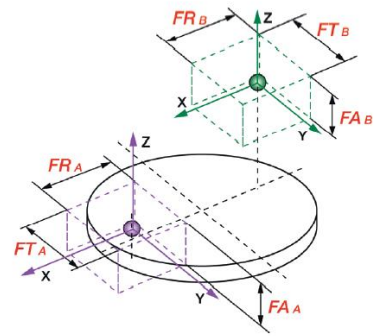
The maximum range of centre point errors in Y corresponds to the tangential 4-axis deviation (FT).

The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → [FT](#)).

- Rotary table error - Axial (FA):

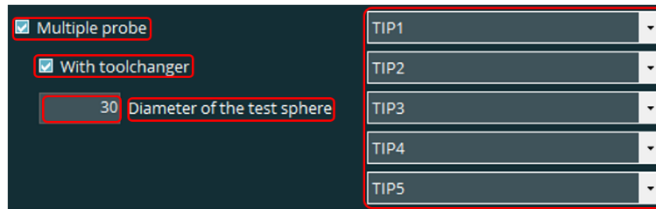
The maximum range of centre point errors in Z corresponds to the axial 4-axis deviation (FA).

The limit value is defined in the "Extras" menu item → "Specification" tab (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: ["Specification" tab](#) → [FA](#)).



- Multiple probe

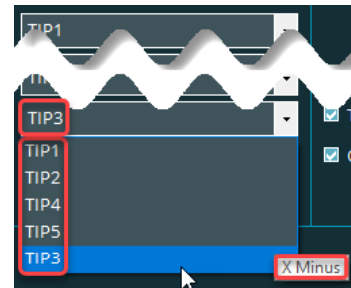
If this checkbox is enabled, no further tests are available. The checkbox "[With toolchanger](#)" (see below), the input field "[Diameter of the check sphere](#)" (see below) and various drop-down lists are available.



Depending on the probe selected under "Probe" (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#)) you can define the tips.

Clicking on the "▼" symbol or the selection field opens a drop-down list with all probe tips available for the selected probe (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#)).

If the mouse pointer is moved over a probe tip, a tooltip appears. If a nickname has been assigned to the probe tip in PC-DMIS, it will be displayed. If this is not the case, the probe ID appears.



The desired entry can then be selected

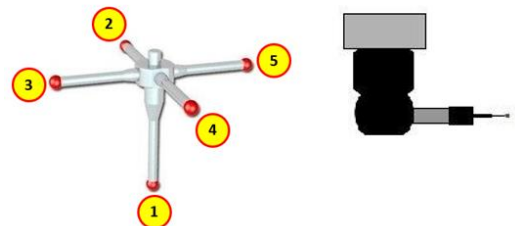
If a manual alignment is to be carried out (see section: [Temperature compensation and manual alignment](#), point: "[Artefact manual alignment](#)" checkbox), the first probe specified in the drop-down list is used.

The assignment (order) of the individual tips in the user interface must be carried out in accordance with the touch point sequence. The direction of the machine axes must be observed:

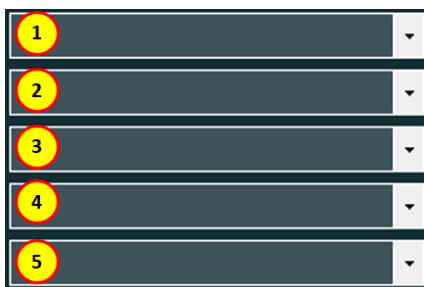
Probe assignment in the user interface:



