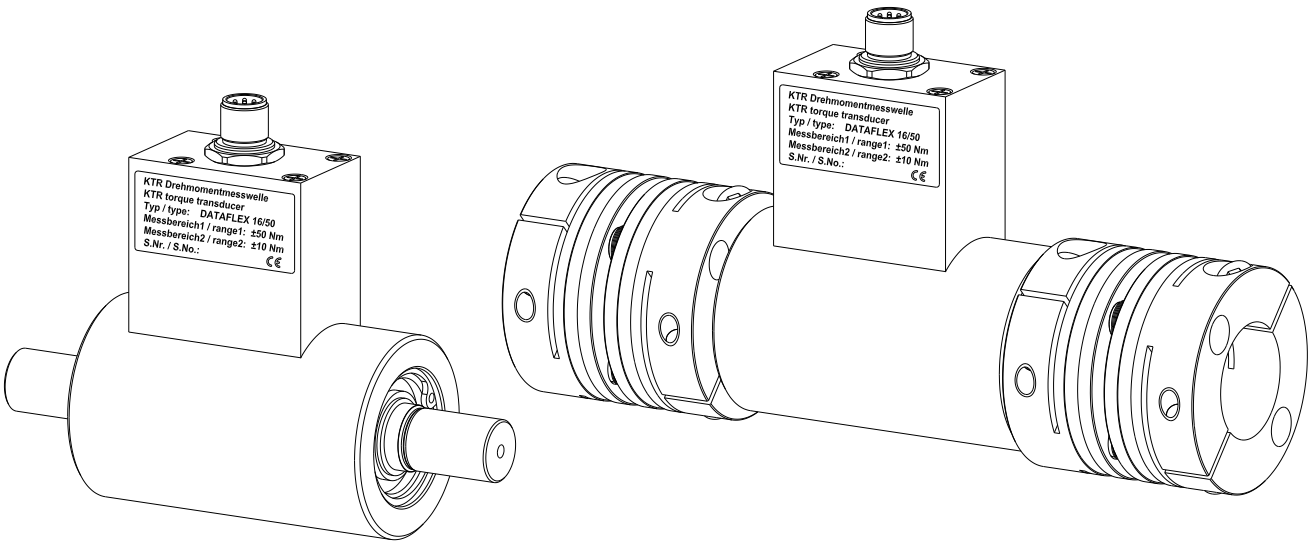
# DATAFLEX®

Torque measuring shaft type 16/…




**DATAFLEX®** is a maintenance-free torque measuring shaft with two measuring ranges and integrated speed measurement. Combined with the steel laminae coupling **RADEX®-NC** the complete system forms a torsionally stiff, double-cardanic coupling with integrated measuring shaft.

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# 1 Technical data

## DATAFLEX® torque measuring shaft

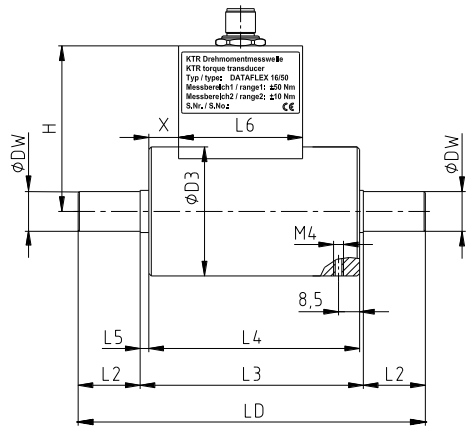



Illustration 1: DATAFLEX® torque measuring shaft

**Table 1: Dimensions**

| DATAFLEX® type | Dimensions [mm] | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | DW | D3 | LD | L2 | L3 | L4 | L5 | L6 | H | X |
| 16/10<br>16/30<br>16/50 | 16 | 52 | 140 | 25 | 90 | 85 | 3.5 | 50 | 67 | 12 |

**Table 2: Technical data**

| Coupling size of DATAFLEX® | 16/10 | 16/30 | 16/50 |
|---|---|---|---|
| **Electrical data** | | | |
| Measuring range 1 - rated torque $T_{KN}$ [Nm] | -10 ... +10 Nm | -30 ... +30 Nm | -50 ... +50 Nm |
| Measuring range 2 - rated torque $T_{KN2}$ [Nm] | -2 ... +2 Nm | -6 ... +6 Nm | -10 ... +10 Nm |
| Band width of torque signal [kHz] (-3dB) | 2 | | |
| Error in linearity incl. hysteresis [%] 1) | < 0.1 (< 0.2 2)) | | |
| Influence of temperature [%/10K] | 0.05 | | |
| Nominal temperature range [°C] | 0 - 55 | | |
| Supply voltage [V] DC | 24 ± 4 | | |
| Max. current consumption [mA] | 100 | | |
| **Torque output** | | | |
| Voltage output torque [V] | -10 ... +10 | | |
| **Speed output 3)** | | | |
| Number of pulses / revolutions | 2x 360 | | |
| Amplitude [V] | 24/5V | | |
| DC voltage output [V] | 0 - 10 | | |
| Scale of DC voltage output | 16fold via micro switch | | |
| Inaccuracy of DC voltage output [%] 4) | ± 0.2 | | |
| Direction signal [V] | 24/5V | | |
| **Mechanical data** | | | |
| Static load limit $T_{Kmax.}$ 1) [%] | 150 | | |
| Breaking load $T_{K\ break}$ 1) [%] | 300 | | |
| Max. bending torque [Nm] | 1.07 | 3.2 | 5.3 |
| Max. radial force [N] | 12 | 37 | 61 |
| Max. axial force [kN] | 1.1 | 2.3 | 3.1 |
| Weight [kg] | 0.7 | | |
| Torsion spring stiffness $C_T$ [Nm/rad] | 910 | 2840 | 4100 |
| Torsion angle with $T_{KN}$ [degrees] | 0.63 | 0.61 | 0.7 |
| Mass moment of inertia [kgmm²] | 22.6 | | |
| Max. speed [rpm] | 10000 | | |

1) Referring to rated torque $T_{KN}$
2) Referring to rated torque $T_{KN2}$
3) With connection housing DF2
4) Referring to upper range value

