

# n·gineric

Intelligent Torque and  
Force Measurement  
Systems

Micro Sensor  
Torque Driver Systems



Catalog 2018

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# 1 Applications



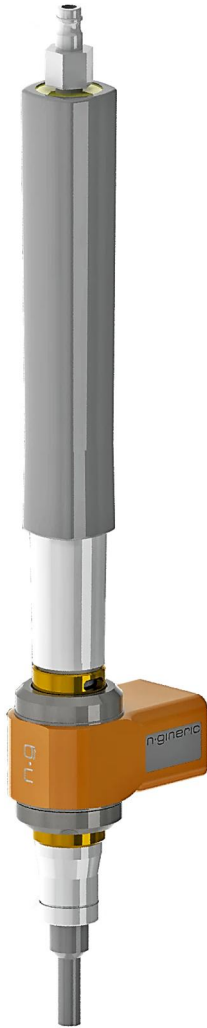
## Mobile Torque/ Angle Measurement

- Mobile Phone or Tablet with Android-OS serves as a simple „Measurement Instrument“
- Result window monitoring
- Graph data transmission via WiFi



## Torque/ Angle Measurement for the Calibration of Screw Drivers

- Mobile measurement case with battery supply
- Windows Tablet-PC
- Screw driver tool identification with bar code reader
- Excel document template for SPC calculation
- Data storage via WiFi



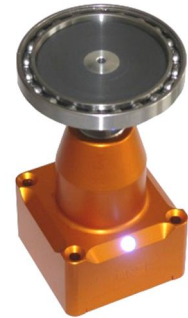
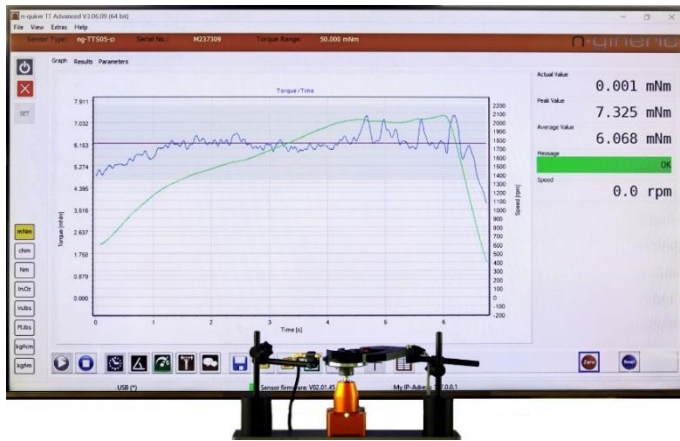
Rotary Sensor for Torque/Angle  
Measurement with mounting  
flanges to be attached at a simple  
clutch Type screwdriver

- 100 percent control
- G/NG-Signalizing

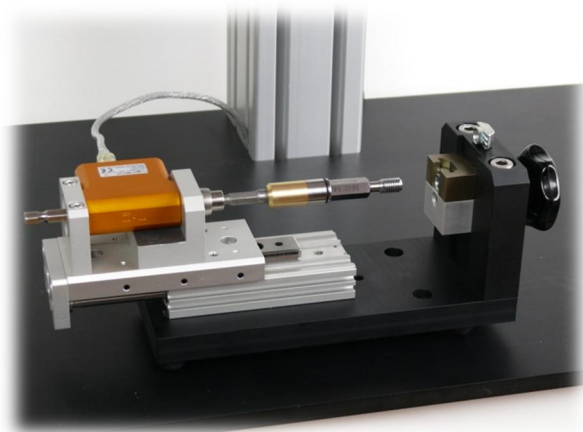


Force/Displacement  
measurement system for  
push button testing

Stationary sensor system for the measurement of the friction of ball bearings



Torque repeatability test of manual screwdrivers



Thread testing of cage nuts

Simultaneous Torque/Angle and clamping force measurement of pulse and impact tools with screw joint simulators



Cyclic torque verification inside the automated assembly system



Accessory for torque/angle sensors which provides a WiFi hotspot for the transmission of measurement and high resolution graph data



## Automated Screw Tightening - Semi Automation or Full Automation

- Torque Driving Cell for Semi Automation or Inline Automation, Positioning with SCARA
- Screw Supply via Blow Feeding from Bowl Feeder System
- Industry-4.0-compliant by Connection to Manufacturing Execution Systems (MES)





### Automated Screw Tightening – Semi Automation

- Torque Driving Cell for Semi Automation, Positioning with Desktop-Robot
- Screw Supply via Pick & Place with Vacuum
- Industry-4.0-compliant by Connection to Manufacturing Execution Systems (MES)
- Operator-Feedback with Touch-Screen-Monitor
- Process Data Documentation



### Automated Screw Tightening – Semi Automation

- Miniaturized Torque Driving Cell for Semi Automation, Positioning with Desktop-Robot
- Screwe size M1 to M2.5
- Screw Supply via Pick & Place with Vacuum
- Industry-4.0-compliant by Connection to Manufacturing Execution Systems (MES)
- Operator-Feedback with Touch-Screen-Monitor
- Process Data Documentation



## Automated Screw Tightening – Semi Automation

- Torque Driving Cell for Semi Automation, Positioning with Cartesian Robot
- Screw Supply via Pick & Place with Vacuum (3 feeders)
- Flexible workpiece tooling
- Numerical screw insertion depth control
- Screw tightening and removal functionality
- Industry-4.0-compliant by Connection to Manufacturing Execution Systems (MES)
- Operator-Feedback with Touch-Screen-Monitor
- Process Data Documentation

## 1.1 Sensor System Software n-quirer TT V3 basic

For tablet PCs, laptops, notebooks, PC running Windows, in combination with all intelligent Sensors from n-gineric, providing

- Graph recordings of
  - Torque vs. time
  - Torque vs. angle
  - Force vs. time
  - Force vs. displacement
- Automatic sensor identification
- Graph reading with up to 2,000 measurements per second
- Display resolution 5 digits plus decimal point
- Supports different physical units
- 2 control windows with internal or external triggering
- 2<sup>nd</sup> trigger value for angle control or displacement control
- Adjustable low pass filter (10 to 500 Hz)
- Supports the loading of a reference graph for comparison
- Direct export of the graph reading into Excel
- Direct export of measurements results listing into Excel with SPC document template
- Supported operating systems: Windows 7, Windows 8, Windows 10.
- Direct sensor connectivity via USB or Ethernet

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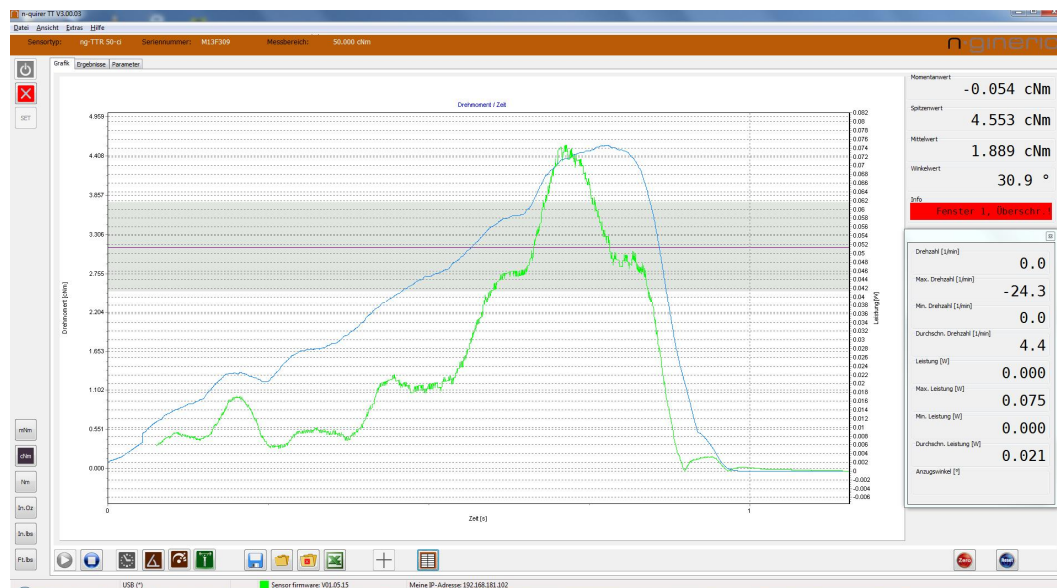
## 1.2 Sensor System Software n-quirer TT V3 advanced

For tablet PCs, laptops, notebooks, PC running Windows, in combination with all intelligent Sensors from n-gineric, providing

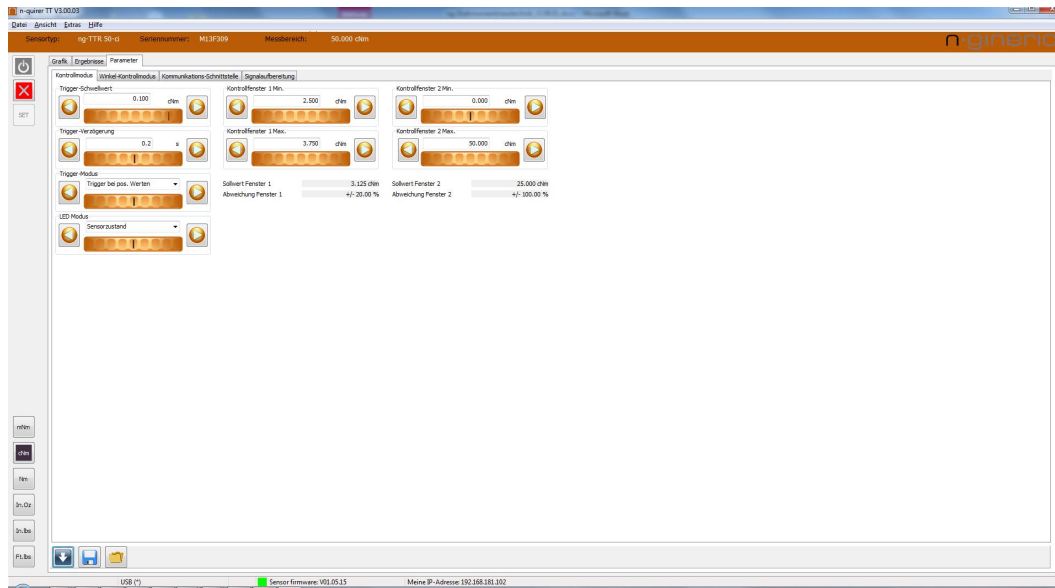
- Graph recordings of
  - Torque vs. time
  - Torque vs. angle
  - Force vs. time
  - Force vs. displacement
  - Speed vs. time
  - Speed vs. angle
  - Power vs. time
  - Power vs. Angle

- Automatic sensor identification
- Graph reading with up to 2,000 measurements per second
- Display resolution 5 digits plus decimal point
- Supports different physical units
- 2 control windows with internal or external triggering
- 2<sup>nd</sup> trigger value for angle control or displacement control
- Adjustable low pass filter (10 to 500 Hz)
- Supports the loading of a reference graph for comparison
- Direct export of the graph reading into Excel
- Direct export of measurements results listing into Excel with SPC document template
- Supported operating systems: Windows 7, Windows 8, Windows 10.
- Direct sensor connectivity via USB or Ethernet
- Cursor function with single values
- 2<sup>nd</sup> measurement display window (configurable)
- Bar code reader support for automatic loading of sensor configuration
- Supports a 2<sup>nd</sup> connected sensor with overlaid secondary graph ("n-clude-mode" e.g. for additional simultaneous measuring of clamping force in a screw joint)

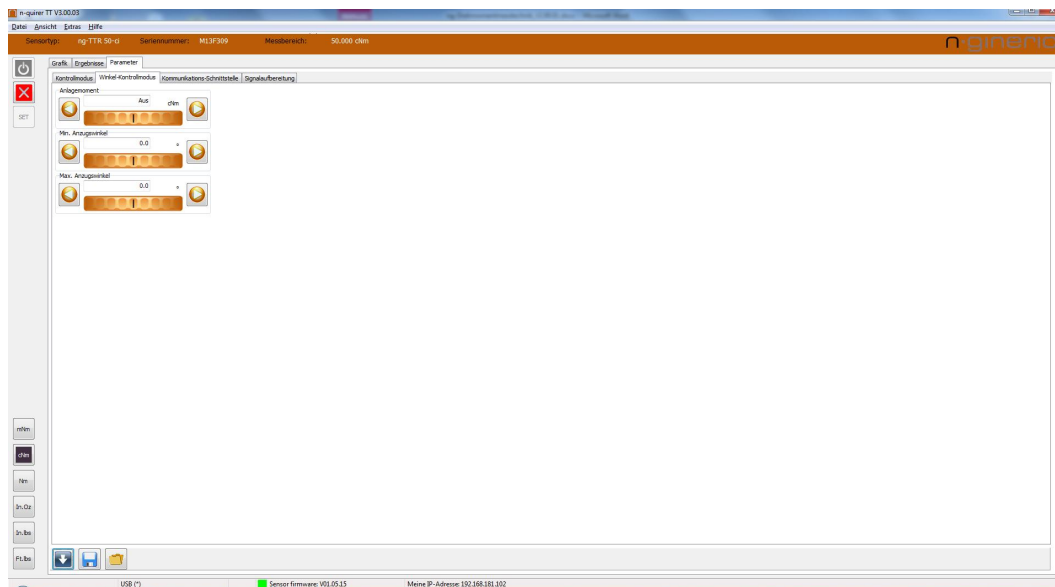
Article Number 01-01-00143-01



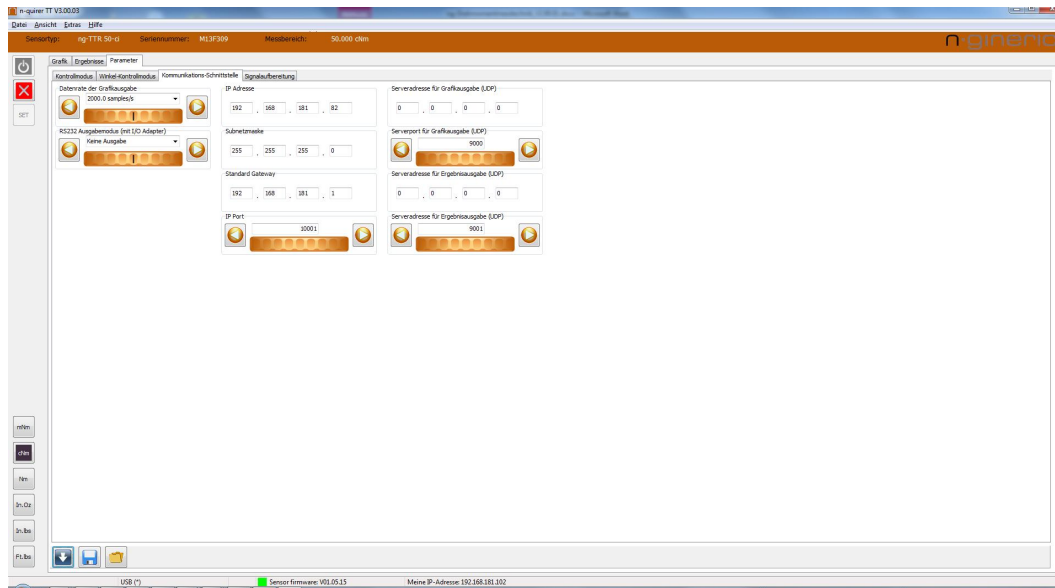
n-quirer TT V3 graph window



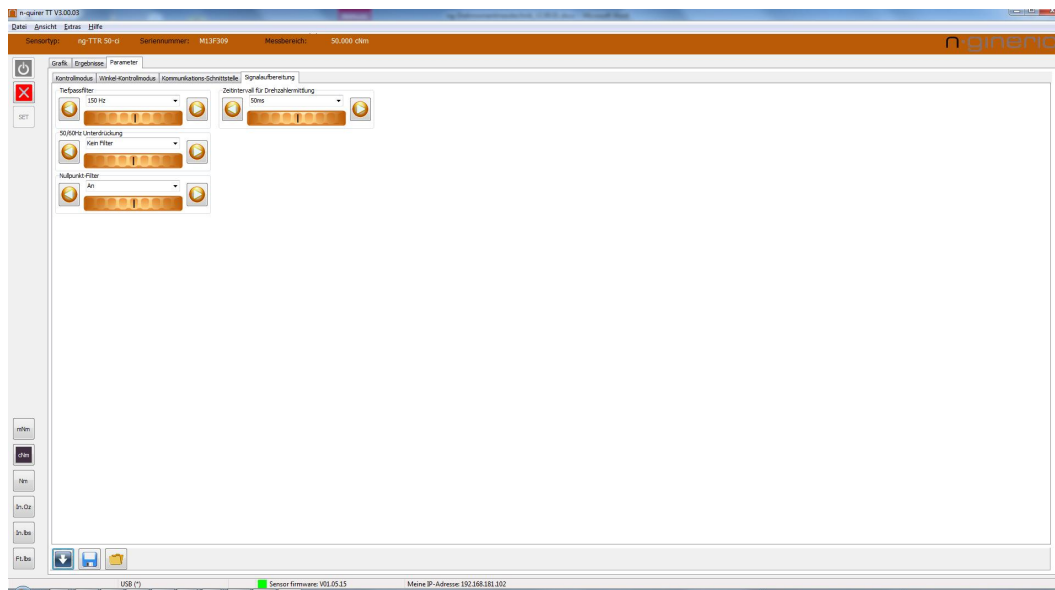
n-quirer TT V3 control mode tab sheet



n-quirer TT V3 angle control mode tab sheet



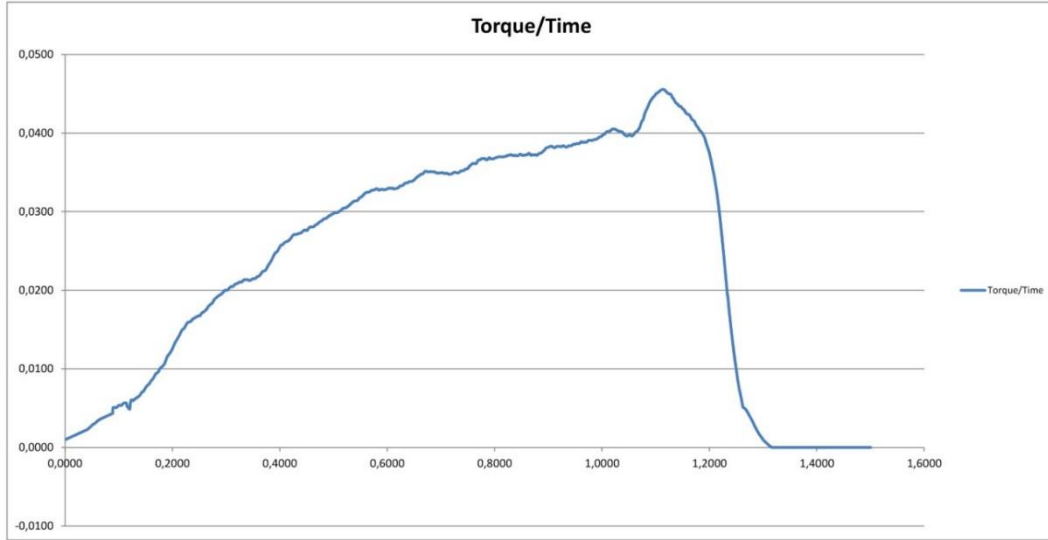
n-quirer TT V3 communication interface tab sheet



n-quirer TT V3 signal conditioning tab sheet

Graph

Date/Time:	26.05.13 17:43:20
Tool Serial Number:	M13F309
Y-Axis Unit:	cNm
X-Axis Unit:	s



n-quirer TT V3 graph exported to Excel

Seq.	Objekt	Zeit	Max.	Min.	Wert	Einheit	Winkel	Minuswert (Ergebnis)	Max. Drehzahl (U/min)	Min. Drehzahl (U/min)	Durchschn. Drehzahl	Max. Leistung (W)	Min. Leistung (W)	Durchschn. Leistung	Anzahlwert	
1	2013-05-26	17:34:34	3.593	-0.001	1.346	dNm		12.30	*	0x0000	16.0	0.0	3.7	0.000	0.000	0.018
2	2013-05-26	17:34:35	3.462	0.000	1.418	dNm		3.20	*	0x0000	-9.6	0.0	0.6	0.030	0.000	0.008
3	2013-05-26	17:34:36	3.742	-0.001	1.560	dNm		3.60	*	0x0000	-10.0	0.0	0.6	0.035	0.000	0.010
4	2013-05-26	17:34:37	2.998	0.000	1.245	dNm		-0.30	*	0x0000	-6.3	0.0	-0.4	0.011	0.000	0.003
5	2013-05-26	17:34:39	3.112	0.000	1.296	dNm		1.60	*	0x0000	-7.6	0.0	0.6	0.010	0.000	0.004
6	2013-05-26	17:34:40	3.904	0.000	1.229	dNm		0.80	*	0x0000	-7.1	0.0	0.0	0.011	0.000	0.003
7	2013-05-26	17:34:41	2.956	-0.001	1.268	dNm		0.00	*	0x0000	-8.6	0.0	-0.1	0.008	0.000	0.003
8	2013-05-26	17:34:42	3.353	-0.001	1.604	dNm		2.60	*	0x0000	-9.0	0.0	0.5	0.017	0.000	0.006
9	2013-05-26	17:34:44	3.378	0.000	1.606	dNm		1.30	*	0x0000	-8.6	0.0	0.2	0.013	0.000	0.004
10	2013-05-26	17:34:45	3.323	-0.001	1.431	dNm		0.00	*	0x0000	-8.0	0.0	-0.1	0.013	0.000	0.003

n-quirer TT V3 measurement results

n-gineric Statistical Report

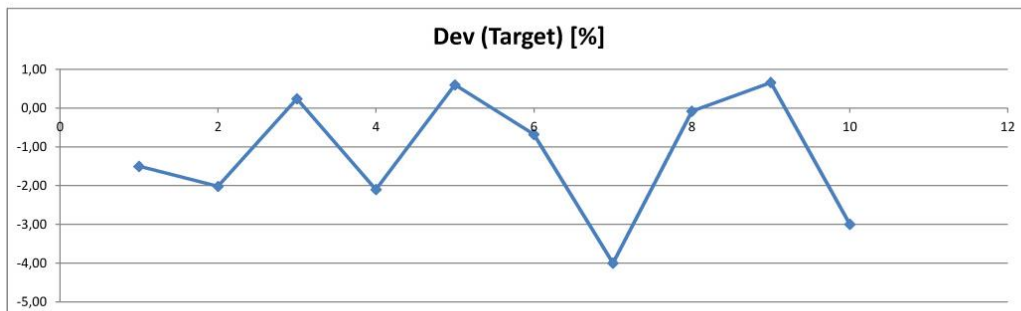
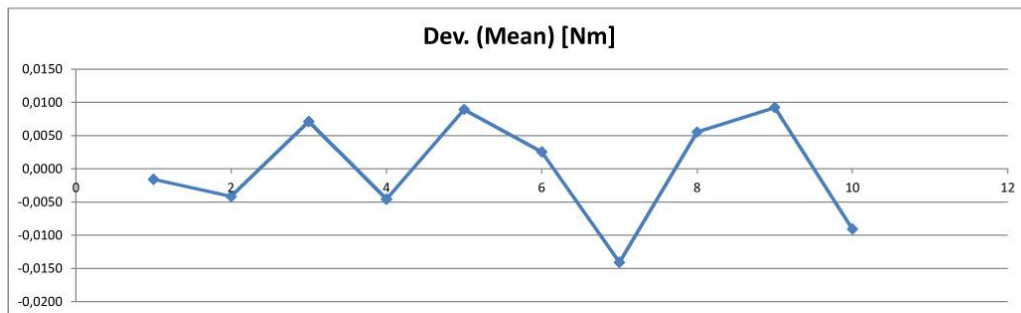
Date/Time:	28.08.12 18:01:49	Tool Serial Number:	M13F4E0
Target Value [Nm]:	0,5000	Tolerance (+/-) [%]:	12,00%

Count	Date	Time	Max.	Unit	Dev (Target) [%]	Dev. (Mean) [Nm]	Sqr. Deviation
1	2012-08-28	18:00:47	0,4925	Nm	-1,50	-0,0016	0,0000
2	2012-08-28	18:00:52	0,4899	Nm	-2,02	-0,0042	0,0000
3	2012-08-28	18:00:55	0,5012	Nm	0,24	0,0071	0,0001
4	2012-08-28	18:00:58	0,4895	Nm	-2,10	-0,0046	0,0000
5	2012-08-28	18:01:00	0,503	Nm	0,60	0,0089	0,0001
6	2012-08-28	18:01:03	0,4966	Nm	-0,68	0,0025	0,0000
7	2012-08-28	18:01:06	0,48	Nm	-4,00	-0,0141	0,0002
8	2012-08-28	18:01:11	0,4996	Nm	-0,08	0,0055	0,0000
9	2012-08-28	18:01:22	0,5033	Nm	0,66	0,0092	0,0001
10	2012-08-28	18:01:25	0,485	Nm	-3,00	-0,0091	0,0001

Lower Limit:	0,4400
Upper Limit:	0,5600
Process Mean:	0,4941
Standard Deviation:	0,0080
Cm	2,50
Cml	2,26
Cmu	2,75
Cmk	2,26

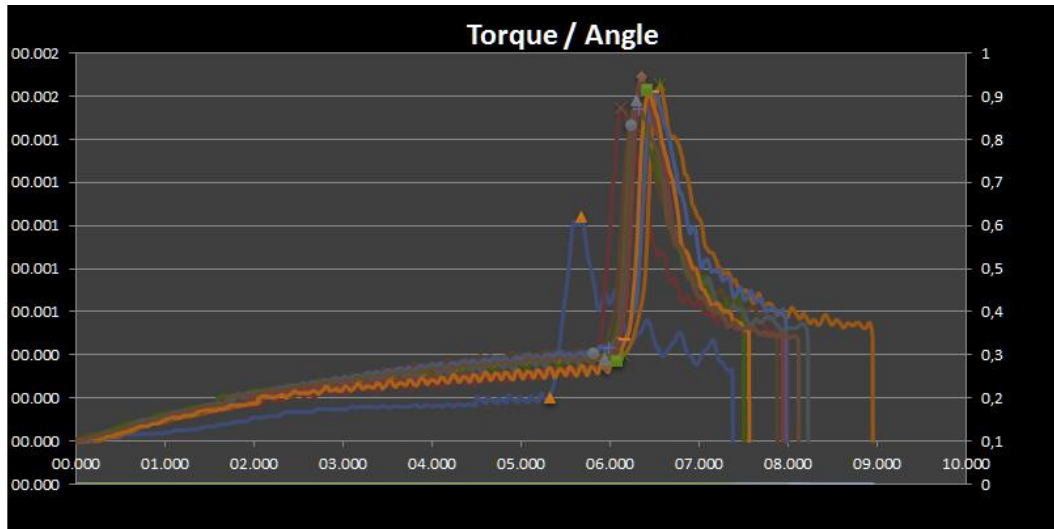
n-quirer TT V3 SPC report in Excel

n-gineric Statistical Report



Example of an Excel report with SPC functionality. Modifications of the template are possible according to your demands.





n-quirer TT V3 Torque/Angle Signature Analysis report in Excel

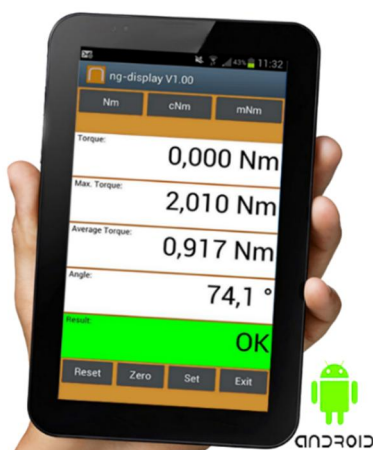
### 1.3 Sensor System Software ng-Display

Measurement Monitoring Application for Android devices, in combination with all intelligent Sensors from n-gineric, providing

- Automatic sensor identification
- Supports different physical units
- 2 control windows
- Direct sensor connectivity via USB

This application can be downloaded free of charge.

