Operating Instructions

TORKMASTER 5.1

Version 5.1

Table of contents

Saferty instructions

Please observe the safety instructions in the operating instructions of the measuring equipment used.

We would also like to draw your attention to the section >Calibration instructions< in these operating instructions. Factors that can influence the result of the calibration are described there.

Incorrectly adjusted or calibrated torque wrenches can cause consequential damage due to improperly tightened screw connections. When adjusting and calibrating, follow the instructions of the torque wrench manufacturer. STAHLWILLE accepts no liability for incorrect operation of the software and incorrectly adjusted and calibrated torque wrenches, nor for any resulting damage or consequential damage.

Introduction

With the software TORKMASTER 5, test, adjustment and calibration sequences can be carried out in conjunction with the calibration devices perfectControl 7794-x, the actuating devices 7791 and 7792. It is used to record measured values from the torque transducers of the 772x series and the 7770-x transfer torque wrenches. With this software you can manage calibration objects and data.

In the standard version, manually operated torque tools type I, class A-E and type II, class A-G can be calibrated according to DIN EN ISO 6789:2017 such as DIN EN ISO 6789:2003. A special test and calibration method are available for testing and calibration. This method can also be activated as a quick test method.

The functional scope of the software can be extended by optional licenses, including customer-specific calibration procedures or the adjustment of transducers using transfer torque wrenches or lever-mass systems.

Please observe the safety instructions and instructions for use in the operating instructions of the transducers, transfer torque wrenches and the perfectControl 7794-x calibration devices, the actuators 7791 and 7792.

If you do not understand parts of these operating instructions or have questions about this product, please contact the application engineers at STAHLWILLE Eduard Wille GmbH & Co KG. You can reach them either by telephone at +49 202 4791-0 or by e-mail at support@stahlwille.de.

System requirements

Operating system: Microsoft Windows XP, SP3; Windows Vista; Windows 7; Windows 10

Hardware: 1 available USB Interface for the STAHLWILLE USB Adapter 7757-1

Requirements for the user

For a proper calibration it is necessary that the user knows and has understood the content of the applicable standards (e.g. DIN EN ISO 6789-2:2017). Ignorance of these standards and guidelines can falsify the results of calibrations.

Installation

The installation of the software is explained below. For the installation you need at least local administrator rights under WINDOWS. If you do not have the required rights, please contact your system administrator.

> ➢ Start the application InstallTorkmaster_5.exe for the installation.
> ➢ Confirm the warning message with Yes.
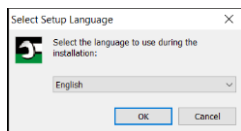
> ➢ Select a language for the Installation software.

Note: This is not the later program language. The program starts first in the language preset in the operating system, but can subsequently be switched to one of the available program languages in the basic settings of the TORKMASTER.

> ➢ Confirm the query with Next.
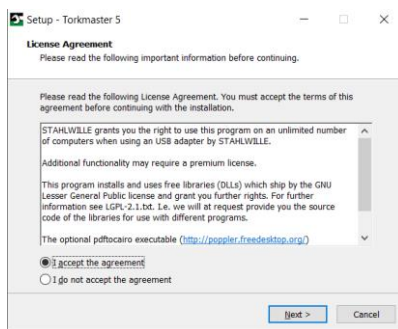
> ➢ Please read the licence terms and accept them. Afterwards please continue the installation process with Continue.
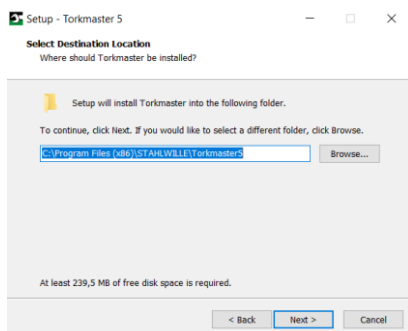
> ➢ Select the installation directory for the application.
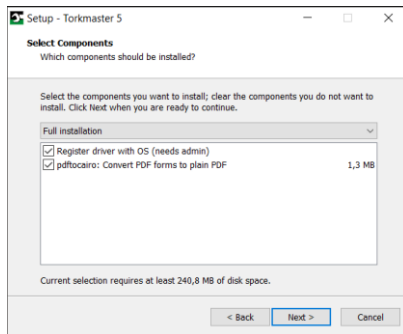
> ➤ Select the installation components required for operating the software
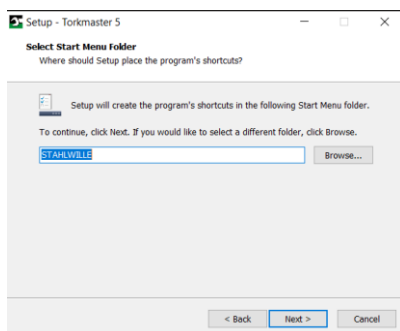
> ➤ Select a name for the menu item in the WINDOWS start menu
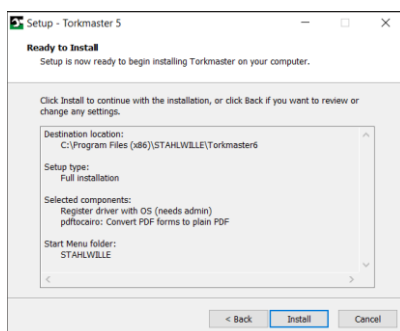
> ➤ The window shows the summary of the upcoming installation. Continue the installation by clicking Install.

The program now installs the TORKMASTER 5 software on the PC..
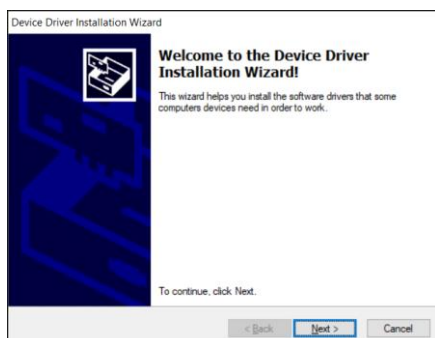
> ➤ After installing the software, the device drivers for the STAHLWILLE USB dongle are installed. Confirm the installation with Next.
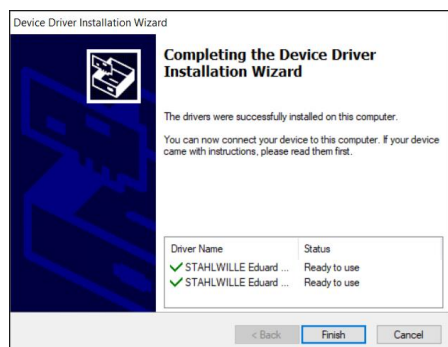
➢ Click Finish to complete the installation of the USB driver.
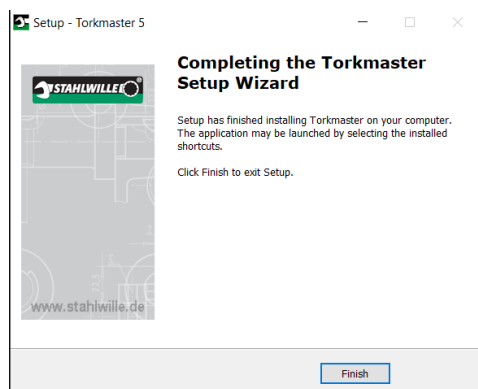
➢ Click Finish to complete the installation.

Hints for the first program start after the installation

If you have already installed an earlier version of TORKMASTER 5 on your PC, the following message will appear when you start the program for the first time. Please confirm this message. This will convert the existing database to the new version of TORKMASTER.
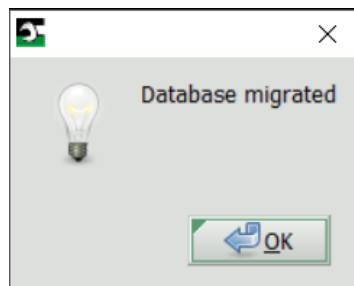
If no USB adapter is found by the software after the first program start (note in the status line of the TORKMASTER 5), or if the sensor directly connected to the PC emits a permanent acoustic signal, the driver for the USB adapter has not been installed correctly. To solve this problem, please refer to the notes in thesection >Device driver under WINDOWS<.

User Interface

Main window

No.	Function / Description
1	Selection of the calibration device. For automatic calibration devices, the serial number of the connected actuator appears here. For manual actuators, the selection must be made manually via the drop-down menu.
2	Serial number of the connected reference (transducer). If two references are required during a calibration, both serial numbers are displayed. Reference 1 is the currently connected reference.
3	Input field for the search term of the calibration object. This can be either the Seriennummer or the Identnummer of the calibration object. If the serial or ident number is displayed in red, it is not yet stored in the database. For calibrations, the calibration object must first be created in the database. See the section "Creating a new tool".
4	Selection field for the calibration method. The selection is made via the drop-down menu. The entries may differ depending on the program license. Standard methods: Test, Quick test up, Quick test down, DIN EN ISO6789-2:20170, DIN EN 6789-1:2017, DIN EN ISO 6789:2003 and Adjustment.
5	Function keys (description on next page)
6	Display of the last recorded measured value.
7	Display of the current measured value.
8	Bargraph- Display over the entire measuring range of the reference.
9	Graphical display of the torque curve over time.

10	The green area describes the target field from the time parameters (width) relevant according to DIN EN ISO 6789-2:2017 or DIN EN ISO 6789:2003 and the display deviation of the torque wrench in the database (height).
11	Display of the detected trip value (maximum value).
12	80% marking according to DIN EN ISO 6789.
13	Bargraph- Display for the restricted measuring range (±25 % of setpoint).
14	Status line for application notes (yellow-black), action notes (grey-green) and error messages (yellow-red).
15	Comment field. Optional comments can be entered here. This is possible until the calibration is saved. The comment is stored together with the calibration data in the database. It cannot be changed afterwards.
16	Display of the calibration results (measured values).
17	Display of the calibration summary (after saving).
18	Humidity during calibration. This must be recorded and entered manually. The default is 0%.
19	Input field for the search term of the adaptation. It is selected according to the catalog number.
20	Checkbox for optional selection of a reduction adapter. If the checkbox is active, an input field for the search term of the reduction adapter is displayed. Similar to the adaptation, the selection is made according to the catalog number.
21	Temperature during calibration. This must be recorded and entered manually.
22	Checkbox for MU parameters. This check box indicates whether or not the current calibration must be performed with calibration and calculation of the parameters. If this does not have to be done, the measurement and calculation can optionally be forced.

Description of the graphical display:

100% (setpoint)

Target area
(green field)

80% of setpoint

last measured values (black)

current measured values
(green)
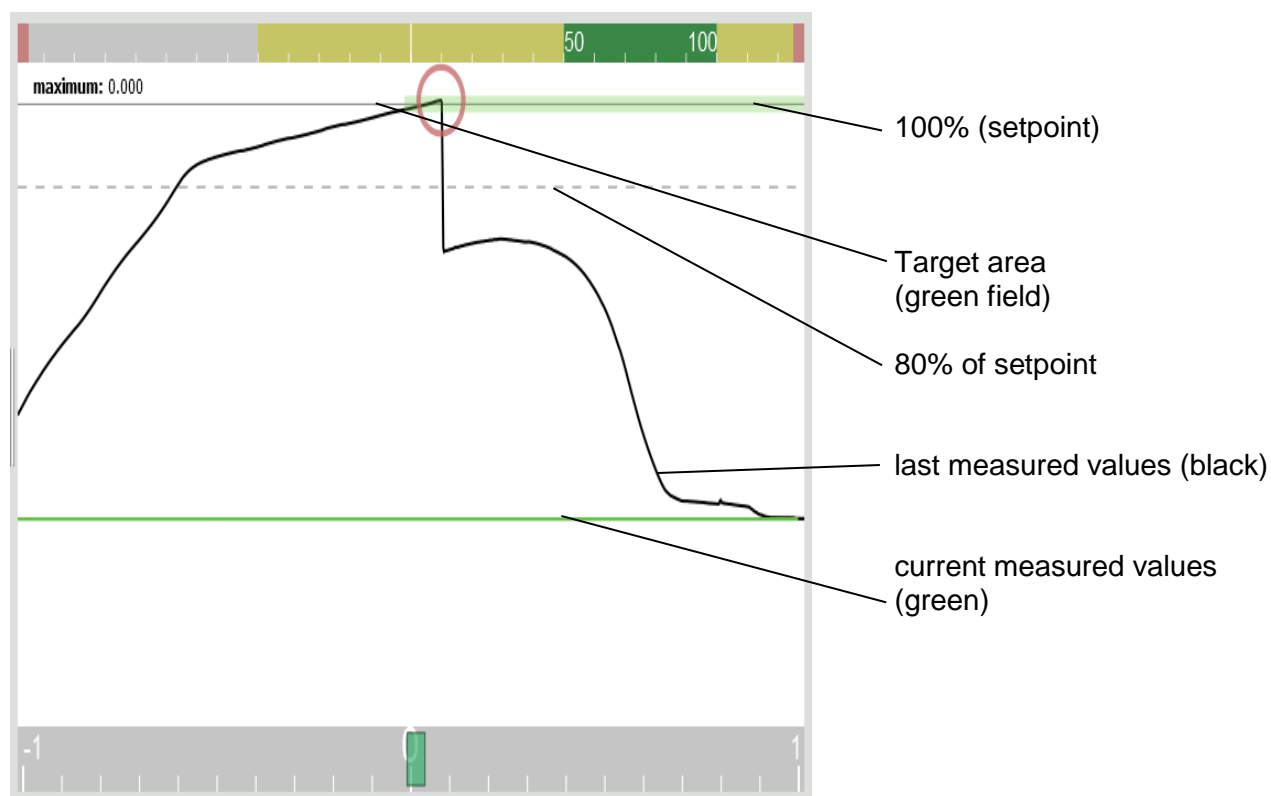
The height of the target range represents the display deviation of the torque wrench set in the database under Tool Group.
The length of the target area is determined by the requirements of the standard used for calibration. The length of the target area for standard 6789:2017 can be found in the standard. For standard 6789:2003, the length of the target range is 0.5 to 4 seconds.
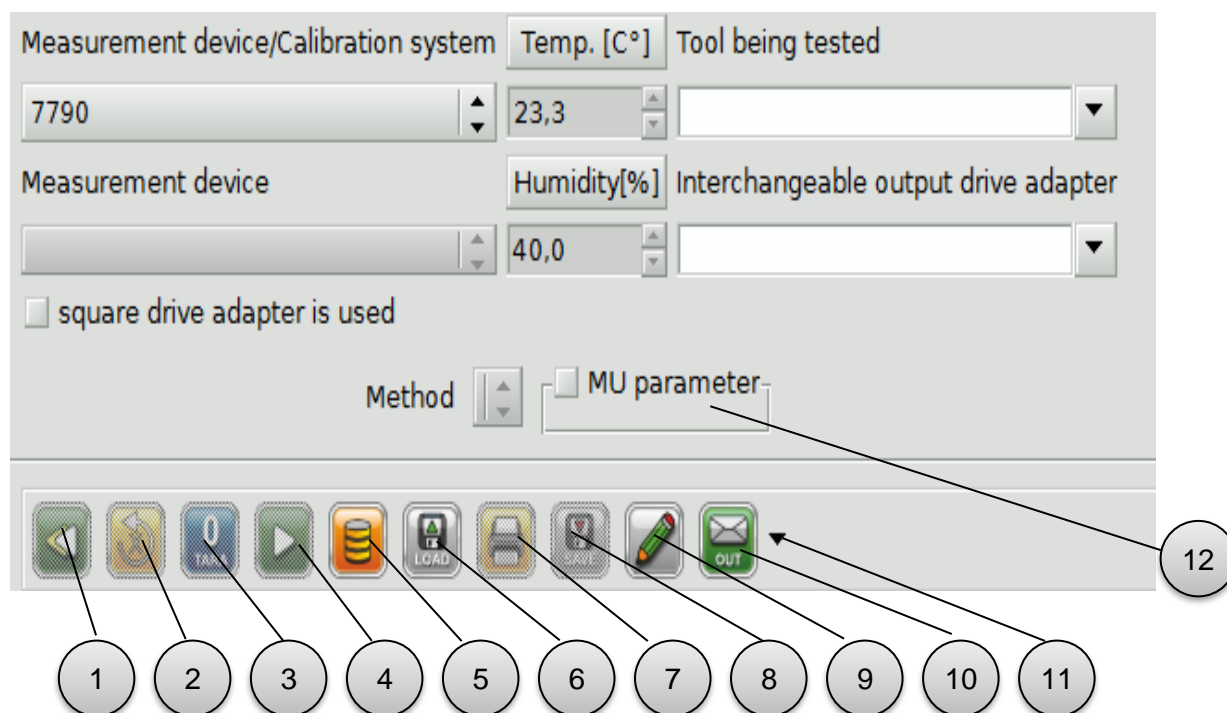
The individual function keys are inactive if the function is not available.

No.	Function / Description
1	Repeat calibration. A new calibration is started. If the previous calibration was not saved, it is discarded.
2	Repeat last measurement.
3	Tare the sensor.
4	Send the last calibration step to the calibration device again. This allows aborted calibrations to be continued (e.g. after an error).
5	Opens the TORKMASTER database and the basic settings.
6	Read test and calibration data already stored.
7	Print calibration certificate. Depending on the basic settings, the calibration certificate can be displayed, printed or saved as a PDF file in a location defined in the basic settings. When this key is pressed, the calibration is stored in the database and the set option is executed.
8	Store calibration in the database.
9	Show comment field. Comments can only be added up to the time of saving a calibration.
10	Identification of the calibration as input or output calibration.
11	Extension of the menu for additional functions (output graph, export calibration (CSV format) and open the operating instructions).
12	Optionally, the measurement of all data for the selected measurement chain can be forced to compute the MU data, even if sufficient statistical data is available.