# 1 Technical data

## DATAFLEX® torque measuring shaft in combination with RADEX®-NC

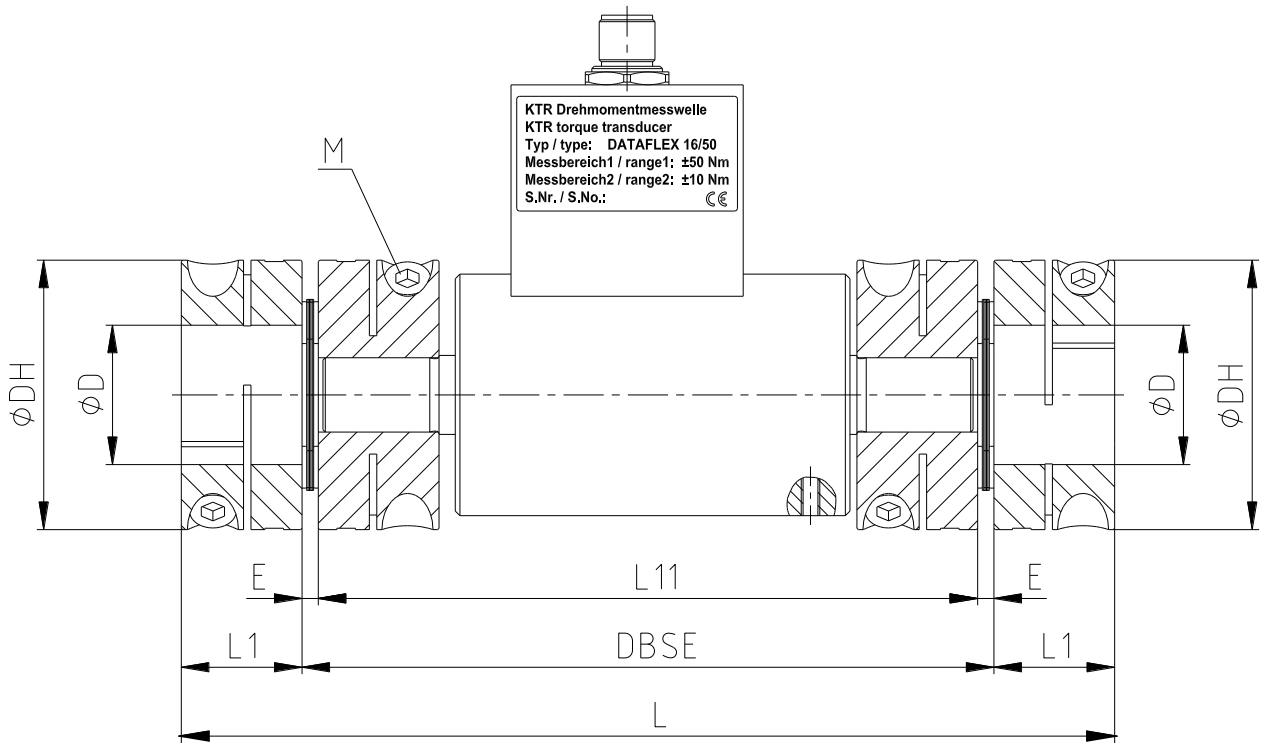



Illustration 2: DATAFLEX® with RADEX®-NC

**Table 3: Dimensions and technical data**

| Coupling size of DATAFLEX® | 16/10 | 16/30 | 16/50 |
|---|---|---|---|
| **Coupling size of RADEX®-NC** | **21** | | **26** |
| **Dimensions [mm]** | | | |
| Dimension DH | 58 | | 69 |
| Dimension $D_{max.}$ | 30 | | 38 |
| Dimension DBSE | 149 | | 166 |
| Dimension L | 201 | | 232 |
| Dimension L1 | 26 | | 33 |
| Dimension L11 | 142 | | 156 |
| Dimension E | 3.5 | | 5.0 |
| **Clamping screw [mm]** | | | |
| Dimension M | M6 | | M8 |
| Tightening torque $T_A$ [Nm] | 10 | | 25 |
| **Mechanical data of combination (DATAFLEX® with RADEX®-NC)** | | | |
| Mass moment of inertia [kgmm²] | 323 | | 800 |
| Torsion spring stiffness [Nm/rad] | 870 | 2500 | 3600 |
| Weight [kg] | 1.3 | | 1.8 |
| Max. speed [rpm] 1) | 7500 | | |

1) Higher speeds on request; with high speeds use coupling hubs that are balanced.

# 2 Advice

## 2.1 General advice

Please read through these operating/assembly instructions carefully before you start up the measuring shaft. Pay special attention to the safety instructions!
The operating/assembly instructions are part of your product. Please store them carefully and close to the measuring shaft. The copyright for these operating/assembly instructions remains with KTR.

## 2.2 Safety and advice symbols

| | | |
|---|---|---|
|  | **Warning of potentially explosive atmospheres** | This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death caused by explosion. |
|  | **Warning of personal injury** | This symbol indicates notes which may contribute to preventing bodily injuries or serious bodily injuries that may result in death. |
|  | **Warning of product damages** | This symbol indicates notes which may contribute to preventing material or machine damage. |
|  | **General advice** | This symbol indicates notes which may contribute to preventing adverse results or conditions. |

## 2.3 General hazard warnings

**With assembly, operation and maintenance of the measuring shaft it has to be made sure that the entire drive train is secured against accidental switch-on. You may be seriously hurt by rotating parts. Make absolutely sure to read through and observe the following safety indications.**

- All operations on and with the measuring shaft have to be performed taking into account "safety first".
- Make sure to switch off the power pack before you perform your work on the measuring shaft.
- Secure the power pack against accidental switch-on, e. g. by providing warning signs at the place of switch-on or removing the fuse for current supply.
- Do not reach into the operation area of the measuring shaft as long as it is in operation.
- Secure the rotating components of the measuring shaft against accidental contact. Provide for the necessary protection devices and covers.

# 2 Advice

## 2.4 Intended use

You may only assemble, operate and maintain the measuring shaft if you

- have carefully read through the operating/assembly instructions and understood them
- are technically qualified and specifically trained (e. g. safety, environment, logistics)
- are authorized by your company

The measuring shaft may only be used in accordance with the technical data (see chapter 1). Unauthorized modifications on the measuring shaft are not admissible. We will not assume liability for any damage that may arise. In the interest of further development we reserve the right for technical modifications.
The **DATAFLEX® torque measuring shaft** described in here corresponds to the state of the art at the time of printing of these operating/assembly instructions.