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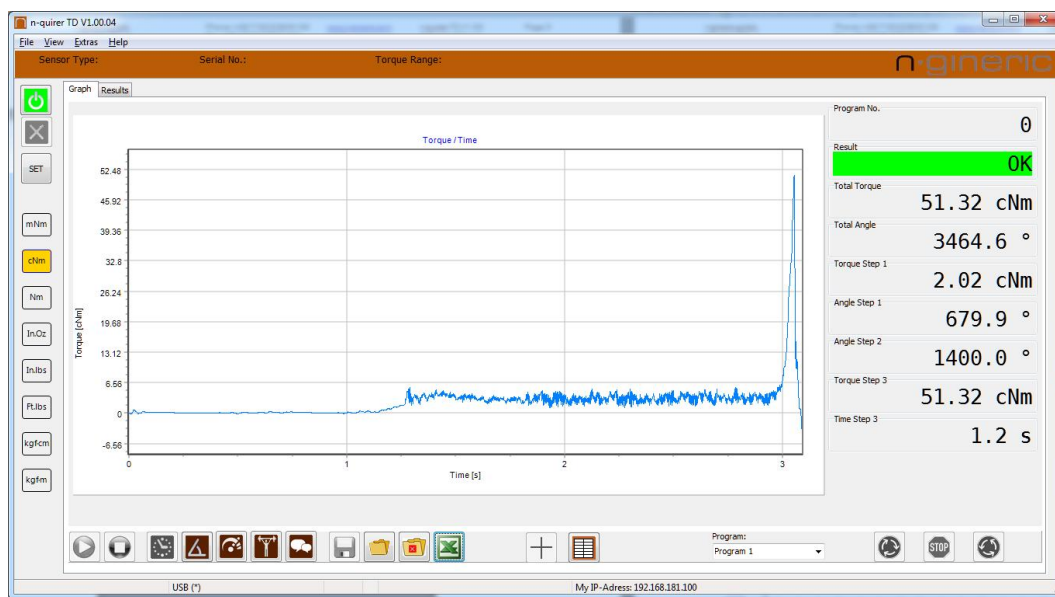
Requirements: Android 3.2 or higher, USB Host or OTG

## 1.4 Torque Driver System Software n-quirer TD

n-quirer TD is a software designed for ng-TDH and ng-TDS Torque Drivers. It provides parameter and program management, graphical visualization, and screw driving process data logging.

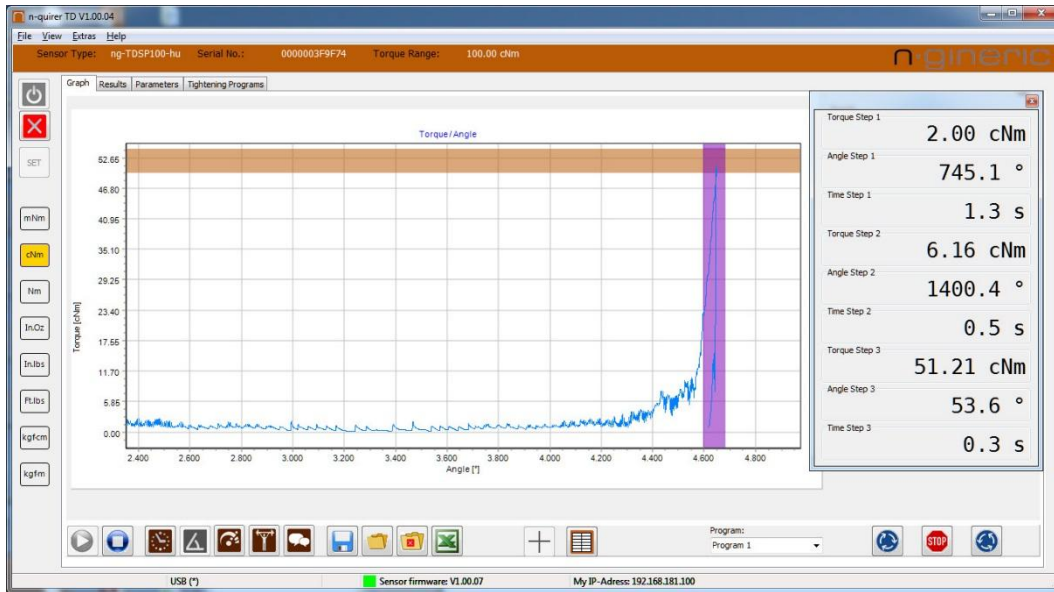
After connecting the Torque Driver, the system is being identified by showing the Type, serial number, and torque range in the header line. The Torque Driver firmware version is shown at the bottom line.

Article Number	01-01-00215-01
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### n-quirer TD V2 Graph

The graph reading of the screw tightening process is shown here. The display for numerical results of each screw tightening step can be configured in the setup.



n-quirer TD V2 Torque/ Angle Graph

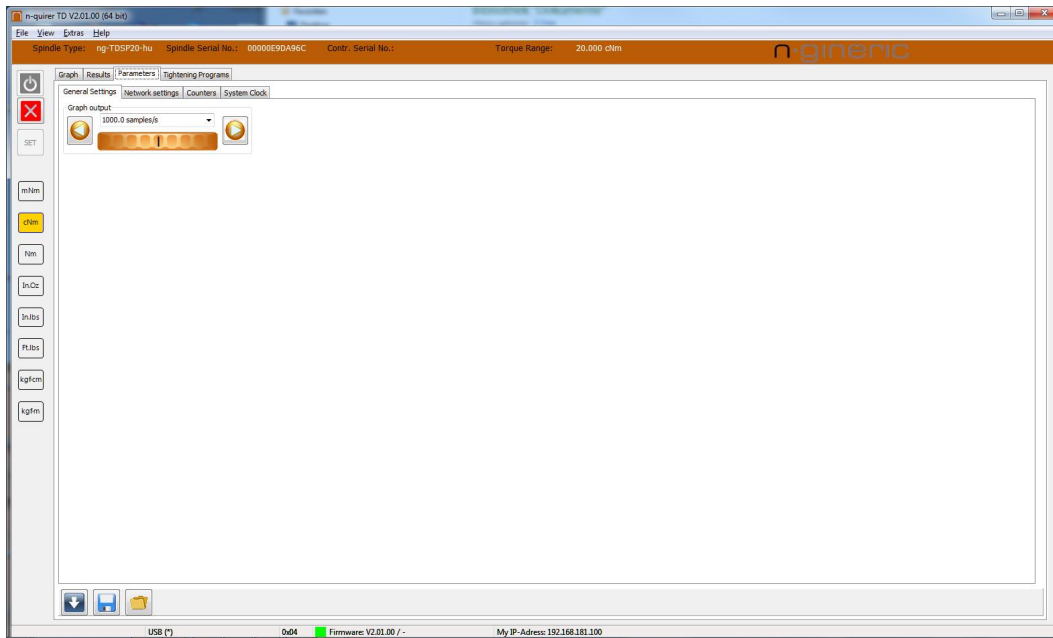
No.	Date	Time	Serial No.	Program No.	Result	Unit	Total Torque	Total Angle	Total Time	Torque Step 1	Angle Step 1	Time Step 1	Torque Step 2	Angle Step 2	Time Step 2	Torque Step 3	Angle Step 3	Time Step 3	Torque Step 4	Angle Step 4	Time Step 4	Torque Step 5	Angle Step 5	Time Step 5	
1	2015-07-27	14:30:45	0000003F9F74	P1	1	3	okm	50.31	2521.8	1.9	2.03	412.9	0.7	7.47	1461.0	0.5	50.31	766.3	0.6	0.00	0.0	0.0	0.0	0.0	0.0
2	2015-07-27	14:30:51	0000003F9F74	P1	1	3	okm	50.49	2478.5	2.1	2.01	613.2	1.1	7.71	1400.8	0.5	50.49	463.2	0.4	0.00	0.0	0.0	0.0	0.0	0.0
3	2015-07-27	14:30:55	0000003F9F74	P1	1	3	okm	50.00	2346.3	2.3	2.01	704.9	1.3	15.52	1441.3	0.5	50.00	532.4	0.3	0.00	0.0	0.0	0.0	0.0	0.0
4	2015-07-27	14:30:58	0000003F9F74	P1	1	3	okm	50.55	2463.7	1.9	2.00	481.3	0.9	12.77	1400.0	0.5	50.55	560.7	0.5	0.00	0.0	0.0	0.0	0.0	0.0
5	2015-07-27	14:31:29	0000003F9F74	P1	1	3	okm	50.71	2487.0	2.1	2.01	628.2	1.1	28.99	1400.0	0.5	50.71	426.5	0.3	0.00	0.0	0.0	0.0	0.0	0.0

n-quirer TD V2 Screw Tightening Results

After each screw tightening the result will be appended to the listing. The listing of results can be exported into Excel.

n-gineric Screw Fastening Results																				
n-gineric Screw Fastening Results																				
Date/Time: 2015-07-27 18:00:05			Tool Ser. No: 0000003F9F74				Tool Type: ng-TDSP100-hu													
Comment: Test 1001			Part Name:				Batch:													
Part No.																				
No.	Date	Time	Measurement			Total Result			Step 1		Step 2		Step 3							
			Serial No.	Program No.	Result	Step	Unit	Torque	Angle	Time	Torque	Angle	Time	Torque	Angle	Time				
10	1	2015-07-27	17:57:31	0000003F9F74	P1	1	3	cNm	50.940	3456.0	3.2	2.010	809.3	1.5	10.970	1401.2	0.5	50.940	19.8	1.1
11	2	2015-07-27	17:57:37	0000003F9F74	P1	1	3	cNm	51.940	3267.9	2.8	2.010	594.2	1.1	7.680	1400.0	0.5	51.940	20.5	1.1
12	3	2015-07-27	17:57:42	0000003F9F74	P1	1	3	cNm	52.180	3559.7	3.0	2.000	592.2	1.0	6.180	1400.1	0.5	52.180	31.2	1.4
13	4	2015-07-27	17:57:46	0000003F9F74	P1	1	3	cNm	52.540	3695.5	3.2	2.000	626.0	1.1	8.590	1400.5	0.5	52.540	25.4	1.5
14	5	2015-07-27	17:57:51	0000003F9F74	P1	1	3	cNm	50.510	3621.6	3.1	2.010	593.5	1.1	6.850	1400.9	0.5	50.510	22.9	1.6
15	6	2015-07-27	17:58:01	0000003F9F74	P1	1	3	cNm	51.360	3225.4	2.7	2.010	540.9	1.0	6.530	1400.3	0.5	51.360	81.6	1.1
16	7	2015-07-27	17:58:05	0000003F9F74	P1	1	3	cNm	50.700	2726.9	2.3	2.010	621.1	1.1	5.910	1400.9	0.5	50.700	43.8	0.6
17	8	2015-07-27	17:58:09	0000003F9F74	P1	1	3	cNm	51.270	2768.2	2.3	2.000	558.0	1.0	6.710	1401.1	0.5	51.270	87.9	0.7
18	9	2015-07-27	17:58:16	0000003F9F74	P1	1	3	cNm	50.810	2712.6	2.2	2.000	497.4	0.9	11.730	1400.3	0.5	50.810	32.3	0.7
19	10	2015-07-27	17:58:20	0000003F9F74	P1	1	3	cNm	53.030	2321.4	1.8	2.000	457.2	0.8	9.450	1400.1	0.5	53.030	45.3	0.4
20	11	2015-07-27	17:58:36	0000003F9F74	P1	1	3	cNm	50.800	2376.0	1.9	2.000	484.8	0.9	13.000	1401.3	0.5	50.800	72.8	0.4
21	12	2015-07-27	17:58:40	0000003F9F74	P1	1	3	cNm	51.580	2435.6	1.8	2.050	395.3	0.7	6.260	1400.8	0.5	51.580	36.8	0.6

The listing of the screw tightening results can be exported into Excel, e. g. for Statistical Process Control.



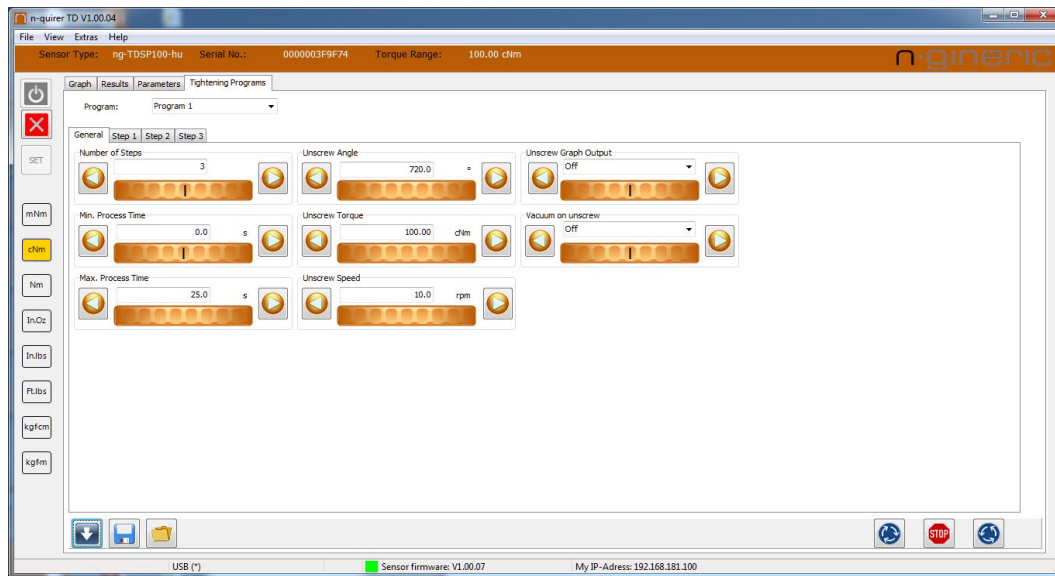
### n-quirer TD V2 Parameters

Here you can configure the general settings like the graph output data rate, the network settings, the counters and the system clock.

## n-quirer TD V2 Tightening Programs

## General Parameters

General parameters like the number of steps of the tightening process, the unscrew parameters, the vacuum function and the tightening cycle time window can be configured here.



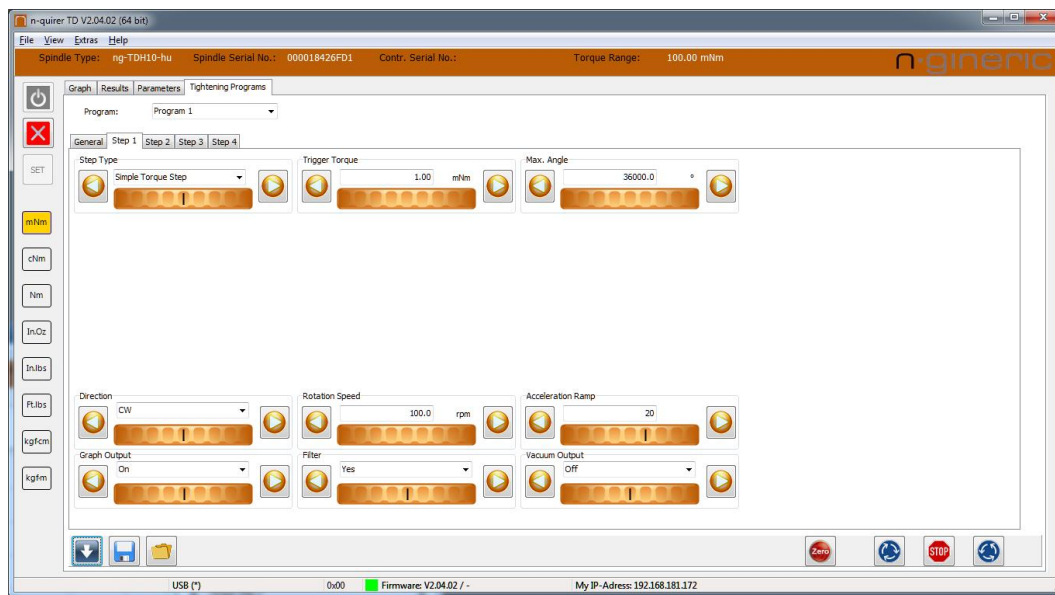
## Screw Tightening Step Types

The screw tightening process can be defined by a sequence of 1 to 8 different steps.

There are 7 step Types:

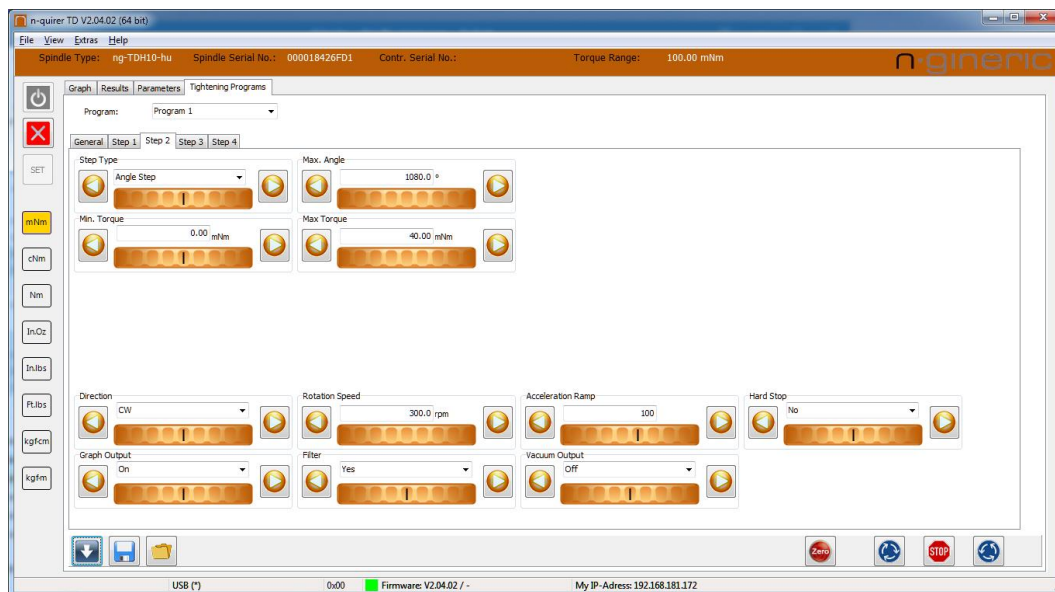
- Simple Torque Step
- Angle Step
- Average Angle Step
- Torque Step
- Snug Torque Step
- Delta Torque Step
- Time Step

## Simple Torque Step



The Simple Torque Step facilitates the screw engagement and avoids cross threading.

## Angle Step

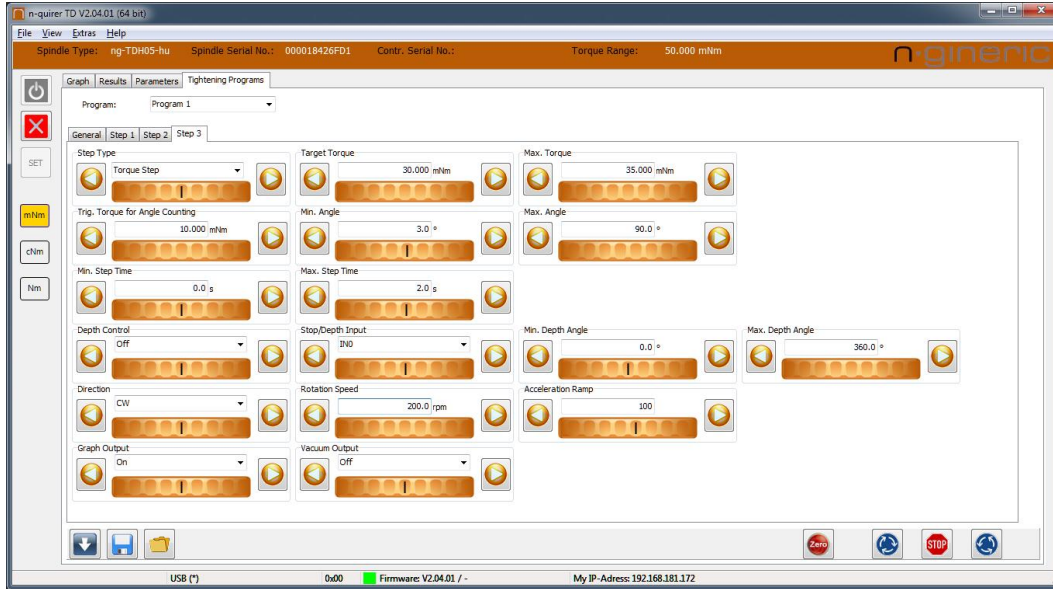


The Angle Step provides high productivity by quickly running the screw down. The Angle Step is limited by the angle programmed. It has to be adjusted accordingly that the final tightening can be done after the Angle Step has been finished.

## Average Angle Step

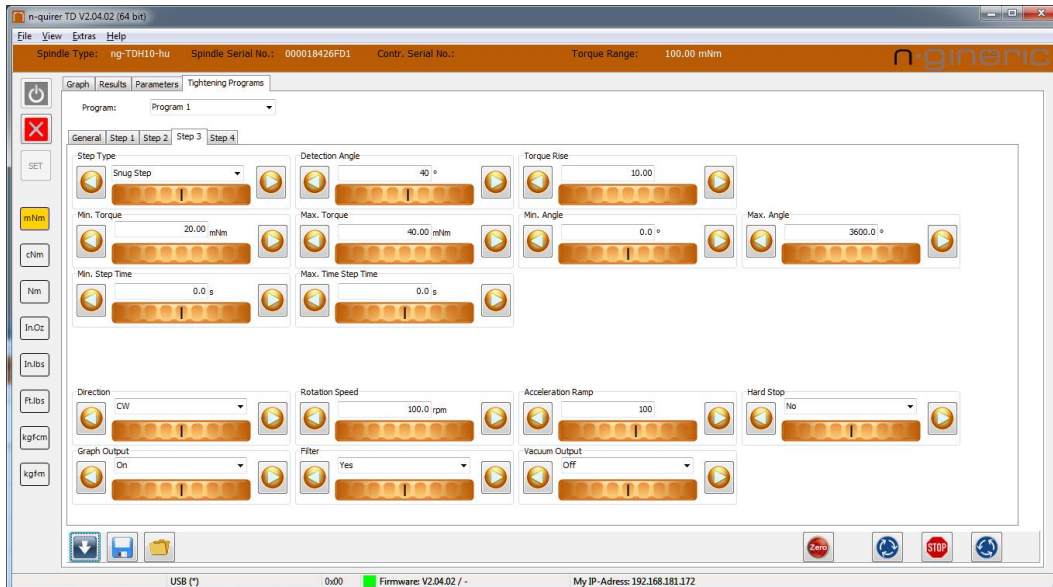
The Average Angle Step is mainly used for measurement applications. Here the arithmetic mean of the torque is being calculated while the angle step is running. The mean value has to reach the minimum torque, but must not exceed the maximum torque.

## Torque Step



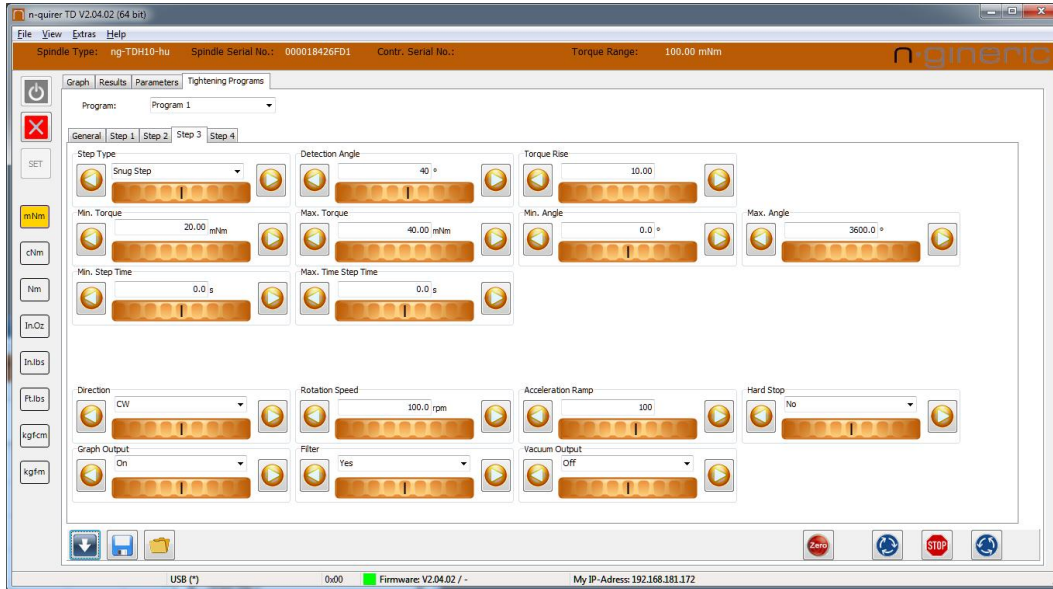
The Torque Step provides a high level of process security by monitoring the torque window, the time window, the angle torque/angle gradient, and, as an option, the screw insertion depth.

