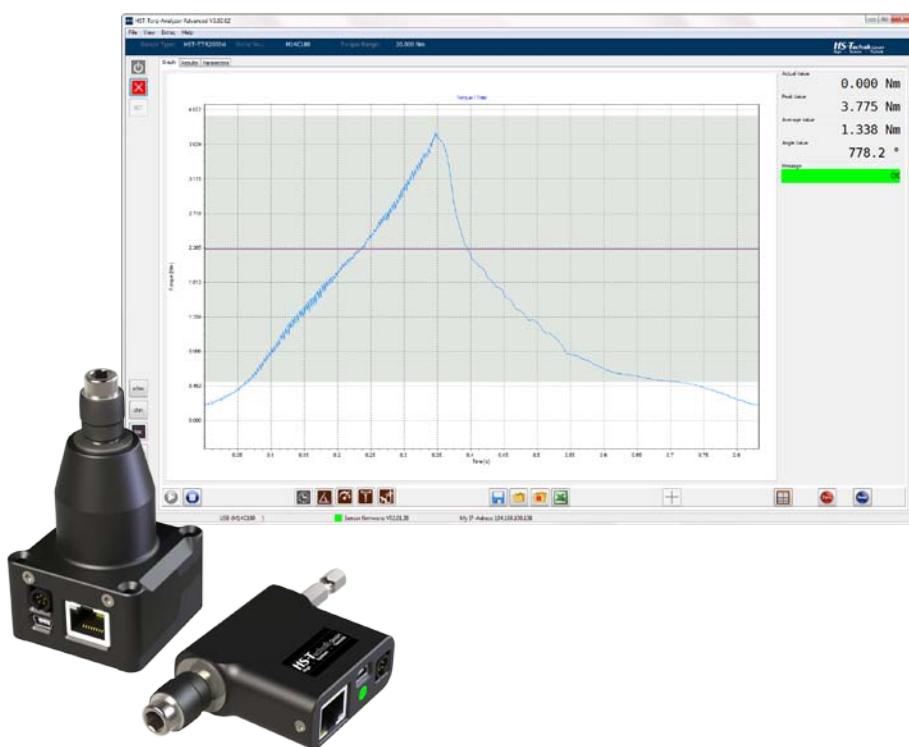


# OPERATING INSTRUCTIONS

# HST-TORQ-ANALYZER

Measurement Visualization & Control Software



**HST-TORQ-ANALYZER | TTR series | TTS series**

Release date: May 2016  
PC-Software: 3.06



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### NOTICE

This warning symbol indicates additional information that will make your work easier.



### WARNING

General warning to prevent operating errors and failures.



### DANGER

This indicates a direct hazard for the worker or the tool. This warning symbol is especially important and must be observed.

## 1. IMPORTANT INFORMATION

---



### **Danger!**

Before you put the tool down, wait until it has come to a complete stop as otherwise, the screwdriver you use can jam and you may lose control of the screwdriver.



### **Danger!**

When tightening and unscrewing screws, high reaction torques may arise. Therefore, always keep a tight grip on the screwdriver.



### **Danger!**

Switch the electrical device off immediately if the tool screwdriver locks up and be prepared for high reaction torques that can cause kickback. The tool locks up when it is overladed or jams in the workpiece.



## 2. GENERAL INFORMATION

---

### 2.1.0. IMPORTANCE OF THE OPERATING INSTRUCTIONS

This information was written with the intention of being read, understood and complied with in all points by persons responsible for the operation of the HST-TTR & HST-TTS series (hereinafter referred to as the tool).

Prior to start-up, please read the operating instructions and comply with the safety instructions. Work station faults can only be prevented if the contents of these operating instructions are known and fault-free operation can be ensured.

We are not liable for damages and operational errors that result from non-compliance with these operating instructions. If difficulties arise nonetheless, please contact us and we will gladly provide assistance.

### 2.2.0. PROPER INTENDED USE

The tool may only be used, as described in these instructions, to check the adjusted torque of a screwdriver.



#### NOTICE

Proper intended use also includes:

- complying with all instructions in the operating instructions
- complying with the inspection and maintenance work.

Any other use beyond this is not considered proper intended use. HS-Technik GmbH is **not** liable for any damages resulting from non-compliance.

### 2.3.0. IMPROPER USE

We are not liable for damages and operational errors that result from non-compliance with these operating instructions or improper use.



#### **2.4.0. GUARANTEE AND LIABILITY**

Guarantee and liability claims for personal and material damages are excluded if they can be traced back to one or more of the following causes:

- improper use
- improper assembly, start-up, operation and maintenance
- operating the tool with defective safety equipment or improperly installed or non-functioning safety and protective equipment
- non-compliance with the instruction in the operating instructions pertaining to transport, storage, assembly, start-up, operation and maintenance of the tool
- unauthorized structural modifications to the tool
- improper repair
- catastrophes caused by foreign bodies and force majeure



## 2.5.0. COPYRIGHT

These operating instructions are only for the operator and its personnel.

They contain the regulations and instructions, which may neither be completely nor partially

- reproduced
- edited or
- otherwise published.

The copyrights to these operating instructions remain with HS-Technik GmbH.

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## **3. BASIC SAFETY INSTRUCTIONS**

---

### **3.1.0. NOTICES IN THE OPERATING INSTRUCTIONS**

- The basic requirement for safe and proper use and fault-free operation is knowledge of the basic safety instructions and safety regulations.
- In addition, the rules and regulations for the place of use must be followed.

### **3.2.0. OPERATOR'S RESPONSIBILITY**

The operator is obligated to only allow persons to work with this tool who are familiar with the basic regulations for work safety and accident prevention and are trained in how to use the tool. Safety-conscious work of the personnel must be checked at regular intervals.

#### **3.2.1. PERSONNEL'S RESPONSIBILITY**

All persons working with this tool are obligated to comply with the basic regulations for work safety and accident prevention prior to starting work.

#### **3.2.2. PERSONNEL TRAINING**

Only trained and qualified personnel may work with this tool. The responsibilities of the personnel for the assembly, start-up, operation, maintenance and servicing must be clearly defined. Personnel-in-training may only operate the machine in the presence of an experienced person.

### **3.3.0. RISKS WHEN WORKING WITH THE TOOL**

Faults that may hinder safety must be immediately rectified.

**WARNING**

The tool was built in accordance with the state of the art in technology and the approved safety regulations. Still, when using it, risks to life and limb of the user or third parties or other material assets may arise.

**WARNING**

Only use the tool

- for the proper intended use
- in working order with regards to safety

**3.4.0. ACCESS****WARNING**

The tool must be kept closed at all times. Access is only permitted for the manufacturer.



### **3.4.1. WORKPLACE SAFETY**

**a) Keep your workspace clean and well lit.**

Disorder or poorly lit workspaces can lead to accidents.

**b) Take environmental influences into account.**

Never subject tools to rain.

Do not use tools in moist or wet environments.

**d) Keep other persons away from tool while in use.**

If you are distracted, you can lose control of the device.

### **3.4.2. ELECTRICAL SAFETY**

**a) Avoid physical contact with grounded surfaces such as pipes, heaters, etc..**

There is an increased risk of electrical shock if your body is grounded.

**b) Keep the device away from rain or moisture.**

Water penetrating into the tool increases the risk of an electrical shock.

**c) Keep the tool away from heat, oil, sharp edges or moving device parts.**



### 3.4.3. PERSONAL SAFETY

**a) Be careful, pay attention to what you are doing and use power tools responsibly.**

Do not use the tool when you are tired or under the influence of drugs, alcohol or medication.

One moment of carelessness when using the tool can lead to severe injuries.

**b) Wear personal safety equipment and always wear protective eyewear.**

Wearing protective safety equipment such as a dust mask, safety shoes, a protective helmet and hearing protection, depending on the type and use of the tool, decreases the risk of injuries.

**c) Avoid non-ergonomic posture.**

Make sure you are standing stably and always maintain your balance. You can then control the power tool in unexpected situations.

**d) Wear suitable clothing.**

Do not wear loose clothing or jewelry. Keep your hair, clothing and gloves away from moving parts. Loose clothing, jewelry or long hair can get caught in moving parts.

### 3.4.4. USING AND HANDLING THE TOOL

**a) Do not overload the tool.**

Use the proper tool for your work. You work better and more safely in the defined input range when using the proper tool.

**b) Store unused tools out of reach of children.**

Do not allow persons to use the device who are not familiar with it or have not read these instructions.

**c) Take good care of the power tool.**

Check that moving parts work properly and do not jam, that there are no broken or damaged parts and that the functionality is not hindered. Have damaged parts repaired prior to using the device. Many accidents are caused by poorly maintained tools.



**d) Keep the tools clean.**

Carefully maintained tools jam less often and are easier to use.

**e) Use the right tool**

Do not use low-input tools for heavy loads. Do not use the tool for purposes and work for which it is not intended.

**f) Check your tool for damage**

Prior to further use of the tool, the safety equipment or damaged parts must be inspected to ensure proper functionality.

Check to ensure the functionality of moving parts, that they don't jam, that no parts are broken and that all parts are properly and correctly installed and all conditions required for the operation of the device have been fulfilled.

Damaged safety equipment and parts should be properly repaired or replaced by a customer service workshop unless otherwise indicated in the operating instructions.

### **3.4.5. SERVICE**



**NOTICE**

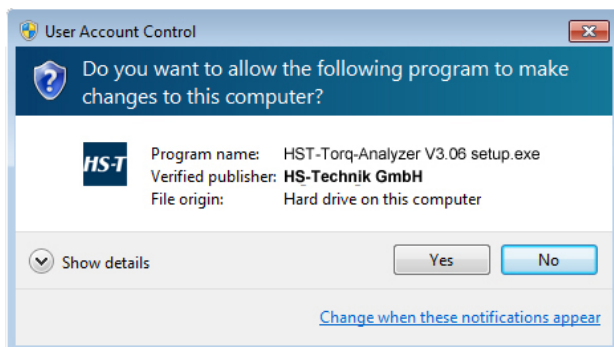
Only allow your device to be repaired by a qualified technician using only original spare parts, available from HS-Technik GmbH. This ensures that the safety of your device is maintained.



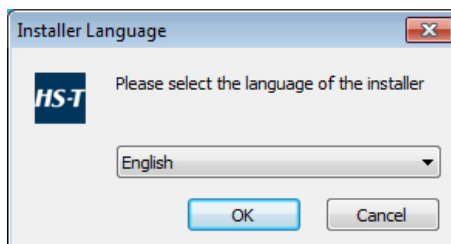
## 4. SOFTWARE INSTALLATION

### 4.1.0. INSTALLATION UNDER WINDOWS 7

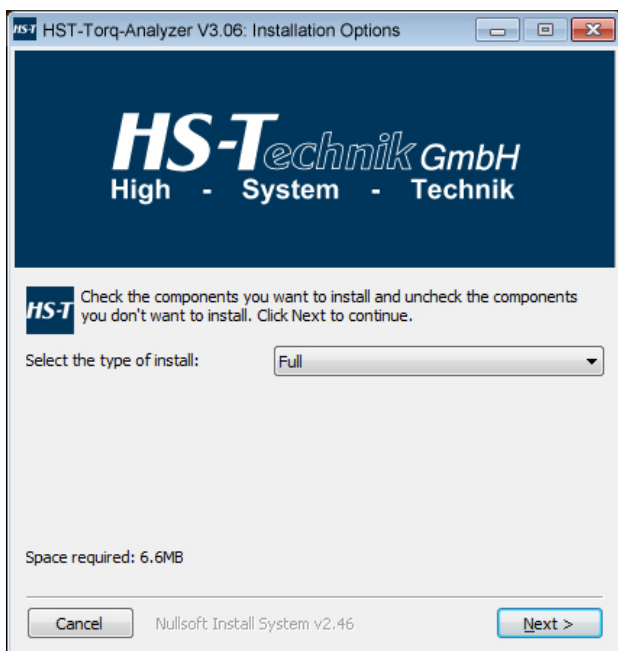
- Before installing the software, connect your intelligent HST-TTR, HST-eTTR or HST-TTS transducer (i- or u-version) to your PC system via USB.
- The message "Device was not successfully installed" might show up for a couple of seconds. This is normal, as the driver has not been installed until now.
- Start the installation of HST-Torq-Analyzer by clicking the setup file (HST-Torq-Analyzer\_V3\_06\_08\_setup) from your media. Click Yes in the following dialog:

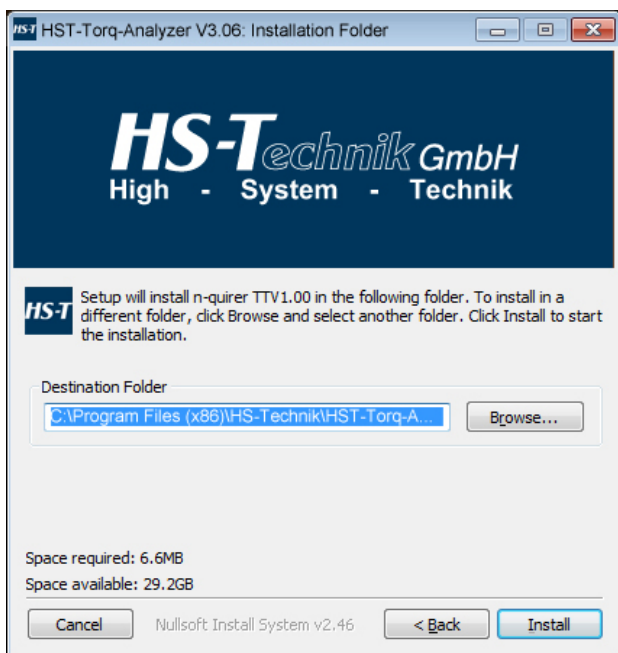


- Chose the language in the drop down menu and click OK.