## 2.5 Reference to EC Machinery Directive 2006/42/EC

The measuring shafts supplied by KTR should be considered as components, not machines resp. partly completed machines according to EC Machinery Directive 2006/42/EC. Consequently KTR does not have to issue a declaration of incorporation. For details about safe assembly, start-up and safe operation refer to the present operating/assembly instructions considering the warnings.

# 3 Storage, transport and packaging

## 3.1 Storage

The **RADEX®-NC** couplings are supplied in preserved condition. Both **DATAFLEX®** and **RADEX®-NC** can be stored in a dry and covered place for 6 - 9 months.

**Humid storage rooms are not suitable.**
**Make sure that condensation is not generated. The best relative air humidity is less than 65 %.**

## 3.2 Transport and packaging

**In order to avoid any injuries and any kind of damage always make use of proper transport and lifting equipment.**

The couplings are packed differently each depending on size, number and kind of transport. Unless otherwise contractually agreed, packaging will follow the in-house packaging specifications of KTR.

# 4 Assembly

The measuring shaft and the couplings are supplied as single pre-assembled subassemblies. Before assembly the measuring shafts have to be inspected for completeness.
The mounting position of **DATAFLEX®** is variable. The measurement system can be mounted both horizontally and vertically. Vertical assembly may require a support in the bottom coupling.

## 4.1 Components of DATAFLEX® torque measuring shaft

**Components of DATAFLEX® torque measuring shaft**

| Component | Quantity | Component assembly |
|---|---|---|
| 1 | 1 | DATAFLEX® torque measuring shaft |

**Components of DATAFLEX® torque measuring shaft with RADEX®-NC coupling**

| Component | Quantity | Component assembly |
|---|---|---|
| 1 | 1 | DATAFLEX® torque measuring shaft |
| 2 | 2 | RADEX®-NC type EK |

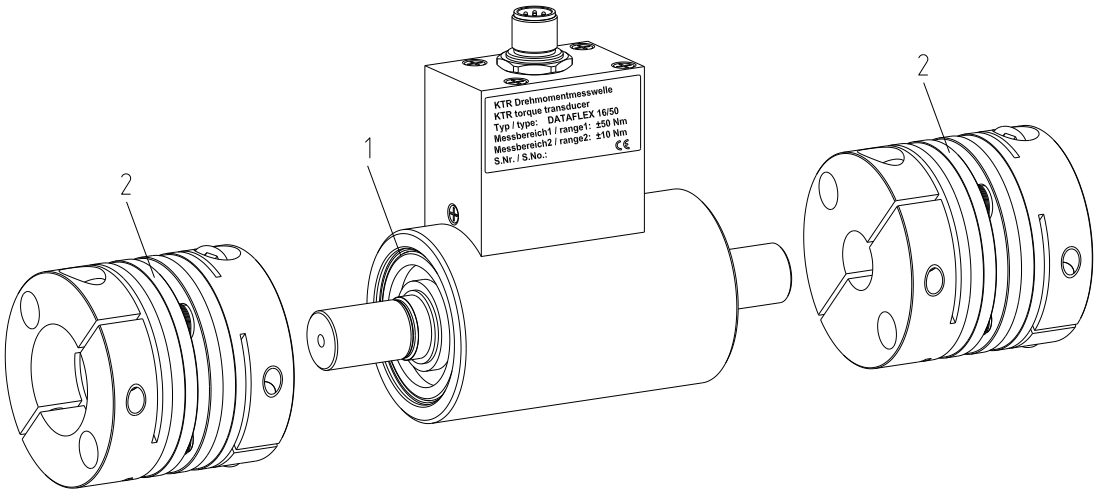



Illustration 3: DATAFLEX® 16 torque measuring shaft with RADEX®-NC

## 4.2 Advice for finish bore

STOP

**The maximum permissible bore diameters D (see chapter 1 - technical data) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.**

- Clamping hub bores machined by the customer have to observe concentricity resp. axial runout (see illustration 4).
- Make absolutely sure to observe the figures for ØD.
- Carefully align the clamping hubs when the finish bores are drilled.

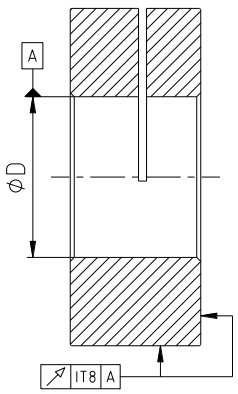



Illustration 4: Concentricity and axial runout

# 4 Assembly

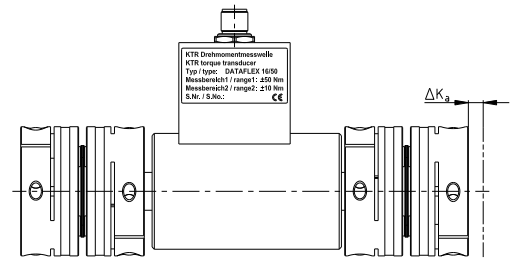
## 4.3 Displacements - alignment of the torque measuring shaft

The displacement figures specified in table 4 provide for sufficient safety to compensate for external influences like, for example, thermal expansion or foundation settling.

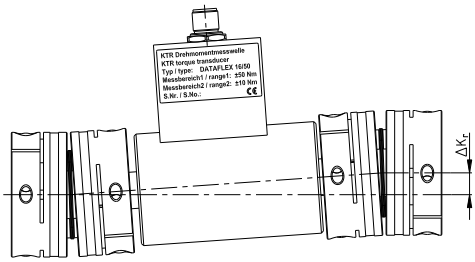
**In order to ensure a long service life of the measuring shaft, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures specified (see table 4). If the figures are exceeded, the measuring shaft with coupling will be damaged.**

**Please note:**

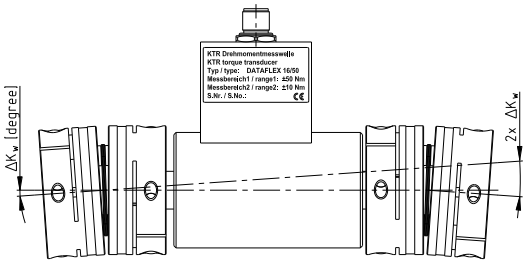
- The displacement figures specified in table 4 are maximum figures which must not arise in parallel. If axial, radial and angular displacement arises at the same time, these values must be reduced (see illustration 6).
- Inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 4 can be observed.