## Snug Torque Step



The Snug Torque Step was designed to detect the torque just at the point when the screw is seated, that means when the screw head touches the surface of the part, just before additional torque will generate clamping force inside the screw joint. As soon as the screw is seated, the torque raises quickly, the torque vs. angle gradient changes, so it can be detected by appropriate parameter settings.

## Delta Torque Step



The Delta Torque Step allows to apply an amount of torque providing proportionate clamping force to the screw joint, with monitoring of the programmed windows. It is especially used after the Snug Point detection. The target torque is variably calculated, depending on the Snug Torque (if the previous step was a Snug Step), and the programmed limits. The torque delta can be varied by setting the target limits, because if the snug torque is high, it allows a higher amount of added torque, compared to a low snug torque.

## Time Step

The Time Step provides a programmable residence time, with an optional CW or CCW rotation.



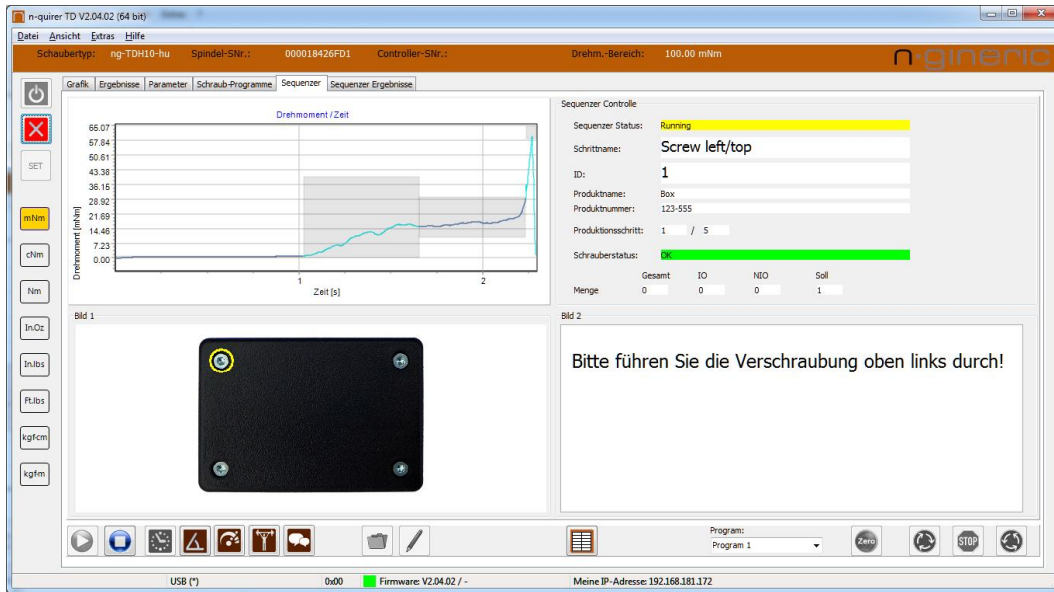
## 1.5 Torque Driver System Software n-quirer TD advanced

The scope of functions of the n-quirer TD advanced is the same as for the n-quirer TD, supplemented by a module that guides the operator through the assembly procedure.

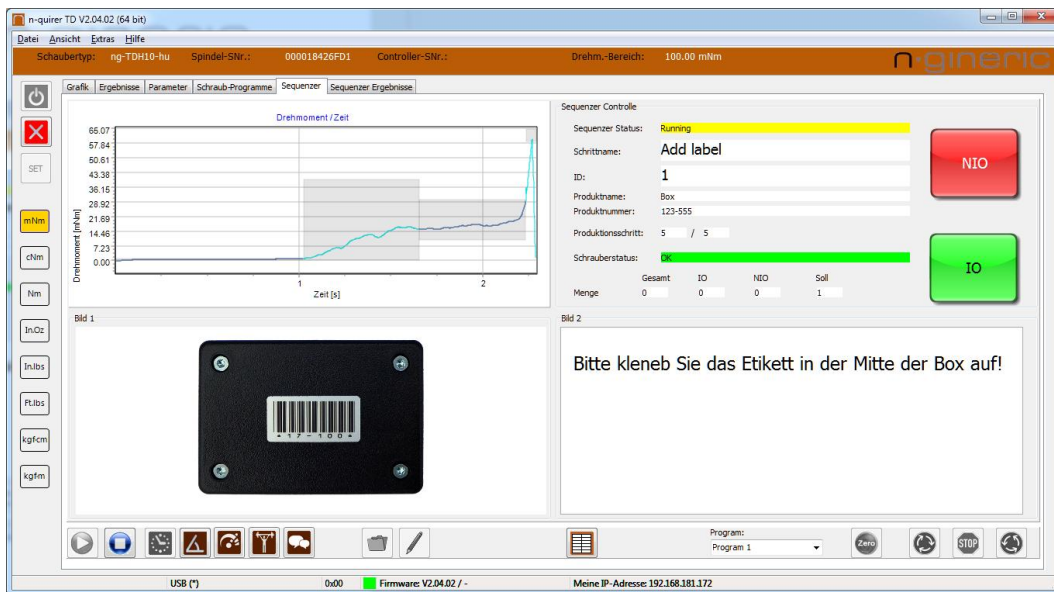


Each step in the assembly sequence is described with a written instruction and with pictures. Screw joint positions are visualized with circles. After a successful screw tightening, the sequence proceeds to the next step. Steps different from screw tightening can also be included. The result of the sequence is saved, as well as each sequence step. Workpieces can be identified via a bar code or DMC reader.

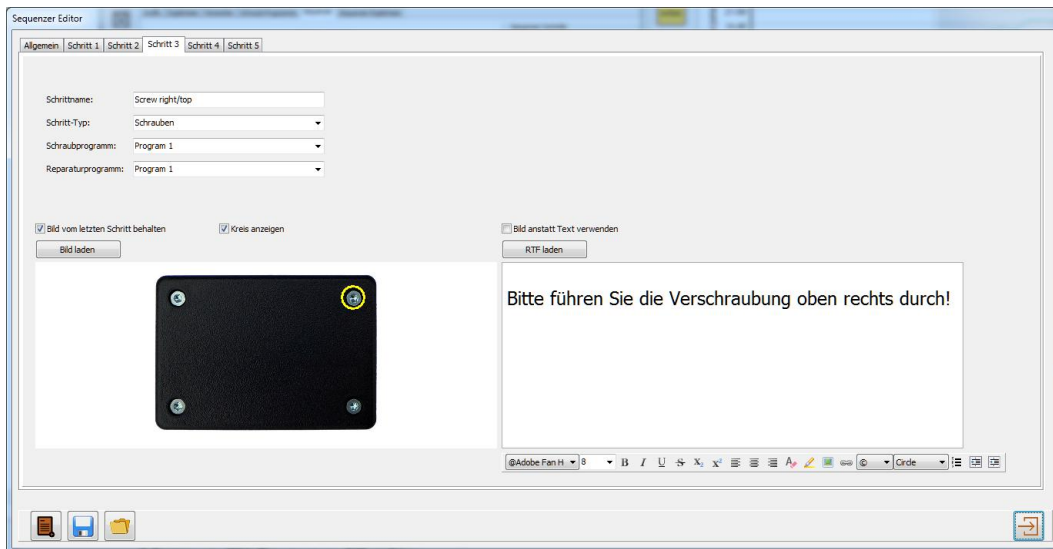
Article Number	01-01-00319-01
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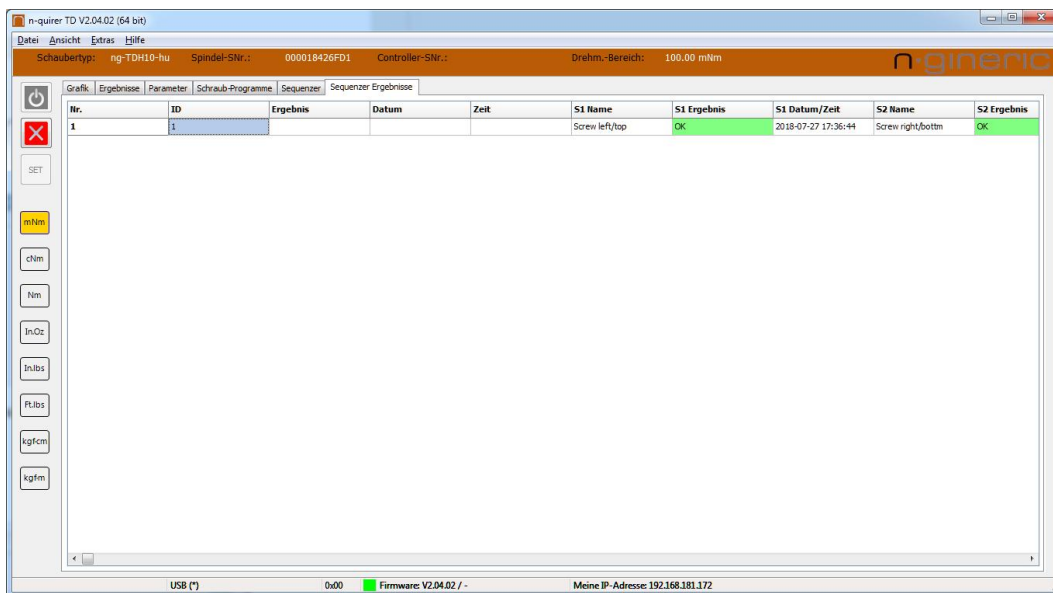
Example of instructions for a screw tightening step



Example of instructions for a general step



Sequencer - Editor



Sequencer- Results Listing

## 2 Intelligent Torque Sensors

- Based on Strain Gauge Technology
- Digital and Analog Interfaces



- Rotary Torque/Angle Sensors

- Stationary Torque Sensors

Nominal Measurement Ranges:

+/- 0,01 Nm

...

+/- 1000 Nm

- Handheld Torque Sensors

+/- 0,01 Nm

...

+/- 2 Nm

Torque Sensor Type Nomenclature:

ng-TT□-□ □-□□ □

- └ i = intelligent (USB + Ethernet + RS-485)
- └ u = intelligent (USB)
- └ a = analog
- └ x = 1/4" hexagon drive
- └ c = cylindric shafts
- └ q = square drive
- └ Torque measurement range (cNm)
- └ R = Rotary
- └ S = Stationary
- └ H = Handheld
- └ TT = Torque Transducer
- └ ng = n-gineric Product

## 2.1 Rotary Torque/Angle Sensors ng-TTR-i

- High precision strain gauge based torque sensors
- Brushless energy and signal transmission
- High resolution incremental encoder
- Ultra compact size
- USB Interface
- Ethernet Interface
- *ng-Link* Interface
- Torque window control
- Mechanical overload protection clutch (sensors up to 200 cNm range)
- Standard USB and Ethernet connectors



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00036-01	ng-TTR01-ci	+/- 1	intelligent	✓	3 mm Shaft
01-01-00004-01	ng-TTR02-ci	+/- 2	intelligent	✓	3 mm Shaft
01-01-00005-01	ng-TTR05-ci	+/- 5	intelligent	✓	3 mm Shaft



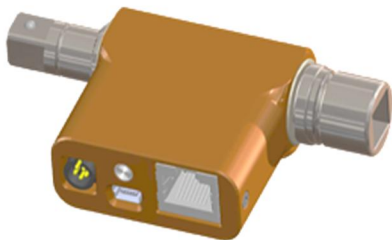
Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00006-01	ng-TTR10-ci	+/- 10	intelligent	✓	5 mm Shaft
01-01-00003-01	ng-TTR20-ci	+/- 20	intelligent	✓	5 mm Shaft



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00037-01	ng-TTR50-ci	+/- 50	intelligent	✓	8 mm Shaft
01-01-00038-01	ng-TTR100-ci	+/- 100	intelligent	✓	8 mm Shaft
01-01-00039-02	ng-TTR200-ci	+/- 200	intelligent	✓	8 mm Shaft
01-01-00040-01	ng-TTR500-ci	+/- 500	intelligent	-	8 mm Shaft
01-01-00041-01	ng-TTR1000-ci	+/- 1000	intelligent	-	8 mm Shaft
01-01-00140-02	ng-TTR2000-ci	+/- 2000	intelligent	-	12 mm Shaft

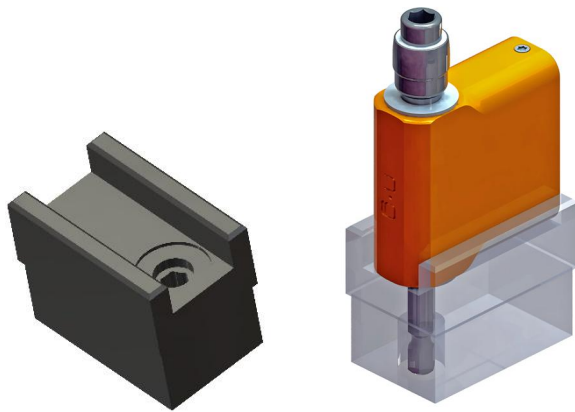


Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00007-01	ng-TTR50-xi	+/- 50	intelligent	✓	1/4" Hexagon
01-01-00008-01	ng-TTR100-xi	+/- 100	intelligent	✓	1/4" Hexagon
01-01-00009-01	ng-TTR200-xi	+/- 200	intelligent	✓	1/4" Hexagon
01-01-00010-01	ng-TTR500-xi	+/- 500	intelligent	-	1/4" Hexagon
01-01-00011-01	ng-TTR1000-xi	+/- 1000	Intelligent	-	1/4" Hexagon
01-01-00074-01	ng-TTR2000-xi	+/- 2000	Intelligent	-	1/4" Hexagon



Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00407-01	ng-TTR500-qj	+/- 5	Intelligent	-	1/4" Square
01-01-00249-01	ng-TTR2000-qj	+/- 20	Intelligent	-	1/4" Square
01-01-00073-01	ng-TTR5000-qj	+/- 50	Intelligent	-	3/8" Square

Accessories



Sensor Detent ng-TTR 1/4" Hexagon

Article Number	01-92-00016-01
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Sensor Detent 3/8" Square

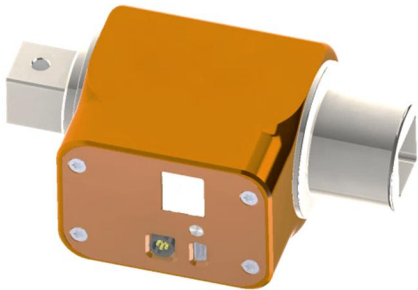
Article Number	01-92-00037-01
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Sensor Detent 1/2" Square

Article Number	01-92-00036-01
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Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00149-01	ng-TTR10000-qi	+/- 100	Intelligent	-	1/2" Square
01-01-00189-01	ng-TTR20000-qi	+/- 200	Intelligent	-	1/2" Square



Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00151-01	ng-TTR50000-qi	+/- 500	Intelligent	-	3/4" Square
01-01-00200-01	ng-TTR100000-qi	+/- 1000	Intelligent	-	1" Square



## 2.2 Rotary Torque/Angle Sensors ng-TTR-u

- High precision strain gauge based torque sensors
- Brushless energy and signal transmission
- High resolution incremental encoder
- Ultra compact size
- USB Interface
- Torque window control
- Mechanical overload protection clutch (sensors up to 200 cNm range)
- Standard USB connector



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00088-01	ng-TTR01-cu	+/- 1	USB	✓	3 mm Shaft
01-01-00089-01	ng-TTR02-cu	+/- 2	USB	✓	3 mm Shaft
01-01-00090-01	ng-TTR05-cu	+/- 5	USB	✓	3 mm Shaft



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00091-01	ng-TTR10-cu	+/- 10	USB	✓	5 mm Shaft
01-01-00092-01	ng-TTR20-cu	+/- 20	USB	✓	5 mm Shaft



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00093-01	ng-TTR50-cu	+/- 50	USB	✓	8 mm Shaft
01-01-00094-01	ng-TTR100-cu	+/- 100	USB	✓	8 mm Shaft
01-01-00095-01	ng-TTR200-cu	+/- 200	USB	✓	8 mm Shaft
01-01-00096-01	ng-TTR500-cu	+/- 500	USB	-	8 mm Shaft
01-01-00097-01	ng-TTR1000-cu	+/- 1000	USB	-	8 mm Shaft
01-01-00142-02	ng-TTR2000-cu	+/- 2000	USB	-	12 mm Shaft

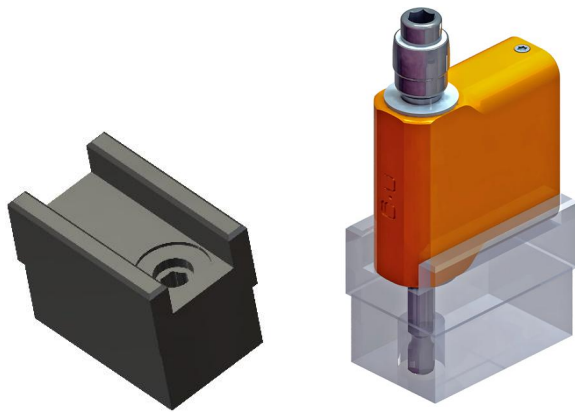


Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00098-01	ng-TTR50-xu	+/- 50	USB	✓	1/4" Hexagon
01-01-00099-01	ng-TTR100-xu	+/- 100	USB	✓	1/4" Hexagon
01-01-00100-01	ng-TTR200-xu	+/- 200	USB	✓	1/4" Hexagon
01-01-00101-01	ng-TTR500-xu	+/- 500	USB	-	1/4" Hexagon
01-01-00102-01	ng-TTR1000-xu	+/- 1000	USB	-	1/4" Hexagon
01-01-00103-01	ng-TTR2000-xu	+/- 2000	USB	-	1/4" Hexagon



Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00191-01	ng-TTR2000-qu	+/- 20	USB	-	1/4" Square
01-01-00104-01	ng-TTR5000-qu	+/- 50	USB	-	3/8" Square

Accessories



Sensor Detent ng-TTR 1/4" Hexagon

Article Number	01-92-00016-01
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Sensor Detent 3/8" Square

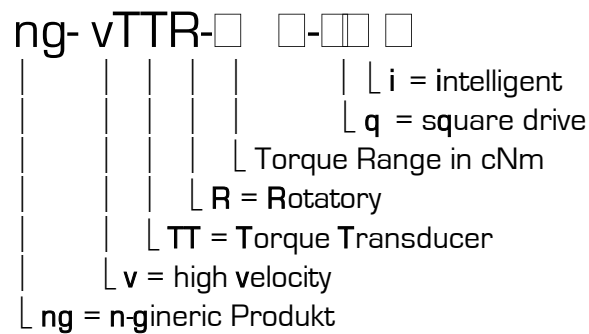
Article Number	01-92-00037-01
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## 2.3 Rotary Torque/Angle Sensors ng-vTTR

Optimized for the measurement of pulse tools

- High precision strain gauge based torque sensors
- Brushless energy and signal transmission
- High resolution incremental encoder
- Ultra compact size
- Minimized weight and moment of inertia
- Extended RPM range (up to 10.000)
- USB Interface
- Ethernet-Interface
- ng-Link Interface
- Torque window control
- Robust threaded connector for USB

Torque Sensor Type Nomenclature:



Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00330-01	ng-vTTR8000-qi	+/- 80	intelligent	-	1/2" Square
01-01-00335-01	ng-vTTR16000-qi	+/- 160	intelligent	-	1/2" Square

### Accessories

Cable ng-eTTR / USB-A 1,8 m

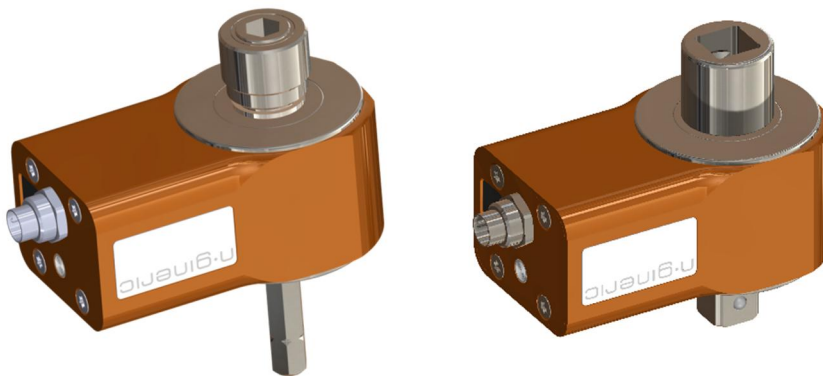
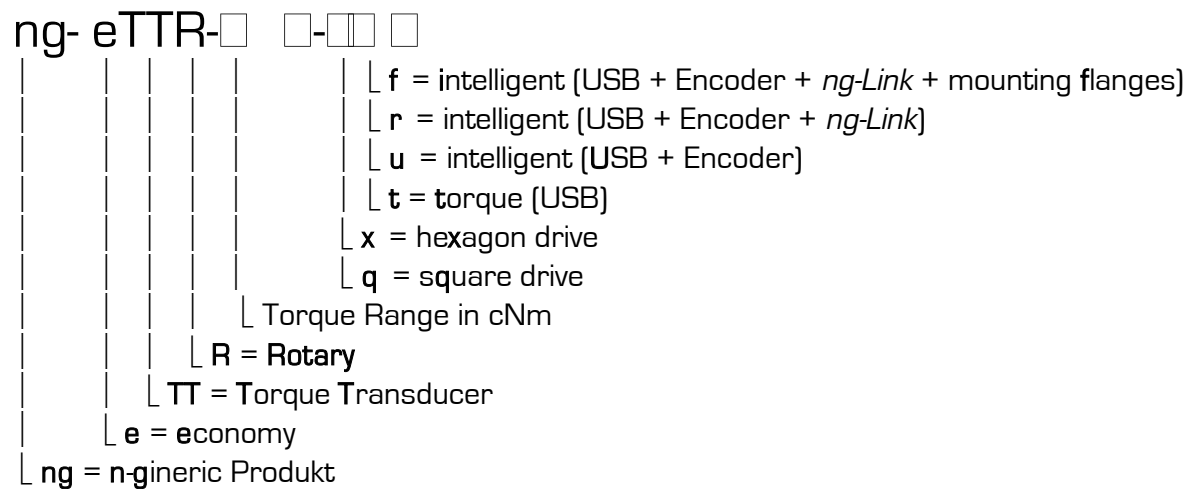
Article Number	01-90-00008-01
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## 2.4 Rotary Torque/Angle Sensors ngeTTR

Torque sensors with robust design for the production floor

- High precision strain gauge based torque sensors
- Brushless energy and signal transmission
- Optional high resolution incremental encoder
- Compact size
- USB Interface
- Optional *ng-Link* Interface
- Torque window control
- Robust threaded connector for USB
- Optional mounting flanges

Torque Sensor Type Nomenclature:



Article Number	Type	Torque Range Nm	USB	Encoder	ng-Link	Drive
01-01-00197-01	ng-eTTR200-xt	+/- 2	✓	-	-	1/4" Hexagon
01-01-00202-01	ng-eTTR200-xu	+/- 2	✓	✓	-	1/4" Hexagon
01-01-00206-01	ng-eTTR200-xr	+/- 2	✓	✓	✓	1/4" Hexagon
01-01-00196-01	ng-eTTR500-xt	+/- 5	✓	-	-	1/4" Hexagon
01-01-00203-01	ng-eTTR500-xu	+/- 5	✓	✓	-	1/4" Hexagon
01-01-00207-01	ng-eTTR500-xr	+/- 5	✓	✓	✓	1/4" Hexagon
01-01-00195-01	ng-eTTR1000-xt	+/- 10	✓	-	-	1/4" Hexagon
01-01-00204-01	ng-eTTR1000-xu	+/- 10	✓	✓	-	1/4" Hexagon
01-01-00208-01	ng-eTTR1000-xr	+/- 10	✓	✓	✓	1/4" Hexagon
01-01-00201-01	ng-eTTR2000-xt	+/- 20	✓	-	-	1/4" Hexagon
01-01-00205-01	ng-eTTR2000-xu	+/- 20	✓	✓	-	1/4" Hexagon
01-01-00209-01	ng-eTTR2000-xr	+/- 20	✓	✓	✓	1/4" Hexagon
01-01-00288-01	ng-eTTR5000-qt	+/- 50	✓	-	-	3/8" Square
01-01-00159-01	ng-eTTR5000-qu	+/- 50	✓	✓	-	3/8" Square
01-01-00323-01	ng-eTTR5000-qr	+/- 50	✓	✓	✓	3/8" Square

With double-sided mounting flanges



Article Number	Type	Torque Range Nm	USB	Encoder	ng-Link	Drive
01-01-00211-01	ng-eTTR200-xf	+/- 2	✓	✓	✓	1/4" Hexagon
01-01-00212-01	ng-eTTR500-xf	+/- 5	✓	✓	✓	1/4" Hexagon
01-01-00213-01	ng-eTTR1000-xf	+/- 10	✓	✓	✓	1/4" Hexagon
01-01-00214-01	ng-eTTR2000-xf	+/- 20	✓	✓	✓	1/4" Hexagon
01-01-00322-01	ng-eTTR5000-qf	+/- 50	✓	✓	✓	3/8" Square

## Accessories

Cable ng-eTTR / USB-A 1,8 m

Article Number	01-90-00008-01
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## 2.5 Rotary Torque/Angle Sensors ng-TTR-a

Rotary torque sensors with analog + digital Interface

- High precision strain gauge based Torque Sensors
- Brushless energy and signal transmission
- High resolution incremental encoder (2 channel TTL level signals)
- Ultra compact size
- Mechanical overload protection clutch (sensors up to 200 cNm range)
- Calibration data stored in sensor memory
- Analog torque output signal options:
  - 0 to 5 V, zero point at 2.5 V
  - 0 to 10 V, zero point at 5 V
- Power supply 12 V DC +/- 5 %, 150 mA
- USB Interface
- Torque window control (via USB)



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00048-01	ng-TTR01-ca	+/- 1	analog + USB	✓	3 mm Shaft
01-01-00049-01	ng-TTR02-ca	+/- 2	analog + USB	✓	3 mm Shaft
01-01-00050-01	ng-TTR05-ca	+/- 5	analog + USB	✓	3 mm Shaft



