# Intelligent Measurement Components and Systems

For the Measuring of

- Torque
- Angle
- Force
- Displacement

Designed and made in Germany

....test your torque with n-gineric!

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# Contents

# Intelligent Torque and Force Measurement

designed and made by n-gineric

## Systems for measurement with your PC or Android device directly via USB or LAN

- for all applications from a simple handheld measurement to your fully automated testing system

- Torque
- Angle

- Force
- Displacement

## Features:

- USB Interface
- Ethernet Interface
- RS-485 Interface
- Windows software for measurement visualization and data management available
- Android App for measurement monitoring and control available

## Application Examples:


Torque/Angle Measurement

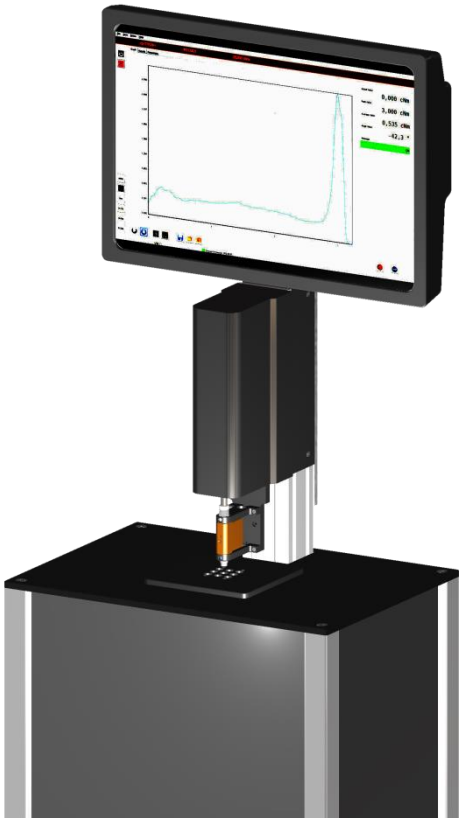
- Mobile phone used as measurement instrument
- Torque window monitoring
- Data transmission via WiFi

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

Torque/Angle Measurement of Battery Screw Driver

- 100 percent control
- G/NG signalizing



Torque Testing Machine for Rotary Dampers

- Fully automated measurement
- Modular design (scaleable)
- PC controlled system

Force/Displacement Measurement Application for Tactile Switches

Torque Measurement System for Friction Control of Ball Bearings

Calibration System for Manual Clutch Type Screw Drivers

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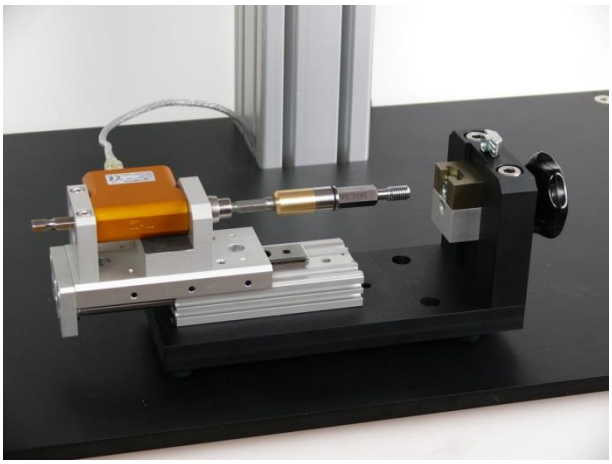

Thread Testing Device for Fixture Nuts


Torque Testing Unit for Rotary Knobs

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# 1. Intelligent and Analog Torque Sensors

- Rotary Torque/Angle Sensors
- Stationary Torque Sensors
- Handheld Torque Sensors

Nominal Measurement Ranges:

+/- 0,01 Nm
...
+/- 50 Nm

Sensor Type Nomenclature:

ng-TT□-□□□-□□
- **ng** = **n**-**g**ineric Product
- **TT** = **T**orque **T**ransducer)
- **R** = **R**otary
- **S** = **S**tationary
- **H** = **H**andheld
- Torque measurement range (cNm)
- **q** = s**q**uare drive
- **c** = **c**ylindric shafts
- **x** = ¼"he**x**agon drive
- **a** = **a**nalog
- **u** = intelligent (**U**SB)
- **i** = **i**ntelligent (USB + Ethernet + RS-485)

## 1.1 Intelligent Rotary Torque/Angle Sensors **ng-TTR-i** with USB, Ethernet and RS-485 Interface:

- High precision strain gauge based torque sensors
- High resolution incremental encoder and brushless energy and signal transmission
- Ultra compact size
- USB interface
- Ethernet interface
- RS-485 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 |
| 01-01-00039-01 | 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 |
| 01-01-00140-01 | ng-TTR2000-ci | +/- 2000 | intelligent | - | 8 mm shaft |

| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00007-01 | ng-TTR50-xi | +/- 50 | intelligent | ✓ | ¼“ hexagon |
| 01-01-00008-01 | ng-TTR100-xi | +/- 100 | intelligent | ✓ | ¼“ hexagon |
| 01-01-00009-01 | ng-TTR200-xi | +/- 200 | intelligent | ✓ | ¼“ hexagon |
| 01-01-00010-01 | ng-TTR500-xi | +/- 500 | intelligent | - | ¼“ hexagon |
| 01-01-00011-01 | ng-TTR1000-xi | +/- 1000 | Intelligent | - | ¼“ hexagon |
| 01-01-00074-01 | ng-TTR2000-xi | +/- 2000 | Intelligent | - | ¼“ hexagon |

| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00073-01 | ng-TTR5000-qi | +/- 5000 | Intelligent | - | 3/8“ square |

## 1.2 Intelligent Rotary Torque/Angle Sensors **ng-TTR-u** with USB:

- High precision strain gauge based torque sensors
- High resolution incremental encoder and brushless energy and signal transmission
- 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 |
| 01-01-00142-01 | ng-TTR2000-cu | +/- 2000 | USB | - | 8 mm shaft |

| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00098-01 | ng-TTR50-xu | +/- 50 | USB | ✓ | ¼“ hexagon |
| 01-01-00099-01 | ng-TTR100-xu | +/- 100 | USB | ✓ | ¼“ hexagon |
| 01-01-00100-01 | ng-TTR200-xu | +/- 200 | USB | ✓ | ¼“ hexagon |
| 01-01-00101-01 | ng-TTR500-xu | +/- 500 | USB | - | ¼“ hexagon |
| 01-01-00102-01 | ng-TTR1000-xu | +/- 1000 | USB | - | ¼“ hexagon |
| 01-01-00103-01 | ng-TTR2000-xu | +/- 2000 | USB | - | ¼“ hexagon |

| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00104-01 | ng-TTR5000-qu | +/- 5000 | USB | - | 3/8“ square |

## 1.3 Intelligent Rotary Torque/Angle Sensors **ng-TTR-a** with Analog Interface and USB:

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

| 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 |
| 01-01-00141-01 | ng-TTR2000-ca | +/- 2000 | Analog + USB | - | 8 mm shaft |

| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00058-01 | ng-TTR50-xa | +/- 50 | Analog + USB | ✓ | ¼“ hexagon |
| 01-01-00059-01 | ng-TTR100-xa | +/- 100 | Analog + USB | ✓ | ¼“ hexagon |
| 01-01-00060-01 | ng-TTR200-xa | +/- 200 | Analog + USB | ✓ | ¼“ hexagon |
| 01-01-00061-01 | ng-TTR500-xa | +/- 500 | Analog + USB | - | ¼“ hexagon |
| 01-01-00024-01 | ng-TTR1000-xa | +/- 1000 | Analog + USB | - | ¼“ hexagon |
| 01-01-00078-01 | ng-TTR2000-xa | +/- 2000 | Analog + USB | - | ¼“ hexagon |

| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00077-01 | ng-TTR5000-qa | +/- 5000 | Analog + USB | - | 3/8“ square |

## 1.4 Intelligent Stationary Torque Sensors **ng-TTS-i** with USB, Ethernet and RS-485 Interface:

- High precision strain gauge based Torque Sensors
- USB interface
- Ethernet interface
- RS-485 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 |
|---|---|---|---|---|---|
| 01-01-00042-01 | 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 | ✓ | ¼“ hexagon |
| 01-01-00020-01 | ng-TTS100-xi | +/- 100 | intelligent | ✓ | ¼“ hexagon |
| 01-01-00021-01 | ng-TTS200-xi | +/- 200 | intelligent | ✓ | ¼“ hexagon |
| 01-01-00022-01 | ng-TTS500-xi | +/- 500 | intelligent | - | ¼“ hexagon |
| 01-01-00023-01 | ng-TTS1000-xi | +/- 1000 | intelligent | - | ¼“ hexagon |
| 01-01-00075-01 | ng-TTS2000-xi | +/- 2000 | intelligent | - | ¼“ hexagon |

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

## 1.5 Intelligent Stationary Torque Sensors **ng-TTS-u** with USB:

- High precision strain gauge based torque sensors
- USB 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 |
|---|---|---|---|---|---|
| 01-01-00105-01 | 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 | ✓ | ¼“ hexagon |
| 01-01-00111-01 | ng-TTS100-xu | +/- 100 | USB | ✓ | ¼“ hexagon |
| 01-01-00112-01 | ng-TTS200-xu | +/- 200 | USB | ✓ | ¼“ hexagon |
| 01-01-00113-01 | ng-TTS500-xu | +/- 500 | USB | - | ¼“ hexagon |
| 01-01-00114-01 | ng-TTS1000-xu | +/- 1000 | USB | - | ¼“ hexagon |
| 01-01-00115-01 | ng-TTS2000-xu | +/- 2000 | USB | - | ¼“ hexagon |

| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00116-01 | ng-TTS5000-qu | +/- 5000 | USB | - | 3/8“ square |

## 1.6 Stationary Torque Sensors **ng-TTS-a** with Analog Interface:

- High precision strain gauge based torque sensors
- Mechanical overload protection clutch (sensors up to 200 cNm range)
- Calibration data stored in sensor memory
- Analog torque output signal (0 to 5 V, zero point at 2.5 V)
- Power supply 12 V DC +/- 5 %, 150 mA

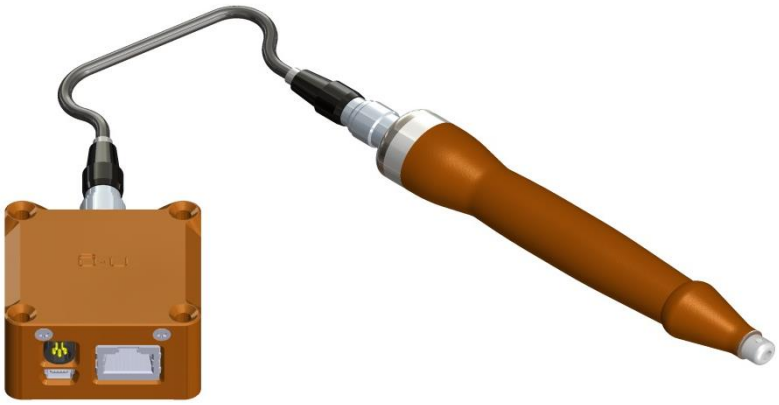
| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00062-01 | ng-TTS01-ca | +/- 1 | Analog | ✓ | 3 mm bore |
| 01-01-00063-01 | ng-TTS02-ca | +/- 2 | Analog | ✓ | 3 mm bore |
| 01-01-00035-01 | ng-TTS05-ca | +/- 5 | Analog | ✓ | 3 mm 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 | ✓ | ¼“ hexagon |
| 01-01-00067-01 | ng-TTS100-xa | +/- 100 | Analog | ✓ | ¼“ hexagon |
| 01-01-00068-01 | ng-TTS200-xa | +/- 200 | Analog | ✓ | ¼“ hexagon |
| 01-01-00013-01 | ng-TTS500-xa | +/- 500 | Analog | - | ¼“ hexagon |
| 01-01-00014-01 | ng-TTS1000-xa | +/- 1000 | Analog | - | ¼“ hexagon |
| 01-01-00144-01 | ng-TTS2000-xa | +/- 2000 | Analog | - | ¼“ hexagon |