Axial displacement




Radial displacement




Angular displacement

Illustration 5: Displacements

**Table 4: Displacement figures**

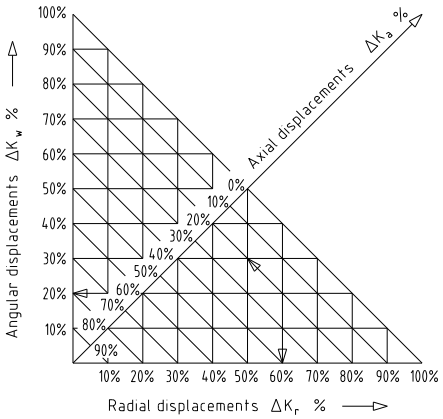
| DATAFLEX® size | RADEX®-NC size | Max. axial displacement ΔKa [mm] | Max. radial displacement ΔKr [mm] | Max. angular displacement ΔKw [degree] |
|---|---|---|---|---|
| 16/10 | 21 | 1.2 | 2.4 | 1.0 |
| 16/30 | | | | |
| 16/50 | 26 | 1.6 | 2.7 | |

Examples of the displacement combinations specified in illustration 6:

Example:
$\Delta K_r = 60\%$
$\Delta K_w = 20\%$
$\Delta K_a = 20\%$

$$\Delta K_{total} = \Delta K_a + \Delta K_r + \Delta K_w \leq 100\%$$

Illustration 6: Combinations of displacement



# 4 Assembly

## 4.4 Assembly of the hubs

☞ **We recommend to inspect bores, shaft, keyway and feather key for dimensional accuracy before assembly.**

## 4.5 Assembly of the RADEX®-NC on the DATAFLEX® torque measuring shaft

The power transmission of RADEX®-NC is frictionally engaged by clamping hubs.

**The following process should be observed with the assembly:**

- Clean and degrease the contact surfaces of hub bores and shafts before assembly.

⚠ **Oils and greases containing molybdenum disulfide or other high-pressure additives as well as internal lubricants must not be used.**

- Lightly detach the clamping screws.
- Insert the shaft ends of the measuring shaft and the driving and driven end into the hubs of the RADEX®-NC coupling (see illustration 7).
- Shift the driving and driven machine in axial direction until the dimension E resp. DBSE is reached. If the power packs have already been firmly assembled, shifting the hubs axially on the shafts allows for adjusting the dimension E or DBSE (see illustration 8).

⚠ **When tightening the clamping screws make sure that the torque measuring shaft is not loaded and the hazard of bending or overload by torque can be excluded.**

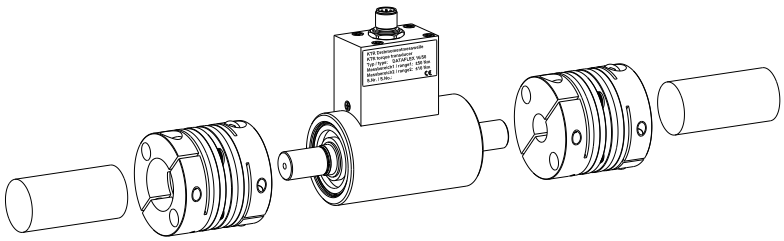


Illustration 7: Assembly of clamping hubs

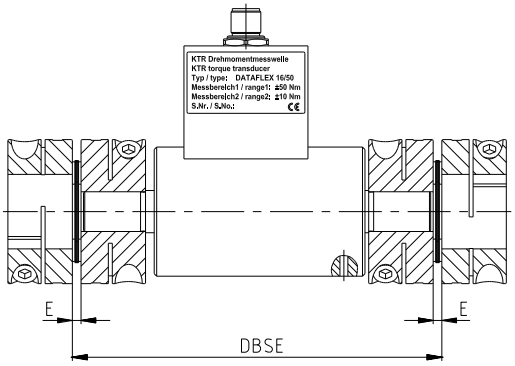



Illustration 8: Adjusting to dimension E and DBSE

⚠ **With the assembly make sure that the dimension E resp. DBSE (see table 3 and 6) is observed so that the coupling is installed free from distortion in axial direction. Disregarding this advice may cause damage to the coupling.**

- Tighten the clamping screws of the hub at the tightening torque $T_A$ specified in table 5.

⚠ **The torques of the clamping hubs of the coupling transmittable via frictional locking are dependent on the bore diameter.**

# 4 Assembly

## 4.5 Assembly of the RADEX®-NC on the DATAFLEX® torque measuring shaft

**Table 5:**

| DATAFLEX® size | 16/10 | 16/30 | 16/50 |
|---|---|---|---|
| RADEX®-NC size | 21 | | 26 |
| Clamping screw M | M6 | | M8 |
| Tightening torque $T_A$ [Nm] | 10 | | 25 |
| Bore and transmittable torques of clamping hubs [Nm] | | | |
| Ø12 | 41 | | |
| Ø13 | 44 | | |
| Ø14 | 48 | | |
| Ø15 | 51 | | 93 |
| Ø16 | 54 | | 100 |
| Ø17 | 58 | | 106 |
| Ø18 | 61 | | 112 |
| Ø19 | 64 | | 118 |
| Ø20 | 68 | | 124 |
| Ø21 | 71 | | 131 |
| Ø22 | 75 | | 137 |
| Ø23 | 78 | | 143 |
| Ø24 | 81 | | 149 |
| Ø25 | 85 | | 156 |

| DATAFLEX® size | 16/10 | 16/30 | 16/50 |
|---|---|---|---|
| RADEX®-NC size | 21 | | 26 |
| Clamping screw M | M6 | | M8 |
| Tightening torque $T_A$ [Nm] | 10 | | 25 |
| Bore and transmittable torques of clamping hubs [Nm] | | | |
| Ø26 | 88 | | 162 |
| Ø27 | 92 | | 168 |
| Ø28 | 95 | | 174 |
| Ø29 | 98 | | 180 |
| Ø30 | 102 | | 187 |
| Ø31 | | | 193 |
| Ø32 | | | 199 |
| Ø33 | | | 205 |
| Ø34 | | | 211 |
| Ø35 | | | 218 |
| Ø36 | | | 224 |
| Ø37 | | | 230 |
| Ø38 | | | 236 |
| | | | |

