BOSSARD
SmartTool

Bossard SmartTool-Manager

Battery-DC-Driver

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HELP AND SUPPORT

Support for the SmartTool-Manager can be reached here:
smartfactoryassembly@bossard.com

Please note that our support service may only clarify questions about understanding the programming and settings, but may not define any programs of the client.

The warnings are structured as follows:

DANGER
Indicates an immediate dangerous situation that can lead to serious or even deadly injuries and/or that could seriously damage or even destroy the tool.

WARNING
Indicates a potentially dangerous situation that can lead to serious injuries and/or damage to the tool.

NOTE
Important and useful information on using this tool.

OPEN FLAT GEAR
This symbol indicates functions which are used particularly for open flat drives.

OPERATING INSTRUCTIONS

The functionality of the tools are explained in the two sets of operating instructions. One set of instructions includes settings using the SmartTool-Manager (software) and the second includes the hardware (tool).

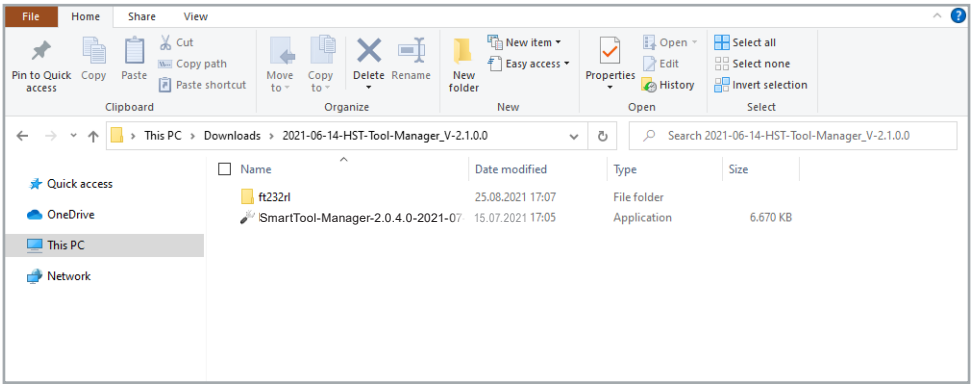
Several topics, for instance, the displays, are overarching so both sets of instructions have to be followed.

1 Installation of the driver

Open the data carrier.

NOTE
The current software as well as the driver are available as a download on our webpage: https://www.bossard.com/smarttool-downloads/

Then the folder will open automatically. If it does not open, go to „Start“ - „This PC“ and open it manually.

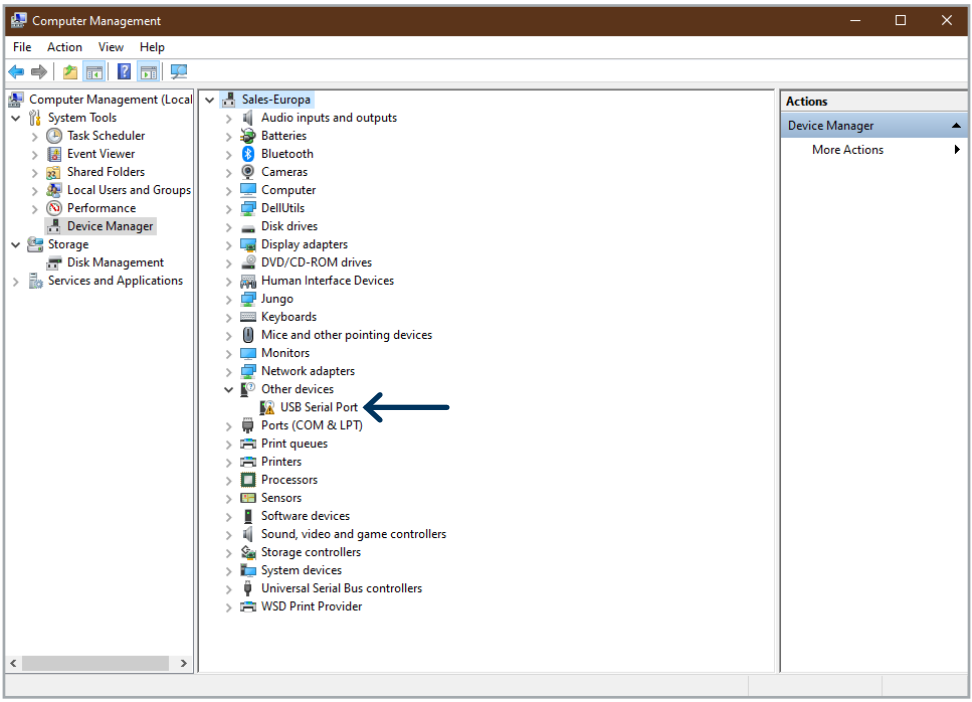


1 Installation

Save the files in a folder on the desktop or in another folder on your computer. Name the folder, for example Date-SmartTool-Manager-Version. If you save it in another folder we advise that you create a shortcut on the desktop. Then you can start SmartTool-Manager.exe.

NOTE
The installation of drivers on a computer requires administrative rights. If you do not have these contact your IT department.

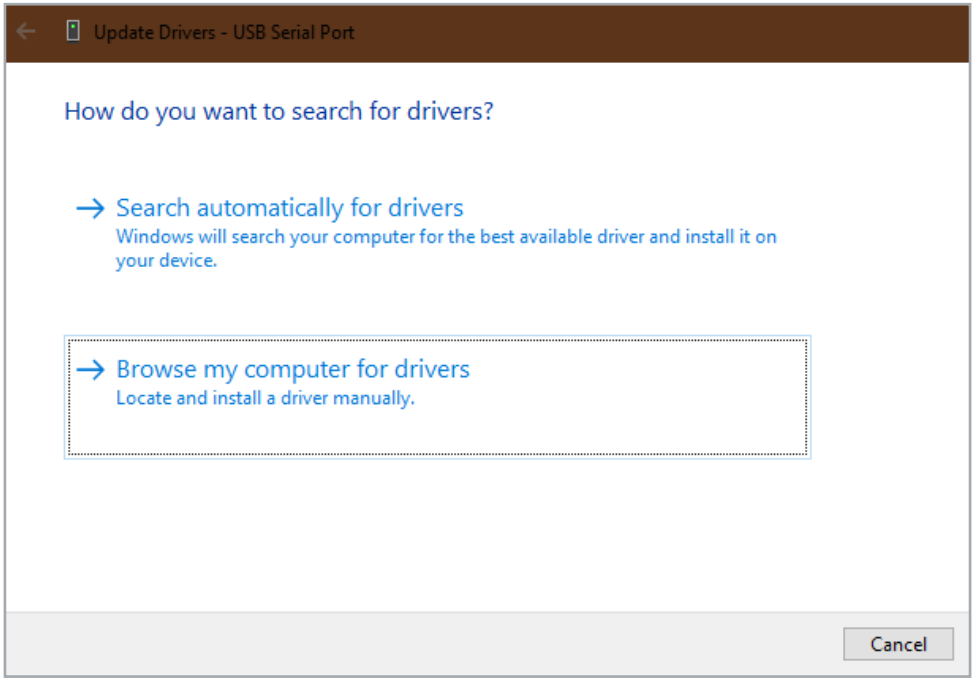
If the software does not open or the software does not recognise the tool check whether you have already installed the USB driver (ft232rl). To do this connect the tool to the computer via USB and open the device manager.



2 Adapter not recognised

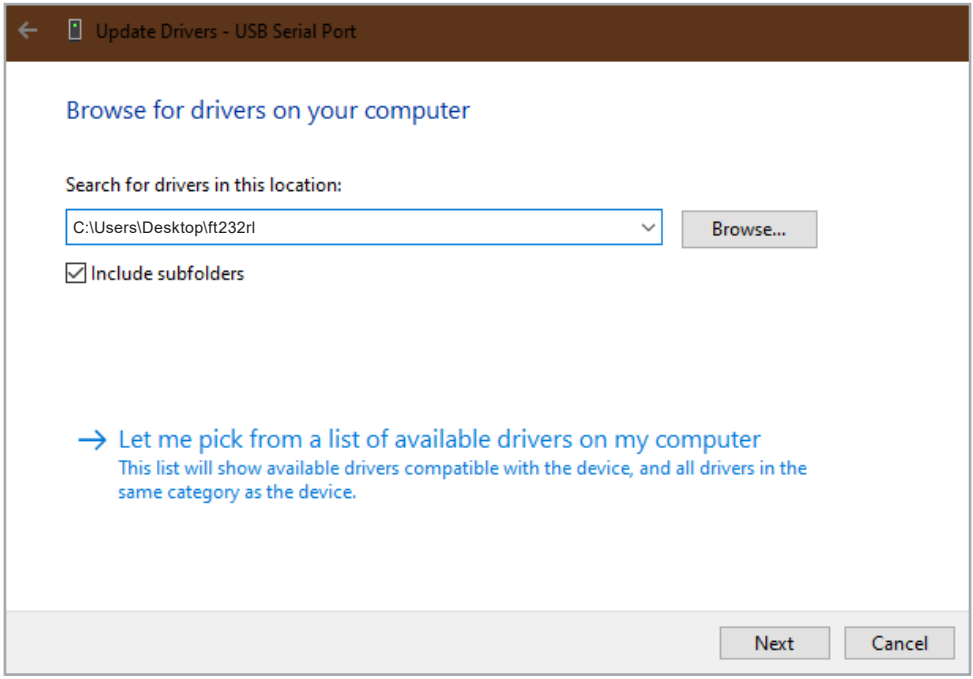
The ft2323rl driver is not yet installed and does not correctly recognise the COM-Port.

After connecting the tool to the computer using the USB go to „New hardware detected” on the bottom right of your computer. The window for updating the driver software will open.



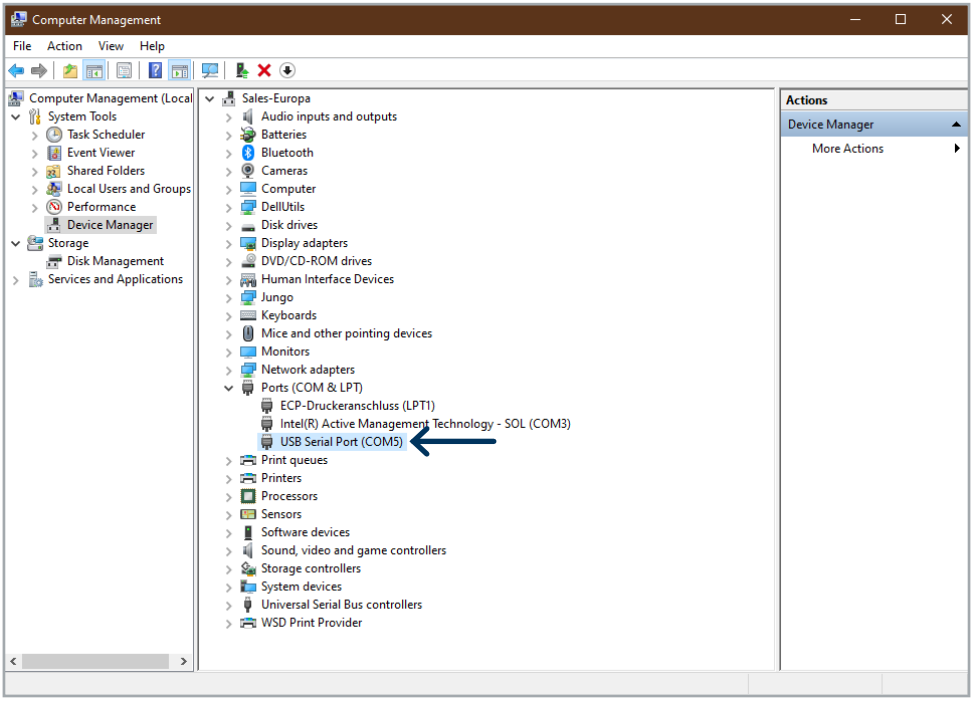
3 Manually search for driver

Click on: „Search for driver software on the computer“ and select the ft232rl folder from the data carrier or the folder into which you copied the files.



4 Open driver location

The device manager will no longer display an error and the USB serial port will be displayed if the tool is connected to the computer. The software is now functional.



5 Driver detected

2 General information

2.1 Overview

The SmartTool-Manager is a programming interface which makes it possible to change the various parameters of the product features and functionality in all compatible tools.
All settings for a tool are made with the SmartTool-Manager via USB. The software does not require installation (only the driver has / needs to be installed).
A change in the tool can only be made if there is a connection to it.
Settings for a tool can be loaded for editing in the SmartTool-Manager software. After the editing the file can be transferred back to the tool via USB.

2.2 Introduction

The SmartTool-Manager requires no installation and is available as an .exe file for download at https://www.bossard.com/smarttool-downloads/

The SmartTool-Manager can be copied into any directory and executed directly. However all users will require write permissions for this directory.

2.3 Guarantee and liability

Guarantee and liability claims for personal injury and property damage are excluded, if caused by one or more of the following:

- unintended usage
- improper installation, commissioning, operation and maintenance
- operating the tool with defective safety devices or improperly installed, or non-functioning safety and protective devices
- non-compliance with the instructions in the operating instructions regarding transporting, storing, assembling, commissioning, operating, and maintaining the tool
- unauthorised structural changes to the tool
- improperly performed repairs
- catastrophes due to external influences and acts of God

2.4 Copyright

These operating instructions designed solely for the operator and his personnel. It contains guidelines and information which may not be fully, or partially

- reproduced
- distributed or
- otherwise shared.

The copyright of these operating instructions is retained by the company HS-Technik GmbH / Bossard AG.

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2.5 System requirements

The minimum system requirements for the SmartTool-Manager:

- Windows XP, Vista, Windows 7, Windows 8 oder Windows 10 operating system
- In order to run the program on XP operating systems Microsoft .NET-Framework Version 4.0 or higher is required.
- USB 2.0
- Pentium III Processor (recommended: Dual Core)

2.6 Installation of the SmartTool-Manager

The software can be stored in every directory. It is important that every user on the computer has writing permission for the directory. Separate installation is not necessary.

2.7 Settings options by user group

Setting/function	EVALUATION	PROGRAMMER	ADMINISTRATOR	NETWORK ADMINISTRATOR	CALIBRATOR	SERVICE
Open file	●	●	●	●	●	●
Save file		●	●	●	●	●
Print current view	●	●	●	●	●	●
Settings		●	●	●	●	●
Display		●	●	●	●	●
Data		●	●	●	●	●
Roles		●	●	●	●	●
Change user	●	●	●	●	●	●
Connect without read out			●	●	●	●
Send configuration to the tool (write)		●	●	●	●	●
Display statistics	●	●	●			
Display graphic	●	●	●			
Programming	●	●	●			
Program	●	●	●			
Program 1-100	●	●	●			
Program	●	●	●			
Counting function	●	●	●			
Measurement window	●	●	●			
Option	●	●	●			
Step 1-5	●	●	●			
Drive	●	●	●			
Switching conditions	●	●	●			

	EVALUATION	PROGRAMMER	ADMINISTRATOR	NETWORK ADMINISTRATOR	CALIBRATOR	SERVICE
Process 1	●	●	●			
Barcode	●	●	●			
Barcode 1-10	●	●	●			
Settings		●	●	●	●	●
General		●	●			
Display		●	●			
OLED Display		●	●			
Acoustic signal		●	●			
Communication			●	●		
Messages			●			
Wi-Fi				●		
IPv4				●		
IEEE 802.1x				●		
EAP				●		
EAP-TLS X.509				●		
Roaming				●		
GA Suite		●	●			
Default setting		●	●			
Update			●			
Adjustment					●	
Service						●
Log file	●	●	●	●	●	●
Change Language	●	●	●	●	●	●

2.8 Settings options by tool type

Programming	TT11B-12L(-S) TT34B-XXL(-S) TT35B-XXL(-S)	TT11B-10(-S) TT34B-XX(-S) TT35B-XX(-S)
Program 0 & 1	●	●
Program 2-99	●	●
Program	●	●
Options	●	●
Double-Hit (Rehit)	●	●
Barcode* optional	●	●
Process	●	●
Program-Table* optional	●	●
Graphic (Diagram)	●	●
Statistics	●	●

Settings	TT11B-12L(-S) TT34B-XXL(-S) TT35B-XXL(-S)	TT11B-10(-S) TT34B-XX(-S) TT35B-XX(-S)
General	●	●
Process control	●	●
Energy & lighting	●	●
Functions	●	●
Management	●	●
Display	●	●
OLED-display	●	●
LEDs	●	●
Acoustic signal	●	●
Vibration	●	●
Communikation* optional	●	●
Graphics (Settings)	●	●
System time	●	●
Default setting	●	●
Update	●	●
Adjustment	●	●
Service	●	●
MCT	●	●

3 Read out tool data

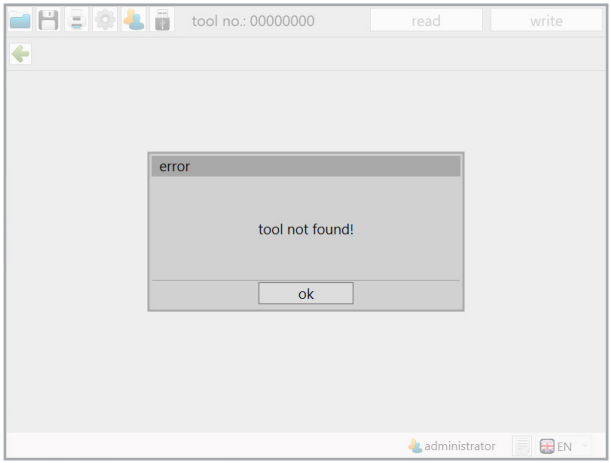
In order to read out the data from a tool connect it to the computer via USB or connect via Wi-Fi.

Start the SmartTool-Manager, log in and read out the current tool by clicking on „read“. Now you can edit the settings as described in the following steps. So that the tool parametrization is not lost we recommend saving this separating under another name.

DANGER
With every use of the SmartTool-Manager the corresponding operating instructions for operating the tool must be read and understood!

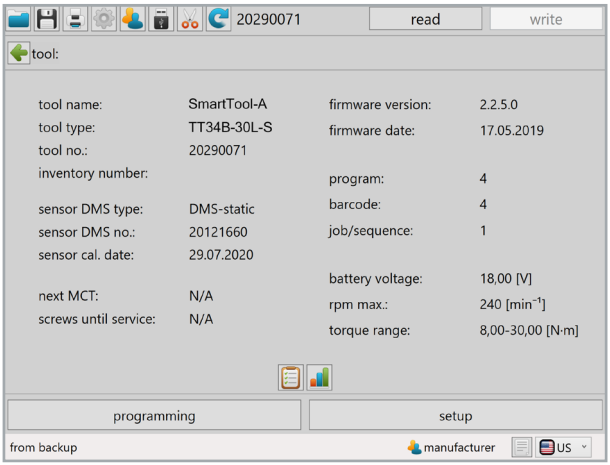
NOTE

It rare cases the data may not be loaded right away. Click on „read“ again, if this does not work check the cable connection as well as the USB driver and repeat the process.



6 Not found

3.1 Basic information on the tool

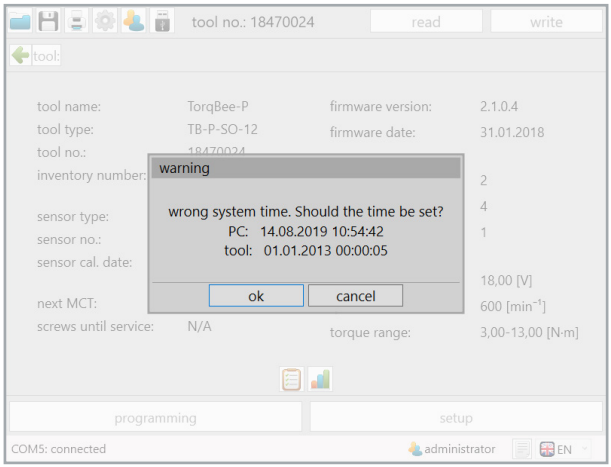


7 Homepage

The basic information about the tool is displayed. Depending on the type of tool different information is displayed.

„tool name“	Manufacturer’s designation
„tool type“	Basic article number of the manufacturer
„tool no.“	Serial number of the tool
„inventory number“	Can be specified under settings - management by the administrator.
„sensor type“	Built in sensor type
„sensor no.“	Serial number of sensor
„sensor DMS type“	Built in DMS sensor type
„Sensor DMS no.“	Serial number of the DMS sensor
„sensor cal. date“	Last calibration of the sensor
„next MCT“	Date of the next MCT
„screws until service“	At 0 turns the tool must go to maintenance and be inspected.
„firmware version“	Firmware version on the tool

„firmware date“	Creation date of the firmware
„program“	Number of saved programs which are available on the tool.
„barcode“	Number of saved barcodes which are available on the tool.
„job/sequence“	Number of saved processes which are available on the tool.
„battery voltage“	Nominal voltage of the battery: The tool can only be operated with batteries with this nominal voltage.
„rpm max.“	Maximum idling speed with which the tool can be operated.
„torque range“	Torque range within which the tool can be operated.



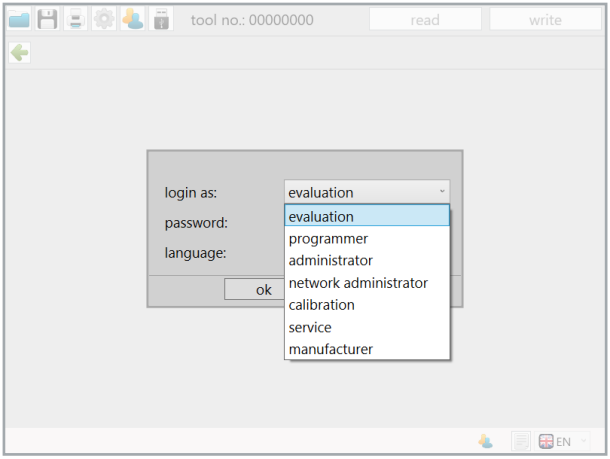
8 System time

If the system time and the time on the tool amounts to a difference of more than 30 seconds a warning will appear indicating that the system time is incorrect.
Click on „ok“ in order to adjust to the time on the tool. The update system time is required in order to correctly record the time stamp of the wrenching process. Click „cancel“ for no synchronisation to take place.

4 First steps

4.1 Login to the SmartTool-Manager

In order to start the SmartTool-Manager you will need the login data as „evaluation“, „programmer“, „administrator“, „network administrator“, „calibration“ or „service“.

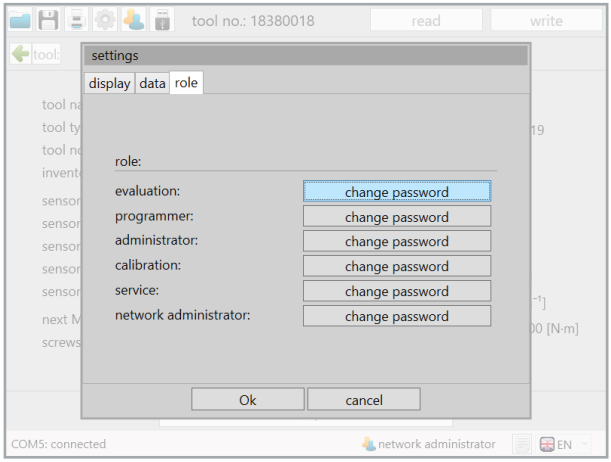


9 Logon

WHERE DO I FIND THE PASSWORDS?

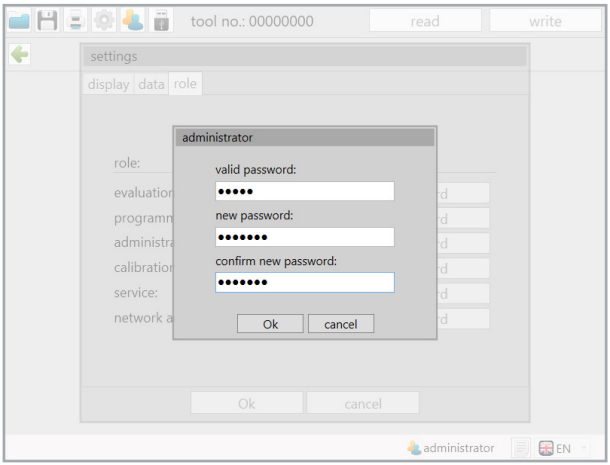
The passwords are delivered in printed form upon delivery to the key contact, or purchaser for the tools.