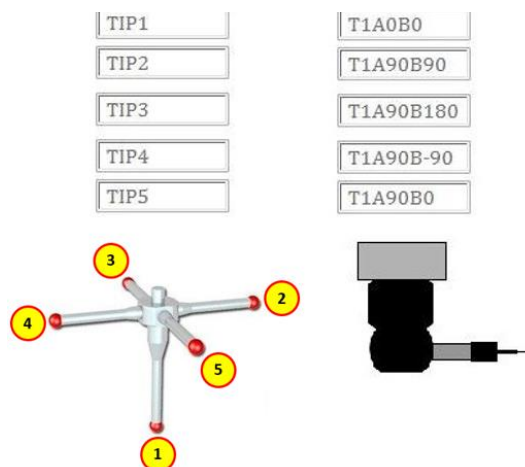
Sequence of touch points



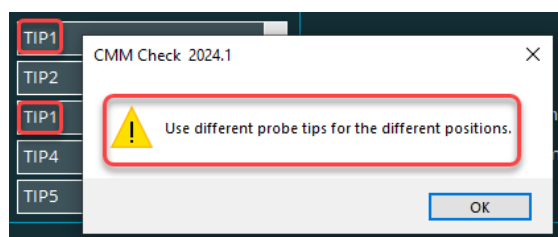
Probe assignment in the user interface:



Sequence of touch points (Leitz):



If at least one identical tip is selected, a message appears after the start (see chapter: [User interface](#), section: ["Start measurement" button](#)):



After confirming the message with "OK", the tips can be changed as described above.

- "With toolchanger" enabled:
If the CMM has a toolchanger, five changes must be carried out, one at a time before each probe is used. A probe exchange is performed before each new measurement.
- "With toolchanger" disabled:
All five positions are carried out one after the other without probe changing.
- Input field "Diameter of the check sphere":
This value is populated with the data from the drop-down list at "Artefact" (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Artefact Name](#)). This value should not be changed or only as described for the [menu item "Extras"](#) → [Settings](#) → ["Artefact" tab](#) → [Diameter](#).
If no artefact is selected under "Artefact" (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Artefact Name](#)), the last used diameter is displayed and used.



The procedures described below refer to the [artefact type](#) "I.O.360 Check m" (see below). If a different artefact type is used, these procedures may differ.

If the "[Artefact manual alignment](#)" checkbox is activated, the measurement starts with manual alignment. This procedure is described in detail in chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: "[Artefact manual alignment](#)" checkbox. The first tip is used for manual alignment. The measurement is then performed as described below.

If the "[Artefact manual alignment](#)" checkbox is disabled, the measurement is carried out in the CNC mode as follows:

- A check sphere is mounted on the table of the measuring machine. The diameter (see: [Input field "Diameter of the check sphere"](#) above) must match the one of the selected artefact (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Artefact Name](#)).

The position of the check sphere is determined with 25 measuring points. Then, each probe takes 25 equally distributed touch points on the sphere.

After the measurement, the measuring machine moves by a fixed value in Z+ direction.

The following values are output according to DIN EN ISO 10360-5 (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Output of measurement results](#)):

- PFTj:
The form error of the sphere is determined with 125 measuring points. The limit value is defined under menu item "Extras" → "Specification" tab, depending on whether the probe selected under "[Probe](#)" (see above) is a fixed or articulated probing system, (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Specification](#)" tab → [P\[Form.Sph.5x25:MS:Tact,MPE\]](#) or [P\[Form.Sph.5x25:Emp:Tact,MPE\]](#)).
- PSTj:
The deviation of the sphere diameter is determined with 125 measuring points. The limit value is defined under menu item "Extras" → "Specification" tab, depending on whether the probe selected under "[Probe](#)" (see above) is a fixed or articulated probing system, (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Specification](#)" tab → [P\[Size.Sph.5x25:MS:Tact,MPE\]](#) or [P\[Size.Sph.5x25:Emp:Tact,MPE\]](#)).
- PLTj:
The maximum range of the 5 sphere diameters is determined. The limit value is defined under menu item "Extras" → "Specification" tab, depending on whether the probe selected under "[Probe](#)" (see above) is a fixed or articulated probing system, (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Specification](#)" tab → [P\[Dia.Sph.5x25:MS:Tact,MPE\]](#) or [P\[Dia.Sph.5x25:Emp:Tact,MPE\]](#)).

- **Output of measurement results**

After the measurements have been completed, a results file (*.TXT) is created containing all the necessary information for evaluation with the [CMM Monitoring](#) software.