## 4.6 Advice for assembly of the RADEX®-NC coupling

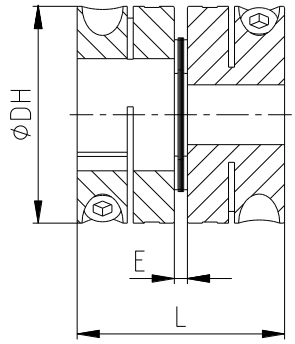



Illustration 9: Assembly of coupling

**Table 6:**

| DATAFLEX® size | 16/10 | 16/30 | 16/50 |
|---|---|---|---|
| RADEX®-NC size | 21 | | 26 |
| **Assembly dimensions** | | | |
| Dimension E | 3.5 | | 5 |
| Dimension DH | 58 | | 69 |
| Dimension L | 55.5 | | 71 |
| **Screws of laminae set** | | | |
| Thread size | M6 | | M6 |
| Tightening torque $T_A$ [Nm] | 10 | | 14 |

## 4.7 Advice for assembly of the DATAFLEX® torque measuring shaft

- **Fixing the housing**

**The housing must be protected from rotation. For that purpose there is a thread size M4 at the bottom side. Make absolutely sure to avoid rigid fixing of the housing!**

**Opening the housing is not required and may cause damage to the measuring shaft.**

- **Protection level**
  All DATAFLEX® measuring shafts type 16 correspond to the protection class IP51 according to DIN EN 60529.

- **Maintenance**
  The DATAFLEX® measuring shaft is maintenance-free. Lubrication or cleaning is not necessary.

- **Calibration**
  The transducer is calibrated when supplied. We recommend an annual inspection of the calibration.

# 4 Assembly

## 4.8 Technical description

### 1. General description

The measuring shafts type DATAFLEX® 16 are provided with wire strain gauges (DMS) the signals of which are transmitted contactlessly.
In addition, a two-channel shaft encoder provides two speed signals shifted by 90 degrees. Each signal has a resolution of 360 periods per revolution. The measuring shaft is connected to the connection housing DF2 via the connection cable which is available as an accessory.

☞ **The measuring shaft should not be switched on before all connections have been properly connected. After initial switch-on the measuring shaft needs about 5 minutes until the warm-up period is finished and the measurement device has its standard accuracy.**

### 2. Connection housing DF2

The connection housing DF2 has 12 screw terminals to connect power supply, display equipment and switches.
The torque signal is displayed as proportional direct voltage from -10 … 10 V.
For the speed display two square wave signals, one scalable voltage signal and one direction signal are available (for pin configuration see table 7).
The button T1 serves for programming and can be bridged externally against GND via the terminal 12 (T1).

**Table 7: Pin assignment of the connection housing DF2**

| No. | Description | Function | Properties |
|---|---|---|---|
| **Input of operating voltage** | | | |
| 10 | 24V | Supply voltage + | 24 V DC ± 4 V / 100 mA |
| 11 | GND | Supply voltage - | |
| **Torque output** | | | |
| 4 | M-U | Voltage output + | -10 V ... 10 V ($R_A$ = 1 kΩ) |
| 5 | GND | Ground of torque output | |
| 6 | M-I | Without function | |
| **Speed output pulse signal** | | | |
| 7 | N1 | Pulsed output speed track 1 | HTL (24V, 360 pulses/rev.)<br>TTL (5V, 360 pulses/rev.) |
| 8 | GND | Ground of pulsed output | |
| 9 | N2 | Pulsed output speed track 2 | HTL (24V, 360 pulses/rev.)<br>TTL (5V, 360 pulses/rev.) |
| **Speed output DC-voltage** | | | |
| 1 | R/L | Direction signal speed | HTL (24V, clockwise = 0)<br>TTL (5V, clockwise = 0) |
| 2 | GND | Ground for DC speed output | |
| 3 | N-U | Speed of direct voltage output | 0 V ... 10 V (scalable) |
| **Other connections / operating devices** | | | |
| 12 | T1 | Push button T1 | External push button connection T1 |
| 13 | L1, L2 | Signal LEDs | |
| 14 | T1, T2 | Sensor T1, T2 | Sensor for programming |
| 15 | TP | Switch low pass | On/off switch low-pass |
| 16 | - | Connection of measuring shaft | Connection cable |
| 17 | - | Switch for speed scaling | see table 11 |

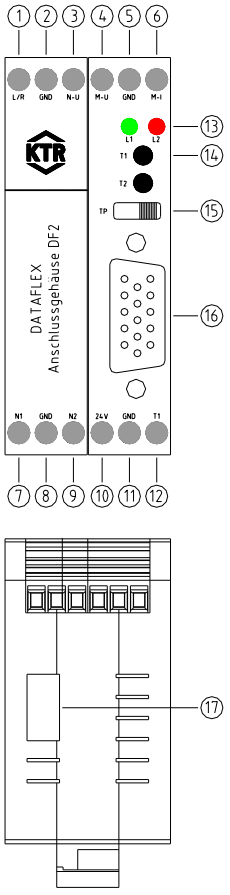



Illustration 10:
Connection housing DF2

# 4 Assembly

## 4.8 Technical description

### 3. Description of connections

#### a) Supply voltage 24V (No. 10 and 11)

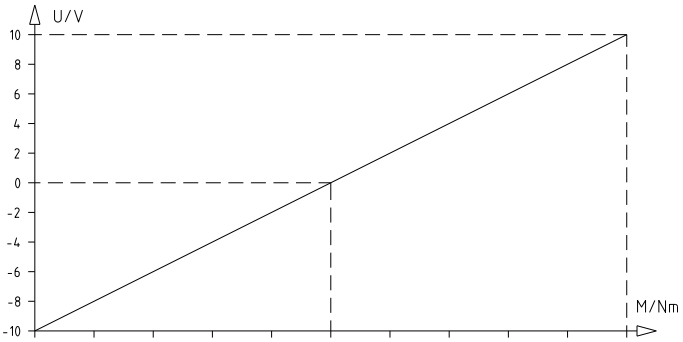
The supply voltage is 24V ± 4V direct current voltage (DC). The current consumption is 100 mA at the maximum.

#### b) Torque signal M-U (No. 4 and 5)

The output voltage is proportional to the torque with an output of values between -10V and 10V. Table 8 shows the relation between torque and output voltage.