In settings under „role“ the passwords for the individual user types (roles) can be changed. To do this you must click on „change password”.
Each user group may only be assigned 1 password. In order to change the password the current password is required.



10 Change roles

After clicking „change password” for the corresponding user group, the pop-up window for changing the password opens. At the top, in the header of the window, the display indicates which user group the password change is being made for.
First, the current keyword must be entered. Then the new keyword must be entered twice. When one of the above-mentioned conditions is not met the „Ok” button for confirming the change of the password remains greyed out.

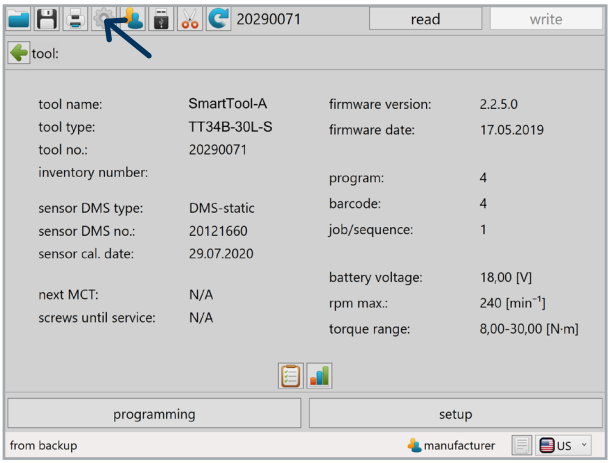


11 Change password

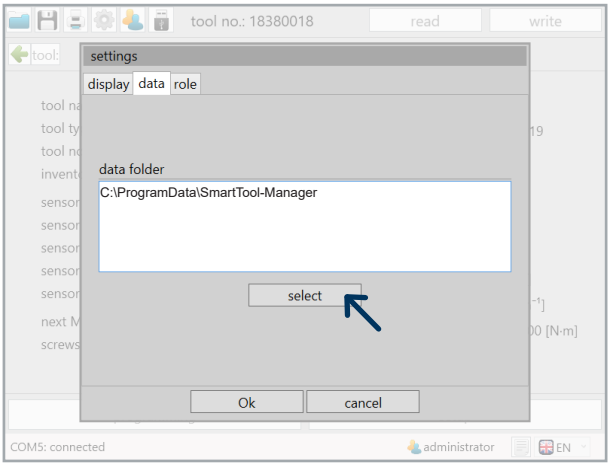
4.2 Set storage location

DANGER
Only work with a correctly adjusted tool and only with a tool whose settings and programming you are familiar with.

After logging on as an administrator go to settings in the top left of the toolbox.

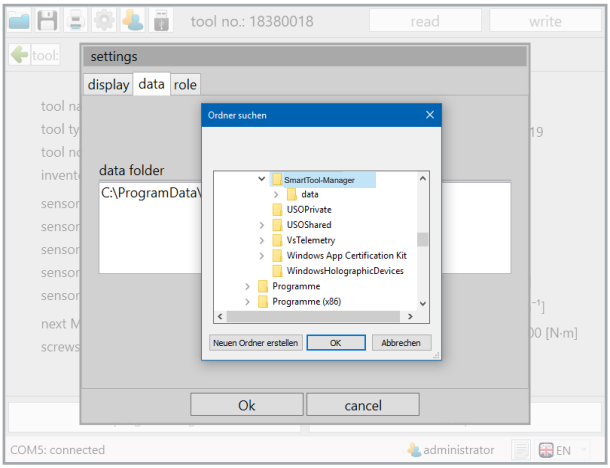


12 Homepage



13 File path

Now go to the „data“ tab in the opened pop-up window and click on „select“ in order to specify a new storage location.



14 Settings data storage location

Select the new storage location. In our case it is a software folder on the desktop.

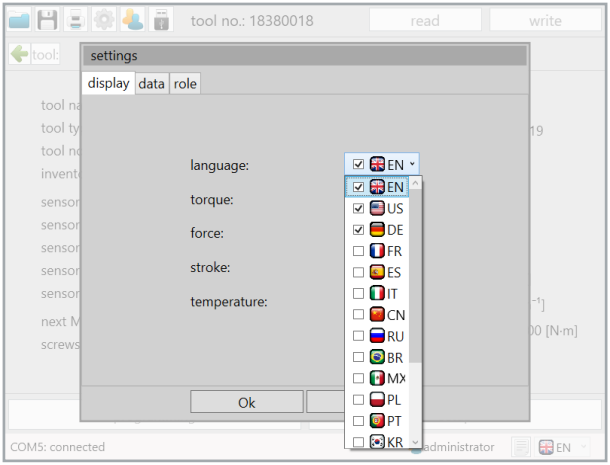
The „data“ folder is automatically created in the folder selected. Backup copies and log files for the tool are automatically saved here.

Afterwards, click „OK“.

The data folder is once again displayed in the pop-up window. By clicking „OK“ you will confirm the storage location.

4.3 Activate additional languages

In order to now activate additional languages for other users go to

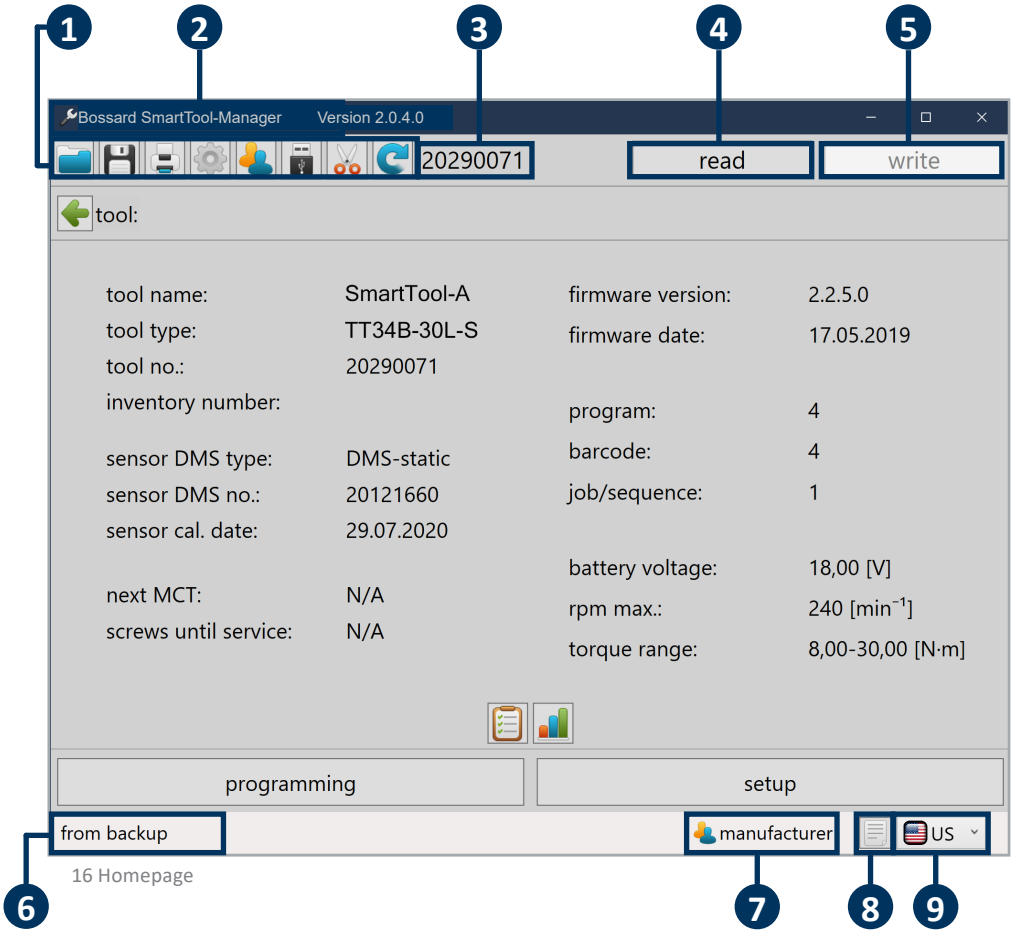


15 Languages

Open the drop down menu and activate the desired languages for the users by clicking in the box in front of the language. The software will start in the language highlighted in blue. The display settings „language“ - „torque“ - „force“ - „stroke“ - „temperature“, may only be made by an administrator. All languages which are selected are then permanently available for the users.

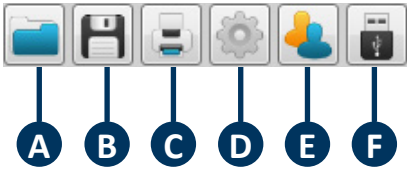
4.4 General software interface

The start window



The start window after login contains various messages and buttons which are important for working with the SmartTool-Manager.

1 Toolbox



A Load saved configuration
B Save current configuration
C Print menu (multiple options)
D Display settings (language, torque, power, path, temperature)
E Change user
F Connect with the tool without read out (in order to conduct the update or to restore the tool in an emergency)

2 Software version

Displays the opened software version.

3 Tool number

After connecting and the read out the serial number of the connected tool is displayed.

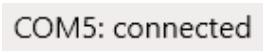
4 Read

After connecting the tool all internal tool data is read out of the tool using the „read“ button. Do not double click because this can lead to errors in the software.

5 Write

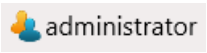
After configuration of the tool all the changed data is sent to the tool using the „write“ button. The button only becomes active after changing configurations or parameters.

6 COM Port



Message box for the status of the connection with the tool.

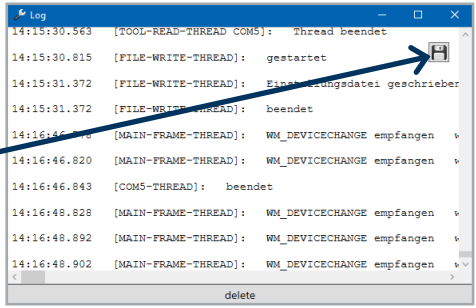
7 User display



The user display shows which user is active (evaluation, administrator,...).

8 Log window

Show or hide the log window or save on the data carrier as a text file. The communication between the tool and the software is recorded in the log.

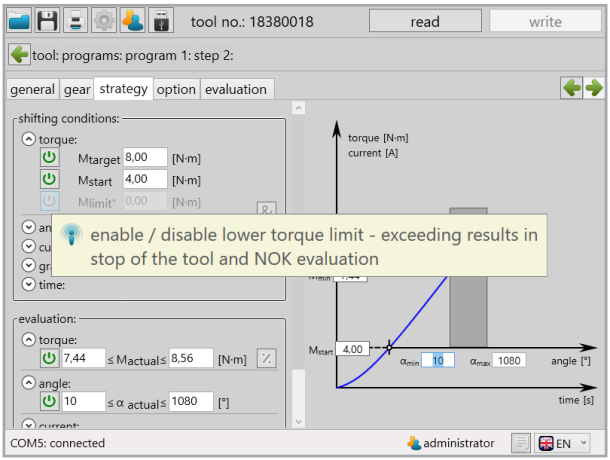


It is a good aide in those instances when the tool cannot be completely or partially read out. The log file provides detailed information about where the problem is and is intended for technical support. The log contains primarily specific notifications. e.g. in the event of a problem show the log window, save as a .txt file and send it to the technical support.

9 Language

The language can be temporarily changed in the language drop down menu (bottom right).

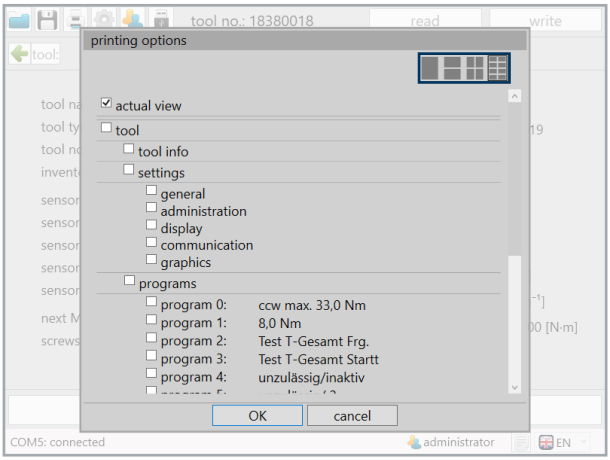
4.4.1 Direct help option



17 Help

If you place the cursor over an input field or over an ON / OFF Button, a help text for the associated function will appear automatically.

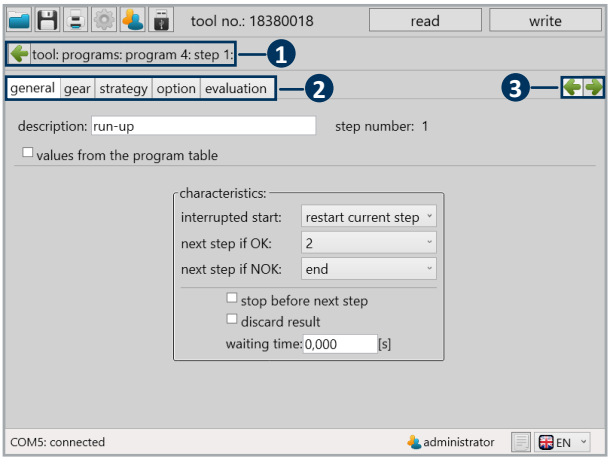
4.4.2 Print option



18 Print options

In order to print data, programs or settings in a clear format a special print option was integrated which makes it possible to print every view from different pages. In addition, at the top right you can specify whether 1, 2, 4 or 8 of the pages should be printed on one DIN-A4 page. With co-option and deselection the desired number of pages can be printed. Each selected element is printed. In this example the current view will be printed.

4.5 General operation



19 Operator interface

1 **Navigation Bar**

Here you are taken directly back to the desired subitem by clicking on the individual fields. For example, click on programming in order to get to the program overview. Alternatively you will go back one level with one click on the green arrow.

2 **Register**

In this register you can switch between the individual tabs. The navigation buttons are connected with the register.

3 **Navigation Buttons**

These elements are only available in the steps. Using these you can toggle between the current view and the next step quickly, in order to compare them.
Currently one would go to step 2 with the right arrow and nothing would happen with the left arrow because we are currently in step 1.

Conversion of reference values from
„is equal or larger than“ to ≥
„is equal or smaller than“ ≤
the value entered.

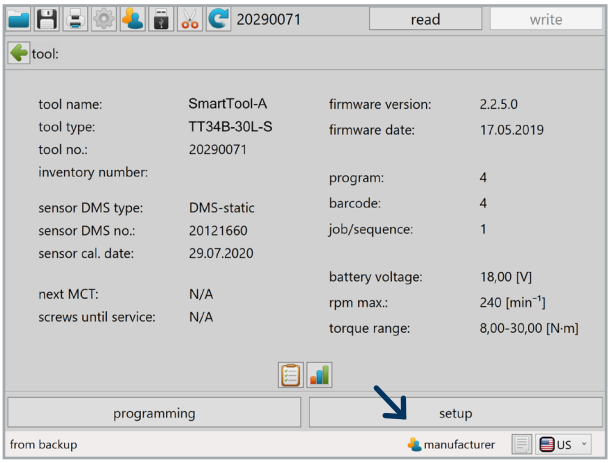
Check all entries and send to the tool by clicking on „write“.

Many input areas have a limit. If a red box appears around the number which you would like to enter then it is too high, too low, or invalid characters are being used.

5 Tool settings

After reading out every tool a homepage with type-specific information is displayed. Different settings can be made in each tool type which are important for working at the workplace, or which make the work easier. In order to clarify the settings they are divided into individual tabs. Go to the homepage and click on „setup”.

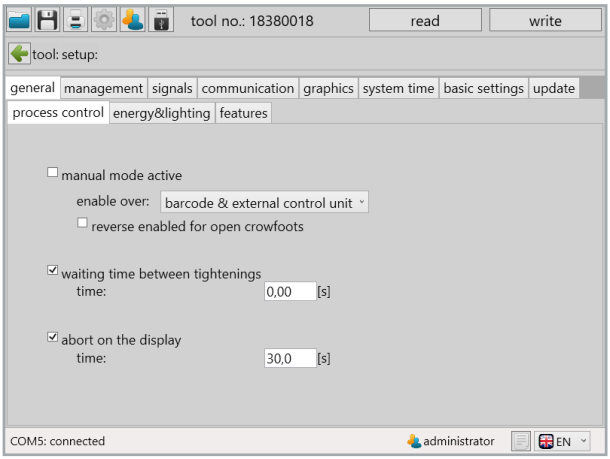
NOTE
Changes can only be made to a tool that is connected.



20 Homepage

5.1 Tab „General”

5.1.1 Process control



21 Process control

„manual mode active“

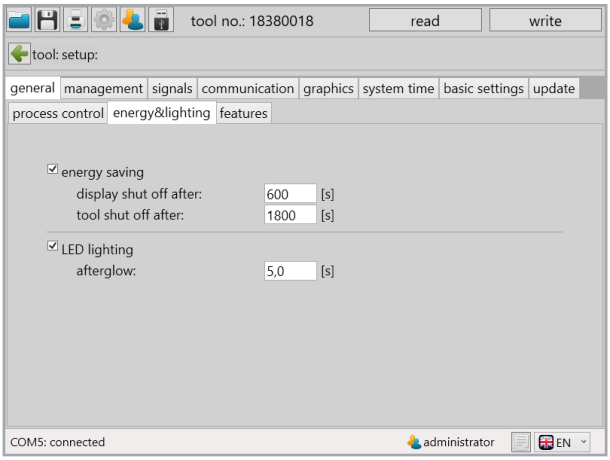
In applications in which the tool is being used as an individual solution this mode can be activated. If a connected tool needs to be quickly tested without being connected to a controller this mode can also be activated. When deselecting the type of enabling must be selected using the drop-down menu.

„enable over”
- „start key”
  press the start key 3x in quick succession in order to enable the tool.
- „time”
  Enables the tool after time entered in seconds.
- „start key & time”
  Combination of function start key and time.
- „barcode”
  Enabling through correct barcode scan.
- „external control”
  External control issues the enabling.
- „barcode & external control”
  After scanning a barcode external control issues the enabling.

„reverse enabled for open crowfoots”
Is used for open flat drives in particular. By activating the checkbox you can always screw backwards.

„waiting time between tightenings”	Break time between the individual screw connections of a job/sequence.
„abort on the display”	Cancellation of an active job/sequence using the yellow button on the display. The time determines the length of time the button must be pushed until the prompt for interruption appears on the display .

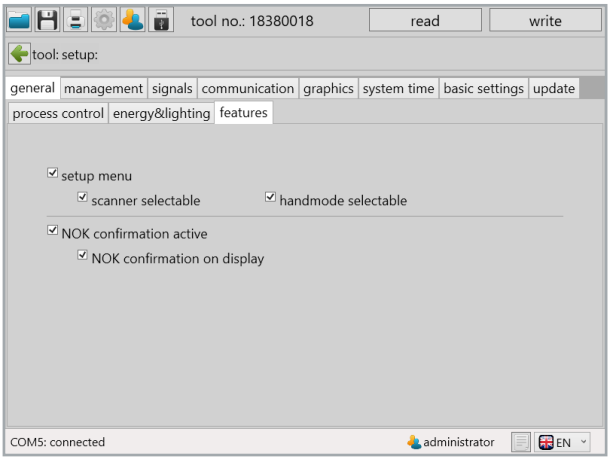
5.1.2 Energy and lighting



22 Energy and lighting

„energy saving”	„display shut off after” Display switches to standby after the time entered in seconds, if the tool is not being used. „tool shut off after” Tool powers off after the time entered in seconds, if it is not being used.
„LED lighting afterglow”	With everey activation of the trigger switch the lighting LED is activated. The LED continues to glow for the length of time entered in seconds.

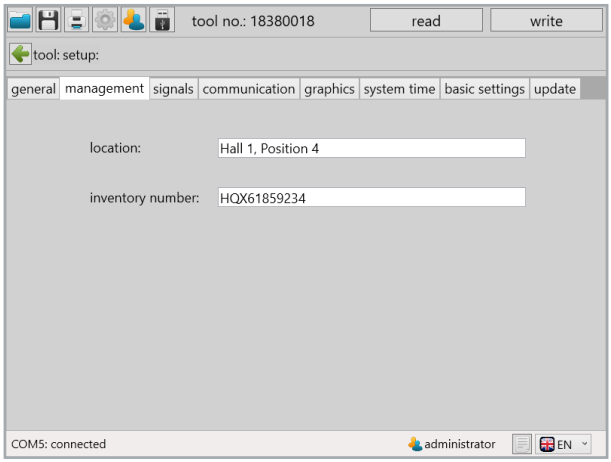
5.1.3 Features



23 Functions

„setup menu”	If this function is selected the program or the process can be changed using the keys under the display, or the torque can be adjusted in Program 1. In order to get into setup mode hold down the start key and push the battery up. If „scanner selectable” is activated you can now go to the display in setup mode with the yellow display key and confirm by pressing the start key. Then you must still confirm the left adjustment knob (on the left next to the yellow display knob). This way barcodes can be scanned in the emergency strategy or also the network settings. If you have activated „handmode selectable” you can now go in setup mode with the yellow display key to the display **M** then you must still confirm the left adjustment knob (on left next to the yellow display knob). Now the tool will execute the default program which is identified with a yellow star in the tool manager.
„NOK conformation active”	In the event of a NOK result it must be loosened in an anti-clockwise direction and tightened again. „NOK confirmation on display” Acknowledgement NOK screw connection with yellow key on display or loosen in the case of a NOK - screw connection. Must be selected under programs under „charcteristics”.

5.2 Tab „Management”

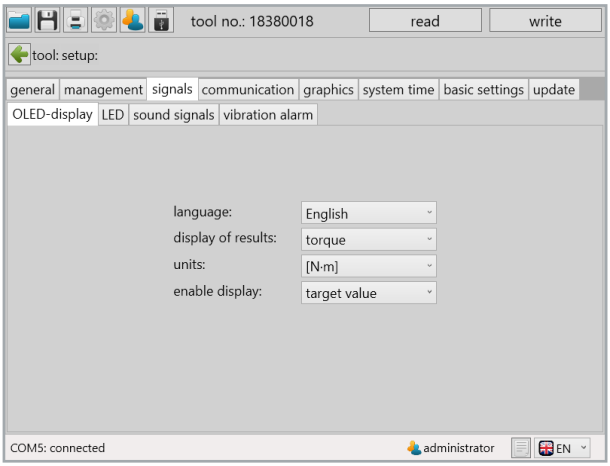


24 Administration

„location”	Freely writeable text lines in order to enter the location for use or the system on which the tool will be used. This field is limited to 20 characters.
„inventory number”	Freely writeable text lines in order to enter the internal company inventory number. This field is limited to 40 characters.

5.3 Tab „Signals”

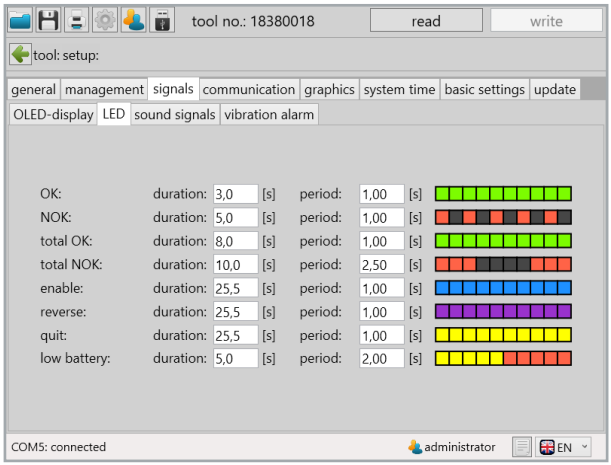
5.3.1 OLED-Display



25 OLED-Display

„language”	One of 2 languages may be selected for the display of the tool and its display. - *German* - *English*
„display of results”	In the display for the evaluation of the screw connection various modes can be displayed. - *Smiley* - *Torque* - *Counter* - *Angle*
„units”	Setting the physical unit. - *N•m* - *Lbf•in* - *Lbf•ft*
„enable display”	Determines the information shown in the display upon receipt of an enabling. - *Target value:* Displays the target value of the last step (in case of multiple switching conditions torque is prioritised). - *Barcode:* Barcode ID for enabling is displayed.