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Target 1.000 N·m (tool)
Measured 1.018 N·m (measurement device)
Measurement error -0.018 N·m
Measurement error -1.77 %

- 1.018

123

Serial no.: 123
Range: 1-20N·m
Manufacturer: Stahlwille
Model no: 701/2
Max. permissible deviation (%): 2.0
Direction: right
Scale increment: 0.001
Type: Type I, indicating torque tool
Class: C
Conformity/Calibration Interval: 12
Preloadings: 1
Specified torque range: 4,12,20
Interchangeable drive end: 0
Tool owner:
Stahlwille
Eduard Wille GmbH & Co KG
Postfach 120103
42331 Wuppertal

You can move the cursor to the page number of the calibration object, over the references or over the individual measured values. If the cursor remains on these values for a short time, a context menu opens automatically. This contains essential information about this value.
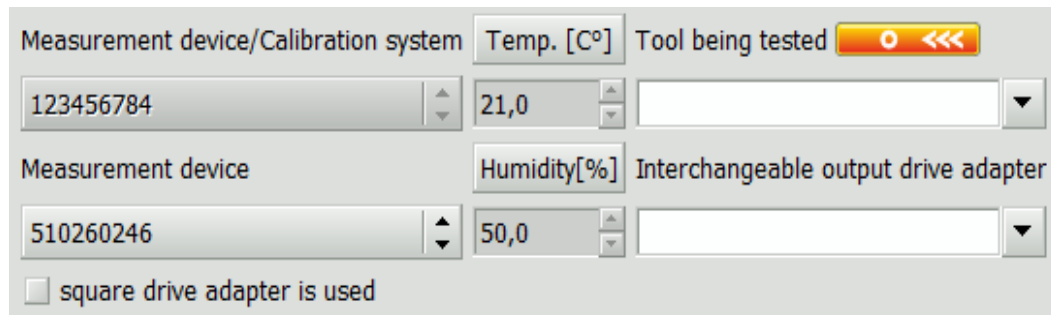
In the case of a torque wrench it is the details from the database, in the case of the transducer the data stored and in the case of measured values the nominal and actual values including the associated errors.

Measured values outside the tolerance are displayed in red.

Connection with electronic calibration objects

If electronic calibration objects are to be calibrated or adjusted with the perfectControl 7794-2 or 7794-3, they must be connected to the calibration system via the rear connection. Please refer to the operating instructions for the calibration system for details.

To start the communication between the calibration system and the calibration object, please press the button above the input field for the serial number (see illustration).

Measurement device/Calibration system	Temp. [C°]	Tool being tested O <<<	
123456784	21,0		▼
Measurement device	Humidity[%]	Interchangeable output drive adapter	
510260246	50,0		▼
☐ square drive adapter is used			

When communication is established, the serial number is displayed in grey in the input field.

If no communication can be established with the calibration object, the connection attempt is aborted after 60 seconds. It is possible that no connection can be established due to the hardware of the calibration object. In these cases, the calibration object must be calibrated manually.

If the torque screwdriver tool is not yet in the database at this time, it will be added automatically. The current tool settings are used.

Quick test mode

The TORKMASTER has a quick test mode. This mode is particularly recommended when using the STAHLWILLE 7707 W workshop test equipment to document the test results.
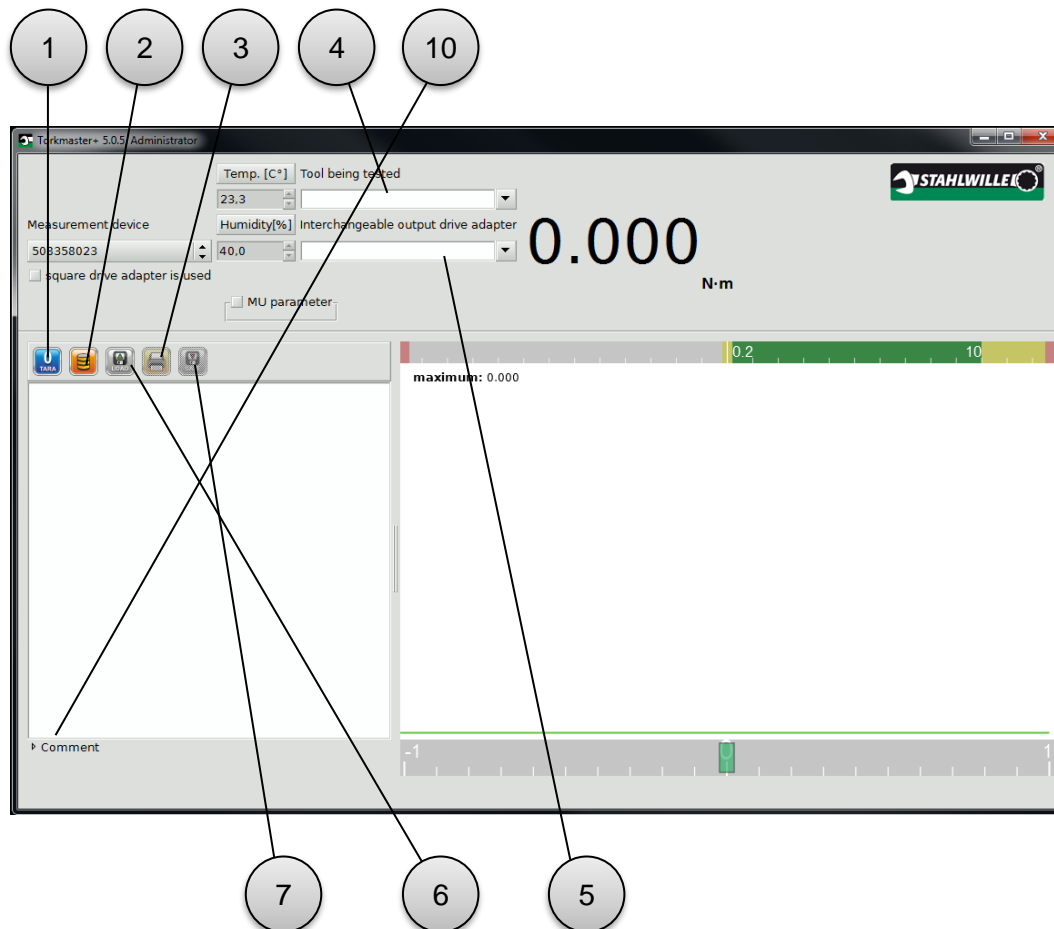
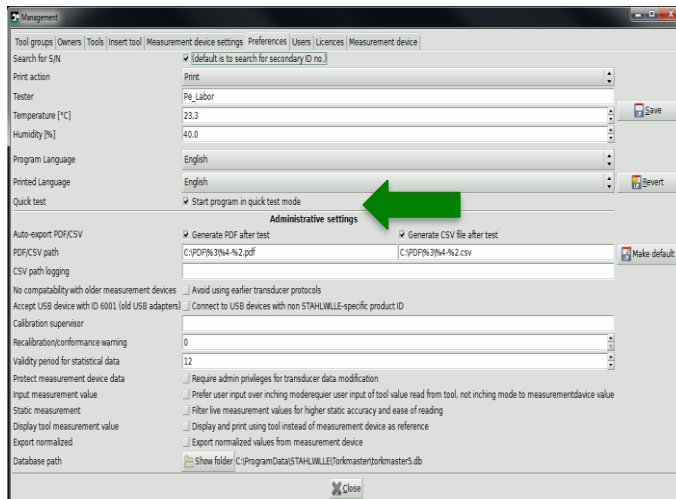| No.	Function / Description
1	Tare the sensor.
2	Opens the TORKMASTER database and the basic settings.
3	Print calibration certificate. Depending on the basic settings, the calibration certificate can be displayed, printed or saved as a PDF file at a location specified in the basic settings. When this key is pressed, the calibration is saved in the database and the set option is executed.
4	Input field for the search term of the calibration object. This can be either the serial number or the identification number of the calibration object. If the serial or ident number is displayed in red, it is not yet stored in the database.
5	Input field for the search term of the adaptation. This is selected via the catalog number.
6	Read already stored test and calibration data.
7	Saving rapid test data in the database

The quick test mode can be activated via the basic settings menu. Proceed as follows:
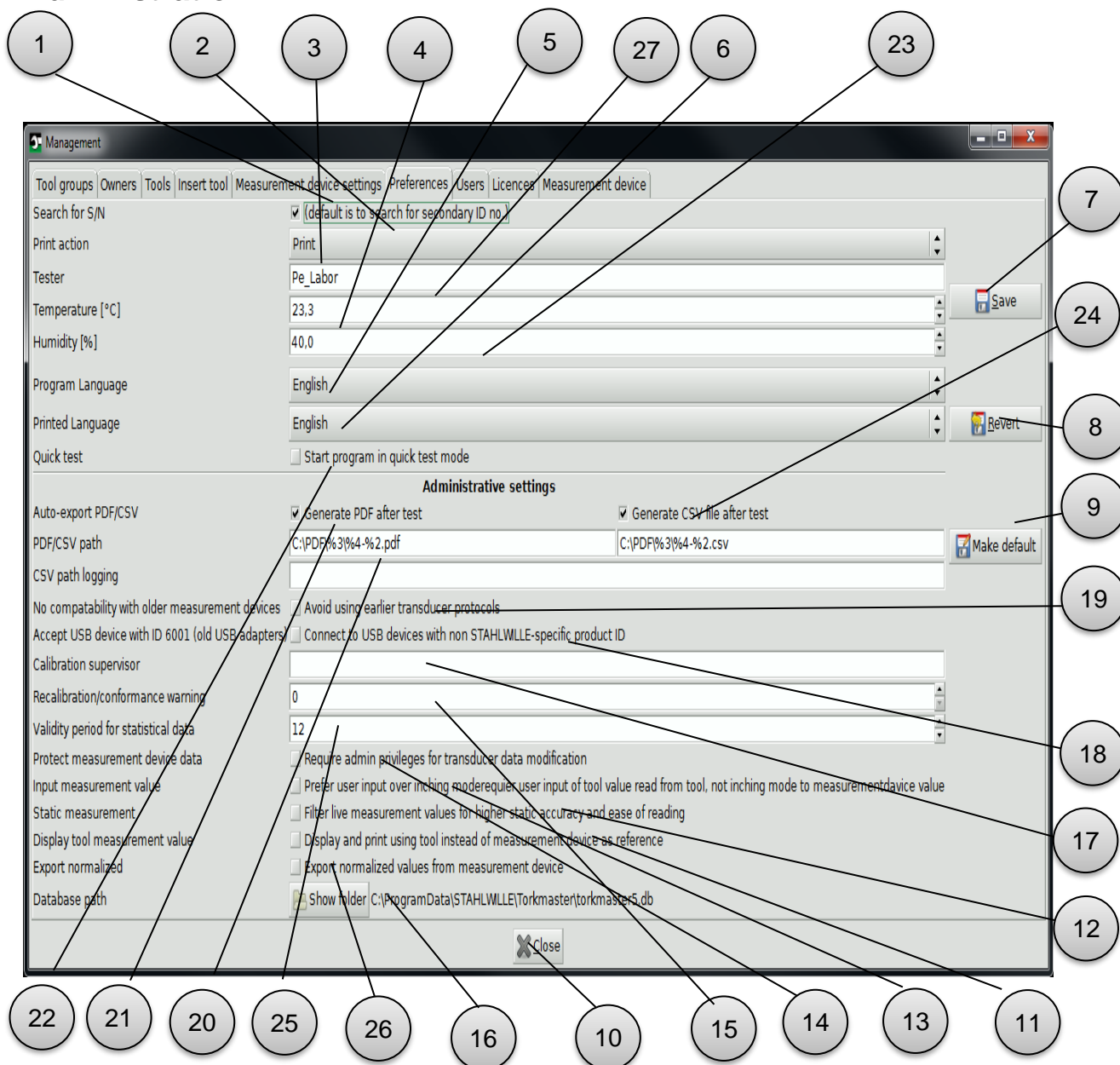
- ➢ Open Menu >Administration<
- ➢ Check the box >Quick test< (green arrow)
- ➢ Press key >Save<.
- ➢ Close menu
- ➢ Exit and restart TORKMASTER

If the check mark is set, the TORKMASTER always starts in quick test mode until the check mark is removed again.

The results of the quick test are stored in the database under the serial number of the torque tool.

Administration

No.	Function / Description
1	Default search setting. You can always search using the serial number and the ID number. The identification number or the serial number can be displayed.
2	Settings for the printer symbol in the main window.
3	Name of the employee performing the calibration.
4	Temperature during calibration. This must be recorded and entered manually. The default is 21°C.
5	Language setting. The language of the operating system is selected as default. Alternatively, a different language can be selected. If the language of the operating system is not supported, all texts are displayed in English.
6	Language setting for the calibration certificate. The language of the operating system is selected as default. Alternatively, a different language can be selected. If the language of the operating system is not supported, all texts are displayed in English.
7	Saving the changed basic settings.
8	Restore default settings.

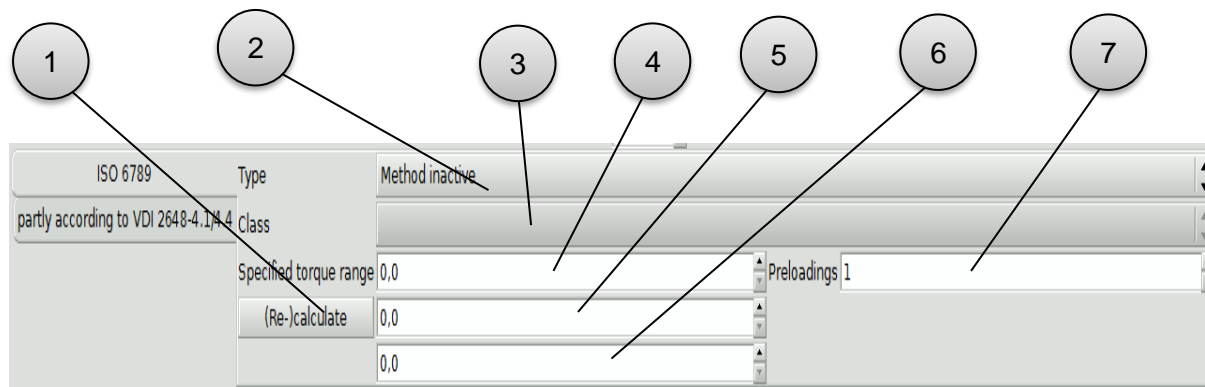| 9	Save current settings as new default.
10	Close the window.
11	Only for displaying calibration objects: Display of the object results in the calibration certificate instead of the reference results. According to DIN EN ISO 6789-2:2017, the reference results should be displayed (check mark not set). Activating this option does not influence the calculated and displayed deviation between the calibration object and the reference.
12	Mathematical filtering of the torque signal. This can increase the accuracy of static measurements. Activate this function only for static measurements!
13	This function only applies to torque wrenches that display the torque signal. If the option is active, perfectControl automatically moves to the setpoint. The user enters the display value of the torque wrench manually.
14	Parameters of the transducer may only be changed by the administrator.
15	Number of days for determining an advance calibration warning. If this function is activated, the TORKMASTER reports in advance all objects requiring calibration that must be subjected to a new calibration within the specified period. If a 0 is entered, the function is deactivated.
16	This allows you to open the database path for archiving. If you want to change the database path, use regedit.
17	Name of the head of laboratory, which is specified in the calibration certificate. If no name is stored, the field will not be displayed on the certificate.
18	STAHLWILLE USB adapters used different USB ID numbers in the past. If all identification numbers are to be accepted, this field must be activated. Otherwise only current adapters will be accepted.
19	If this field is activated, transducers with firmware 2.xx are also accepted. WARNING: If this field is activated, there is no comprehensive protection for the transducer!
20	Path for saving the automatic PDF calibration certificate / CSV file. If you move the cursor over the field, options for a generic path are displayed.
21	Automatically save calibration certificate as PDF after calibration is complete.
22	Start TORKMASTER in quick test (test mode). See section >Quick Test Mode<.
23	Humidity during calibration. This must be recorded and entered manually. The default is 0%.
24	Automatically save calibration as CSV after calibration is complete.
25	Validity of statistical data in months.
26	When active, the values exported to the CSV file are reference normalized. If inactive, the unchanged values of the reference are exported.
27	Enter a valid calibration certificate number. This is excluded from the determination of the statistical data. In this field certain measurements / calibrations for the consideration of the statistical data can be excluded. If you do not use a calibration for statistical purposes, please enter the calibration certificate number here and click save.