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00051-01	ng-TTR10-ca	+/- 10	analog + USB	✓	5 mm Shaft
01-01-00052-01	ng-TTR20-ca	+/- 20	analog + USB	✓	5 mm Shaft



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00053-01	ng-TTR50-ca	+/- 50	analog + USB	✓	8 mm Shaft
01-01-00054-01	ng-TTR100-ca	+/- 100	analog + USB	✓	8 mm Shaft
01-01-00055-01	ng-TTR200-ca	+/- 200	analog + USB	✓	8 mm Shaft
01-01-00056-01	ng-TTR500-ca	+/- 500	analog + USB	-	8 mm Shaft
01-01-00057-01	ng-TTR1000-ca	+/- 1000	analog + USB	-	8 mm Shaft
01-01-00141-02	ng-TTR2000-ca	+/- 2000	analog + USB	-	12 mm Shaft



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00058-01	ng-TTR50-xa	+/- 50	analog + USB	✓	1/4" Hexagon
01-01-00059-01	ng-TTR100-xa	+/- 100	analog + USB	✓	1/4" Hexagon
01-01-00060-01	ng-TTR200-xa	+/- 200	analog + USB	✓	1/4" Hexagon
01-01-00061-01	ng-TTR500-xa	+/- 500	analog + USB	-	1/4" Hexagon
01-01-00024-01	ng-TTR1000-xa	+/- 1000	analog + USB	-	1/4" Hexagon
01-01-00078-01	ng-TTR2000-xa	+/- 2000	analog + USB	-	1/4" Hexagon



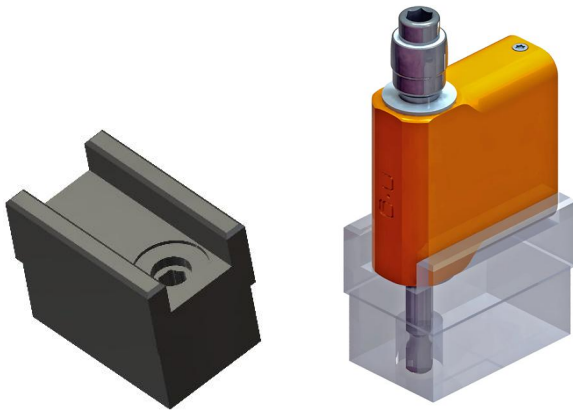
Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00077-01	ng-TTR5000-qa	+/- 5000	analog + USB	-	3/8" Square



## Accessories

Sensor cable for analog interface, with single-sided connector, 1.5 meters

Article Number	01-90-00021-01
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Sensor Detent ng-TTR 1/4" Hexagon

Article Number	01-92-00016-01
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## 2.6 Stationary Torque Sensors ng-TTS-i

- High precision strain gauge based Torque Sensors
- USB Interface
- Ethernet Interface
- *ng-Link* Interface
- Torque window control
- Mechanical overload protection (sensors up to 200 cNm range)
- Standard USB and Ethernet connectors



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00042-01	ng-TTS01-ci	+/- 1	intelligent	✓	3 mm Bore
01-01-00015-01	ng-TTS02-ci	+/- 2	intelligent	✓	3 mm Bore
01-01-00016-01	ng-TTS05-ci	+/- 5	intelligent	✓	3 mm Bore
01-01-00017-01	ng-TTS10-ci	+/- 10	intelligent	✓	3 mm Bore
01-01-00018-01	ng-TTS20-ci	+/- 20	intelligent	✓	3 mm Bore

Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00019-01	ng-TTS50-xi	+/- 50	intelligent	✓	1/4" Hexagon
01-01-00020-01	ng-TTS100-xi	+/- 100	intelligent	✓	1/4" Hexagon
01-01-00021-01	ng-TTS200-xi	+/- 200	intelligent	✓	1/4" Hexagon
01-01-00022-01	ng-TTS500-xi	+/- 500	intelligent	-	1/4" Hexagon
01-01-00023-01	ng-TTS1000-xi	+/- 1000	intelligent	-	1/4" Hexagon
01-01-00075-01	ng-TTS2000-xi	+/- 2000	intelligent	-	1/4" Hexagon

Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00076-01	ng-TTS5000-qi	+/- 5000	intelligent	-	3/8" Square



Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00168-02	ng-TTS10000-qi	+/- 100	intelligent	-	1/2" Square



Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00169-01	ng-TTS20000-qi	+/- 200	intelligent	-	1/2" Square
01-01-00170-01	ng-TTS50000-qi	+/- 500	intelligent	-	3/4 Square
01-01-00210-01	ng-TTS100000-qi	+/- 1000	intelligent	-	1" Square

## 2.7 Stationary Torque Sensors ng-TTS-u

- High precision strain gauge based Torque Sensors
- USB Interface
- Torque window control
- Mechanical overload protection (sensors up to 200 cNm range)
- Standard USB and Ethernet connectors



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00105-01	ng-TTS01-cu	+/- 1	USB	✓	3 mm Bore
01-01-00106-01	ng-TTS02-cu	+/- 2	USB	✓	3 mm Bore
01-01-00107-01	ng-TTS05-cu	+/- 5	USB	✓	3 mm Bore
01-01-00108-01	ng-TTS10-cu	+/- 10	USB	✓	3 mm Bore
01-01-00109-01	ng-TTS20-cu	+/- 20	USB	✓	3 mm Bore

Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00110-01	ng-TTS50-xu	+/- 50	USB	✓	1/4" Hexagon
01-01-00111-01	ng-TTS100-xu	+/- 100	USB	✓	1/4" Hexagon
01-01-00112-01	ng-TTS200-xu	+/- 200	USB	✓	1/4" Hexagon
01-01-00113-01	ng-TTS500-xu	+/- 500	USB	-	1/4" Hexagon
01-01-00114-01	ng-TTS1000-xu	+/- 1000	USB	-	1/4" Hexagon
01-01-00115-01	ng-TTS2000-xu	+/- 2000	USB	-	1/4" Hexagon

Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00116-01	ng-TTS5000-qu	+/- 5000	USB	-	3/8" Square



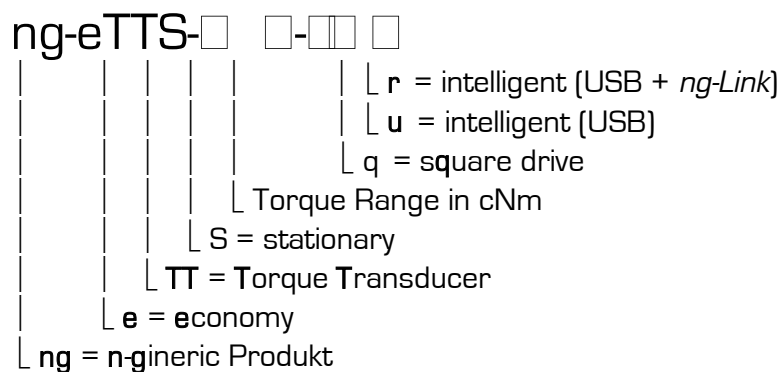
Article Number	Type	Torque Range Nm	Interface	Overload Protected	Drive
01-01-00171-02	ng-TTS10000-qu	+/- 100	USB	-	1/2" Square

## 2.8 Stationary Torque Sensors ng-eTTS-u

Torque sensors with robust design for the production floor

- High precision strain gauge based torque sensors
- Compact size
- USB Interface
- Optional *ng-Link* Interface
- Torque window control

Torque Sensor Type Nomenclature:





Article Number	Type	Torque Range Nm	USB	ng-Link	Drive
01-01-00314-01	ng-eTTS500-qu	+/- 5	✓	-	3/8" Square
01-01-00313-01	ng-eTTS1000-qu	+/- 10	✓	-	3/8" Square
01-01-00312-01	ng-eTTS2000-qu	+/- 20	✓	-	3/8" Square
01-01-00309-01	ng-eTTS5000-qu	+/- 50	✓	-	3/8" Square

## Accessories



### Sensor Detent 3/8" Square

Article Number	01-92-00037-01
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## 2.9 Stationary Torque Sensors ng-TTS-a

- High precision strain gauge based Torque Sensors
- Mechanical overload protection (sensors up to 200 cNm range)
- Analog torque output signal options:
  - 0 to 5 V, zero point at 2.5 V
  - 0 to 10 V, zero point at 5 V
- Power supply 12 V DC +/- 5 %, 150 mA



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00062-01	ng-TTS01-ca	+/- 1	analog	✓	3 mm Bore
01-01-00063-01	ng-TTS02-ca	+/- 2	analog	✓	3 mm Bore
01-01-00035-01	ng-TTS05-ca	+/- 5	analog	✓	3 mm Bore
01-01-00002-01	ng-TTS10-ca	+/- 10	analog	✓	3 mm Bore
01-01-00065-01	ng-TTS20-ca	+/- 20	analog	✓	3 mm Bore

Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00066-01	ng-TTS50-xa	+/- 50	analog	✓	1/4" Hexagon
01-01-00067-01	ng-TTS100-xa	+/- 100	analog	✓	1/4" Hexagon
01-01-00068-01	ng-TTS200-xa	+/- 200	analog	✓	1/4" Hexagon
01-01-00013-01	ng-TTS500-xa	+/- 500	analog	-	1/4" Hexagon
01-01-00014-01	ng-TTS1000-xa	+/- 1000	analog	-	1/4" Hexagon
01-01-00144-01	ng-TTS2000-xa	+/- 2000	analog	-	1/4" Hexagon

Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00145-01	ng-TTS5000-qa	+/- 5000	analog	-	3/8" Square

### Accessories

Sensor cable for analog interface, with single-sided connector, 1.5 meters

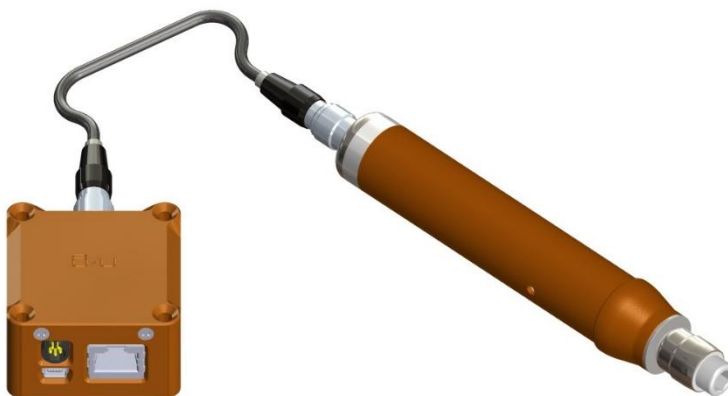
Article Number	01-90-00021-01
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## 2.10 Handheld Torque Sensors ng-TTH-i

- High precision strain gauge based torque sensors
- USB Interface
- Ethernet Interface
- *ng-Link* Interface
- Torque window control
- Mechanical overload protection
- Standard USB and Ethernet connectors



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00030-01	ng-TTH01-ci	+/- 1	intelligent	✓	3 mm Bore
01-01-00031-01	ng-TTH02-ci	+/- 2	intelligent	✓	3 mm Bore
01-01-00032-01	ng-TTH05-ci	+/- 5	intelligent	✓	3 mm Bore
01-01-00033-01	ng-TTH10-ci	+/- 10	intelligent	✓	3 mm Bore
01-01-00034-01	ng-TTH20-ci	+/- 20	intelligent	✓	3 mm Bore

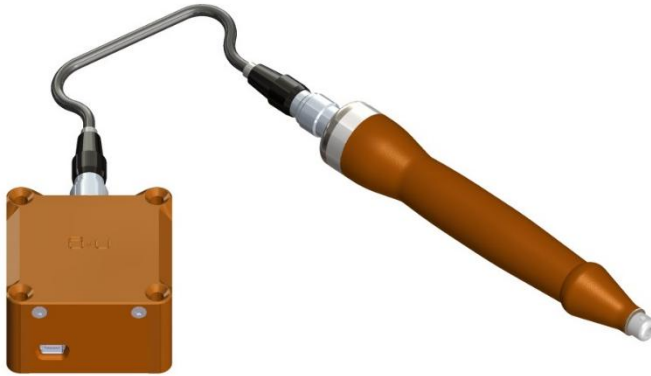


Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00043-01	ng-TTH50-xi	+/- 50	intelligent	✓	1/4" Hexagon
01-01-00044-01	ng-TTH100-xi	+/- 100	intelligent	✓	1/4" Hexagon
01-01-00045-01	ng-TTH200-xi	+/- 200	intelligent	✓	1/4" Hexagon



## 2.11 Handheld Torque Sensors ng-TTH-u

- High precision strain gauge based torque sensors
- USB Interface
- Torque window control
- Mechanical overload protection
- Standard USB and Ethernet connectors



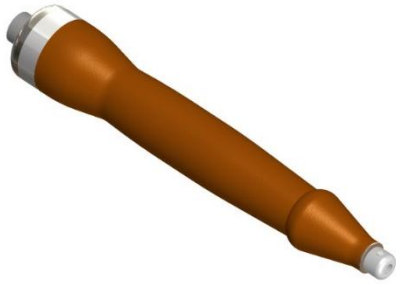
Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00118-01	ng-TTH01-cu	+/- 1	USB	✓	3 mm Bore
01-01-00119-01	ng-TTH02-cu	+/- 2	USB	✓	3 mm Bore
01-01-00120-01	ng-TTH05-cu	+/- 5	USB	✓	3 mm Bore
01-01-00121-01	ng-TTH10-cu	+/- 10	USB	✓	3 mm Bore
01-01-00122-01	ng-TTH20-cu	+/- 20	USB	✓	3 mm Bore



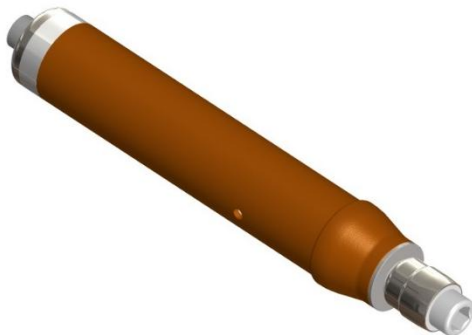
Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00123-01	ng-TTH50-xu	+/- 50	USB	✓	1/4" Hexagon
01-01-00124-01	ng-TTH100-xu	+/- 100	USB	✓	1/4" Hexagon
01-01-00125-01	ng-TTH200-xu	+/- 200	USB	✓	1/4" Hexagon

## 2.12 Handheld Torque Sensors ng-TTH-a

- High precision strain gauge based Torque Sensors
- Mechanical overload protection
- Analog torque output signal options:
  - 0 to 5 V, zero point at 2.5 V
  - 0 to 10 V, zero point at 5 V
- Power supply 12 V DC +/- 5 %, 150 mA



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00025-01	ng-TTH01-ca	+/- 1	analog	✓	3 mm Bore
01-01-00026-01	ng-TTH02-ca	+/- 2	analog	✓	3 mm Bore
01-01-00027-01	ng-TTH05-ca	+/- 5	analog	✓	3 mm Bore
01-01-00028-01	ng-TTH10-ca	+/- 10	analog	✓	3 mm Bore
01-01-00029-01	ng-TTH20-ca	+/- 20	analog	✓	3 mm Bore



Article Number	Type	Torque Range cNm	Interface	Overload Protected	Drive
01-01-00069-01	ng-TTH50-xa	+/- 50	analog	✓	1/4" Hexagon
01-01-00070-01	ng-TTH100-xa	+/- 100	analog	✓	1/4" Hexagon
01-01-00071-01	ng-TTH200-xa	+/- 200	analog	✓	1/4" Hexagon

### Accessories

Sensor cable for analog interface, with single-sided connector, 1.5 meters

Article Number	01-90-00021-01
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### 3 Intelligent Force Sensors

- Based on Strain Gauge Technology
- Digital and Analog Interfaces

Miniature Compression and Tension Force Sensors

Measurement Ranges:

100 N  
...  
200 kN



The sensor interface is optionally equipped with an input for an incremental encoder to measure the displacement! Please let us know your demands!

Force Sensor Type Nomenclature:

ng-FTS-□ □-□□ □

- = **i** = intelligent (USB + Ethernet + RS-485)
- = **u** = intelligent (USB)
- = **b** = button load cell (compression force)
- = **d** = donut shape load cell (compression force)
- = **z** = z-shape load cell (compression/tension force)
- = Measurement range in N
- = **S** = Stationary
- = **FT** = Force Transducer
- = **ng** = n-gineric Product

### 3.1 Compression Force Load Cells ng-FTS-bi

- High precision strain gauge based button load cells
- USB interface
- Ethernet interface
- *ng-Link* Interface
- Force window control
- Standard USB and Ethernet connectors



Article Number	Type	Torque Range N	Interface	Size mm	Accuracy Class
01-01-00126-01	ng-FTS100-bi	100	intelligent	Ø 31,8 x 9.9	0.25 %
01-01-00127-01	ng-FTS200-bi	200	intelligent	Ø 31,8 x 9.9	0.25 %
01-01-00128-01	ng-FTS400-bi	400	intelligent	Ø 31,8 x 9.9	0.25 %
01-01-00129-01	ng-FTS1000-bi	1000	intelligent	Ø 31,8 x 9.9	0.25 %



Article Number	Type	Torque Range kN	Interface	Size mm	Accuracy Class
01-01-00130-01	ng-FTS4000-bi	4	intelligent	Ø 31,8 x 9.9	0.5 %
01-01-00131-01	ng-FTS8000-bi	8	intelligent	Ø 31,8 x 9.9	0.5 %
01-01-00132-01	ng-FTS10000-bi	10	intelligent	Ø 31,8 x 9.9	0.5 %

### 3.2 Compression Force Load Cells ng-FTS-bu

- High precision strain gauge based button load cells
- USB interface
- Force window control
- Standard USB and Ethernet connectors



Article Number	Type	Torque Range N	Interface	Size mm	Accuracy Class
01-01-00133-01	ng-FTS100-bu	100	USB	Ø 31,8 x 9.9	0.25 %
01-01-00134-01	ng-FTS200-bu	200	USB	Ø 31,8 x 9.9	0.25 %
01-01-00135-01	ng-FTS400-bu	400	USB	Ø 31,8 x 9.9	0.25 %
01-01-00136-01	ng-FTS1000-bu	1000	USB	Ø 31,8 x 9.9	0.25 %

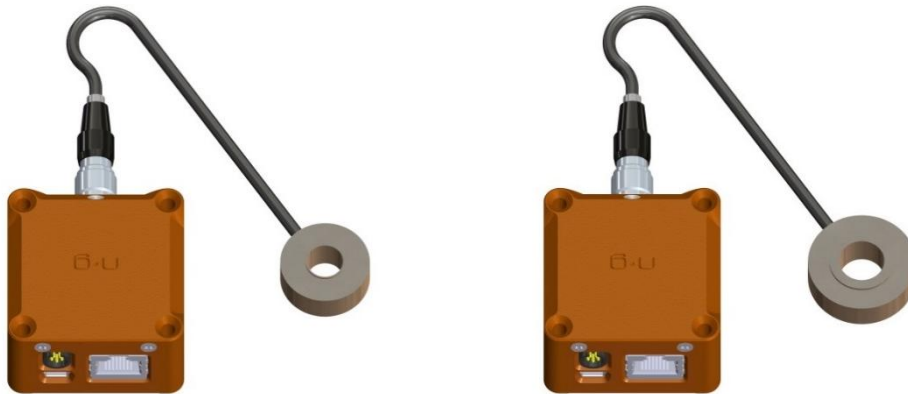


Article Number	Type	Torque Range N	Interface	Size mm	Accuracy Class
01-01-00137-01	ng-FTS4000-bu	4000	USB	Ø 31,8 x 9.9	0.5 %
01-01-00138-01	ng-FTS8000-bu	8000	USB	Ø 31,8 x 9.9	0.5 %
01-01-00139-01	ng-FTS10000-bu	10000	USB	Ø 31,8 x 9.9	0.5 %

### 3.3 Compression Force Load Cells ng-FTS-di

Load cells with bore to be attached to screw joints for clamp force measurement

- High precision strain gauge based button load cells
- USB interface
- Ethernet interface
- *ng-Link* Interface
- Force window control
- Standard USB and Ethernet connectors



Article Number	Type	Torque Range kN	Interface	Size mm	Accuracy Class
01-01-00156-02	ng-FTS1000-di	1	intelligent	Ø 38,0 x 10,0	2 %
01-01-00180-01	ng-FTS2000-di	2	intelligent	Ø 38,0 x 10,0	2 %
01-01-00172-01	ng-FTS5000-di	5	intelligent	Ø 38,0 x 10,0	2 %
01-01-00184-01	ng-FTS10000-di	10	intelligent	Ø 38,0 x 10,0	2 %
01-01-00185-01	ng-FTS20000-di	20	intelligent	Ø 49,0 x 16,0	2 %
01-01-00186-01	ng-FTS50000-di	50	intelligent	Ø 49,0 x 16,0	2 %



Article Number	Type	Torque Range kN	Interface	Size mm	Genauigkeits- klasse
01-01-00157-01	ng-FTS100000-di	100	intelligent	Ø 78,0 x 25,0	2 %
01-01-00167-01	ng-FTS200000-di	200	intelligent	Ø 78,0 x 25,0	2 %

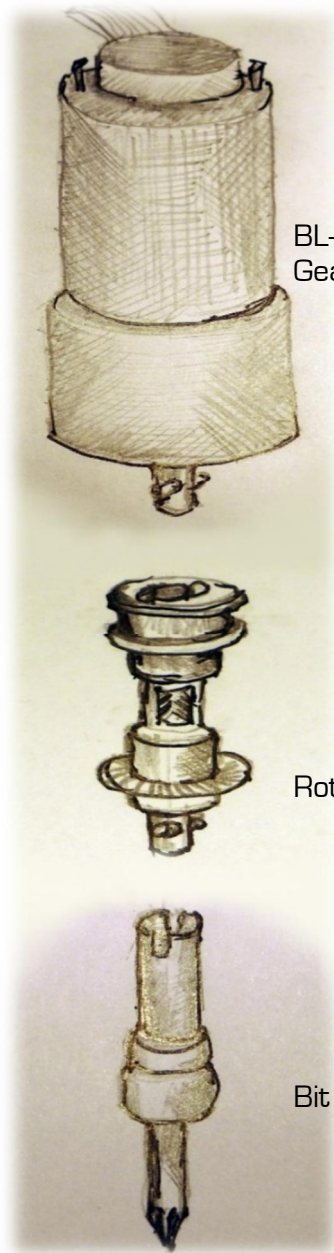
## 4 Micro Sensor Torque Driver Systems

### 4.1 Handheld Micro Sensor Torque Drivers ng-TDH



- Total Torque Range: 0.01 – 5.0 Nm
- Ultimate Torque/Angle Measurement Precision:
  - Strain Gauge based Rotary Torque Sensor integrated at the Bit Chuck
  - 24 bits A/D Converter Resolution of the Torque Measurement at the Rotary Part
  - Brushless Digital Signal Transmission from the Rotary to the Stationary Part
  - 0.1 Degrees Resolution of the Angle Measurement directly at the Bit Chuck
- Brushless DC Motor Technology
- Sophisticated Screw Tightening Strategies
- Massive Aluminum Housing
- All Controls integrated
- Industry-4.0-compliant
- Precise in measurement and highly productive

Inner Structure



BL-DC Drive with Planetary Gearbox

Rotary Torque/Angle Sensor

Bit Chuck Unit





## ng-TDH10-hu Micro Sensor Torque Driver System

Article Number	01-01-00264-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDH10-hu Spindle	Torque Driver Handpiece	01-01-00255-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH10-hi Micro Sensor Torque Driver System

Article Number	01-01-00265-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDH10-hi Spindle	Torque Driver Handpiece	01-01-00254-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDH20-hu Micro Sensor Torque Driver System

Article Number	01-01-00266-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDH20-hu Spindle	Torque Driver Handpiece	01-01-00256-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH20-hi Micro Sensor Torque Driver System

Article Number	01-01-00267-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDH20-hi Spindle	Torque Driver Handpiece	01-01-00257-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDH50-hu Micro Sensor Torque Driver System

Article Number	01-01-00311-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDH50-hu Spindle	Torque Driver Handpiece	01-01-00310-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH50-hi Micro Sensor Torque Driver System

Article Number	01-01-00350-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDH50-hi Spindle	Torque Driver Handpiece	01-01-00349-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD7	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDH100-hu Micro Sensor Torque Driver System

Article Number	01-01-00268-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDH100-hu Spindle	Torque Driver Handpiece	01-01-00258-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH100-hi Micro Sensor Torque Driver System

Article Number	01-01-00269-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDH100-hi Spindle	Torque Driver Handpiece	01-01-00259-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD7	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDH200-xu Micro Sensor Torque Driver System

Article Number	01-01-00278-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDH200-xu Spindle	Torque Driver Handpiece	01-01-00283-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH200-xi Micro Sensor Torque Driver System

Article Number	01-01-00281-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDH200-xi Spindle	Torque Driver Handpiece	01-01-00284-01
ng-TD-PS600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01

## ng-TDH400-xu Micro Sensor Torque Driver System

Article Number	01-01-00271-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 750 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDH400-xu Spindle	Torque Driver Handpiece	01-01-00260-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH400-xi Micro Sensor Torque Driver System

Article Number	01-01-00270-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 750 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDH400-xi Spindle	Torque Driver Handpiece	01-01-00261-01
ng-TD-PS600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01

## ng-TDH500-xu Micro Sensor Torque Driver System

Article Number	01-01-00272-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 600 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDH500-xu Spindle	Torque Driver Handpiece	01-01-00262-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH500-xi Micro Sensor Torque Driver System

Article Number	01-01-00273-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 600 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDH500-xi Spindle	Torque Driver Handpiece	01-01-00263-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## 4.2 Handheld Micro Sensor Measurement Drivers ng-TD HQ

The ng-TD HQ systems are optimized for high precision torque and angle measurement at low RPM. They can especially fulfill the high requirements of handheld or automated measurement and adjustment applications.

The scope of functions of the ng-TD HQ systems are identical to the ng-TD H systems, just the RPM Range starts very low.