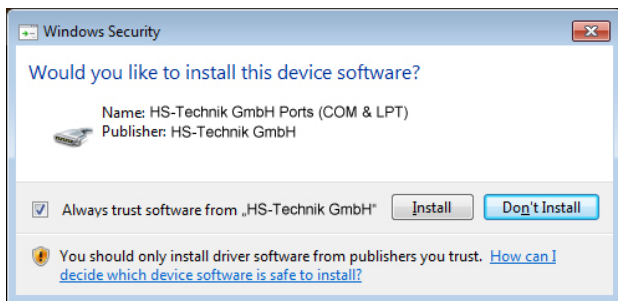


- Chose the type of installation. Full installation is recommended. Click NEXT.





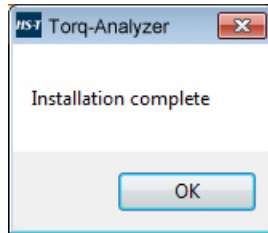
- Chose the installation folder. The software will suggest a default which can be changed. Then, click Install.
- Set the flag at "Always trust software from HS-Technik GmbH" and click Install in the following window:







- The installation will be finished successfully when the following message is shown:

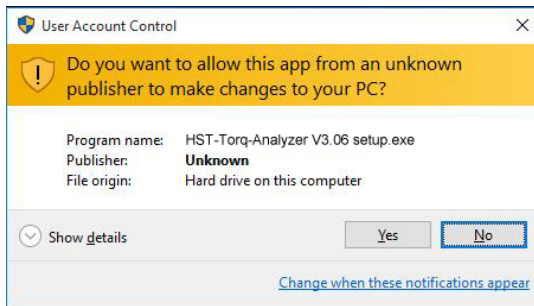


- You will now find the HST-Torq-Analyzer icon on your desktop.

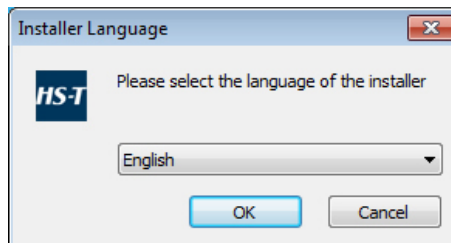


## 4.2.0. INSTALLATION UNDER WINDOWS 10

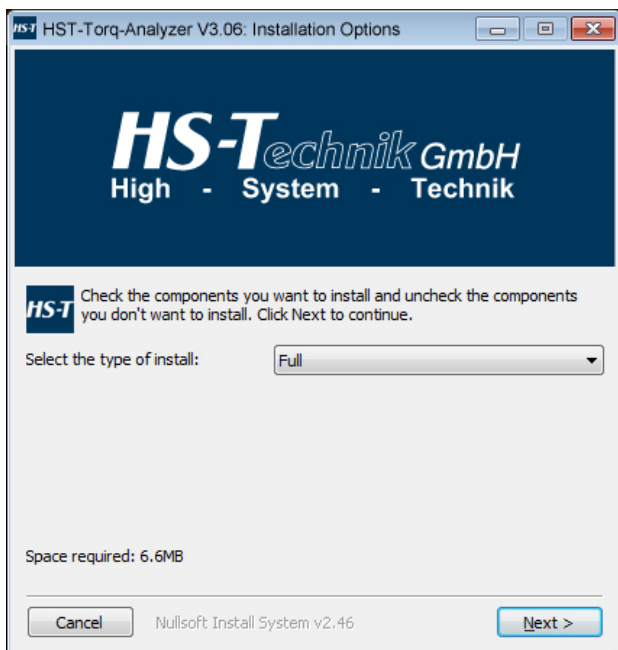
- Before installing the software, connect your intelligent HST-TTR, HST-eTTR or HST-TTS transducer (i- or u-version) to your PC system via USB.
- Start the installation of HST-Torq-Analyzer by clicking the setup file (HST-Torq-Analyzer\_V3\_06\_08\_setup) from your media. Click on 'Yes' in the following dialog, to allow the installation on your computer system.

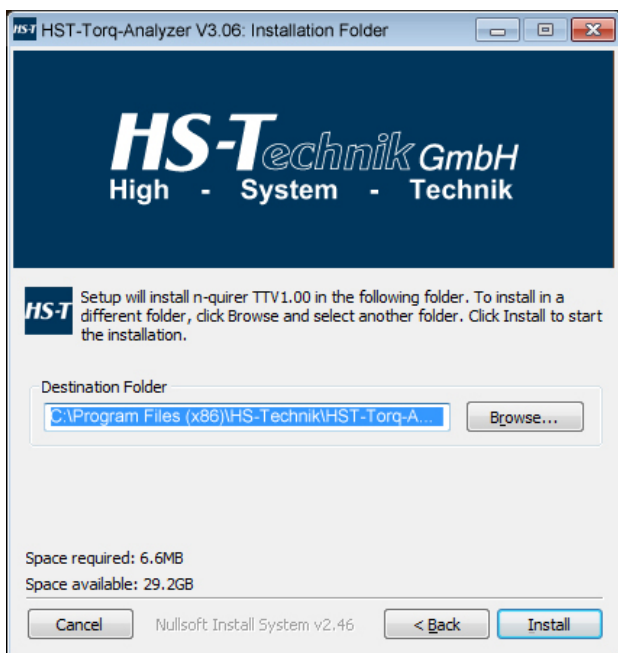


- Chose the language in the drop down menu and click OK.

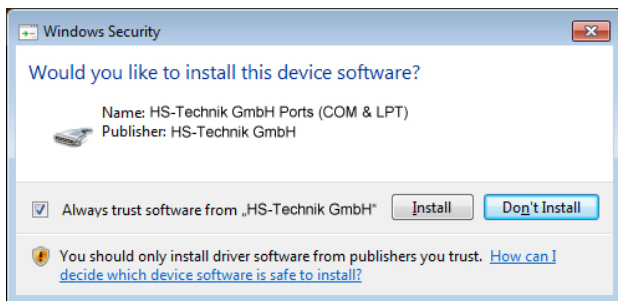


- Chose the type of installation. Full installation is recommended. Click NEXT.



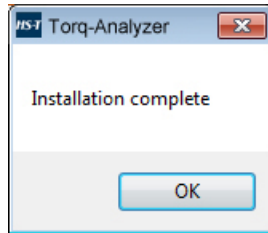


- Chose the installation folder. The software will suggest a default which can be changed. Then, click Install.
- Set the flag at "Always trust software from HS-Technik GmbH" and click Install in the following window:





- The installation will be finished successfully when the following message is shown:



- You will now find the HST-Torq-Analyzer icon on your desktop.



### 4.3.0. REGISTRATION

After having started the HST-Torq-Analyzer software for the first time, you will be requested to execute the online registration of your license. If you have access to the internet, you can directly fill the form. The serial number and your complete address are required. The hardware-ID of your PC system will be automatically calculated and displayed.

Demo

**HST-technik GmbH**  
High - System - Technik

Please Register the software

Register via Internet | Register via Web-Browser | Register by Mail

Serial Number.

Hardware-ID: 17592

Name:

Family Name:

Company:

Street:

ZIP/City:

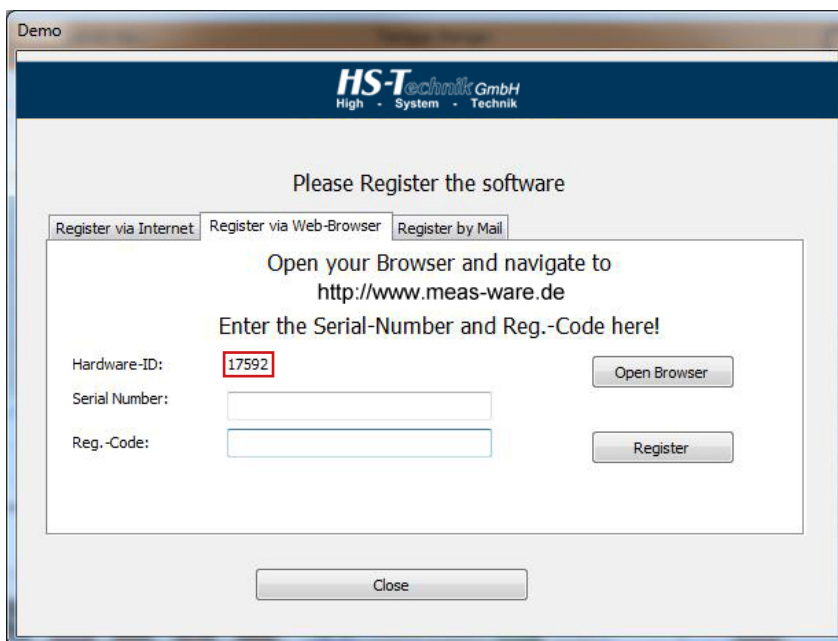
Country:

E-Mail:

Register via Internet

Close

As an alternative, you can register the software on another computer which is connected to the internet. For the registration process, you need the software serial number and the hardware ID of the computer on which the software has been installed. You can find the hardware ID on the second tab sheet 'Register via Web-Browser'.



Demo

**HST-Technik GmbH**  
High - System - Technik

Please Register the software

Register via Internet   Register via Web-Browser   Register by Mail

Open your Browser and navigate to  
<http://www.meas-ware.de>  
Enter the Serial-Number and Reg.-Code here!

Hardware-ID: 17592   Open Browser

Serial Number:

Reg.-Code:    Register

Close

Open the Site <http://www.meas-ware.de> on your web browser and enter the serial number of the software from your license document and your hardware-ID along with your address data.

After this, copy serial number and the generated register code into the 'register via Web-Browser' dialog of HST-Torq-Analyzer.

If you only have the demo version, you can use the limited demo mode after the waiting time has elapsed.



## 5. GENERAL OVERVIEW

---

HST-Torq-Analyzer is as software designed for Torque/Force and, if available, Angle/Displacement, Speed and mechanical Power. It combines the graphical visualization of curve progressions with the possibility to control adjustable torque-/force windows as well as angle/displacement windows.

### 5.1.0. FEATURES

- Recording of torque/angle, torque/time, force/time and force/displacement curves.
- Additional display of the speed progression vs. time or angle/displacement (HST-Torq-Analyzer Advanced only)
- Additional display of the mechanical power progression vs. time or angle/displacement (HST-Torq-Analyzer Advanced only)
- Additional display of a second torque/force progression vs. time or angle/displacement (n-clude mode). For this function, a second intelligent transducer from HS-Technik is necessary.
- Direct transducer connectivity via USB or Ethernet
- Adjustable data output rate from 2 to 2.000 samples per second
- Supported physical units:

Torque	Force
mNm	mN
cNm	cN
Nm	N
In.Oz	kN
In.lbs	lbf
Ft.lbs	ozf
kgf.cm	gf
kgf.m	kgf

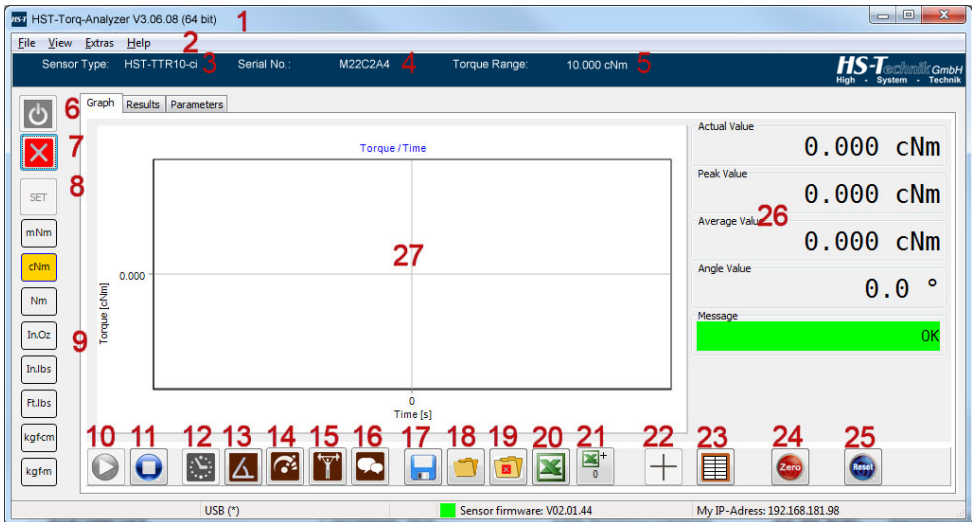
- 2 adjustable limit value ranges with internal or external triggering
- Angle/displacement limit range
- Recording of graphs and results depending on trigger settings
- Measurement results listing function with direct export to Excel
- Cursor function (HST-Torq-Analyzer Advanced only)