Tool group database
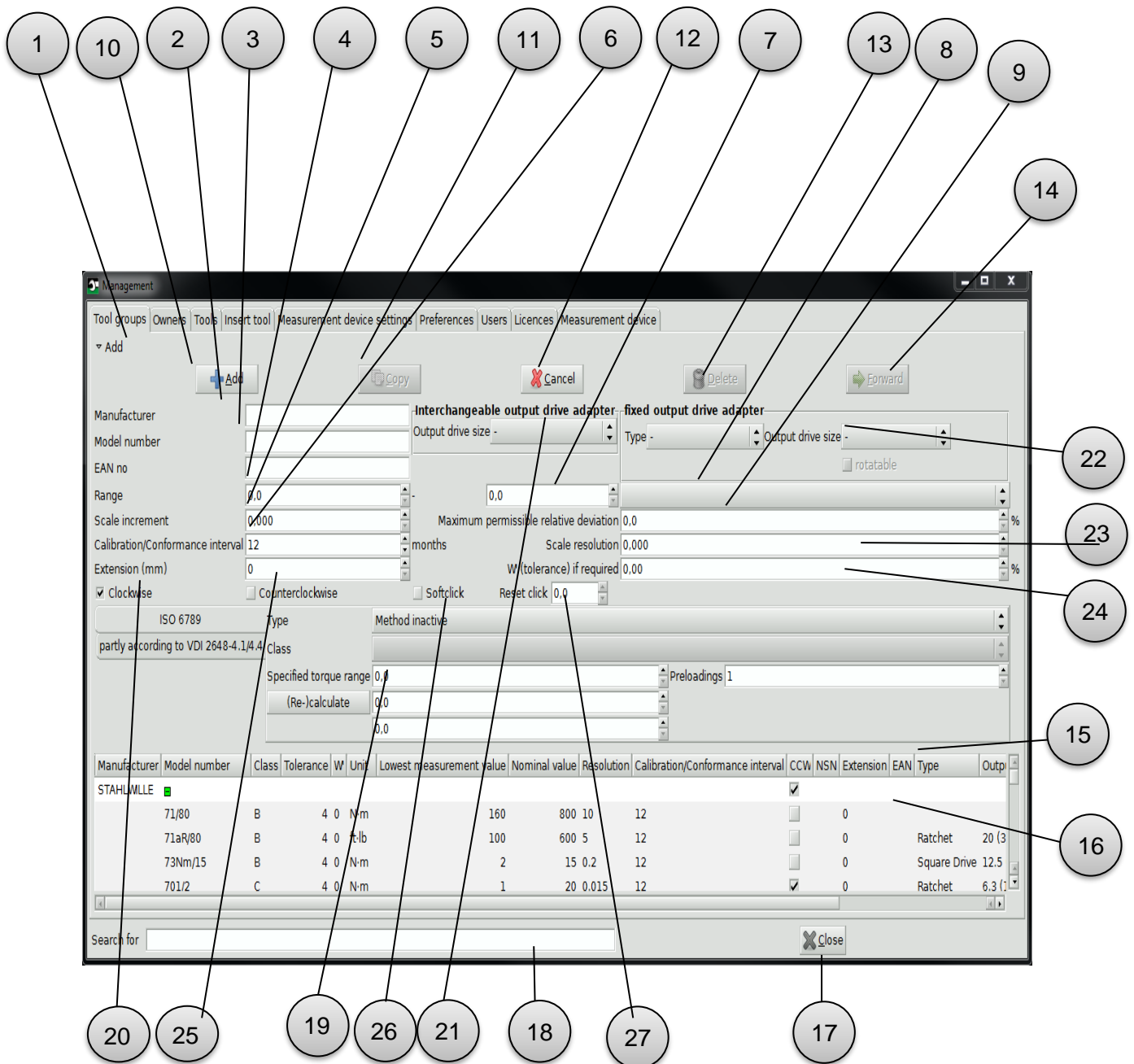
General tool-specific data of the calibration object is stored in the so-called tool group. For a calibration object to be calibrated, it must first be created in the tool group. Furthermore, an owner and the individual tool parameters (e.g. serial number) must be stored for each calibration object.

STAHLWILLE tools are already stored in the database. Other makes can be added by the user.

The manufacturer's specifications and relevant standards or guidelines must be taken into account for the settings.

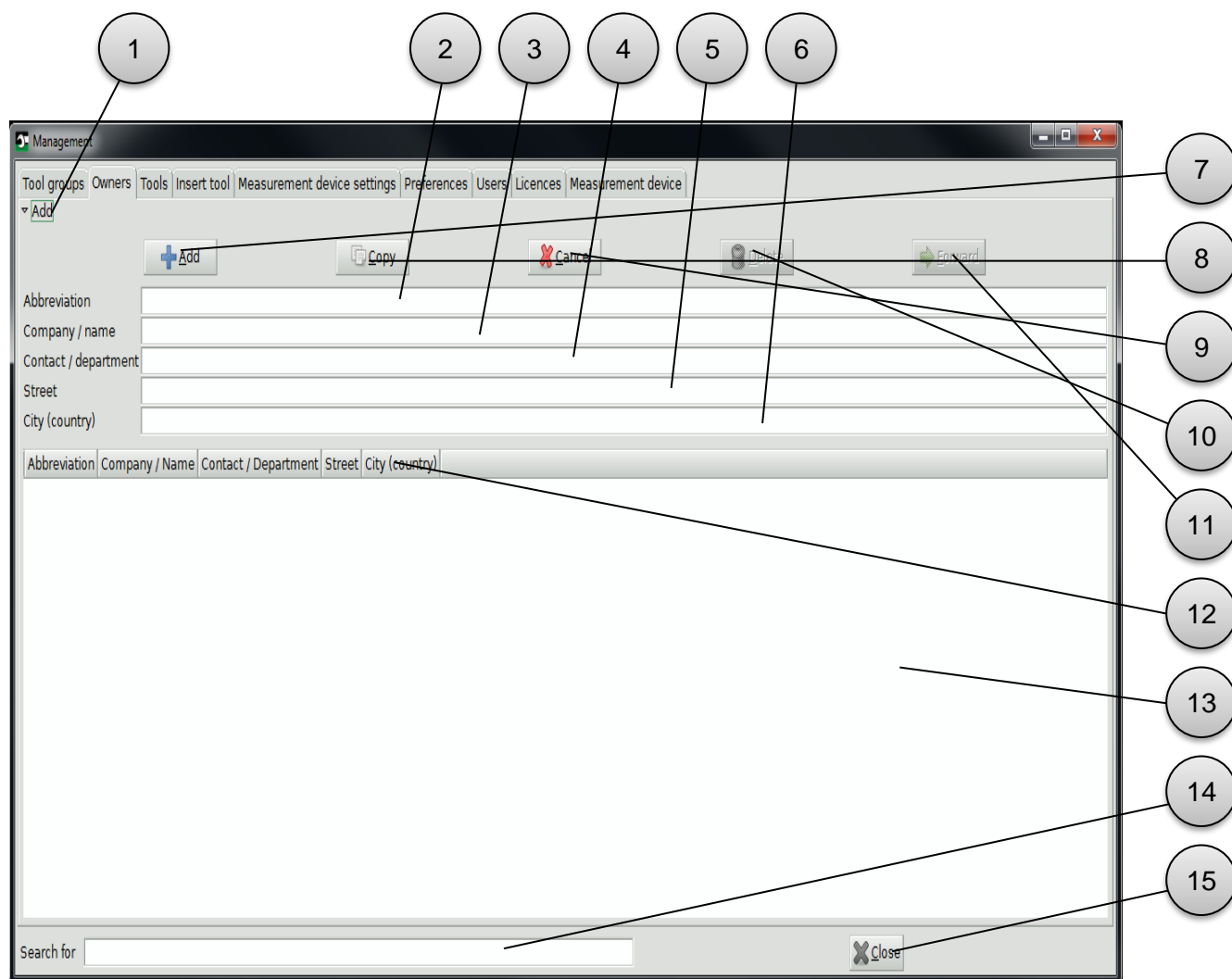| No.	Function / Description
1	Function key to expand the menu.
2	Manufacturer of the torque wrench.
3	Catalogue number / designation of the torque wrench.
4	Beginning value of the measuring range of the torque wrench.
5	Scale division of the torque wrench.
6	Calibration interval of the torque wrench. If an individual calibration interval is specified in the Tool tab, this has priority.
7	Measuring range end value of the torque wrench.
8	Unit of the torque wrench.
9	Display deviation of the torque wrench.
10	Confirm the entries and save the new torque wrench or torque wrench. changed database record.
11	Copying a database record. To do this, select the required database record and confirm the operation with the >Copy< key. You can then make the desired changes (e.g. manufacturer, measuring range or unit). Use the >Apply< key to save the new database record and close the dialog. Note: The data set must have a different type designation, since two identical type designations with different parameters cannot exist in the database.
12	Cancel entry or editing of a database record.
13	Deleting a database record. Deletion is only possible if no tools are assigned to the tool group. In this case, an error message appears.
14	Continue editing on the next tab.
15	Filter bar. Click to sort the created tools.
16	List of all tool groups created in the database.
17	Close the window.
18	Input field for the automatic filter function within the database. This filter refers to the first column of the displayed database. You can select the desired column as the first column by double-clicking on the corresponding column heading.
19	Additional standard specifications for the tool. See below for details.
20	Identification of the tool for right-hand and left-hand tightening.
21	Select adaptation output for the tool if the output adapter is exchangeable.
22	Select the adaptation type and output if the adapter is fixed. In addition, select whether the adapter is rotatable or not. If possible.
23	Resolution of the display
24	Display deviation of the torque wrench including calculation of the MU parameters.
25	Length of the lever, when using the handle of the torque wrench
26	When the soft click is activated, the penetration depth of the break point is reduced.
27	Reset hit defines the minimum expected unloading value. All peaks below this value will be counted to the next load.

Additional settings for calibrations according to DIN EN ISO 6789:2003:

Please take the manufacturer's specifications and the standard DIN EN ISO 6789-2:2017 into account when making your entries.

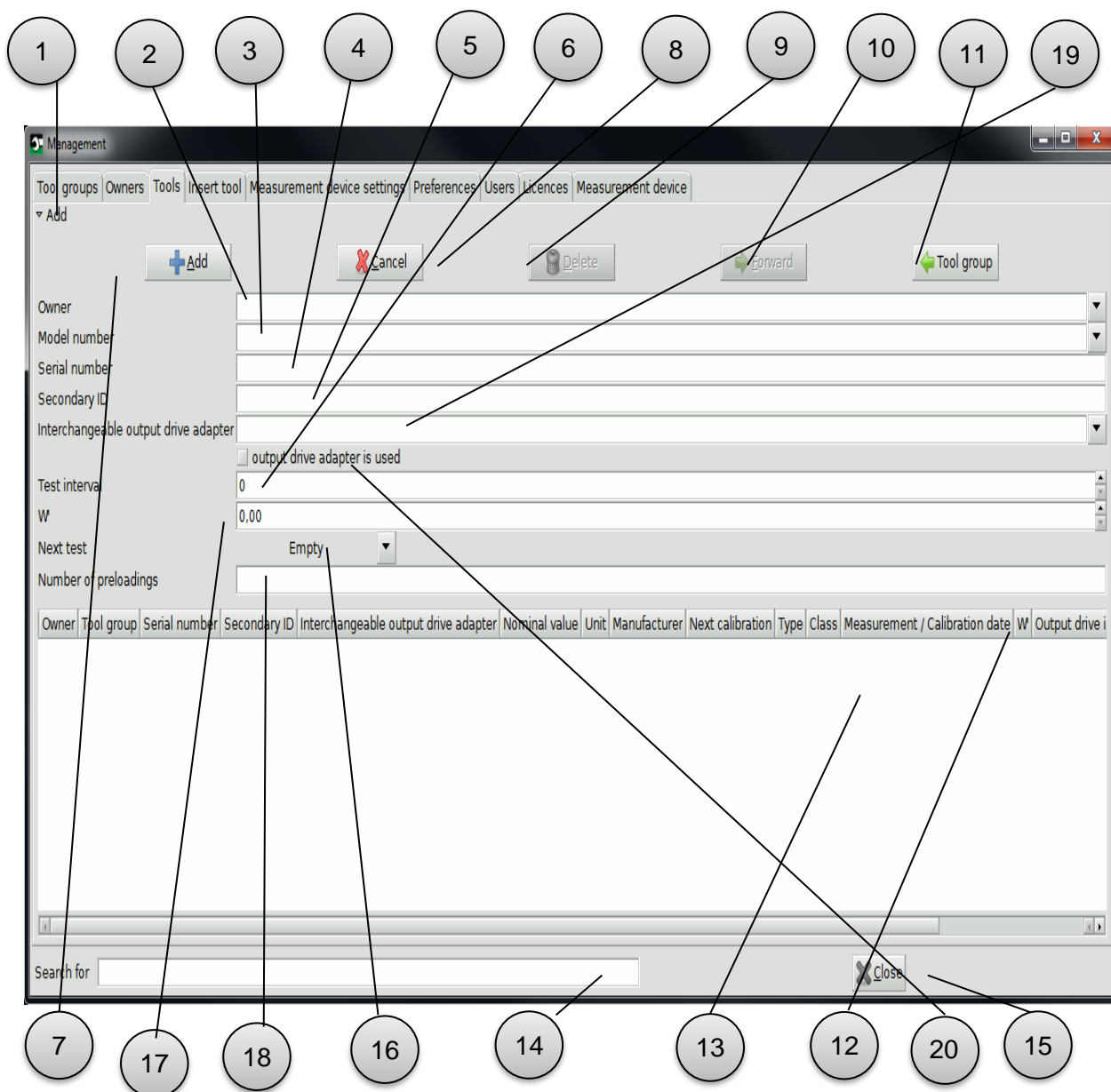| No.	Function / Description
1	Calculate the values for the calibration points (20, 60 and 100%).
2	Type of torque wrench according to DIN EN ISO 6789.
3	Class of torque wrench according to DIN EN ISO 6789.
4	Initial value of the measuring range of the torque wrench.
5	20% (according to DIN EN ISO 6789:2003). Support point. If the torque wrench is to be calibrated at different calibration points, individual changes can be entered manually here.
6	60% Support point. If the torque wrench is to be calibrated at deviating calibration points, individual changes can be entered manually here.
7	100% calibration point. If the torque wrench is to be calibrated at deviating calibration points, individual changes can be entered manually here.

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Owner database

An owner must be assigned to each calibration object. Owners can be customers of a calibration laboratory or also a production cell within a production site.

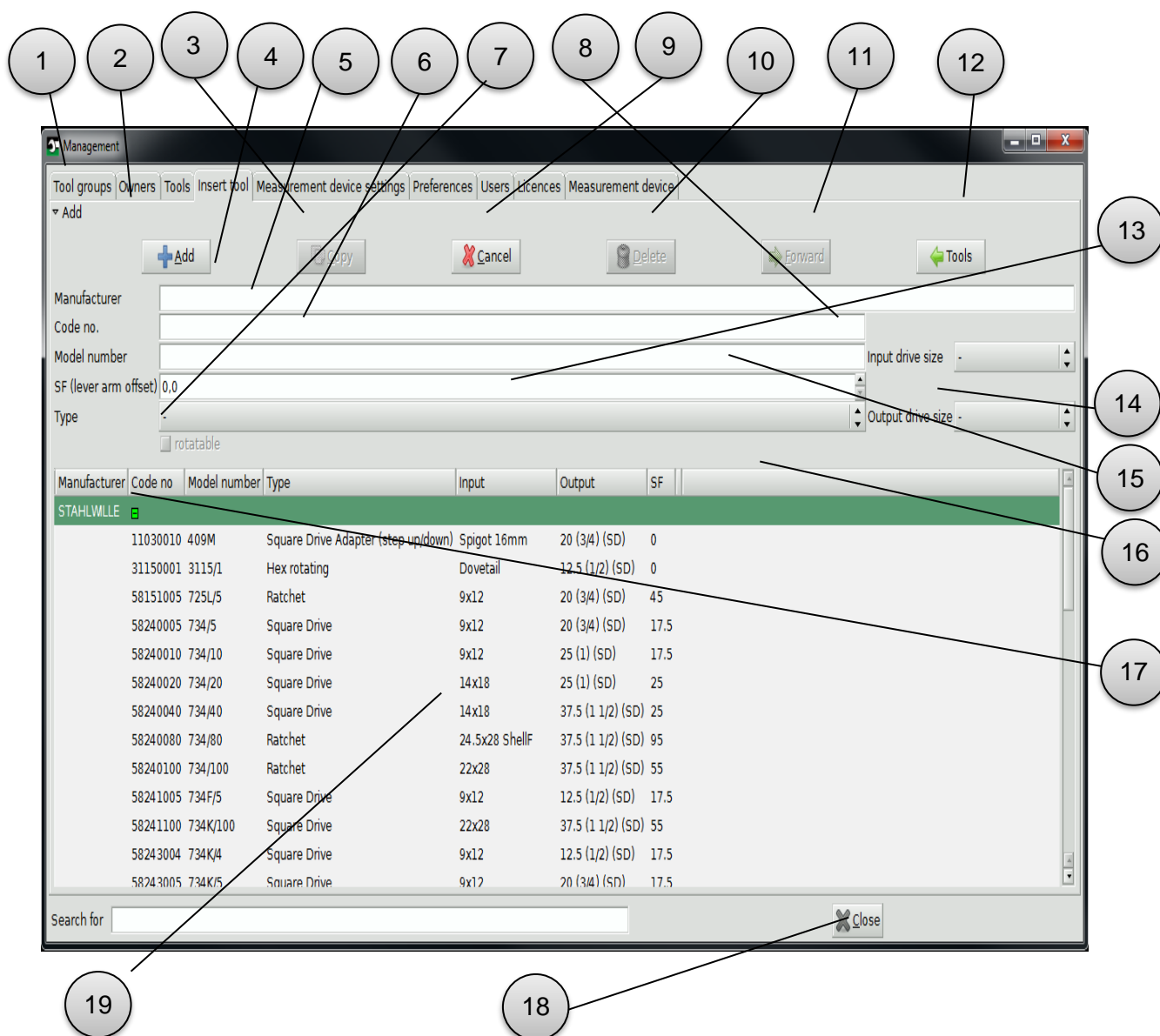| No.	Function / Description
1	Function key to expand the menu.
2	Abbreviation of the owner (alphanumeric).
3	Name of the owner.
4	Contact information of the owner
5, 6	Address of owner
7	Function key for adding a new data record to the database
8	Function key for copying an existing owner.
9	Canceling the entry of a new owner.
10	Deleting an owner from the database. Deletion is only possible if no calibration objects are assigned to the owner.
11	Function key for further input of data for a calibration object (parameters of the tool)
12	Filter bar. Click to sort the created owners.
13	List of all owners contained in the database.
14	Input field for the automatic filter function within the database. This filter refers to the first column of the displayed database. By double-clicking on the corresponding column heading, you can select the desired column as the first column.
15	Close the window.

Tool database

The individual parameters of a calibration object are defined here. The prerequisite for this is that the corresponding tool group and the owner have already been created.