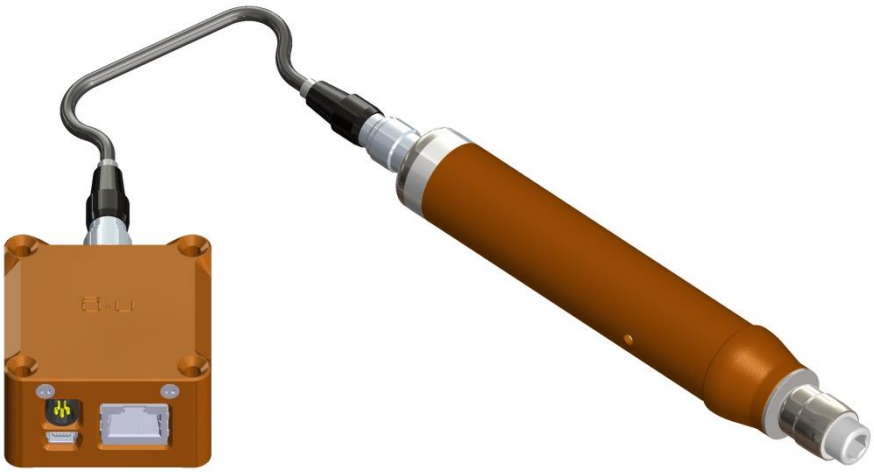
| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00145-01 | ng-TTS5000-qa | +/- 5000 | Analog | - | 3/8" square |

## 1.7 Intelligent Handheld Torque Sensors **ng-TTH-i** with USB, Ethernet and RS-485 Interface:

- High precision strain gauge based torque sensors
- USB interface
- Ethernet interface
- RS-485 interface
- Torque window control
- Mechanical overload protection clutch
- Standard USB and Ethernet connectors



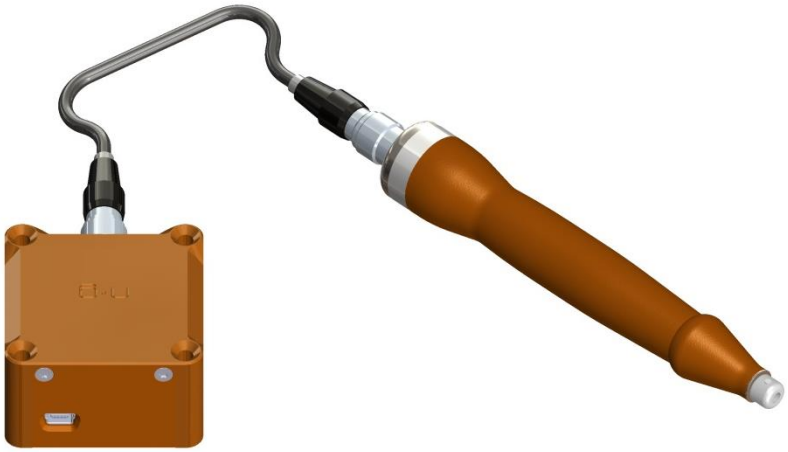
| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00030-01 | ng-TTH01-ci | +/- 1 | intelligent | ✓ | 3 mm bore |
| 01-01-00031-01 | ng-TTH02-ci | +/- 2 | intelligent | ✓ | 3 mm bore |
| 01-01-00032-01 | ng-TTH05-ci | +/- 5 | intelligent | ✓ | 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 |



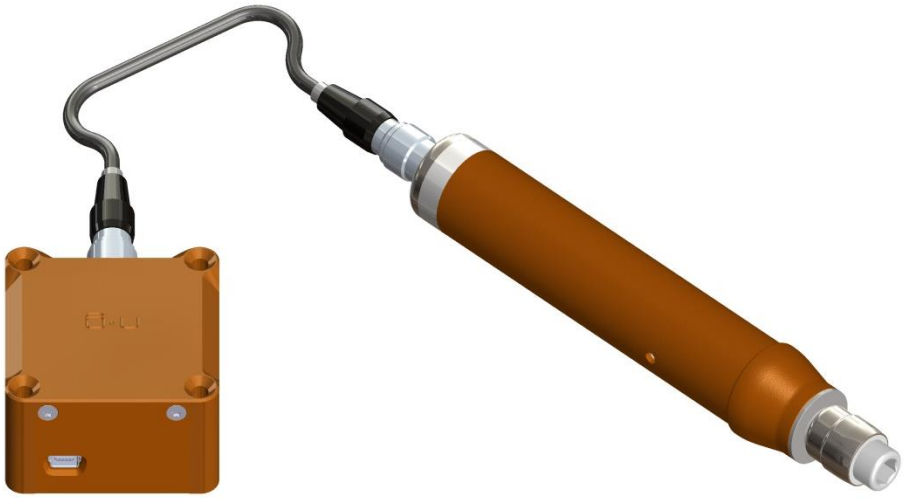
| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00043-01 | ng-TTH50-xi | +/- 50 | intelligent | ✓ | ¼“ hexagon |
| 01-01-00044-01 | ng-TTH100-xi | +/- 100 | intelligent | ✓ | ¼“ hexagon |
| 01-01-00045-01 | ng-TTH200-xi | +/- 200 | intelligent | ✓ | ¼“ hexagon |

## 1.8 Intelligent Handheld Torque Sensors **ng-TTH-u** with USB:

- High precision strain gauge based torque sensors
- USB interface
- Torque window control
- Mechanical overload protection clutch
- Standard USB connector



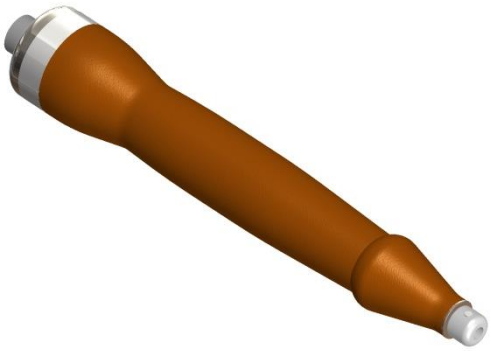
| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00118-01 | ng-TTH01-cu | +/- 1 | USB | ✓ | 3 mm bore |
| 01-01-00119-01 | ng-TTH02-cu | +/- 2 | USB | ✓ | 3 mm bore |
| 01-01-00120-01 | ng-TTH05-cu | +/- 5 | USB | ✓ | 3 mm bore |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



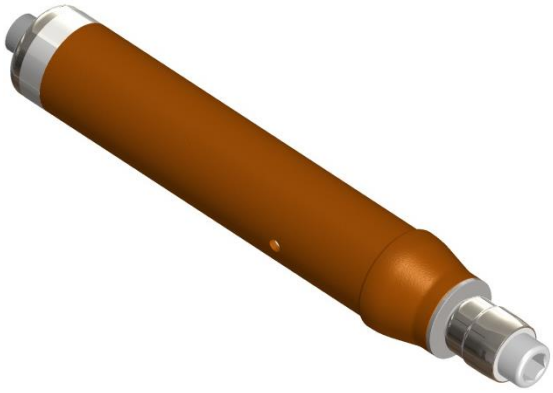
| Article Number | Type | Torque Range cNm | Interface | Overload protected | Drive |
|---|---|---|---|---|---|
| 01-01-00123-01 | ng-TTH50-xu | +/- 50 | USB | ✓ | ¼“ hexagon |
| 01-01-00124-01 | ng-TTH100-xu | +/- 100 | USB | ✓ | ¼“ hexagon |
| 01-01-00125-01 | ng-TTH200-xu | +/- 200 | USB | ✓ | ¼“ hexagon |

## 1.9 Handheld Torque Sensors **ng-TTH-a** with Analog Interface:

- High precision strain gauge based torque sensors
- Mechanical overload protection clutch
- Calibration data stored in Sensor memory
- Analog Torque output signal (0 to 5 V, zero point at 2.5 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 | ✓ | ¼“ hexagon |
| 01-01-00070-01 | ng-TTH100-xa | +/- 100 | Analog | ✓ | ¼“ hexagon |
| 01-01-00071-01 | ng-TTH200-xa | +/- 200 | Analog | ✓ | ¼“ hexagon |

# 2. Intelligent Force Sensors

Miniature Compression Force Sensors

Measurement Ranges:

100 N
...
10 kN

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

Sensor Type Nomenclature:

ng-FTS-□□□-□□
- **ng** = **n-g**ineric Product
- **FT** = Force **T**ransducer
- **S** = **S**tationary
- Measurement range in N
- **b** = button load cell
- **u** = intelligent (**U**SB)
- **i** = **i**ntelligent (USB + Ethernet + RS-485)

## 2.1 Intelligent Compression Force Sensors **ng-FTS-bi** with USB, Ethernet und RS-485-Interface:

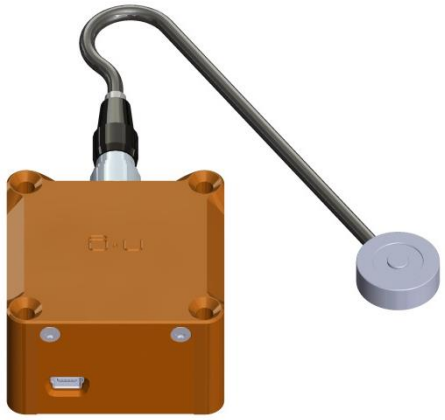
- High precision strain gauge based button load cells
- USB interface
- Ethernet interface
- RS-485 interface
- Force window control
- Standard USB and Ethernet connectors

| Article Number | Type | Force Range N | Interface | Dimensions | Accuracy Class |
|---|---|---|---|---|---|
| 01-01-00126-01 | ng-FTS100-bi | 100 | intelligent | ∅ 19 x 7 | 1 % |
| 01-01-00127-01 | ng-FTS200-bi | 200 | intelligent | ∅ 19 x 7 | 1 % |
| 01-01-00128-01 | ng-FTS400-bi | 400 | intelligent | ∅ 19 x 7 | 1 % |
| 01-01-00129-01 | ng-FTS1000-bi | 1,000 | intelligent | ∅ 19 x 7 | 1 % |

| Article Number | Type | Force Range N | Interface | Dimensions | Accuracy Class |
|---|---|---|---|---|---|
| 01-01-00130-01 | ng-FTS4000-bi | 4,000 | intelligent | ∅ 31 x 10 | 1 % |
| 01-01-00131-01 | ng-FTS8000-bi | 8,000 | intelligent | ∅ 31 x 10 | 1 % |
| 01-01-00132-01 | ng-FTS10000-bi | 10,000 | intelligent | ∅ 31 x 10 | 1 % |

## 2.2 Intelligent Compression Force Sensors **ng-FTS-bi** with USB:

- High precision strain gauge based button load cells
- USB interface
- Force window control
- Standard USB connector



| Article Number | Type | Force Range N | Interface | Dimensions | Accuracy Class |
|---|---|---|---|---|---|
| 01-01-00133-01 | ng-FTS100-bu | 100 | USB | ∅ 19 x 7 | 1 % |
| 01-01-00134-01 | ng-FTS200-bu | 200 | USB | ∅ 19 x 7 | 1 % |
| 01-01-00135-01 | ng-FTS400-bu | 400 | USB | ∅ 19 x 7 | 1 % |
| 01-01-00136-01 | ng-FTS1000-bu | 1,000 | USB | ∅ 19 x 7 | 1 % |

| Article Number | Type | Force Range N | Interface | Dimensions | Accuracy Class |
|---|---|---|---|---|---|
| 01-01-00137-01 | ng-FTS4000-bu | 4,000 | USB | ∅ 31 x 10 | 1 % |
| 01-01-00138-01 | ng-FTS8000-bu | 8,000 | USB | ∅ 31 x 10 | 1 % |
| 01-01-00139-01 | ng-FTS10000-bu | 10,000 | USB | ∅ 31 x 10 | 1 % |

