**burster**

# Torque Sensor
## Square, rotating, contactless
## MODEL **8655**

### Highlights
- Measurement ranges of 0 ... 1 N·m to 0 ... 160 N·m
- Internal square and external square
- Very short design
- Output signal 0 ... ±10 V

### Options
- Speed and angle measurement with resolution of up to 400 increments
- USB port including software

### Applications
- Monitoring and regulation of screwing processes
- Quality monitoring of tools and machines
- Machinery and plant engineering

Small measuring range

Large measuring range

### Product description

The compact torque sensor model 8655 with standard square is contactless constructed. The torque is recorded by the torsion of the shaft using the strain gage principle. Thanks to the inductive and optical transmission of the signals, the sensor is maintenance-free, the signals are digitized directly on the shaft and made available by the evaluation electronics as a voltage signal or via USB. The direction of rotation can be seen from the potential of the output voltage, clockwise rotation corresponds to positive output voltage, counterclockwise rotation the voltage level is negative.

The standard square enables simple integration into existing systems or devices, additional components such as couplings are not require.

To record the speed and angle of rotation, the sensor can optionally be equipped with an incremental disc with 400 increments. This speed / angle signal is available as a TTL output signal.

The free DigiVision software is available in connection with USB, alternatively drivers for LabVIEW and DASYLab are ready for download.

Connection cables in various lengths, metal bellows couplings and mounting brackets are available for integration in customer-specific systems.

# Technical Data

| 8655 | – | 5001 | 5002 | 5005 | 5012 | 5025 | 5050 | 5063 | 5100 | 5160 |
|---|---|---|---|---|---|---|---|---|---|---|
| Measuring range calibrated in N·m from 0 … | | ±1 N·m | ±2 N·m | ±5 N·m | ±12 N·m | ±25 N·m | ±50 N·m | ±63 N·m | ±100 N·m | ±160 N·m |
| **Accuracy** | | | | | | | | | | |
| Relative non-linearity | | 0.25 % F.S. | | | | | | | | |
| Relative hysteresis | | 0.05 % F.S. | | | | | | | | |
| Tolerance of sensitivity | | 0.25 % F.S. | | | | | | | | |
| **Electrical values** | | | | | | | | | | |
| Rated supply voltage range | | 10 … 30 V DC (or 5 V via USB) | | | | | | | | |
| DC power consumption | | approx. 2 W | | | | | | | | |
| Output voltage at ± rated torque | | ±10 V | | | | | | | | |
| Output resistance | | 1 kΩ | | | | | | | | |
| Insulation resistance | | > 5 MΩ | | | | | | | | |
| Update rate | | 400/sec. | | | | | | | | |
| Ripple | | < 50 mV$_{ss}$ | | | | | | | | |
| Control signal | | 10.00 V DC | | | | | | | | |
| **Environmental conditions** | | | | | | | | | | |
| Range of operating and nominal temperature | | 0 °C … +60 °C | | | | | | | | |
| Sensitivity of temperature effects | | on the zero point 0.015 % F.S./K on the sensitivity 0.015 % F.S./K | | | | | | | | |
| **Mechanical values** | | | | | | | | | | |
| Dynamic overload safe | | recommended 70 % of nominal torque | | | | | | | | |
| Max. operation torque | | 120 % of nominal torque | | | | | | | | |
| Breakaway torque | | 300 % of nominal torque | | | | | | | | |
| Alternating load | | 70 % of nominal torque | | | | | | | | |
| Maximum limit axial load | [N] | 70 | | | | 150 | | | 165 | |
| Maximum limit radial load | [N] | 5 | 10 | 13 | 20 | 25 | | 25 | 50 | 65 |
| Spring constant | [N·m/rad] | 300 | | 1000 | | 5000 | | | 16000 | |
| Mass moment of inertia measuring side | [$10^{-6}$ kg*m$^2$] | 3.50 | | | | 7.10 | | | 21.50 | |
| Mass moment of inertia drive side | [$10^{-6}$ kg*m$^2$] | 1.0 | | | 1.05 | 8.50 | | | 34.00 | |
| Max. rotary speed | [min$^{-1}$] | 3000 | | | | | | | | |
| **Other** | | | | | | | | | | |
| Material | | Housing: made of anodized aluminium; Shaft: steel shell 1.4542 | | | | | | | | |
| Protection class | | acc. EN 60529, IP40 | | | | | | | | |
| Weight | [g] | 310 | | | | 450 | | | 750 | |
| **Installation** | | | | | | | | | | |
| Installation instructions | | Do not exceed the permitted axial and radial forces during fitting and operation. Please refer to our operating instructions for detailed information www.burster.com. | | | | | | | | |