5.3.2 LED

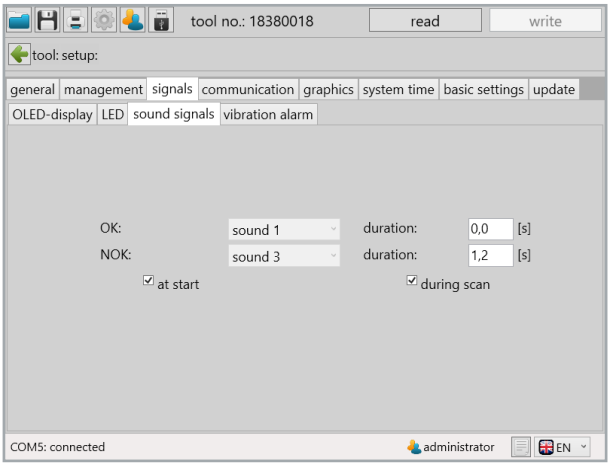


26 LED

One LED signal each may be selected for the various results and information:

„duration”	Total duration of the LED signal. (25.5. seconds = continuous light)
„period”	Duration of the signal sequence
Selectable colours	 The colours of the LED lights can be changed by clicking on the coloured fields.

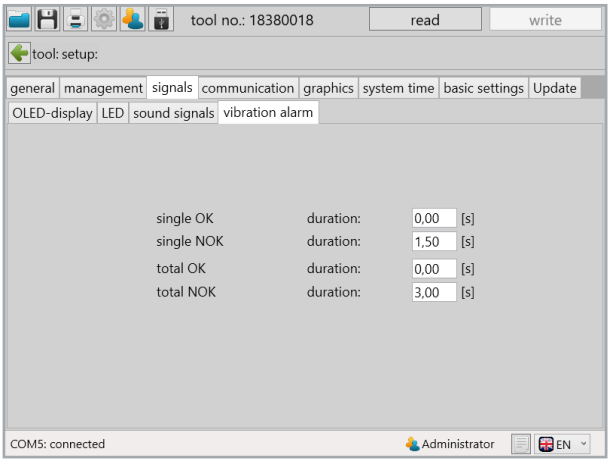
5.3.3 Sound signals



27 Acoustic signal

„OK”	Signal tone is activated for the time entered. (can be deactivated with the value 0)
„NOK”	Signal tone is activated for the time entered. (can be deactivated with the value 0)
„at start”	After pushing in the battery a melody is played.
„during scan”	After scanning a barcode a signal tone is heard.

5.3.4 Vibration alarm

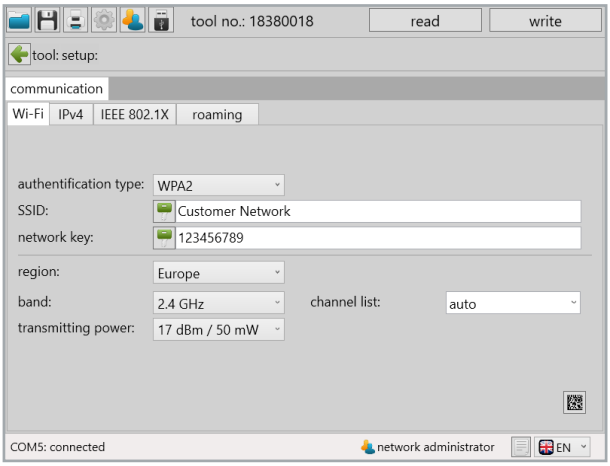


28 Vibration

The duration of the vibration can be specified for each of the individual screw connection results (single OK / single NOK / total OK / total NOK).

5.4 Tab „Communication”

5.4.1 Wi-Fi (only network administrator)



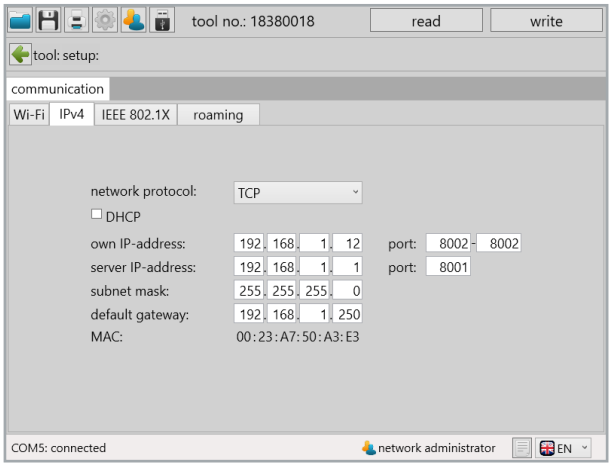
29 Wi-Fi Communication

The network settings of the tool are saved under communication Wi-Fi & IPv4; these serve as communication between the tool and an external control.

NOTE
Under the communication tab there are various access functions for administrators and network administrators.

„authentification type”	Select Wi-Fi Encryption procedure
„SSID”	Service Set Identifier Network name
„network key”	Password for the network. The entry in the „SSID” or „network key” window can be encrypted using the button with the key symbol.
„region”	Provision of the wireless channels depending on the region selected. Selection must correspond with the setting in the access point used. (US/Europe/Japan)
„band”	Select frequency band for data transmission Frequency band: 2.4 GHz / 5 GHz
„transmitting power”	Must be selected depending on the distance between the tool and control, or access point.
„channel list”	Activation / deactivation of different wireless channels.

5.4.2 IPv4

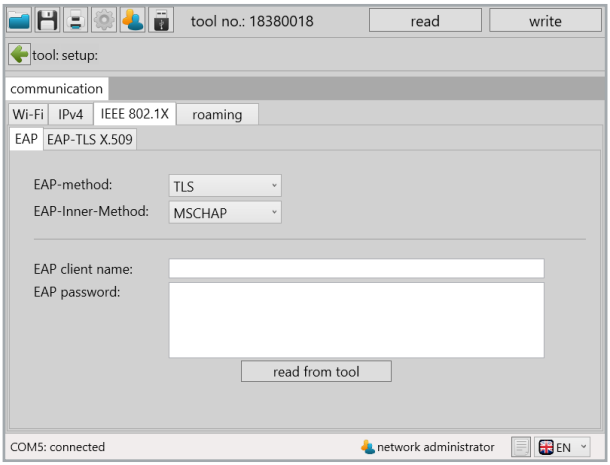


30 IPv4 Communication

In the case of IPv4 you can select between the network protocol TCP or UDP.

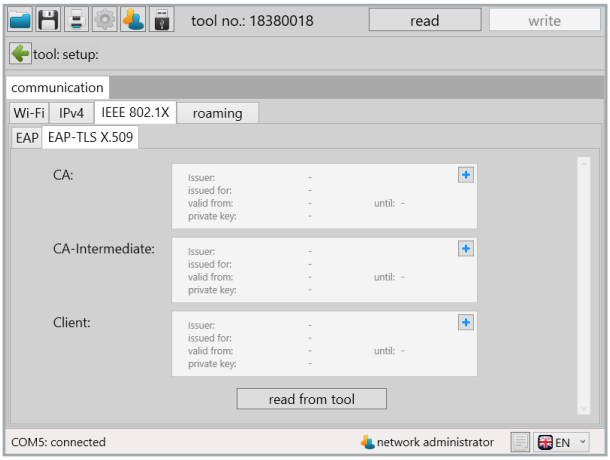
„network protocol”	A selection can be made between the protocol type TCP and the older version UDP. We recommend using the TCP protocol.
„own IP-address / Port”	IP address of the tool and associated port. Here there is the option to specify an area. With each new connection set-up the port number is increased by one.
„server IP-address / Port”	IP address of the controller (control e.g. MCU) and associated port.
„subnet mask”	Subnet mask, belonging to IP network.
„default gateway”	The IP address of the router. Relevant in the event the control and tool are located in different IP networks.
„MAC”	MAC address of the tool.

5.4.3 IEEE 802.1X EAP



31 EAP Communication

„EAP-method”	Encryption methods: - TLS - TTLS - FAST - PEAP
„EAP-Inner-Method”	Encryption methods: - MSCHAP - MSCHAPV2
„EAP Client name”	Client name for EAP encryption.
„EAP password”	Password for the EAP encryption.
	Assumes the changes in the tool. The green check mark only appears if something is entered in the fields „EAP client name” and „EAP password”.
„Read out of the tool”	Reads the EAP settings from the tool.

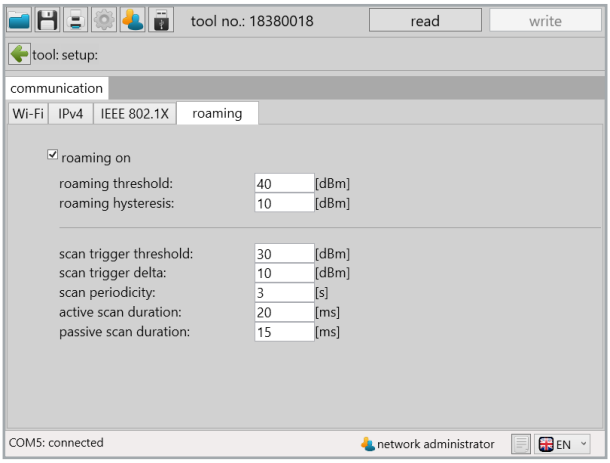


32 Communication EAP TLS X.509

In the EAP-TLS encryption it is possible to load a certificate chain in the tool.

„CA“	CA certificate
„CA-Intermediate“	CA intermediate certificate: Depending on the wireless module multiple certificates can be loaded/ saved.
„Client“	Client key
	Assumes the changes in the tool. The green check mark only appears if something is entered in the fields „EAP client name“ and „EAP password“.
„read from tool“	Reads the EAP settings from the tool.

5.4.4 Roaming

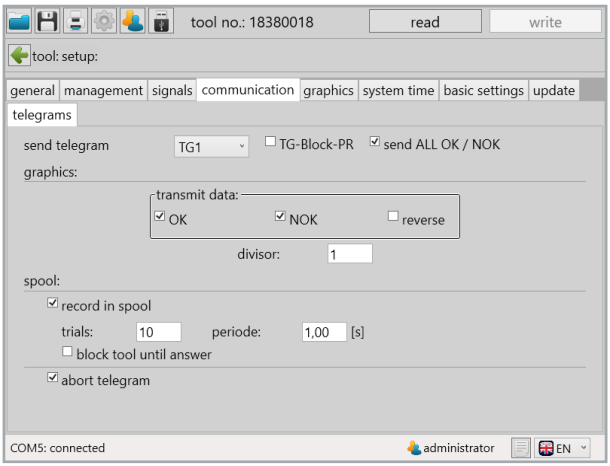


33 Roaming Communication

When roaming is activated in the area of the same SSID an automatic change is made to the access point with the stronger signal.

5.4.5 Telegrams

Under communication telegrams you can specify which data the tool should transfer to the external control. It is possible to transfer OK and NOK graphic data. In doing so whether each individual measurement value of the total measurement in the graphic evaluation should be included can be specified or, for example, whether it should only be every 3rd or 4th value (division factor) that should be transferred. What happens if the tool cannot transfer the data can also be determined. The tool can wait for an answer from the control so that the data can then be sent if there is an existing connection.



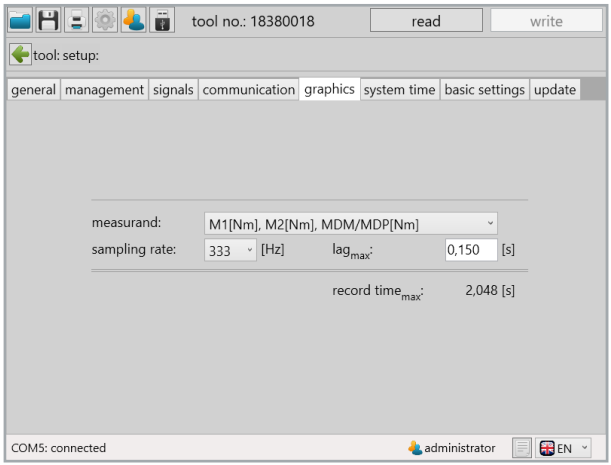
34 Communication telegrams

NOTE

The communication telegrams tab only opens if the configuration „Wi-Fi“ has been activated in the basic settings tab as well as the „external control“ release under „general“.

„send telegram”	Select the communication protocol TG1/TG2 „TG Block-PR” Security function. While the motor is turning no incoming telegrams from the tool will be answered. „send ALL OK /NOK” After the completed screw connection order an additional telegram about the overall result will be sent.
„graphics”	„transmit data” Refers to the sending of the graphic data. - *OK:* OK graphics are being sent. - *NOK:* NOK graphics are being sent. - *Reverse:* Graphics from the loosening program are being sent. „divisor” Determines the number of graphic values which should be transferred. *For example:* If a graphic contains 1000 values and the division factor is „2”, 500 values are transferred.
„spool”	„record in spool” activates/deactivates the repetition of results telegrams if these could not be sent due to transmission problems. „trials” Sets the number of repetitions, per telegram, in the event of an error. „periode” Determines the time between the repeated sending of the telegrams. „block tool until answer” Tool stops until the answer to a telegram sent is received.
„abort telegram”	If a screw connection order is cancelled by the user (user cancellation) a telegram is sent to control.

5.5 Tab „Graphics”

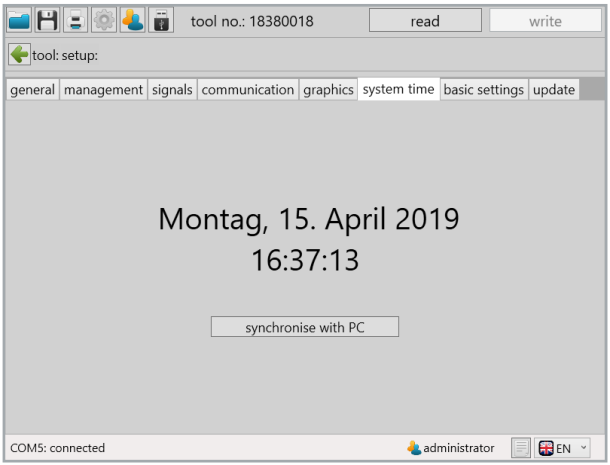


35 Graphics

Over 150,000 curves can be stored in the tools. In this tab you can define the length, type and quality of the curve.
Depending on the number of parameters selected the maximum recording time changes. If the recording period is not long enough for the entire screw connection procedure the front part of the graphic will be cut off.

„measurand”	Selection of the physical parameters of the curve display depending on the tool type. *- Torque, angle, current, voltage* *- Torque, angle, current* *- Torque, angle* *- Torque* *Torque 1, torque 2, MDM/MDP[1]* *Torque 1, torque 2, angle 1, angle 2[2]*
„sampling rate”	Determines the resolution of the graphics recording, 50 - 1000 Hertz High quality (sampling rate) = low recording time Low quality (sampling rate) = high recording time
„lag_{max}”	Input of the recording time after reaching the switching condition.
„record $time_{max}$”	Specifies the recording time which is possible as a result of the settings selected.

5.6 Tab „System time”

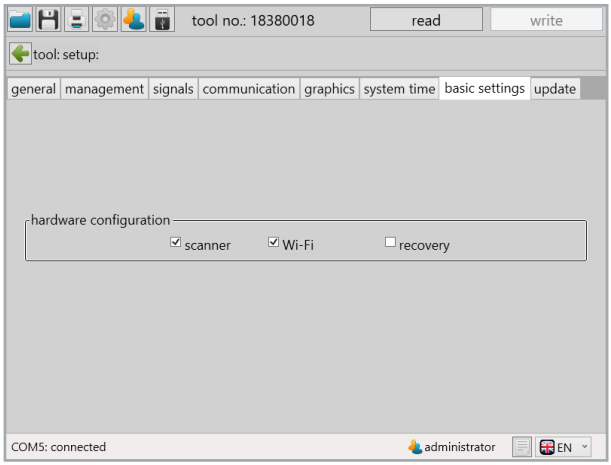


36 System time

In the system time tab the system time can be synchronised with the time of the computer connected. This function is required in order to correctly record the time stamp of the wrenching process.

If the system time and the time on the tool amount to a difference of more than 30 seconds a notification will appear during the read out of the tool.

5.7 Tab „Basic settings”

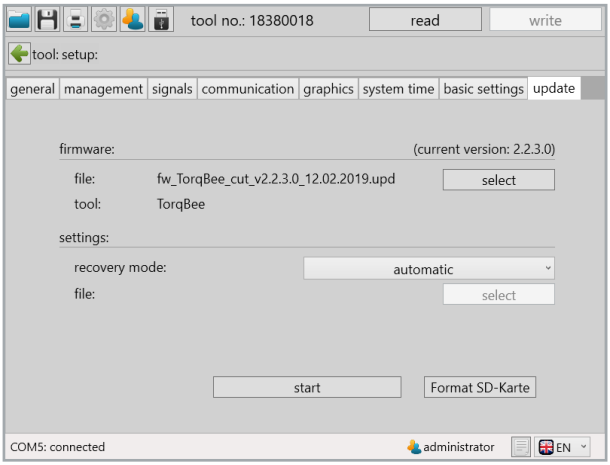


37 Basic settings

Selection of the connected hardware options.

„hardware configuration”	„scanner” Activated / Deactivated „Wi-Fi” Wi-Fi Activated / Deactivated „recovery” Activated / Deactivated The recovery function enables the continuation of a job/sequence after a battery change. This enables a battery change during an ongoing job/ sequence without any loss of data.

5.8 Tab „Update”



38 Update

NOTE
Before every update a data backup of the tool should be conducted manually using the „save“ symbol on the top left.

The firmware of the tool can be updated with an „update”.

„firmware”	„select” Select firmware file(.upd format). „tool” Tool type of the firmware file is displayed. The type from the file must be identical to the current one, otherwise an update is not possible.
„settings”	„recovery mode” With „automatic” the data read out from the tool before the update is entered again after the update (not from the backup file). With „from backup file” (file must be selected) the data from the selected file is entered after the update.

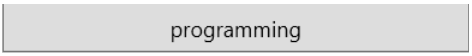
„start”	Starts the update procedure.
„Format SD-Karte”	Deletes all programs and screw connection results from the internal memory.

NOTE

It is recommended that you select the „automatic“ recovery mode. In doing so all previously read out program and settings are reloaded onto the tool again after the update.

6 Tool programming

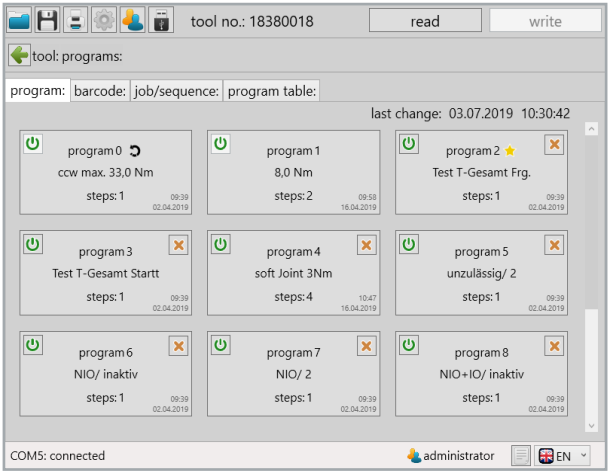
The programs stored on the tool are reached using the „programming” button on the homepage.



The current program names and numbers are listed in the program overview. In addition the following information for each program is displayed:

- Default program
- loosening program
- Program with correction factor
- Number of steps
- Time stamp
- Active / Inactive

The time stamp of the last successful change to the programs is also part of the overview. In addition access to the barcodes, processes and program table which can be selected above by clicking on the corresponding tab, is located here.



39 Programs

6.1 Tab „Program”

There are a possible 100 programs with 6 steps each.

Program 0	loosen, can not be deleted
Program 1	Programmable, can not be deleted
Program 90 - 99	MCT-Programs of the tool (preconfigured)

88 programs for individual programming are available.

Program:	With up to six steps
Step:	Per step with up to 5 possible switching conditions and up to 5 possible evaluation criteria.

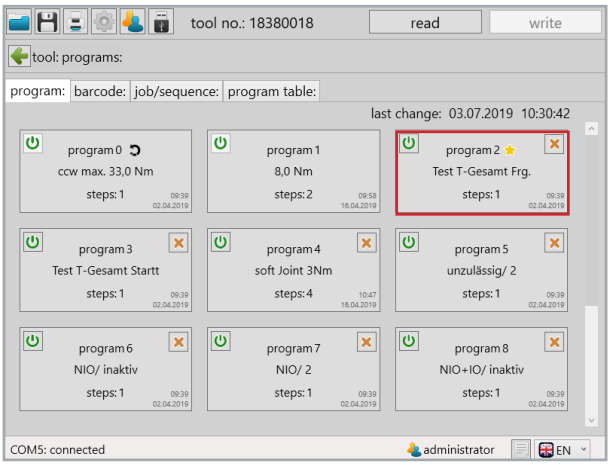
6.1.1 Activate/deactivate program

Up to 100 programs are stored in the tool. For a better overview programs can be activated or deactivated. Deactivated programs will be ignored by the tool.

Activate program: By „clicking” the button the „power” symbol will turn green.

Deactivate program: By „clicking” the button the „power” symbol and the program will be greyed out.

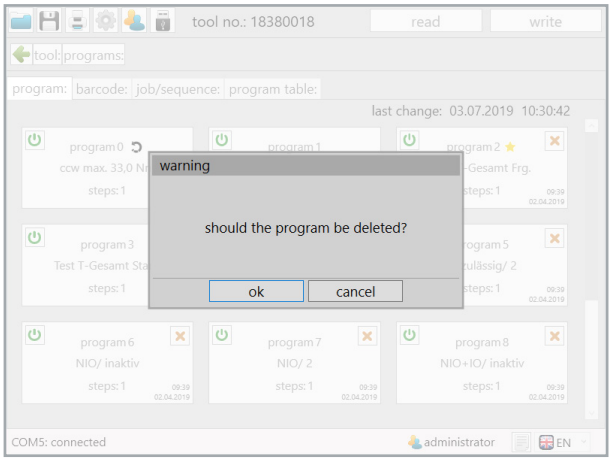
The active program will have a yellow star (default program) in the program overview. The default program is then always executed when no explicit program specification is made via barcode or external control.



40 Programs

6.1.2 Create/delete program

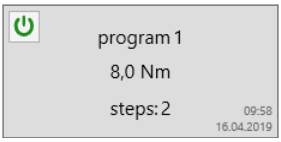
A new program can be created with one click.
A program can be deleted on the with one click.



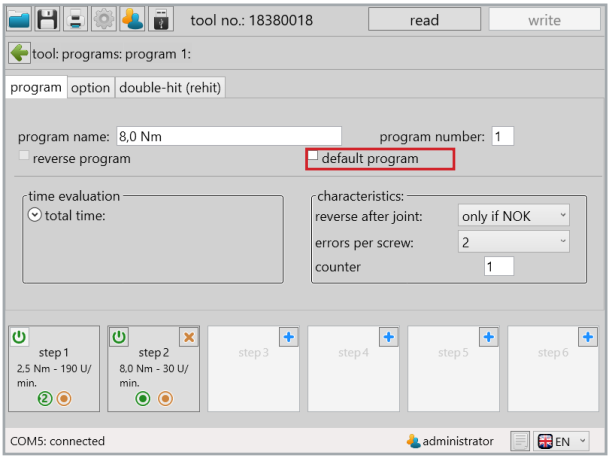
41 Warning delete program

6.1.3 Set program as default program

A program can be opened with a click on the program button.



A program can be identified as the „default program”. This is always executed if no other program is specifically activated via barcode or an external control. This takes place in the desired program with the „default program” or „default process” option.