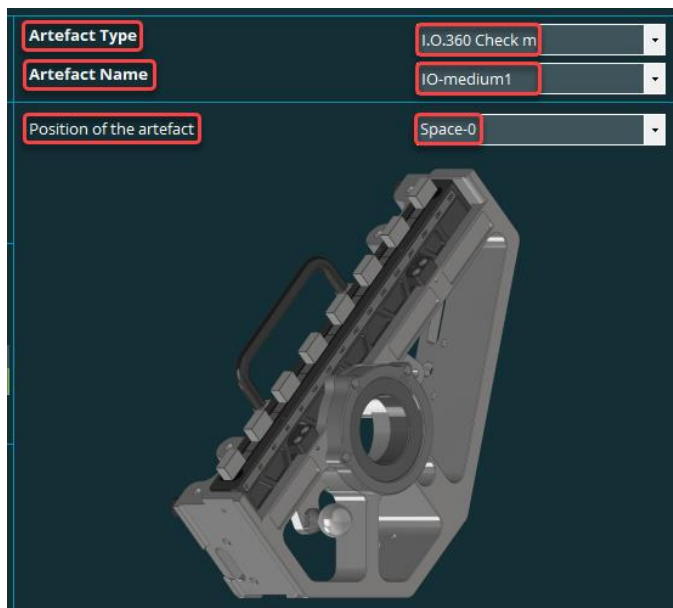
The file is located in the directory defined under the menu option "[Extras](#)" → "[Settings](#)" in the "[General](#)" tab → "[Output directory](#)". The selected output directory must match the directory defined in the "CMM Monitoring" software from "eumetron".

After the evaluation with [CMM Monitoring](#) the file is deleted. A backup of each file can be found in the folder: [C:\Users\Public\Documents\Hexagon\PC-DMIS CMM Check\Results\Temp](#)

If multiple files have been created, the most recently created is evaluated in [CMM Monitoring](#). If the "Continuous" feature is enabled in [CMM Monitoring](#), all files are evaluated one after the other.

By using the "Start CMM monitoring automatically while measuring" option (see chapter: [Menu item "Extras"](#), section: [Settings](#), point: "[Advanced](#)" tab → [Start CMM Monitoring automatically while measuring](#)), the evaluation of the measurement results is performed automatically after the measurement has been started (see chapter: [User interface](#), section: "[Start measurement](#)" [button](#)).

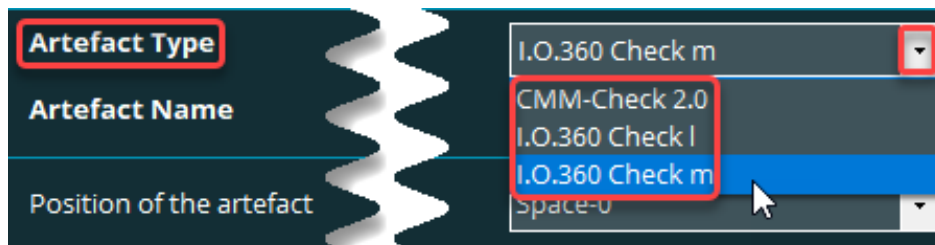
9.3. Selection and position of the artefact



- **Artefact Type**

The artefact type can be selected. To do this, click on the "▼" symbol or the selection field. A drop-down list with all available artefact types opens. The desired entry can then be selected.

If another artefact is selected, it is updated in the ["Artefact" tab](#) → [Artefact name](#) (see above).



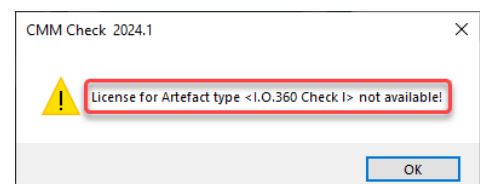
The following artefacts are currently supported:

- CMM-Check 2.0
- I.O.360 Check I
- I.O.360 Check m

A chargeable license is required for each test specimen type. If this is not available, the following message appears:

A valid license can be requested via the menu item ["Help"](#) → ["License"](#).