No.	Function / Description
1	Function key to expand the menu.
2	Select the abbreviation of the owner. You can either use the drop-down menu (right arrow) to display the entire selection or start entering the shortcut. The selection is then automatically restricted according to the input (auto-completion).
3	Selection of the tool group used. You can either use the drop-down menu (right arrow) to display the entire selection or start entering the shortcut. The selection is then automatically restricted according to the input (auto-completion).
4	Serial number of the calibration object. This number can be used to search for the tool within the database.
5	User-specific identification number (e.g. test equipment number) of the calibration object. This number can be used to search for the tool within the database.

| 6	Specification of the calibration interval if the interval deviates from the value stored in the tool group.
7	Function key for adding a new data set to the database.
8	Cancel entry of a new tool.
9	Delete a tool from the database.
10	Returns to the main window and loads the object (torque wrench) for calibration.
11	Returns to the tool group for any adjustments.
12	Filter bar. Click to sort the created tools.
13	List of all tools created in the database.
14	Input field for the automatic filter function within the database. This filter refers to the first column of the displayed database. You can select the desired column as the first column by double-clicking on the corresponding column heading.
15	Close the window.
16	Date of the next calibration of the torque wrench. This can be specified either as a date or as a calendar week/year. This entry is mandatory if you want to use the automatic information about due calibration objects.
17	Display deviation. Compares the display of the result with the calibration result. Here, W' is set for the selected tool.
18	Shows the number of set/desired loads
19	Connect adaptation with a tool. Here, the adaptation is selected, with which this calibration object is calibrated by default. This adaptation is loaded as a preselection when the calibration object is called.
20	Connect reducing adapter with an adapter and a tool. Here, the possibly necessary reducing adapter is selected, with which this calibration object is calibrated by default.

Insertion tool database

No.	Function / Description
1	Function key to expand the menu.
2	Function key to add a new data record to the database.
3	Copying an adaptation data record
4	Manufacturer of the adaptation.
5	User-specific code number for the group to be created
6	Specification of the used catalog designation of the adaptation.
7	Select whether the square/hexagon of the adaptation can be rotated.
8	Drive size of the insertion tool
9	Cancels the entry of a new insertion tool.
10	Delete a tool from the database.
11	Returns to the main window and loads the object (insertion tool) for calibration.
12	Add the insertion tool to the tool.
13	Specify the type of adaptation type.
14	Output size of the insertion tool

| 15	Determine the stitch dimension.
16	Filter bar. Click to sort the created adaptations.
17	Fold out the list of created insertion tools.
18	Close the window.
19	List of all adaptations created in the database.

User administration
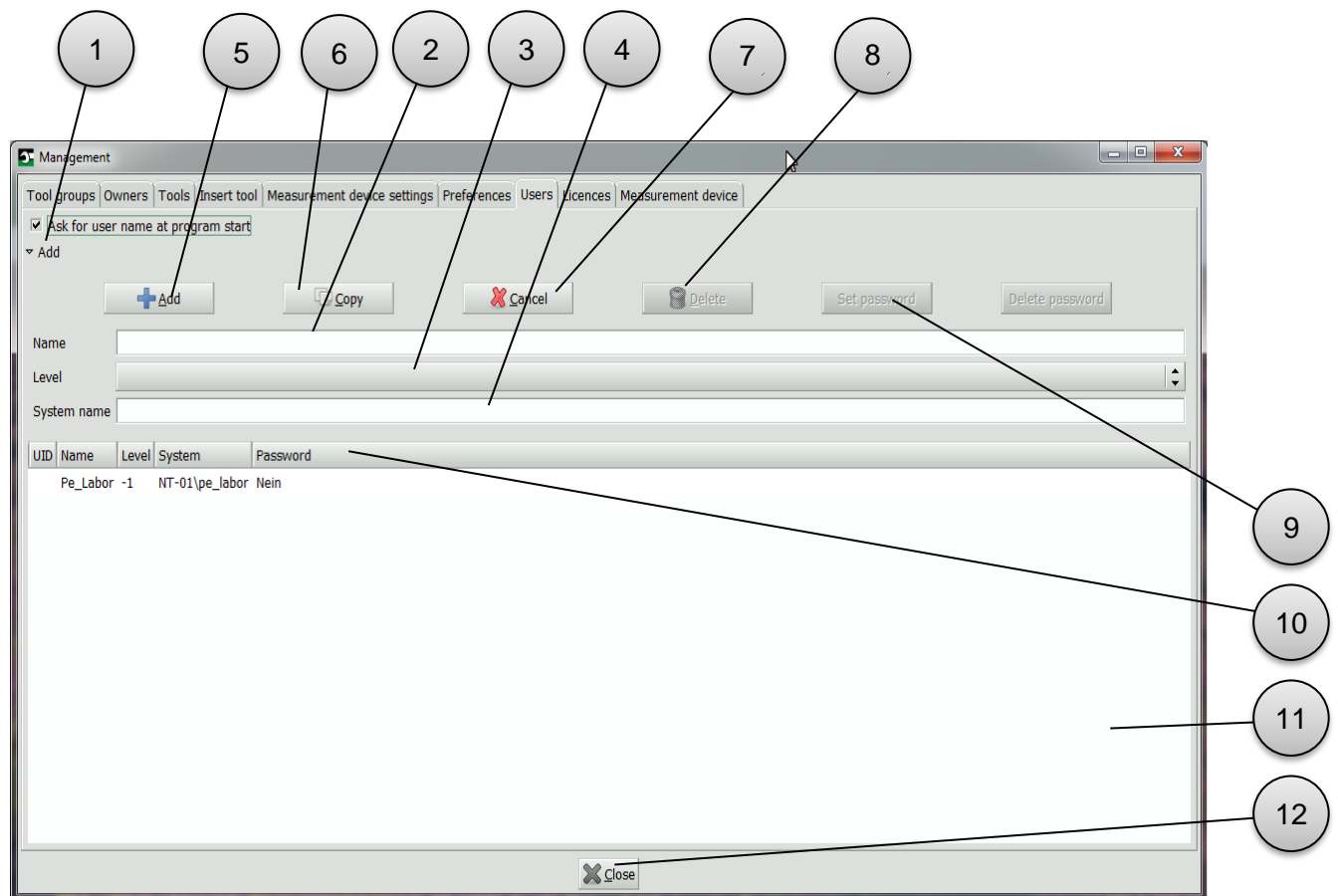
With the user administration it is possible to restrict the functionality of the software.

No.	Function / Description
1	Function key to expand the menu.
2	Name of the user.
3	Level of authorization.
4	Logon name on the operating system.
5	Function key for adding a new data record to the database.
6	Copy a user.
7	Canceling the entry of a new user
8	Delete an existing user
9	Assign a password to the user or change the password. (Admin rights required.)
10	Filter bar. Click to sort the created users.
11	List of all users created in the database.
12	Close the window.

Program licences
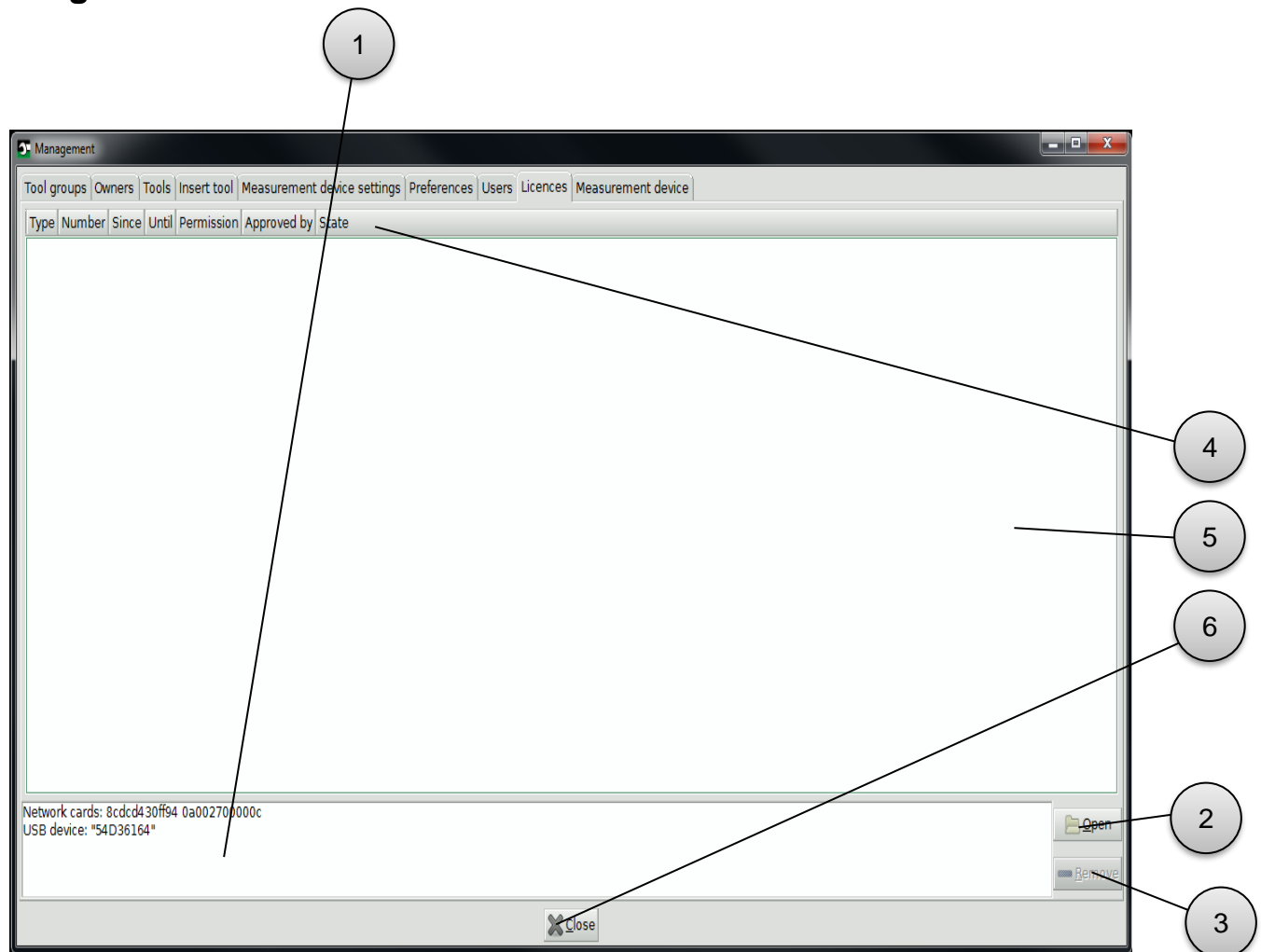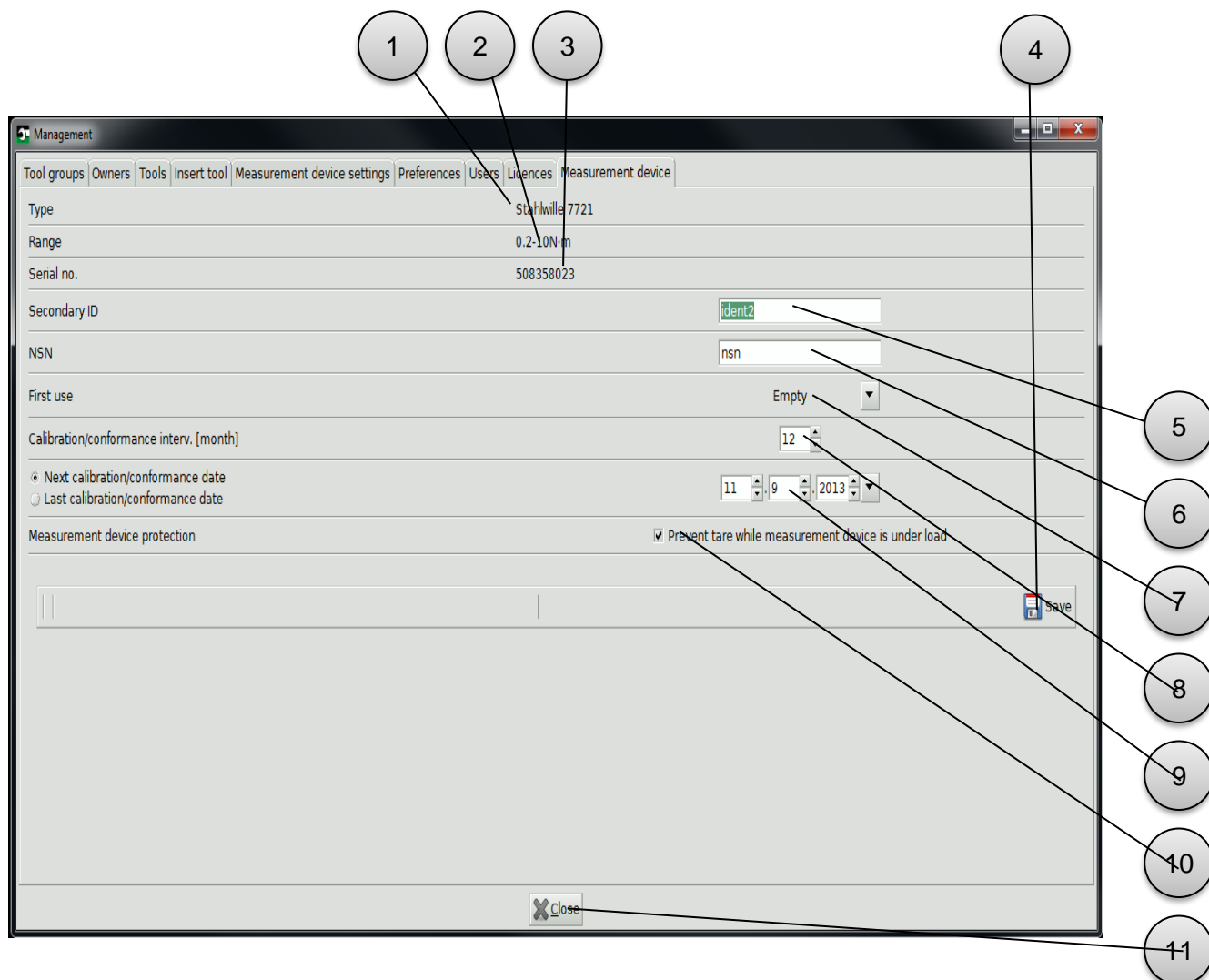
The functional scope of the TORKMASTER software can be extended by additional licenses. Examples for extensions can be special calibration or adjustment procedures (DKD-R 3-8 or ASME B107.300).

For the license, the so-called MAC-ID of the network card of the PC used is required. Alternatively, the USB device ID of the STAHLWILLE USB adapter can be used. These are displayed in the input field and must be transferred to STAHL-WILLE to generate the license file.

No.	Function / Description
1	Input field for the license key
2	Opening a license file.
3	Function key for removing a license.
4	Filter bar. Click to sort the created licenses.
5	List of all licenses created in the database.
6	Close the window.

Parameter for transducer

The variable parameters in the references (transducers) can be set here. For this purpose, the reference must be connected directly to the PC via the USB adapter.

No.	Function / Description
1	Display of the sensor type. This dataset is permanently stored in the transducer.
2	Measuring range of the transducer type. This data set is permanently stored in the transducer.
3	Serial number of the transducer type. This data set is permanently stored in the transducer.
4	Function key for saving the parameters in the connected transducer.
5	User-specific ident number (e.g. test equipment number) of the calibration object.
6	User-specific number of the calibration object.
7	Commissioning date of the transducer (format: dd/mm/yyyy). The drop-down menu (right arrow) opens a calendar view for selection.
8	Calibration interval of the transducer.
9	Date of the next/last calibration of the sensor (format: dd/mm/yyyy). The drop-down menu (right arrow) opens a calendar view for selection. This date is also displayed in a calibration certificate created with TORKMASTER.
10	This function prevents the sensor from taring under load! It must be selected when using the sensor with a perfectControl 7794-2 or 7794-3. It is used to protect the

	sensor in the event of operating errors in the system and to prevent measurement errors due to incorrect pressing of the tare key.
11	Close the window.
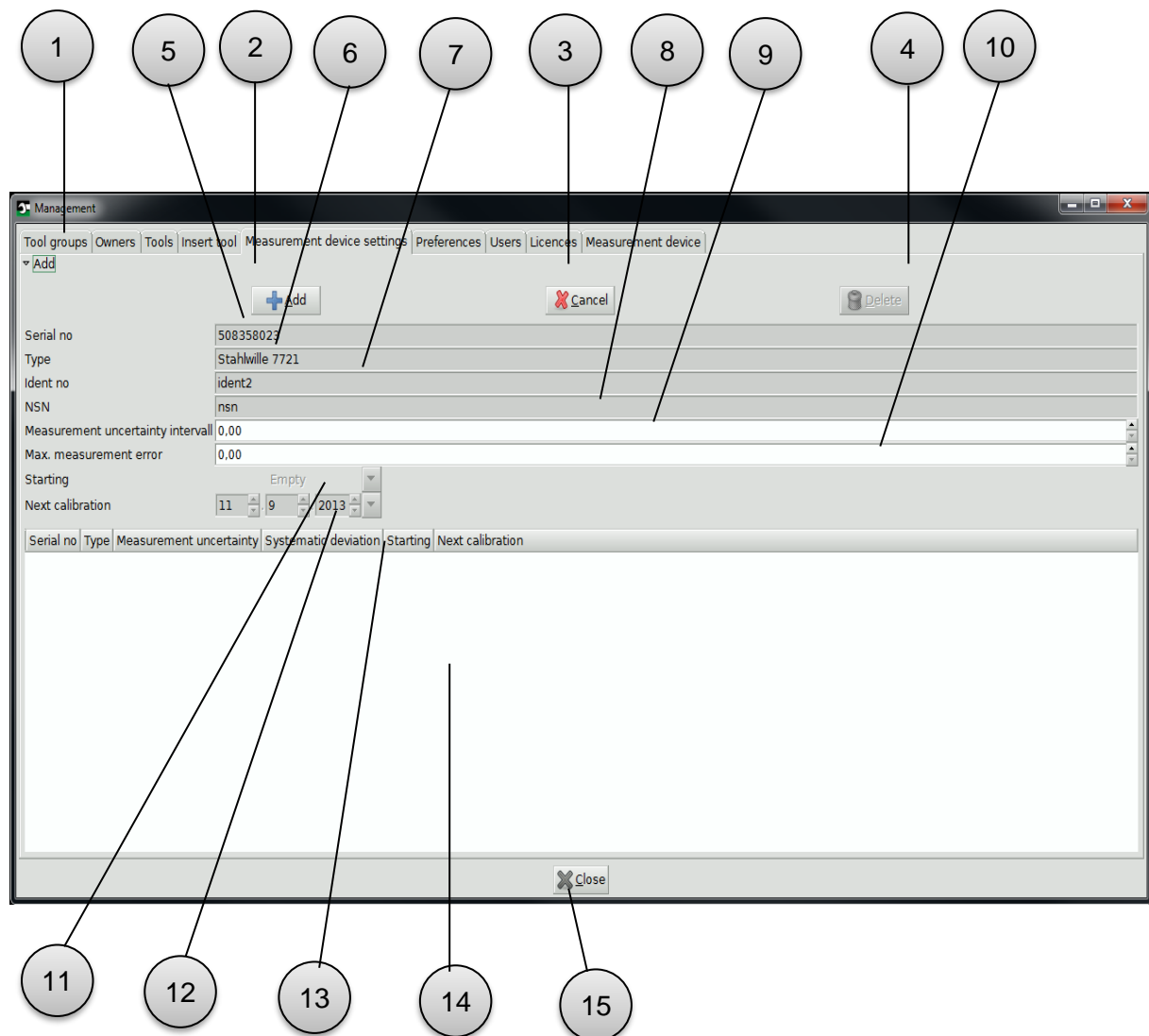
The measurement uncertainty and the systematic deviation of the reference can be entered here. The values must be stored if calibration is performed after DIN EN ISO 6789-2:2017. If a calibration is started without the values being stored, it is not possible to start the calibration. In addition, the parameters of the reference are displayed.