## Dimensional drawing
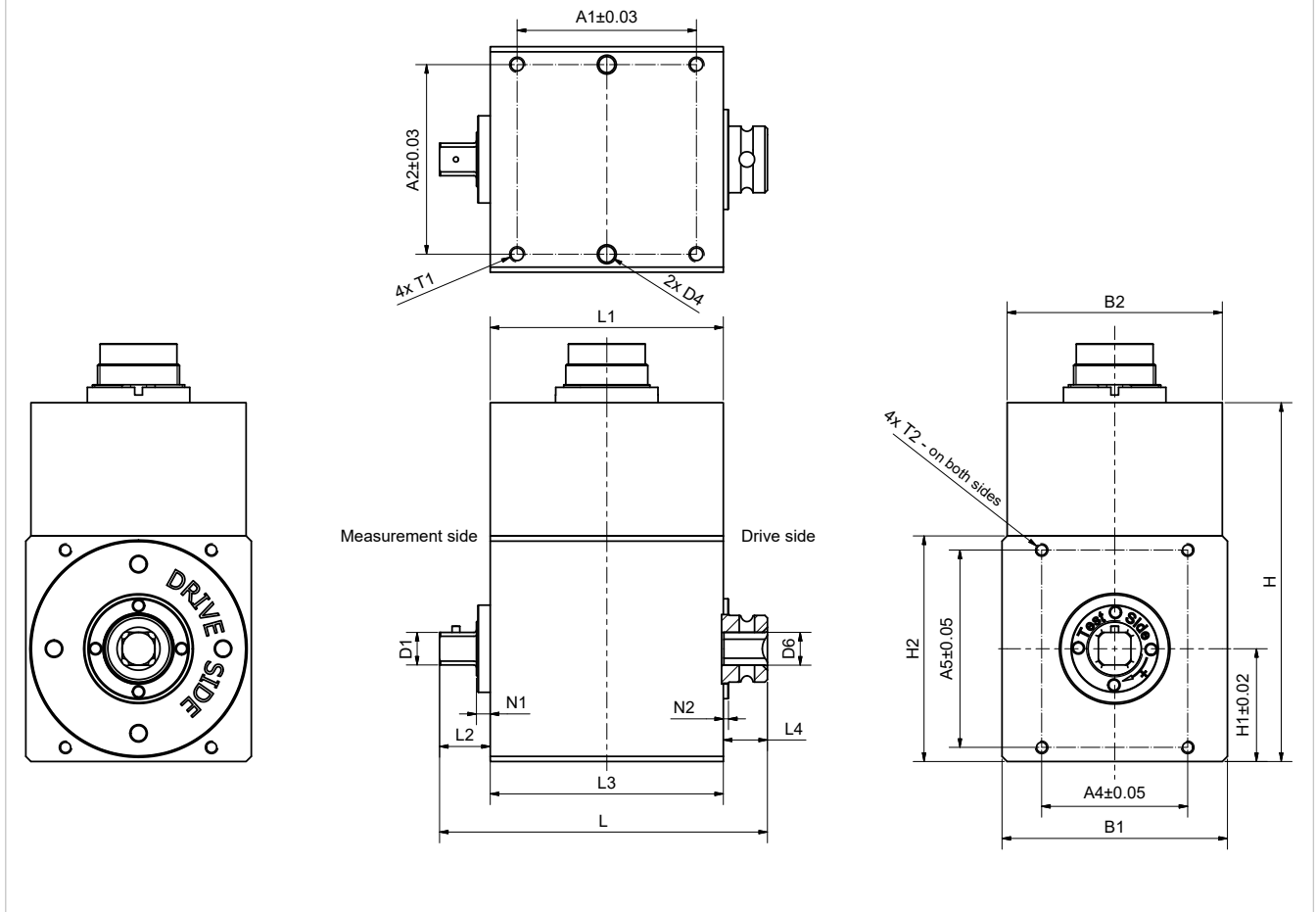


For detailed dimensions you can find sensor CAD data on our website www.burster.com.