# 3. Software

## 3.1 Measurement Visualization & Control Software **n-quirer TT** for Tablet PC, Laptop, Netbook, PC.

For usage in combination with all intelligent Sensors from n-gineric

Functions of the version **n-quirer TT basic**

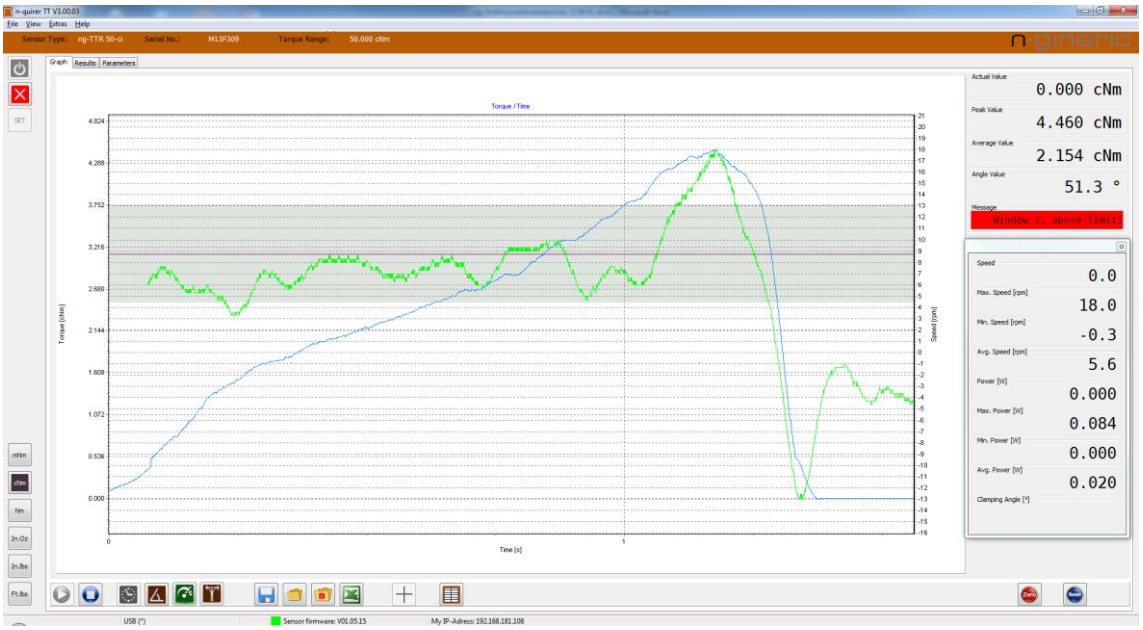
- Graph recordings of
  - Torque vs. time
  - Torque vs. angle
  - Force vs. time
  - Force vs. displacement
- Automatic sensor identification
- Graph reading with up to 2,000 measurements per second
- Supports different physical units
- 2 control windows with internal or external triggering
- Adjustable low pass filter (10 to 500 Hz)
- Selectable 50/60 Hz noise rejection filter
- 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 XP, Windows 7, Windows 8.
- Direct sensor connectivity via USB or Ethernet

| Article Number | 01-01-00012-02 |
|---|---|

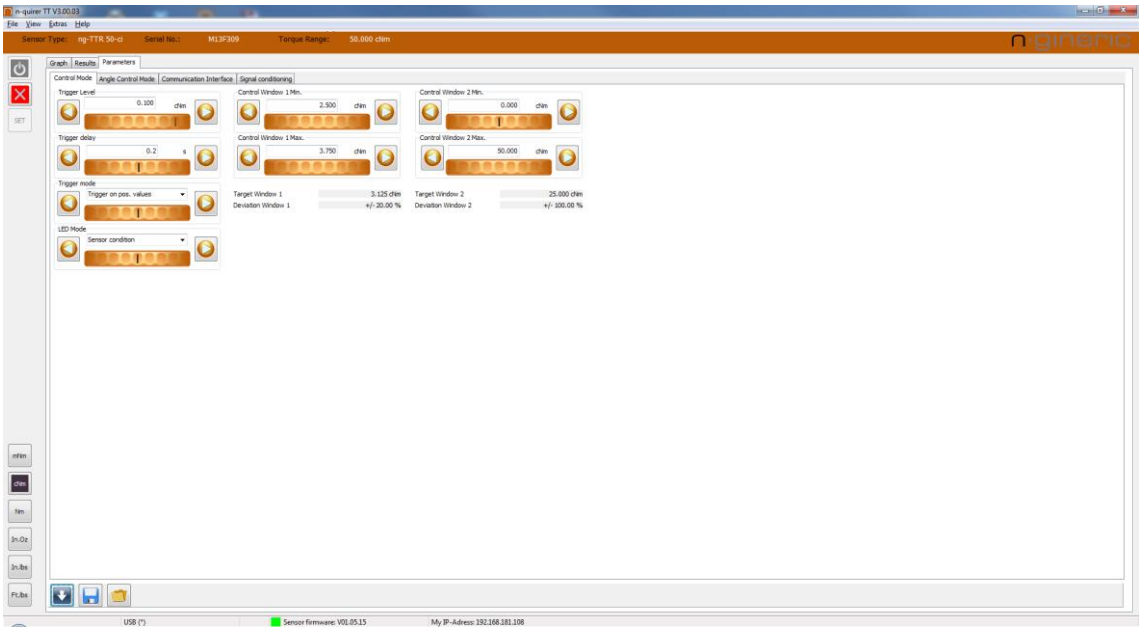
The extended version **n-quirer TT advanced** provides the following additional functions:

- Graph recordings of
  - Speed vs. time
  - Speed vs. angle
  - Power vs. time
  - Power vs. angle
- Cursor function with values display
- 2nd fully configurable measurement display window
- Bar code reader support for repetitive measurements

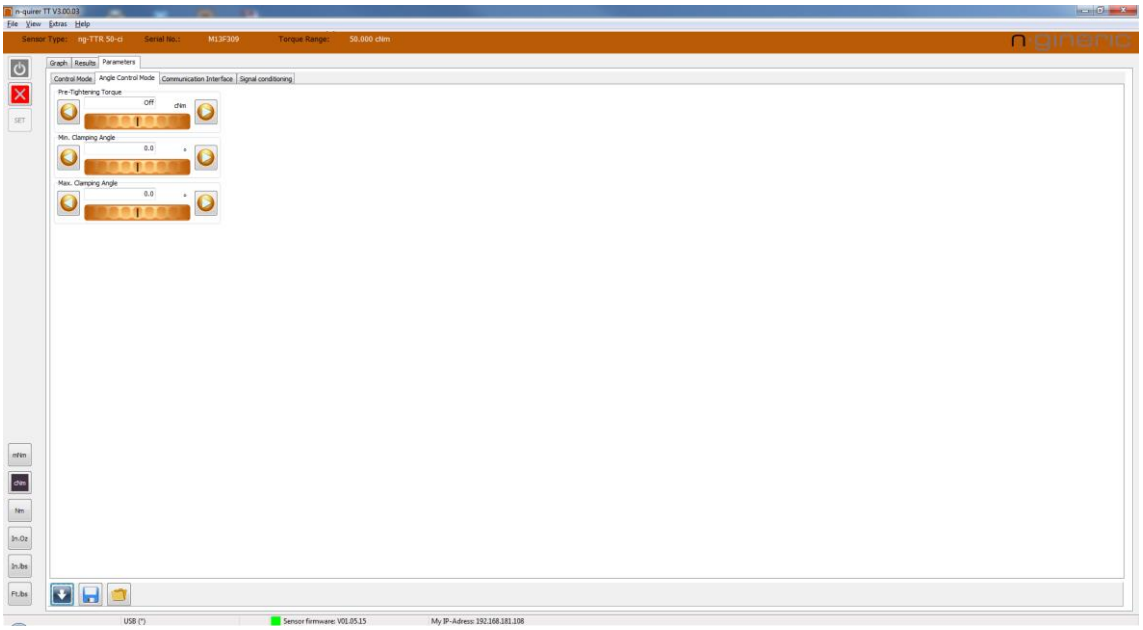
| Article Number | 01-01-00143-01 |
|---|---|