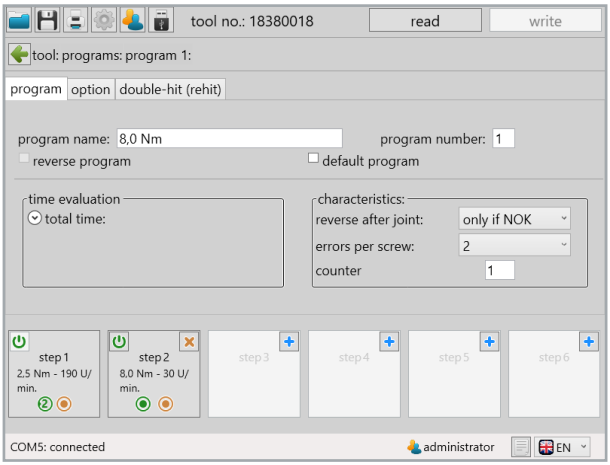


42 Default program

6.2 Configure program

To configure a program the corresponding program button must be clicked.

6.2.1 Program



43 Tab Program

Settings for the program which apply across steps.

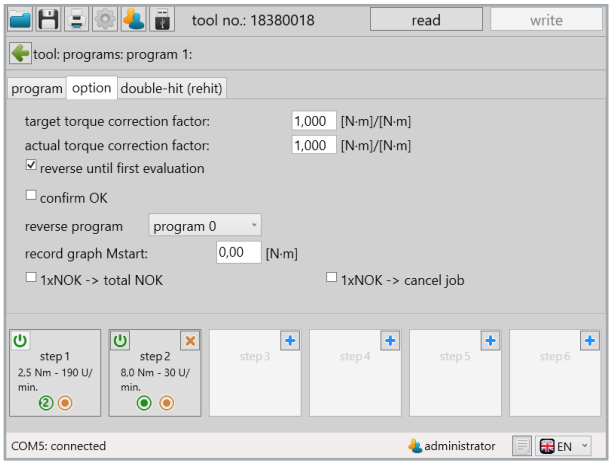
„program name”	Empty text field for the description of the program.
„program number”	Input field for the program number.
„reverse program”	Defines the program as a loosening program.
„default program”	Defines the program as the default program.
„time evaluation”	- *„T total”:* Input of the maximum time for this program for the entire screw connection order. - *„start at”:* Criteria for the start of the time measurement.

„characteristics”	Determines in which cases the last activated screw connection may be loosened. This charcteristics is also dependent upon the function „NOK acknowledgement” under the tab functions (see Chapter 5.1.3 Page 40). Prohibited: Screw connection may not be loosened. - *only if NOK:* Loosening is only possible in the event of NOK. - *if NOK or OK:* It can be loosened after an OK, or NOK screw connection. „errors per screw” Input how often a NOK screw connection may be repeated. - *disabled:* NOK screw connection can be corrected without limitation. - *0...9:* NOK screw connection may be repeated as often as is specified. „counter” Number of screw connections which should take place with one enabeling. In manual mode the screw count number function is inactive.

NOTE

The time evaluation is made for the entire screw connection order (all enabled screws). After expiry of the specified time the work order is interrupted, regardless of whether all the screw connections have been completed.

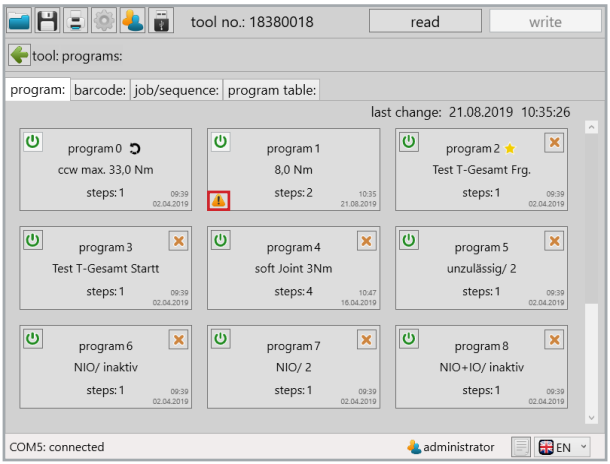
6.2.2 Option



44 Tab Option

„target torque correction factor”	The correction factor is needed primarily in the event of extremely difficult screw connections. In order to reduce exceeding the desired torque value the stop point can be adjusted. A value lower than 1 leads to an earlier stop of the tool.
„actual torque correction factor”	This correction factor is used in order to compensate for friction losses of different drives (flat drives), or extensions. If the torque values of the measurement system and the tool are different these can be adjusted using the correction factor. To this end the torque value of the tool can be divided by the measured torque value of the reference system. The result is then entered as the correction factor. (Nm tool)/(Nm reference system) = factor If you set a current torque correction factor this program will be identified directly in the program overview with a small exclamation point

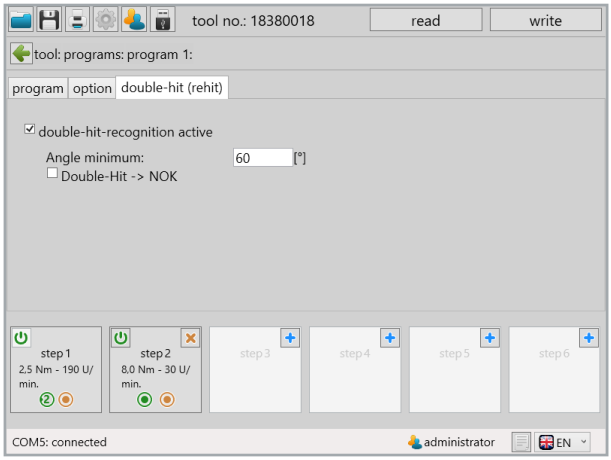
„reverse until first evaluation”	Loosen is permissible up to the first evaluation in the assembly direction. *For Example:* In an already pre-installed part all the screws need to be loosened so that an additional component can be inserted. In the next step all screws are retightened and evaluated.
„confirm OK”	The OK screw connection must then be confirmed in the prescribed time using the yellow key in the display. After expiry of the time and without a confirmation the screw connection is automatically assessed as NOK and documented.
„reverse program”	Assignment of the loosening program for this screw program.
„record graph M_{Start}”	Start torque for the graphic recording. The data points before M_{Start} will not be recorded.
„1xNOK⇨total NOK”	If a single screw connection of the screw job is evaluated as NOK, the whole job will be evaluated as NOK at the end.
„1xNOK ⇨ cancel job”	If a screw connection of the screw job is evaluated as NOK the job is immediately interrupted and evaluated as NOK.



45 Correction factor active

6.2.3 Double-Hit (Rehit)

The function double-hit (rehit) serves to identify already tighten screw connections. If the target torque within the set angle value is reached this screw connection is assessed as a double-hit (rehit). The screw connection process ends. If the „Double-Hit ⇨ NOK" function is also activated the screw connection process is ended and assessed as NOK.



46 Tab Double-Hit (Rehit)

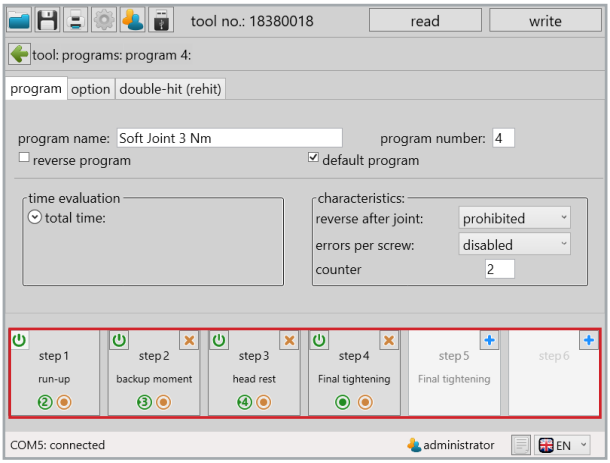
„double-hit-recognition active"	„Angle minimum" Determines the maximum angle up to which the achievement of the target torque will be identified as a double-hit (rehit). „Double-Hit ⇨NOK" Double-Hit (Rehit) is assessed as NOK.

6.3 The steps

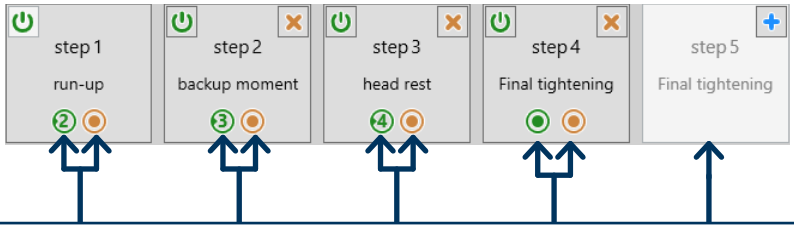
A program can consist of up to 6 steps.
Each step can be occupied with different strategies:

- Torque strategy
- Angle strategy
- Yield point screw connection
- Torque screw connection with locking torque, or friction coefficient calculation

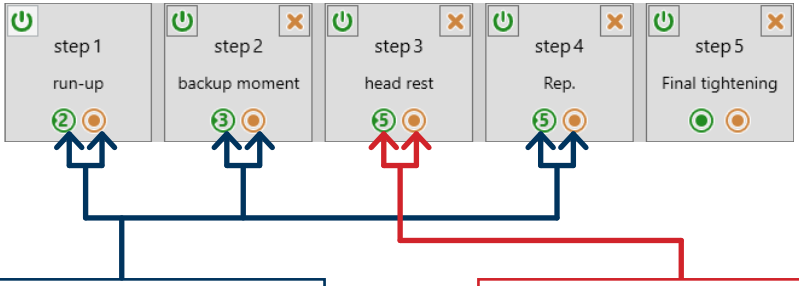
For all strategies the corresponding torque - angle or time monitoring can be generated:
- Torque controlled with rotation angle monitoring
- Rotation angle controlled with torque monitoring



47 Steps



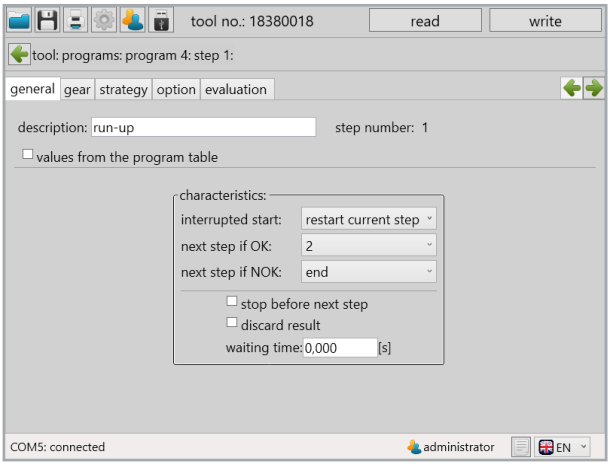
When the step is successfully completed the tool moves into the next step. If the step is not successfully complete the screw connection is assessed as NOK. In addition a new step may be added by clicking on +.



When the step is successfully completed the tool moves into the next step. If the step is not successfully complete the screw connection is assesses as NOK.

When the step is successfully completed the tool switches into the final tightening. If the step is not successfully completed an intermediate step is activated in order to, for example, slightly loosen the screw and then retighten it.

6.4 Tab „General”

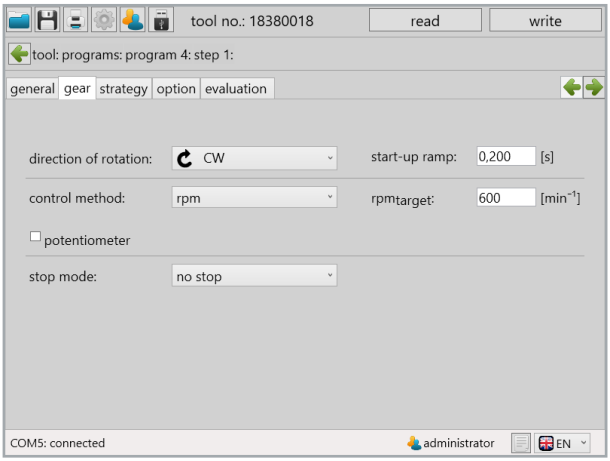


48 Tab general

„description”	Name of the step (free input), max. 20 characters.
„step number”	Number of the current displayed program step.
„values from the program table”	The shut-off parameters in the program step will be replaced by the values entered in the program table. This function must be activated by the manufacturer.
„characteristics”	„interrupted start” Behaviour when activating the start key prior to reaching the switch condition. - *Prohibited:* if the start key is released this leads to a NOK assessment. - *Restart current step:* if the start key is released the current step will be restarted upon repeated activation of the start key. - *Back to step 1:* if the start key is released the first step will be restarted upon repeated activation of the start key. - *Evaluate:* if the start key is released this leads to an evaluation of the step.

„characteristics”	„next step if OK” Determines the next step after an OK assessment. „next step if NOK” Determines the next step after a NOK assessment. „stop before next step” Pause the program after a completed step. To continue the program the start key must be reactivated. „discard result” Results for the step will not be stored. „waiting time” Wait time before switching into the next step; the start key may not be released.

6.5 Tab „Gear”

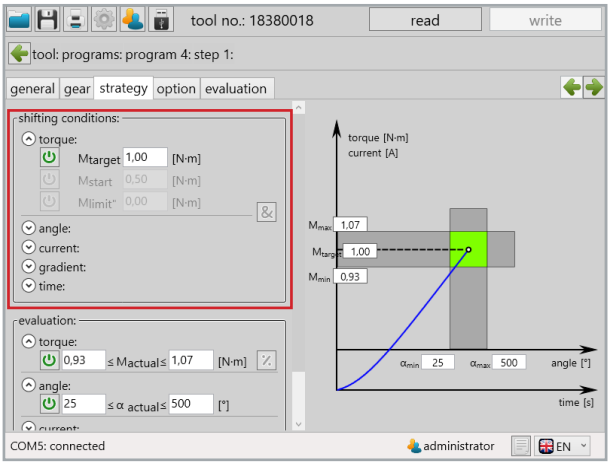


49 Tab gear

„direction of rotation”	Rotation direction of the output.
„start-up ramp”	Time specification within which the target number of revolutions for this step should be reached.
„control method”	- *rpm:* Number of revolutions is regulated. - *Torque - rpm:* Number of revolutions per minute will be regulated depending on the applied torque. - *Angle - rpm:* Number of revolutions per minute will be regulated depending on the rotation angle achieved. - *Set - rpm:* Number of revolutions will not be readjusted (open loop).
„rpm_{target}”	Specification of the number of revolutions per minute for the respective control type.
„rpm_{min}”	Specification for the minimum number of revolutions per minute for the torque-rpm, or angle-rpm control methods.
„shiftdown point”	Percent value of target torque, or target angle. Starting at this value the number of revolutions per minute will be continuously decreased, until reaching the set minimum number of revolutions per minute.
„potentiometer”	Activates the regulation of the speed by the position of the trigger switch.

„stop mode”	Changes the shut off behaviour in the respective screw joint.
	- *no stop:* Motor will not be actively stopped.
	- *Soft-stop:* Torque is slowly reduced after stopping the motor.
	  - *Stop- ramp:* Time in which the torque is decreased.
	  - *Stop-Moment:* Percentage share of the end torque for the start of the stop ramp.
	- *Stop:* Default braking
	- *ECO Stop:* Stop with recuperation. Part of the kinetic energy is directed to the battery when stopping.
	- *Fast Stop 50 %:* Braking with reversal of current (low energy consumption).
	- *Fast Stop 75 %:* Braking with reversal of current (medium energy consumption).
	- *Fast Stop 100 %:* Braking with reversal of current (high energy consumption).
	- *Stop & release:* Braking and turn 2° in opposite direction. (The drive is released for comfortable removal of the tool.)

6.6 Tab „Strategy”



50 Tab Strategy

DANGER

If you only set an angle or time as a target value you must program a torque limit for emergency stop in order to protect workers and the machine from too high a transmission of power.

„shifting conditions”

The tool will observe all activated shifting conditions and ends the current step upon reaching the target specification(s) or limits. When the set value is reached the step is complete.

„torque”
- M_{Target}: The target torque to be reached.
- M_{Start}: Beginning of the angle counting.
- M_{Limit}: Upper limit of the torque (only visible if no M_{target} and no torque evaluation are activated).
- $M_{Limit''}$: Lower limit of the torque, defines the torque value which you may no longer fall below upon reaching M_{Start}.

„angle”
- α_{Target}: Target value of the angle.
- α_{Limit}: Upper limit of the angle (only visible if no W_{target} and no angle evaluation are activated).

„current”
- I_{Target}: Target value of the current.
- I_{Limit}: Upper limit of the current (only visible if no I_{target} and no current evaluation are activated).

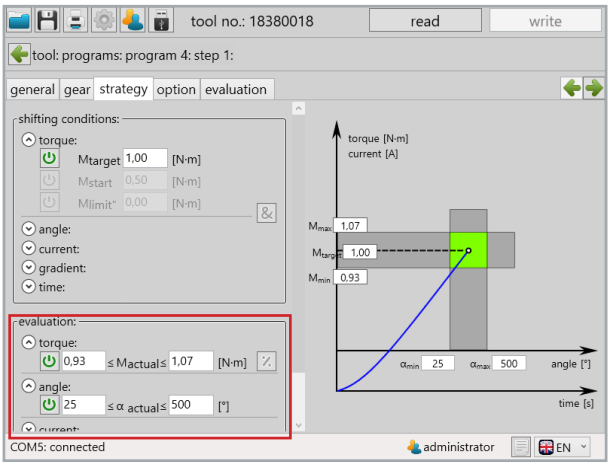
„gradient”
- G_{Target}: Corresponds to a percentage value of the maximum torque rate of increase. If the torque is increasing more slowly than before the tool will shut off.

„time”
- T_{Target}: Target value for time.
- T_{Limit}: Maximum duration (only visible if no T_{Target} and no time evaluation are activated).

„& symbol”

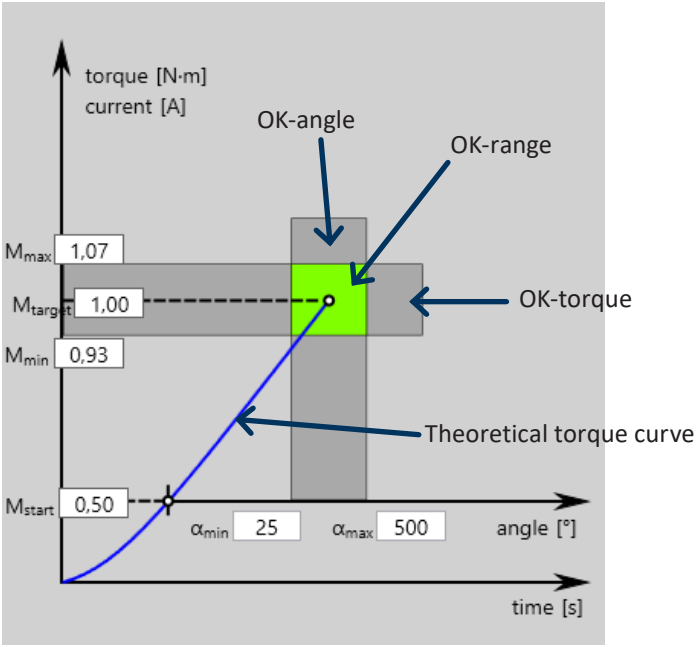
Activates the option of combining multiple target values. (The target value reached first leads to a shift into the next step).

For example, in order to correctly record incorrect assemblies, “idle screw connections” or overruns there is the „evaluation”. Here, corresponding limits can be programmed for all parameters.



51 Tab Strategy

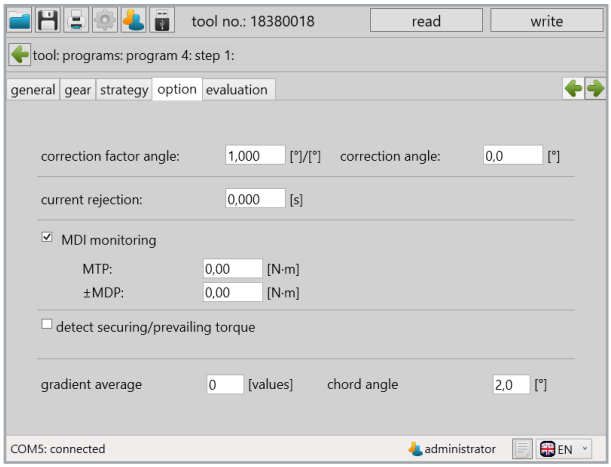
„evaluation“	Criteria for the evaluation of the actual values achieved for the current step. „torque“ Setting the lower and upper limit of the torque. If the torque lies outside these limits the step is assessed with NOK. Using the % sign the limits can be set as percent values of the target value (target value must be activated). Reaching the upper limit automatically leads to advancement and NOK evaluation. „angle“ Setting the lower and upper limit of the angle. If the angle lies outside these limits the step is assessed with NOK. Using the % sign the limits can be set as percent values of the target value (target value must be activated). Reaching the upper limit automatically leads to advancement and NOK evaluation. „current“ Setting the lower and upper limit of the current. If the current lies outside these limits the step is assessed with NOK. Using the % sign the limits can be set as percent values of the target value (target value must be activated). Reaching the upper limit automatically leads to advancement and NOK evaluation. „gradient“ Setting the lower and upper limit of the gradient. If the gradient lies outside these limits the step is assessed with NOK. „time“ Setting the lower and upper limit of the length of time. If the length of time lies outside these limits the step is assessed with NOK. Reaching the upper limit automatically leads to advancement and NOK evaluation.



52 The strategy as a graphic depiction

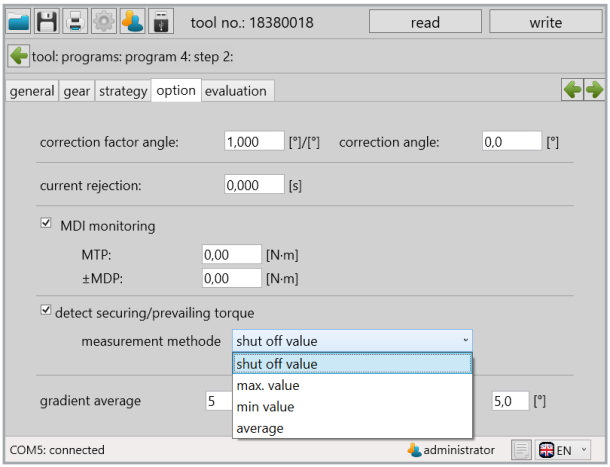
All limit values can also be changed directly in the graphic.

6.7 Tab „Option”



53 Tab Option

„correction factor angle”	Factor for the correction of systematic deviations of the actual angle measures in the tool from the reference measurement system (measuring bench) (default value 1,000).
„correction angle”	Correction value for the target angle of the tool (default value 0.0°).
„current rejection”	The measured current will not be evaluated at the beginning of the step for the time set (elimination of the starting current).
„MDI-monitoring”	In this control method the current is measured and evaluated as a redundancy to the torque. If this lies outside the defined limits the process is interrupted and assessed as NOK.
„MTP”	Start torque value from which the redundancy measurement begins.
„±MDP”	Permissible deviation of the redundancy value. (Tolerance)

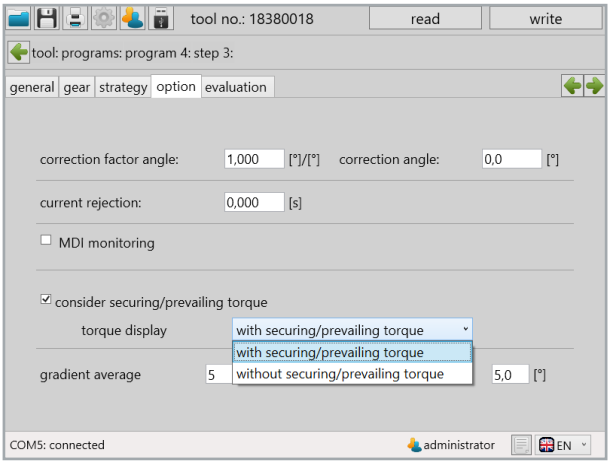


54 Determine locking torque

NOTE

The locking torque can be determined in one step and used in a subsequent step. The locking torque can be determined in the pre-tightening, e.g. in step 2, and then taken into consideration in step 3 during end torque. In step 1 it is only possible to determine the locking torque.