- Selection of parameter sets and export functionality using a barcode scanner (HST-Torq-Analyzer Advanced only)
- Supported operation systems: Windows Vista, Windows 7, Windows 8, Windows 10

## 5.2.0. THE MAIN WINDOW

HST-Torq-Analyzer shows the following items on the main screen:



1. In the header: The HST-Torq-Analyzer Software Release Number
2. The Pull Down Menu
3. Type of the connected transducer
4. Serial number of the connected transducer
5. Measurement range of the connected transducer
6. The 'Connect' button to establish data communication between transducer and PC
7. The 'Disconnect' button to disable the communication
8. The 'Set' button to reach the program settings dialog
9. The torque unit selection group. The available units can be configured in the program settings dialog.
10. The 'Start Recording' button to record graphs



11. The 'Stop Recording' button
12. The 'Torque/Time' button
13. The 'Torque/Angle' button
14. The 'Speed' button
15. The 'Power' button
16. The 'n-clude' button to view an additional Torque/Force graph
17. The 'Save to file' button to save a diagram into a file
18. The 'Load from file' button to load a stored diagram
19. The 'Delete' button to wipe a loaded graph
20. The 'Export' button to export the shown diagram to Excel
21. The 'Export+' button to add a graph to the export stack. All graphs in the stack can be exported to excel using the 'Export' button.
22. The 'Cursor' to show a cursor in the diagram
23. The 'Result window' button to show an addition window with results
24. The 'Zero' button to set the reset the offset of the connected transducer
25. The 'Reset' button to clear the peak and average values and to wipe the diagram
26. The result block. The shown values can be configured in the program settings.
27. The diagram window

## 6. SOFTWARE CONFIGURATION

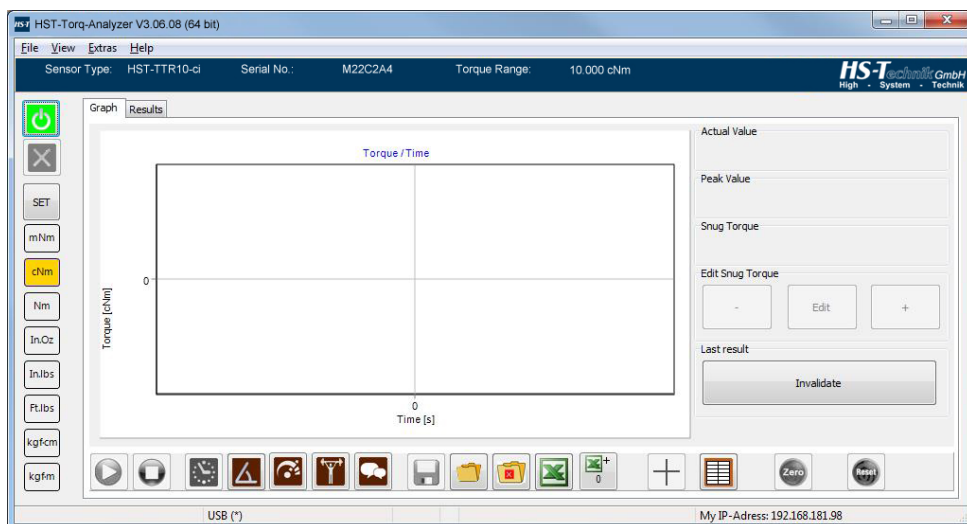
### Remark:

Please note that the Menu and the **General Parameters** affect HST-Torq-Analyzer directly.

The **Control Mode Parameters**, the **Communication Parameters**, and the **Signal Conditioning Parameters** affect the transducer connected and can be stored permanently in the transducer's memory, by clicking the "**Save to Transducer**" button.



### 6.1.0. THE MENU





The Menu contains 4 items:

## 6.1.1. FILE MENU

### 6.1.1.1 EXIT

To quit the program.

### 6.1.1.2 SETTINGS

To configure the HST-Torq-Analyzer software. The settings dialog is only available before the connection to a transducer has not been established. The settings dialog is also reachable via the 'Set' button on the graph tab sheet.

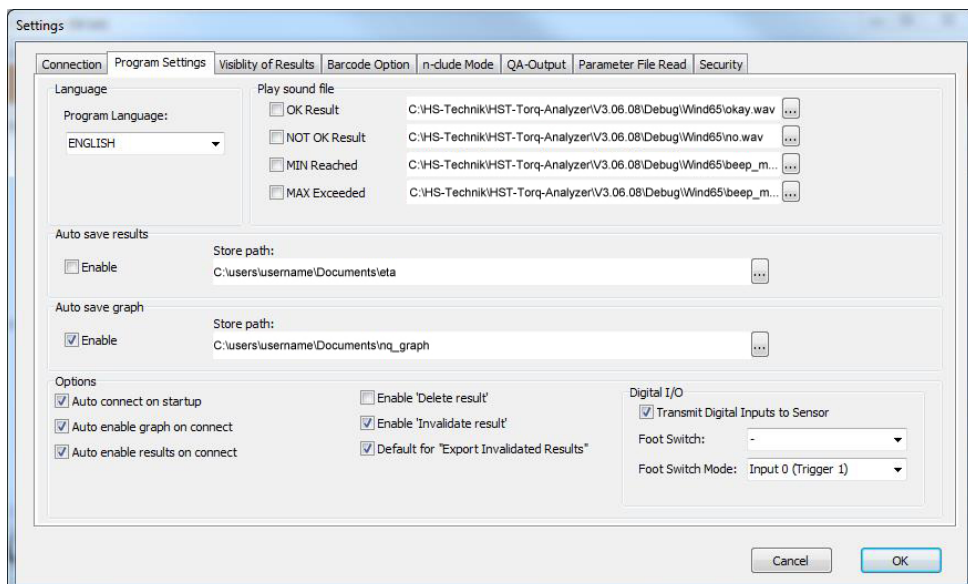
#### Connection

By default the connection via USB is set. If more than one sensor is connected to the PC, the active sensor can be selected using the 'USB-Port' drop-down field.

Before you can use the communication via Ethernet, please make sure that the IP configuration has been set up by your IT system administrator.

## Program settings

In this tab sheet, the basic behavior of HST-Torq-Analyzer can be set.



- **Language**

Here you can set the language of the HST-Torq-Analyzer program

- **Play sound file**

Here you can set or activate the sound files, which are played on different occasions:

1. **OK-Result:** If the last measurement was OK, i.e. the peak value was within the set limits of the control window.
2. **Not OK Results:** If the last measurement was not OK, i.e. the peak value was not within the set limits of the control window.
3. **MIN Reached:** If the actual value has reached the lower limit of the control window. This can be used as an electronic torque wrench.



**4. MAX Exceeded:** If the actual value has exceeded the upper limit of the control window. If the transducer is used as an electronic torque wrench, this can be used as a 'Not OK' signal.

- **Auto save results**

If this option is activated, all results are saved automatically in a text file. You can select the store path the file is written to. A separate file is written for every day and every transducer. If the file already exists, new results will be appended. The file name is built using the following scheme:

xxxxxxx\_YYYY-mm-dd.txt  
xxxxxxx = Serial number of the used transducer  
YYYY = Year  
mm = Month  
dd = Day

- **Auto save results**

If this option is activated, all graphs are saved automatically in the selected folder. The format of the files is the HST-Torq-Analyzer format (.nqg). The file name of the saved graphs is built using the following scheme:

xxxxxxx\_YYYY-mm-dd\_hh-nn-ss.nqg  
xxxxxxx = Serial number of the used transducer  
YYYY = Year  
mm = Month  
dd = Day  
hh = Hour in the 24-Hour-Format  
nn = Minute  
ss = Second

- **Options**

The following options are available:

- 1. Auto connect on startup**

If you activate this option, HST-Tool-Manager will automatically connect to the selected transducer after starting the HST-Torq-Analyzer software.



## **2. Auto enable graph on connect**

If you activate this option, the graph recording will start automatically after connection to the transducer, without clicking the 'Start Recording' button.

## **3. Auto enable results on connect**

If you activate this option, the result recording will start automatically, without clicking the 'Start results' button.

## **4. Enable 'delete results'**

If you activate this option, you can delete single results in the results list using the context menu.

## **5. Enable 'invalidate results'**

If you activate this option, you can invalidate single results in the results list using the context menu.

## **6. Default for 'export invalidated results'**

If you activate this option, the 'Export Invalidated Results' checkbox while exporting results to excel is activated by default.

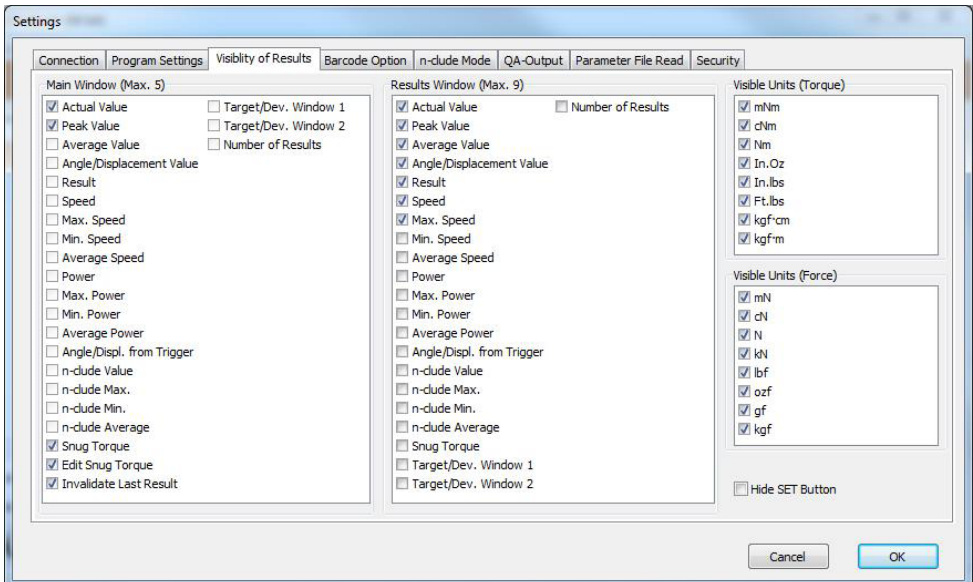
## **7. Digital I/O**

- **Transmit digital inputs to sensor**  
This option activates the 'I/O Emulation' in the I/O status window. If you use an HST-TTR, HST-eTTR or HST-TTS I/O Adapter, do not activate this function.
- **Foot Switch**  
Here you can select an optional foot switch.
- **Foot Switch Mode**  
Here you can select the functionality the foot switch.
  - **Input 0 (Trigger 1)**  
The foot switch emulates the digital input 0, i.e. activation of trigger signal 1
  - **Input 1 (Trigger 2)**  
The foot switch emulates the digital input 1, i.e. activation of trigger signal 2.
  - **Add Excel Graph**  
The foot switch will have the same functionality as the 'Export+' Button, i.e. it will add a graph to the export stack.



## Visibility of results

In this tab sheet you can select which results and units are visible.



- **Main window**

Here you can choose from a selection which results will be visible at the graph window on the right side. You can select up to of 5 results from the list.

- 1. Result window**

Here you can select, which results are visible in the Additional Results Window. The Additional Results window can be opened using this button:



- 2. Visible units (Torque)**

With this setting you can setup the selectable torque units. If you only work with metric units for example, you can hide the imperial units.



### 3. Visible units (Force)

With this setting you can setup the selectable force units. If you only work with metric units for example, you can hide the imperial units.

### 4. Hide SET Button

With this option you can select, if the SET button is visible in the main window.