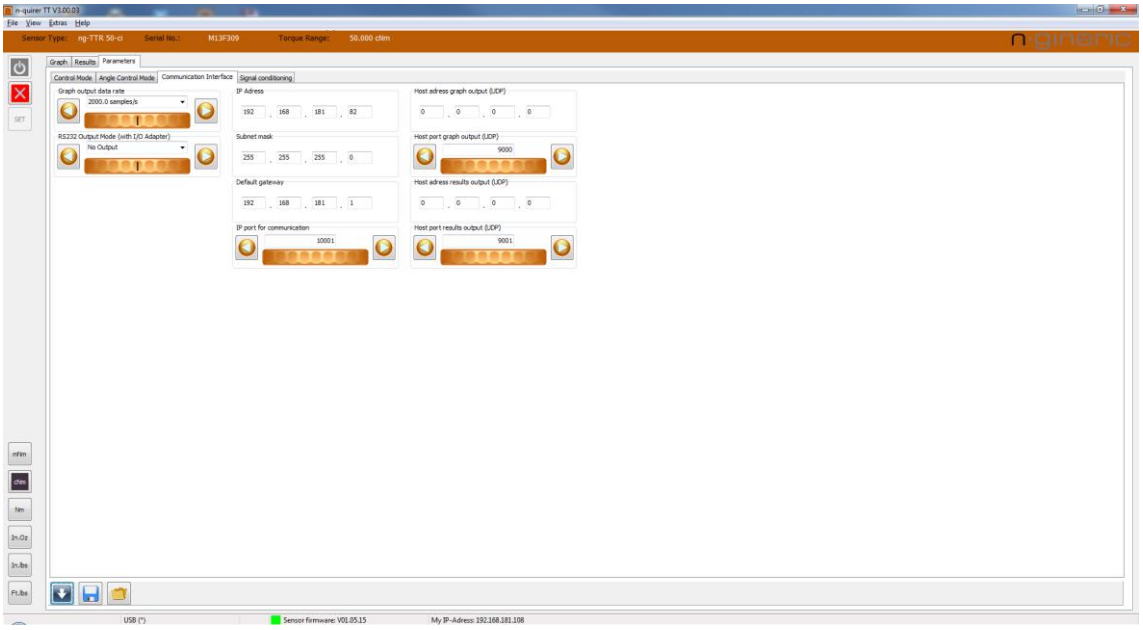

**n-quirer TT** graph window



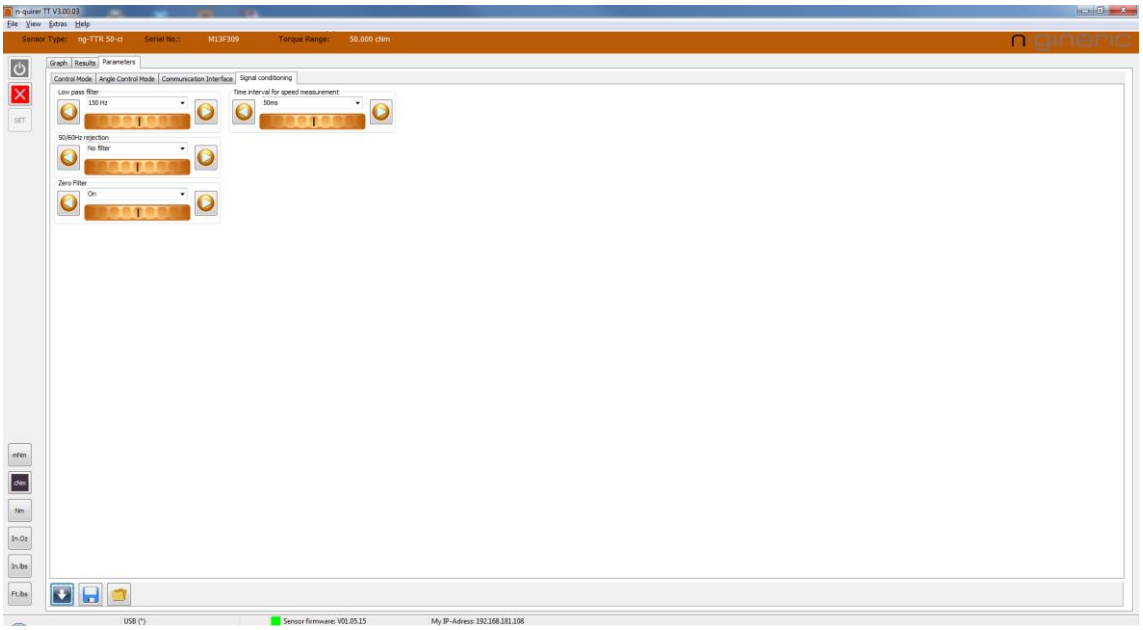

**n-quirer TT** control mode tab sheet



**n-quirer TT** angle control mode tab sheet



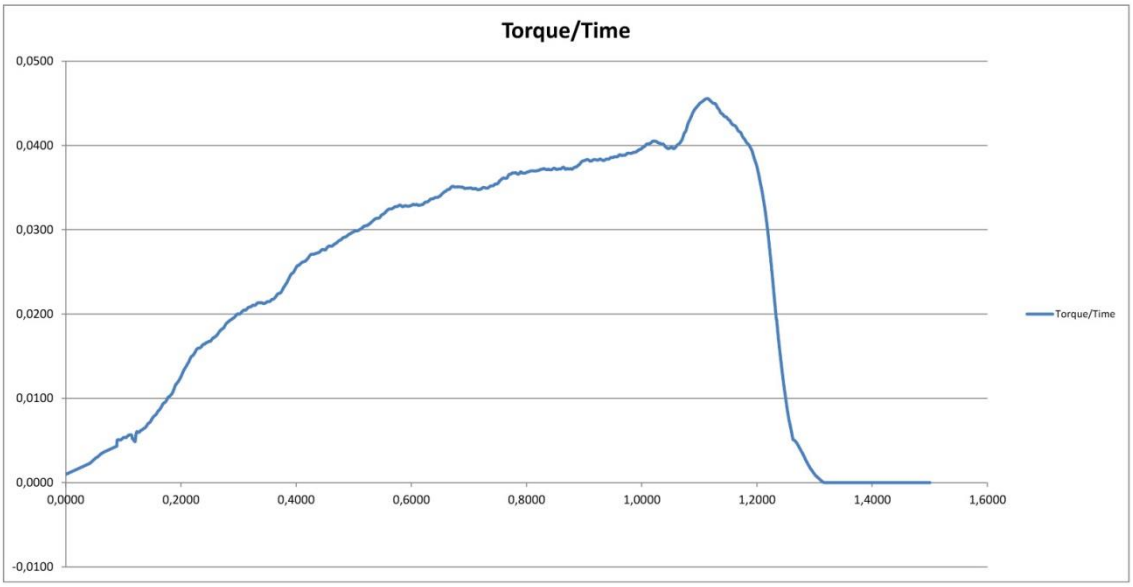
**n-quirer TT** communication interface tab sheet



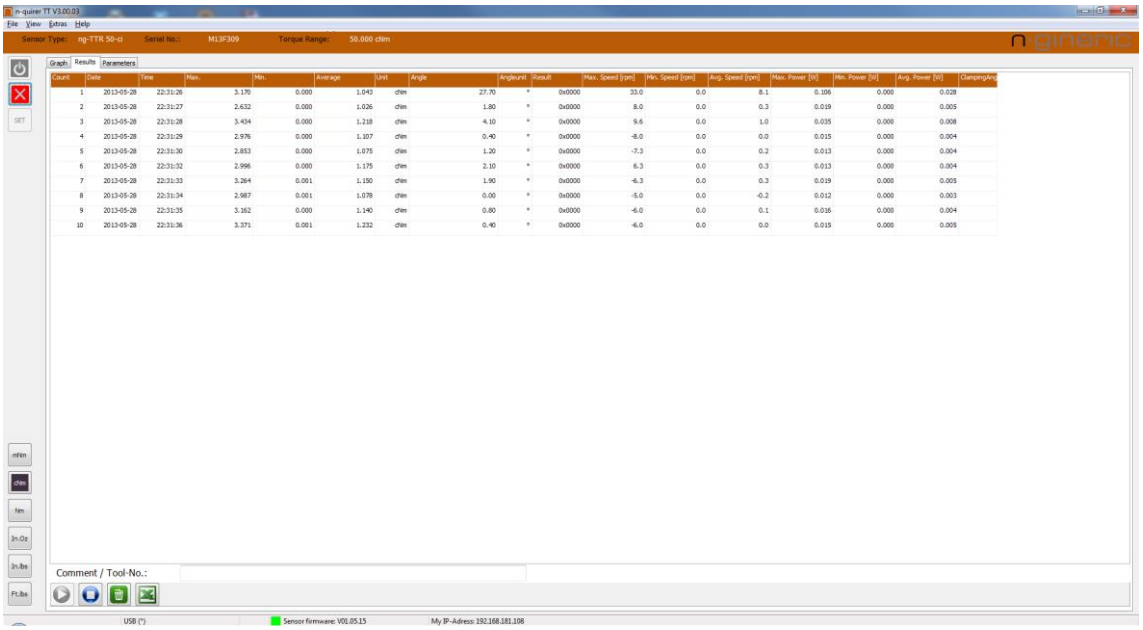
**n-quirer TT** signal conditioning tab sheet

Graph

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




**n-quirer TT** graph exported to Excel




**n-quirer TT** measurement results tab sheet

n-gineric Statistical Report

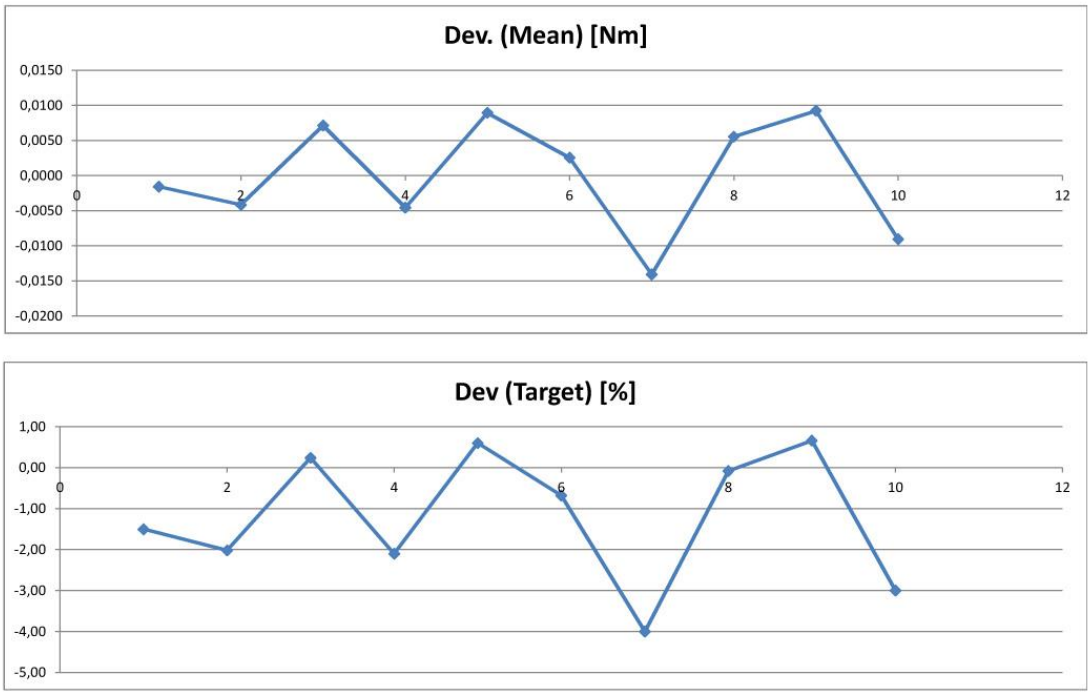
| | | | |
|---|---|---|---|
| Date/Time: | 28.08.12 18:01:49 | Tool Serial Number: | M13F4E0 |
| Target Value [Nm]: | 0,5000 | Tolerance (+/-) [%]: | 12,00% |

| 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** 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.

## 3.2 Measurement Monitoring Software **ng-display** for Android Devices

For usage in combination with all intelligent sensors from n-gineric

- Automatic sensor identification
- Supports different physical units
- 2 control windows
- Direct Sensor connectivity via USB
- Requirements: Android 3.2 or higher, USB Master or OTG
- Direct sensor connectivity via USB

| Article Number | 01-01-00087-01 |
|---|---|


Please let us know your which Android device you use for compatibility check.

# 4. Accessories

## 4.1 Interface Extension **ng-TTx** for Intelligent Sensors from n-gineric

| Article Number | 01-01-00072-01 |
|---|---|

- 12 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 signalizing of control window status
- RS232-C-interface for continuous graph data output or measurements results output
- Ethernet interface for general use of the digital IOs
- Dimensions 105 x 46 x 88 mm

Connection Cable from Sensor to **ng-TTx**

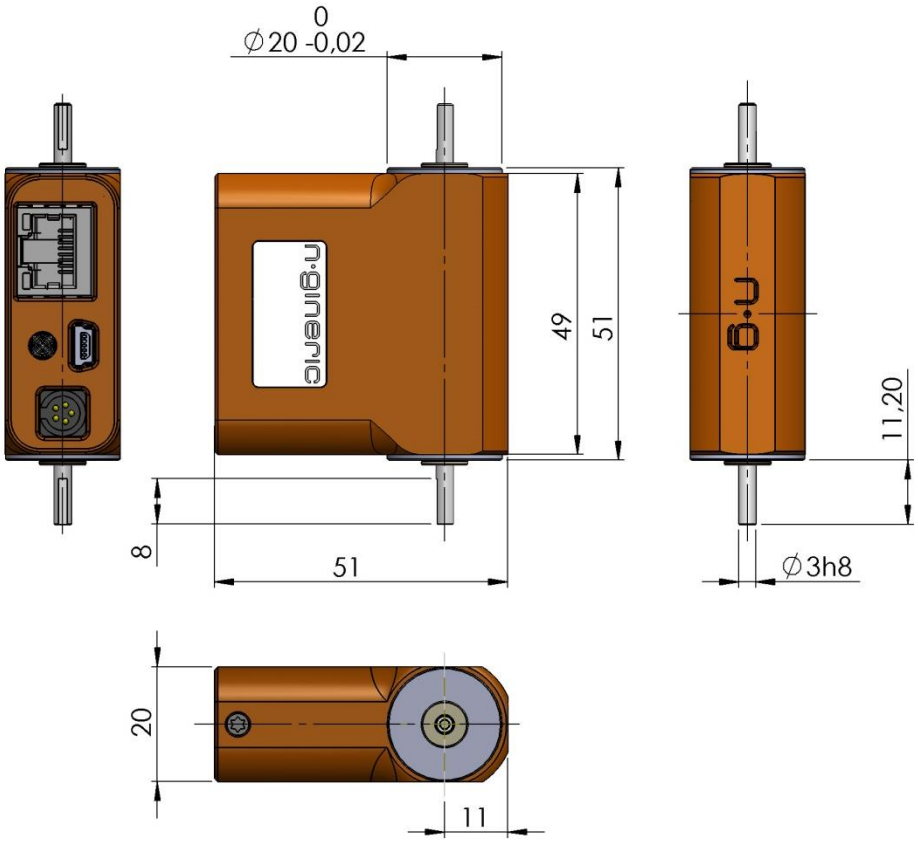
| Article Number | 01-90-00003-01 |
|---|---|

Power supply 24 V DC 45 W (Input voltage 100 – 250 V DC)

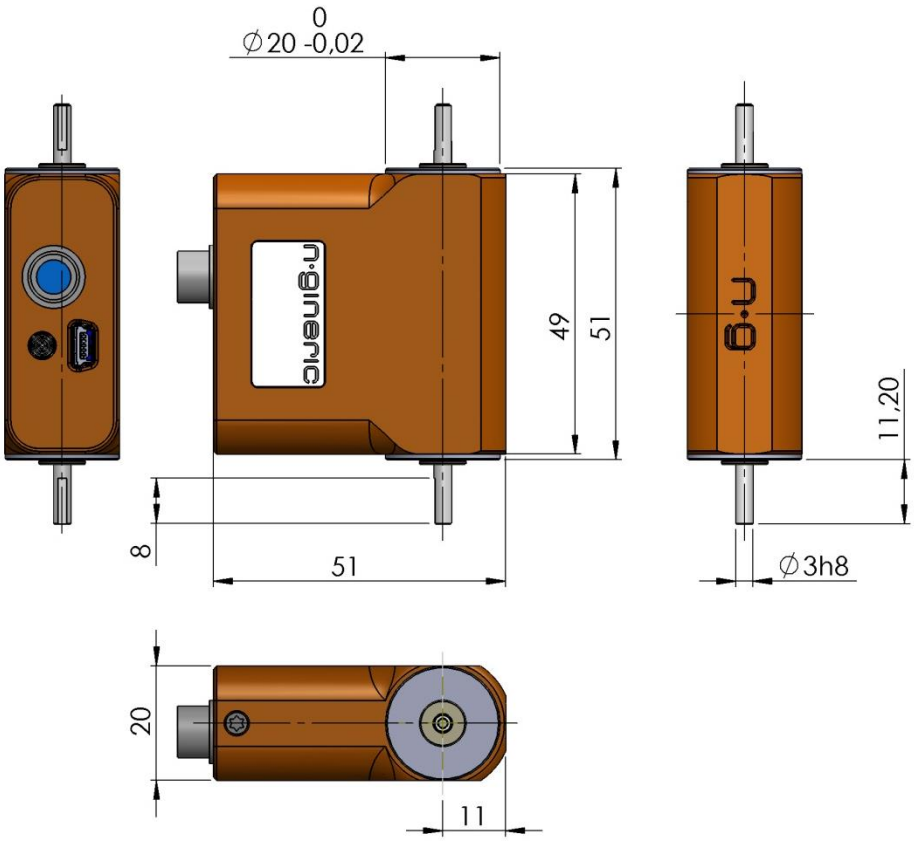
| Article Number | 01-91-00001-01 |
|---|---|