The data for the test specimen selected here can be defined in the menu item ["Extras"](#) → ["Settings"](#) in the ["Artefact"](#) tab.

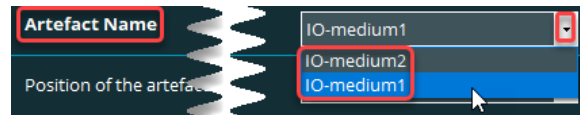


- **Artefact Name**

The prerequisite is that at least one artefact name is defined in the "[Artefact](#)" tab of the "[Extras](#)" menu item "[Settings](#)".

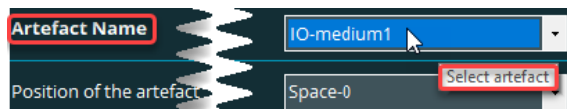
This field is pre-assigned with the artefact name selected under "[Artefact name](#)" in the "[Extras](#)" menu item → Settings in the "[Artefact](#)" tab.

This value can be changed if required. To do this, click on the "▼" symbol or the selection field. A drop-down list with all available artefact names opens (see [above](#)). The desired entry can then be selected.



If a different artefact name is selected, this is updated in the "[Artefact](#)" tab → "[Artefact name](#)" (see above).

If the mouse pointer is moved over the "▼" symbol or the selection field, a tooltip appears with the note: "Select artefact".



Selecting an artefact is essential for the measurement and subsequent correct evaluation in the [CMM Monitoring](#) software.

If there is no entry in this field, the measurement cannot be started (see section: [User interface](#), section: "[Start measurement](#)" button).

If there is no entry in this field (e.g.: no artefact name defined under the menu item "[Extras](#)" → "[Settings](#)" in the "[Artefact](#)" tab), the measurement cannot be started (see chapter: [User interface](#), section: "[Start measurement](#)" button).

- **Position of the artefact**

The information in chapter: [Operation](#), section: [Additional information](#) must be observed.

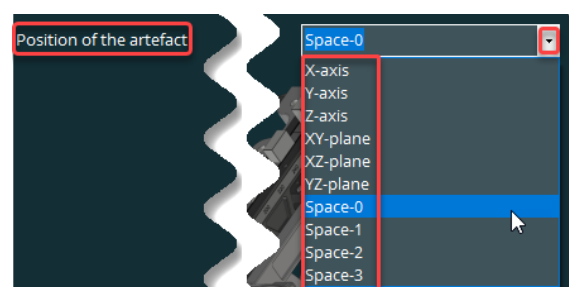
If the [Multiple probe](#) checkbox is enabled (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Multiple probe](#)), this field is not available.

If the "Rotary checkbox" is enabled (see chapter: [User interface](#), section: [Selection and sequence of tests](#), point: [Rotary table](#)), the artefact is always mounted in a defined position and the field is pre-assigned with "Rotary table". The drop-down list (see below) is not available.

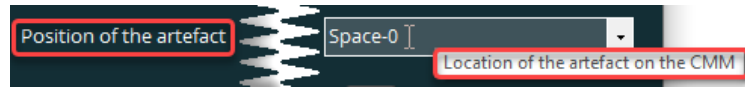
This field is pre-assigned with the last selected position of the artefact on the CMM.

If the measurement is to be performed in a different position, it must be defined here accordingly. To do this, click on the "▼" symbol.

A drop-down list with various options opens. The desired entry can then be selected.



If the mouse pointer is moved over the "▼" symbol or the selection field, a tooltip appears with the note: "Location of the artefact on the CMM".