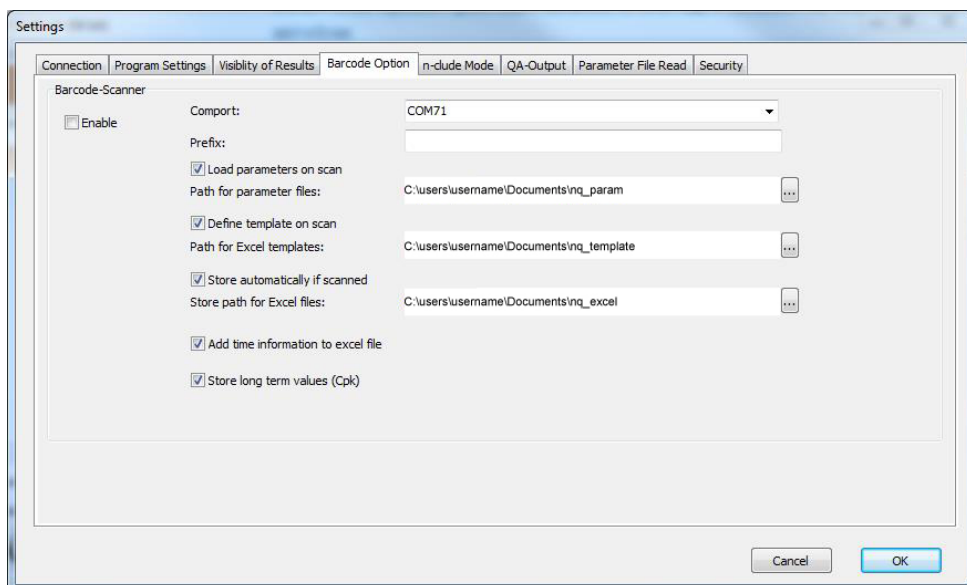
## Barcode-Option

In this tab sheet you can adjust the settings for an optional barcode scanner. The preferred choice are Datalogic handheld scanners type 'Touch'.



### NOTICE

The barcode option is available in the HST-Torq-Analyzer Advanced version only.



The screenshot shows the 'Settings' dialog box with the 'Barcode Option' tab selected. The 'Barcode-Scanner' section has an 'Enable' checkbox. Below it, there are several settings:

- Comport: COM71 (dropdown menu)
- Prefix: (empty text field)
- ☒ Load parameters on scan
- Path for parameter files: C:\users\username\Documents\inq\_param (text field with browse button)
- ☒ Define template on scan
- Path for Excel templates: C:\users\username\Documents\inq\_template (text field with browse button)
- ☒ Store automatically if scanned
- Store path for Excel files: C:\users\username\Documents\inq\_excel (text field with browse button)
- ☒ Add time information to excel file
- ☒ Store long term values (Cpk)

At the bottom right are 'Cancel' and 'OK' buttons.



The following options are available:

- **Enable**  
With this option, you can enable or disable the scan function.
- **Comport**  
Please select the comport of the connected barcode scanner. A connected USB scanner should be set to USB-COM (Com port emulation).
- **Prefix**  
Here you can enter an optional prefix, which will be written to the 'Part / Tool No' in front of the scanned code.
- **Load parameters on scan**  
If you activate this option, HST-Torq-Analyzer will try to open a parameter file with the same file name as the scan code. If the corresponding file is not available, an error message will be displayed.  
The path, where the parameter file is searched for, can be selected. E.g. if you scan a barcode '13-0001', HST-Torq-Analyzer will try to open a parameter file named '13-0001.ntp'.
- **Define template on scan**  
If this option is activated, an excel template is automatically selected. E.g. if you scan a barcode '13-0001', HST-Torq-Analyzer will try to use 13-0001.xls as template for the export of results.
- **Store automatically if scanned**  
If this option is activated, the dialog for the export filename is omitted. Instead the file is automatically stored in the selected path. The file name is built of the scan code and the actual date.
- **Add time information to excel file**  
Normally, when exporting an excel file, the file name is built of the scan code and the actual date. If you perform multiple measurements with the same scan code on one day, you can optionally add the time to file name, if you activate this option.

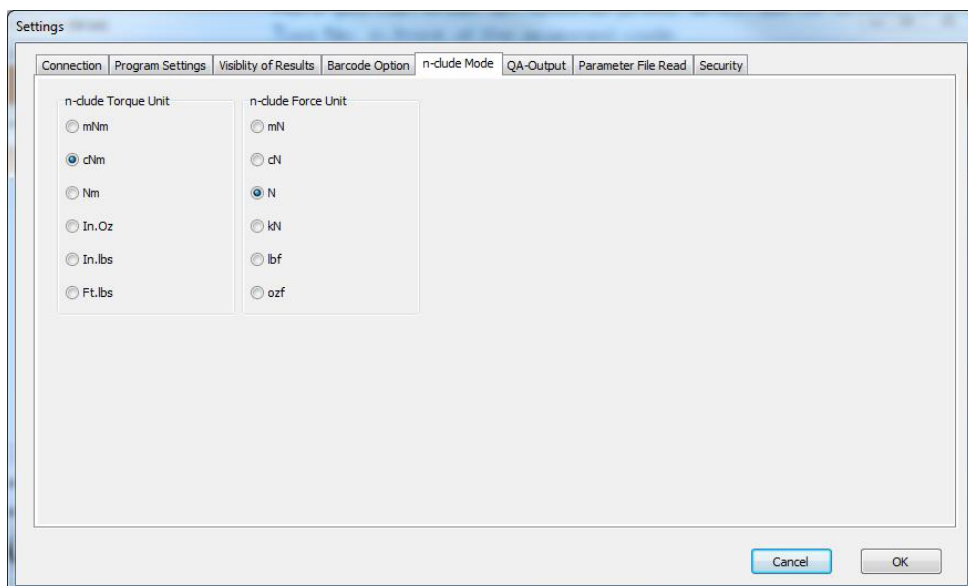


- **Store long term values (Cpk)**

If you activate this option, the measured results are still available after closing HST-Torq-Analyzer. If you scan the same code again, the former values are filled automatically to the result list. So you have the possibility to perform a long term investigation. The deletion of the values can be done manually only.

### n-clude Mode

The n-clude mode offers the possibility to interconnect 2 Torque- / Force-transducers and to record both graphs simultaneously. The 'Main' sensor is connected directly to the PC, via USB or Ethernet, the 'Aux' transducer is connected through a connection cable via RS-485 to the 'Main' transducer. Here you can select between the torque and force units for the 'Aux' transducer:





## QA-Output

In this tab sheet you chose the QS-Stat-compatible data format according to the specification from Q-DAS

Settings

Connection | Program Settings | Visibility of Results | Barcode Option | n-clude Mode | **QA-Output** | Parameter File Read | Security

QA-Output Path

C:\users\username\Documents

☒ Use Comment as sub directory

Output Format

☒ DFQ-Format ☐ DFD/DFX-Format

QA Output Values

<input checked="" type="checkbox"/> Max. Torque/Force	<input checked="" type="checkbox"/> Min. Speed	<input checked="" type="checkbox"/> Max. n-clude Value
<input checked="" type="checkbox"/> Min. Torque/Force	<input checked="" type="checkbox"/> Avg. Speed	<input checked="" type="checkbox"/> Min. n-clude Value
<input checked="" type="checkbox"/> Avg. Torque/Force	<input checked="" type="checkbox"/> Max. Power	<input checked="" type="checkbox"/> Avg. n-clude Value
<input checked="" type="checkbox"/> Angle	<input checked="" type="checkbox"/> Min. Power	<input checked="" type="checkbox"/> Angle from Trigger
<input checked="" type="checkbox"/> Max. Speed	<input checked="" type="checkbox"/> Avg. Power	

Cancel OK

- **QA-Output Path**

Here you can select, to which folder the QA data should be written to.

- **Use Comment as sub directory**

If this option is activated, the content of the 'Part-/Tool No.' field will be used to create and use a subdirectory within the above path. If the option is not activated, the data is written directly in above path.

- **Output format**

With this option you can select, if the data is written in the combined DFQ format, or as separate DFD and DFX file. Please read in the user's manual of your QA software, which format you need.

- **QS Output Values**

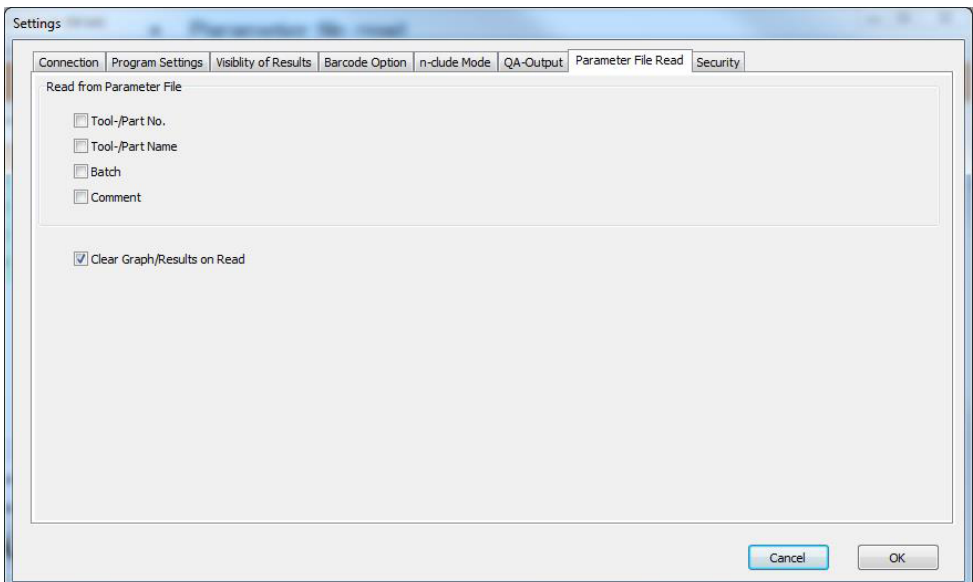
Here you can select, which values should be written to the QA output file.

**NOTICE**

The QA output option is available in the HST-Torq-Analyzer Advanced version only.

### Parameter file read

In this tab sheet you can chose the behavior of HST-Torq-Analyzer on opening a parameter file.



- **Read from Parameter File**

With the here mentioned option you can select, which values should be read from the opened parameter file. If a single option is not activated, the corresponding field will remain blank instead.

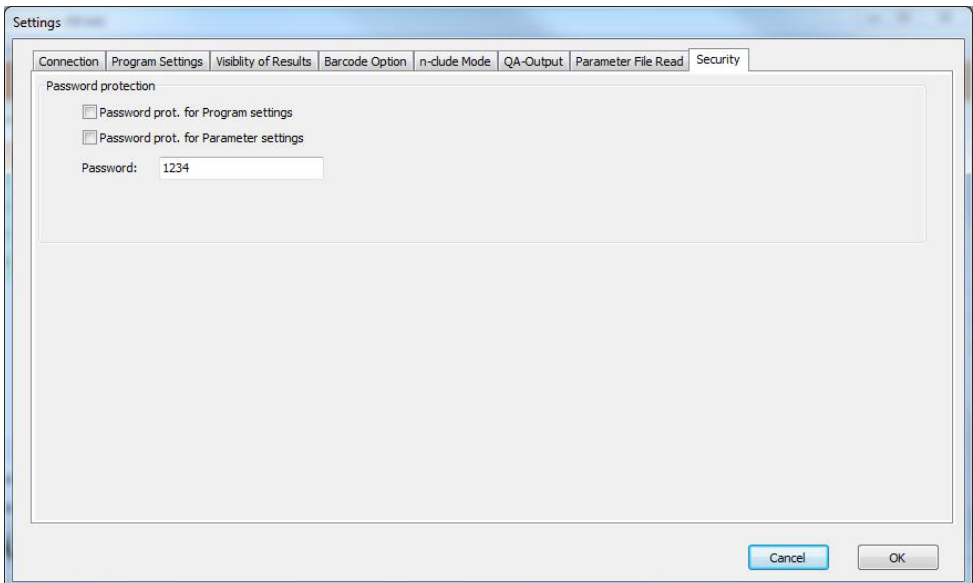


- **Clear Graph/Results on Read**

If this option is activated, the diagram and the result list will be deleted on opening a parameter file. This can be an advantage, particularly in conjunction with the use of a barcode scanner. Whenever a new barcode is scanned and the corresponding parameter file is read, the results list is cleared. So you can perform an all new measurement.

## Security

In this tab sheet, you can add security settings to prevent from unintentionally changed parameters.



- **Password prot. for Program settings**

If this option is activated, a password has to be entered to change the program settings. If the correct password has not been entered, the menu item 'File - Settings' and the 'SET' button on the main window are not active.

- **Password prot. for Parameter settings**

If this option is active, a password has to be entered to change any parameter of the transducer. The tab sheet 'Parameter' is still visible, but not changeable.

- **Password**

Here you can enter the password for the above settings.

The password is entered using the menu 'Extras - Extended view'.

## 6.1.2. THE MENU VIEW

### 6.1.2.1 I/O STATUS

This menu item opens an additional window, where you can view (inputs and outputs) and modify (inputs) the digital I/O Status of an optionally connected PLC interface.

This can be useful to simulate the external triggering to calculate an average value.

Please note, that the digital inputs are written to the transducer only, if the 'transmit digital inputs to sensor' is activated in the program settings.



The transducer can be connected to a PLC using the HST-eTTx or HST-TTx interface.

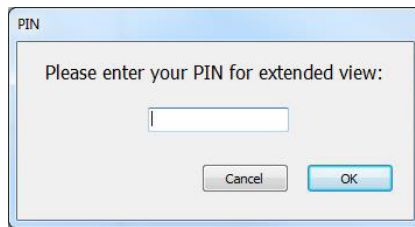


## 6.1.3. THE MENU EXTRAS

### 6.1.3.1 EXTENDED VIEW

You can use this, to access the protected areas of a transducer, e.g. the calibration data. Normally this password is not disclosed, to avoid unintentional changes of calibration data.