No.	Function / Description
1	Function key to expand the menu.
2	Function key to add a new data record to the database.
3	Canceling the entry of a new transducer
4	Deleting a transducer from the database
5	Serial number of the transducer type. This data record is permanently stored in the sensor and is read out automatically.
6	Display of the sensor type. This data record is permanently stored in the sensor and is read out automatically.
7	Display of the identification number of the calibration object assigned by the user.
8	Display of the number of the calibration object assigned by the user.

9	Input field for the measurement uncertainty of the sensor.
10	Input field for the systematic deviation of the transducer.
11	Display of the commissioning date of the sensor.
12	Displays the date of the next calibration of the sensor.
13	Filter bar. Click to sort the created transducers.
14	List of all transducers created in the database.
15	Close the window.

Application notes and examples

Notes on calibration (influencing factors)

The results of a calibration can be negatively influenced by the following factors, among others:

- Climatic conditions
    - Room temperature (absolute value and stability)
      18...28°C and ≤ 1K Temperature change during calibration
    - Temperature of the calibration object
      We recommend 24h storage of the calibration object in the laboratory for acclimatization.
    - Relative humidity
- measurement transducer
    - Display accuracy / measurement uncertainty
    - Sampling rate
    - Shear force dependence
    - Time of tare
    - Fixation of the measuring sensor
- Alignment of the calibration object
    - Horizontal or vertical construction
    - Levelling of the calibration object to the base area (e.g. ±3°)
    - Position of the point of application of force (variation of the lever arm)
    - Displacement of the force application point during the measuring process
    - Support of the point of application of force
- Adaptation of the calibration object
    - Calibration insertion tool and square alignment
    - Reducing adapter for adapting the insertion tool to the measurement transducer
    - Use of ratchets or square edges with balls
      Both insertion tools have a large influence on the calibration result due to high production-related tolerances. We therefore recommend the use of special calibration insertion tools.
- Recognition of the buckling point
    - Sampling rate of the measurement transducer
    - Tightening speed of the torque wrench
    - Time of the tare for the measuring transducer
    - Parameters for detecting the kink point
- Staff
    - Knowledge in handling the calibration technology used
    - Knowledge of the applicable standards and directives
    - Knowledge of the calibration objects
    - Non-observance of instructions from the relevant documents
        - instruction manuals
        - Standards and directives

We recommend performing a Failure Mode Effects Analysis (FMEA) for the calibration process to identify possible process failures and their consequences and to take appropriate corrective action to avoid these failures.
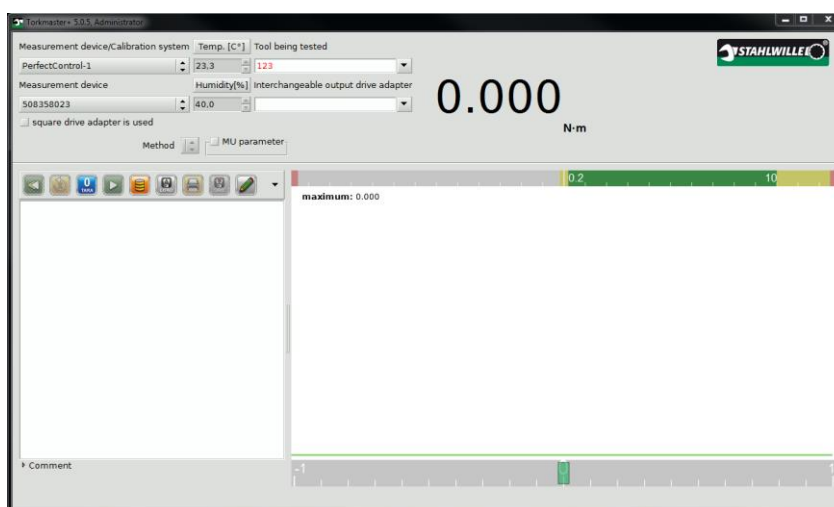
5-M: Man, Machine, Environment, Method, Material

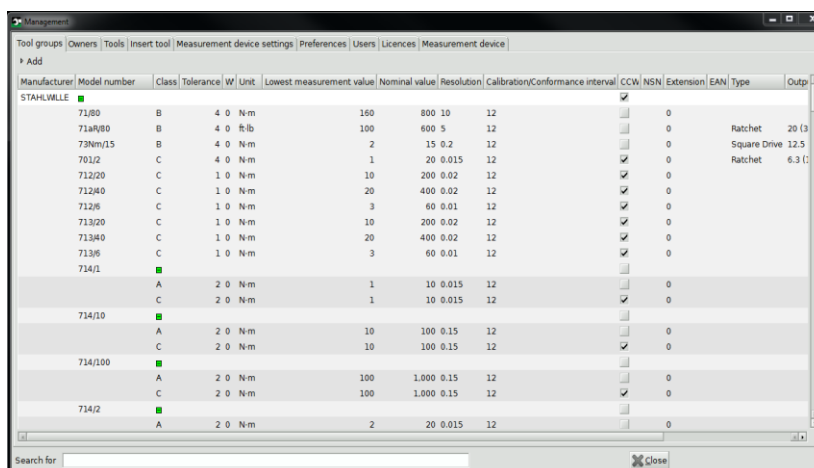# Creating a new tool in the database

The following example shows how a triggering torque wrench (Type II / Class A) in accordance with DIN EN ISO 6789-2:2017 is completely created in the TORKMASTER database. The creation takes place in four steps:

1. Create 1st tool group

2. create owner

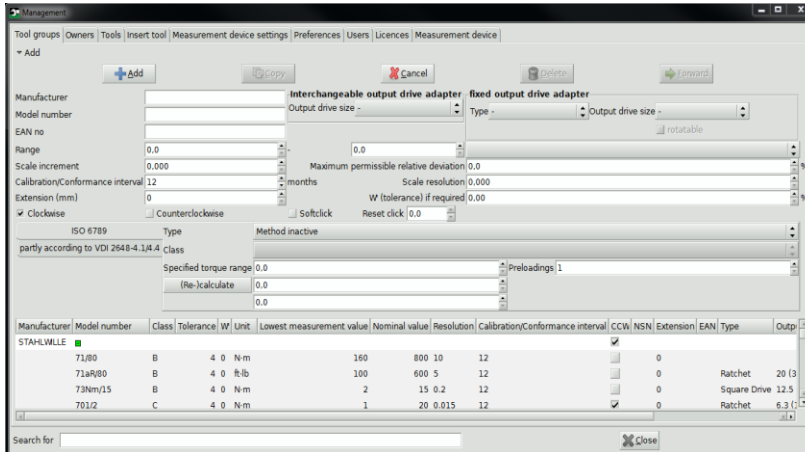3. create tool

4. start calibration
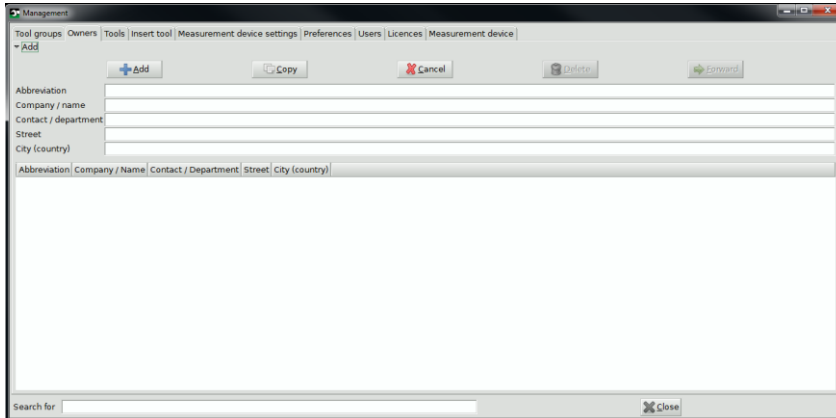
➢ Open the database.

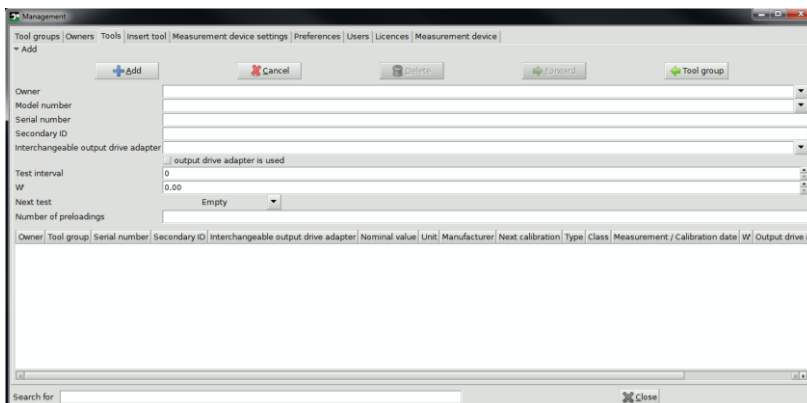➢ Select the <Tool Group> tab.

➢ Click <add>.

> ➢ Enter the manufacturer of the tool.
> ➢ Enter the type designation of the tool.
> ➢ Note: The type designation is the reference within the database. If, for example, you want to create the same type with different units within the database, you must indicate this within the type designation. Example: 730D/10_Nm and 730D/10_inlb.
> ➢ If it is a tool group with fixed adaptation, enter the type and the drive and mark whether the square/hexagon can be rotated.
> ➢ Enter the scale start value.
> ➢ Enter the full scale value.
> ➢ Select the unit.
> ➢ Enter the scale division.
> ➢ Enter the display deviation.
> ➢ Enter the resolution.
> ➢ Enter the calibration interval.
> ➢ Check the boxes for the permissible load directions (here: right only).
> ➢ Select the type according to DIN EN ISO 6789-2:2017.
> ➢ Select the class according to DIN EN ISO 6789-2:2017.
> ➢ Enter the three scales for the calibration. With the key >(recalculate)< the values are calculated automatically.
> ➢ If necessary, adjust the number of pre-pollutions.
> ➢ Press the >Add< keys to create the new tool group.
> ➢ Press the >Vor< key to go to the >Tool< tab. If the owner of the tool has not yet been created in the database, select the >Owner< tab to create it.

> ➢ Enter an abbreviation for the user.
> ➢ Note: This abbreviation is the reference within the database.
> ➢ Enter the company and/or name.
> ➢ Enter the contact information.
> ➢ Enter the street.
> ➢ Enter the city.
> ➢ Press the >Add< buttons to create the new owner.
> ➢ Press the >Ahead< button to move to the >Tool< tab.

> ➢ Select the owner. You can enter the beginning of the name, if known. In the list that appears, you can select the entry by clicking with the mouse or by using the cursor keys and the enter key.
> ➢ Select the torque tool. You can enter the beginning of the drawing - if known. In the appearing list you can select the entry by mouse click or by cursor keys and enter key.
> ➢ Enter the serial number.
> ➢ Note: It serves as a reference within the database.
> ➢ Enter your test equipment number/description.
> ➢ Select a suitable adaptation (optionally).
> ➢ Enter a calibration interval.
> ➢ Enter the display deviation W' (optionally).
> ➢ Enter the date of the next calibration. This can be specified either as a date or as a calendar week/year. This information is required if you want to use the automatic information about calibration objects that are due.
> ➢ Press the >Add< keys to create the new tool.
> ➢ Press the >Vor< key to go to the main window.
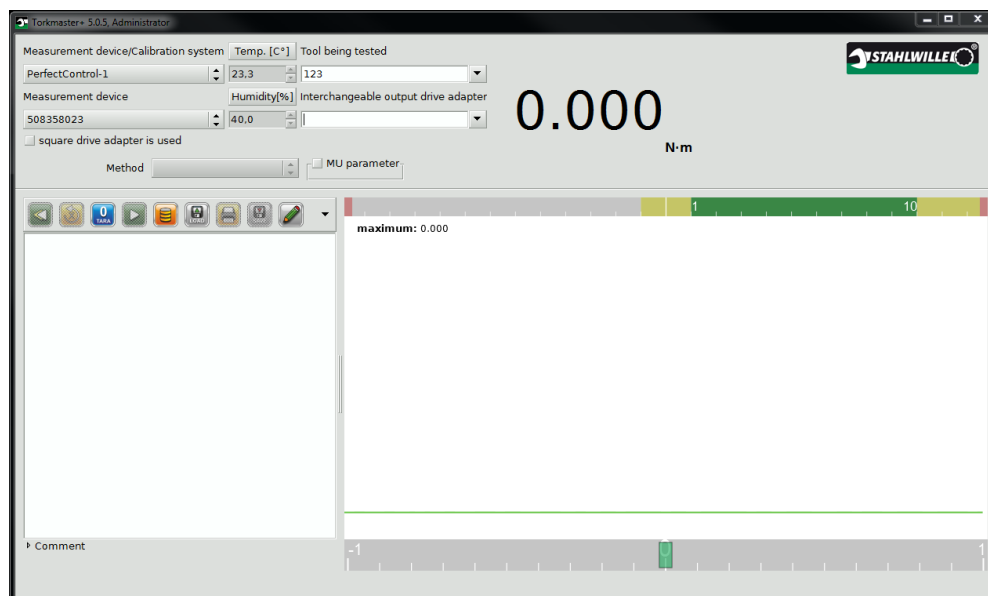
➢ Select an adaption
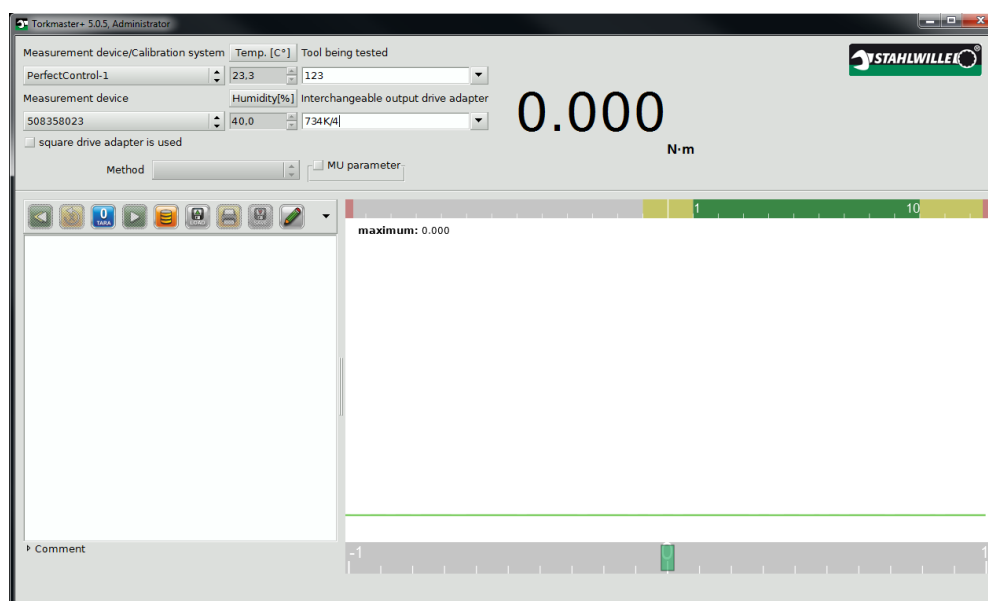
➢ Select calibration method
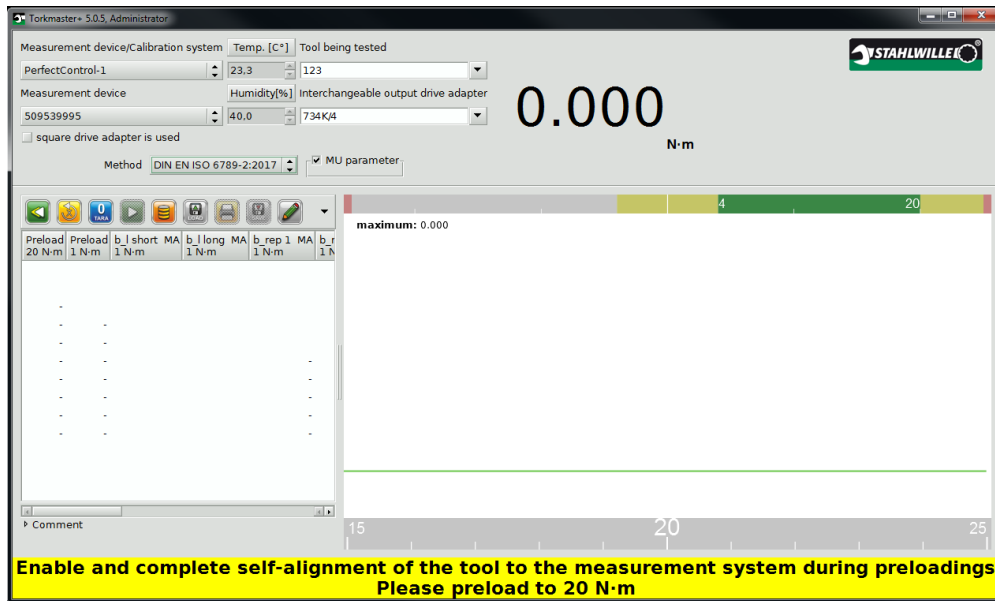
➢ Start the calibration and follow the instructions of the TORKMASTER software in the status line.