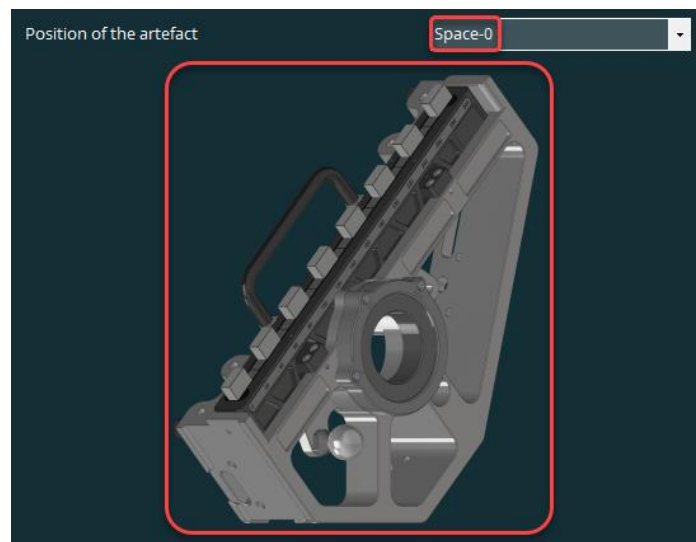
Please note that suitable probes and tips must be chosen for the selected position (see chapter: [User interface](#), section: [Selection of the probe system and probe](#), point: [Probe](#) and [Tip 1](#) and [Tip 2](#)).

If you change the position of the artefact, the "Artefact manual alignment" checkbox must be enabled (see chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: ["Artefact manual alignment" checkbox](#)).

The position depends on the position of the machine coordinate system. The zero-space of the gauge on the artefact is selected as datum.

The schematically selected position is shown below the input field.

Example:



If there is no entry in this field (e.g. deleted with the "Del" key), the measurement cannot be started (see section: [User interface](#), section: ["Start measurement" button](#)).

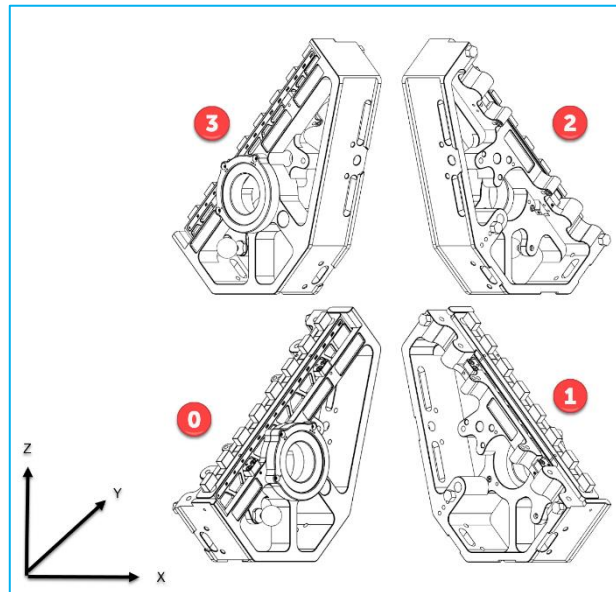
The following artefact positions can be selected:

- "X-axis" or "Y-axis":
The artefact is mounted in a horizontal position on the CMM table. The zero surface of the gauge points in the direction of the selected axis.
- Z-axis:
The artefact is mounted in an upright position on the CMM table. The zero surface of the gauge points in the direction of the Z-axis.
- XY plane:
The artefact is mounted as under ["X-axis"](#) or ["Y-axis"](#) (see above) but rotated around the Z-axis.