If you have enabled any security features in the program settings, the password required is also entered using this menu item.



### 6.1.3.2 SENSOR FIRMWARE UPDATE

This menu item is only accessible if the software is already connected to a transducer. The connection has to be established via USB and only one single transducer can be connected to the PC.



If you can see this window, disconnect the USB cable from the transducer for a couple of seconds and reconnect it afterwards. The rest of the firmware upgrade will be done automatically.





## 6.1.4. THE MENU HELP

### 6.1.4.1 USER'S MANUAL

With this menu item you can open the according version of the user's manual.

### 6.1.4.2 ENTER REGISTRATION CODE

With this menu item you can register your HST-Torq-Analyzer software at any time, if not already done at the first startup. This can be used also if you have upgraded your software from HST-Torq-Analyzer **Basic** to HST-Torq-Analyzer **Advanced**.

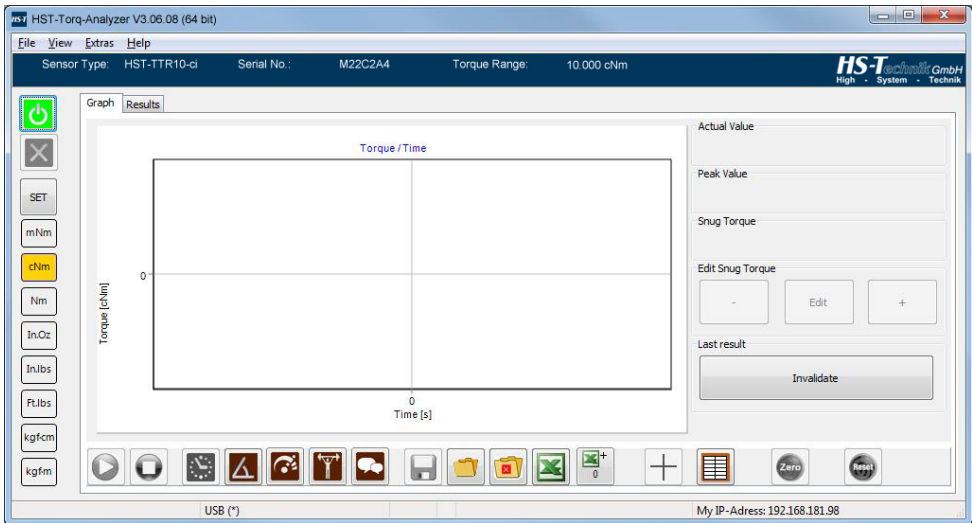
### 6.1.4.3 INFO

Here you can find information which program version you are using and the used serial number of your software.



## 6.2.0. GENERAL PARAMETERS

After choosing the interface, over which the transducer is connected to the PC, the communication between the transducer and HST-Torq-Analyzer can be established by pressing the 'Connect' button.



The color of the 'Connect' button changes from green to grey, since it is inactive now. The 'Disconnect' button changes its color from grey to red since it is active now.



Now the preferred physical unit can be selected by clicking one of the unit buttons. The unit can be changed at any time, also during a measurement.

Choose between the 2 buttons for the graphical display mode. These are Torque/Time (Force/Time) and Torque/Angle (Force/Displacement). Torque/Angle (Force/Displacement) is only available, if the transducer is equipped with an integrated with angle or linear encoder.



The graphical display mode can be changed at any time, also during or after a measurement.

In addition, a speed or power curve can be displayed. The corresponding curve overlies the actual torque or force curve (HST-Torq-Analyzer Advanced only).



If you have connected an additional transducer by using the n-clude mode, the torque or force curve of the 'Aux' transducer can be displayed by clicking the following button.

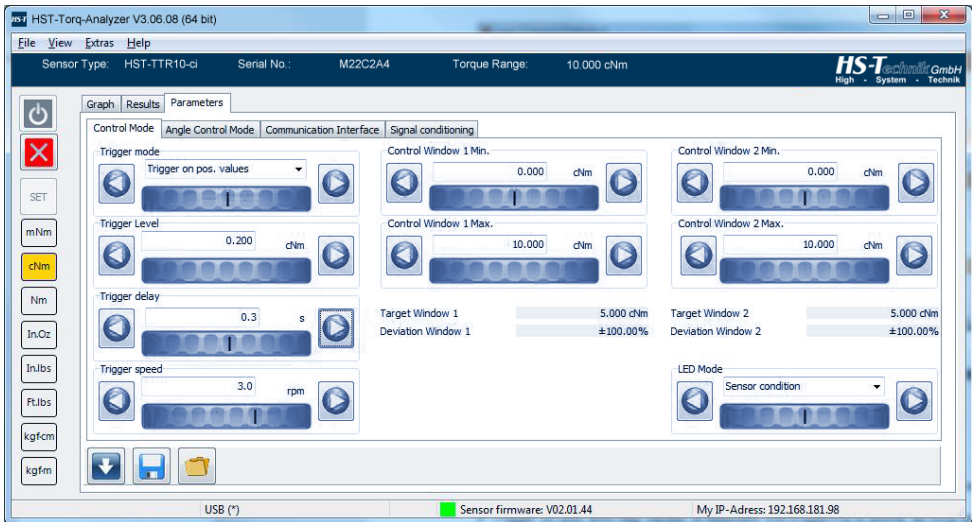


### **NOTICE**

Please note that only one of the three possible curves, speed, power or n-clude can be overlaid at the same time.



## 6.3.0. CONTROL PARAMETERS



The control mode can be disabled by selecting 'None' in the parameter Trigger mode.

If 'Trigger on pos. values' is selected, the triggering is active as long as the measurement value exceeds the selected Trigger level.

If 'Trigger on neg. values' is selected, the triggering is active as long as the measurement value exceeds the selected Trigger level, considering the negative sign.

If 'Trigger on pos. and neg. values' is selected, the triggering is active as long as the measurement value exceed the selected Trigger level, considering both signs, positive and negative.

If 'Trigger on ext. input' is selected, the triggering is active as long as the signal state on the digital inputs DI-0 or DI-1 is high. As described above, this can also be simulated by using the menu View without the requirement of the connection to an external PLC. The testing result is OK if all data points on the curve match the limits as defined in the according control window.

If 'Trigger on ext. input' is selected, the triggering is active as long as the signal state on the digital inputs DI-0 or DI-1 is high. As described above, this can also be simulated by using the menu View without the requirement of the connection to an external PLC. The testing result is OK, if the peak value matches the limits as defined in the according control window.

If 'Trigger on pos. speed' is selected, the triggering is active, as long as the speed exceeds the selected Trigger Speed.

If 'Trigger on neg. speed' is selected, the triggering is active, as long as the speed exceeds the selected Trigger Speed, considering the negative sign

If 'Trigger on pos. and neg. speed' is selected, the triggering is active, as long as the speed exceeds the selected Trigger Speed, considering both, the positive and negative sign

The Trigger Delay extends the active trigger state by the programmed delay time. This means, the triggering status remains after the trigger condition is no more active, until the delay will be expired.

The setting of the control mode affects 3 functions:

- The recording of graphs:

If the control mode is deactivated, the graph is recorded all the time, as soon as the 'Start recording' button is clicked. By clicking the 'Stop recording' the recording is stopped. In all other cases, the recording starts as soon as the triggering is active. With the setting above, the trigger will be active, whenever the measurement value exceeds 0.2 cNm or -0.2 cNm with delay of 0.3 s.

- The control of the limit windows:

The parameters Control Window 1 Min and Control Window 1 Max correspond to positive measurement values. If the triggering is active, and the measurement values exceeds the parameter Control Window 1 Max, the message Window 1, above limit is displayed. If the triggering is active, and the measurement value



has not reached the Control Window 1 Min, the message Window 1, below limit is displayed.

If the triggering by external input is selected, the Control Window 1 limits are monitored as long as the digital Input DI-0 is active.

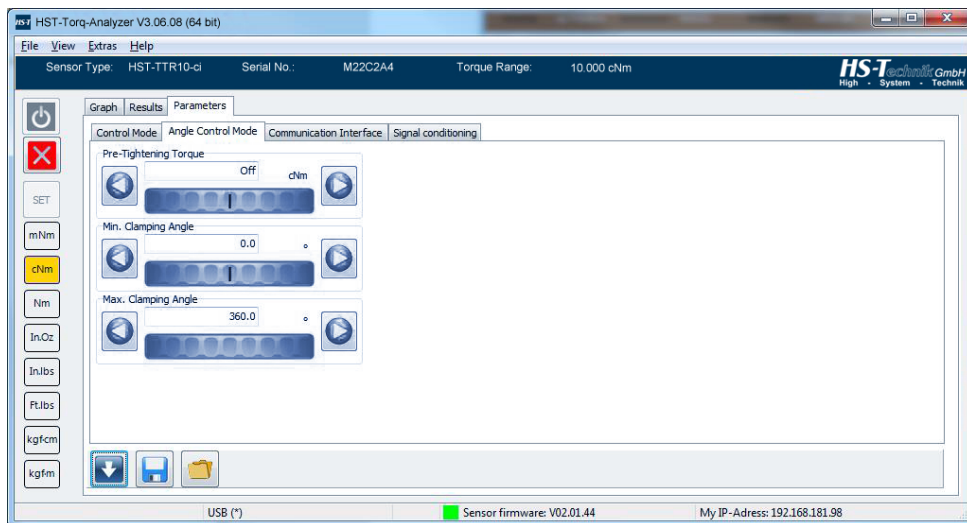
The parameters Control Window 2 Min and Control Window 2 Max correspond to negative measurement values. If the triggering is active, and the measurement values exceeds the parameter Control Window 2 Max, the message Window 2, above limit is displayed. If the triggering is active, and the measurement value has not reached the Control Window 2 Min, the message Window 2, below limit is displayed.

If the triggering by external input is selected, the Control Window 2 limits are monitored as long as the digital Input DI-1 is active.

- The recording of measurement results:

If the control mode is set to 'None', no measurement results are recorded. In all other cases, whenever the triggering changes from active to inactive, an end of measurement will be detected. As long as the 'recored results' is active, a new line with the result of the last measurement will be added on the end of the results list.

## 6.4.0. ANGLE CONTROL PARAMETERS



The angle control mode is an additional control feature, to monitor the angle between a selectable snug torque and the peak torque of the measurement. For this, valid values for the angle are between the limits Min Clamping Angle and Max. Clamping Angle. This can be used to monitor the angle between snug and final torque on screw joints. E. G. the presence of a spring washer can be detected as well as the defect of the screw joint components using this function.



## 6.5.0. COMMUNICATION PARAMETERS

HST-Torque-Analyzer V3.06.08 (64 bit)

File View Extras Help

Sensor Type: HST-TTR10-ci Serial No.: M22C2A4 Torque Range: 10.000 cNm

HST-Technik GmbH High System Technik

Graph Results Parameters

Control Mode Angle Control Mode Communication Interface Signal conditioning

Graph output data rate: 1000.0 samples/s

RS232 Output Mode (with I/O Adapter): No Output

RS485 Mode: IO-Interface

IP Address: 192, 168, 181, 90

Subnet mask: 255, 255, 255, 0

Default gateway: 192, 168, 181, 1

IP port for communication: 10001

Host address graph output (UDP): 192, 168, 181, 98

Host port graph output (UDP): 9000

Host address results output (UDP): 192, 168, 181, 98

Host port results output (UDP): 9001

USB (\*) Sensor firmware: V02.01.44 My IP-Address: 192.168.181.98

On this tab sheet you can find 6 parameter groups:

- **The IP parameters of the transducer:**
  - IP Address
  - Subnet Mask
  - Default Gateway
  - IP Port for communication
- **The Host IP parameters for the graph output:**
  - Server IP address
  - Communication port
- **The Host IP parameter for the result output:**
  - Server IP address
  - Communication Port





### **Remark:**

If the Server IP address for graph output and/or result output are set to 0.0.0.0, the graph and result output are automatically directed to the HST-Torq-Analyzer. Optionally the graph or result output can be directed to another PC.

### **Attention:**

Please check with your system administrator, which IP address you can use. After changing and saving the IP address, the transducer must be rebooted by disconnecting and reconnection the power.

- **The graph data rate**

The data rate for the output of curve data from the transducer to HST-Torq-Analyzer can be selected between 2 and 2,000 Samples per second. With slow signals or long recordings, it can be reasonable to set the output rate to a small value.

The transducer-internal sampling rate remains at 2,000 samples per second. Peak values between two outputs are stored and sent out with the next output. So no peak will be lost.

- **RS232 output mode**

If you use the optional HST-TTx adapter, you can select, which data are sent via the RS232 on it.

- No output:  
No data is sent via RS232
- Continuously:  
Curve data are sent continuously. The output is fixed to 200 samples per second.
- Results:  
At the end of a recording, the result data are sent via RS232.