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Example of a calibration according to DIN EN ISO 6789-2:2017 with the perfectControl 7794-1, 7791 or 7792

The following example shows how a triggering torque wrench (Type II / Class A) according to DIN EN ISO 6789-2:2017 is calibrated with perfectControl 7794-1 and manual operation. This procedure also applies to the 7791 and 7792 actuating devices and when using this software with the 7707W workshop tester.

Basic condition:
- The TORKMASTER software is installed and started.
- A transducer is connected to the computer via the USB adapter.
- The software automatically recognizes the transducers and the serial number of the transducer is displayed in field 1. Reference.
- A torque is displayed.
- There is no fault in the system.

Calibration:
- ➢ Select a >Calibration setup<.
- ➢ First carry out an optical check of the calibration object for damage and cracks as well as the legibility of the scale.
- ➢ To calibrate, first enter the serial number, or alternatively the ID number, in the >Calibration object< field. If the number is displayed in red, the calibration object is not yet stored in the database. In this case, you must first include the calibration object in the database (see section Tool database).
- ➢ If the calibration object is already in the database, the serial number is displayed in black.
- ➢ Select an appropriate adaptation with a suitable calibration insertion tool. If necessary, use appropriate reducers. Never combine several reducers! These influence the
- ➢ Calibration result.
- ➢ Select the calibration method DIN EN ISO 6789-2:1027.
- ➢ Place the torque wrench in the calibration device and align it according to the normative specifications. Observe the notes on calibration (influencing factors)!
- ➢ Set the maximum value on the torque wrench for the preloads.

    Note: Always set from a low value to a higher value.

Enable and complete self-alignment of the tool to the measurement system during preloadings

➢ Now follow the instructions in the status line and carry out the 2 preloads by initiating the force via the handwheel. The preload is used to align the key correctly. When cranking, make sure that the kink point is within the target range shown in green. If the force is initiated too fast, the break point lies in front of the green area. If the force is introduced too slowly, the break point - according to DIN EN ISO 6789: 2003 - lies behind the green area. According to DIN EN ISO 6789: 2017 there are minimum times to reach the green range. These can be found in the standard.


Adjust tool to 50 N·m and press Start/CCW.
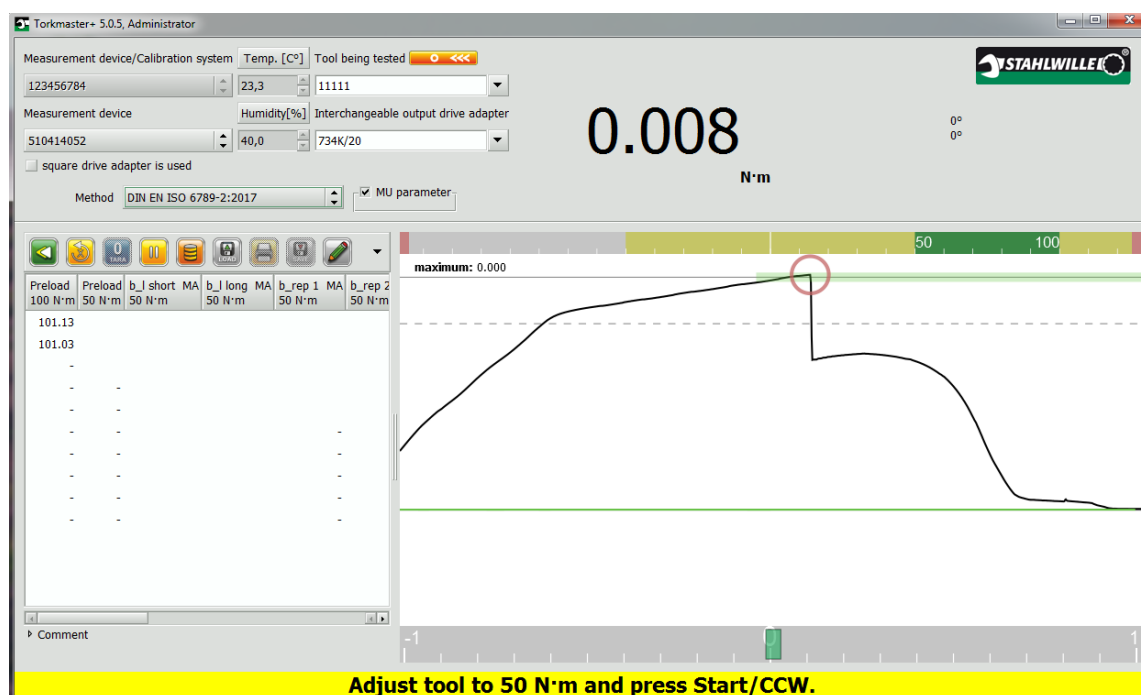
➢ The following pre-loading is carried out at the beginning of the measuring range. 3 pre-loads are carried out.
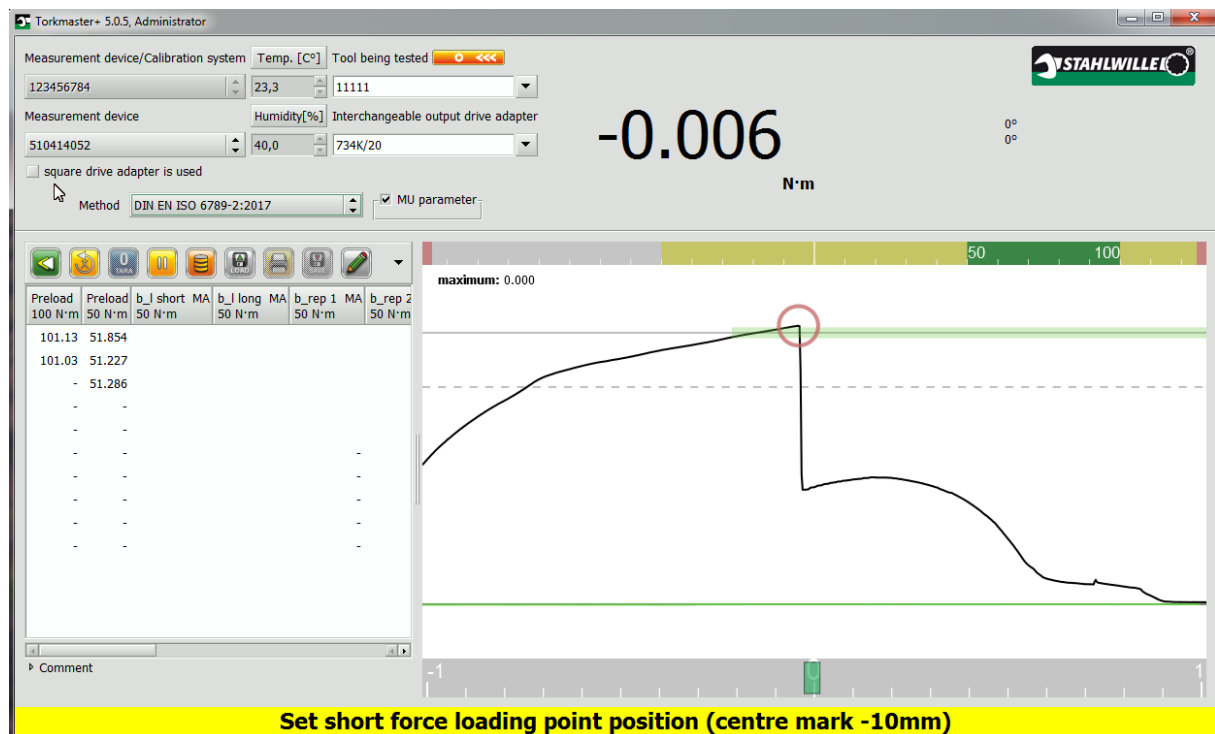

➢ Adjust the small lever according to DIN EN ISO 6789-2:2017. To do this, push the carriage on which the strain gage rests 10 mm in the direction of the transducer. Then carry out 10 measurements.
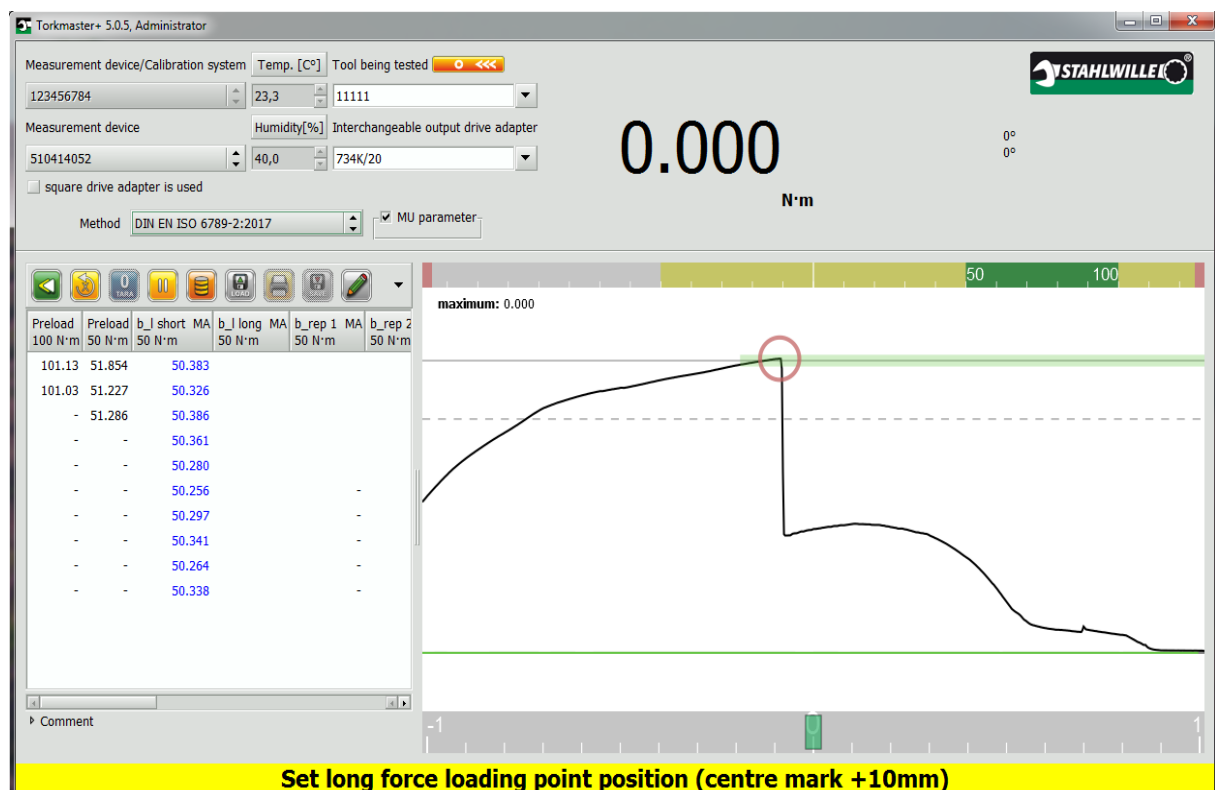
> Adjust the big lever. To do this, push the carriage on which the strain gage rests 10 mm from the center in the opposite direction of the sensor. Then carry out 10 measurements.
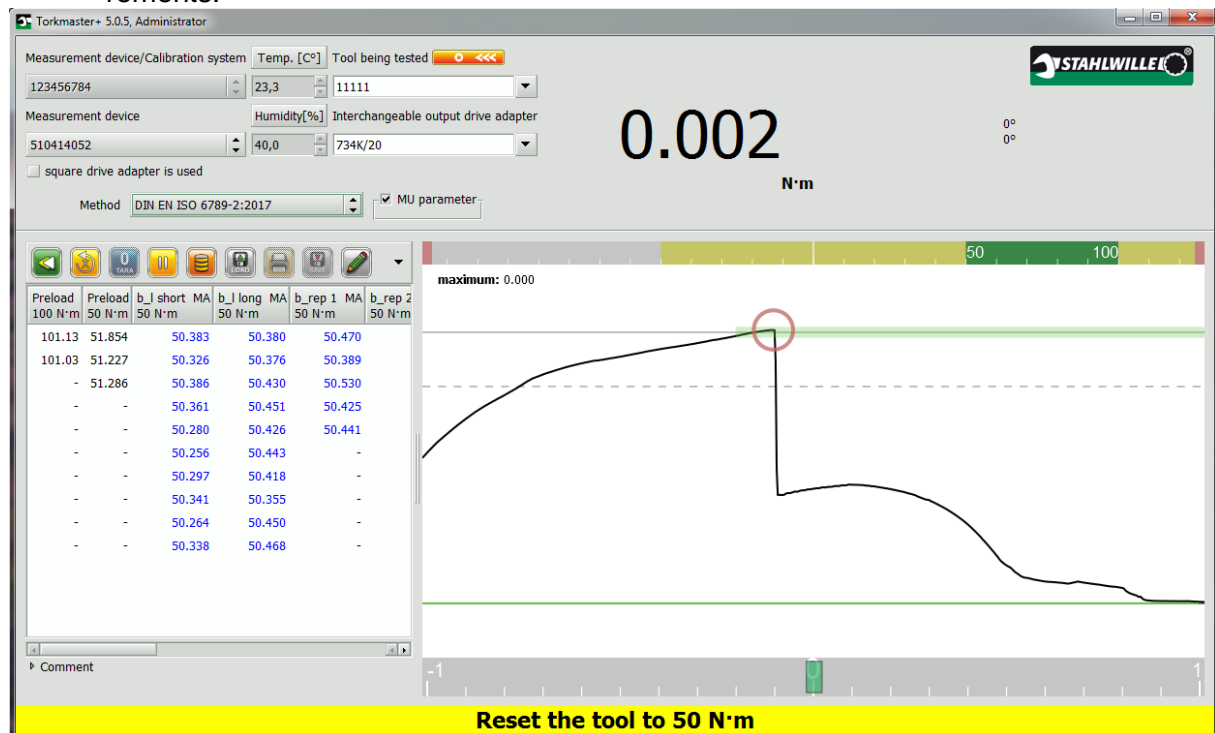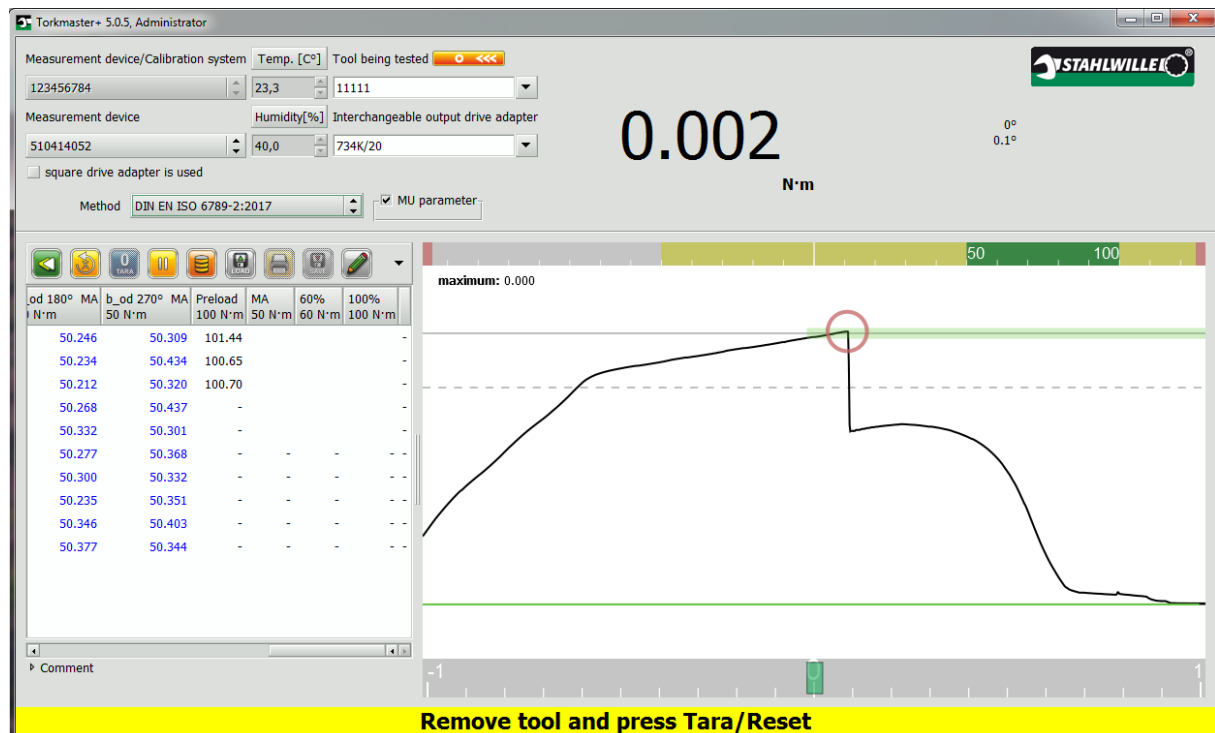