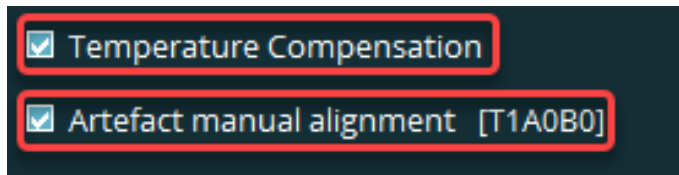


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- "XZ plane" or "YZ plane":
The artefact is mounted in an upright position on the CMM table. The zero surface of the gauge points in the direction of the X-axis or Y-axis, depending on the selected plane.
- Diagonal-0 (see figure below):
The artefact is mounted in an upright position on the CMM table. The zero surface of the gauge points in the direction of the machine origin.
- Diagonal-1 (see figure below):
The artefact is mounted in an upright position on the CMM table. The position of the artefact is mathematically positive (counter-clockwise) rotated by 90 degrees in relation to "[Diagonal-0](#)" (see above).
- Diagonal-2 (see figure below):
The artefact is mounted in an upright position on the CMM table. The position of the artefact is mathematically positive (counter-clockwise) rotated by 180 degrees in relation to "[Diagonal-0](#)" (see above).
- Diagonal-3 (see figure below):
The artefact is mounted in an upright position on the CMM table. The position of the artefact is mathematically positive (counter-clockwise) rotated by 270 degrees in relation to "[Diagonal-0](#)" (see above).



9.4. Temperature compensation and manual alignment



- Temperature Compensation

If the checkbox is activated, the value defined under the menu item "[Extras](#)" → [Settings](#) in the "[Artefact](#)" tab for [Alpha \[µm\]](#) is taken into account.

If the checkbox is disabled, the measurement is carried out without temperature compensation.

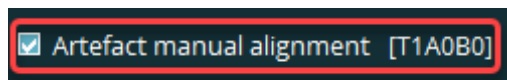
- "Artefact manual alignment" checkbox

This checkbox applies to all tests. Details on the individual tests can be found in the chapter: [User interface](#), section: [Selection and sequence of tests](#).

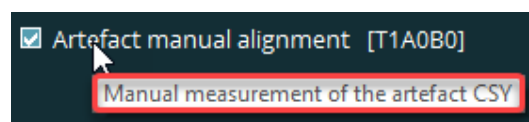
If the tests are carried out for the first time or the position of the artefact has not yet been determined, this checkbox must be enabled.

The position selected according to chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Position of the artefact](#)) must be taken into account.

The probe tip selected under section: [Selection and sequence of tests](#), point: [Check sphere and ring gauge](#) → "[Tip 1](#)" is used and displayed for the measurement. The prerequisite is that at least one test is selected there. If *no* test is selected, the probe tip selected in the [step gauge](#) → [Tip 2](#) (see above) is used. Different rules apply for the "[Multiple probe](#)" test (see below). Details on manual alignment for the multiple probe test are described in section: [Temperature compensation and manual alignment](#), point: "[Check sphere manual alignment](#)" checkbox.



If the mouse pointer is moved over the text, a tooltip appears with the message: "Manual measurement of the artefact CSY".



The procedures described below refer to the [artefact type](#) "I.O.360 Check m" (see below). If a different artefact type is used, these procedures may differ.

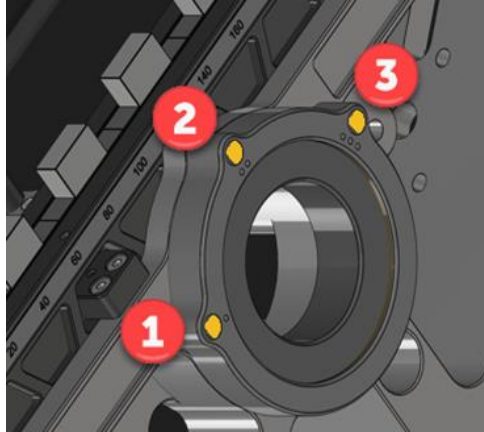


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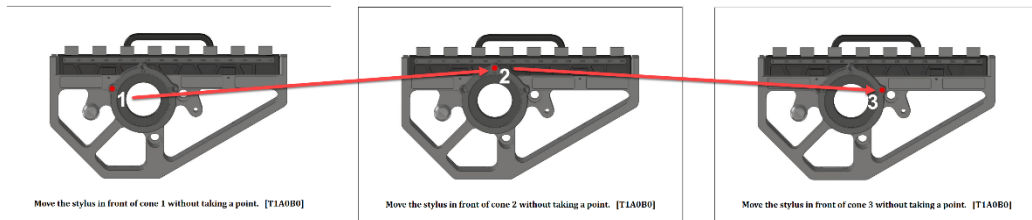
- “[Sphere single points](#)“, “[Sphere scanning](#)“, “[Ring single points](#)“, “[Ring scanning](#)“ and “[Step Gauge](#)“