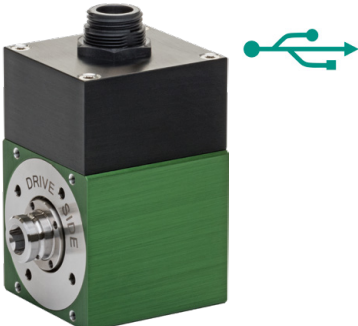| 8655 | – | 5001 | 5002 | 5005 | 5012 | 5025 | 5050 | 5063 | 5100 | 5160 |
|---|---|---|---|---|---|---|---|---|---|---|
| Measuring range from 0 ... | | ±1 N·m | ±2 N·m | ±5 N·m | ±12 N·m | ±25 N·m | ±50 N·m | ±63 N·m | ±100 N·m | ±160 N·m |
| **Geometry** | | | | | | | | | | |
| A1 | [mm] | 35 | | | | | | | 33.5 | |
| A2 | [mm] | 37 | | | | 36 | | | 41 | |
| A4 | [mm] | 28.5 | | | | 44 | | | 50 | |
| A5 | [mm] | 38.5 | | | | 41 | | | 48 | |
| B1 | [mm] | 44 | | | | 50 | | | 59 | |
| B2 | [mm] | 42 | | | | | | | | |
| D1 | [mm] | ¼" external square DIN 3121 form E | | | | ⅜" external square DIN 3121 form E | | | ½" external square DIN 3121 form E | |
| D6 / deep | [mm] | ¼" internal square DIN 3121 form H, 8 mm | | | | ⅜" internal square DIN 3121 form H, 12.2 mm | | | ½" internal square DIN 3121 form H, 16.5 mm | |
| D4 Ø / deep | [mm] | Ø 3.1 / 6 | | | | | | | | |
| H1 | [mm] | 22 | | | | 25 | | | 29.5 | |
| H2 | [mm] | 44 | | | | 50 | | | 59 | |
| L | [mm] | 64 | | | | 71.10 | | | 89.4 | |
| L2 | [mm] | 9.9 | | | | 13.5 | | | 17.90 | |
| L3 | [mm] | 45.5 | | | | 47.5 | | | | |
| L4 | [mm] | 8.6 | | | | 10.1 | | | 24 | |
| T1 / deep | [mm] | M3 / 7 | | | | M4 / 7 | | | | |
| T2 / deep | [mm] | M2.5 / 8 | | | | M3 / 8 | | | M4 /8 | |

# Electrical values

12-pin connector or USB connection for configuration / measurement (option, USB connection cable included)

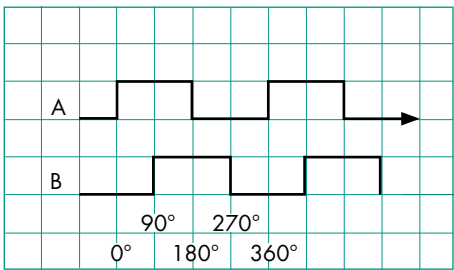| Wiring Code depends on the options selected | | |
|---|---|---|
| Pin | Assignment | Cable colour (99540-000F-052XXXX) |
| A | NC | |
| B | Angular exit B | violet |
| C | Moment output + | yellow |
| D | Moment output - | green |
| E | Supply - | blue |
| F | Supply + | red |
| G | Angular exit A | pink |
| H | NC | |
| J | Ground angle output | black |
| K | Control signal | white |
| L | NC | brown |
| M | NC | |

# Options

## Integrated amplifier with USB interface



This sensor version has an USB connection instead of the ±10 V output. The sensor is powered via USB, no further connections required.

In addition to torque, the speed or rotation angle measured values are optionally available at the output. The mechanical performance calculated in the sensor can also be displayed using the DigiVision software.

Free drivers are available for integration into LabVIEW and DASYLab, also a DLL for integration into your own programs.

## Torque sensor with integrated rotational speed / angular displacement measurement



8655 torque sensors are optionally available with integrated rotational speed and angular displacement measurement. Two pulse channels with TTL level – channel A and channel B – are always available. For clockwise rotation (looking at the test side), channel A leads channel B with a phase shift of 90°. Only one pulse channel is needed for speed measurement.

For angular displacement measurement (or direction detection), both channels need to be evaluated. To achieve the maximum angular resolution, four-edge decoding must be used to read both the rising and falling edges, so an angular resolution of 0.255 ° is possible.

# Accessories

**Mounting block model  8600-Z02X**

The mounting block has a central hole and special design allowing a range of options for reliable cable attachment. Two clips ensure the sensor is fixed securely.