# 5. Appendix

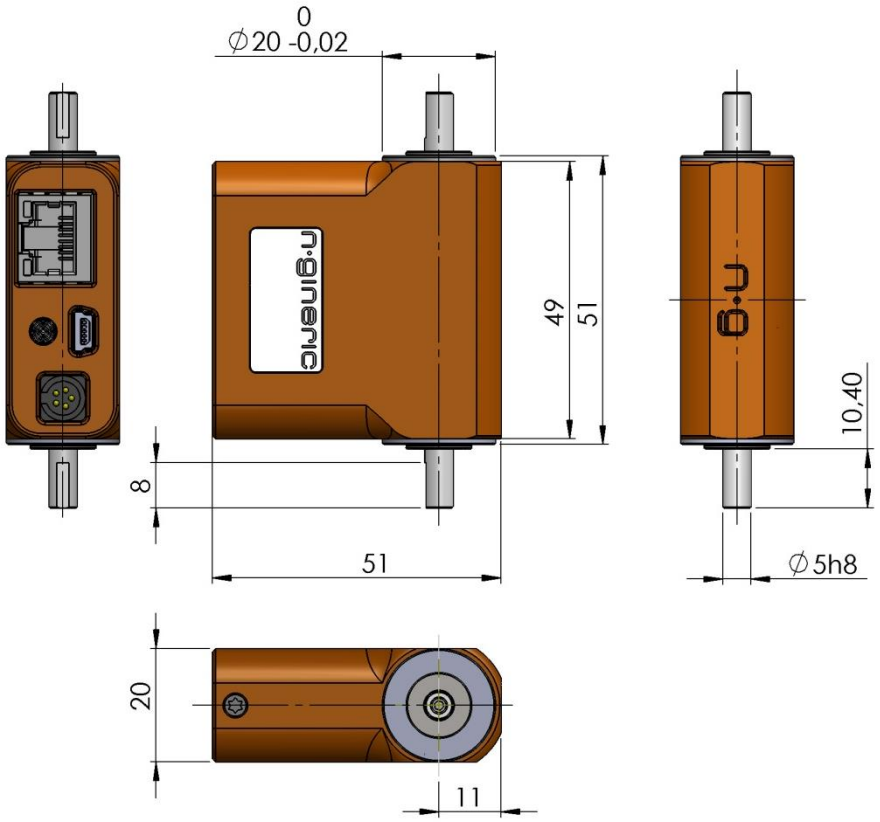
## 5.1 Physical dimensions



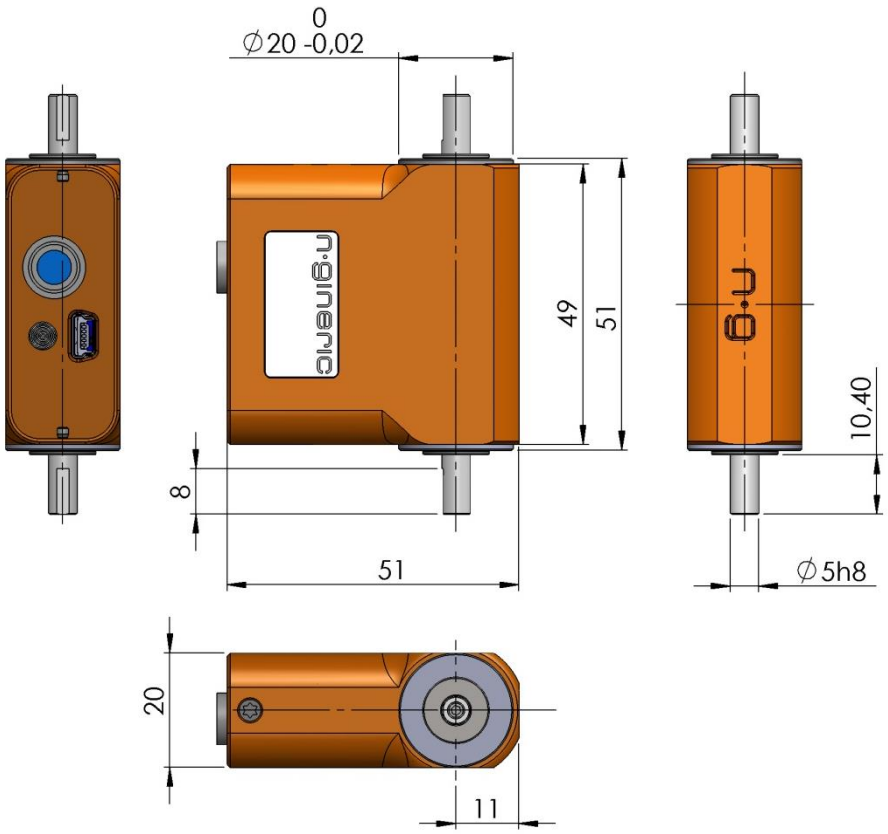

ng-TTR01-ci,
ng-TTR02-ci
ng-TTR05-ci



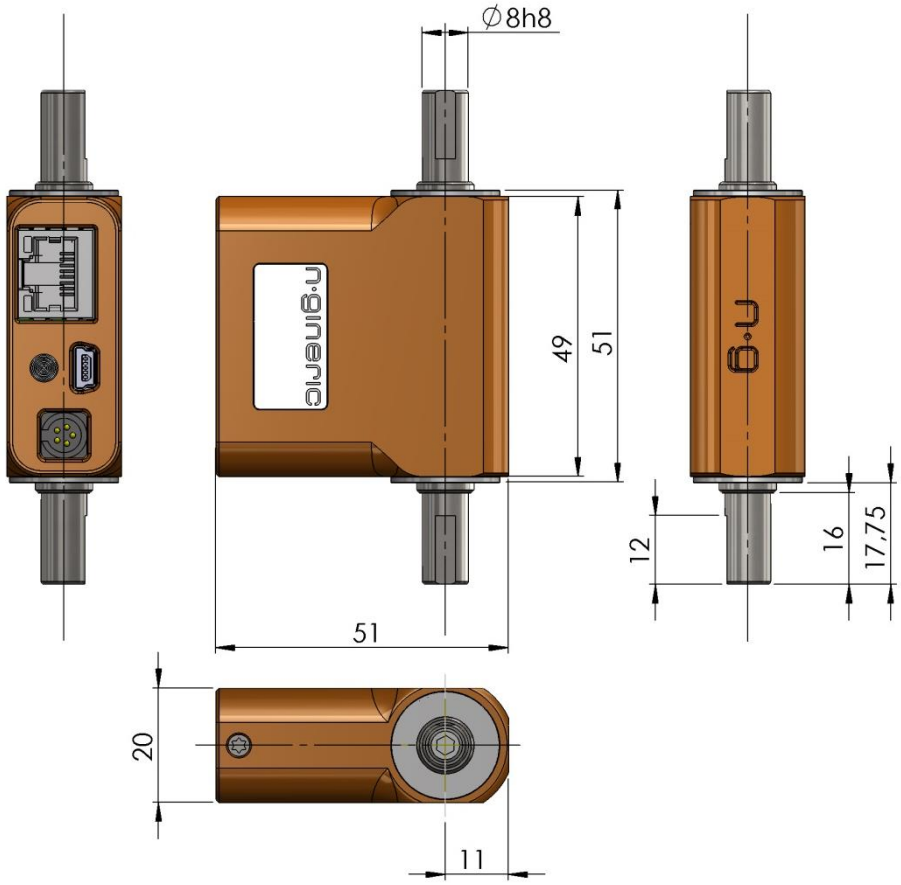

ng-TTR01-ca
ng-TTR02-ca
ng-TTR05-ca



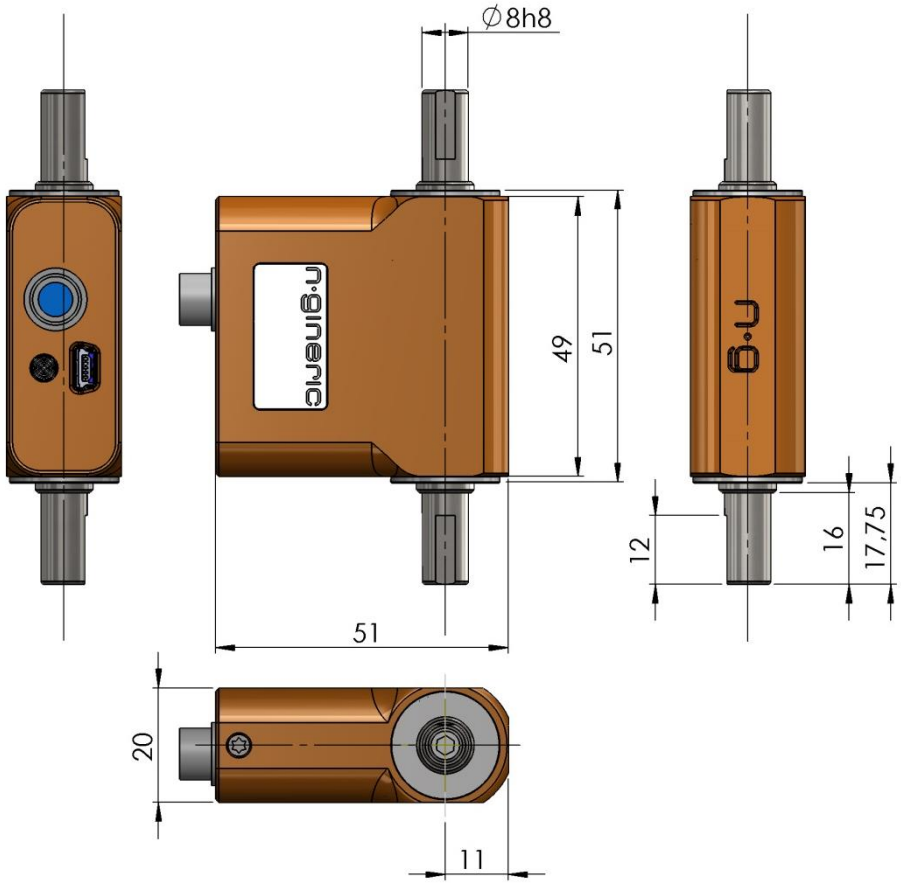

ng-TTR10-ci,
ng-TTR20-ci



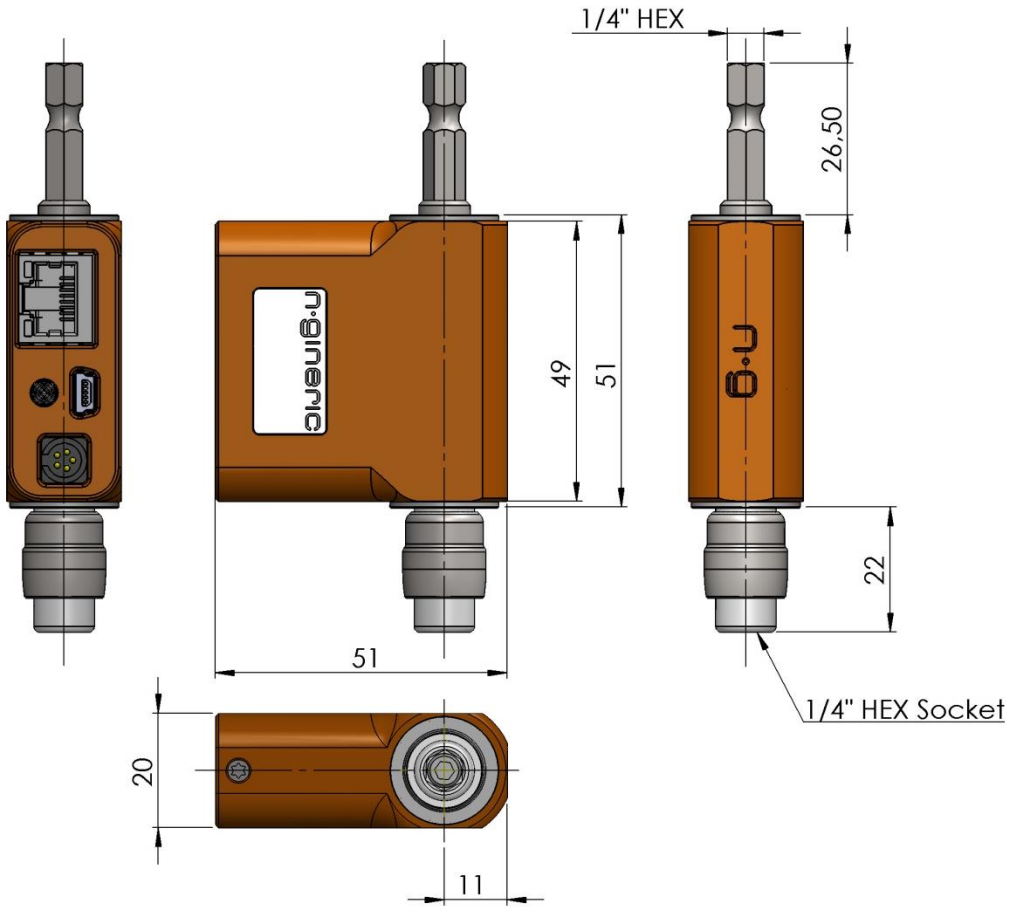

ng-TTR10-ca
ng-TTR20-ca



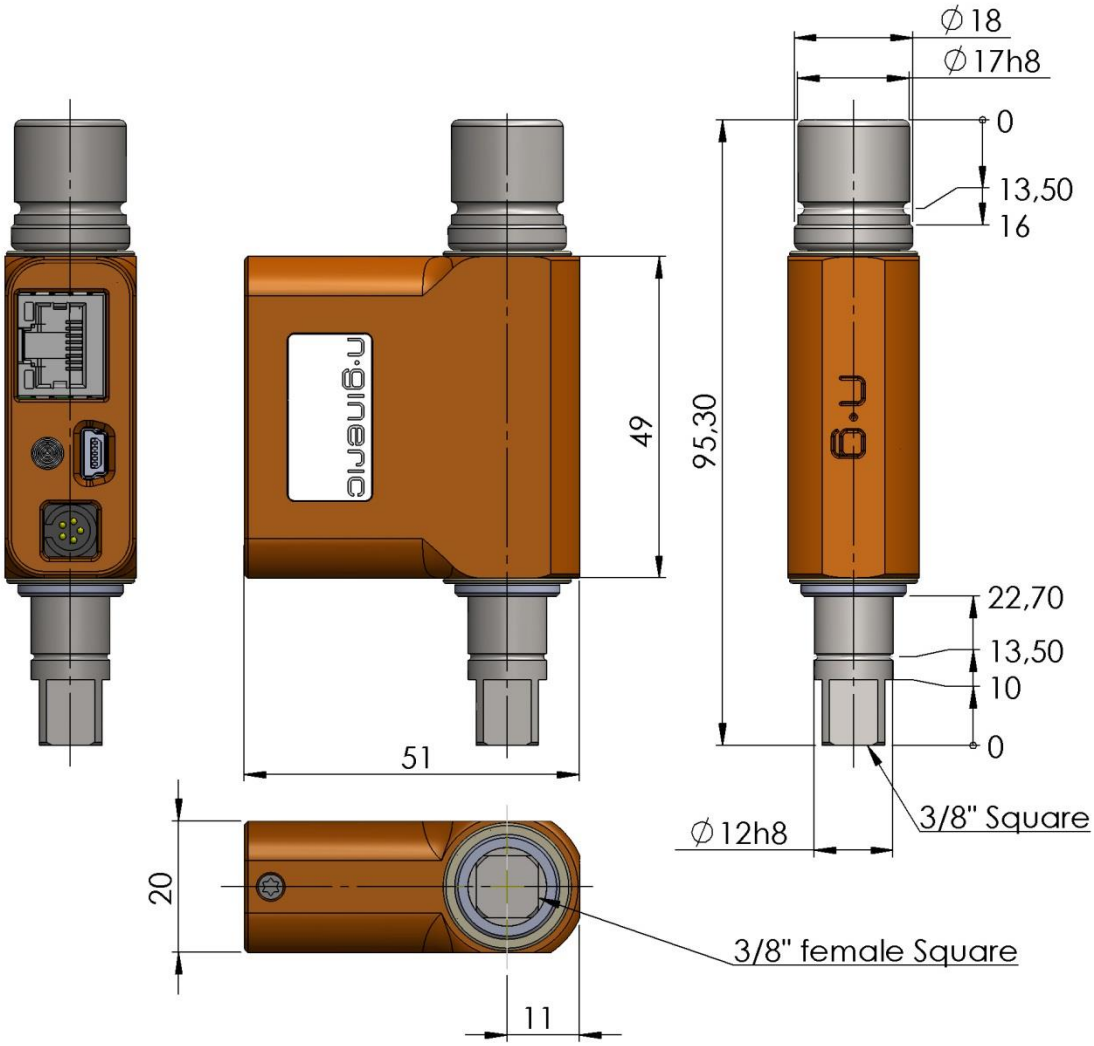

ng-TTR50-ci
ng-TTR100-ci
ng-TTR200-ci
ng-TTR500-ci
ng-TTR1000-ci
ng-TTR2000-ci



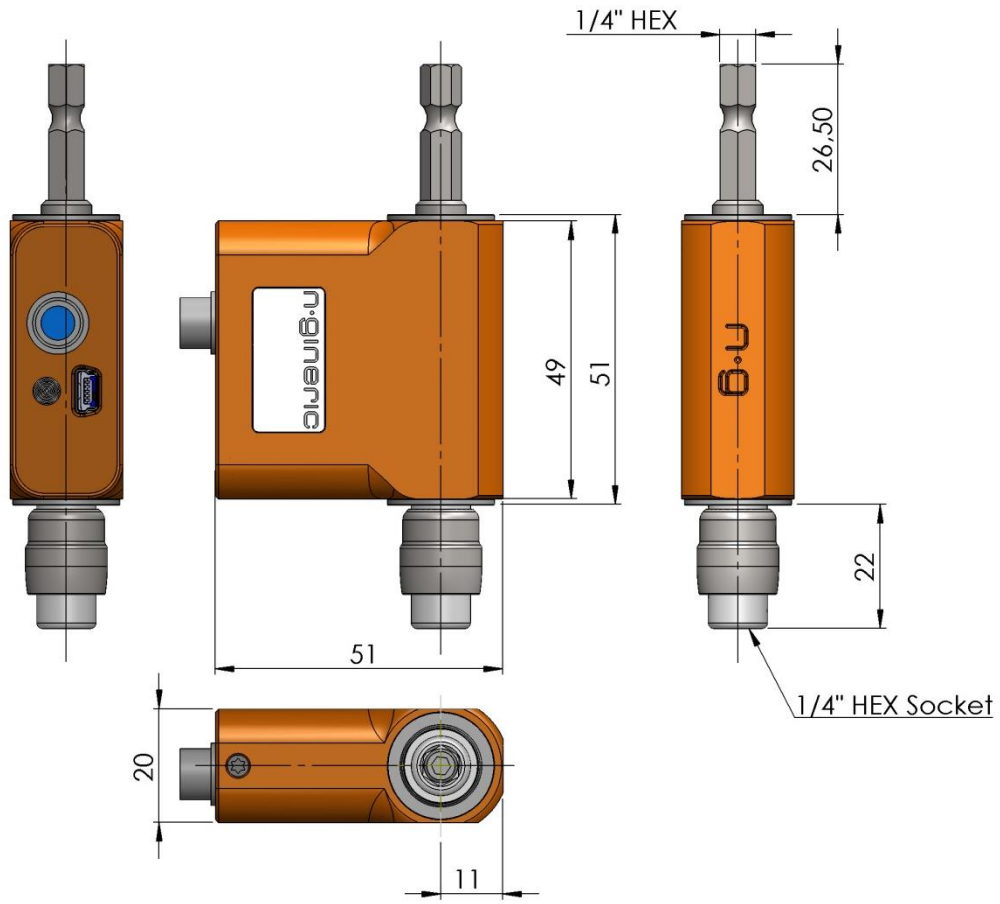

ng-TTR50-ca
ng-TTR100-ca
ng-TTR200-ca
ng-TTR500-ca
ng-TTR1000-ca
ng-TTR2000-ca



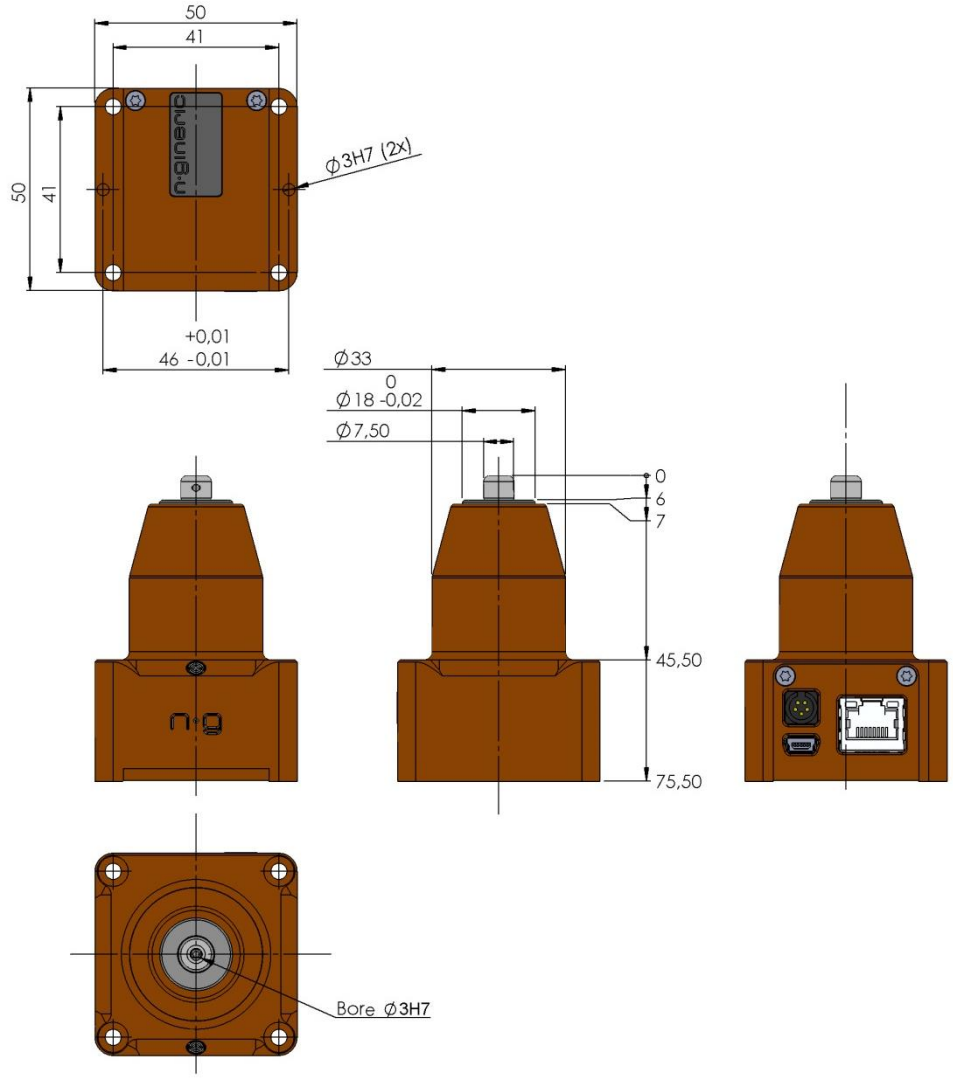