### ng-TD HQ 10-hu Micro Sensor Measurement Driver System

Article Number	01-01-00391-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TD HQ 10-hu Spindle	Torque Driver Handpiece	01-01-00384-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01



## ng-TD HQ10-hi Micro Sensor Measurement Driver System

Article Number	01-01-00390-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TD HQ10-hi Spindle	Torque Driver Handpiece	01-01-00383-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TD HQ20-hu Micro Sensor Measurement Driver System

Article Number	01-01-00290-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TD HQ20-hu Spindle	Torque Driver Handpiece	01-01-00382-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TD HQ20-hi Micro Sensor Measurement Driver System

Article Number	01-01-00389-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TD HQ20-hi Spindle	Torque Driver Handpiece	01-01-00381,01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TD HQ50-hu Micro Sensor Measurement Driver System

Article Number	01-01-00373-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TD HQ50-hu Spindle	Torque Driver Handpiece	01-01-00371-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TD HQ50-hi Micro Sensor Measurement Driver System

Article Number	01-01-00372-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TD HQ50-hi Spindle	Torque Driver Handpiece	01-01-00370-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD7	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A / USB Mini 1,8 m	01-90-00002-01

## ng-TD HQ100-hu Micro Sensor Measurement Driver System

Article Number	01-01-00282-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TD HQ100-hu Spindle	Torque Driver Handpiece	01-01-00302-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A / USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TD HQ100-hi Micro Sensor Measurement Driver System

Article Number	01-01-00388-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TD HQ100-hi Spindle	Torque Driver Handpiece	01-01-00380-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD7	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A / USB Mini 1,8 m	01-90-00002-01

## ng-TD HQ200-xu Micro Sensor Measurement Driver System

Article Number	01-01-00294-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TD HQ200-xu Spindle	Torque Driver Handpiece	01-01-00379-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A / USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TD HQ200-xi Micro Sensor Measurement Driver System

Article Number	01-01-00387-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TD HQ200-xi Spindle	Torque Driver Handpiece	01-01-00378-01
ng-TD-PS600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01

## ng-TD HQ400-xu Micro Sensor Measurement Driver System

Article Number	01-01-00293-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TD HQ400-xu Spindle	Torque Driver Handpiece	01-01-00377-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDH400-xi Micro Sensor Measurement Driver System

Article Number	01-01-00386-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TD HQ400-xi Spindle	Torque Driver Handpiece	01-01-00376-01
ng-TD-PS600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01

## ng-TD HQ500-xu Micro Sensor Measurement Driver System

Article Number	01-01-00291-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TD HQ500-xu Spindle	Torque Driver Handpiece	01-01-00375-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

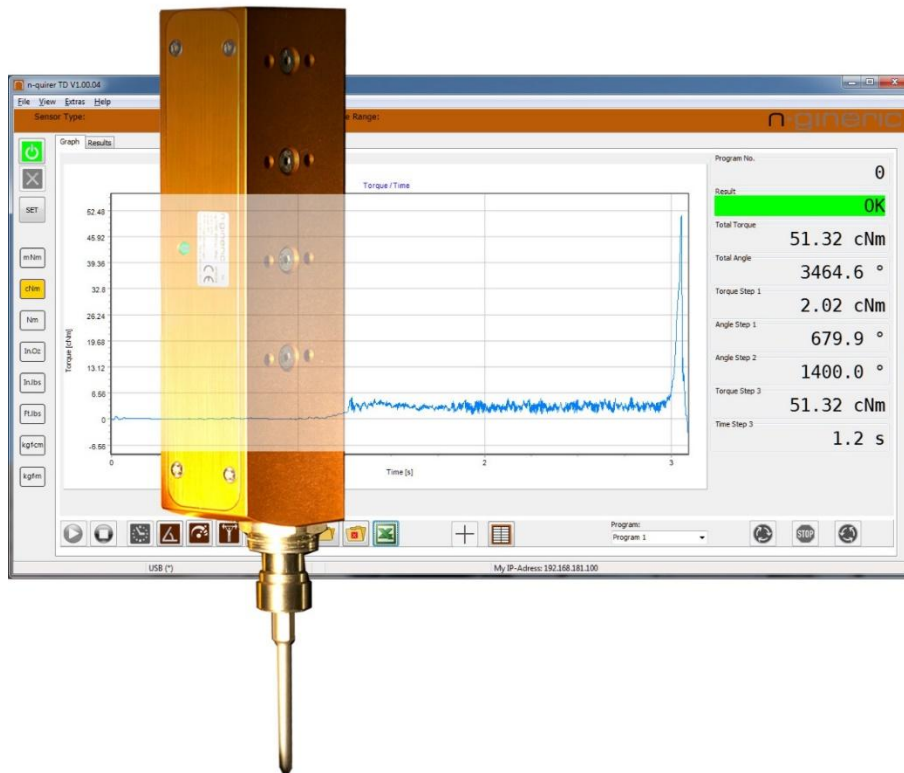
ng-TD HQ500-xi Micro Sensor Measurement Driver System

Article Number	01-01-00385-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

Scope of Supply

Type	Description	Article Number
ng-TD HQ500-xi Spindle	Torque Driver Handpiece	01-01-00374-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A / USB Mini 1,8 m	01-90-00002-01

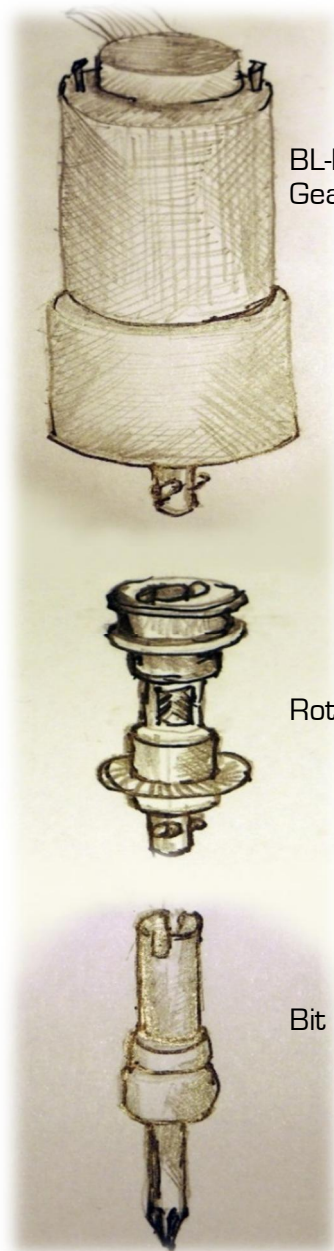
## 4.3 Stationary Micro Sensor Torque Drivers ng-TDS



- Total Torque Range: 0.01 – 5.0 Nm
- Ultimate Torque/Angle Measurement Precision:
  - Strain Gage based Rotary Torque Sensor integrated at the Bit Chuck
  - 24 bits A/D Converter Resolution of the Torque Measurement at the Rotary Part
  - Brushless Digital Signal Transmission from the Rotary to the Stationary Part
  - 0.1 Degrees Resolution of the Angle Measurement directly at the Bit Chuck
- Brushless DC Motor Technology
- Sophisticated Screw Tightening Strategies
- Massive Aluminum Housing
- All Controls integrated
- Industry-4.0-compliant
- Precise in measurement and highly productive



Inner Structure



BL-DC Drive with Planetary Gearbox

Rotary Torque/Angle Sensor

Bit Chuck Unit



## ng-TDS10-hu Micro Sensor Torque Driver System

Article Number	01-01-00241-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDS10-hu Spindle	Torque Driver Spindle	01-01-00232-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDS10-hi Micro Sensor Torque Driver System

Article Number	01-01-00243-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDS10-hi Spindle	Torque Driver Spindle	01-01-00230-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDS20-hu Micro Sensor Torque Driver System

Article Number	01-01-00233-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDS20-hu Spindle	Torque Driver Spindle	01-01-00218-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDS20-hi Micro Sensor Torque Driver System

Article Number	01-01-00239-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDS20-hi Spindle	Torque Driver Spindle	01-01-00219-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDS50-hu Micro Sensor Torque Driver System

Article Number	01-01-00352-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDS50-hu Spindle	Torque Driver Spindle	01-01-00351-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDS50-hi Micro Sensor Torque Driver System

Article Number	01-01-00297-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDS50-hi Spindle	Torque Driver Spindle	01-01-00298-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDS100-hu Micro Sensor Torque Driver System

Article Number	01-01-00231-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDS100-hu Spindle	Torque Driver Spindle	01-01-00223-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDS100-hi Micro Sensor Torque Driver System

Article Number	01-01-00237-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDS100-hi Spindle	Torque Driver Spindle	01-01-00217-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDS200-xu Micro Sensor Torque Driver System

Article Number	01-01-00279-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDS200-xu Spindle	Torque Driver Spindle	01-01-00285-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDS200-xi Micro Sensor Torque Driver System

Article Number	01-01-00280-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 1.000 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDS200-xi Spindle	Torque Driver Spindle	01-01-00286-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDS400-xu Micro Sensor Torque Driver System

Article Number	01-01-00235-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 750 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDS400-xu Spindle	Torque Driver Spindle	01-01-00164-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDS400-xi Micro Sensor Torque Driver System

Article Number	01-01-00238-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 750 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDS400-xi Spindle	Torque Driver Spindle	01-01-00216-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDS500-xu Micro Sensor Torque Driver System

Article Number	01-01-00274-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 600 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDS500-xu Spindle	Torque Driver Spindle	01-01-00276-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDS500-xi Micro Sensor Torque Driver System

Article Number	01-01-00275-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	100 to 600 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDS500-xi Spindle	Torque Driver Spindle	01-01-00277-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01



## 4.4 Stationary Micro Sensor Measurement Drivers ng-TDSQ

The ng-TDSQ systems are optimized for high precision torque and angle measurement at low RPM. They can especially fulfill the high requirements of automated measurement and adjustment applications.

The scope of functions of the ng-TDSQ systems are identical to the ng-TDS systems, just the RPM Range starts very low.

### ng-TDSQ10-hu Micro Sensor Measurement Driver System

Article Number	01-01-00244-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDSQ10-hu Spindle	Torque Driver Spindle	01-01-00364-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDSQ10-hi Micro Sensor Measurement Driver System

Article Number	01-01-00245-01
Torque Range	1 to 10 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDSQ10-hi Spindle	Torque Driver Spindle	01-01-00363-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDSQ20-hu Micro Sensor Measurement Driver System

Article Number	01-01-00229-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDSQ20-hu Spindle	Torque Driver Spindle	01-01-00362-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDSQ20-hi Micro Sensor Measurement Driver System

Article Number	01-01-00246-01
Torque Range	2 to 20 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	181 x 48 x 24 mm
Weight	0.47 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDSQ20-hi Spindle	Torque Driver Spindle	01-01-00361-01
ng-TD-PS-24-80	Power Supply Unit	01-91-00006-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDSQ50-hu Micro Sensor Measurement Driver System

Article Number	01-01-00365-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDSQ50-hu Spindle	Torque Driver Spindle	01-01-00353-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDSQ50-hi Micro Sensor Measurement Driver System

Article Number	01-01-00307-01
Torque Range	5 to 50 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDSQ50-hi Spindle	Torque Driver Spindle	01-01-00306-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD7	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDSQ100-hu Micro Sensor Measurement Driver System

Article Number	01-01-00227-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDSQ100-hu Spindle	Torque Driver Spindle	01-01-00360-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDSQ100-hi Micro Sensor Measurement Driver System

Article Number	01-01-00247-01
Torque Range	10 to 100 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	4 mm Halfmoon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDSQ100-hi Spindle	Torque Driver Spindle	01-01-00251-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD7	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01

## ng-TDSQ200-xu Micro Sensor Measurement Driver System

Article Number	01-01-00369-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDSQ200-xu Spindle	Torque Driver Spindle	01-01-00359-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDSQ200-xi Micro Sensor Measurement Driver System

Article Number	01-01-00368-01
Torque Range	20 to 200 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDSQ200-xi Spindle	Torque Driver Spindle	01-01-00358-01
ng-TD-PS600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01

## ng-TDSQ400-xu Micro Sensor Measurement Driver System

Article Number	01-01-00228-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	¼" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDSQ400-xu Spindle	Torque Driver Spindle	01-01-00357-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

## ng-TDSQ400-xi Micro Sensor Measurement Driver System

Article Number	01-01-00248-01
Torque Range	40 to 400 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

### Scope of Supply

Type	Description	Article Number
ng-TDSQ400-xi Spindle	Torque Driver Spindle	01-01-00356-01
ng-TD-PS600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A /USB Mini 1,8m	01-90-00002-01

## ng-TDSQ500-xu Micro Sensor Measurement Driver System

Article Number	01-01-00367-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	USB

### Scope of Supply

Type	Description	Article Number
ng-TDSQ500-xu Spindle	Torque Driver Spindle	01-01-00355-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
USB Cable	Cable USB-A /USB Mini 1,8 m	01-90-00002-01
n-quirer TD	Torque Driver System Software	01-01-00215-01

ng-TDSQ500-xi Micro Sensor Measurement Driver System

Article Number	01-01-00366-01
Torque Range	50 to 500 cNm
Torque Measurement Accuracy	0.5% of the F.S.R.
Angle Measurement Resolution	0.1 Degrees
RPM Range	5 to 300 min <sup>-1</sup>
Bit Drive	1/4" Hexagon
Dimensions	212 x 58 x 35 mm
Weight	0.98 kg
Interface	Digital to ng-TDC

Scope of Supply

Type	Description	Article Number
ng-TDSQ500-xi Spindle	Torque Driver Spindle	01-01-00354-01
ng-TD-PS-36-600	Power Supply Unit	01-91-00004-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00014-01
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00011-01
ng-TDC	Torque Driver Controller Interface	01-01-00220-01
n-quirer TD	Torque Driver System Software	01-01-00215-01
USB Cable	Cable USB-A / USB Mini 1,8 m	01-90-00002-01



## 5 Systems and Components for Automated Assembly

### 5.1 Blow-Feeding Module ng-BF400



The blow feeding module is designed for highly effective automated screw tightening applications. It is built from the following components:

- Fixture unit, prepared for mounting of the module at a robot (e. g. a SCARA or Cartesian Robot)
- Pneumatic precision slide für the driver stroke
- Mouthpiece Assembly with bracket set

The screws are blown from the screw feeder unit through a tube into the mouthpiece. They are stopped by the spring balanced brackets in alignment with the screw driver spindle. The tightening process begins, when the spindle moves downwards pushing the screw through the brackets towards the workpiece while rotating slowly.

The mouthpiece and the brackets sets are designed and manufactured in accordance with the geometric requirements of the parts and screws.

The module is prepared to carry the torque driver types

- ng-TDS50-xi
- ng-TDS100-xi
- ng-TDS200-xi
- ng-TDS400-xi
- ng-TDS500-xi

The total weight of the unit, including the torque driver spindle is approximately 2.0 kg.

The modules are based on a standard design. Most of the times, customization of application specific parts is necessary. It can be done on request after a profound technical clarification.

## 5.2 „Flying Handling“ Module ng-FLH400



The Pick-&Place feeding module is designed for highly effective automated screw tightening applications. It is built from the following components:

- Fixture Plate, prepared for mounting of the module at (e. g.) a Cartesian robot
- Pneumatic precision slide für the driver stroke
- Screw handling assembly with vertical / horizontal movements via pneumatic precision slides

While the screw is being tightened, the next screw can be blow fed into a dome mounted in the screw handling. When the screw driver spindle has moved back into the upper position, the handling brings the screw to the vacuum nozzle, then it moves back into the loading position. This can happen while the robot moves to the next screw joint position. The process time is significantly shorter than with the normal Pick-&Place.

The vacuum adapter assembly with the nozzle is attached to the torque driver spindle.

The module is prepared to carry the torque driver types

- ng-TDS50-xi
- ng-TDS100-xi
- ng-TDS200-xi
- ng-TDS400-xi
- ng-TDS500-xi

The total weight of the unit, including the torque driver spindle is approximately 3.4 kg.

The modules are based on a standard design. Most of the times, customization of application specific parts is necessary. It can be done on request after a profound technical clarification.

### 5.3 Micro-Screwfeeder ng-FEED



Intelligent Screwfeeder Module for high volume 24/7 production, prepared for Pick-&-Place by vacuum of micro screws (screw sizes from M1 to M2). All components are integrated in an aluminum housing.

- Vibratory feeder drive
- Feeder bowl
- Numerically controlled escapement
- Optical screw sensor
- Micro air compressor
- Control electronics
- Up-/Down-keys
- Digital-I/O-Interface
- USB-Interface
- Ethernet-Interface
- RS232-C-Interface

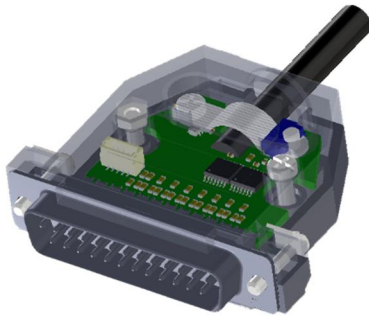
Power supply: 24 V 1 A

The feeder modules are based on a standard design. Most of the times, customization of application specific parts is necessary. It can be done on request after a profound technical clarification.

## 6 Accessories

### 6.1 Interface Extension ng-eTTx

For all intelligent torque and force sensor with *ng-Link* interface



Article Number	01-01-00152-01
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- 8 isolated digital Inputs, NPN or PNP configurable, voltage range 12 – 36 V
- 8 isolated digital Outputs, NPN or PNP configurable, voltage range 12 – 36 V
- Supply voltage 24 V DC 1 A (sensor consumption included)
- Direct signaling of control window status
- Integrated in a SUB-D-25 Case
- Connector compatible to the *ng-Link* interface
- Cable length 1.8m

### 6.2 Sensor Mounting Assy

Prepared for ng-TTR-Series (ng-TTR01-ci to ng-TTR5000-qj)



Article Number	Type
01-01-00163-01	Diameter 19 mm
01-01-00226-01	Diameter 20 mm

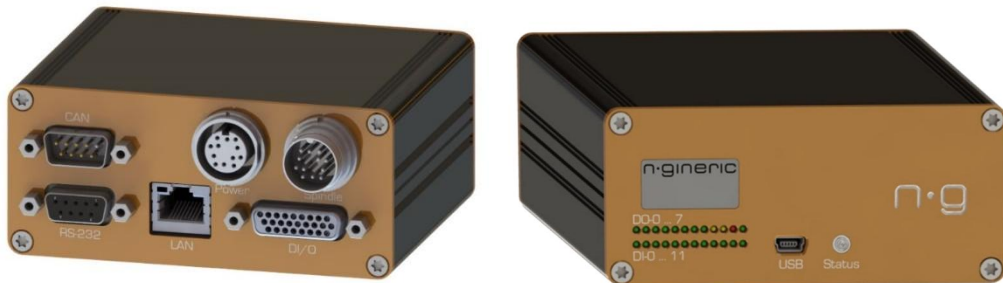
## 6.3 Screw Joint Simulator Sets



Article Number	Type	Drive	Thread Size
01-92-00019-01	Screw Test Joint Set 3 mm CYL M1	3 mm Shaft	M1
01-92-00020-01	Screw Test Joint Set 3 mm CYL M1.6	3 mm Shaft	M1.6
01-92-00002-01	Screw Test Joint Set 3 mm CYL M2	3 mm Shaft	M2
01-92-00014-01	Screw Test Joint Set 1/4" HEX M2	1/4" Hexagon	M2
01-92-00001-01	Screw Test Joint Set 1/4" HEX M3	1/4" Hexagon	M3
01-92-00003-01	Screw Test Joint Set 1/4" HEX M4	1/4" Hexagon	M4
01-92-00013-01	Screw Test Joint Set 1/4" HEX M5	1/4" Hexagon	M5
01-92-00004-01	Screw Test Joint Set 1/4" HEX M6	1/4" Hexagon	M6
01-92-00006-01	Screw Test Joint Set 1/4" HEX M8	1/4" Hexagon	M8
01-92-00027-01	Screw Test Joint Set 3/8" SQR M6	3/8" Square	M6
01-92-00028-01	Screw Test Joint Set 3/8" SQR M8	3/8" Square	M8
01-92-00029-01	Screw Test Joint Set 3/8" SQR M10	3/8" Square	M10
01-92-00030-01	Screw Test Joint Set 1/2" SQR M8	1/2" Square	M8
01-92-00012-01	Screw Test Joint Set 1/2" SQR M12	1/2" Square	M12
01-92-00031-01	Screw Test Joint Set 3/4" SQR M16	1/2" Square	M16
01-92-00032-01	Screw Test Joint Set 3/4" SQR M24	3/4" Square	M24
01-92-00033-01	Screw Test Joint Set 1" SQR M24	1" Square	M24

## 6.4 Torque Driver Controller Interface ng-TDC

The Digital Interface Extension for Torque Driver Spindles ng-TDH-i and ng-TDS-i can manage 32 screw tightening programs which can be addressed directly vial digital I/Os, Additional interfaces provide versatile connectivity to external controls.



<b>Article Number</b>	01-01-00220-01
<b>Interfaces</b>	12 photo isolated digital inputs, NPN/PNP configurable, 24 V DC 8 photo isolated digital outputs, NPN/PNP configurable, 24 V DC USB-Interface Ethernet-Interface (10/100 Mbit) RS-232-C CAN (in Preparation)
<b>Dimensions</b>	105 x 84 x 46 mm
<b>Weight</b>	0.3 kg

## 6.5 Linear-Arm ng-LA200

Linear Arms provide ergonomic support for the operator by a smooth movement and by the absorption of the reaction torque. They are highly recommended to be used for handheld screw tightening applications. Vertical alignment is mandatory to prevent from cross threading, and avoiding the rotation of the screw driver housing eliminates possible deviations of the angle measurement, as happens if the tool was just held manually.

The ng-LA200 is prepared for the Micro Sensor Torque Driver Spindles

- ng-TDH50-xi, -xu
- ng-TDH100-xi, -xu
- ng-TDH200-xi, -xu
- ng-TDH400-xi, -xu
- ng-TDH500-xi, -xu

Features:

- Horizontal Reach 200 mm
- Vertical Reach 300 mm
- Adjustable Spring Balancer for tool weight 1 to 2 kg
- Fixture Clamp



Article Number	01-01-00303-01
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## 6.6 Foot Switch ng-Tx-FSW



The footswitch ng-Tx-FSW can be used as an external operating element for the n-quirer TT and n-quirer TD Software. It is connected to the PC running the software via USB. The following functions are available:

n-quirer TT:

- External measurement triggering
- Quick graph export into Excel format (for multi-graph collection)

n-quirer TD:

- Start of the screw tightening process

Article Number	01-90-00034-01
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Conector: USB-A, cable length 2.5 meters

## 6.7 Cables

Type	Description	Article Number
ng-TD-Cable 2 m	Driver Cable 2 Meters	01-90-00014-01
ng-TD-Cable 3 m	Driver Cable 3 Meters	01-90-00011-01
Cable USB-A /USB Mini 1,8 m	USB-Cable 1,8 Meter	01-90-00002-01
Cable USB-A /USB Mini 5 m	USB-Cable 5 Meter	01-90-00006-01
Cable ng-eTTR / USB-A 1,8 m	ng-eTTR /USB-Cable 1,8 Meter	01-90-00008-01
Power Cord ng-PSC-EU	Power Cord Europe	01-90-00028-01
Power Cord ng-PSC-CH	Power Cord Switzerland	01-90-00029-01
Power Cord ng-PSC-US	Power Cord USA	01-90-00030-01
Power Cord ng-PSC-GB	Power Cord England	01-90-00031-01
Power Cord ng-PSC-CN	Power Cord China	01-90-00032-01
Sensor Cable single-sided	Sensor cable for analog interface, with single-sided connector, 1.5 meters	01-90-00021-01
Cable n-clude 1,8 m	<i>ng-Link</i> -Cable for sensor connection	01-90-00012-01



Driver Cable



USB Cable



Power Cord

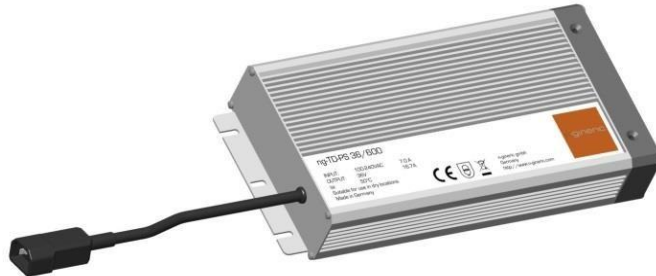


## 6.8 Power Supply Units

Type	Description	Article Number
ng-TD-PS-24-80	Power Supply Unit 24 V 80 VA	01-91-00006-01
ng-TD-PS-36-600	Power Supply Unit 36 V 600 VA	01-91-00004-01



ng-TD-PS-24-80



ng-TD-PS-36-600

## 6.9 Vacuum Adapter Assemblies



Vacuum Adapter Assemblies for Micro Sensor Torque Driver Spindles ng-TD are available in different sizes. They are selected according to the driver size, the screw geometry and possible constraints of the workpiece. Sometimes customizing can be necessary. The vacuum nozzle is not included.

Type	Article Number
ng-TD20-h44 Vacuum Adapter Assy D6	30-01-00032-01
ng-TD100-h44 Vacuum Adapter Assy D6	30-01-00035-01
ng-TD100-h64 Vacuum Adapter Assy D6	30-01-00034-01
ng-TD200-x Vacuum Adapter Assy D6	30-01-00033-01
ng-TD200-x Vacuum Adapter Assy D8	30-01-00029-01
ng-TD200-x Vacuum Adapter Assy D10	30-01-00030-01

## 6.10 Vacuum Nozzles

Vacuum nozzles are available in different standard sizes. They can be customized according to the screw geometry and possible constraints from the workpiece.



## 6.11 Bits

Bits for Micro Sensor Torque Driver Systems ng-TD are available from various manufacturers, with 4-mm- Halfmoon drive or 1/4" Hexagon drive. They are selected according to the screw tightening application requirements. They can be customized, if needed, especially for automated screw tightening systems.