For further information please see accessories data sheet 8600-Z02X

# DigiVision configuration and analysis software

## Features

- Can be used to actuate tare function
- Configuration options for averaging and filters
- Intuitive user interface
- Automatic sensor identification
- Sensor calibration data readout
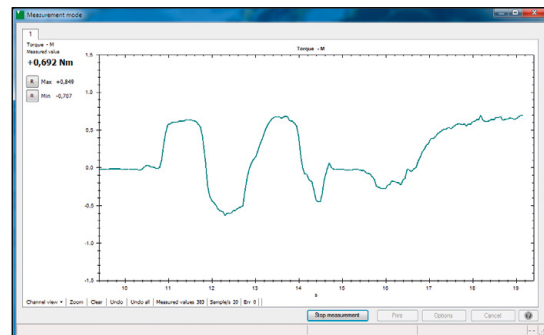
| DigiVision Light PC software | |
|---|---|
| freely available on our website | DigiVison configuration and analysis software max. 200 measured value/s for one sensor |
| **DigiVision Standard PC software** | |
| Model 8655-P100 | DigiVison configuration and analysis software up to 16 channels |
| **PC-Software DigiVision Professional** | |
| Model 8655-P200 | DigiVision configuration and analysis software with additional configurable maths channel; up to 32 channels |

## USB measurement option

- Numerical & graphical display and measurement of the physical torque value
- Practical start and stop trigger functions
- 4 limits can be configured for each measurement channel
- MIN/MAX value acquisition
- Automatic scaling
- Measurement reports can be saved as Excel or PDF file
- Archive viewer for displaying sets of curves
- X Multichannel measurements, even with different sensors (e.g. 9206, 8631, 8625, 8661) available with standard version

## Accessories

| Order code | | |
|---|---|---|
| 9940 | | Mating connection 12 pin (scope of delivery) |
| 9900-V539 | | Mating connection 90°-angle |
| 99540-000F-0520030 | | Connecting cable, length 3 m, other end free |
| 99539-000F-0520030 | | Connecting cable, length 3 m, plug with 90°-angle, other end free |
| 99209-540G-0160030 | | Connecting cable for model 7281 and model 9311, length 3 m, with external supply |
| 99163-540A-0150030 | | Connecting cable, length 3 m, 8655 to DIGIFORCE® 9307combined cannel D (option channel) |
| 99209-215A-0090004 | | Adapter cable to DIGIFORCE® 9307 standard channel A/B and C (usable only in connection with type 99163-540A-015xxxx) |
| | | DigiVision Light configuration and analysis software, max. 200 measured value/s for one sensor (freely available on our website) |
| 9900-K349 | | USB cable, length 2 m (included with the USB version) |
| 8655-P100 | | DigiVision Standard configuration and analysis software; up to 16 channels |
| 8655-P200 | | DigiVision Professional with additional configurable maths channel; up to 32 channels |
| 8600-Z02X | | Mounting block, see accessories data sheet 8600-Z02X |

## Calibration

| Manufacturer Calibration Certificate (WKS) | | |
|---|---|---|
| | | Special calibration for clockwise or/and counter clockwise direction torque, in 20 % steps of range up and down. |
| **DAkkS Calibration Certificate** | | |
| | | DAkkS calibration certificate per DIN 51309, clockwise or/and counter clockwise torque, with eight steps spaced across the measurement range, increasing and decreasing. |

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3067-008655EN-5699-081528

# Order Code

| Measuring Range | | | | Code | | | |
|---|---|---|---|---|---|---|---|
| 0 ... | ±1 | N·m | | 5 | 0 | 0 | 1 |
| 0 ... | ±2 | N·m | | 5 | 0 | 0 | 2 |
| 0 ... | ±5 | N·m | | 5 | 0 | 0 | 5 |
| 0 ... | ±12 | N·m | | 5 | 0 | 1 | 2 |
| 0 ... | ±25 | N·m | | 5 | 0 | 2 | 5 |
| 0 ... | ±50 | N·m | | 5 | 0 | 5 | 0 |
| 0 ... | ±63 | N·m | | 5 | 0 | 6 | 3 |
| 0 ... | ±100 | N·m | | 5 | 1 | 0 | 0 |
| 0 ... | ±160 | N·m | | 5 | 1 | 6 | 0 |

| | | | | | | | | Standard | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 0 | 0 | 0 | 1 |
| **8** | **6** | **5** | **5** | **–** | | | | **–** | **V** | **0** | | | **1** |

| | Code |
|---|---|
| ■ Without angle/speed measurement | 0 |
| ■ Speed/angle measurement 400 increments | 1 |

**Output signals**

| | Code |
|---|---|
| ■ Output voltage 0 ... ±10 V | 0 |
| ■ USB interface | 1 |

| | Code |
|---|---|
| ■ Internal square and external square acc. DIN 3121 | 1 |