After pressing the "Execute" button (see chapter: [User interface](#), section: “[Start measurement](#)” button), the alignment is performed as follows if the checkbox is activated before the measurement:

The sphere of the tip is positioned manually one after the other approximately in the middle of the three countersinks on the ring gauge and each position is confirmed. The sequence is symbolized by embossed circles under the respective countersinks.



The sequence of the countersinks is visualized in PC-DMIS.



The alignment is then carried out on the three countersinks in CNC mode.

If only one test is selected, it is now run in the CNC mode.

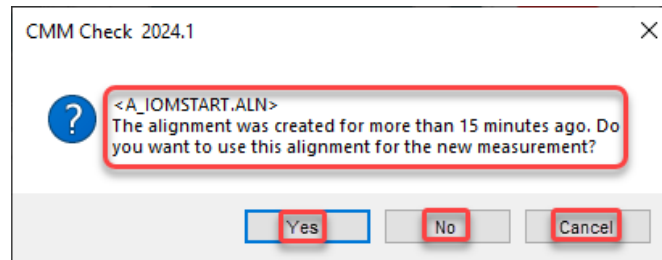
If more than one test is selected, the alignment must be performed once, and then all tests are performed one after the other. The sequence of the respective tests is described in detail in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: “[Check sphere and ring gauge](#)” and [Step Gauge](#).

If *no* test is selected in the user interface (see chapter: [User interface](#), section: [Selection and sequence of tests](#)), *only* the alignment is executed (as described above).

If the position of the artefact is not changed on the measuring machine, the checkbox can be disabled: and the tests can be carried out without manual alignment. The checkbox is shown in red. This is an indication that the measurement starts immediately without manually aligning the artefact.

Artefact manual alignment [T1A0B0]

If the warning limit set according to chapter: [Menu item “Extras”](#), section: [Settings](#), point: [“Advanced” tab](#) → [Warning limit for the last saving of the external alignment \(Minutes\)](#) is exceeded, the following message appears:

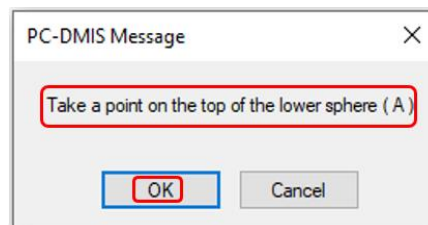


The following options can be selected:

- Yes
The window closes and the last created alignment is used for the measurement.
- No
The window closes and the manual alignment starts. The selected tests are then executed.
- Cancel
The window closes and no further action is taken.
- [Rotary table](#)

After pressing the "Start measurement" button (see chapter: [User interface](#), section: [“Start measurement” button](#)) the alignment before the measurement will be carried out as follows if the checkbox is enabled:

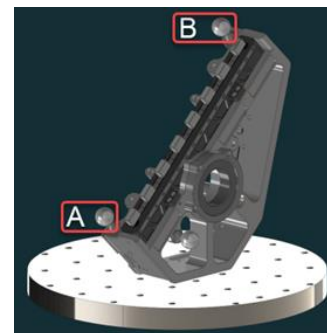
The message:



is confirmed with "OK" and a measuring point is taken on the north pole of sphere "A". The sphere is then measured with 5 points in the CNC mode.

This procedure is repeated for sphere "B".

If the checkbox is disabled, it is shown in red. This is an indication that the measurement starts immediately without manually aligning the artefact.



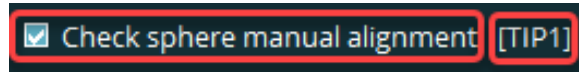
❑ **Artefact manual alignment [T1A0B0]**

The last alignment is used for the measurement. A monitoring of the time window defined according to chapter: [Menu item “Extras”](#), section: [“Advanced” tab](#), point: [Warning limit for the last saving of the external alignment \(minutes\)](#) doesn't take place.