> Adjust the middle lever again and reset the scale to the value shown. Then carry out 5 measurements. Repeat setting the scale to the displayed value a total of 4 times.
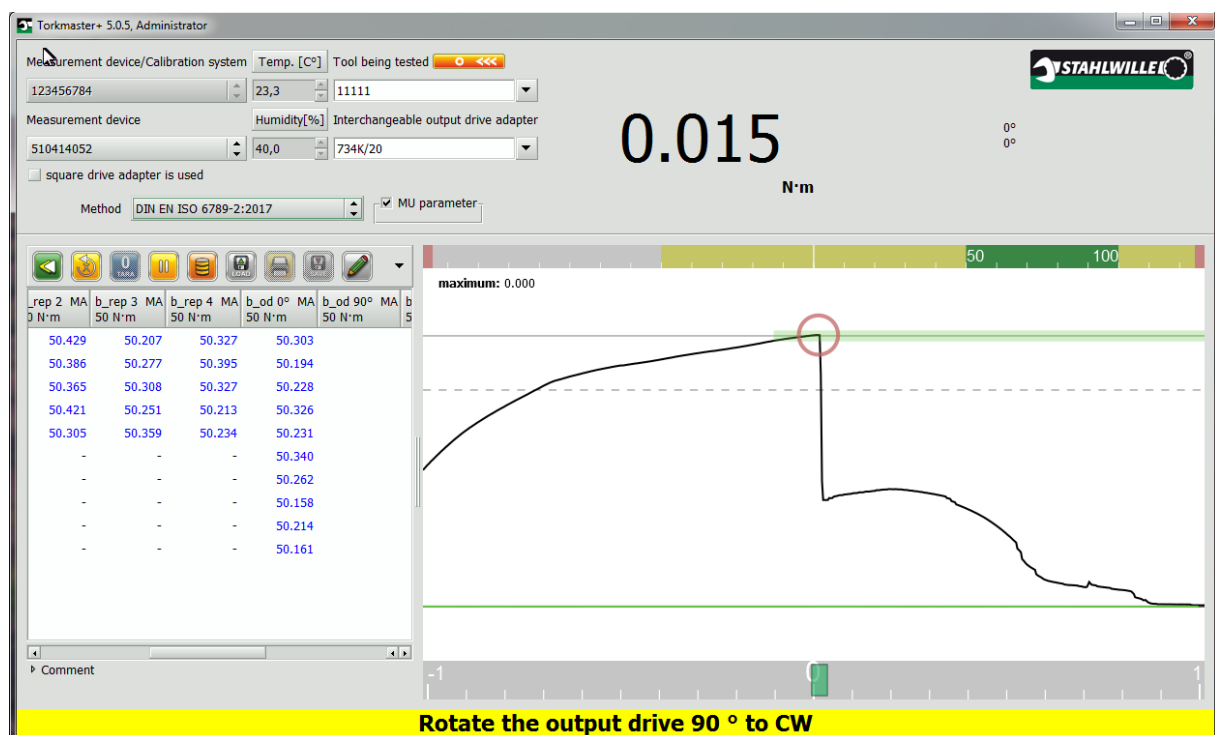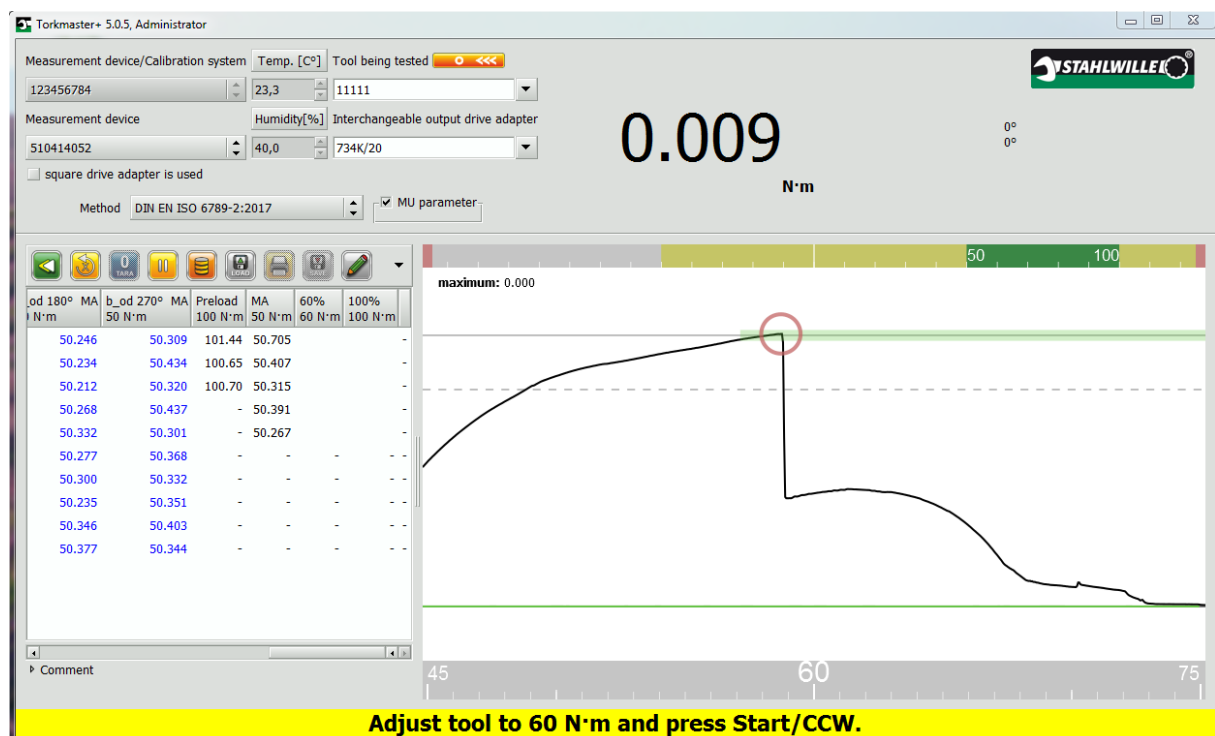

> Turn the square adapter 90° in the CW direction. Then perform 10 measurements. Repeat this step a total of 4 times. Then set the specified measured value. Perform the load 3 times.
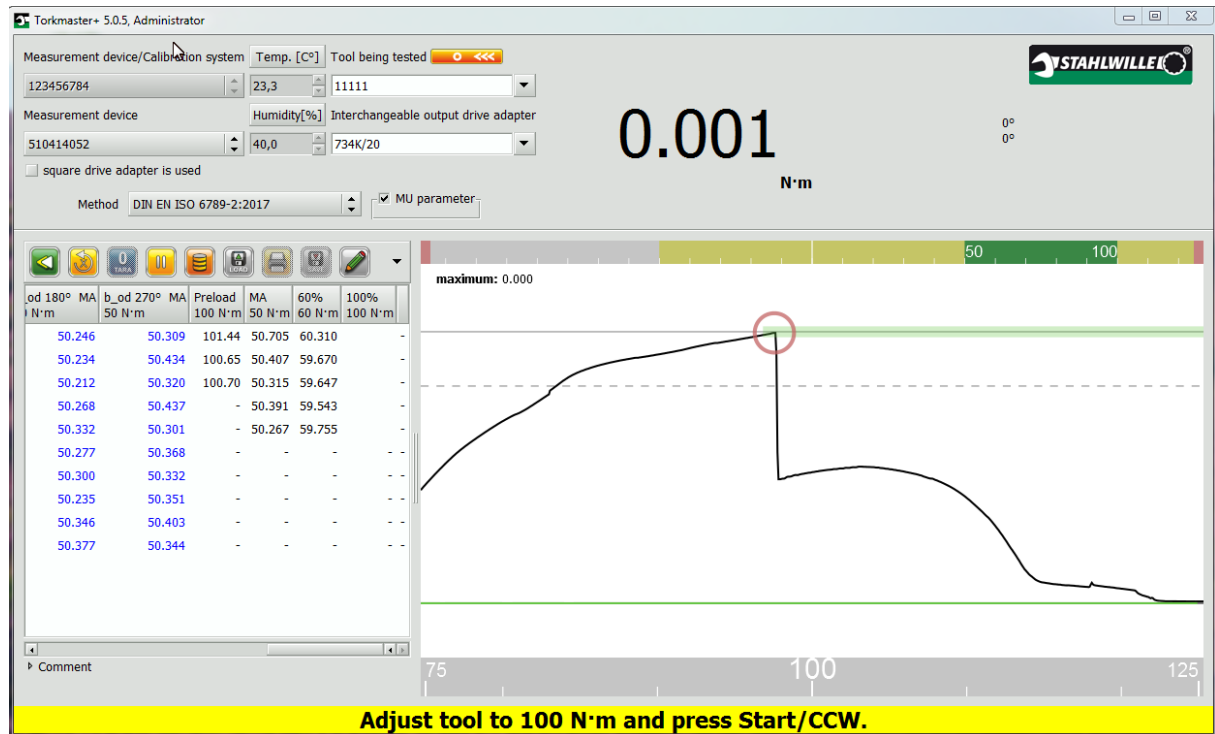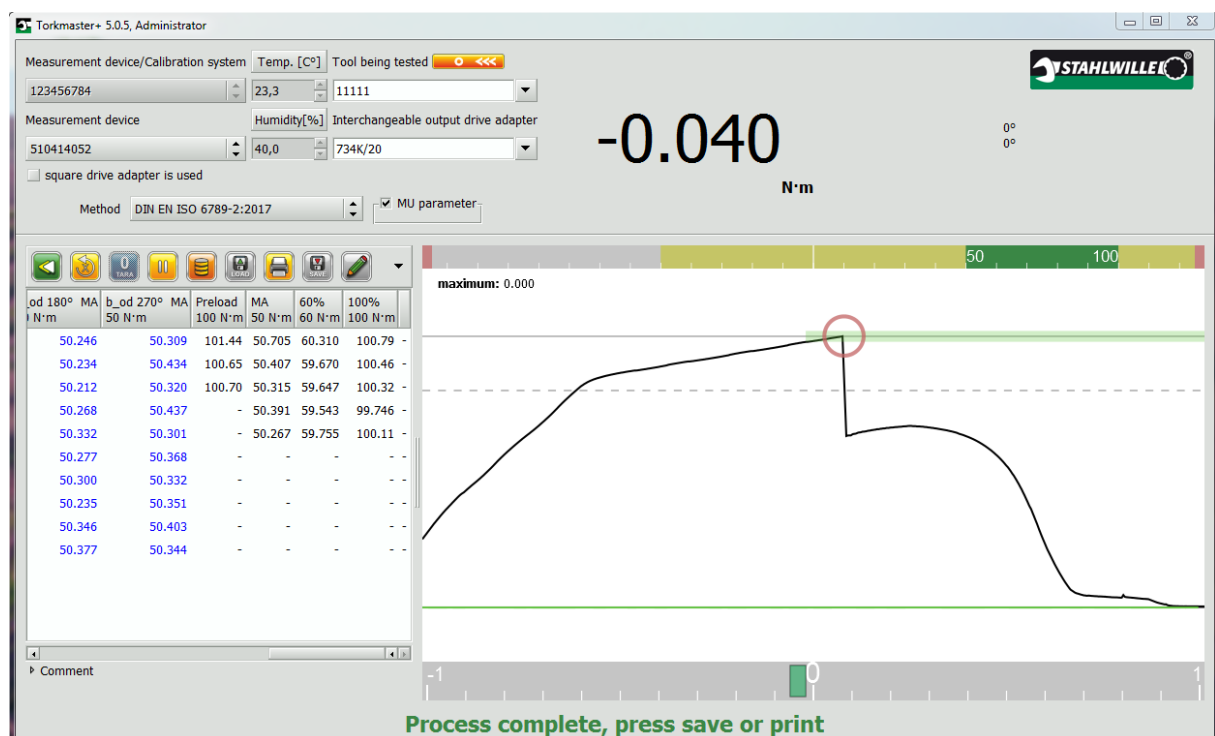
> ➢ Tare the torque wrench: Remove it from the sensor and press the tare button.
> ➢ Now set the value displayed in the status field on the torque wrench. Carry out the loads.

> ➢ Now set the value displayed in the status field on the torque wrench.
> ➢ Execute the loads.

> ➢ Now set the value displayed in the status field on the torque wrench.
> ➢ Execute the loads.

> ➢ After completion of the fifth load, the software recognizes the completion of the calibration. You can now mark the calibration as input or output calibration and/or enter a comment in the comment field. You can then save or print the calibration.
> ➢ The software displays the calibration summary at the end. It is now available again for the next calibration. Values outside the permissible tolerance are displayed in red.

Example of a calibration according to DIN EN ISO 6789:2:2017 with the perfectControl 7794-2

The following shows how a triggering torque wrench (Type II / Class A) is automatically calibrated with perfectControl 7794-2 according to DIN EN ISO 6789-2:2017.
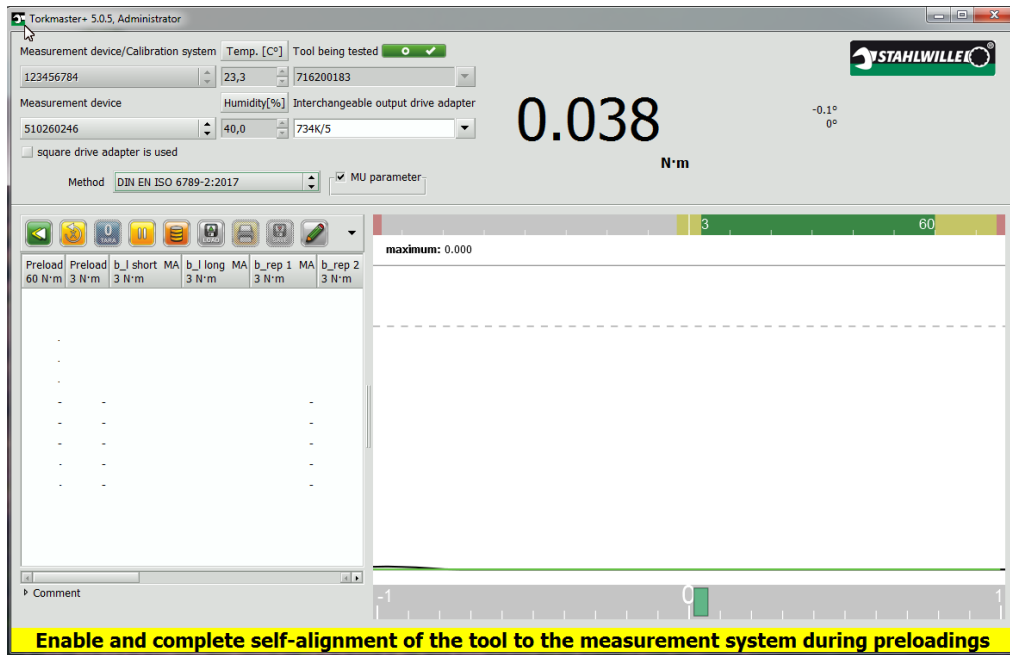
Base state:
- The perfectControl is switched on, the TORKMASTER software is installed and started.
- The software automatically detects the calibration device.
- The serial number of the system is displayed in the >Calibration device< field and the serial number of the sensor is displayed in the >1. Reference< field.
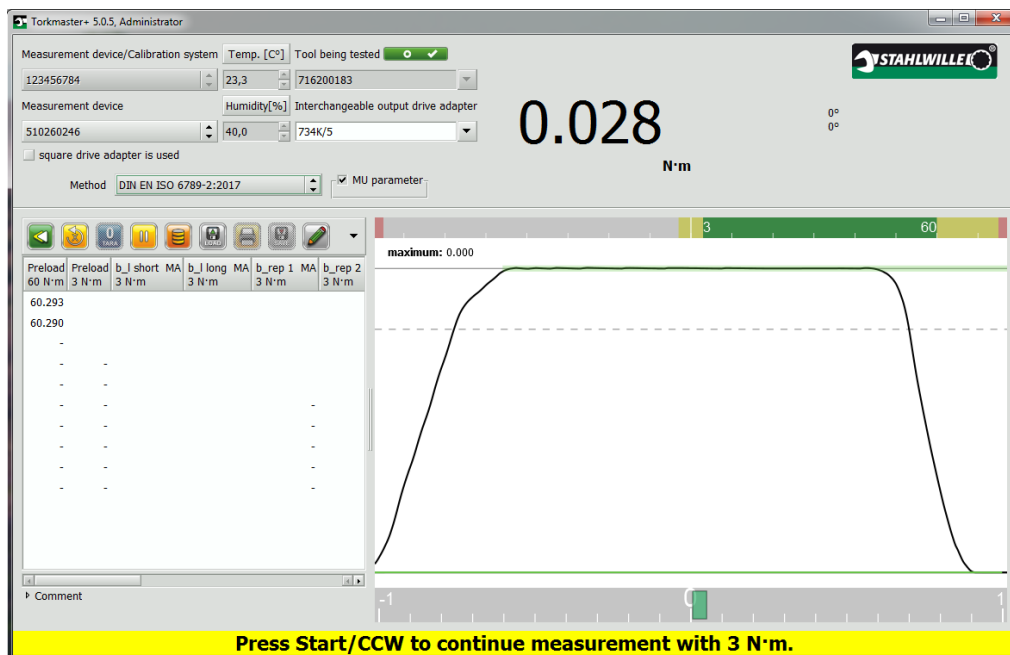- A torque is displayed.
- There is no fault in the system.