**Table 8: Assignment of torque - output values**

| DATAFLEX® size | Measuring range 1 ΔM / ΔU | Measuring range 2 ΔM / ΔU |
|---|---|---|
| 16/10 | 1 Nm / V | 0.2 Nm / V |
| 16/30 | 3 Nm / V | 0.6 Nm / V |
| 16/50 | 5 Nm / V | 1.0 Nm / V |




| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DATAFLEX 16/10 | -10 (-2) | -8 (-1,6) | -6 (-1,2) | -4 (-0,8) | -2 (-0,4) | 0 (0) | 2 (0,4) | 4 (0,8) | 6 (1,2) | 8 (1,6) | 10 (2) |
| DATAFLEX 16/30 | -30 (-6) | -24 (-4,8) | -18 (-3,6) | -12 (-2,4) | -6 (-1,2) | 0 (0) | 6 (1,2) | 12 (2,4) | 18 (3,6) | 24 (4,8) | 30 (6) |
| DATAFLEX 16/50 | -50 (-10) | -40 (-8) | -30 (-6) | -20 (-4) | -10 (-2) | 0 (0) | 10 (2) | 20 (4) | 30 (6) | 40 (8) | 50 (10) |

Illustration 11: Assignment of torque - output values
Measuring range 1 (measuring range 2)

#### c) Filter voltage output (No. 15)

The torque signal may be filtered by activating a low-pass filter so that high-frequency shares of the signal are suppressed.

**Table 9: Low pass switch (No. 15)**

| Switch position TP | Left | Right |
|---|---|---|
| | Low pass on | Low pass off |

The limit frequency of the filter can be changed by varying the DIP switches (see illustration 12) inside the connection housing:

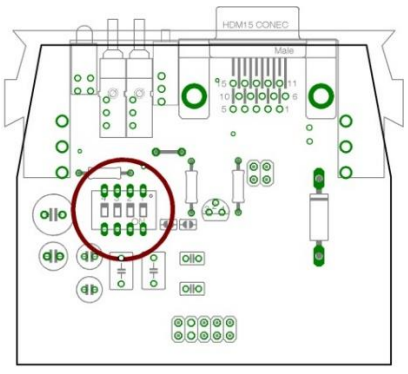


Illustration 12: Location of DIP switch

**Table 10: Adjustment of the requested filter frequency**

| Limit frequency [Hz] | Switch 1 | Switch 2 | Switch 3 | Switch 4 |
|---|---|---|---|---|
| 2000 | **OFF** | **OFF** | **OFF** | **OFF** |
| 1000 | **ON** | OFF | OFF | OFF |
| 100 | OFF | **ON** | OFF | OFF |
| 10 | OFF | OFF | **ON** | OFF |
| 1 | OFF | OFF | OFF | **ON** |

A filter frequency of 1000 Hz is preset.

# 4 Assembly

## 4.8 Technical description

### d) Speed signals N1, N2, N-U, R/L (No. 1, 3, 7, 9)

The connection housing DF2 has 4 connections for speed output:

- Two square-wave signals shifted by 90 degrees (N1, N2)
- A scalable voltage output (N-U) with direction signal (R/L)

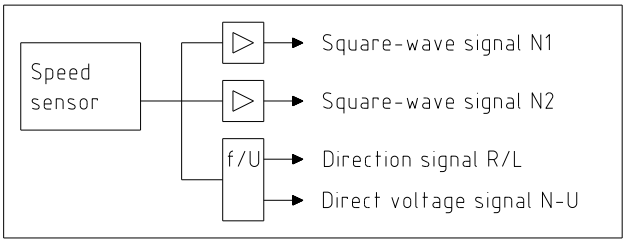



Illustration 13

**Outputs N1 and N2**

Each of the speed outputs N1 and N2 provide a square-wave signal with a resolution of 360 periods per revolution (see illustration 14).

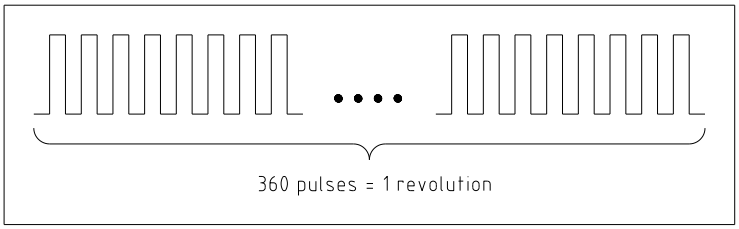
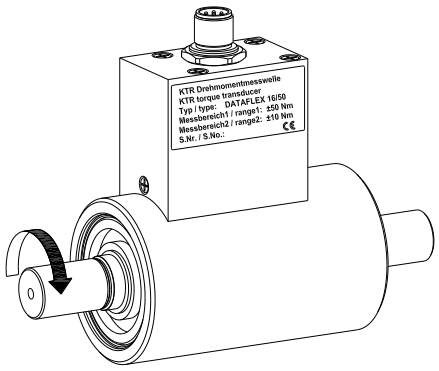



Illustration 14

The speed is calculated as follows:**N [rpm] = f [Hz] / 6**

The speed channel signals N1 and N2 have a phase shift of 90 degrees to each other. Depending on the rotational direction one of the two signals leads 90° in phase (see illustration 15).




Clockwise

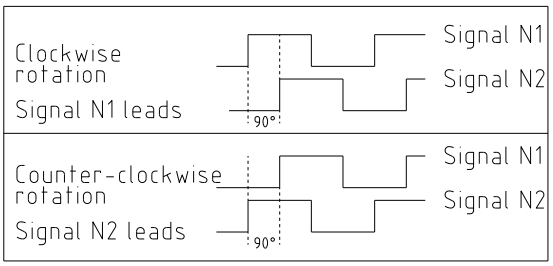



Illustration 15

# 4 Assembly

## 4.8 Technical description

**Output circuit (connection N1 and N2)**

The speed outputs N1 and N2 have short-circuit proof push-pull outputs providing a square-wave voltage with an amplitude of 24V and a maximum switching current of 30 mA. The output terminals must not be charged with an external voltage (see illustration 16).

The output voltage of speed lines and torsional direction line can be varied by modifying the jumper position in the connection housing to 5V level (see illustration 17).