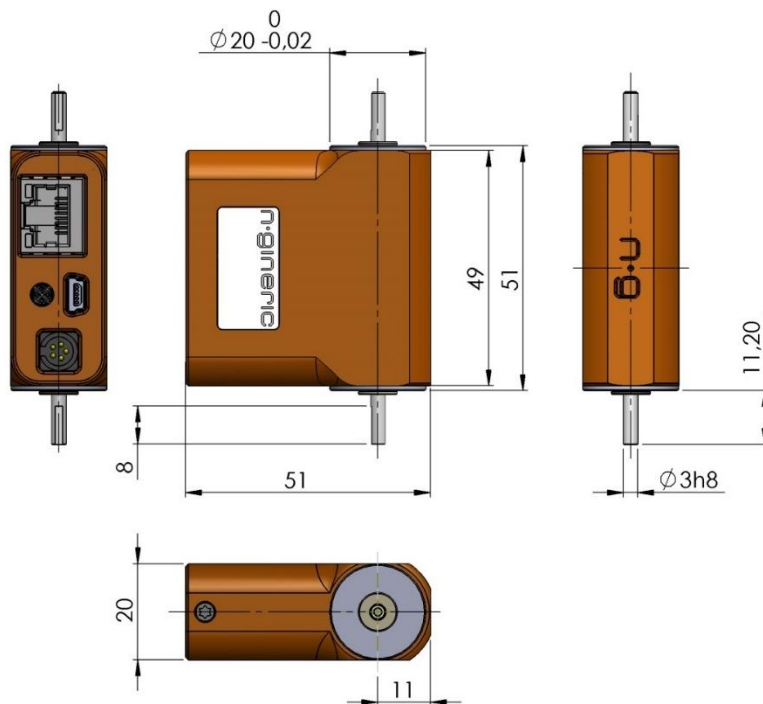
Bit with 4-mm-Halfmoon Drive



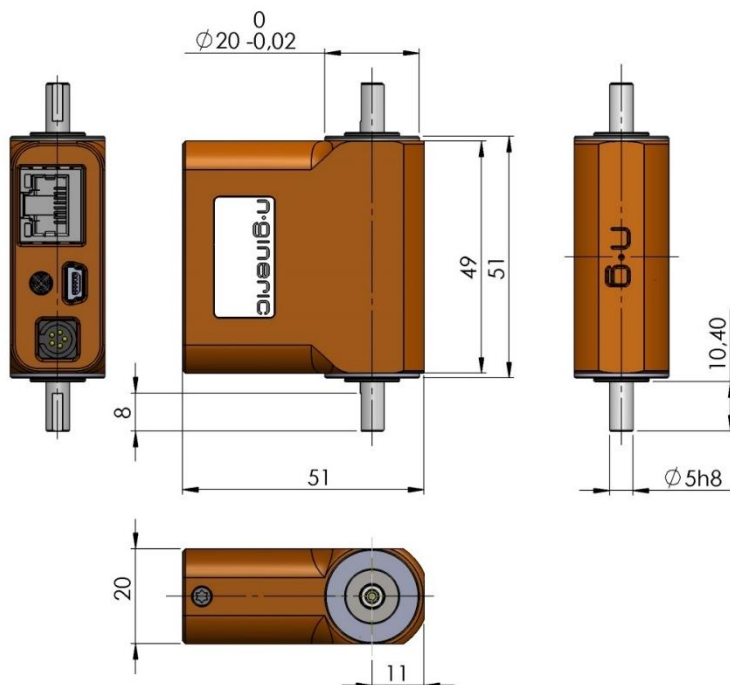
Bit with 1/4" Hexagon-Drive

## 7 Technical Data

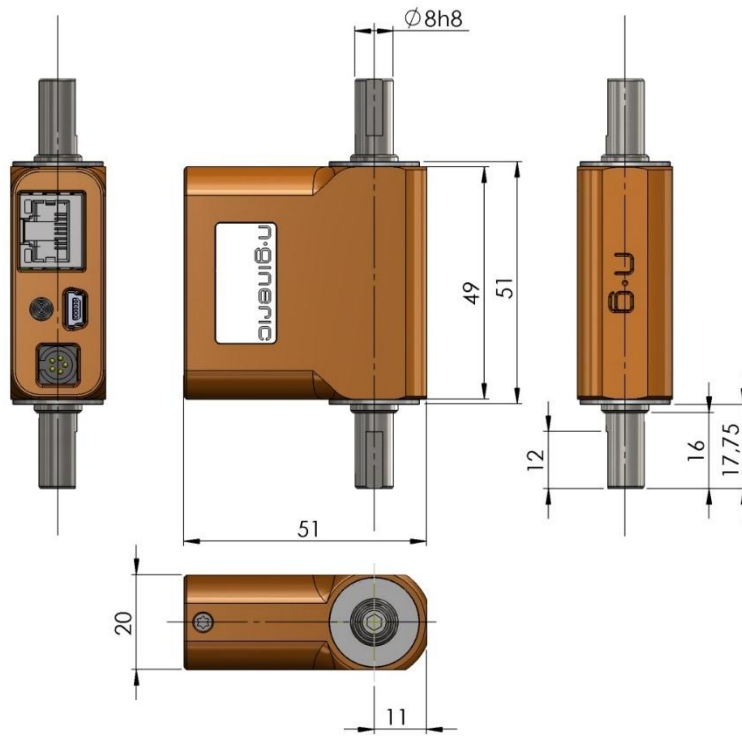
### 7.1 Dimensions – Sensors



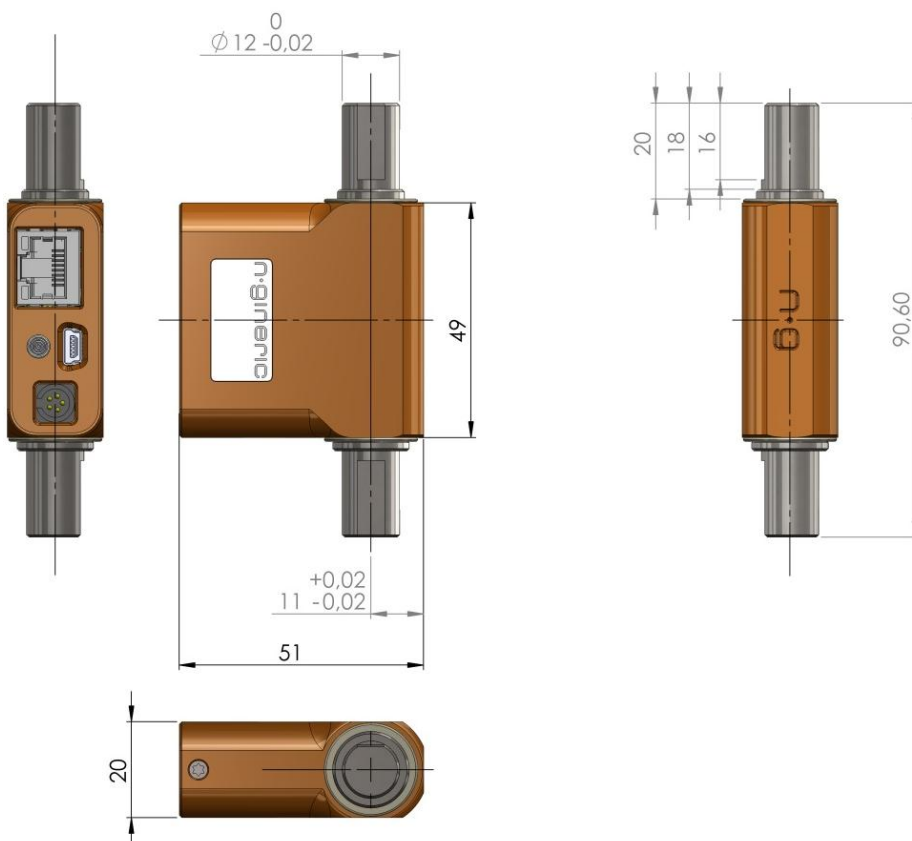
ng-TTRO1-ci  
ng-TTRO2-ci  
ng-TTRO5-ci



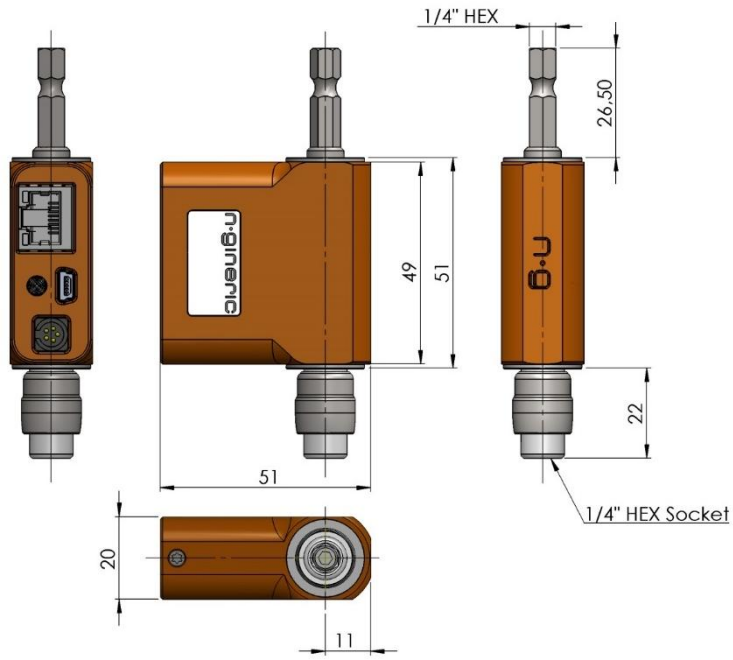
ng-TTR10-ci  
ng-TTR20-ci



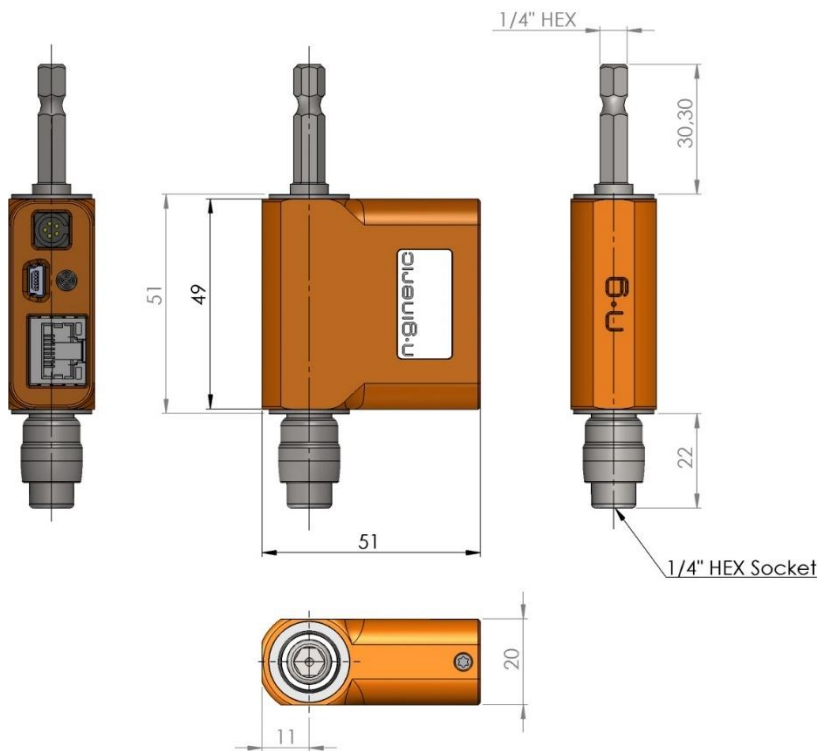
ng-TTR50-ci  
 ng-TTR100-ci  
 ng-TTR200-ci  
 ng-TTR500-ci  
 ng-TTR1000-ci



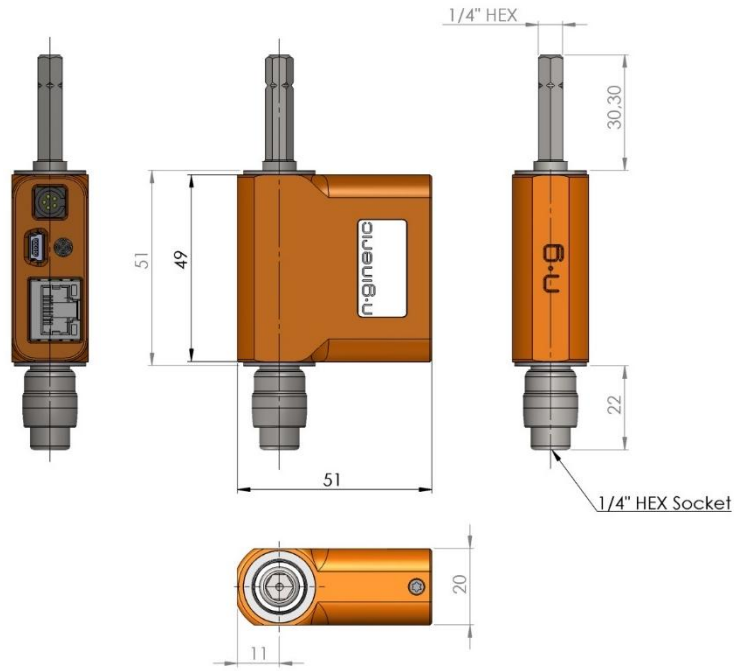
ng-TTR2000-ci



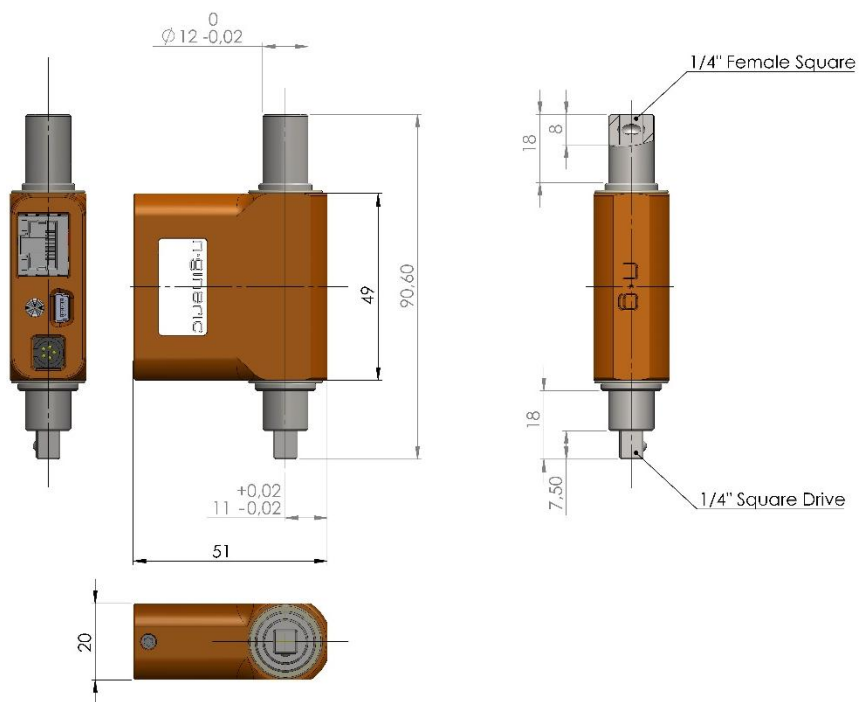
ng-TTR50-xi  
ng-TTR100-xi  
ng-TTR200-xi



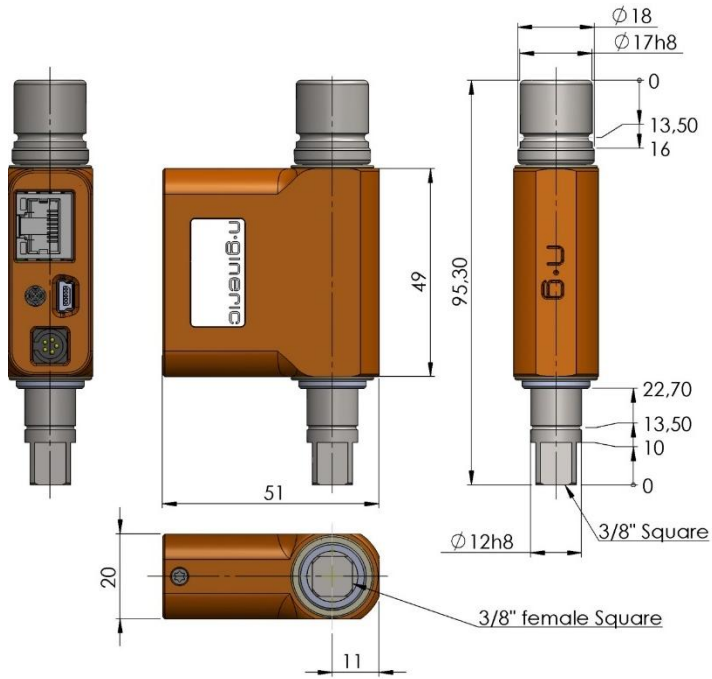
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ng-TTR1000-xi