- “Check sphere manual alignment” checkbox

This checkbox is available if “[Multiple probe](#)” has been selected in the user interface. Details of this test are given in chapter: [User interface](#), section: [Selection and sequence of tests](#), point: “[Multiple probe](#)”.

The probe tip selected in the first drop-down list under section: [Selection and sequence of tests](#), point: “[Select Test](#)” area → [Multiple probe](#) is used and displayed for the measurement.



The procedures described below refer to the [artefact type](#) “I.O.360 Check m” (see below). If a different artefact type is used, these procedures may differ.

After pressing the “Execute” button (see chapter: [User interface](#), section: “[Start measurement](#)” button) the alignment before the measurement will be carried out as follows if the checkbox is enabled:

A touch point is manually taken on the north pole of the check sphere. Then a coarse alignment is performed with 5 points and then the fine alignment with 25 points.

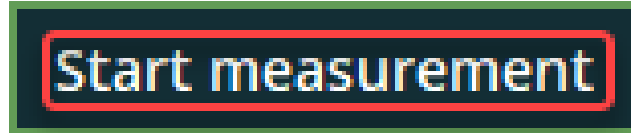
If the checkbox is disabled, it is shown in red. This is an indication that the measurement starts immediately without manually aligning the artefact.



The last alignment is used for the measurement. A monitoring of the time window defined according to chapter: [Menu item “Extras”](#), section: “[Advanced](#)” tab, point: [Warning limit for the last saving of the external alignment \(minutes\)](#) doesn’t take place.

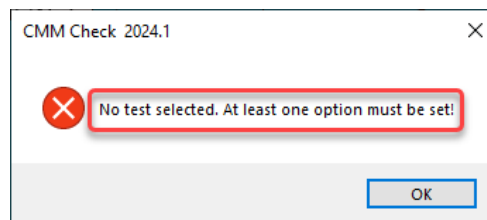
9.5. "Start measurement" button

The tests selected in [Selection and sequence of tests](#) (see above) are executed.



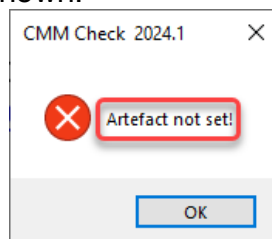
If the "CMM Check manual alignment" checkbox is *enabled* (see chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: ["Artefact manual alignment"](#) checkbox) and *no* tests have been selected (see chapter: [User interface](#), section: [Selection and sequence of tests](#)), only the manual alignment for the artefact is carried out.

If the "CMM Check manual alignment" checkbox is *disabled* (see chapter: [User interface](#), section: [Temperature compensation and manual alignment](#), point: ["Artefact manual alignment"](#) checkbox) and *no* tests have been selected (see chapter: [User interface](#), section: [Selection and sequence of tests](#)) the following message is shown:



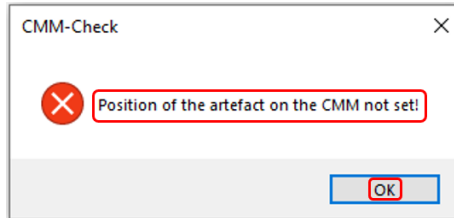
After confirming the message with "OK", you can select and start at least one test.

If no artefact is selected in the "Artefact" field (see chapter: [User interface](#), section: [Selection and position of the artefact](#), point: [Artefact name](#)), the following message is shown:



After confirming the message with "OK", you can select an artefact and start the measurement.

If no position is selected in the “Position of the artefact” field (see chapter: [User interface](#), section: [Selection and position of the artefact](#) , point: [Position of the artefact](#)), the following message is shown:



After confirming the message with "OK", you can select a position and start the measurement.

During the measurement, the user interface is minimized and changes cannot be made (check boxes, radio button etc. are not available).



10. About Hexagon

Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter. For more information, visit hexagonmi.com.

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