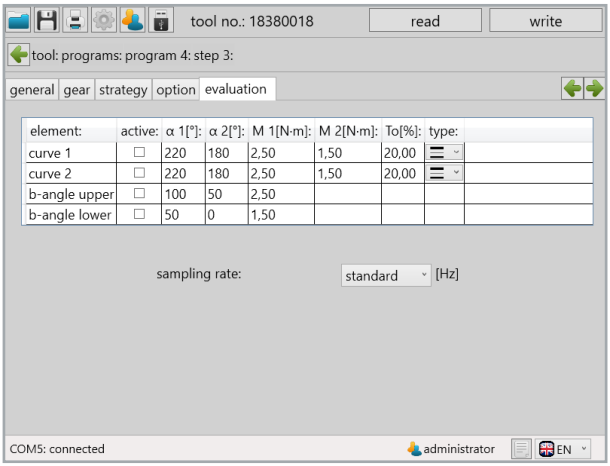
„detect securing/pre-vailing torque“	Activates the determination of the locking torque. „measurement methode“ Selection of the method to determine the locking torque. - *Switch-off value:* The last determined value of the step will be saved as the locking torque. - *Maximum value:* The maximum value of the step will be saved as the locking torque. - *Minimum value:* The minimum value of the step will be saved as the locking torque. - *Average:* The average of the step will be saved as the locking torque.



55 Use locking torque

„consider securing/ prevailing torque“	The saved locking torque will totalled with the torque target value (friction coefficient). (Is only available in the following step) „torque display“ - *with securing/prevailing torque:* The display shows current torque reached. - *without securing/prevailing torque:* The display shows current torque reached minus the locking torque.
„gradient average“	Number of values which are used for the average filter of the gradient.
„chord angle“	Determines across how many angle degrees the gradient will be formed.

6.8 Tab „Evaluation”



56 Tab Evaluation

„curve 1 curve 2”

A curve consists of a base line which is defined across two points (torque and angle). The permissible deviation from the base line is specified using the tolerance. An OK assessment only takes place if the torque process lies within the defined limits. It is important to ensure that curves exhibit a defined direction which is identified by an arrow.

- *Active:* Checkboxes in order to activate/deactivate the windows and curves.
- *α 1[°]:* First point of the element on the angle axis.
- *α 2[°]:* Second point of the element on the angle axis.
- *M 1[Nm]:* First point of the element on the torque axis.
- *M 2[Nm]:* Second point of the element on the torque axis.
- *To[%]:* The tolerance determines the permissible deviation from the base line of the curve.
- *Type:* Specifies whether the evaluation is made horizontally or vertically. The orientation results from the torque curve.

(Steep curve , flat curve)

„b-angle upper b-angle lower”	Limits the area which the screw curve may pass through. The uniqueness of this element is that the angle counting refers to the switch-off point. The switch-off point, in this sense, corresponds to the 0° angle. - *Active:* Checkboxes in order to activate/deactivate the angle monitoring. - *α 1[°]:* First point of the element on the angle axis. - *α 2[°]:* Second point of the element on the angle axis. - *M 1[Nm]:* Defines the torque that the screw curve may not exceed or fall below.
„sampling rate”	Determines the resolution of the graphics recording.

High quality (sampling rate) = low recording time
Low quality (sampling rate) = high recording time
With the „default” selection the setting from Chapter 5.5 Tab „Graphics” from page 53 is assumed.

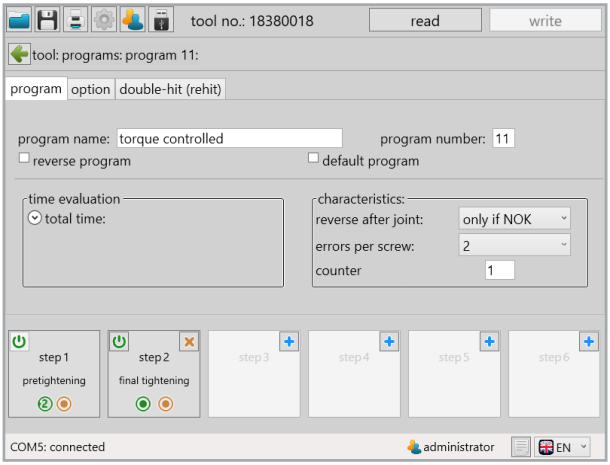
7 Program examples

In this chapter different examples for the creation of screw programs are described. Please note that the examples are primarily intended to inform you of the numerous options for the tool and its use. It is, however, not permitted to determine which procedure is suitable for your own screw connection and how the parameters of the screw program are determined.

7.1 Strategy Torque controlled/Rotation angle monitored

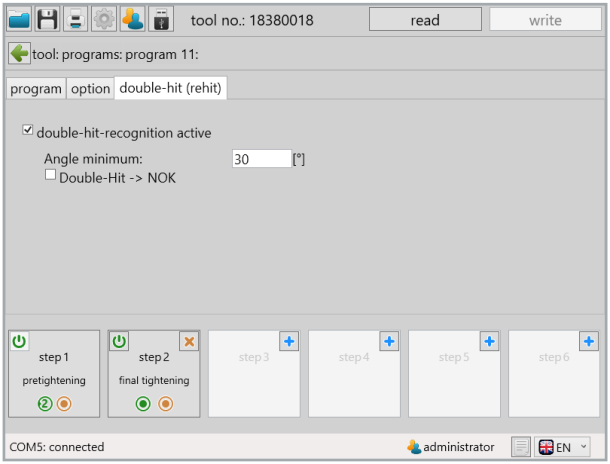
To this end a new program will be created which we have called „torque controlled".

Under the „program" tab an additional step will be added to the standard existing step 1. In the area „charcteristics" the value „only if NOK" will be set for „errors per screw", which permits a screw connection to be loosened after a NOK screw connection. With the „errors per screw" we set the parameters so that an overall NOK is only issued after the third attempt which is assessed with NOK.
We have made no changes under the „option" tab.



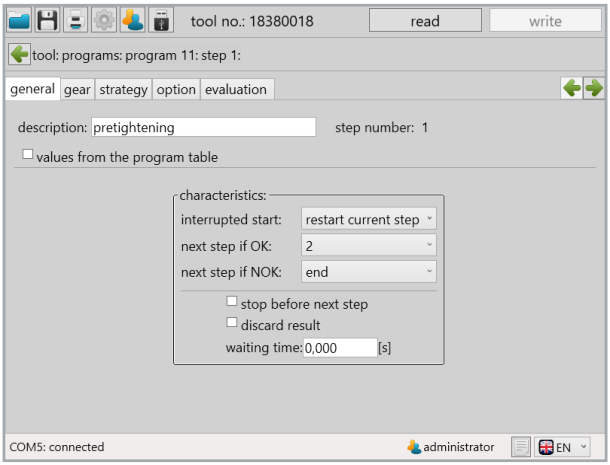
57 Sample program 1 Program

Under the „double-hit (rehit)" tab we activated the double-hit identification and entered the minimum angle of 30° so that a screw connection is assessed as a double-hit if the angle achieved is smaller than 30°.



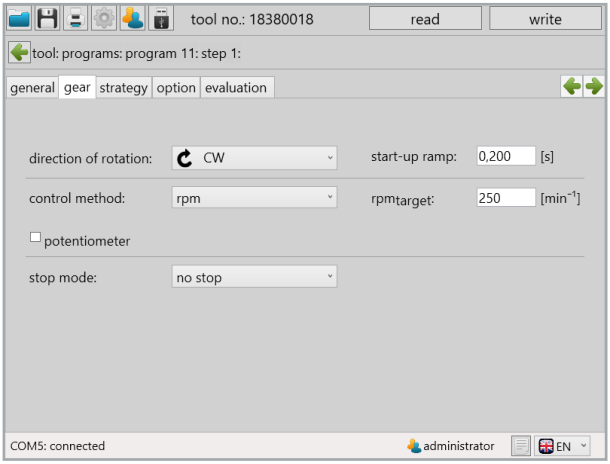
58 Sample program 1 Double-Hit (Rehit)

Now we will devote our attention to the steps, beginning with step 1. Under the tab „general” nothing needs to be changed because the charcteristics already corresponds to our expectations. An aborted start is not permitted in the event of an OK assessment in the first step the program jumps into the second step and in the event of a NOK assessment the program is ended.



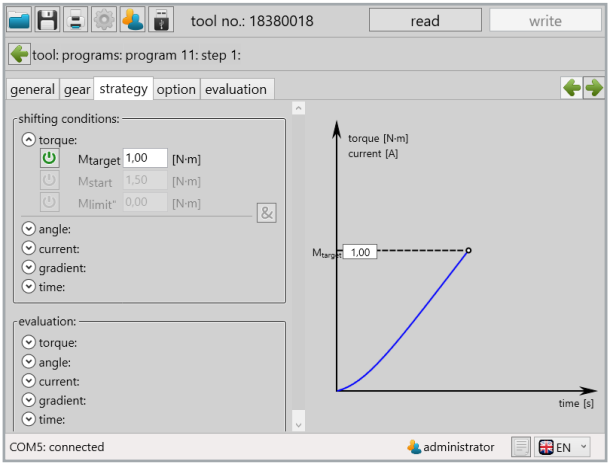
59 Sample program 1 General 1

In the „gear” tab we parameterise the number of revolutions per minute and the type of control for the motor. We set 250 rpm and select „rpm" for the control method whereby the tool will try to maintain this rotation speed, even under load. In order to obtain a more engine-friendly start and reduce the starting current peak at the same time we will set another „start-up ramp” of 150ms. For stop mode we will select „no stop” because we want to achieve a fluid transfer into the second step in which the final tightening of the screw connection then takes place.



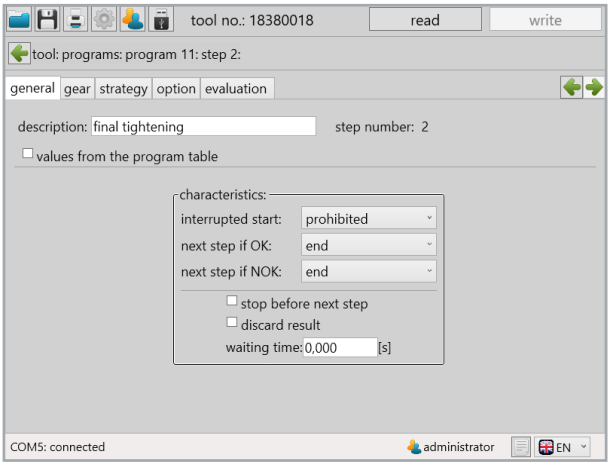
60 Sample program 1 Gear 1

Under the „strategy” tab both shifting conditions as well as evaluation criteria can be set. In the first step, however, the condition for proceeding as soon as a torque of 1Nm is reached, which we enter at „M_{Target}”, is sufficient. We do not need to make any changes in the „option” and „evaluation” tabs.



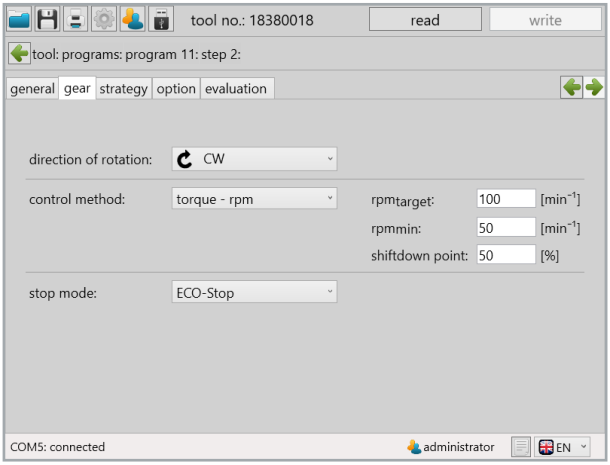
61 Sample program 1 Strategy 1

The first step is parameterized and we switch into the second step, the final tightening. Under the „general” tab we do not need to make any more changes for the charcteristics because this is already automatically set the way we want it during the creation of the step. An aborted start is not permitted and both in the event of an OK - as well as with a NOK assessment of the second step, the program will be ended.



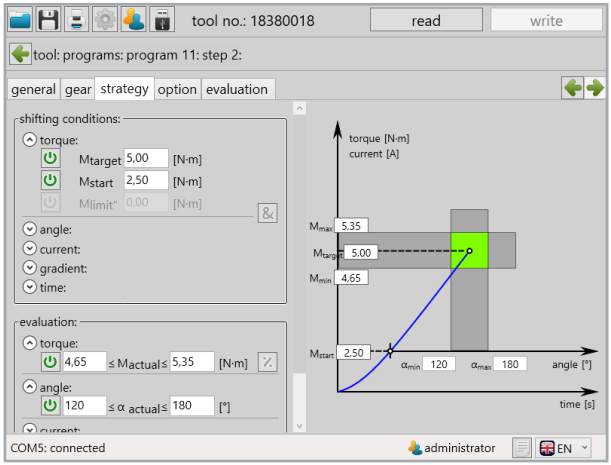
62 Sample program 1 General 2

Now we selected a different control type under the „gear" tab. With the option „torque-rpm" the rotation speed is controlled depending on the torque achieved. To this end, the rotation speed with which the step should be started with is specified under „rpm_{target}"; we slow the tool down here and set the speed at 100 rpm. The value „rpm_{min}" specifies the switch off speed; when switching off we only want to be 50 rpm. The shiftdown point relates to the target torque to be reached in the program in percent. As soon as it has been reached the tool begins to regulate the speed down, but not slower than „rpm_{min}". Because we did not set a stop in the first step and the tool is already turning when it switches into the second step we do not need a start-up ramp. However, in this step the tool should come to a stop when reaching the set torque which is why we are setting „ECO-Stop" in the stop mode, an effective and gentle method of stopping.



63 Sample program 1 Gear 2

Under the tab „strategy” we set the parameters for the screw joint. With these switch conditions we set „M_{target}” at 5.00 Nm; the tool hereby switches off when reaching this torque value. With „M_{start}” the torque is specified from which the angle counting begins. We set it to 50% of the target torque, at 2.50 Nm. In the evaluation we set the upper and lower limits for the evaluation criteria „torque” and „angle”. For the torque we tolerate ±7% of the target torque. The rotation angle must lie between 120 and 180 angle degrees so that the screw connection will be evaluated as OK. In the graphic all evaluation limits are stylistically represented so that a quick overview of the screw joint is provided.



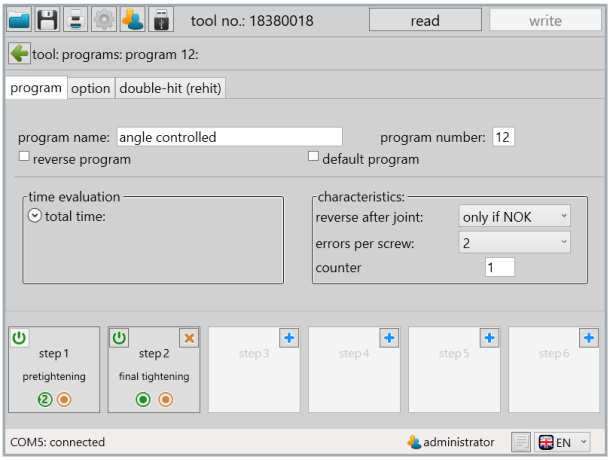
64 Sample program 1 Strategy 2

No changes needed to be made in the „option” and „evaluation” in the second step as well. The torque controlled program with torque and rotation angle monitoring is now complete.

7.2 Strategy Rotation angle controlled/Torque monitored

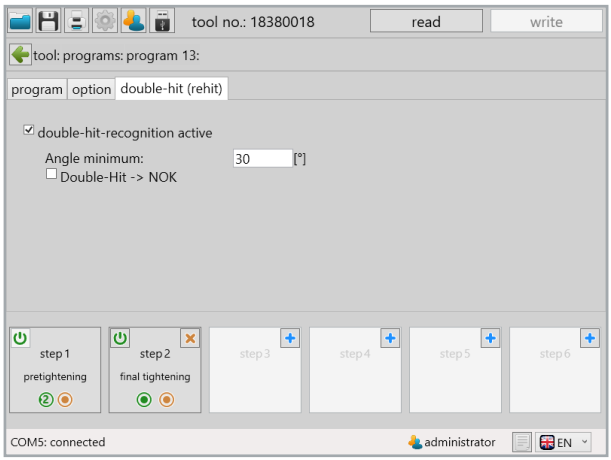
Switch-off using the rotation angle with torque monitoring.

To this end a new program will be created which we have called „angle controlled”. Under the „program” tab an additional step will be added to the standard existing step 1. In the area „characteristics” the value „only if NOK” will be set for „reverse after joint”, which permits a screw connection to be loosened after a NOK screw connection. With the „error per screw” we set the parameters so that an overall NOK is only issued after the third attempt which is assessed with NOK.
We have made no changes under the „option” tab.



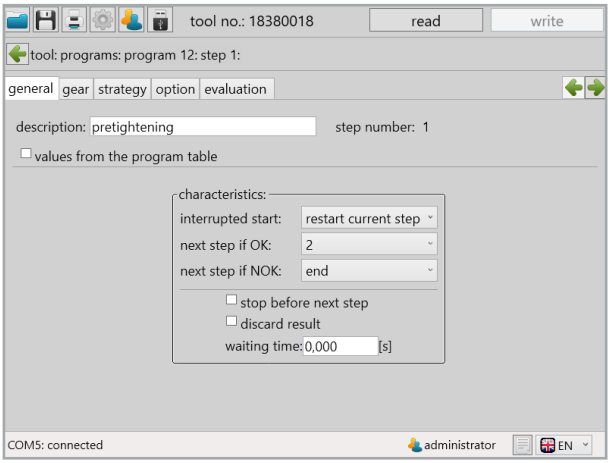
65 Sample program 2 Program

Under the „double-hit (rehit)" tab we activated the double-hit identification and entered the minimum angle of 30° so that a screw connection is assessed as a double-hit if the angle achieved is smaller than 30°.



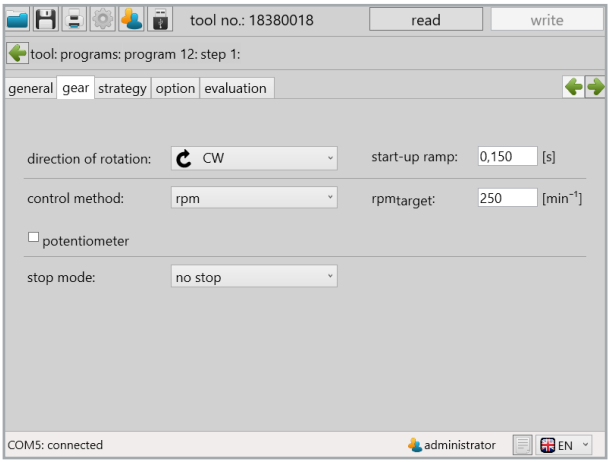
66 Sample program 2 Double-Hit (Rehit)

Now we will devote our attention to the steps, beginning with step 1. Under the tab „general” nothing needs to be changed because the characteristics already corresponds to our expectations. An aborted start is not permitted in the event of an OK assessment in the first step the program jumps into the second step and in the event of a NOK assessment the program is ended.



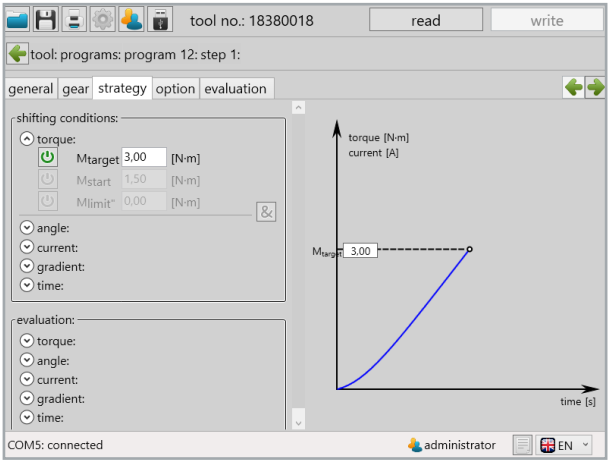
67 Sample program 2 General 1

In the „gear” tab we parameterise the number of revolutions per minute and the control method for the motor. We set 250 rpm and select „rpm” for the control method whereby the tool will try to maintain this rotation speed, even under load. In order to obtain a more engine-friendly start and reduce the starting current peak at the same time we will set another „start-up ramp” of 150ms. For stop mode we will select „no stop” because we want to achieve a fluid transfer into the second step in which the final tightening of the screw connection then takes place.



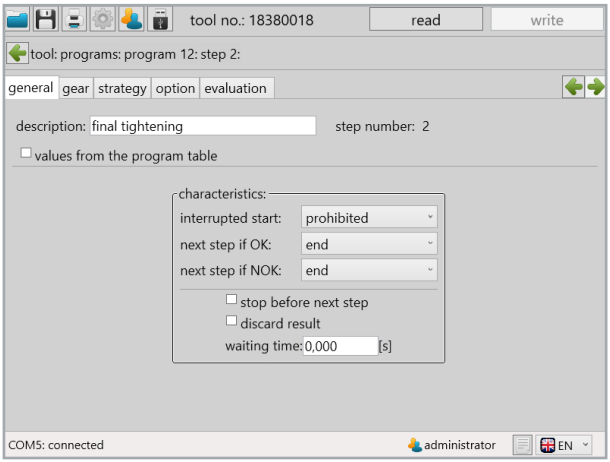
68 Sample program 2 Gear 1

Under the „strategy” tab both progression conditions as well as evaluation criteria can be set. In the first step, however, the condition for proceeding as soon as a torque of 3Nm is reached, which we enter at „M_{Target}”, is sufficient. We do not need to make any changes in the „option” and „evaluation” tabs.



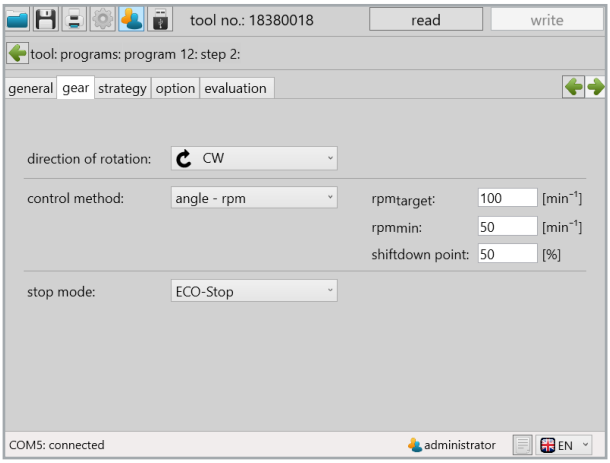
69 Sample program 2 Strategy 1

The first step is parameterized and we switch into the second step, the final tightening. Under the „general” tab we do not need to make any more changes for the charcteristics because this is already automatically set the way we want it during the creation of the step. An aborted start is not permitted and both in the event of an OK - as well as with a NOK assessment of the second step, the program will be ended.



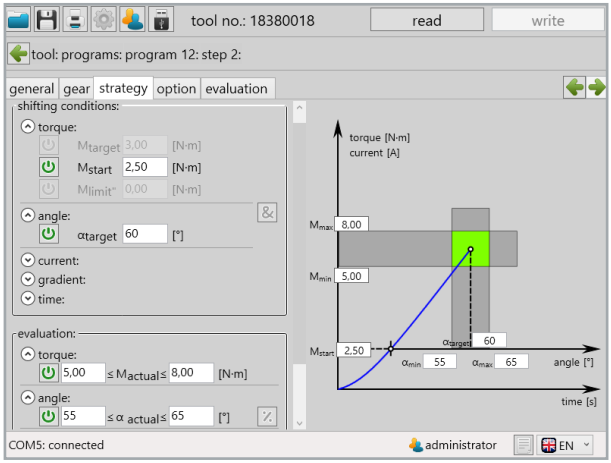
70 Sample program 2 General 2

Now we selected a different control method under the „gear” tab. With the option „angle-rpm” the number of revolutions the speed is controlled depending on the torque achieved. To this end, the number of revolutions per minute with which the step should be started with is specified under „rpm_{target}”; we slow the tool down here and set the speed at 100 rpm. The value „rpm_{min}” specifies the switch off speed; when switching off we only want 50 rpm. The „shiftdown point” relates to rotation angle to be reached for the program in percent. As soon as it has been reached the tool begins to regulate the speed down, but not slower than „rpm_{min}”. Because we did not set a stop in the first step and the tool is already turning when it switches into the second step we do not need a start-up ramp. However, in this step the tool should come to a stop when reaching the set rotation angle which is why we are setting „ECO-Stop” in the stop mode, an effective and gentle method of stopping.