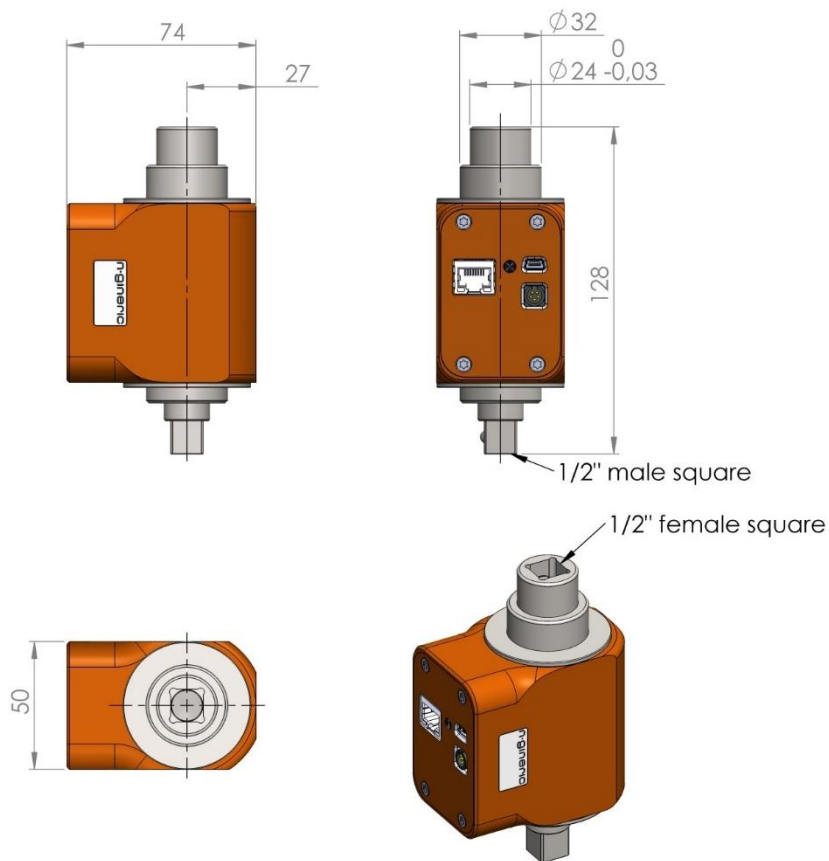
ng-TTR2000-xi



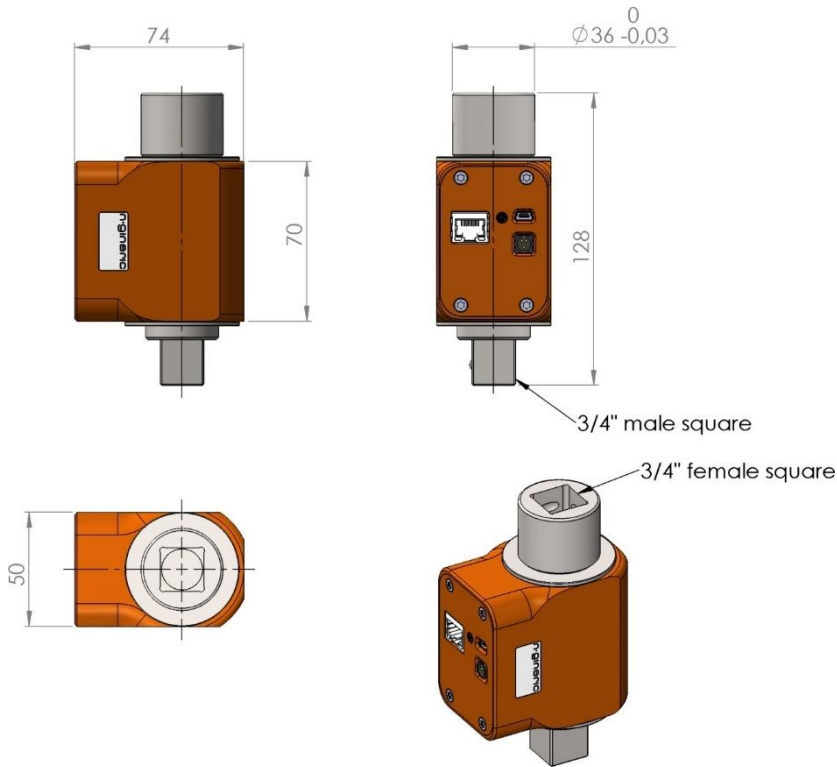
ng-TTR500-qj  
ng-TTR2000-qj



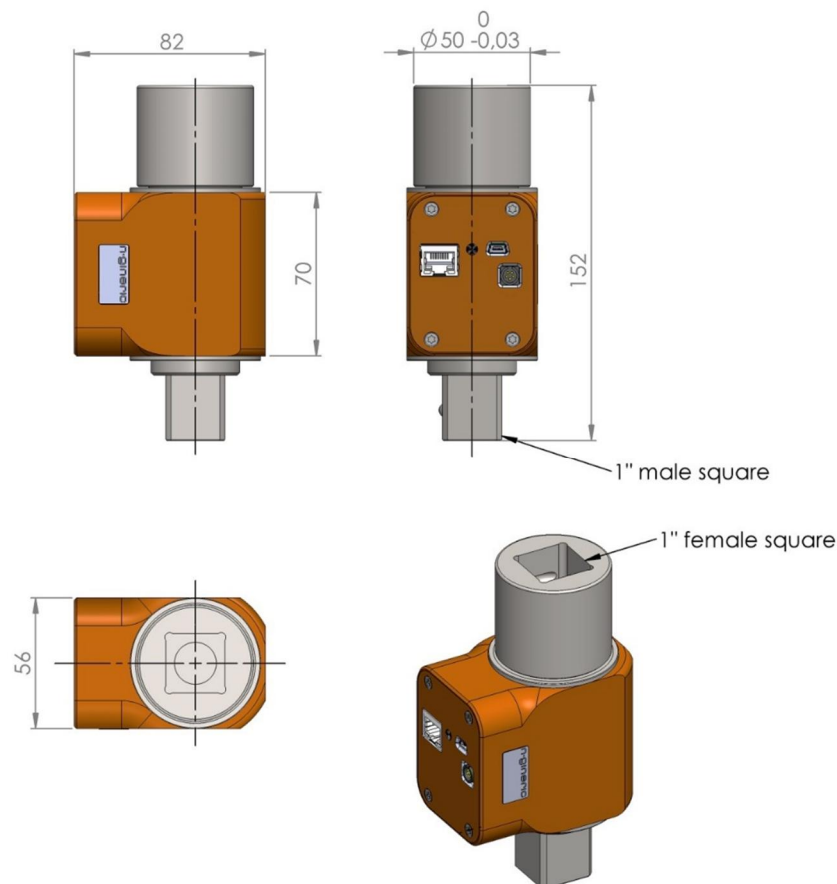
ng-TTR5000-qj



ng-TTR10000-qj  
ng-TTR20000-qj

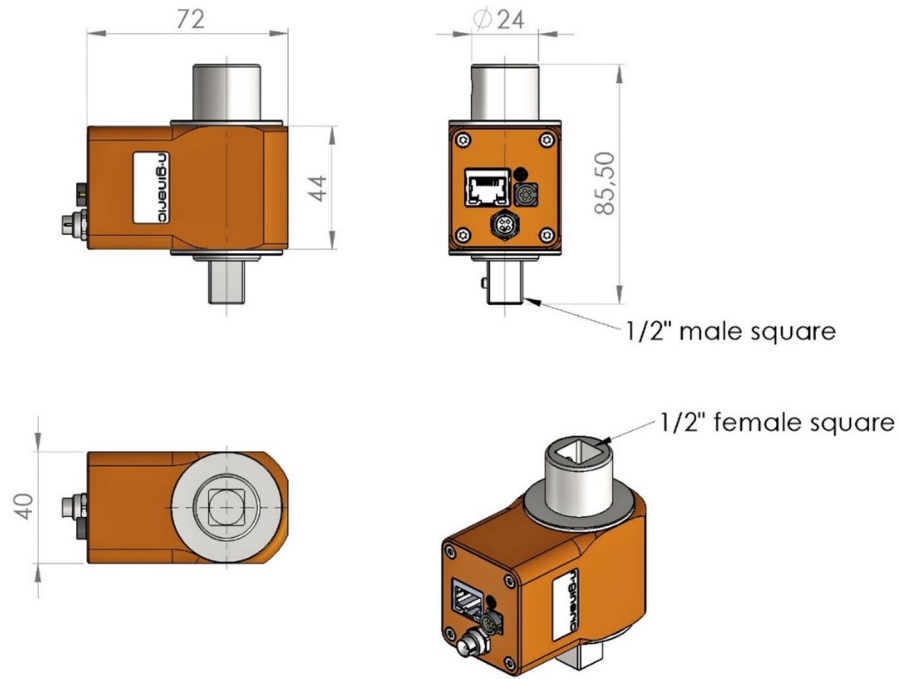


ng-TTR50000-qj

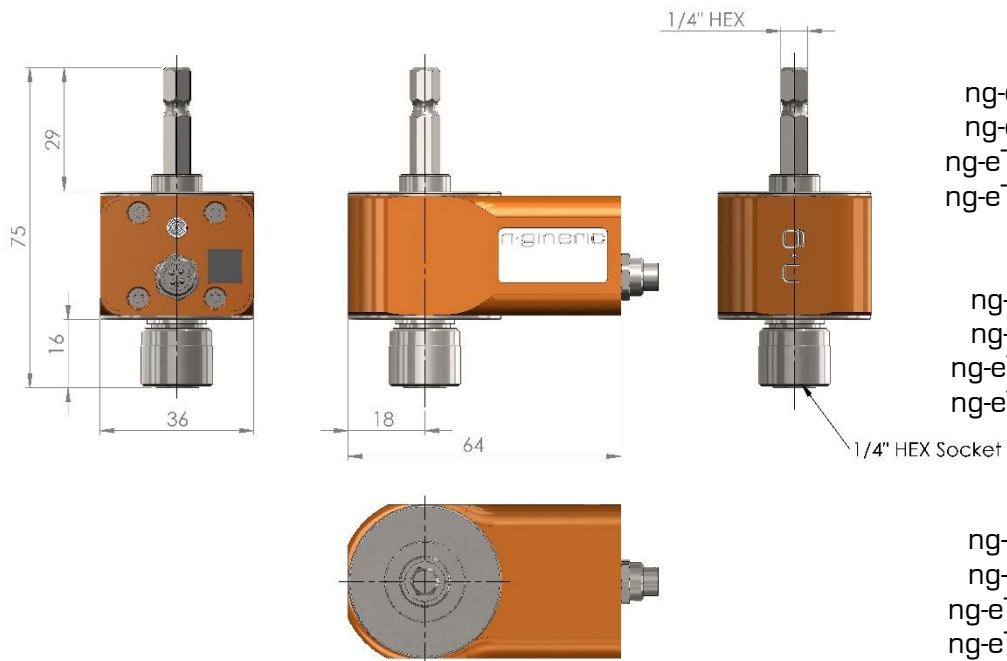


ng-TTR100000-qj





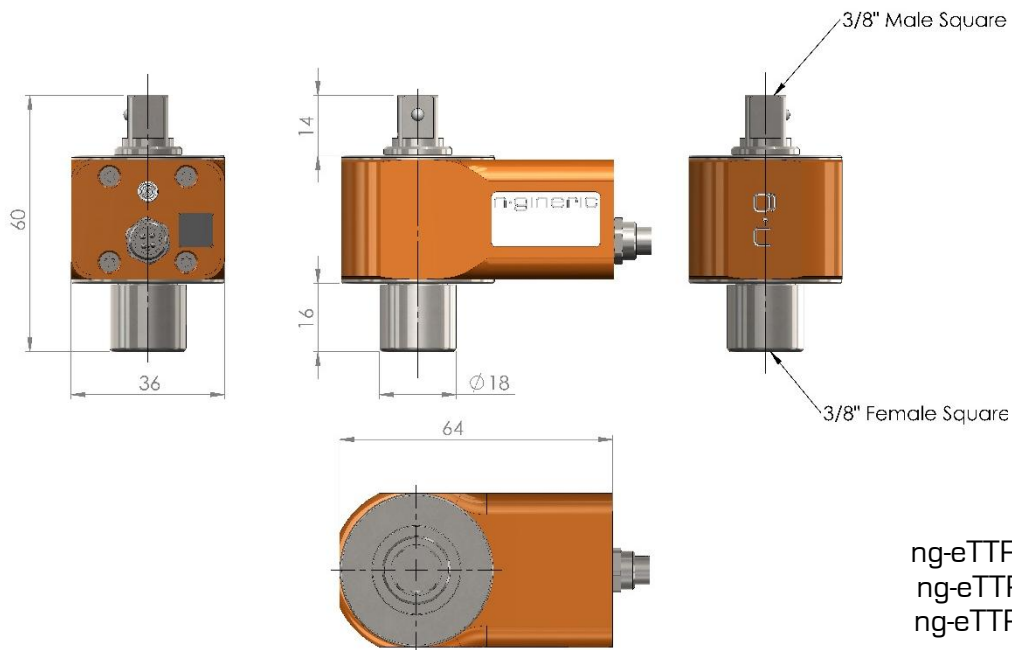
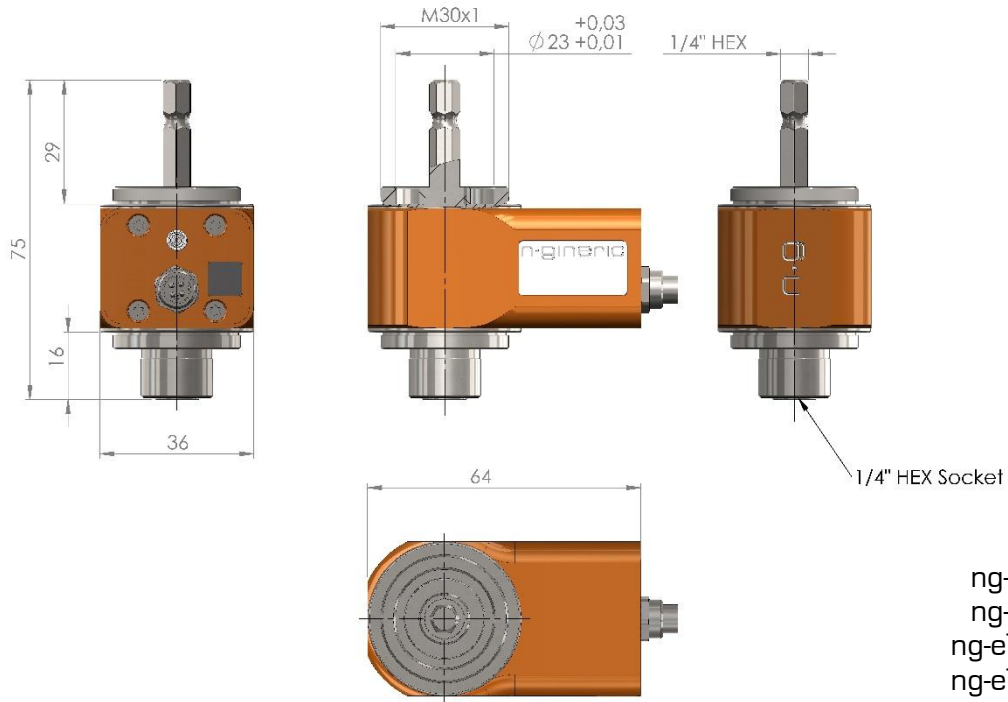
ng-vTTR8000-qi  
ng-vTTR16000-qi

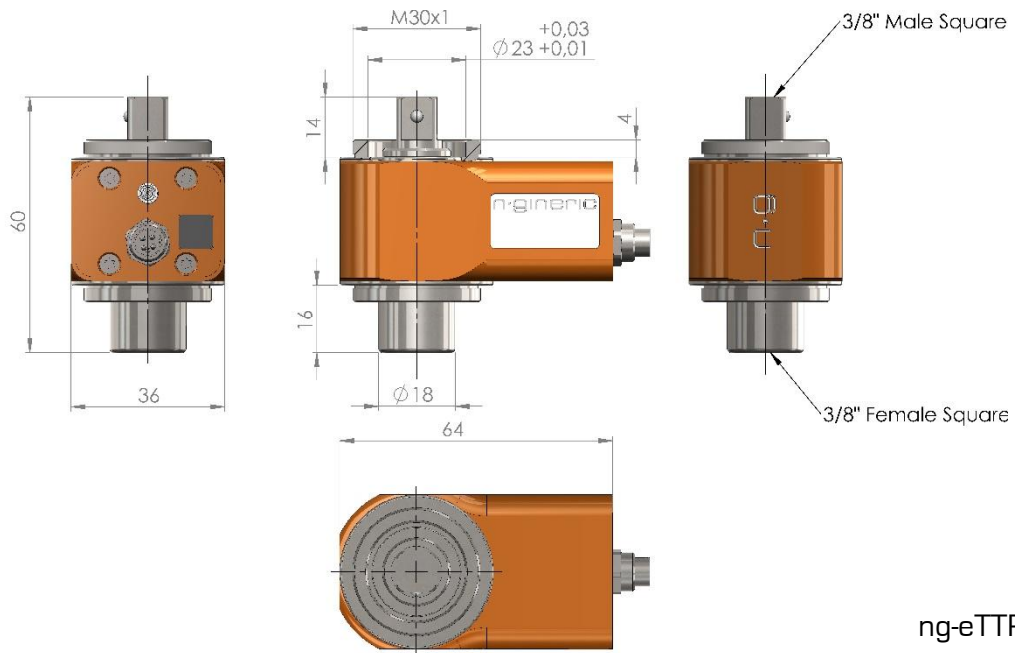


ng-eTTR200-xu  
ng-eTTR500-xu  
ng-eTTR1000-xu  
ng-eTTR2000-xu

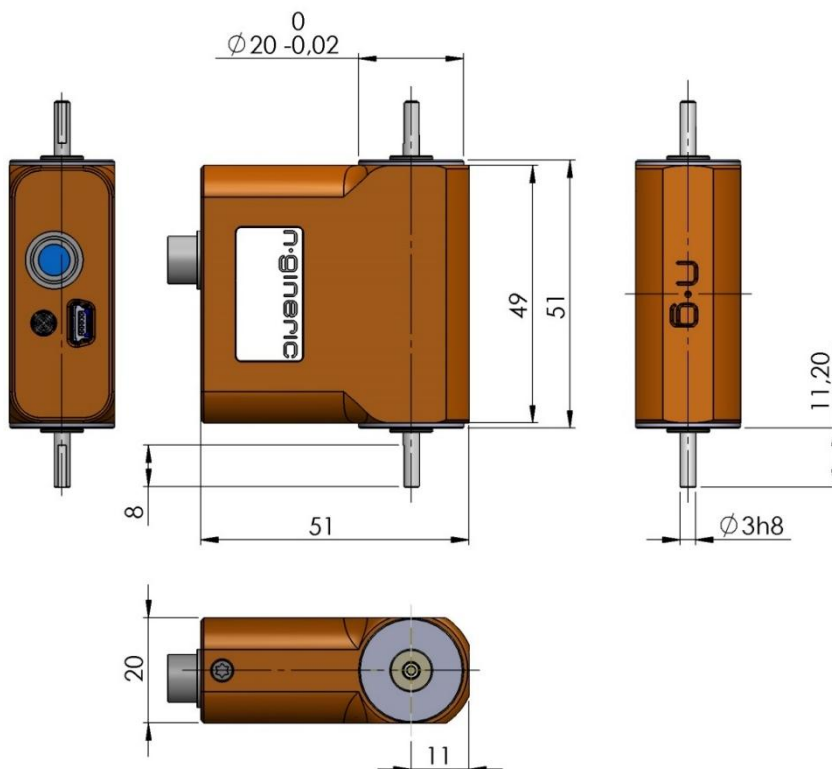
ng-eTTR200-xt  
ng-eTTR500-xt  
ng-eTTR1000-xt  
ng-eTTR2000-xt

ng-eTTR200-xr  
ng-eTTR500-xr  
ng-eTTR1000-xr  
ng-eTTR2000-xr

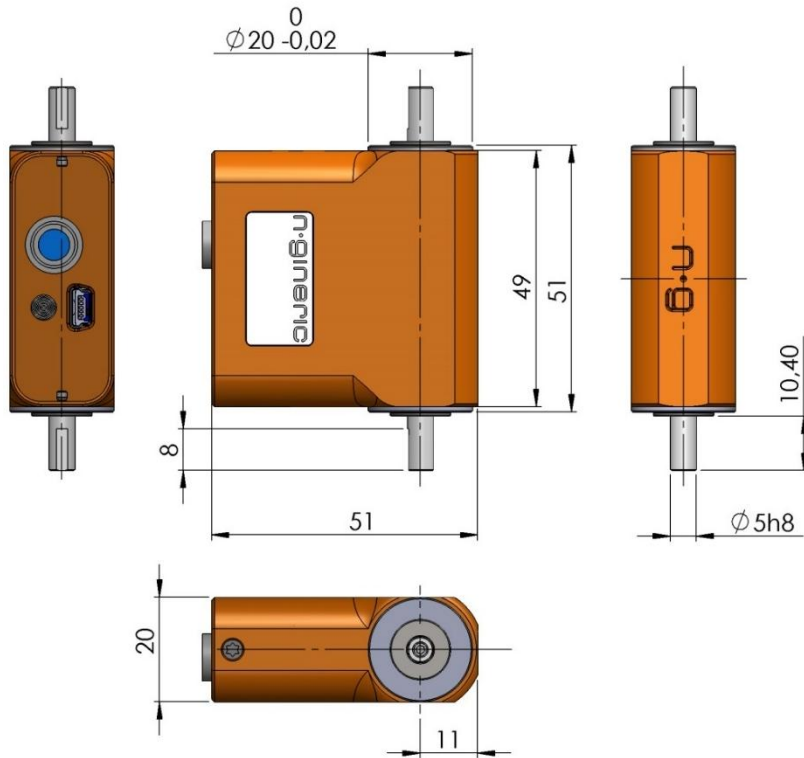




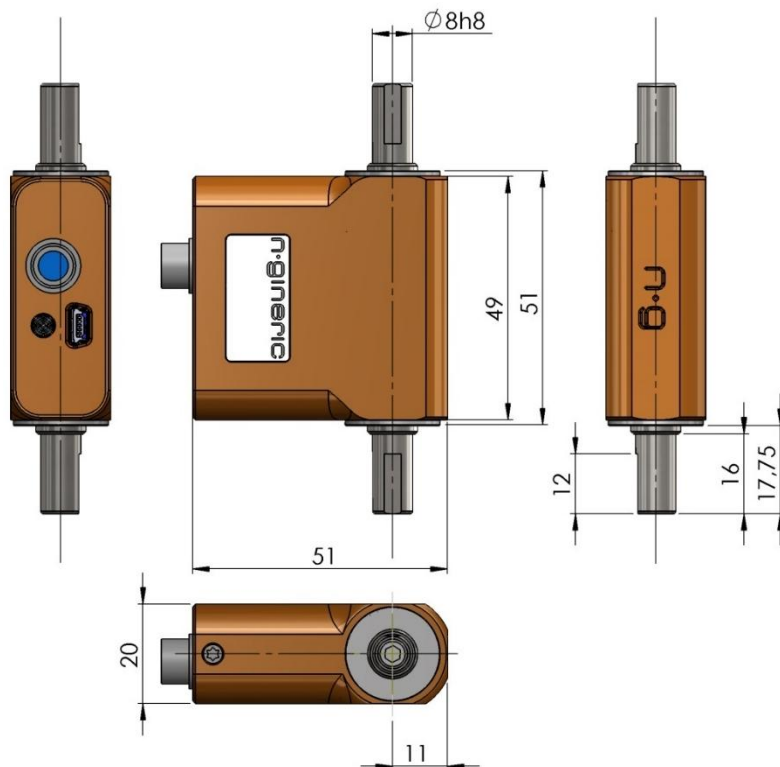
ng-eTTR5000-qf



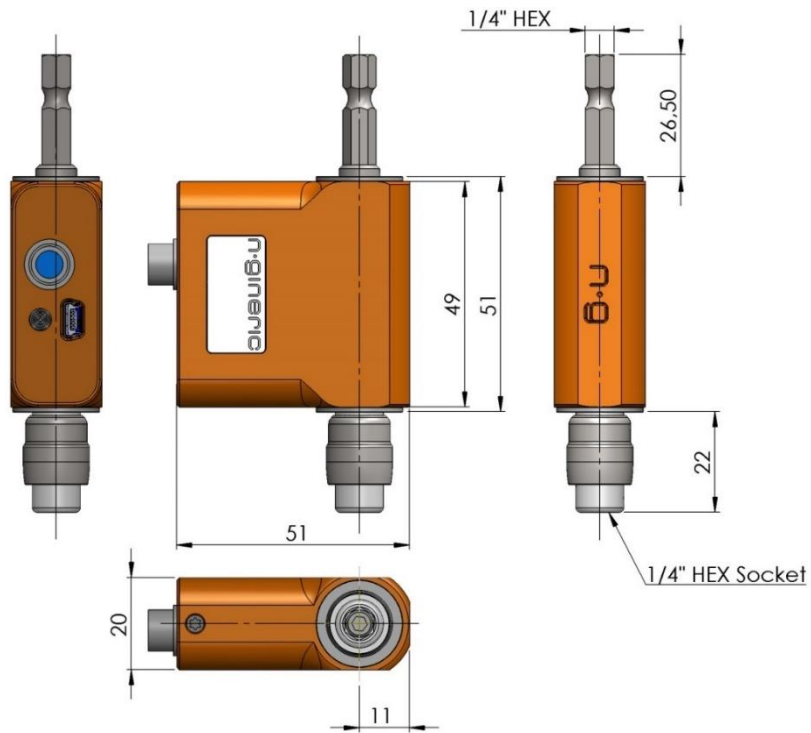
ng-TTRO1-ca  
ng-TTRO2-ca  
ng-TTRO5-ca



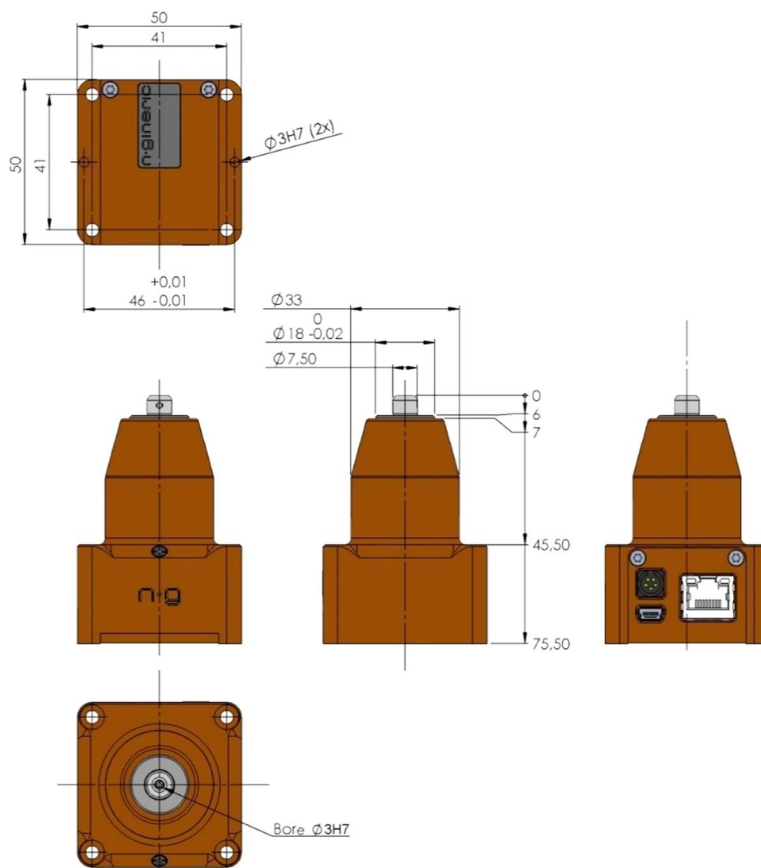
ng-TTR10-ca  
ng-TTR20-ca



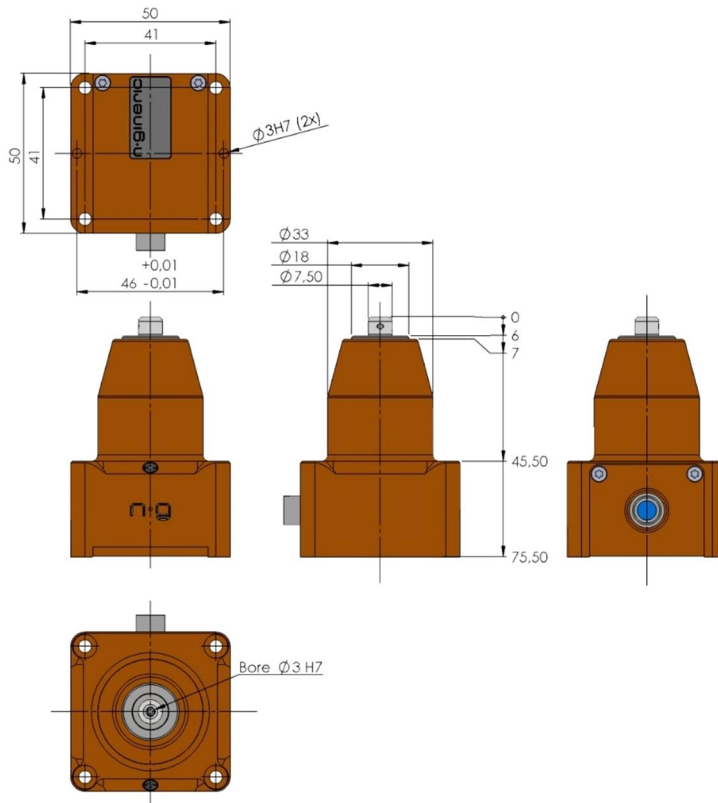
ng-TTR50-ca  
ng-TTR100-ca  
ng-TTR200-ca  
ng-TTR500-ca  
ng-TTR1000-ca



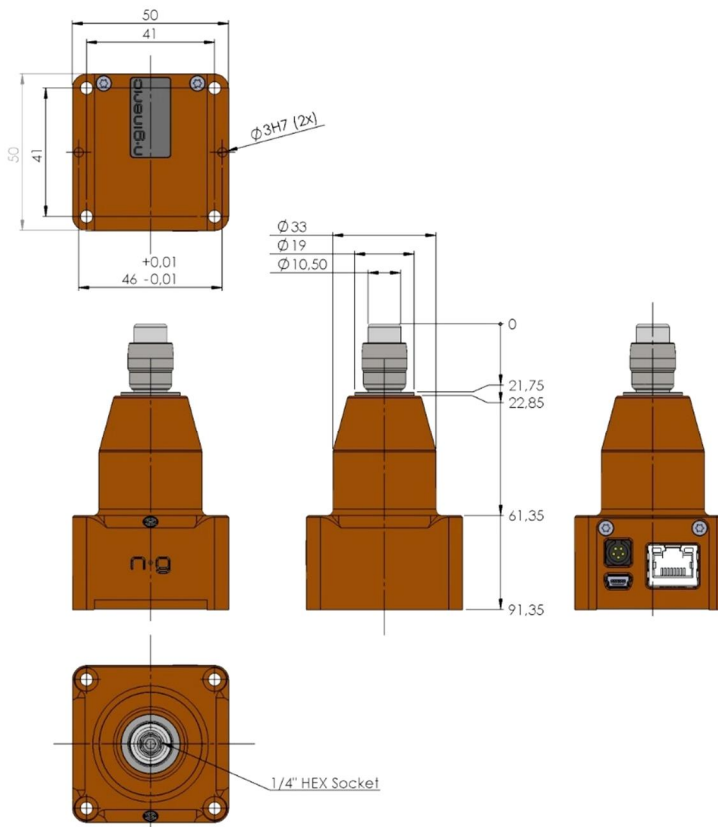
ng-TTR50-xa  
 ng-TTR100-xa  
 ng-TTR200-xa  
 ng-TTR500-xa  
 ng-TTR1000-xa  
 ng-TTR2000-xa



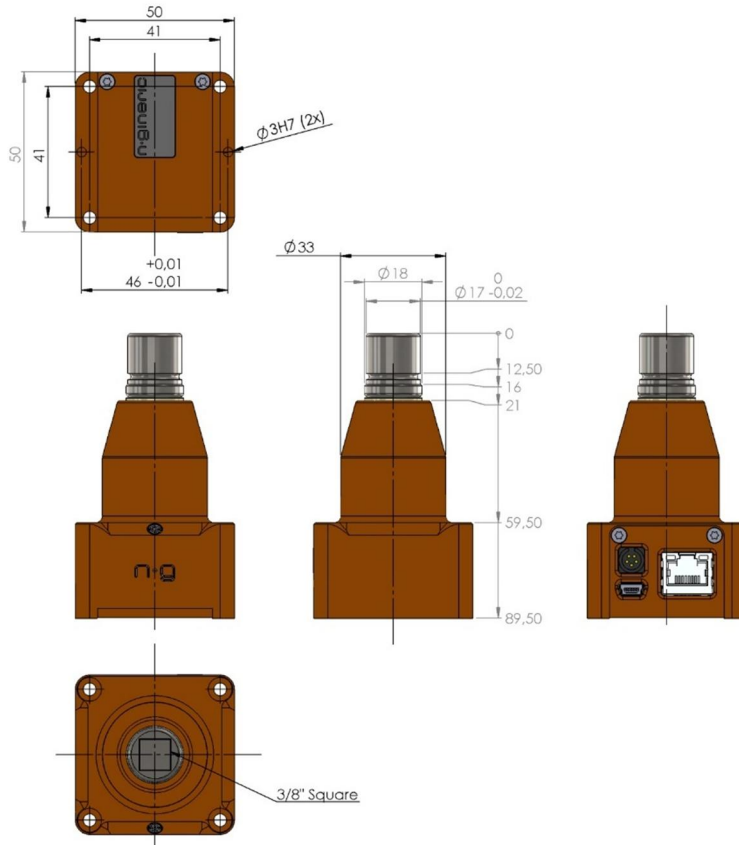
ng-TTS01-ci  
 ng-TTS02-ci  
 ng-TTS05-ci  
 ng-TTS10-ci  
 ng-TTS20-ci



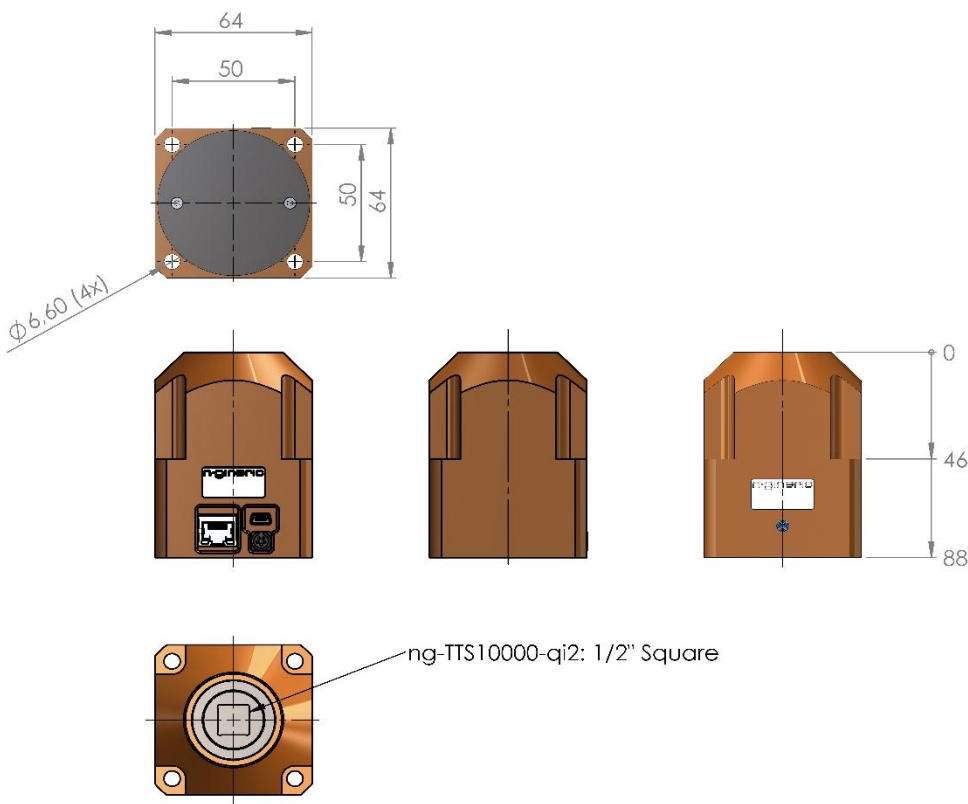
ng-TTS01-ca  
 ng-TTS02-ca  
 ng-TTS05-ca  
 ng-TTS10-ca  
 ng-TTS20-ca