The communication parameters are fixed to 115200 Baud, 8 data bits, 1 stop bit, no parity.

- **RS485 mode**

With this parameter you can select, what function the RS485 interface in the transducer will serve.

- **IO-Interface**

The interface is configured for the connection of HST-TTx or HST-eTTx adapter.

- **n-clude Main**

The interface is configured as n-clude 'Main' transducer, i.e. the transducer which is connected to the PC, if you interconnect 2 transducers.

- **n-clude Aux**

The interface is configured as n-clude 'Aux' transducer. The torque or force data are transmitted via the RS485 interface to the main transducer.

- **Motion Controller**

The interface is configured for the use of an optional motion controller.

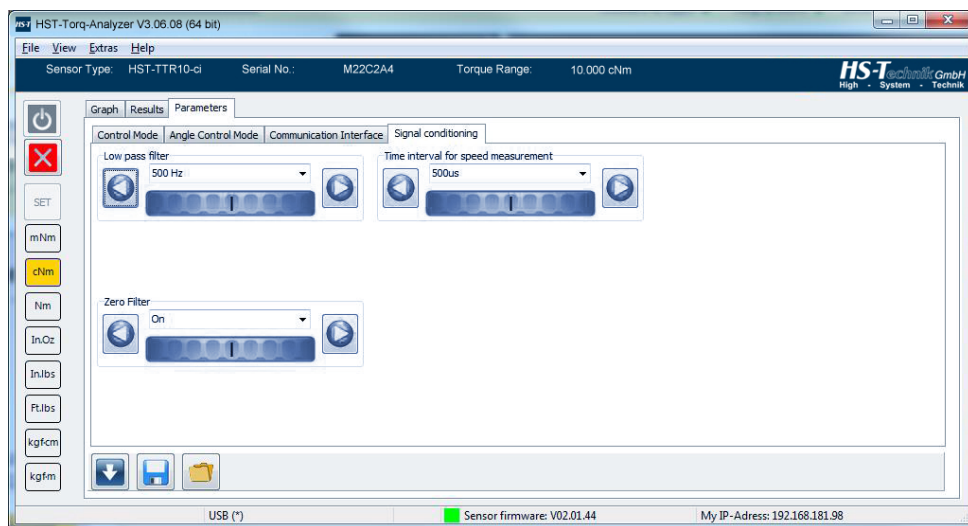
**Remark:**

If the n-clude mode is used, only the torque or force data from the 'Aux' sensor are used. Angle or Displacement values are not evaluated. Angle or Displacement values are only recorded from the 'Main' transducer.

## 6.6.0. SIGNAL CONDITIONING PARAMETERS

There are 2 adjustable filter for the torque/force signal in HST-Torq-Analyzer:

- The Lo pass filter. This is useful for curve smoothing, especially for low measurement values. The cutoff frequency can be set to 10, 50, 150, 250 and 500 Hz. You should choose the correct cutoff frequency according to the needs in your application.
- The Zero Filter is used to filter the signal whenever the transducer is not loaded with torque or force. It is active within +/- 1% of the measurement range of the transducer. If you want to measure signals within 1% of the measurement range, you should deactivate this filter.



The parameter 'Time interval for speed measurement' is used to select the time interval used to measure the speed of the transducer. A short interval means, that the speed curve will react very fast to changes, but the noise is high. In contrast to that, if you select a long interval, that curve has much less noise, but it will react sluggish on speed changes.



## 7. HST-TORQ-ANALYZER USAGE

### 7.1.0. GRAPHS

#### 7.1.1. RECORDING GRAPHS

If a transducer is connected and the system is configured accordingly, HST-Torq-Analyzer will record torque or force curves in the diagram area on the screen. The diagram adapts itself to the recorded data. The recording is started using the 'Start recording' button and stopped by clicking the 'Stop recording' button on the graph tab sheet. If a trigger mode has been selected, the recording is started automatically when the trigger condition is met and is stopped automatically whenever the trigger condition is not met anymore. By meeting the trigger condition again, the old graph is wiped and new one started. See also the Control parameters.



Choose between the 2 buttons for the graphical display mode. These are Torque/Time (Force/Time) and Torque/Angle (Force/Displacement). Torque/Angle (Force/Displacement) is only available, if you use a transducer with integrated angle encoder (displacement sensor).



The graphical display mode can be switched at any time, also during or after a measurement.

In addition, a secondary curve can be display in the diagram area:



#### Speed

(only with angle encoder or displacement encoder)

This function is availabe in HST-Torq-Analyzer Advanced only.



#### Mechanical Power

(only with angle encoder or displacement encoder)

This function is availabe in HST-Torq-Analyzer Advanced only.



#### n-clude Mode

Visualization of an additional torque or force curve. To use this function, an additional transducer has to be interconnected to the main sensor.

This function is availabe in HST-Torq-Analyzer Advanced only.

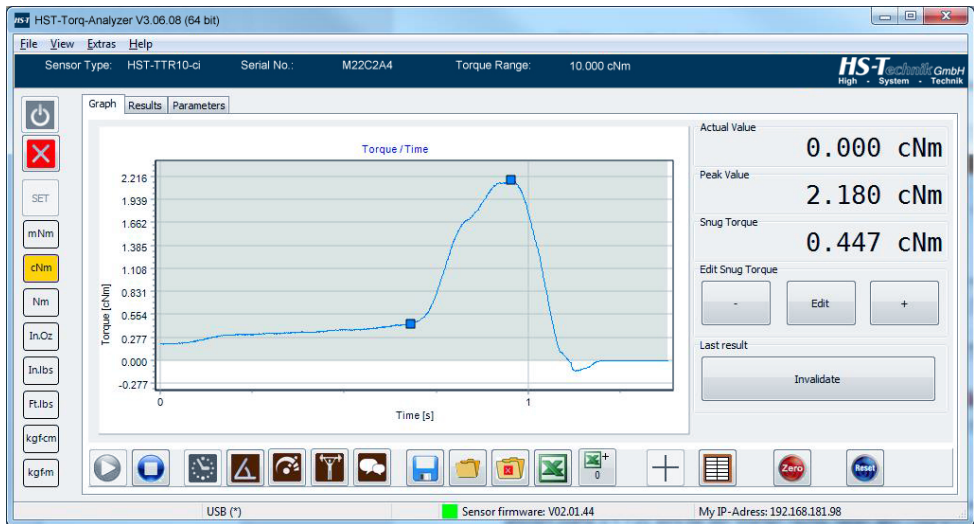
#### **Remark:**

The additional curves use the right vertical diagram axis as ordinate. The main curve uses the left vertical diagram axis as ordinate.



### 7.1.1.1 DETERMINE THE SNUG TORQUE

If you have selected the values 'Snug torque' and 'Edit snug Torque' in the visibility of results, the snug torque of the last recorded screw joint can be determined. Normally the snug torque is automatically calculated by HST-Torq-Analyzer. The snug torque and the peak torque are shown as squares in the curve. If you want to manually correct the snug torque, you can do this by clicking 'Edit' in the 'Edit Snug Torque' box. Now you can move the value clicking on the '+' or '-' button in this box. Alternatively you can also directly click on a point on the curve.



### 7.1.1.2 INVALIDATE RESULTS

If you have selected the value 'Invalidate last result' in the visibility or results, you can see an addition button in the values area named 'Invalidate'. With this button you can invalidate the last value in the results list. The assigned as invalidate results will no more affect the listing, but still will be shown.

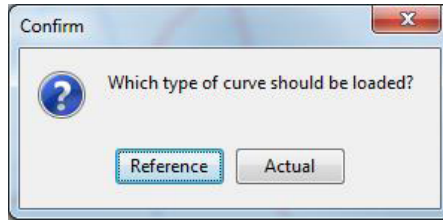
## 7.1.2. SAVING AND LOADING OF GRAPHS

Recorded graphs can be stored, loaded and also wiped. The diagram scaling adapts itself automatically. Use the button 'Save to file', to save a file to your storage medium. Use the button 'Load from file' to load a file from your storage medium. With the 'Delete' button, the loaded graph can be wiped from the diagram. The saved file will not be deleted by using this function.



The blue curve shows the actual measurement, the loaded reference curve is shown in red.

By using the 'Load from file' function, you can decide, if the curve is loaded as reference curve or actual curve.



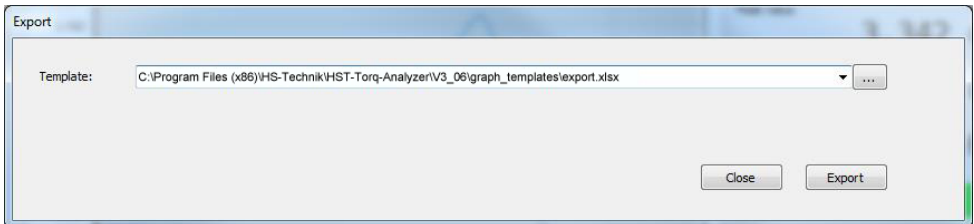
So you have the possibility to export also formerly saved curves to Excel. The blue curve (actual curve) is exported to Excel.

### 7.1.3. EXPORT GRAPHS TO EXCEL

The recorded diagrams can be stored in an Excel compatible format.



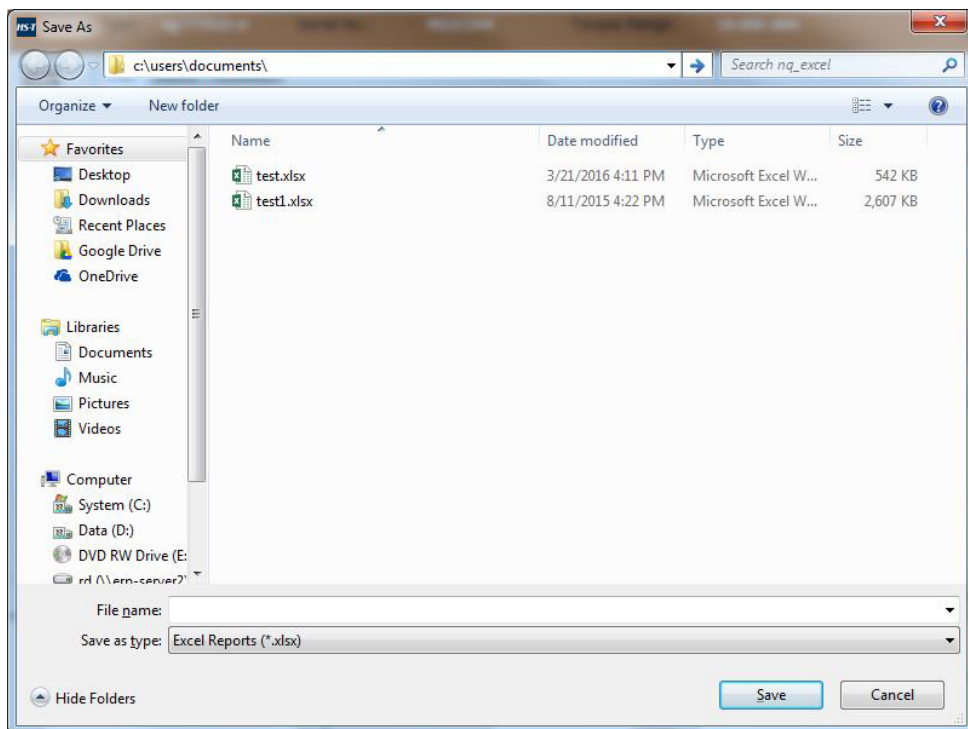
By clicking the big Excel button, a dialog window is opened, where you can select the template which will be filled with the export data.



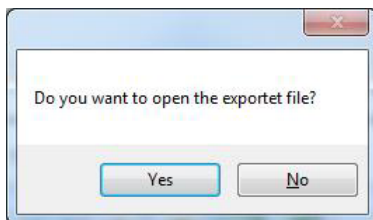
You have the possibility to create or modify your own templates according to your needs.

After choosing the appropriate template, the 'Save as' dialog window is opened, where you can select the final Excel file name.





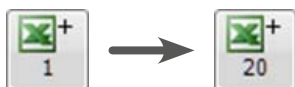
You can now open the created Excel file instantly.



To save multiple graphs in one single Excel file, you can use the button with the 'Excel+' symbol.

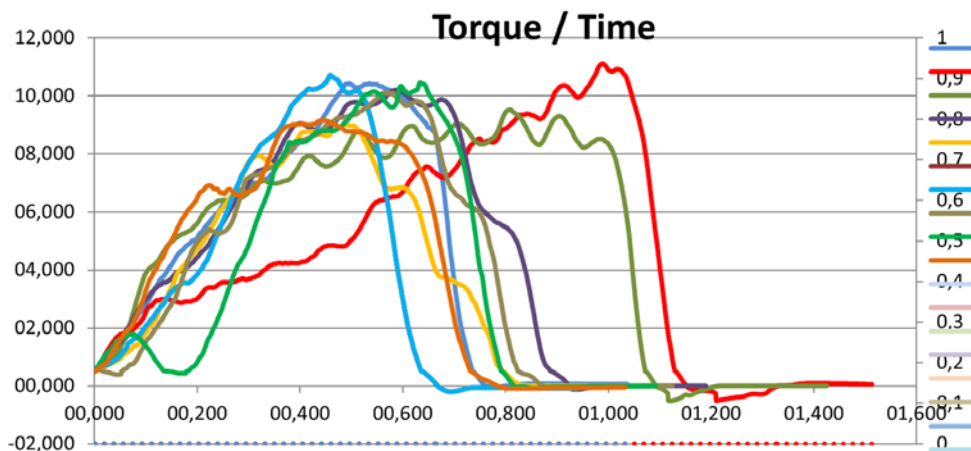


By clicking on it with the left mouse key, you can add the actual graph to the output stack.