71 Sample program 2 Gear 2

Under the tab „strategy” we set the parameters for the screw joint. With these switch conditions we set „α_{target}“ at 60°; the tool hereby switches off when reaching this rotation angle. By setting „M_{start}” at 2.50 Nm the angle counting begins only upon reaching this torque. In the evaluation we set the upper and lower limits for the evaluation criteria „torque” and „angle”. With the torque, generous limits, from 5.00 to 8.00 Nm, because our target value is the rotation angle. The rotation angle may deviate a maximum of 5° so that the screw connection is evaluated as OK. In the graphic all evaluation limits are stylistically represented so that a quick overview of the screw joint is provided.
No changes needed to be made in the „option” and „evaluation” in the second step as well. The rotation angle controlled program with torque and rotation angle monitoring is now complete.

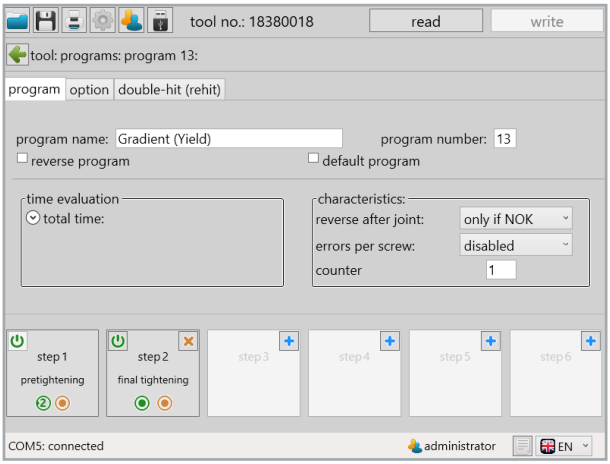


72 Sample program 2 Strategy 2

7.3 Strategy gradient controlled/Rotation angle monitored

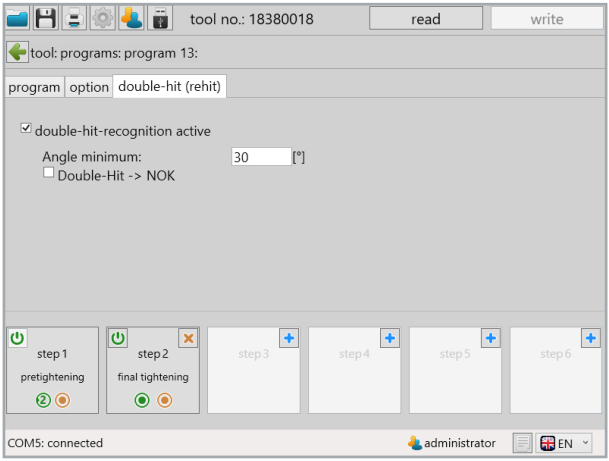
Switching off using the torque-gradient with angle monitoring.

To this end a new program will be created which we have called „Gradient (Yield)". Under the „program" tab an additional step will be added to the standard existing step 1. In the area „characteristics" the value „NOK" will be set for „reverse after joint", which permits a screw connection to be loosened after a NOK screw connection. With the „error per screw" at „disabled" we set the parameters so that an overall NOK is already issued after the first attempt which is assessed with NOK. For screw connections which are gradient controlled the yield strength of the screw material is used, therefore the effective force, starting from which the material no longer deforms elastically, but plastically. For this reason a screw which has already been stressed above its yield strength cannot be used again.
We have made no changes under the „option" tab.



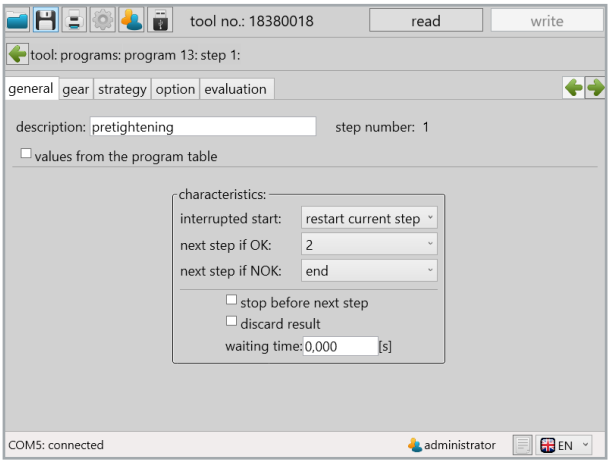
73 Sample program 3 Program

Under the „double-hit (rehit)” tab we activated the double-hit identification and entered the minimum angle of 30° so that a screw connection is assessed as a double-hit if the angle achieved is smaller than 30°.



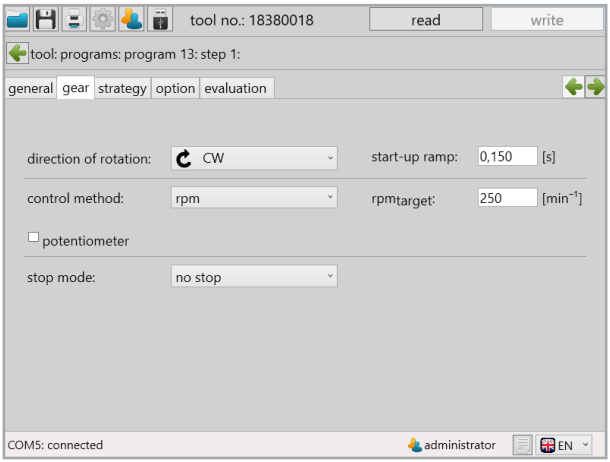
74 Sample program 3 Double-Hit (Rehit)

Now we will devote our attention to the steps, beginning with step 1. Under the tab „general” nothing needs to be changed because the characteristics already corresponds to our expectations. An aborted start is not permitted in the event of an OK assessment in the first step the program jumps into the second step and in the event of a NOK assessment the program is ended.



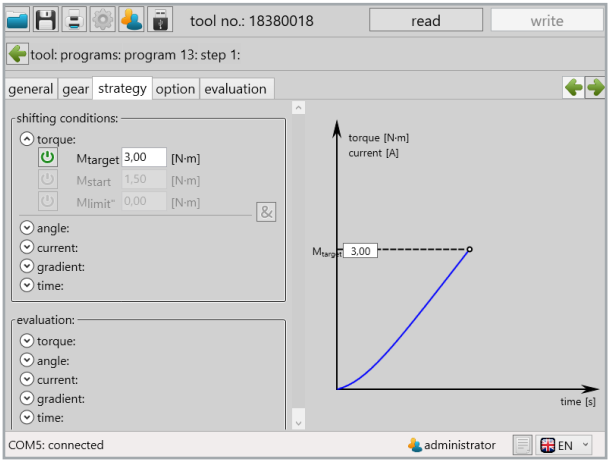
75 Sample program 3 General 1

In the „gear” tab we parameterise the number of revolutions per minute and the type of control method for the motor. We set 250 rpm and select „rpm” for the control method whereby the tool will try to maintain this speed, even under load. In order to obtain a more engine-friendly start and reduce the starting current peak at the same time we will set another „start-up ramp” of 150ms. For stop mode we will select „no stop” because we want to achieve a fluid transfer into the second step in which the final tightening of the screw connection then takes place.



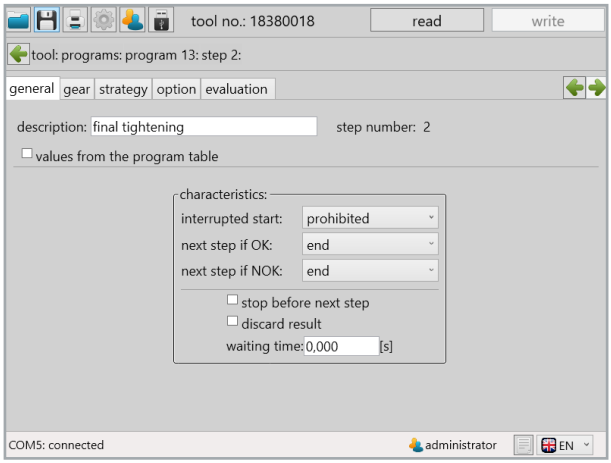
76 Sample program 3 Gear 1

Under the „strategy” tab both progression conditions as well as evaluation criteria can be set. In the first step, however, the condition for proceeding as soon as a torque of 3Nm is reached, which we enter at „M_{Target}”, is sufficient. We do not need to make any changes in the „option” and „evaluation” tabs.



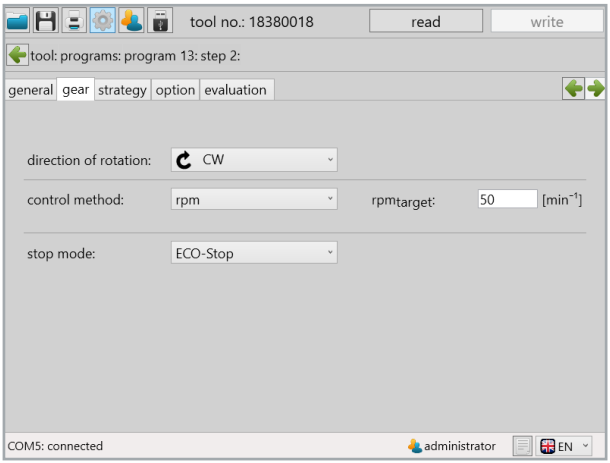
77 Sample program 3 Strategy 1

The first step is parameterized and we switch into the second step, the final tightening. Under the „general” tab we do not need to make any more changes for the charcteristics because this is already automatically set the way we want it during the creation of the step. An aborted start is not permitted and both in the event of an OK - as well as with a NOK assessment of the second step, the program will be ended.



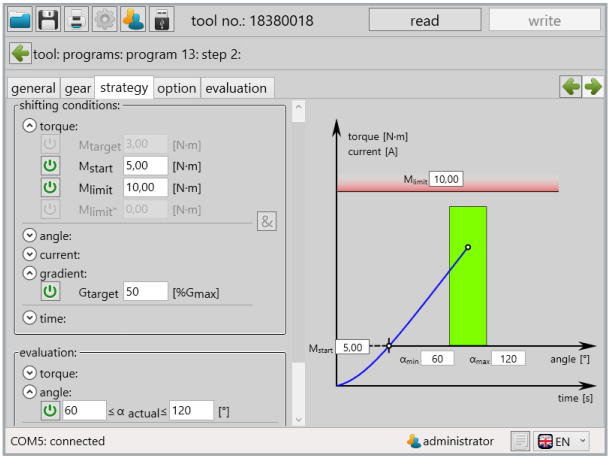
78 Sample program 3 General 2

Under the „gear” tab we retained the „rpm” control method. In order to establish a targeted torque we slow the tool down here and set the speed to 50 rpm. Because we did not set a stop in the first step and the tool is already turning when it switches into the second step we do not need a start-up ramp. However, in this step the tool should come to a stop as soon as the torque gradient drops again. For this reason we set „ECO-Stop” in the stop mode; an effective and gentle method of stopping.



79 Sample program 3 Gear 2

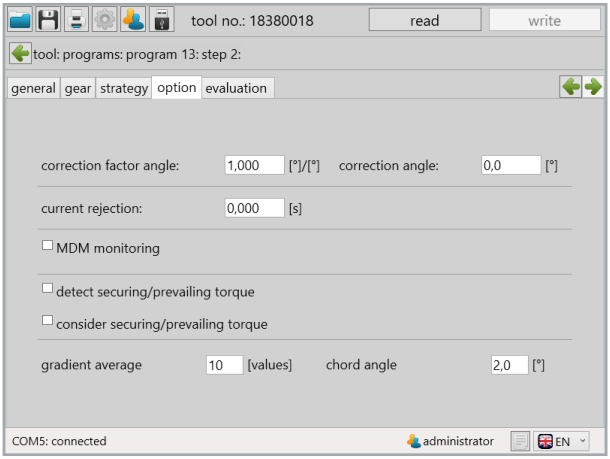
Under the tab „strategy” we set the parameters for the screw joint. In the switching conditions we set „M_{start}” to 5 Nm so that the rotation angle counting begins starting at this torque. In addition we set an „M_{limit}” with 10 Nm. As soon as this torque is reached the tool also switches off. The actual desired switch off should take place via the torque gradient. This gradient is the torque rate of increase. Under „G_{target}” we set the value in percent of the maximum value at which a switch off should take place. The tool permanently measures the torque rate of increase during the screwing process; if this suddenly drops due to reaching the yield strength of the screw material the tool realises this and switches off. In our case the switch off occurs as soon as the torque rate of increase drops to 50% of the maximum. In the evaluations we set another rotation angle range of 60 to 120 angle degrees.



80 Sample program 3 Strategy 2

For the calculation of the torque gradients one must specify over how many measurement values the rate of increase should be calculated under the „option” tab; to this end we specify 10 values under „gradient average” so that the average is always derived from the last 10 values and the increase to the last average then results in the gradients. The „chord angle” specifies across how many angle degrees the 10 measurement values should be distributed. In our case we want to calculate the average from 10 measurement values across 2 angle degrees.

No changes need to be made under the tab „measuring window”. The screw program with switch off using torque gradients with angle monitoring is now complete.



81 Sample program 3 Option 2

8 The barcode

With all tools which are equipped with a barcode scanner it is possible to select programs directly using a defined barcode. It is also possible to connect multiple barcodes to one sequence. In this scenario the program is only then started when all the barcodes have been scanned in the correct order.

8.1 Basic setting

Make sure that your tool is equipped with a barcode scanner. In administrator mode the program enabling can be selected via barcode at any time under „setup“ ⇨ „general” ⇨ „process control”. See Chapter 5.1.1. tab „process control”, page 37.

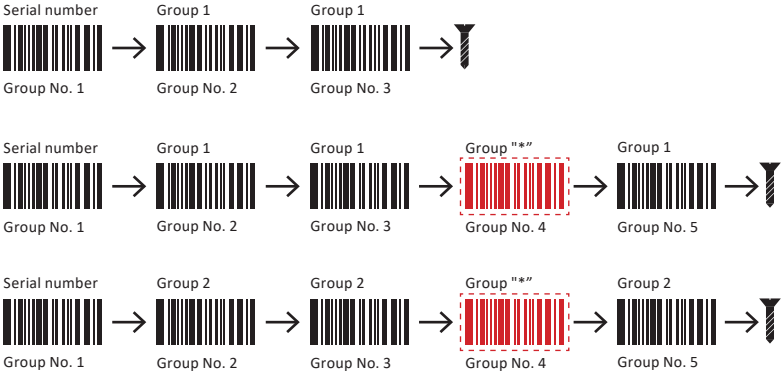
8.2 Barcode interface

Under „programming” ⇨ „barcode” you will find the interface in order to create a barcode and define its function.

NOTE
A barcode have a maximum of 64 characters.

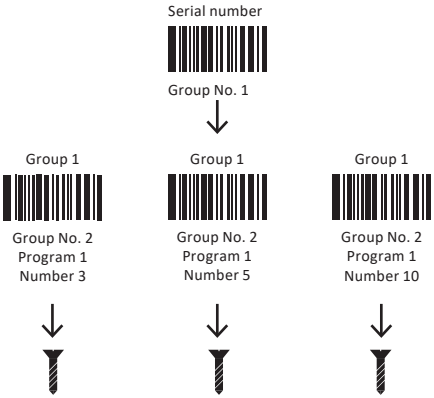
8.3 Barcode types

Depending on the application barcodes can be configured accordingly.
The following graphic shows several of the options available.



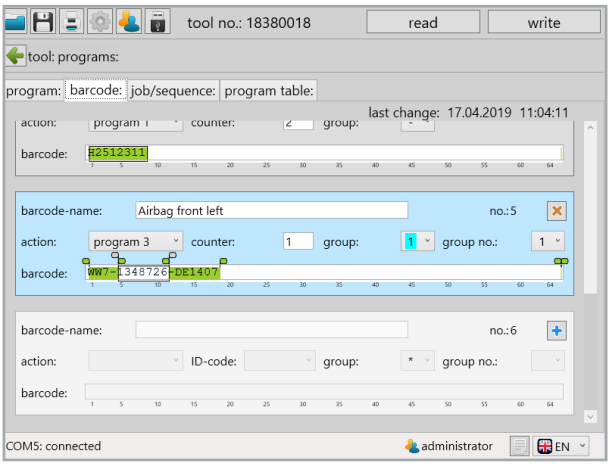
NOTE
Barcodes with the group assignment “*“ can be applied individually in every group. Only the position / no. must be entered.

Special grouped barcodes



Depending on which component should be processed first, the corresponding barcode can be scanned in.

The green fields define the part of the barcode for the evaluation. The grey field defines the part of the barcode to be displayed in the tool's display. A maximum of 9 characters can be displayed.



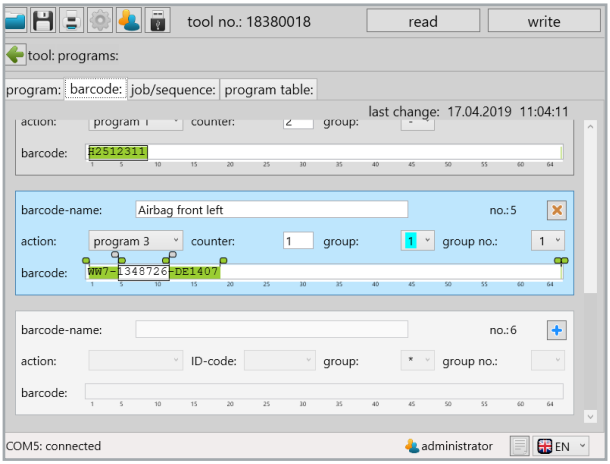
82 Create barcode

WW7-1348726-DE1407

Will not be evaluated and can be variably changed (e.g. continuous serial number). In the example: Value shown in display

The complete barcode is saved. The green fields define the area which is to be evaluated. The variable part, which is defined with the grey sliders, can be at the beginning, in the middle, or at the end of the barcode and will not be evaluated. This part will also be displayed on the display for control purposes. The green and grey sliders can be moved by pressing and holding down the left mouse key.

Activate the screen with .

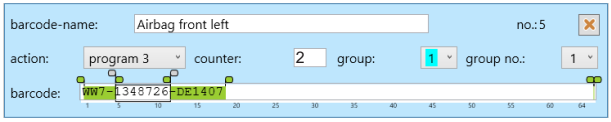


83 Create barcode

Up to 99 barcodes can be stored.

8.3.1 Screen with a barcode

In order to activate a program directly using the barcode often only part of the barcode is necessary. For this selection and in order to determine the display on the tool the screen is divided into different selection fields.

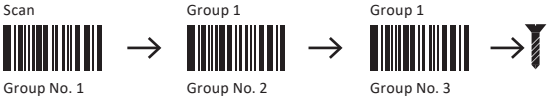


Example WW7-1348726-DE1407

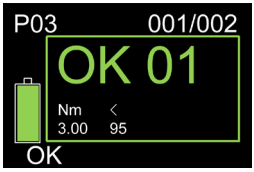
„barcode-name"	Designation of the barcode / area of application (maximum 20 characters).
„action"	If a barcode is recognised this setting determines any further action. - *program:* The program, which should be released with the barcode. - *Or:* The process number of the program process, which should be enabled with the barcode. - *scan:* An additional barcode scan is necessary.
„counter"	Number of screws which were enabled with the barcode. In our example we entered 2, i.e. the tool specifies two screw connections, of which one screw connection was already successfully completed in our display image.
„group"	- *" - ":* Barcode is not assigned to a group. - *"1-99":* The barcode will be assigned to one of 99 groups. - *" * ":* The barcode is valid for all groups.
„group no."	*"1-9":* Establishes the position in the order of the group.
„ID Code"	Becomes visible in the „scan" action. This way the ID code filed in the result can be determined. By default the last barcode is filed as the ID code. - *Inactive:* Barcode is not filed as the ID code. Last barcode is filed as the ID code, ID2 remains empty. - *Active:* Barcode is filed as the ID code. ID2 remains empty. - *2x Code:* Barcode is filed as ID2 code, the last barcode is filed as the ID code.

WW7-1348726-DE1407

NOTE
The last barcode in the group must ALWAYS lead to the enabling of the program or the program process.



Here, for example a serial number is being scanned in.



8.3.2 Screen with multiple barcodes

If multiple barcodes are being used for an enabling additional input screens must be activated.

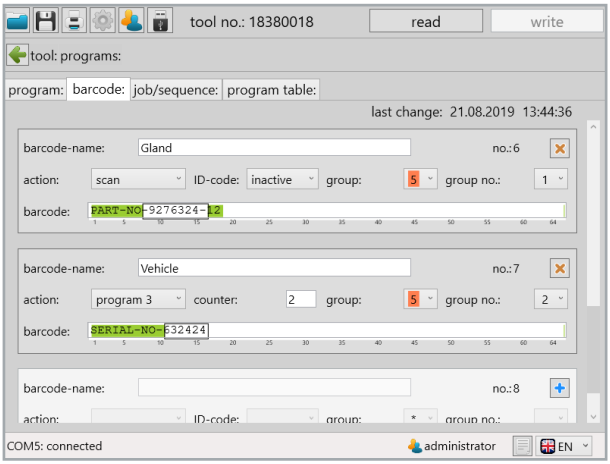
Example with two barcodes:

The first barcode is part number „PART-NO-9276345-12“.

PART-NO-9276345-12

The second barcode is serial number „SERIAL-NO-632424“.
With this the program is activated and the process data documented.

SERIAL-NO-632424



84 Create barcode 2

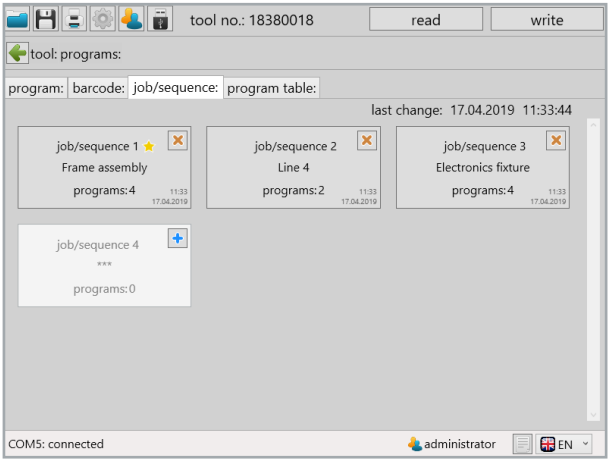
In our example the barcode, which must first be scanned in, so the one with the „group no.: 1“, is the component identification.
With the barcode screen the parts of the code which are preset are highlighted in green. The framed part is the component number which can vary. It is displayed in the display for monitoring purposes.

The second barcode with the serial number receives „group no.: 2“. Here too, there is a preset part.
The serial number, which constantly changes, is framed with the grey sliders as a variable part. It is also used for enable the program as well as for documentation and for display.

The sequence must comply with this configuration. Only after the component identification is scanned does a scan of the serial number lead to enabling of the program.

9 Sequence (Job)

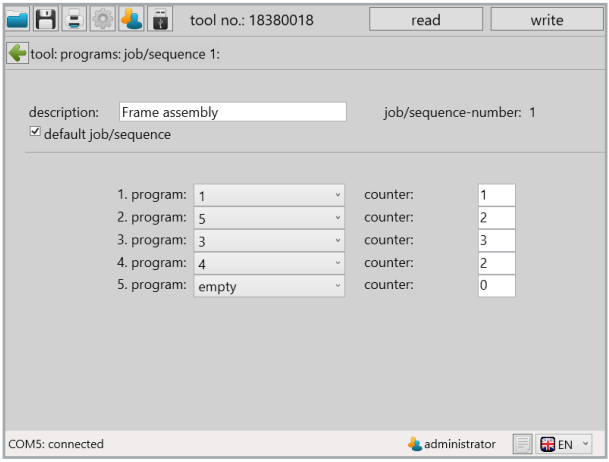
With the SmartTool-Manager it is possible to create program sequences. In doing so the sequence of the individual programs which should be processed one after the other, is defined. Using this function it is possible to start a preset sequence of programs with one single enabling.