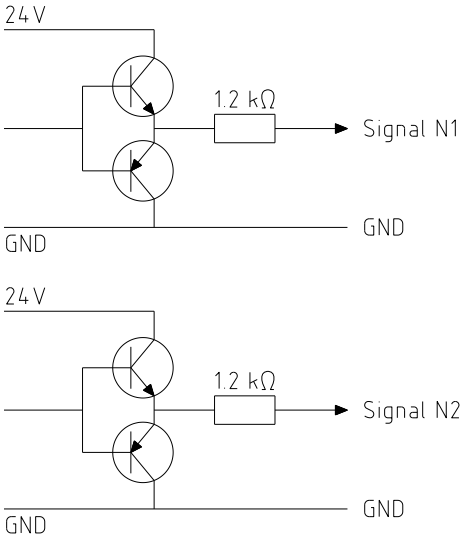
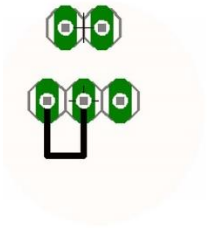
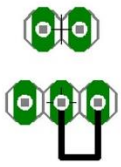



Illustration 16: Output circuit of speed outputs

Outputs N1, N2, R/L = 24Vss:



Outputs N1, N2, R/L = 5Vss:



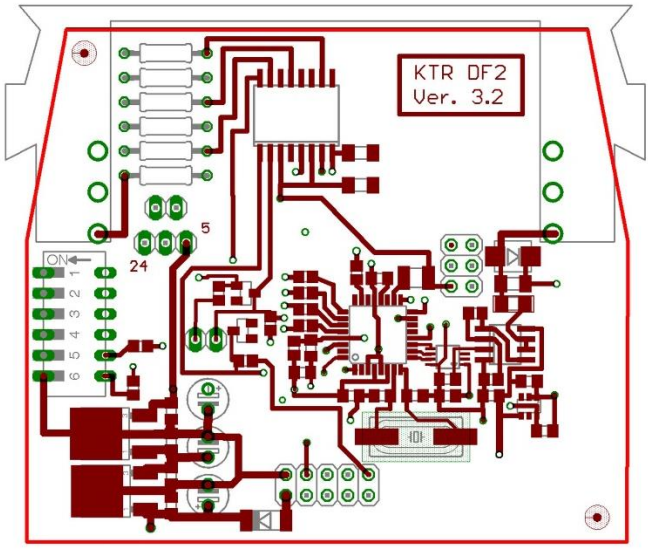



Illustration 17: Modification of voltage level for the speed signal/direction signal

# 4 Assembly

## 4.8 Technical description

### Outputs N-U and R/L

The KTR connection housing DF2 has an integrated f/U converter which converts the square wave signals of the encoder into a linear DC voltage output (terminal N-U) and generates an additional signal for the rotational direction (terminal R/L).
On the bottom side of the connection housing DF2 there is a sixfold multiple switch allowing to adapt the scaling of the speed signal to the type of measuring shaft and the speed range (see illustration 10 and 18).

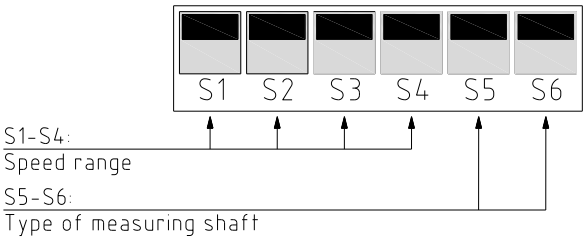



Illustration 18: Switch positions

### Scaling of the speed direct voltage output

**Table 11: Switch position S1-S4 and the corresponding scale of the speed output N-U**

| Max. speed | Scaling | S1 | S2 | S3 | S4 |
|---|---|---|---|---|---|
| 10 | 1 rpm / V | 0 | 0 | 0 | 0 |
| 20 | 2 rpm / V | 0 | 0 | 0 | 1 |
| 40 | 4 rpm / V | 0 | 0 | 1 | 0 |
| 60 | 6 rpm / V | 0 | 0 | 1 | 1 |
| 80 | 8 rpm / V | 0 | 1 | 0 | 0 |
| 100 | 10 rpm / V | 0 | 1 | 0 | 1 |
| 200 | 20 rpm / V | 0 | 1 | 1 | 0 |
| 400 | 40 rpm / V | 0 | 1 | 1 | 1 |
| 600 | 60 rpm / V | 1 | 0 | 0 | 0 |
| 800 | 80 rpm / V | 1 | 0 | 0 | 1 |
| 1000 | 100 rpm / V | 1 | 0 | 1 | 0 |
| 2000 | 200 rpm / V | 1 | 0 | 1 | 1 |
| 4000 | 400 rpm / V | 1 | 1 | 0 | 0 |
| 6000 | 600 rpm / V | 1 | 1 | 0 | 1 |
| 8000 | 800 rpm / V | 1 | 1 | 1 | 0 |
| 10000 | 1000 rpm / V | 1 | 1 | 1 | 1 |

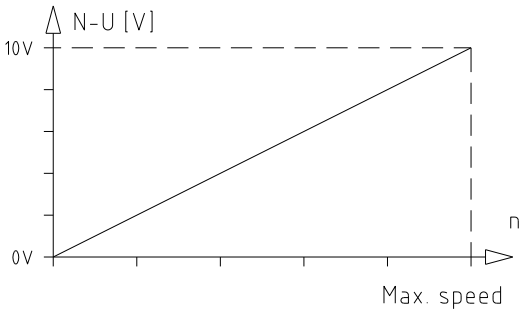



Illustration 19

**Table 12: Selection of DATAFLEX® series**

| DATAFLEX® type | S5 | S6 |
|---|---|---|
| DATAFLEX® 22, 42, 85, 140 | 0 | 0 |
| DATAFLEX® 16 | 1 | 1 |
| DATAFLEX® 32, 42 (red), 110 | 0 | 1 |
| DATAFLEX® 70 | 1 | 0 |

**Table 13: Direction signal**

| Output voltage R/L | Torsional direction |
|---|---|
| 0 | Clockwise |
| 24V | Counterclockwise |

The signal of the speed direction output R/L shows the rotational direction (see table 13).

* Switching between 5V and 24V possible (see illustration 17 *Modification of voltage level for the speed signal/direction signal*)

# 4 Assembly

## 4.8 Technical description

**e) Control buttons and LEDs (No. 12 to 14 and illustration 20)**

The connection housing DF2 has two LEDs and two push buttons for visual inspection allowing to change settings.