Calibration:
- Select a >Calibration Setup<.
- First carry out an optical check of the calibration object for damage and cracks as well as the legibility of the scale.
- To calibrate, first enter the serial number, or alternatively the ID number, in the >Calibration object< field. If the number is displayed in red, the calibration object is not yet stored in the database. In this case, you must first include the calibration object in the database (see section Tool database).
- If the calibration object is already in the database, the serial number is displayed in black.
- Select an appropriate adaptation with a suitable calibration insertion tool. If necessary, use appropriate reducers. Never combine several reducers! These influence the
- Calibration result.
- Select the calibration method DIN EN ISO 6789-2:1027.
- Place the torque wrench in the calibration device and align it according to the normative specifications. Observe the notes on calibration (influencing factors)!
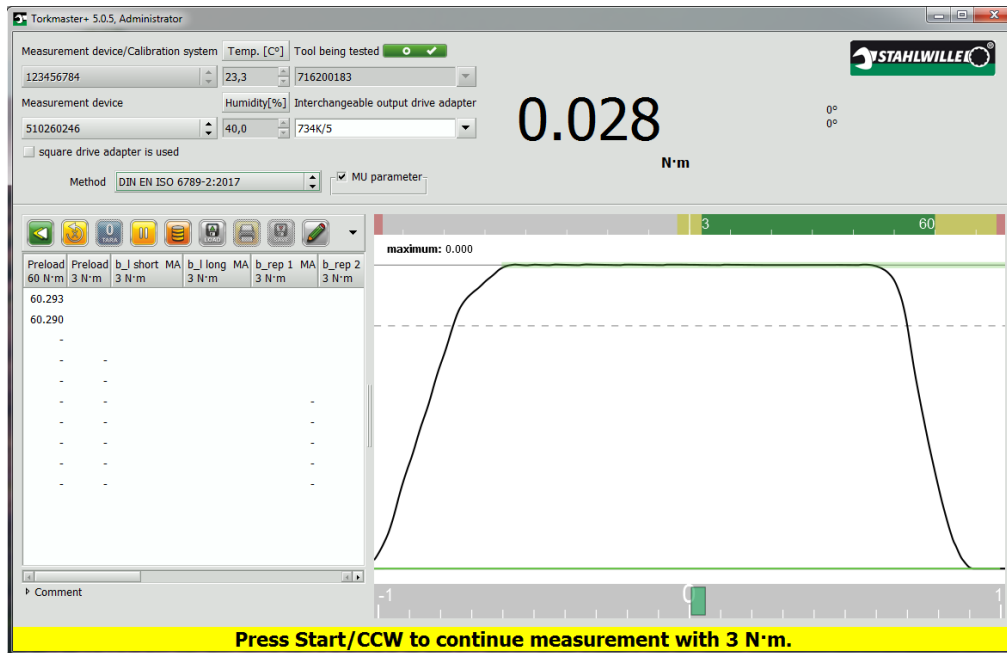- Set the maximum value on the torque wrench for the preloads.

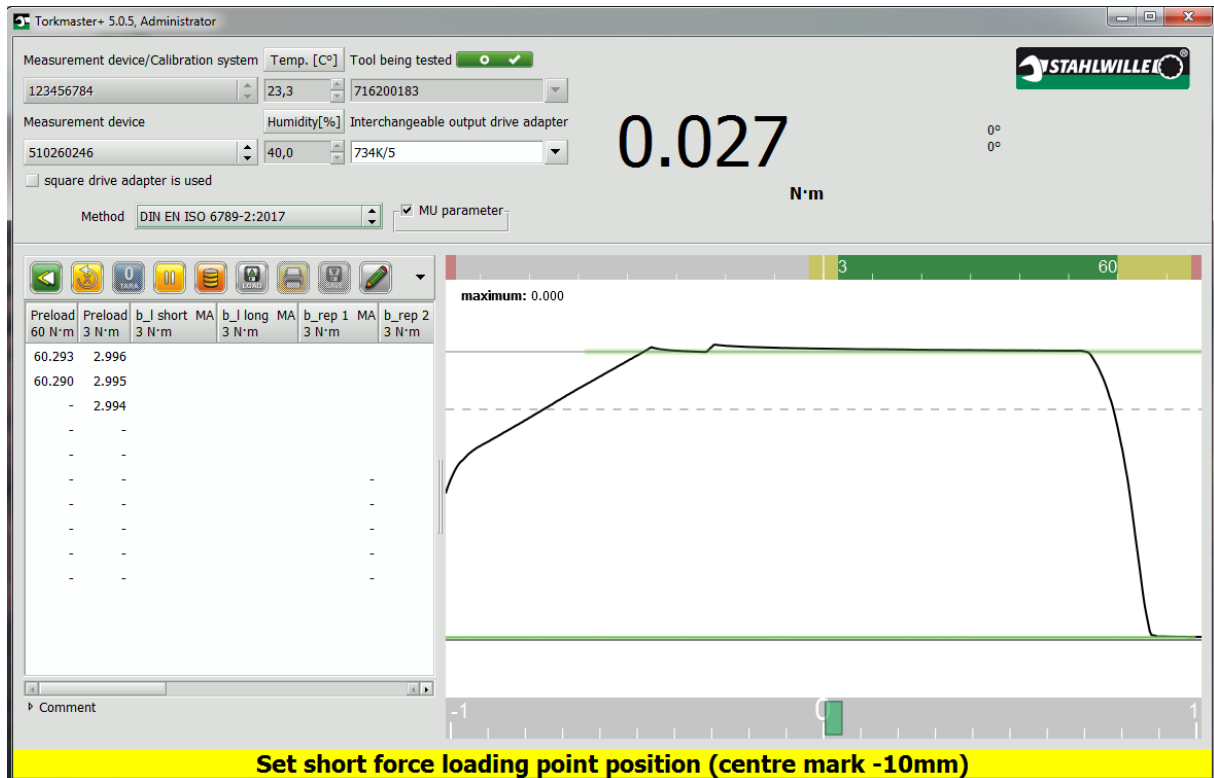 Note: Always set from a low value to a higher value.

Enable and complete self-alignment of the tool to the measurement system during preloadings

➢ Press the Start key.

**Press Start/CCW to continue measurement with 3 N·m.**

➢ The perfectControl now carries out the pre-pollutions fully automatically.

> ➢ Remove the torque wrench completely.
> ➢ Press the tare key on the system. Make sure that the displayed torque no longer drifts before taring.
> ➢ Reinsert the torque wrench. Pay attention to the horizontal alignment and a correctly adjusted clamping protection. If the software displays a torque after insertion, this indicates an incorrectly inserted torque wrench. The torque is generated by transverse forces. An incorrectly inserted torque wrench can falsify the result of the calibration.
> ➢ Close the protective hood.
> ➢ Set the value displayed in the status field on the torque wrench.
> ➢ Press the START button on the system.

> ➢ The perfectControl now carries out the loads fully automatically.
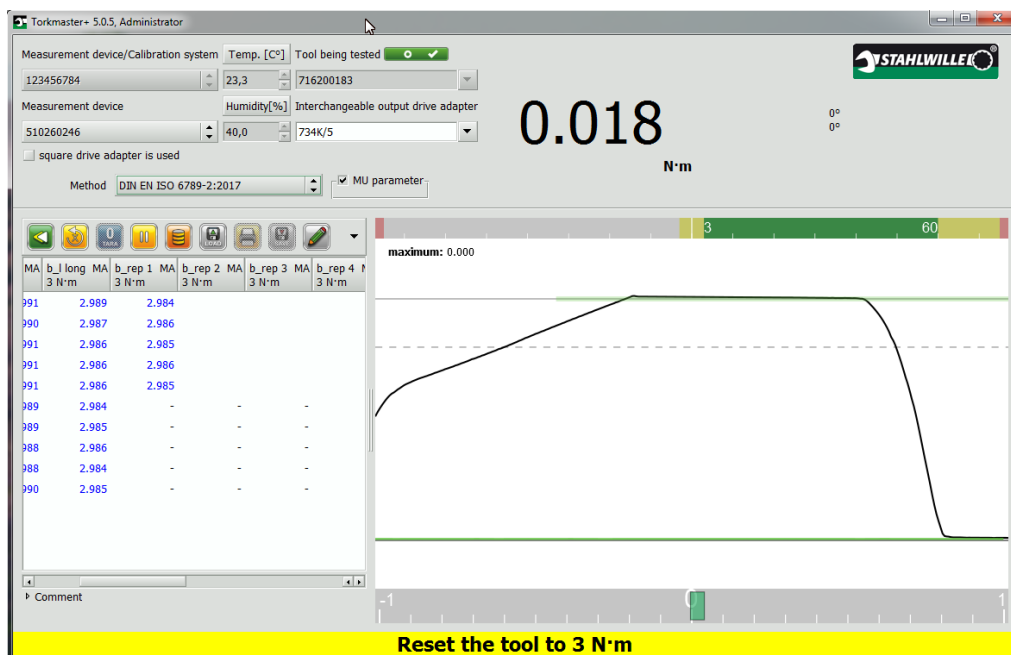
> ➢ Set the value displayed in the status field on the torque wrench.
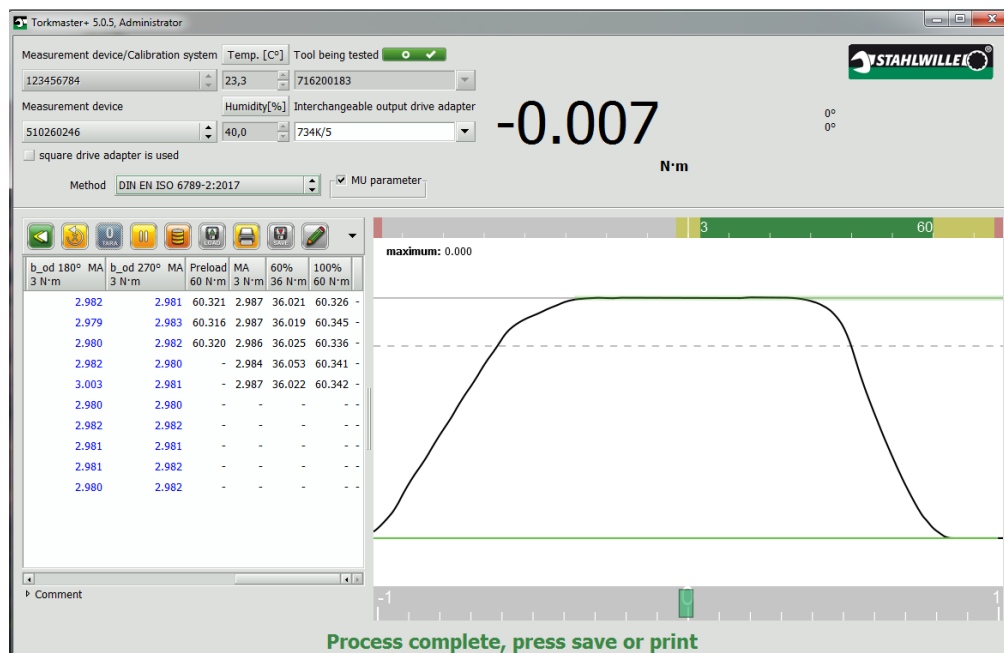> ➢ Press the START button on the system.
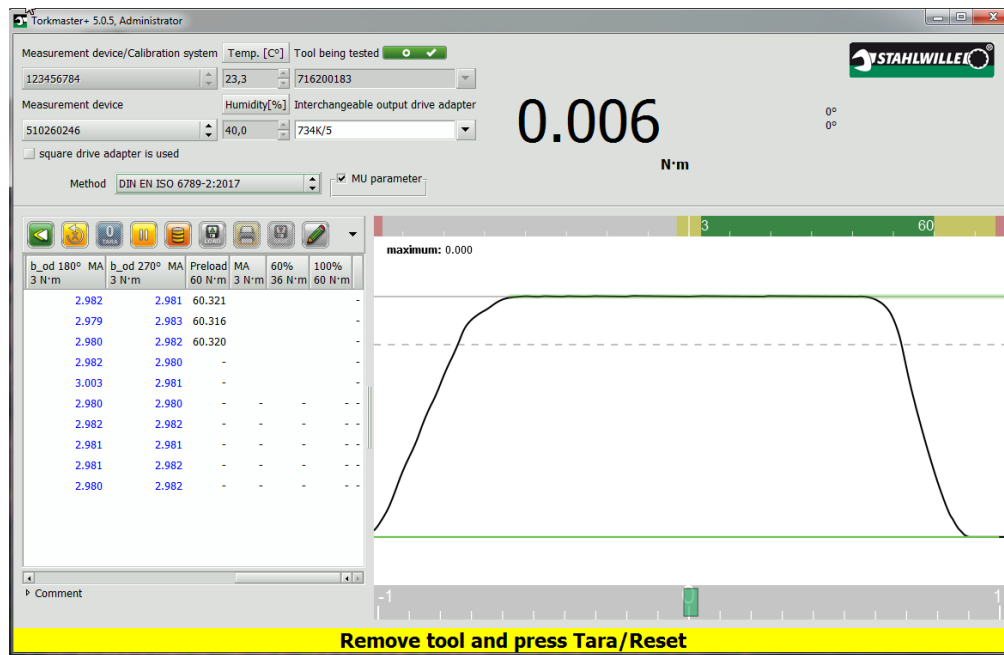
- ➢ The perfectControl now carries out the loads fully automatically.
- ➢ Set the value displayed in the status field on the torque wrench.
- ➢ Press the START button on the system.
- ➢ The perfectControl now carries out the loads fully automatically.

- ➢ The perfectControl returns the torque wrench to its initial position after calibration has been completed.
- ➢ After completion of the fifth load, the software recognizes the completion of the calibration. You can now mark the calibration as input or output calibration and/or enter a comment in the comment field. You can then save or print the calibration.
- ➢ The software now displays the calibration summary. It is now available for the next calibration.

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Example of Test and Adjustment Mode

The following shows how a triggering torque wrench (Type II / Class A) is tested or adjusted with the perfectControl 7794-2.

Basic condition:
- The perfectControl is switched on, the TORKMASTER software is installed and started.
- The software automatically recognizes the calibration device and the serial number of the system is displayed in the >Calibration device< field.
- The serial number of the sensor is displayed in the field >1. Reference<.
- A torque is displayed.
- There is no fault in the system.

Test and adjustment:
- ➢ the calibration object for damage and cracks.
- ➢ To test or calibrate, first enter the serial number, or alternatively the Ident number, in the >Target object< field. If the number is displayed in red, the calibration object is not yet stored in the database. In this case, you must first include the calibration object in the database (see section Tool database).
- ➢ If the calibration object is already in the database, you can now select the >Calibration method<. In this example, the calibration object is to be tested or adjusted. To do this, select >Test and Adjustment<.
- ➢ Select an appropriate adaptation with a suitable calibration insertion tool. If necessary, use appropriate reducers. Never combine several reducers! Place the torque wrench in the calibration device and align it according to the normative specifications. Observe the notes on calibration (influencing factors).
- ➢ Set the nominal value on the torque wrench for the preloads.
- ➢ Press the start button.

Use the selection box shown to select the value with which you want to test or adjust the calibration object. In addition to the support points stored in the database: small value (20%), mean value (60%) and large value (100%), you can also enter a free value (enter and confirm with the Enter key).

▸ Comment
right MIN MID (60%) MAX 4,0
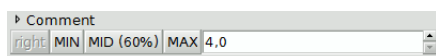
The corresponding statement is displayed in the status line. You can now execute this selected load as often as you like by pressing the Start key.
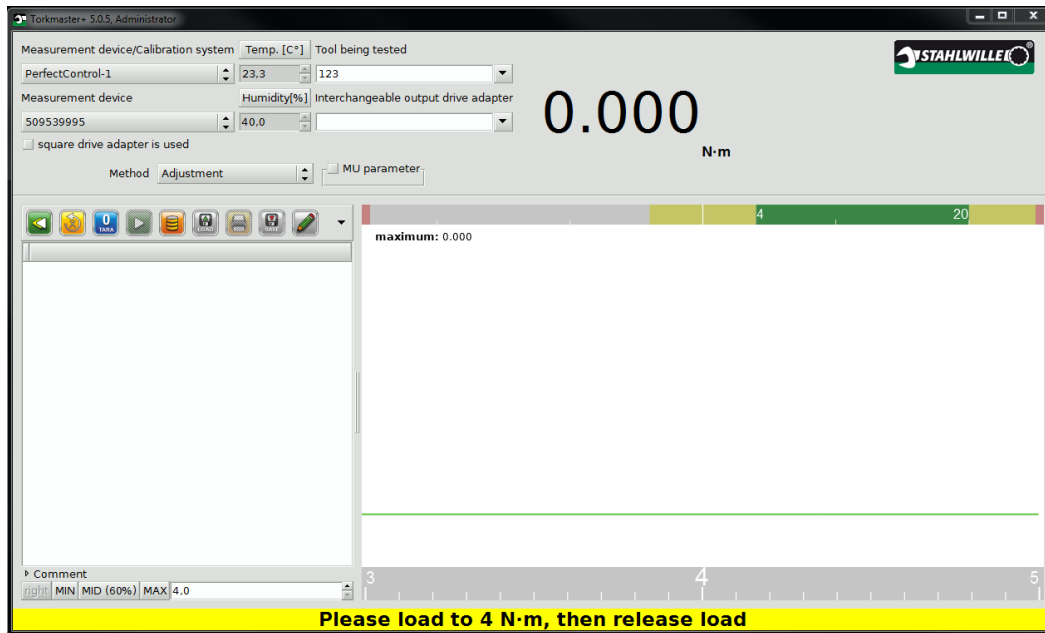
The data of the test or adjustment can also be stored in the database if required. It is possible to print this data additionally or to save it as a PDF file. Please note that a maximum of 10 data points can be printed.

Note: After adjustment has been carried out, please load the torque wrench several times to avoid the influence of any mechanical setting operations during subsequent calibration.