85 Process

In order to program a new process press the button.

You can get to parametrization via the job/sequence 1 button. Here you can set the order of programs which should be consolidated into one sequence. For each program the number of screw connections is individually specified.

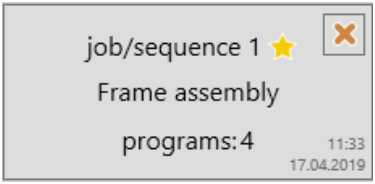


86 Process 2

„description”	Name of the job/sequence (maximum 20 characters).
„job/sequence-number”	Number of the process, max. 8 jobs/sequences are possible.
„default job/sequence”	See default program. The active job/sequence is indicated with a yellow star as with the programs. If a job/sequence is selected as the default job/sequence the tool always starts with this job/sequence in manual mode.
„1(2...n) program”	Selection of the program.
„counter”	Number of screws which will be enabled with the program. If a number of screws is specified in the program it will be ignored.

There are several ways to start a job/sequence:

1. Define the job/sequence as the default. The tool will always start with this job/sequence in manual mode.



2. Start the job/sequence with a barcode. To do this select job/sequence 1 under „action" in barcode, enter etc...

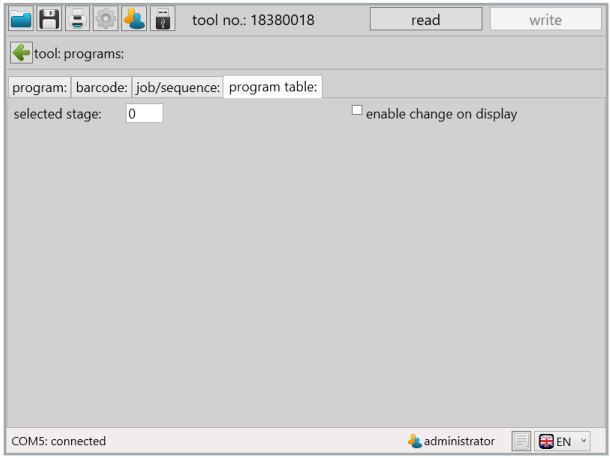
3. Enable via wireless (Wi-Fi)

4. Enable using a set time

5. Enable via confirmation of the start switch

10 Program table

If the program table is activated in the tool, the values from the active line overwrite the values in the last program step.



87 Program table

„selected stage“	Determines from which line (1-100) the values will be used.
„enable change on display“	Activates/deactivates the option of adjusting the active line directly on the tool’s display.

NOTE

The „program table“ function can only be activated by the manufacturer. In this case please contact our support service@hs-technik.com | Telephone: +49 7628 9111-57

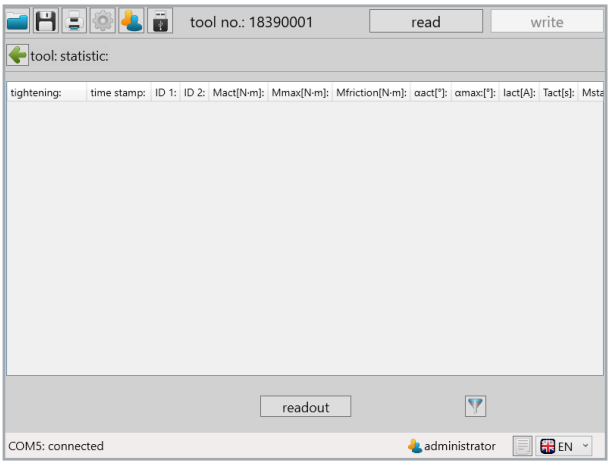
11 Statistics and Graphics

11.1 Statistics

The tool stores at least 150,000 results on the internal data storage (micro SD card: 8 GB) which can be read out using the SmartTool-Manager.

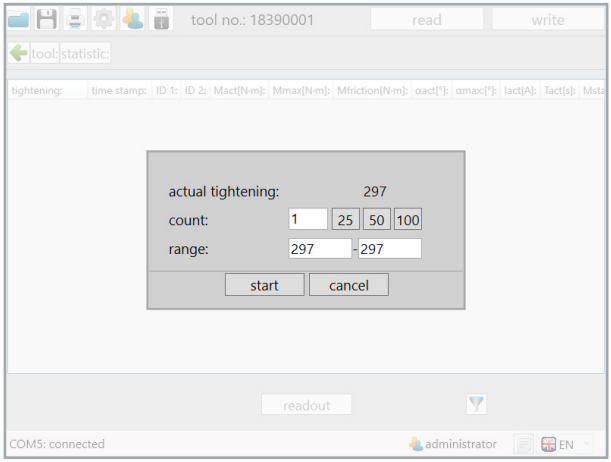
NOTE
The tool must be connected with the computer via Wi-Fi or USB in order to be read.

The statistics can be retrieved on the homepage using the button.



88 Statistics

In order to read statistical data from the tool click on the „readout” button. Then a pop-up window will open in which the desired data for reading can be entered.

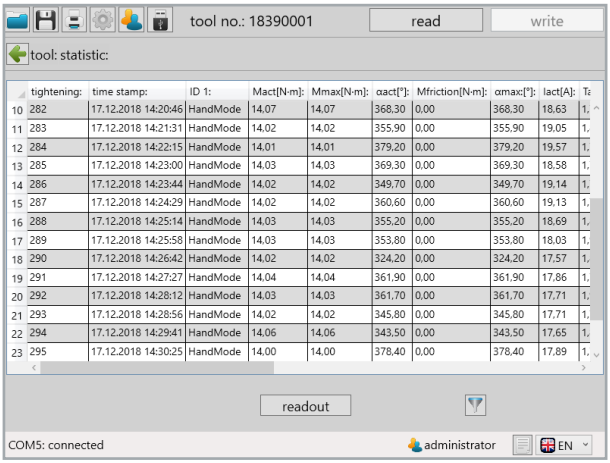


89 Statistics 2

„actual tightening”	The total number of saved results.
„count”	Number of results to be read out.
„25/50/100”	Buttons for quick selection for the last 25, 50 or 100 results. By selecting one of the buttons the read out process will begin directly.
„range”	Selection of the results from a specific area. For example: Screw connection No. 448 - 467.

NOTE
The more screw connections you read out the longer your computer will need in order to display the data.

The SmartTool-Manager loads the data and lists it as a table.



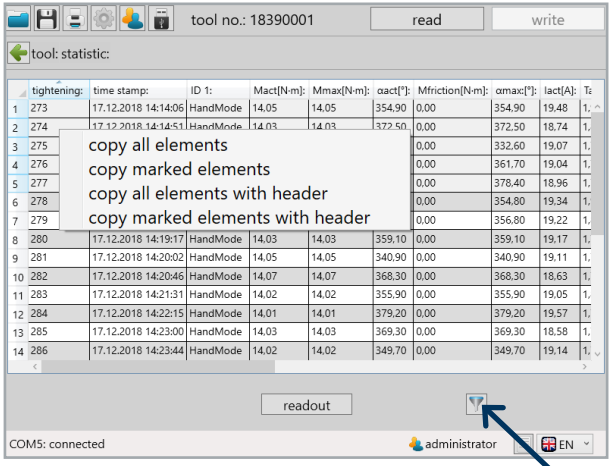
90 Statistics 3

„tightening“	Number of screw results.
„time stamp“	Date and time when the screw connection was conducted.
„ID 1“	Identification number. Is specified via wireless (FRZ max. 64 characters) or barcode (1 x barcode-ID max. 49 characters, 2 x barcode-ID each max. 30 characters).
„ID 2“	Additional identification number when using a double barcode ID (each max. 30 characters).
„M_{act}“	Tightening torque of the screw connection.
„M_{max}“	Maximum torque which was achieved during screwing.
„$M_{friction}$“	Friction coefficient determined (locking torque).
„α_{act}“	Total angle of the final tightening step.
„α_{max}“	Angle at maximum torque.
„I_{act}“	Current reached at tightening torque.
„M_{start}“	Start torque for the angle evaluation.
„α_{total}“	Total angle achieved across all steps.
„T_{start}“	Start time of the last step.

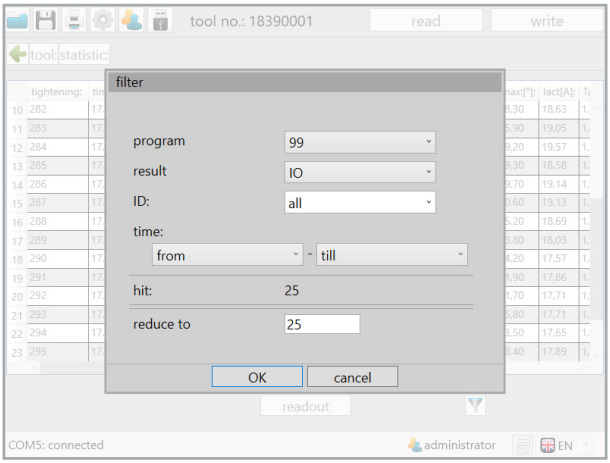
„TM_{start}”	Time upon achieving the starting torque (M_{start}).
„n”	Current number of revolutions at switch-off time.
„t_{MOT}”	Current temperature of the motor at switch-off time.
„t_{FET}”	Current temperature of the engine control at switch-off time.
„Program”	Program number for screw result.
„Step”	Step number for screw result.
„No. in program”	Serial number in the screw order.
„Result”	Evaluation of the screw connection.
„Event”	Reason for switch off for the step.
„NOK event”	Reason for the NOK evaluation in the step.

11.1.1 Filter

In order to apply the filter function click on the button with the filter symbol on the bottom right.



91 Copy statistics elements

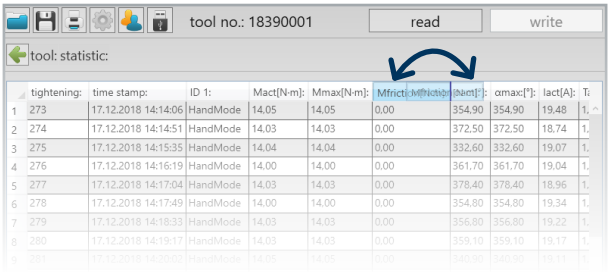


92 Statistics Filter

„program“	Filter results by program.
„result“	Filter results by evaluation.
„ID“	Filter results by ID.
„time“	Filter results by time.
„hit“	Number of results found.
„reduce to“	Reduce results found to desired number.

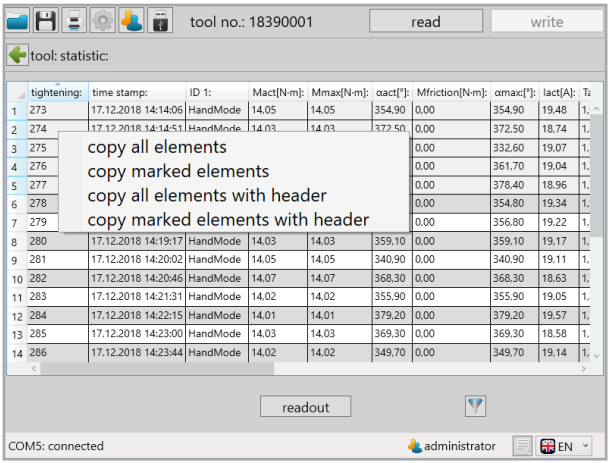
11.1.2 Drag & Drop

All column widths can be adjusted as desired in order to get a better overview (similar operating principle to Microsoft® Excel). In addition each column can be sorted in ascending or descending order. To do this click on the column head. Enlarge/shrink the column width by pulling and dragging on the edge of the column. The whole column can also be moved using drag & drop. To do this drag while holding down the left mouse key at the top on the column header. As a result these can be arranged in front or in back.



11.1.3 Copy elements

In order to copy elements they can be individually marked. Multiple lines can be marked by holding down the left mouse key. All the elements can be copied by right clicking. In addition you can select whether the header should be copied as well or not. This data can be directly inserted into Excel and other programs.



93 Copy statistics elements

NOTE

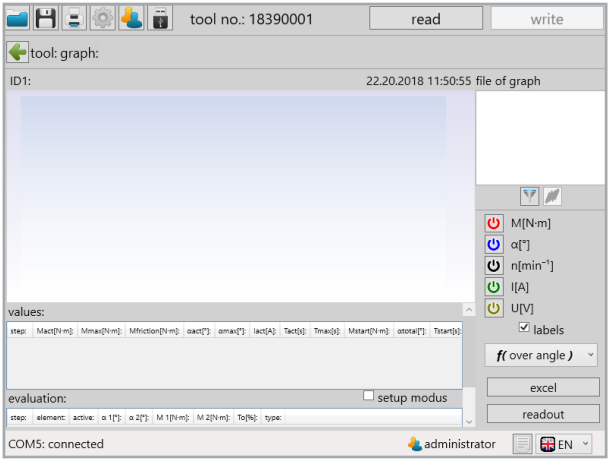
By holding down the CTRL key you can copy various elements into different lines (with empty lines) by clicking on the left.

11.2 Graphics

The tool stores at least 150,000 curves on the internal data storage (8 GB) which can be read out using the SmartTool-Manager.

NOTE
The tool must be connected with the computer via USB or Wi-Fi in order to be read.

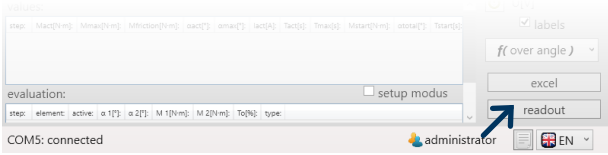
Click on the button on the homepage.
The interface of the „graphic" will open.



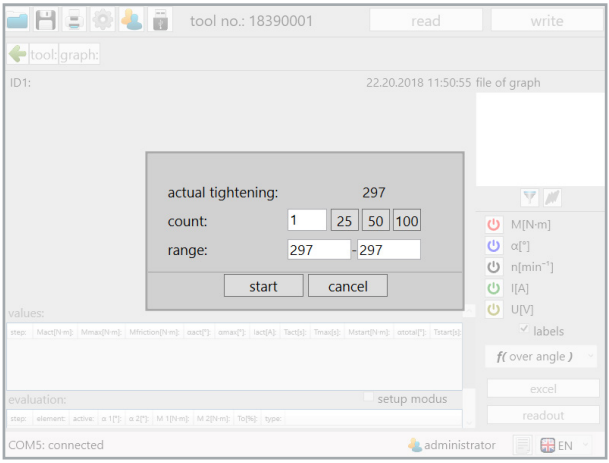
94 graphics

11.2.1 Read out diagrams

The graphics data from the tool can be read out using the „readout” button.



95 Graphics

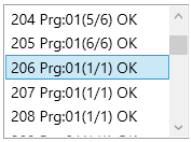


96 Read graphics

„actual tightening”	The total number of saved results.
„count”	Number of results to be read out.
„25/50/100”	Buttons for quick selection for the last 25, 50 or 100 results. By selecting one of the buttons the read out process will begin directly.
„range”	Selection of the results from a specific area, e.g. screw connection NO. 448 - 467.

11.2.2 Graphics interface

97 Graphics curve

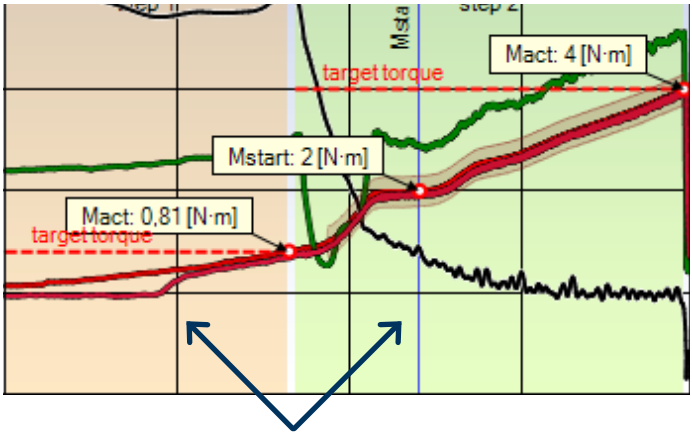
„ID 1”	Identification number of the screw connection in the graphics file. ID 2 (only available with 2xID)
„date/time”	Time stamp for graphics file.
„file of graph” 	Consisting of the screw connection number (206), the program (Prg:01), the number of the screw order (1/1) and the evaluation of the screw connection (OK/NOK).
„Parameter selection” 	Only the parameters which were defined before the screw connections under „Setup - Graphics - Evaluation” are shown in the diagram. The following parameters are available: • Torques (M1, M2) • Angle (α1, α2) • Number of revolutions per minute (is always recorded) • Current • Voltage • MDM/MDP (see Chapter 6.7 page 79) By clicking on the button ⏻ these can be added, or deleted from the display in the graphic.

„labels“	Activates/deactivates the designation elements in the graphic.
„f(over angle)“	Graphic presentation using the angle as a reference value.
„f(over time)“	Graphic presentation using time as the reference value.
„excel“	Export selected graphic to Microsoft® Excel.
„values“	- *Stage:* Screw stage of the program. - M_{act}*[Nm]:* Torque (final value) achieved in the step. - M_{max}*[Nm]:* Maximum torque achieved in the step. - $M_{friction}$*[Nm]:* The locking torque achieved in the step. - α_{act}*[°]:* Angle (final value) achieved in the step. - α_{max}*[°]:* Maximum angle achieved in the step. - I_{act}*[A]:* Current (final value) achieved in the step. - T_{act}*[s]:* Time (final value) achieved in the step. - T_{max}*[s]:* The maximum time achieved in the step. - M_{start}*[Nm]:* The starting torque registered in the step. - α_{total}*[°]:* The total angle achieved in the step. - T_{start}*[s]:* Start time of the step. - Tm_{start}*[s]:* Start time of achieving Mstart. - α_{start}*[°]:* Starting angle in the step (absolute). - *U[V]:* The voltage measured in the step (final value). - G_{act}*:* The torque rate achieved in the step (final value with regard to the maximum torque rate). - G_{max}*:* Maximum torque rate achieved in the step. - *n[min-1]:* Number of revolutions (final value) achieved in the step. - t_{MOT}*[°C]:* Engine temperature in the step (final value).
„values“	- t_{FET}*[°C]:* Electronics temperature in the step (final value). - T_{total}*[s]:* Total time of the step. - *OK/NOK:* Evaluation of the step. - *Event:* Step enabling condition entered. - *NOK event:* Reason for the NOK evaluation of the step (only in the event of a NOK).
„setup mode“	Activates/deactivates the setup mode for the direct adjustment of evaluation criteria of the graphics read out. (Only possible with the graphic representation of angles)
„evaluation“	Evaluation criteria

„α“	- *Element α:* Setting the lower and upper limit of the angle evaluation. - *Active:* Activates/deactivates the angle evaluation, the limits can be entered using α1 and α2 in the table, or be adjusted directly in the graphic. - *α1:* Lower limit value for angle evaluation. - *α2:* Upper limit value for angle evaluation.
„M“	- *Element M:* Setting the lower and upper limit of the torque evaluation. - *Active:* Activates/deactivates the torque evaluation, the limits can be entered using M1 and M2 in the table, or be adjusted directly in the graphic. - *M1:* Lower limit value for torque evaluation. - *M2:* Upper limit value for torque evaluation.
„Curve1“ „Curve2“	A curve consists of a base line which is defined across two points (torque and angle). The permissible deviation from the base line is specified using the tolerance. This can be done either in the table or directly in the graphic. It is important to ensure that curves exhibit a defined direction which is identified by an arrow. - *Active:* Checkboxes in order to activate/deactivate the windows and curves. - *α 1[°]:* First point of the element on the angle axis. - *α 2[°]:* Second point of the element on the angle axis. - *M 1[Nm]:* First point of the element on the torque axis. - *M 2[Nm]:* Second point of the element on the torque axis.
„Curve1“ „Curve2“	- *To[%]:* The tolerance determines the permissible deviation from the base line of the curve. - *Type:* Specifies whether the evaluation is made horizontally or vertically. The orientation results from the torque curve. (Steep curve , flat curve)
„B-angle upper“ „B-angle lower“	Limits the area which the screw curve may pass through. This can be done either in the table, or directly in the graphic. The uniqueness of this element is that the angle counting refers to the switch-off point. The switch-off point, in this sense, corresponds to the 0°.angle. - *Active:* Checkboxes in order to activate/deactivate the angle monitoring. - *α 1[°]:* First point of the element on the angle axis. - *α 2[°]:* Second point of the element on the angle axis. - *M 1[Nm]:* Defines the torque that the screw curve may not exceed or fall below.

NOTE

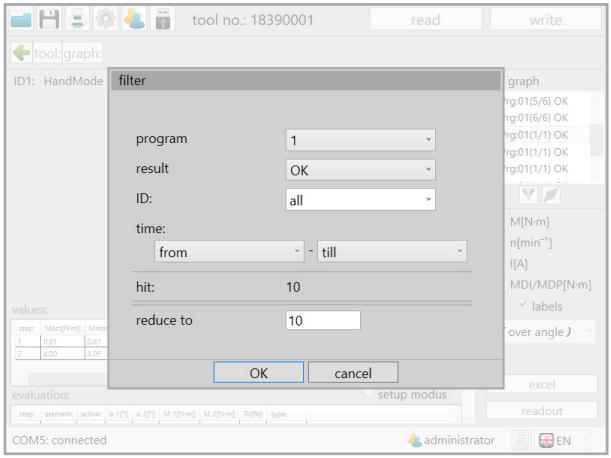
Take into consideration the settings under „setup - graphics - evaluation“. Measurement values not set will not be depicted in the graphic and can not be added.



Within the graphic the programmed steps will also be displayed with different coloured backgrounds.

11.2.3 Filter

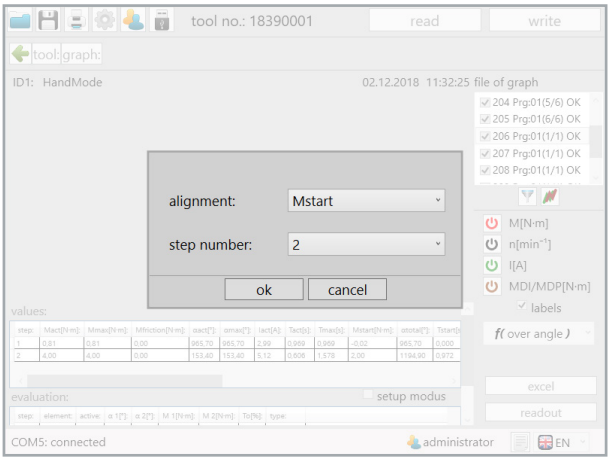
The graphic files read out can also be filtered and superimposed according to different criteria. A pop-up window with the filter options will open using the button with the filter symbol .



98 Filter

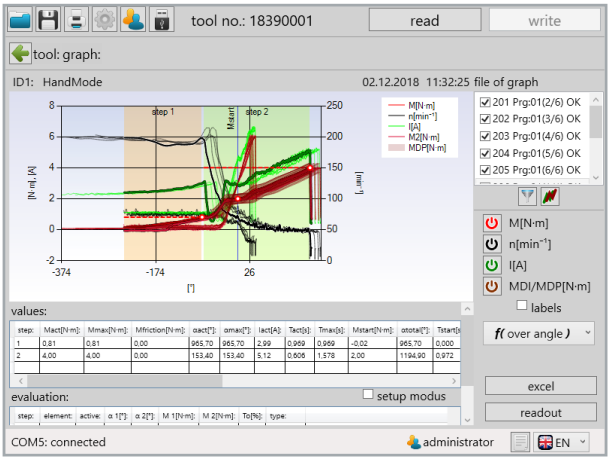
„program“	Filter results by program.
„result“	Filter results by evaluation.
„ID“	Filter results by ID.
„time“	Filter results by time.
„hit“	Number of results found.
„reduce to“	Reduce results found to desired number.

After the filter procedure the button for the curve overlay gets active . The overlay of different graphics data enables an excellent analysis of screw data. So that the decisive points of the screw curve can be compared there is the option of aligning the screw curves with one another.