ng-TTR50-xi
ng-TTR100-xi
ng-TTR200-xi
ng-TTR500-xi
ng-TTR1000-xi
ng-TTR2000-xi



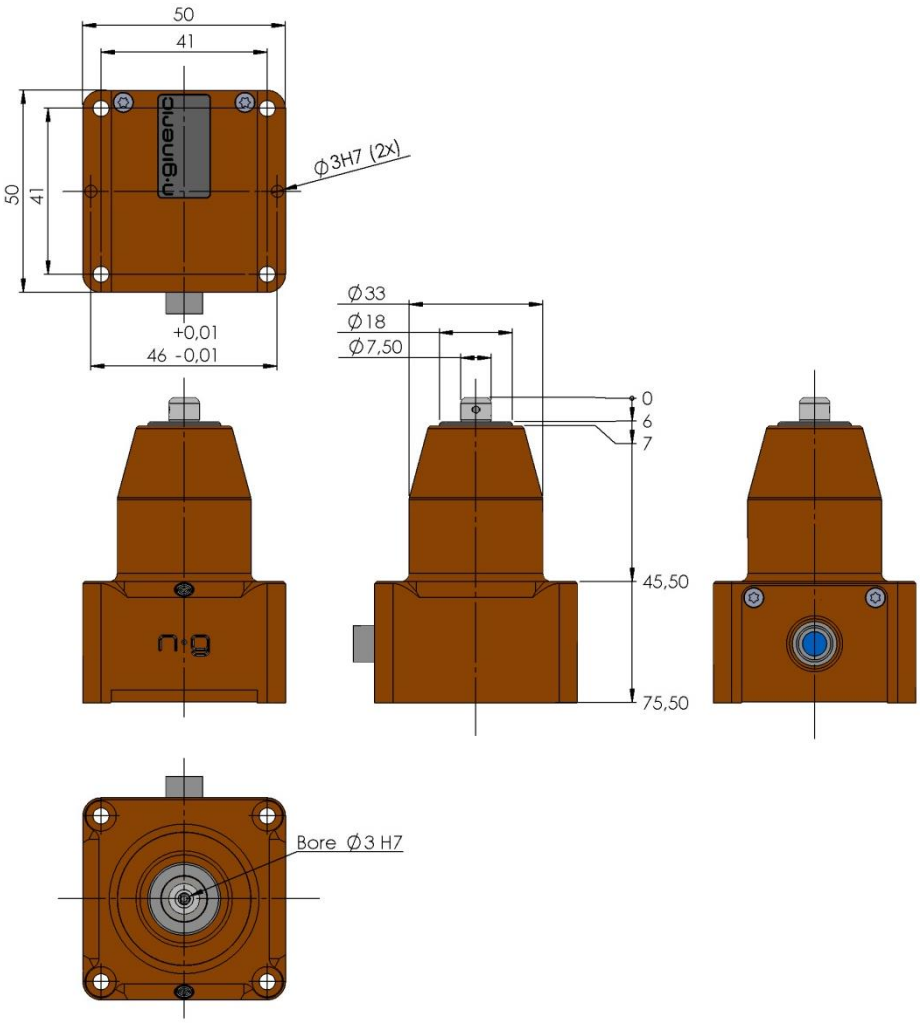

ng-TTR5000-qi



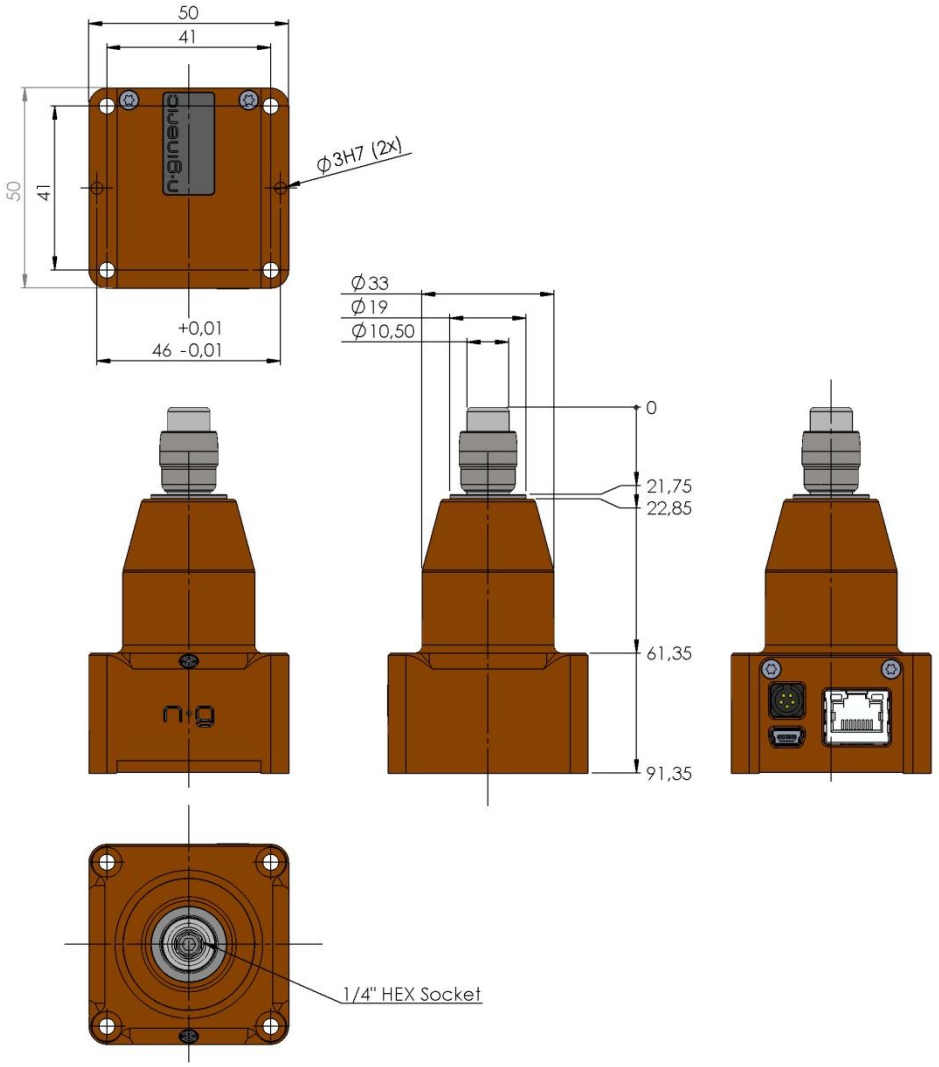

ng-TTR50-xa
ng-TTR100-xa
ng-TTR200-xa
ng-TTR500-xa
ng-TTR1000-xa
ng-TTR2000-xa



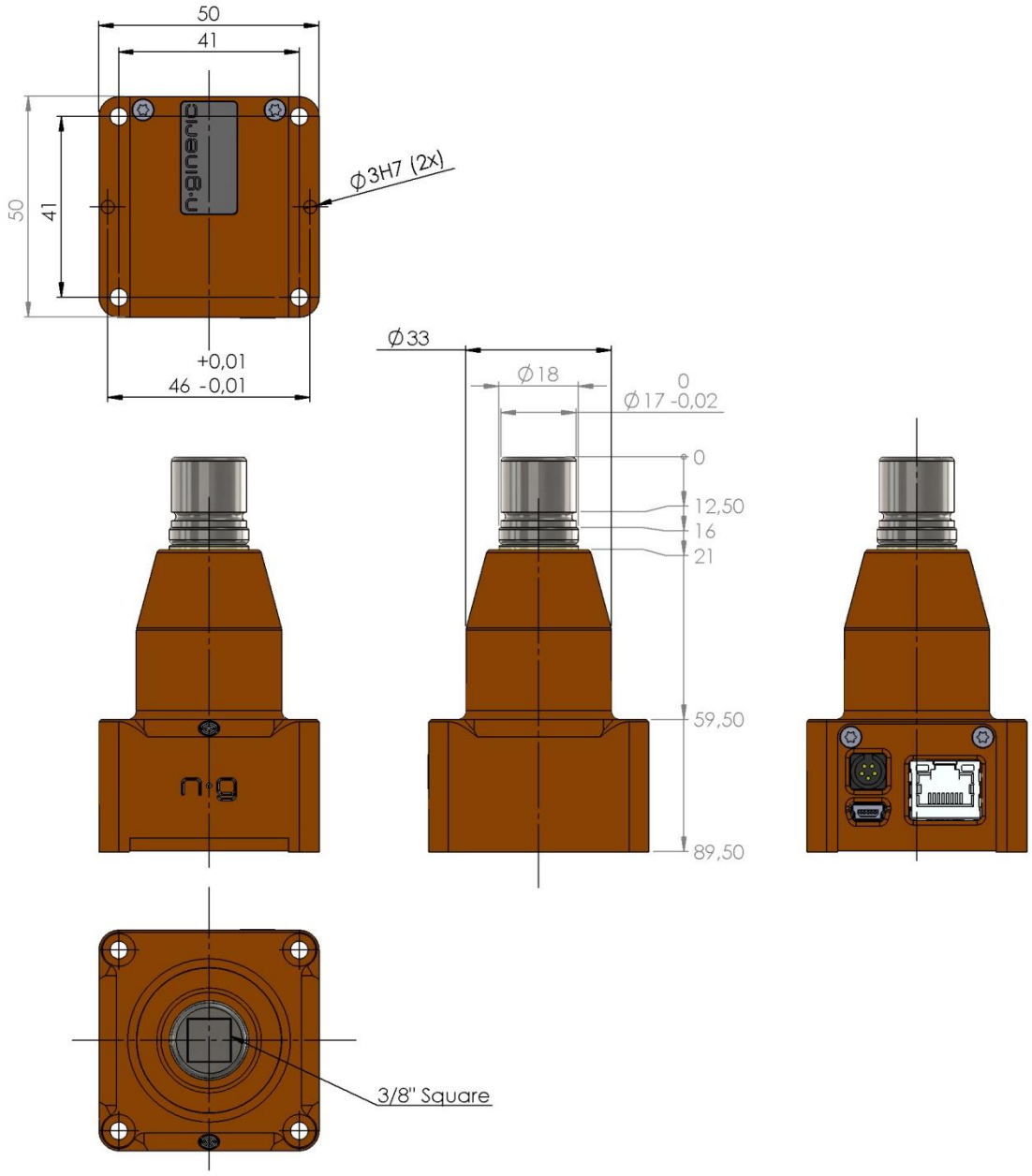

ng-TTS01-ci
ng-TTS02-ci
ng-TTS05-ci
ng-TTS10-ci
ng-TTS20-ci



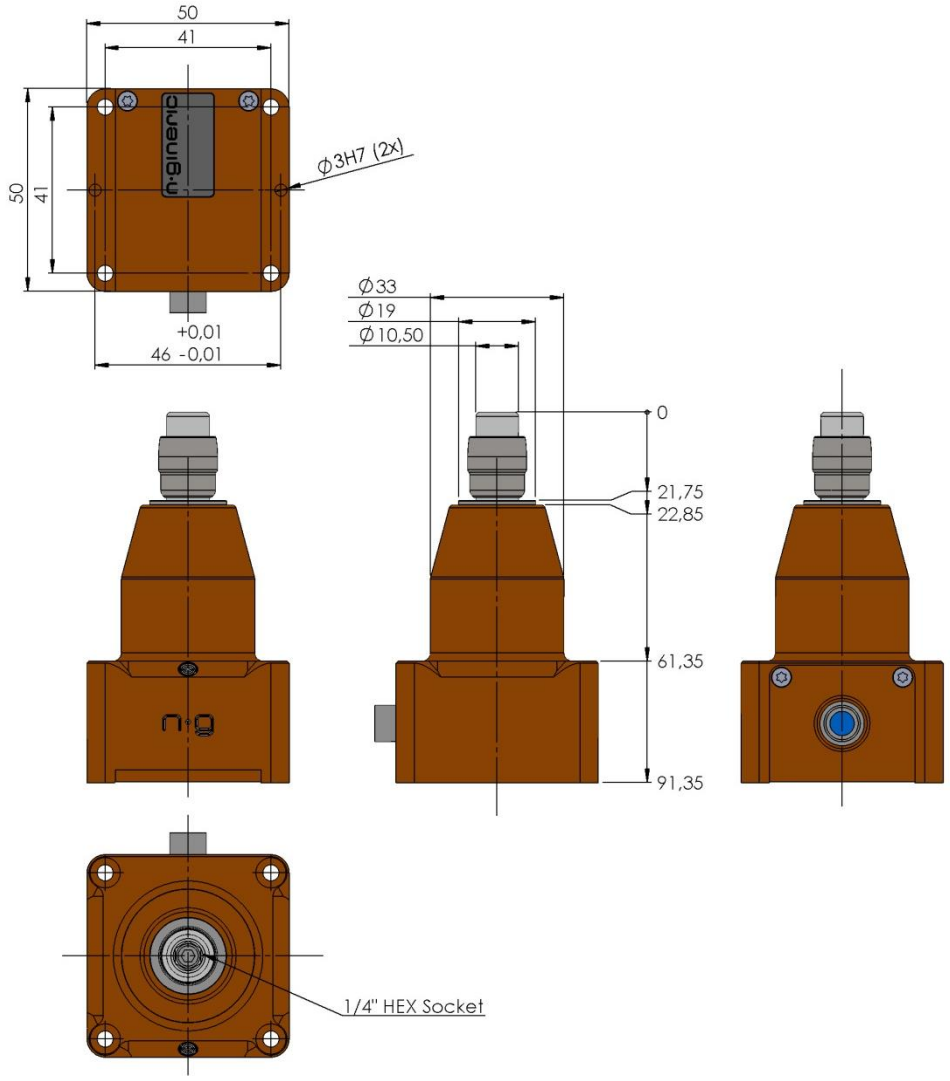

ng-TTS01-ca
ng-TTS02-ca
ng-TTS05-ca
ng-TTS10-ca
ng-TTS20-ca



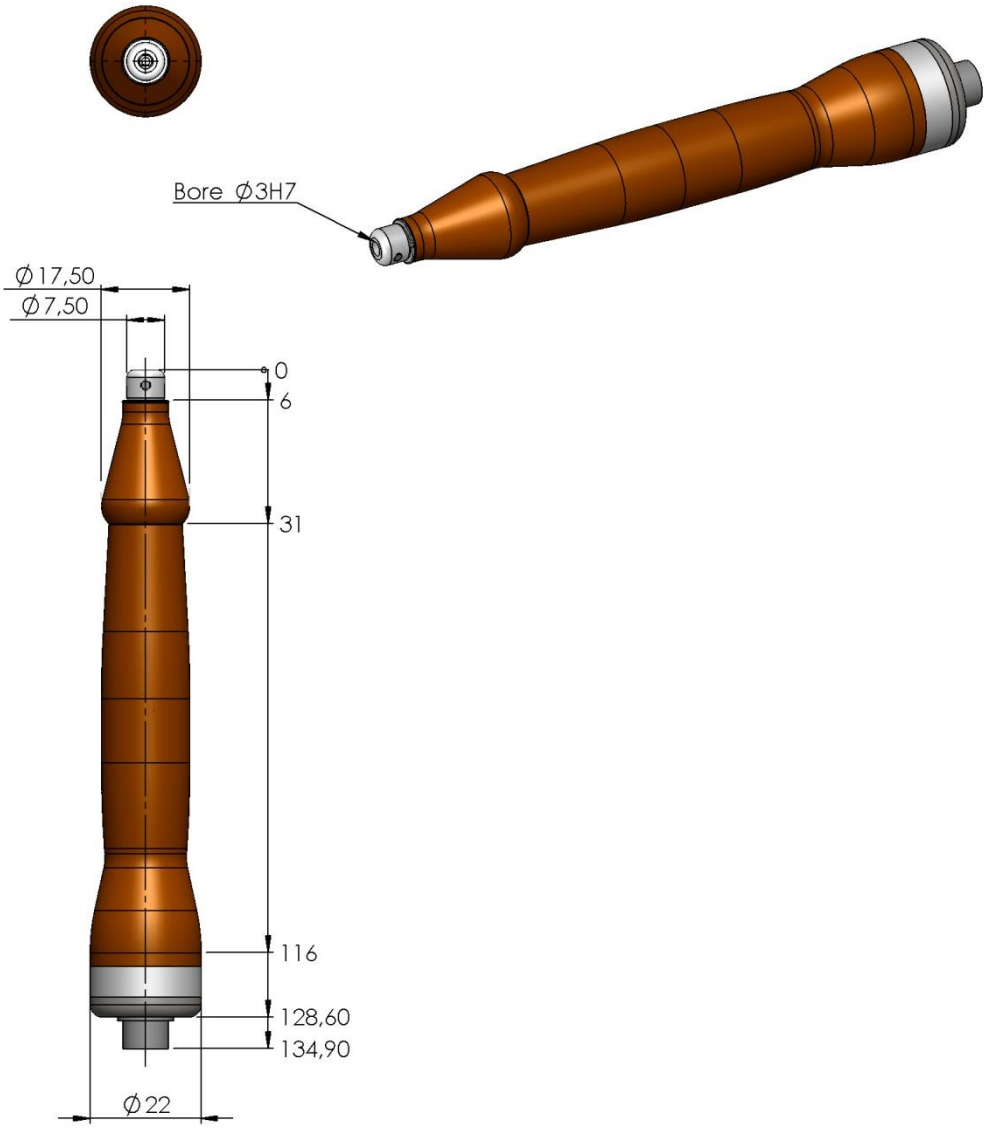

ng-TTS50-xi
ng-TTS100-xi
ng-TTS200-xi
ng-TTS500-xi
ng-TTS1000-xi
ng-TTS2000-xi



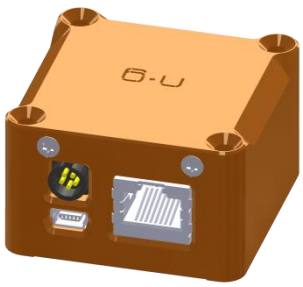

ng-TTS5000-qi