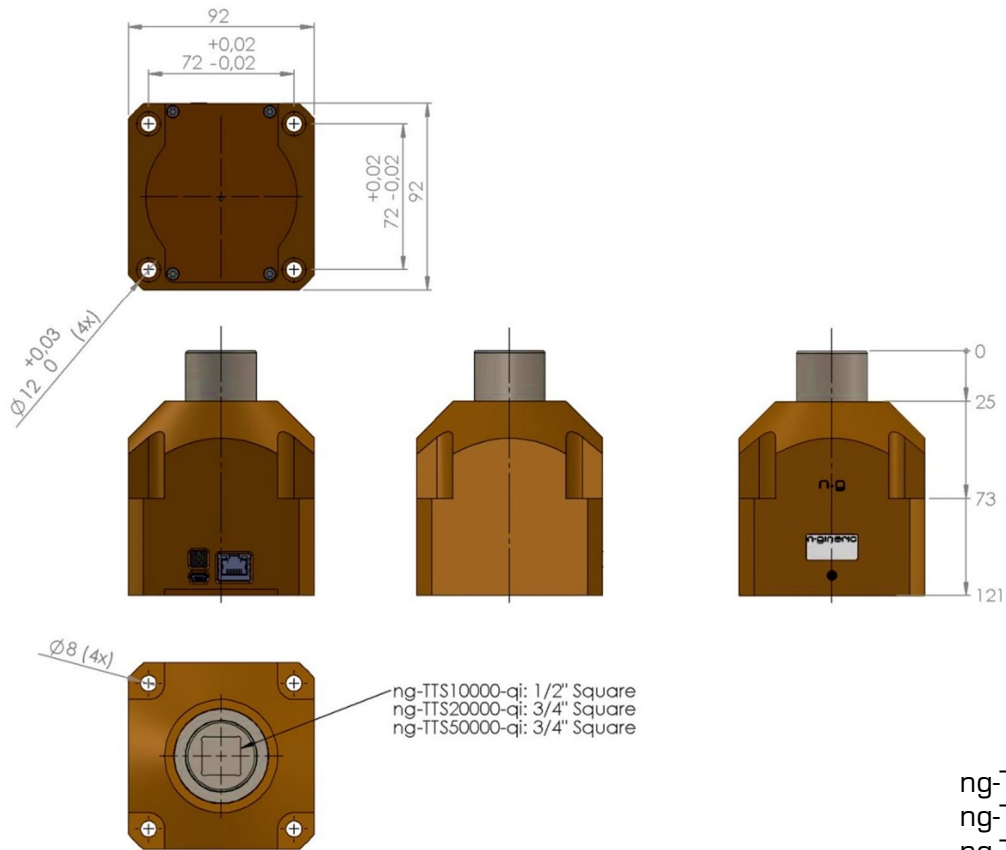
ng-TTS50-xi  
 ng-TTS100-xi  
 ng-TTS200-xi  
 ng-TTS500-xi  
 ng-TTS1000-xi  
 ng-TTS2000-xi



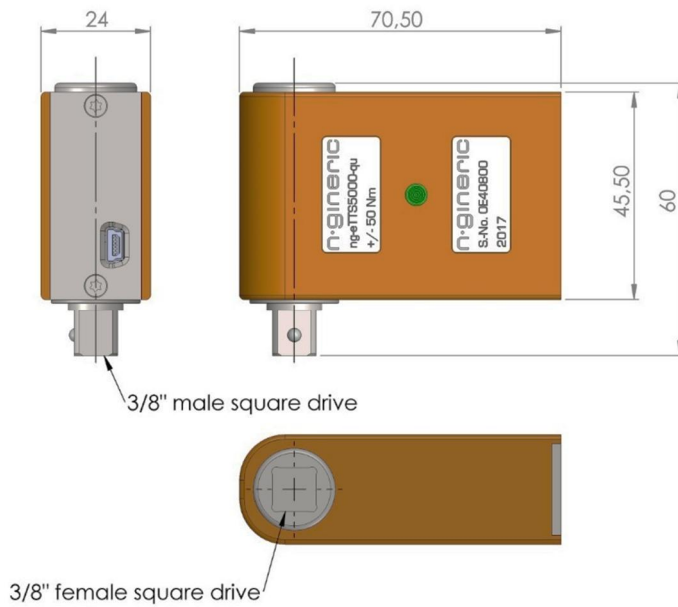
ng-TTS5000-qi



ng-TTS10000-qi2

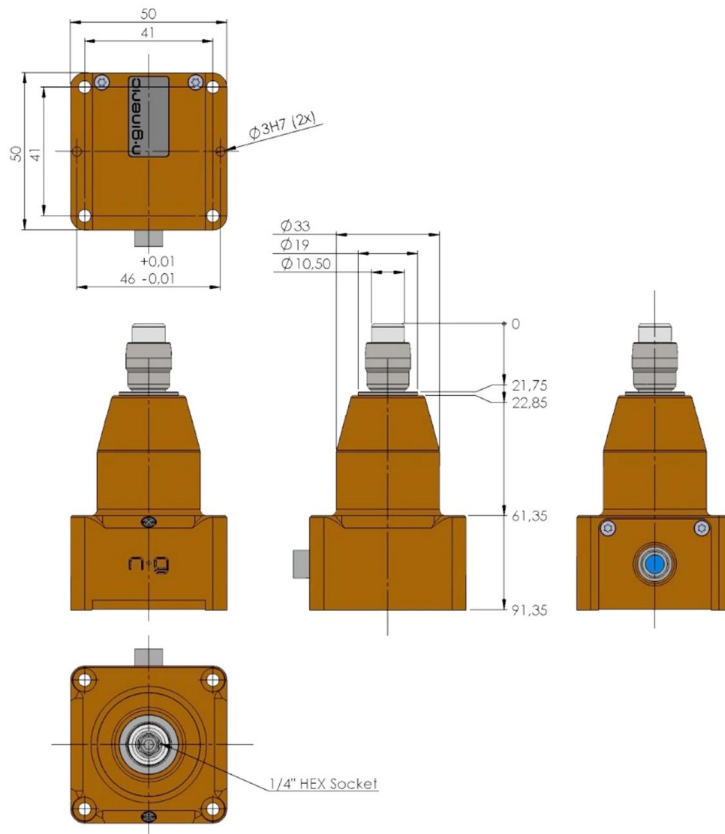


ng-TTS10000-qj  
 ng-TTS20000-qj  
 ng-TTS50000-qj

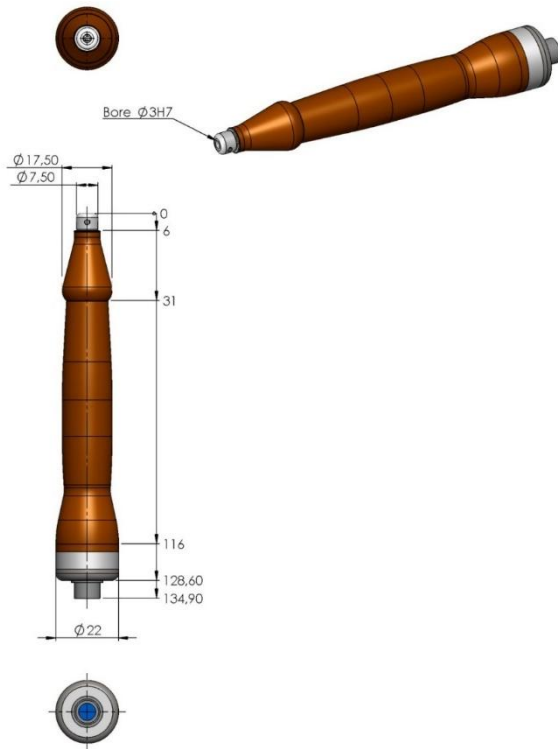


ng-eTTS500-qu  
 ng-eTTS1000-qu  
 ng-eTTS2000-qu  
 ng-eTTS5000-qu



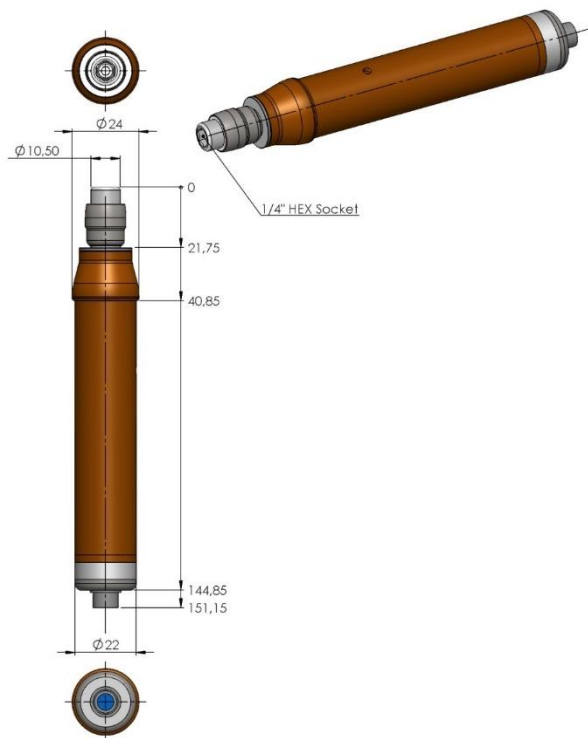


ng-TTS50-xa  
 ng-TTS100-xa  
 ng-TTS200-xa  
 ng-TTS500-xa  
 ng-TTS1000-xa  
 ng-TTS2000-xa



ng-TTH01-ci  
 ng-TTH02-ci  
 ng-TTH05-ci  
 ng-TTH10-ci  
 ng-TTH20-ci

ng-TTH01-ca  
 ng-TTH02-ca  
 ng-TTH05-ca  
 ng-TTH10-ca  
 ng-TTH20-ca



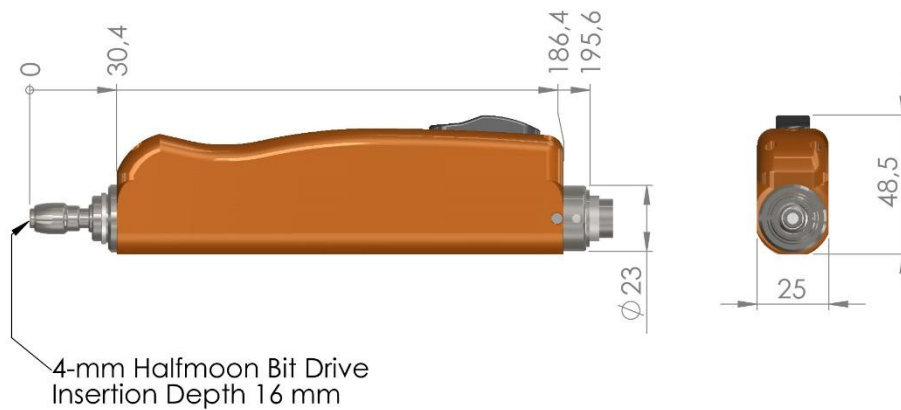
ng-TTH50-xi  
 ng-TTH100-xi  
 ng-TTH200-xi

ng-TTH50-xa  
 ng-TTH100-xa  
 ng-TTH200-xa

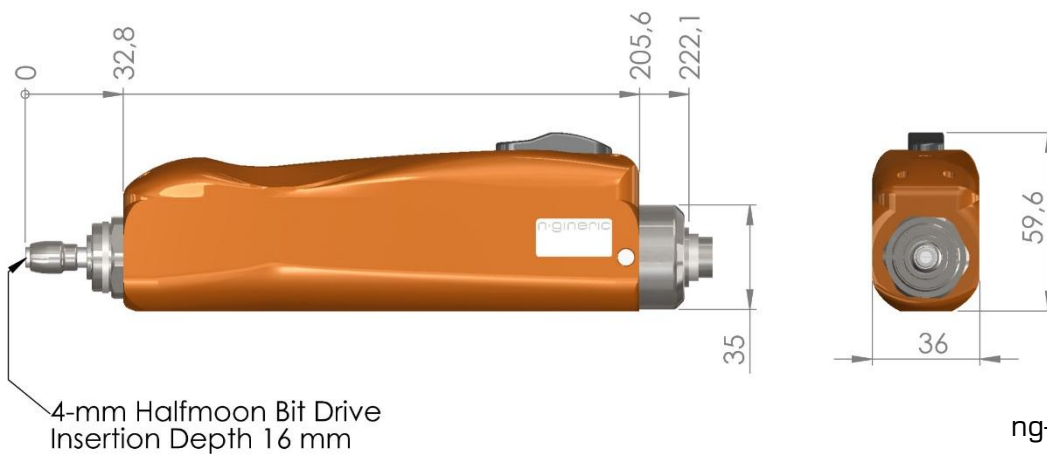


Die ng-TTH-ci Sensoren werden mit der Interface-Elektronik ng-TC-ai geliefert.

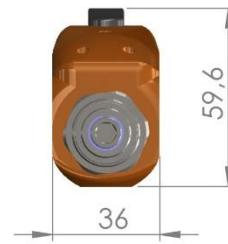
## 7.2 Dimensions – Torque Drivers



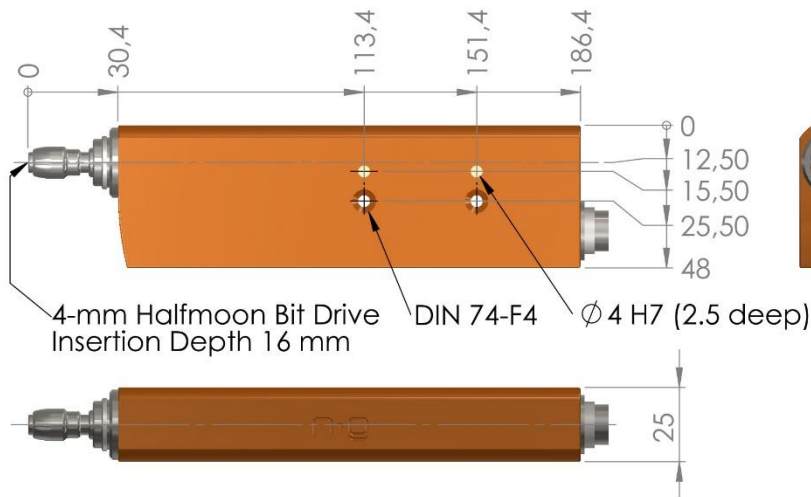
ng-TDH10-hu  
ng-TDH10-hi  
ng-TDH20-hu  
ng-TDH20-hi  
ng-TDHQ10-hu  
ng-TDHQ10-hi  
ng-TDHQ20-hu  
ng-TDHQ20-hi



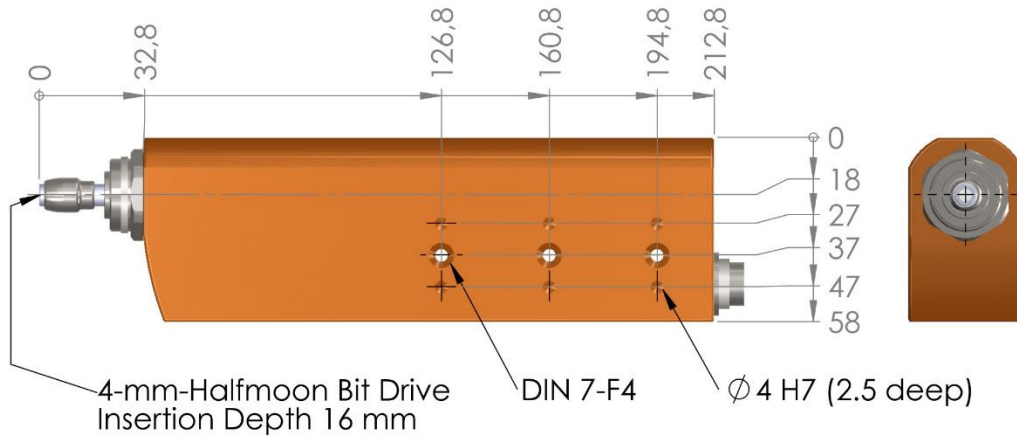
ng-TDH50-hu  
ng-TDH50-hi  
ng-TDH100-hu  
ng-TDH100-hi  
ng-TDHQ50-hu  
ng-TDHQ50-hi  
ng-TDHQ100-hu  
ng-TDHQ100-hi



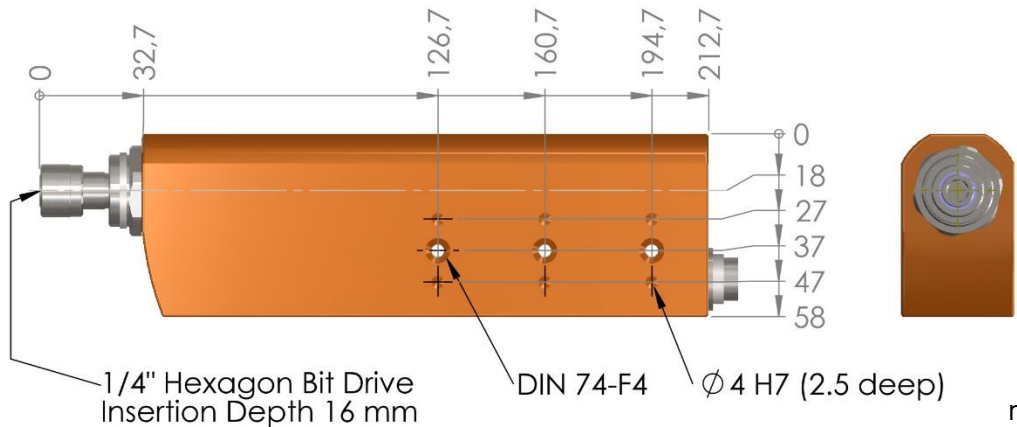
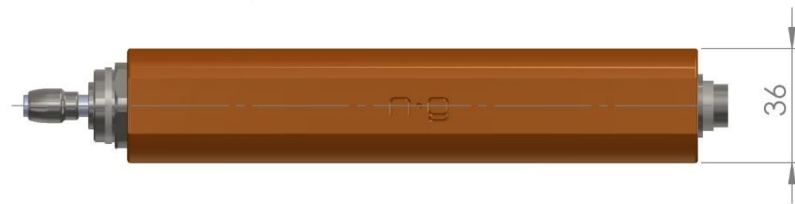
ng-TDH10-xu  
 ng-TDH10-xi  
 ng-TDH20-xu  
 ng-TDH20-xi  
 ng-TDHQ50-hu  
 ng-TDHQ50-hi  
 ng-TDHQ100-hu  
 ng-TDHQ100-hi



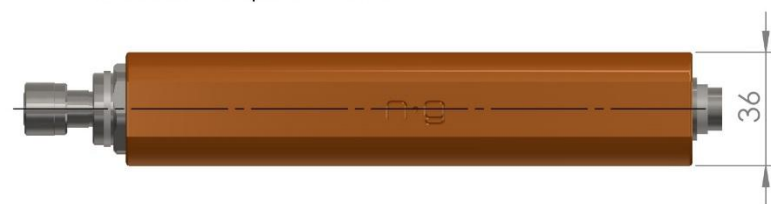
ng-TDS10-xu  
 ng-TDS10-xi  
 ng-TDS20-xu  
 ng-TDS20-xi  
 ng-TDSQ10-xu  
 ng-TDSQ10-xi  
 ng-TDSQ20-xu  
 ng-TDSQ20-xi

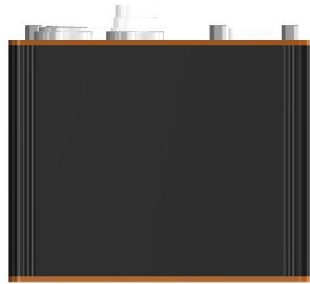


- ng-TDS50-hu
- ng-TDS50-hi
- ng-TDS100-hu
- ng-TDS100-hi
- ng-TDSQ50-hu
- ng-TDSQ50-hi
- ng-TDSQ100-hu
- ng-TDSQ100-hi

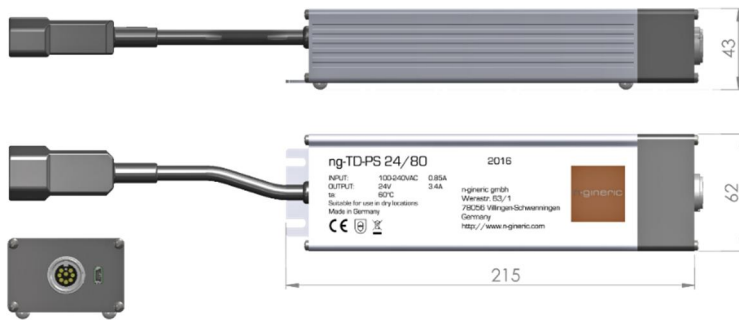


- ng-TDS200-xu
- ng-TDS200-xi
- ng-TDS400-xu
- ng-TDS400-xi
- ng-TDS500-xu
- ng-TDS500-xi
- ng-TDSQ200-xu
- ng-TDSQ200-xi
- ng-TDSQ400-xu
- ng-TDSQ400-xi
- ng-TDSQ500-xu
- ng-TDSQ500-xi

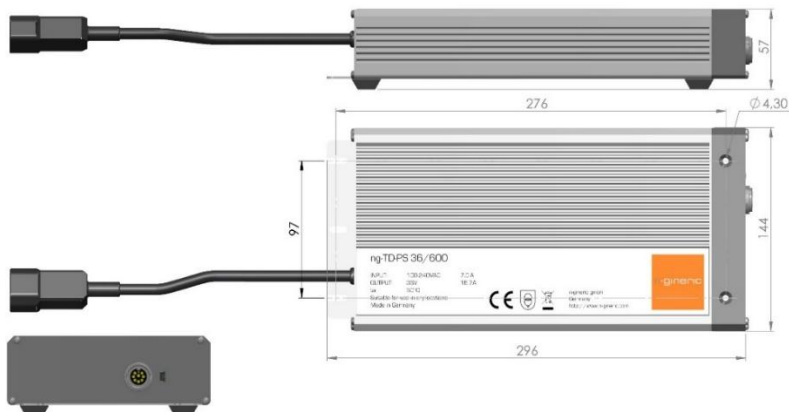




ng-TDC



ng-TD-PS-24-80



ng-TD-PS-36-600

## 7.3 General Technical Data

### Intelligent Torque Sensors

#### ng-TTR-Series

Torque Range	Accuracy Class [% of the F.S.R.]
+/- 1 cNm	1,0 %
+/- 2 cNm	0,5 %
+/- 5 cNm	0,2 %
+/- 10 cNm	0,2 %
+/- 20 cNm	0,2 %
+/- 50 cNm	0,2 %
+/- 1 Nm	0,2 %
+/- 2 Nm	0,1 %
+/- 5 Nm	0,1 %
+/- 10 Nm	0,1 %
+/- 20 Nm	0,1 %
+/- 50 Nm	0,1 %
+/- 100 Nm	0,1 %
+/- 200 Nm	0,1 %
+/- 500 Nm	0,1 %
+/- 1000 Nm	0,2 %

- Encoder Resolution: 0.1 Degrees
- Encoder Accuracy: 0.5 Degrees
- Max. Speed: 5,000 RPM
- Operating Temperature: 0 °C to +40 °C (+32 °F to 104 °F)

#### ng-eTTR-Series

Torque Range	Accuracy Class [% of the F.S.R.]
+/- 2 Nm	0,2 %
+/- 5 Nm	0,2 %
+/- 10 Nm	0,2 %
+/- 20 Nm	0,2 %
+/- 50 Nm	0,2 %

- Encoder Resolution: 0.1 Degrees
- Encoder Accuracy: 0.5 Degrees
- Max. Speed: 5,000 RPM
- Operating Temperature: 0 °C to +40 °C (+32 °F to 104 °F)

## ng-vTTR-Series

Torque Range	Accuracy Class [% of the F.S.R.]
+/- 80 Nm	0,1 %
+/- 160 Nm	0,1 %

- Encoder Resolution: 0.1 Degrees
- Encoder Accuracy: 0.5 Degrees
- Max. Speed: 10,000 RPM
- Operating Temperature: 0 °C to +40 °C (+32 °F to 104 °F)

## ng-TTS-Series

Torque Range	Accuracy Class [% of the F.S.R.]
+/- 1 cNm	1,0 %
+/- 2 cNm	0,5 %
+/- 5 cNm	0,2 %
+/- 10 cNm	0,2 %
+/- 20 cNm	0,2 %
+/- 50 cNm	0,2 %
+/- 1 Nm	0,2 %
+/- 2 Nm	0,1 %
+/- 5 Nm	0,1 %
+/- 10 Nm	0,1 %
+/- 20 Nm	0,1 %
+/- 50 Nm	0,1 %
+/- 100 Nm	0,1 %
+/- 200 Nm	0,1 %
+/- 500 Nm	0,1 %
+/- 1000 Nm	0,2 %

- Operating Temperature: 0 °C to +40 °C (+32 °F to 104 °F)

## ng-eTTS-Series

Torque Range	Accuracy Class [% of the F.S.R.]
+/- 2 Nm	0,2 %
+/- 5 Nm	0,2 %
+/- 10 Nm	0,2 %
+/- 20 Nm	0,2 %
+/- 50 Nm	0,2 %

- Operating Temperature: 0 °C to +40 °C (+32 °F to 104 °F)



## Intelligent Force Sensors

### ng-FTS-b Button Shape Load Cells

- Accuracy Class: 0.5 %
- Operating Overload: 120 % F.S.
- Safe Overload: 150 % F.S.
- Operating Temperature 0 °C to +40 °C (+32 °F to 104 °F)

### ng-FTS-d Donut Shape Load Cells

- Accuracy Class: 2 %
- Operating Overload: 120 % F.S.
- Safe Overload: 150 % F.S.
- Operating Temperature 0 °C to +80 °C (+32 °F to 176 °F)

**n-gineric.**

**Systems and Components designed and made in Germany.**

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