So, up to 20 graphs can be added to the output stack. Afterwards all of them are exported into one single Excel file by pressing the button with the big Excel symbol.

To clear the output stack, you have to click on the 'Excel+' button with the right mouse key. The 'Excel+' button shows 0 and only the actual curve will be exported to Excel.



In the diagrams and the value table of the exported Excel file, you will find the data of all exported curves.

#### 7.1.4. CURSOR-FUNCTION (ADVANCED SOFTWARE ONLY)

By clicking the 'Cursor' button, an addition window will open.



This window shows the measurement value on the crosshair.



The crosshair can be moved by clicking one of the two arrow buttons on the window. It follows the displayed curve. Alternatively, the + and – keys of the numeric keypad of your keyboard can be used to move the cursor.

The crosshair can also be directly placed by clicking directly on an arbitrary point on the curve.



### 7.1.4. ADDITIONAL VALUES WINDOW (ADVANCED SOFTWARE ONLY)

By clicking on this button, an addition window will open, where additional measurement values are shown.



Up to 9 additional values are shown. Which values are displayed, can be selected in the program options.

Actual Value	0.000 cNm
Peak Value	3.342 cNm
Average Value	1.033 cNm
Angle Value	-28.6 °
Message	OK
Results	0.0 rpm
Max. Speed	-26.7 rpm
Min. Speed	0.0 rpm
Avg. Speed	-4.9 rpm

## 7.2.0. MEASUREMENT RESULTS

### 7.2.1. RECORDING MEASUREMENT RESULTS

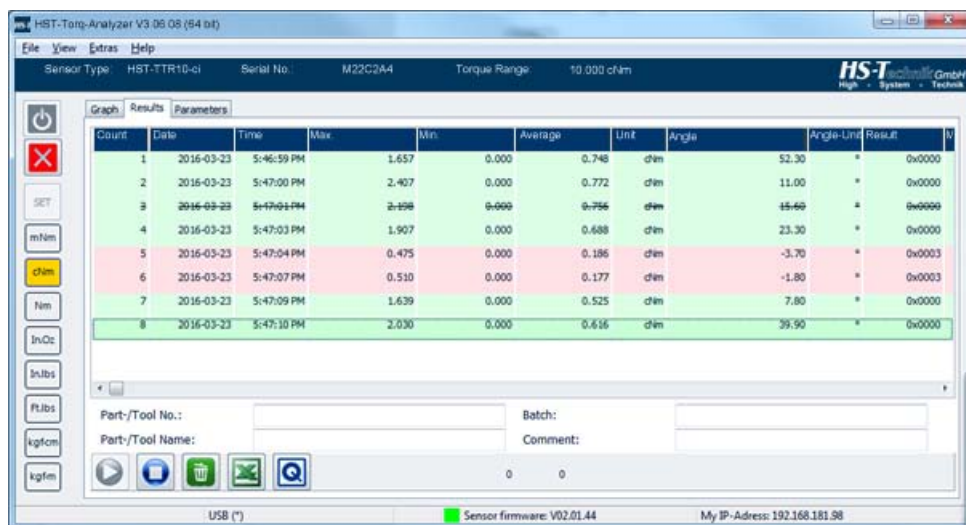
If a transducer is connected and the system is configured accordingly, HST-Torq-Analyzer will record measurement results automatically. For this function the buttons 'Start recording' and 'Stop recording' on the tab sheet Results are used.



#### Remark:

Regarding the triggering of measurement results see Control parameters.

Without an active triggering, no measurement results are recorded. The measurement result is added to list or results, as soon as the triggering changes from active to inactive.



Count	Date	Time	Max	Min	Average	Unit	Angle	Angle-Unit	Result	V
1	2016-03-23	5:46:59 PM	1.657	0.000	0.748	chm	52.30	*	0x0000	
2	2016-03-23	5:47:00 PM	2.407	0.000	0.772	chm	11.00	*	0x0000	
3	2016-03-23	5:47:03 PM	2.498	0.000	0.756	chm	15.60	*	0x0000	
4	2016-03-23	5:47:03 PM	1.907	0.000	0.688	chm	23.30	*	0x0000	
5	2016-03-23	5:47:04 PM	0.475	0.000	0.186	chm	-3.70	*	0x0003	
6	2016-03-23	5:47:07 PM	0.510	0.000	0.177	chm	-1.80	*	0x0003	
7	2016-03-23	5:47:09 PM	1.639	0.000	0.525	chm	7.80	*	0x0000	
8	2016-03-23	5:47:10 PM	2.030	0.000	0.616	chm	39.90	*	0x0000	



To clear the complete list, use the 'Recycle Bin' button.



To clear or invalidate a single line in the list, mark the line with the left mouse button. Then open the context menu by clicking with the right mouse button. Then use 'Delete selection' or 'Invalidate selection' by clicking the appropriate item.

Below the results list you will find different fields for

- Part-/Tool No.
- Part-/Too Name
- Batch
- Comment

These field can be filled freely and are also sent to Excel by using the Export to Excel function.

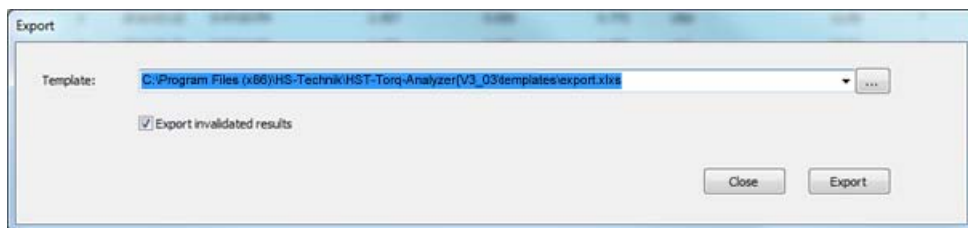
If you use a barcode scanner, the field Tool-/Part no. is automatically filled with the scanned code.

## **7.2.2. EXPORT RESULTS TO EXCEL**

To export a list of measurement values to excel, use the 'Export to Excel' button.



By clicking the big Excel button, a dialog window is opened, where you can select the template which will be filled with the export data. If you select the option 'Export invalidated results', the invalidated results are also exported to Excel and marked as invalid. If this option is not activated, the invalidated results are omitted.



After selecting the template, click on the 'Export' button.

You have the possibility to create or modify your own templates according to your needs and add statistical functions or diagrams to it.


### Remark:

If you use a barcode scanner and active the option 'Define Template on Scan', the template selection dialog is now shown. Instead a template with the same name as the scan code will be used.

By default, two templates are delivered with HST-Torq-Analyzer.

- **Export.xlsx**

With this template, all measurement data are listed in one table.  
No calculation is done.

HS-Technik Measurement Report											
Date/Time: 06.03.12 12:11:24				Tool Serial Number: M1139F3							
Count	Date	Time	Max.	Min.	Average	Unit	Angle	Angleunit	Result Code		
1	2012-03-06	12:02:59	0.943	0.053	0.288	cNm	-50.7°		0		
2	2012-03-06	12:03:00	1.817	0.055	0.571	cNm	-24.9°		0		
3	2012-03-06	12:03:02	2.251	0.053	0.67	cNm	-35.7°		0		
4	2012-03-06	12:03:06	2.421	0.053	0.724	cNm	-3.9°		0		
5	2012-03-06	12:03:08	2.405	0.055	0.701	cNm	2.9°		0		
6	2012-03-06	12:03:09	2.545	0.058	0.785	cNm	-7.6°		0		
7	2012-03-06	12:03:11	2.419	0.06	0.74	cNm	-1.8°		0		
8	2012-03-06	12:03:13	2.18	0.063	0.608	cNm	-2.7°		0		



- **Export machine capability.xlsx**

With this template, a complete machine capability study will be created.

The tolerance limits for the calculation of the cmk value are set by the parameter 'Control window 1 Min' and 'Control Window 1 Max'.

## HS-Technik Measurement Report



Date/Time:	2015-11-04 18:02
Sensor Serial Number:	M1B54E3
Tool Type:	HST-TTS10-ci
Tool / Part No.:	
Tool / Part Name:	
Batch:	
Comment:	

Target Value [cNm]	5.0000
Tolerance (+/-):	100.00%
+Tolerance [cNm]	5.0000
-Tolerance [cNm]	5.0000
Upper Limit [cNm]	10.0000
Lower Limit [cNm]	0.0000

Count (n):	5
Process Mean (x) [cNm]:	2.4018
Max. [cNm]:	2.8830
Min. [cNm]:	1.9090
Spread (R) [cNm]:	0.9740
Standard Deviation (s):	0.355003
5 Sigma (5 s):	2.130019
Cm:	4.89
Cmi:	2.28
Cmu:	7.13
Cmk:	2.28

No.	Date	Time	Max.	Unit	Dev. (Target) [%]	Dev. (Mean) [cNm]	Valid
1	2015-11-04	18:01:15	2.4840	cNm	-50.320%	0.0154	WAHR
2	2015-11-04	18:01:19	1.9090	cNm	-61.880%	-0.3018	WAHR
3	2015-11-04	18:01:20	2.2840	cNm	-54.320%	-0.1238	WAHR
4	2015-11-04	18:01:21	2.4810	cNm	-50.380%	0.0734	WAHR
5	2015-11-04	18:01:22	2.8830	cNm	-42.340%	0.4754	WAHR

A dialog window opens where you can set the file name for saving the file. If you use a barcode scanner and activate the option 'store automatically if scanned', the save file dialog is not shown. Instead the file name is generated automatically of the scan code and the actual date.





## 7.3.0. CREATING CUSTOM EXCEL TEMPLATES

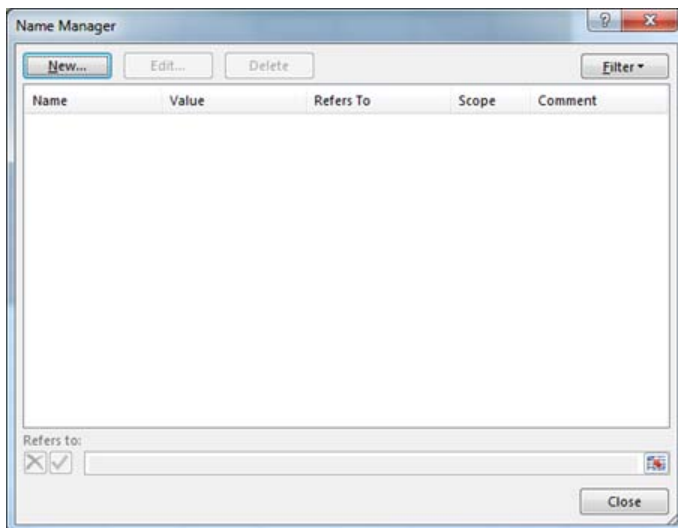
### 7.3.1. GENERAL

The format of the used templates has to be .xlsx. The .xls format (used up to Excel 2003) cannot be used as a template.

All cells with sequential data, i.e. the actual table, have to be in the name range '\_\_\_ExportValues\_\_\_'. The general data (e.g. the export date, the serial number...) have to be outside of the named range.

### 7.3.2. EXCEL SINCE VERSION 2007

To name a range in Excel since version 2007, mark the selected cell range. Now go to the menu ribbon 'Formulas' and click on 'Name manager'. In the now opening window, click on 'New' and enter the name in the 'Name' field.





## 7.4.0. GRAPH EXPORT TEMPLATES

The cells, that should be filled by HST-Torque-Analyzer should have the following content:

Name range	Field content	Description
	<#ExportDate>	The date of the export.
	<#SerialNumber>	The serial number of the used transducer.
	<#Unit>	The torque or force unit of the export.
	<#Sensortype>	The type of the used transducer.
	<#n-cludeUnit>	The torque or force unit of the n-clude 'Aux' transducer.
	<#Partname>	The content of the field 'Part-/Toll no', below the results list.
	<#Partno>	The content of the field 'Part-/Toll name'. If a barcode scanner is used, this will be the scan code.
	<#Batch>	The content of the filed 'Batch'
	<#Comment>	The content of the field 'Comment'
__ExportValues__	<#ExportValues.Torque1> ... <#ExportValues.Torque20>	The torque value of the curve point. The number 1 to 20 declares one of the up to 20 curves.
__ExportValues__	<#ExportValues.Angle1> ... <#ExportValues.Angle20>	The angle value of the curve point in degree.
__ExportValues__	<#ExportValues.Time1> ... <#ExportValues.Time20>	The time value of the curve point in seconds.
__ExportValues__	<#ExportValues.Speed1> ... <#ExportValues.Speed20>	The speed. This can be used to build up a speed/time or speed/angle diagram.
__ExportValues__	<#ExportValues.Power1> ... <#ExportValues.Power20>	The power in Watt. This can be used to build up a power/time or power/angle diagram.
__ExportValues__	<#ExportValues.ExtTorque1> ... <#ExportValues.ExtTorque20>	The torque value of the curve point of the n-clude 'Aux' transducers.