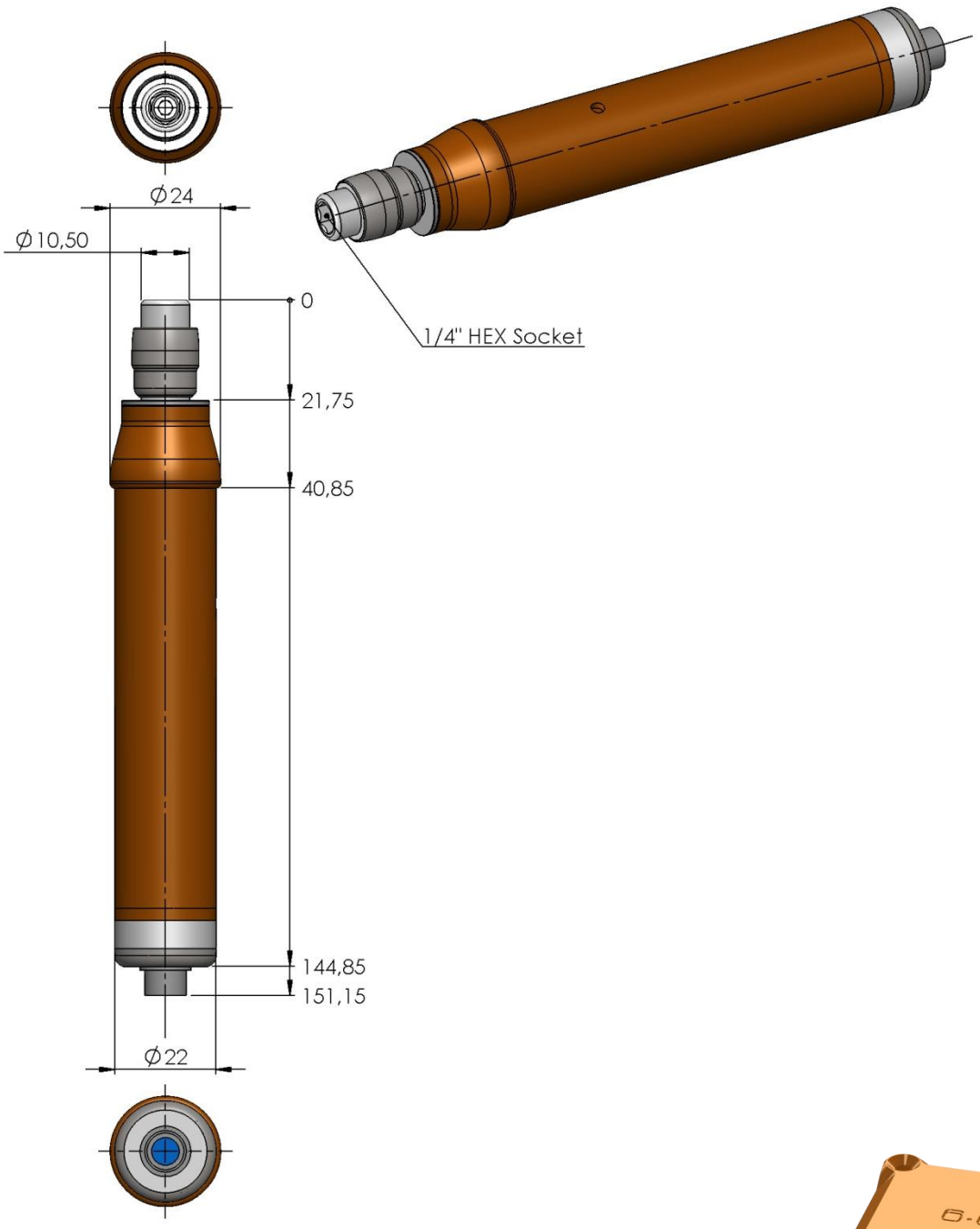

ng-TTS50-xa
ng-TTS100-xa
ng-TTS200-xa
ng-TTS500-xa
ng-TTS1000-xa
ng-TTS2000-xa




| | |
|---|---|
| ng-TTH01-ci | ng-TTH01-ca |
| ng-TTH02-ci | ng-TTH02-ca |
| ng-TTH05-ci | ng-TTH05-ca |
| ng-TTH10-ci, | ng-TTH10-ca |
| ng-TTH20-ci | ng-TTH20-ca |

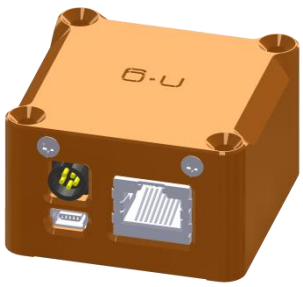



The ng-TTH-ci sensors are supplied with the separate interface **ng-TC-ai**




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

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



The ng-TTH-ci sensors are supplied with the separate interface **ng-TC-ai**

## 5.2 Technical Data:

Intelligent Torque Sensors:

- Accuracy Classes:

| Torque Range | Accuracy Class [% oft he F.S.R.] |
|---|---|
| +/- 1 cNm | 1 % |
| +/- 2 cNm | 1 % |
| +/- 5 cNm | 0.5 % |
| +/- 10 cNm | 0.5 % |
| +/- 20 cNm | 0.2 % |
| +/- 50 cNm | 0.2 % |
| +/- 100 cNm | 0.2 % |
| +/- 200 cNm | 0.2 % |
| +/- 500 cNm | 0.1 % |
| +/- 1,000 cNm | 0.1 % |
| +/- 2,000 cNm | 0.1 % |
| +/- 5,000 cNm | 0.1 % |

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

Rotary Sensors:

- Encoder resolution: 0,1 degrees
- Encoder accuracy: 0,5 degrees
- Max. speed: 5,000 RPM

Intelligent Force Sensors:

Button Load Cells:

- Accuracy Class: 1 %
- Operating overload: 120 % F.S.
- Safe overload: 150 % F.S.
- Operating temperature 0 °C to +40 °C (+32 °F to 104 °F)