99 Curve overlay

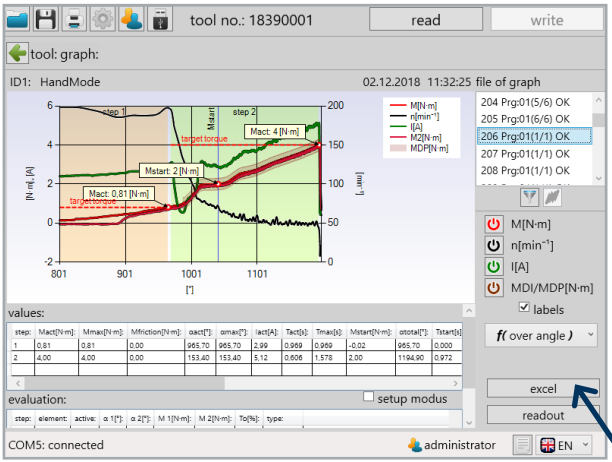
„alignment“	- *M_{start}:* Overlays the selected curves, aligned by the respective starting torque. - *M_{act}:* Overlays the selected curves, aligned by the respective final torque. - *Step begin:* Overlays the selected curves, aligned by the respective beginning of the step. - *Step end:* Overlays the selected curves, aligned by the respective end of the step.
„step number“	Specifies the step number from which the curves will be overlayed.



100 Curve overlay 2

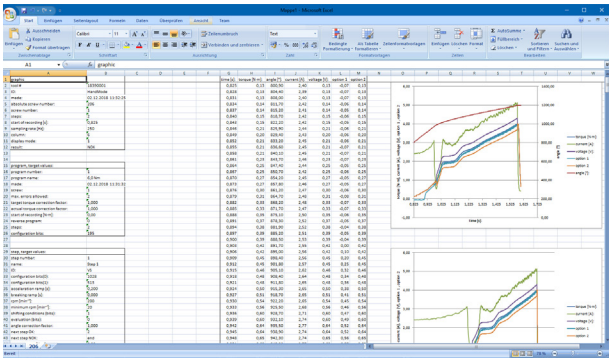
11.3 Excel Export

In order to export the data to Excel you must click on the excel button.



101 Graphic Excel Export

After clicking on the Excel button Excel opens with the corresponding screw connection. At the same time a „save as” window opens in which you can now specify whether to save the file. The file name automatically contains the absolute screw number. However, this can be renamed or added to.



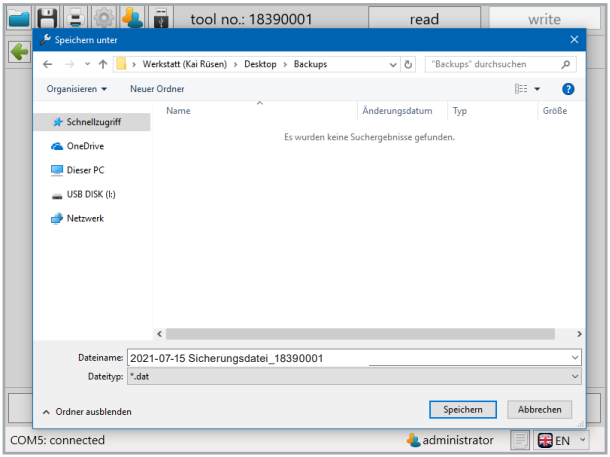
102 Graphic Excel Export 2

12 Saving and loading of parameters

12.1 Saving / loading

In the SmartTool-Manager it is possible to save all configuration data for the tool in an „xml" or „dat" file. The current status of the tool is frozen in the file and can, in this way, be used for analysis. A duplicate of the tool can also be created using this file. Individual programs or Wi-Fi settings can also be copied. In order to save statistics and graphics data as well these must be read out beforehand. Click on the button in the start window. The storage location is displayed, selected the desired storage location and the desired file type (.xml or .dat). Then click save. The file will be stored in your folder.

NOTE
When saving screw results in the .dat format less storage space is required than in the .xml format.



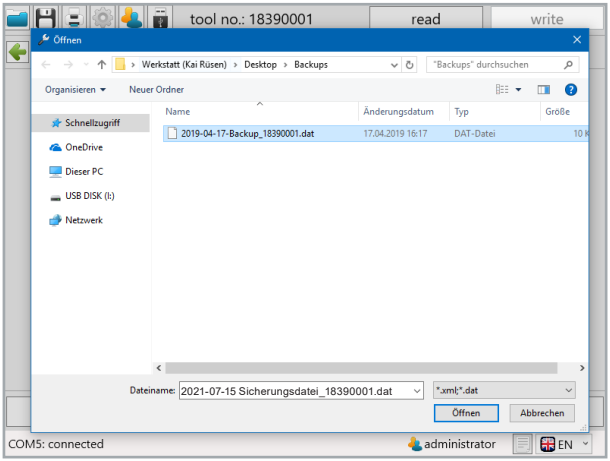
103 Save backup file

12.2 Loading / retrieving

The SmartTool-Manager offers you the option to load complete or individual settings and programs into the tool. For this work you require the administrator user level.
First the tool must be read out, in which changes, an import of files or a restoration is to be completed. Then open the file from which the data is supposed to be overwritten.

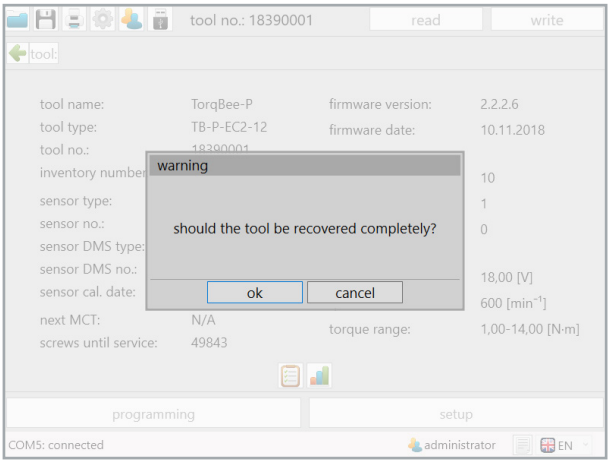
Click on the button in the start window.

The dialogue window for selecting the file will open.



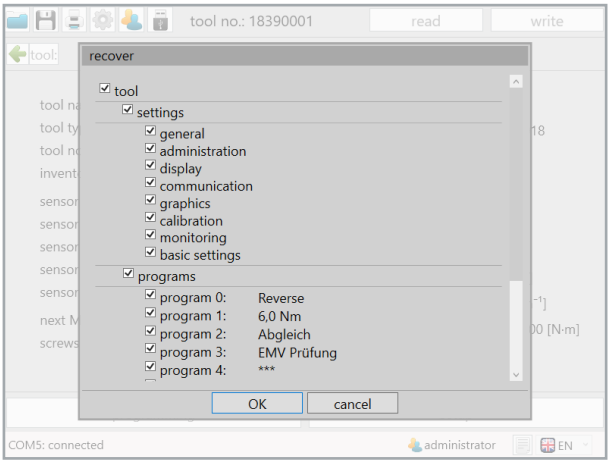
104 Open backup file

Select file and click „open”. A pop-up window will open.



105 Completely restore the tool

If the same serial number is entered in the loaded tool file as in the tool that has been read out the software will recognise this and ask whether the tool should be restored completely. Using the pop-up window you can select whether you want to restore, or import the whole tool or only part of the tool. When you click on „ok” the tool file will be overwritten. If you click „cancel” the import window will open in order to import individual components such as: settings, programs, barcodes or processes.



106 Do not completely restore the tool

If a different serial number from the connected tool is entered in the tool file the import query window will appear. By selecting or deselecting you can load individual data or all data. Then click on „OK“. Then click on the „write“ button. Now the data will be transferred to the tool connected.

13 Service & Calibration

13.1 User group Service

The relevant maintenance employee will decide after how many screw connections service on the tool is necessary.
As soon as that number is reached (e.g. 500,000) the tool will display the service symbol in the display. The tool will automatically be locked and must go for service.
Service should serve as a complete inspection of the tool. Please contact your Bossard contact person to commission the service.

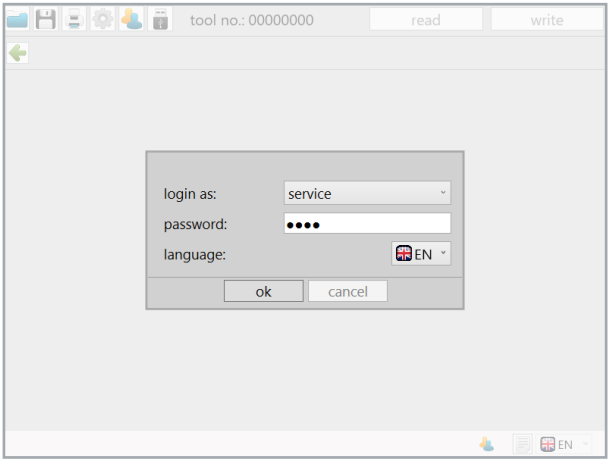
On the display of the tool the „service" symbol will appear when the set service interval has been reached.

On the display of the tool the „MCT" symbol will appear when the set MCT interval has been reached.

The service defined by the maintenance department for this tool must be completed.
For example:
Cleaning, inspection for damage, replacement of defective or damaged parts.

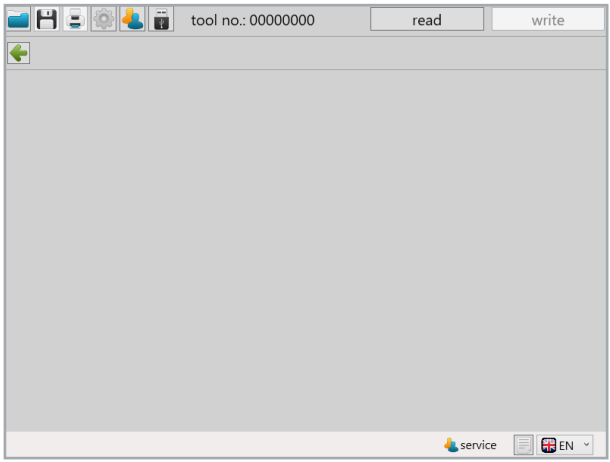
The tool will be connected to the computer via USB. The USB connection for the tool is located in the foot.
In order to select the correct software version the „pc.sw" no. is also specified here, which the required SmartTool -Manager version depicts.

After starting the SmartTool-Manager the user group „service” is selected. To do this you must still enter the password and select the desired language.



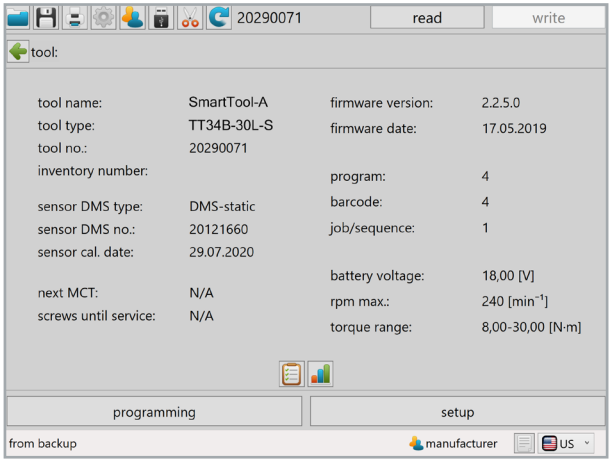
107 Registration Service

The empty start screen appears because no tool has been read yet. With one click on the „read” button the connected tool is read.



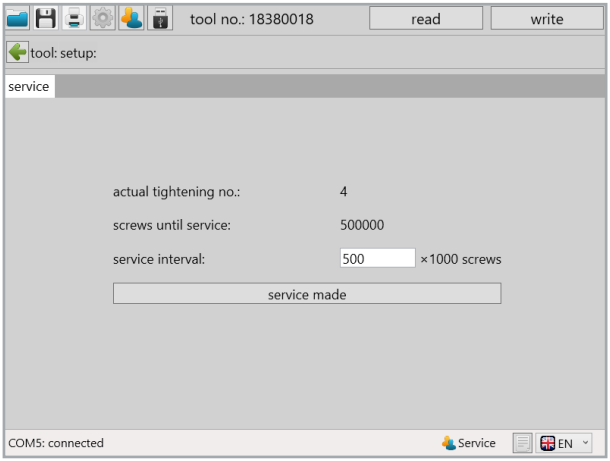
108 Registration Service 2

The tool was successfully read.
Then the „setup” button must be selected.



109 Service read tool

If the „screws until service” is at 0 the tool in the display has already issued the service symbol and locked the tool. The service interval can be individually established. Depending on the requirements of the tool the number of screw connections selected must be higher or lower. The value entered is multiplied by 1,000.

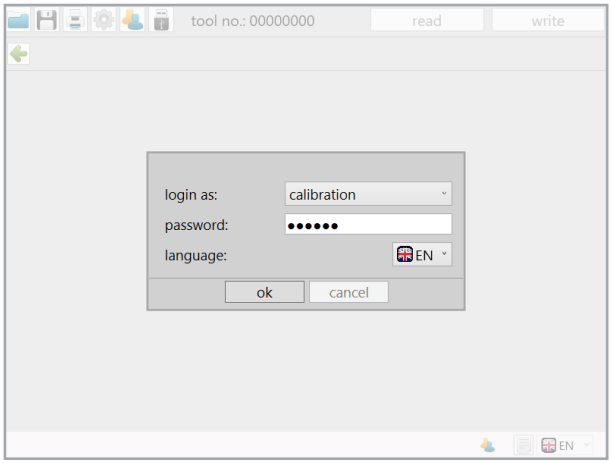


110 Set service interval

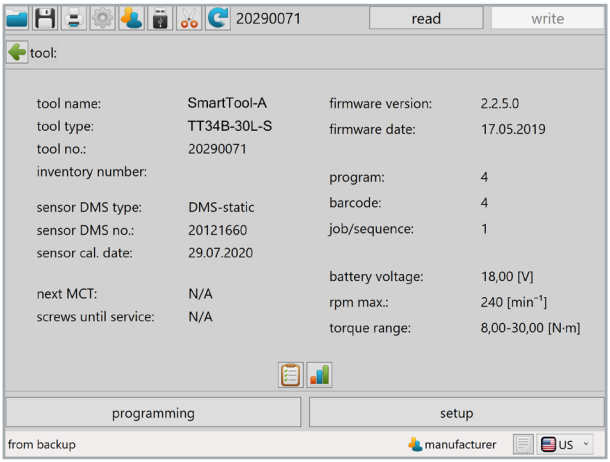
After conducting service work the service interval is reset by clicking the „service made” button.
The screw number until service will be displayed in the overview after reading the tool.

13.2 User group calibration

The relevant maintenance employee will decide after how many days a new MCT on the tool is necessary.
As soon as the days have elapsed the tool will display the MCT symbol. The tool will automatically be locked and must go for maintenance.
Please contact your Bossard contact person to commission the service.



111 Registration calibrator



112 Calibrator read tool

The user group „calibration“ can adjust the programs, barcodes and processes which are required for a tool inspection of MCT under „programming“ as necessary.

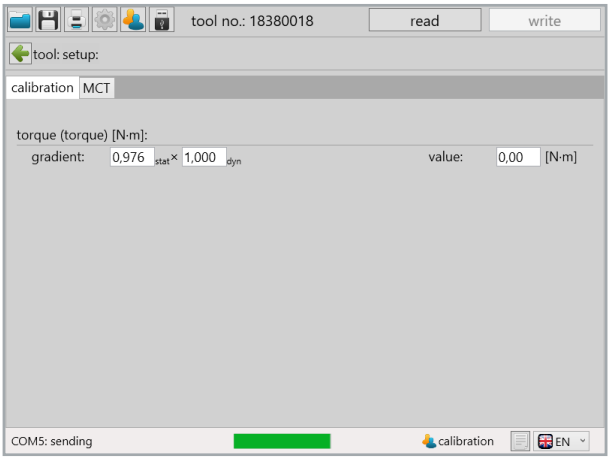
The procedure for creating and changing programs, barcodes and processes is explained here: Programming of programs in Chapter 6 starting on page 58; Programming of barcodes in Chapter 8 starting on page 109; Programming of jobs (sequences) in Chapter 9 starting on page 116.

In addition under „setup“ the interval until the next MCT can be set and the comparison values of the torque sensors can be changed.

DANGER

The comparison tab should only be operated under the supervision of an Bossard employee.

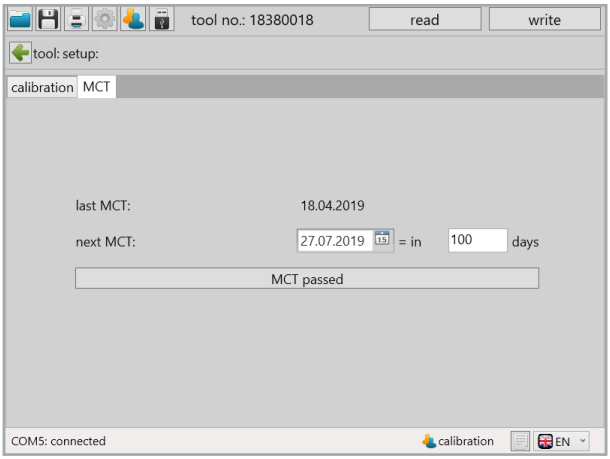
13.3 Tab „Calibration“



113 Calibrator comparison

„gradient static“	This value cannot be changed.
„gradient dynamic“	Correction factor for mechanical friction losses. (e.g. angle head)
„value“	Current torque value recorded by tool.

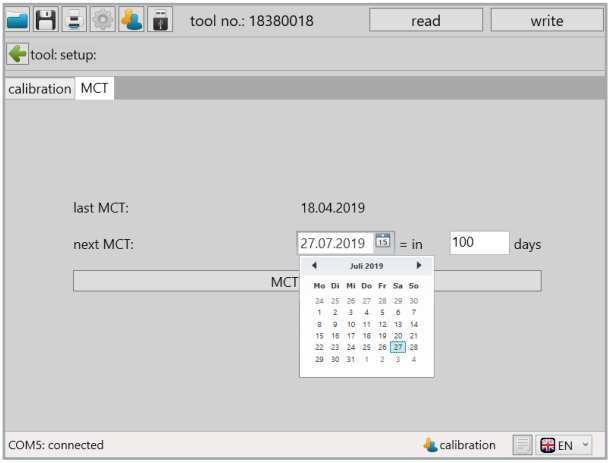
13.4 Tab „MCT“



114 Calibrator MCT

„last MCT“	Provides the date of the last MCT conducted.
„next MCT“	- *Calendar:* Selection for the date of the next MCT using a calendar. - *Direct input:* The date for the next MCT can be entered directly. - *Interval input:* The date for the next MCT is automatically calculated from the current date and the interval specified in days.
„MCT passed“	Resets the interval counter for the MCT.

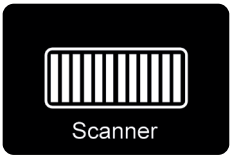
After clicking „MCT passed” the date of the last MCT is set to the current date and the date for the next MCT is determined.



115 Calibrator MCT Calender

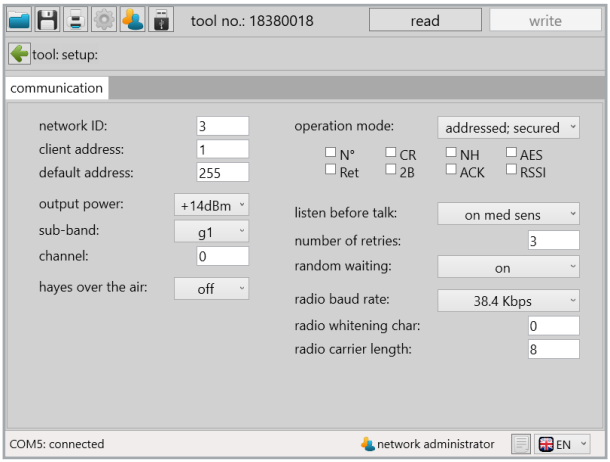
13.5 Integrate tool in the Wi-Fi network using scan function

In order to now scan the network setup barcode you must select scanner on the display. The function of the display is explained in the operating instructions for the tool.



Hold down the start key and align the scan field on the barcode. The tool will confirm a successful scan with a short signal tone and will then display on the screen that it is connecting with the network.

14 Special function RF868



120 RF868

„network ID“	Network identification by controller and tool must match.
„client address“	Address of the tool in the network.
„default address“	Address of the controller in the network.
„output power“	Selection of the output transmission power.
„sub-band“	Frequency band of the tool (must match the controllers).
„channel“	Channel of the tool (must match the controllers).
„hayes over the air“	System-specific setting. Adjust according to specification.
„operation mode“	System-specific setting. Adjust according to specification.
„listen before talk“	System-specific setting. Adjust according to specification.
„number of retries“	Number of the telegram repetition in the event of missing acknowledgement by the controller.
„random waiting“	System-specific setting. Adjust according to specification.
„radio baud rate“	System-specific setting. Adjust according to specification.
„radio whitening char“	System-specific setting. Adjust according to specification.
„radio carrier length“	System-specific setting. Adjust according to specification.

NOTE

Generally the setting of the 868 wireless module takes place with the commissioning of larger projects.
However, should questions still arise please contact your Bossard contact person.

15 Annex and data

15.1 Troubleshooting

Error	Cause	Action
No connection with the tool.	1. No USB cable connected. 2. USB cable not correctly inserted. 3. No driver installed. 4. Firewall blocks connection. 5. Wi-Fi connection lost..	1.Connect cable to tool and PC. 2. Check connection. 3. Install driver. 4. Deactivate firewall Issue release in firewall. 5. Restore Wi-Fi connection, or wait until the tool automatically connects.
Tool does not start after NOK screw connection.	Incorrect setting for NOK evaluation.	Setting under point program - general.
Tool does not start.	1. No program created. 2. Incorrect program set as the default.	1. Setting in the program overview. 2. Setting on the homepage of the program.
No loosening possible.	1. Loosening deactivated. 2. Loosen after screw connection deactivated.	Setting on the homepage of the program.
Tool turns in the wrong direction.	Direction of rotation incorrectly entered.	Setting under step - gear.
Tool switches off too high.	1. Speed too high. 2. Incorrect switch off point entered. 3. Incorrect program activated.	- Setting under step - strategy or program - options. - Setting under „The active program“.
Angle window too high/ low.	Upper and lower limit incorrect.	Setting under step - strategy.
Tool shows crossed out battery symbol in the display and is issuing a warning melody.	Battery too low.	Connect charged battery.
Display off on inserted battery.	Tool is in energy saving mode.	Press the start button.

Engine is getting too hot.	1. Number of revolutions per minute is too low. 2. Soft screw connection on max. torque on tool.	1. Too low of a number of revolutions per minute with high torque lead to overheating of the motor. 2. Check tool programming. 3. Poss. a tool with a higher torque will be necessary.

NOTE

The error search concerns tips which we usually check first. The list is not complete and should only serve as an aid in your own error analysis in order to rule out programming/settings errors.
For a more detailed error analysis please contact service.

15.2 Shortcuts in SmartTool-Manager

Abbreviation	Meaning
I_{act}	Current for tripping torque
M_{act}	Torque value in Nm with which the screw was tightened
M_{limit}	Limit of the torque
M_{max}	$M_{act} + M_{friction}$
$M_{friction}$	Friction coefficient determined (locking torque)
M_{target}	Target value torque
M_{start}	Beginning of the angle counting
T_{total}	Time required for the screw process
T_{act}	Time required for the screw connection
T_{start}	When the step was started
T_{total}	Total time required for the screw connection
TM_{start}	Time the starting torque was achieved (M_{start})
U	Battery voltage in the step
RPM	Number of revolutions in the step
α_{total}	Angle degree after activating the start key
α_{is}	Angle degree with which the screw was tightened
α_{limit}	Limit of the rotation angle
α_{target}	Target value of the rotation angle
α_{Sp}	Angle grade when changing steps

Notes

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The technical data in this printed material provide guidance, but are without guarantee!
We reserve the right to make structural changes. Our construction suggestions are not binding!

08-2021