__ExportValues__	<#ExportValues.Snug1> ... <#ExportValues.Snug20>	The torque value of the snug torque, if calculated. This curve contains only 2 values. The smaller one contains the snug torque, the larger one contains the max. torque. The both values are arranged in the corresponding row, where the occurred.
------------------	--	--



## NOTICE

Please note, that not all fields have to be used. Not used fields can be omitted.



## 7.5.0. RESULT EXPORT TEMPLATES

The cells, that should be filled by HST-Torq-Analyzer should have the following content:

Name range	Field content	Description
	<#ExportDate>	The date of the export.
	<#SerialNumber>	The serial number of the used transducer.
	<#SensorType>	The type of the used transducer.
	<#Comment>	The content of the field 'Comment'
	<#Batch>	The content of the field 'Batch'
	<#Partno>	The content of the field 'Part-/Toll name'. If a barcode scanner is used, this will be the scan code.
	<#Partname>	The content of the field 'Part-/Toll no.', below the results list.
	<#Language>	The set language in HST-Torq-Analyzer. This can be used to change the language in the exported excel document.
	<#target1>	The target value of the measurement. This is the average of 'Control window 1 Min' and 'Control window 1 Max'.
	<#deviation1>	The acceptable deviation, symmetrically around the target1.
	<#target2>	The target value of the measurement. This is the average of 'Control window 2 Min' and 'Control window 2 Max'.
	<#deviation2>	The acceptable deviation, symmetrically around the target2.
__ExportValues__	<#ExportValues.Count>	The consecutive number of the measurement.
__ExportValues__	<#ExportValues.Date>	The date of the actual measurement.
__ExportValues__	<#ExportValues.Time>	The time of the actual measurement.
__ExportValues__	<#ExportValues.Max>	The peak value of the actual measurement.

__ExportValues__	<#ExportValues.Min>	The minimal value of the actual measurement.
__ExportValues__	<#ExportValues.Average>	The average value of the actual measurement.
__ExportValues__	<#ExportValues.Unit>	The torque/force unit of the actual measurement.
__ExportValues__	<#ExportValues.Angle>	The angle value of the actual measurement.
__ExportValues__	<#ExportValues.Angleunit>	The unit of the angle or the displacement. If a rotary transducer is used, this field is filled with '°', for displacement values the field contains 'mm'
__ExportValues__	<#ExportValues.Result>	A numerical value corresponding the result of the measurement: 0 = OK 2 = Maximum 1 exceeded 3 = Minimum 1 not reached 4 = Minimum 2 not reached 5 = maximum 2 exceeded 6 = Angle value exceeded 7 = Angle value not reached
__ExportValues__	<#ExportValues.Speed_max>	The maximum of the speed of the actual measurement.
__ExportValues__	<#ExportValues.Speed_min>	The minimum of the speed of the actual measurement.
__ExportValues__	<#ExportValues.Speed_avg>	The average speed of the actual measurement.
__ExportVauces__	<#ExportValues.Power_max>	The peak power of the actual measurement.
__ExportValues__	<#ExportValues.Power_min>	The min. power of the actual measurement.
__ExportValues__	<#ExportValues.Power_avg>	The average power of the actual measurement.
__ExportValues__	<#ExportValues.clamping>	The angle between reaching the snug torque and reaching the peak torque in the angle control mode.
__ExportValues__	<#ExportValues.n_clude_max>	The peak torque or force value of the n-clude 'Aux' transducer.
__ExportValues__	<#ExportValues.n-clude_min>	The min. torque or force value of the n-clude 'Aux' transducer.



__ExportValues__	<#ExportValues.n-Fusion_avg>	The average torque or force value of the n-clude 'Aux' transducer.
__ExportValues__	<#ExportValues.n-clude_unit>	The torque or force unit of the n-clude 'Aux' transducer.
__ExportValues__	<#ExportValues.valid>	Boolean value (true, false), which shows if the exported data was declared as invalid or not. If the data were invalidated, this field contains 'false'.

Please note, that not all fields have to be used. Not used fields can be omitted.



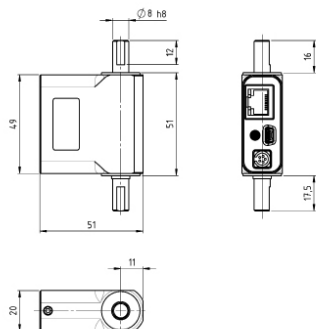
## 8. TECHNICAL DATA

### 8.1.0. TTR SERIES

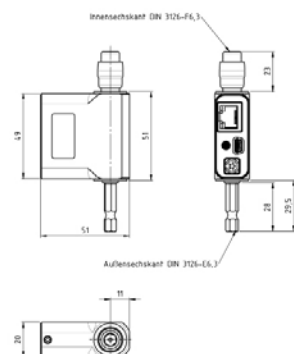
Order no.	Measurement range in Nm	Interface	Overload protection	Accuracy*	Adapter
HST-TTR01-ci	+/- 0.01	intelligent	yes	1.0 %	3 mm shaft
HST-TTR02-ci	+/- 0.02	intelligent	yes	1.0 %	3 mm shaft
HST-TTR05-ci	+/- 0.05	intelligent	yes	0.5 %	3 mm shaft
HST-TTR10-ci	+/- 0.1	intelligent	yes	0.5 %	5 mm shaft
HST-TTR20-ci	+/- 0.2	intelligent	yes	0.2 %	5 mm shaft
HST-TTR50-ci	+/- 0.5	intelligent	yes	0.2 %	8 mm shaft
HST-TTR100-ci	+/- 1.0	intelligent	yes	0.2 %	8 mm shaft
HST-TTR200-ci	+/- 2.0	intelligent	yes	0.2 %	8 mm shaft
HST-TTR500-ci	+/- 5.0	intelligent	-	0.1 %	8 mm shaft
HST-TTR1000-ci	+/- 10.0	intelligent	-	0.1 %	8 mm shaft
HST-TTR2000-ci	+/- 20.0	intelligent	-	0.1 %	8 mm shaft
HST-TTR50-xi	+/- 0.5	intelligent	yes	0.2 %	1/4" hexagon
HST-TTR100-xi	+/- 1.0	intelligent	yes	0.2 %	1/4" hexagon
HST-TTR200-xi	+/- 2.0	intelligent	yes	0.2 %	1/4" hexagon
HST-TTR500-xi	+/- 5.0	intelligent	-	0.1 %	1/4" hexagon
HST-TTR1000-xi	+/- 10.0	intelligent	-	0.1 %	1/4" hexagon
HST-TTR2000-xi	+/- 20.0	intelligent	-	0.1 %	1/4" hexagon
HST-TTR5000-qi	+/- 50.0	intelligent	-	0.1 %	3/8" square
HST-TTR10000-qi	+/- 100.0	intelligent	-	0.1 %	1/2" square
HST-TTR20000-qi	+/- 200.0	intelligent	-	0.1 %	3/4" square
HST-TTR50000-qi	+/- 500.0	intelligent	-	0.1 %	3/4" square



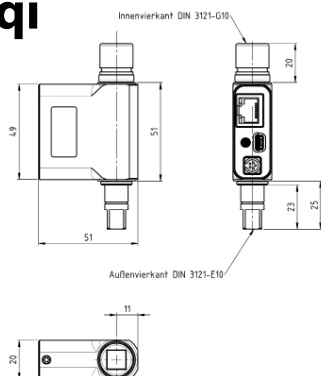
## HST-TTRxxx-**ci**



## HST-TTRxxx-**xi**



## HST-TTRxxx-**qi**



Dimensions in mm





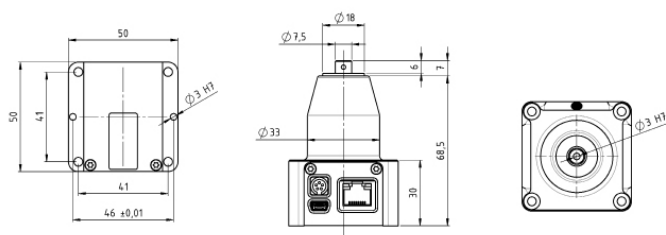
## 8.2.0. TTS SERIES

Order no.	Measurement range in Nm	Interface	Overload protection	Accuracy*	Adapter
HST-TTS01-ci	+/- 0.01	intelligent	yes	1.0 %	3 mm bore
HST-TTS02-ci	+/- 0.02	intelligent	yes	1.0 %	3 mm bore
HST-TTS05-ci	+/- 0.05	intelligent	yes	0.5 %	3 mm bore
HST-TTS10-ci	+/- 0.1	intelligent	yes	0.5 %	3 mm bore
HST-TTS20-ci	+/- 0.2	intelligent	yes	0.2 %	3 mm bore
HST-TTS50-xi	+/- 0.5	intelligent	yes	0.2 %	1/4" hexagon
HST-TTS100-xi	+/- 1.0	intelligent	yes	0.2 %	1/4" hexagon
HST-TTS200-xi	+/- 2.0	intelligent	yes	0.2 %	1/4" hexagon
HST-TTS500-xi	+/- 5.0	intelligent	-	0.1 %	1/4" hexagon
HST-TTS1000-xi	+/- 10.0	intelligent	-	0.1 %	1/4" hexagon
HST-TTS2000-xi	+/- 20.0	intelligent	-	0.1 %	1/4" hexagon
HST-TTS5000-qi	+/- 50.0	intelligent	-	0.1 %	3/8" square
HST-TTS10000-qi	+/- 100.0	intelligent	-	0.1 %	1/2" square
HST-TTS20000-qi	+/- 200.0	intelligent	-	0.1 %	3/4" square
HST-TTS50000-qi	+/- 500.0	intelligent	-	0.1 %	3/4" Vierkant

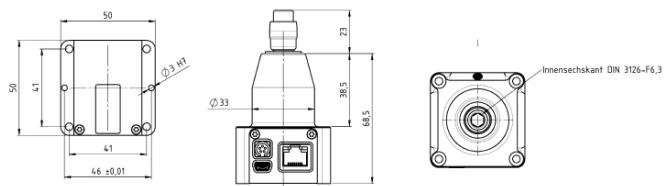
\* The accuracy is shown in percent of full scale  
(sensor with a torque range of 1.0 Nm = deviation 0.002 Nm or 0.2cNm)



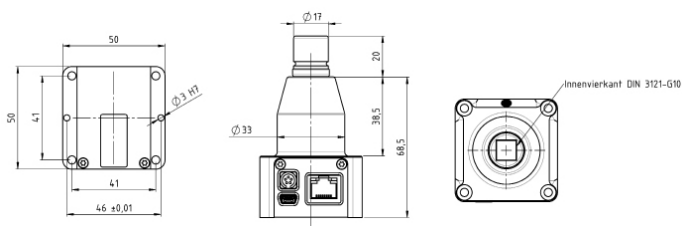
## HST-TTSxxxx-**ci**



## HST-TTSxxxx-**xi**



## HST-TTSxxxx-**qi**



Dimensions in mm

## 8.2.1. FIDAPTORS

Suitable for HST-TTS sensors

Order no.	Nm max.	Screw joint	Drive	Adapter
A10-C10-20-H	10	hard	3/8" female square	3/8" male square
A10-C10-20-M	10	middle	3/8" female square	3/8" male square
A10-C10-20-W	10	soft	3/8" female square	3/8" male square
A10-C10-50-H	50	hard	3/8" female square	3/8" male square
A10-C10-50-M	50	middle	3/8" female square	3/8" male square
A10-C10-50-W	50	soft	3/8" female square	3/8" male square
A12-C12-100	100	hard middle soft	1/2" female square	1/2" male square



Order no.	Nm max.	Screw joint	Drive	Adapter
E6,3-C10-10-H	10.0	hard	3/8" female square	1/4" hexagon socket
E6,3-C10-10-M	10.0	middle	3/8" female square	1/4" hexagon socket
E6,3-C10-10-W	10.0	soft	3/8" female square	1/4" hexagon socket



Further models on request

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Die technischen Daten in dieser Drucksache geben einen Anhalt, sind aber ohne Gewähr!  
Konstruktionsänderungen vorbehalten. Unsere Konstruktionsvorschläge sind unverbindlich!  
The technical data in these printed material provide support, but are not guaranteed!  
Constructional changes reserved. Our construction recommendations are non-binding!