# 5. Special functions

The following settings can be made by means of sensors:

1) Self-test
2) Measuring range switchover
3) Automatic zero adjustment
4) Manual zero adjustment

For safety reasons the settings „1) self-test“ and „2) measuring range switchover“ can only be made up to 15 seconds after powering up. „3) Automatic zero adjustment“ and „4) manual zero adjustment“ can only be made from 15 seconds after powering up.
The termination of the 15 seconds period is signalized by short blinking of the LEDs on the connection housing.

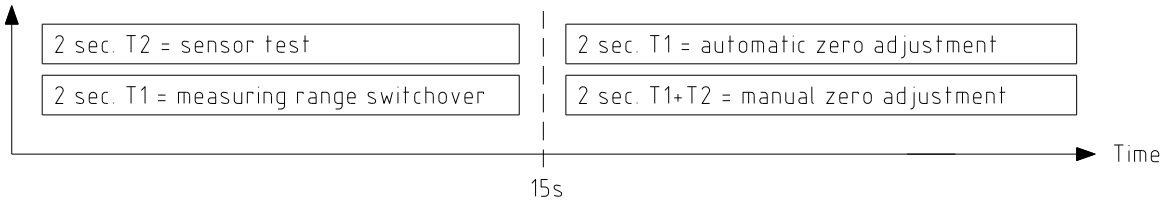



Illustration 20

## 5.1 Sensor test

The torque sensor can be inspected for operativeness if the sensor T2 is pressed for 2 seconds during the first 15 seconds after powering up the measuring shaft. If the sensor is fine, the output voltage increases to approx. 4 volts for the period of 2 seconds. The output voltage increases to approx -10 volts for 2 seconds in the measuring range 2.

☞

- **The sensor test can only be performed during the first 15 seconds after powering up.**

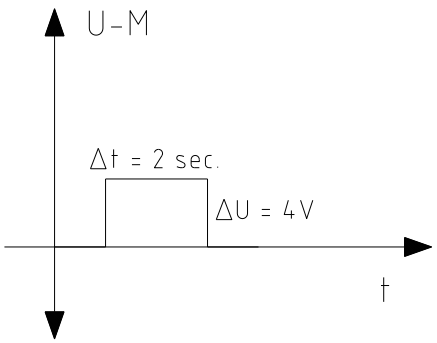



Illustration 21: Sensor test

# 5. Special functions

## 5.2 Measuring range switchover

The measuring range can be switched over within the first 15 seconds after powering up the supply voltage. For that purpose press the button T1 on the connection housing DF2 during 2 seconds. The selected measuring range is displayed by green LEDs on DF2.

Green LEDs off = measuring range 1 (e. g. 100 Nm)
Green LEDs permanently on = measuring range 2 (e. g. 20 Nm)

The selected measuring range remains set after powering on again.

## 5.3 Automatic zero adjustment (see illustration 22)

If the „push button“ T1 is activated for a period of 2 seconds, the output of the torque signal is automatically set to 0 Volt. The adjusting is effected irrespective of the amount of the actual torque.
The termination of the adjustment is confirmed by fast blinking of the LED L1. The new zero point has been saved and the device is in the measuring mode again.

- **The automatic zero adjustment can only be performed if the measuring shaft is switched on for more than 15 seconds.**
- **If necessary, the automatic zero adjustment can be performed by an external control, too. If the potential of the terminal clamp T1 is connected with GND for 2 seconds, an automatic zero adjustment is performed.**

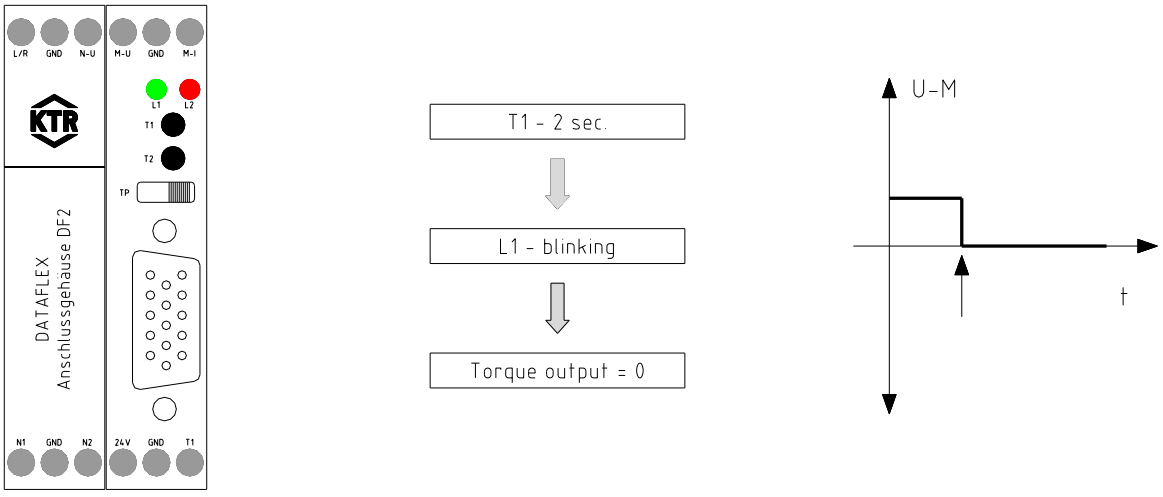



Illustration 22: Automatic zero adjustment

## 5.4 Manual zero adjustment

The zero point of the torque output can be adjusted manually. For this purpose both push buttons T1 and T2 are activated simultaneously for 2 seconds. The LED L1 is blinking four times.
Pressing the push button T1 increases the voltage, pressing the push button T2 reduces the voltage. The modifications are accelerated if the corresponding push button is permanently pressed. Each amendment is confirmed by short blinking of the LED L2.
Having performed the adjusting the new values are lastingly stored by pressing both push buttons again for 2 seconds. The LED L1 is illuminated once and signalizes the return to the measuring mode.

The manual zero adjustment can be set separately for the two measuring ranges. The zero point of the range that is currently activated is generally adjusted.

## 5. Special functions

### 5.4 Manual zero adjustment

- **The manual zero adjustment can only be performed if the measuring shaft is switched on for more than 15 seconds and the signal has levelled off.**

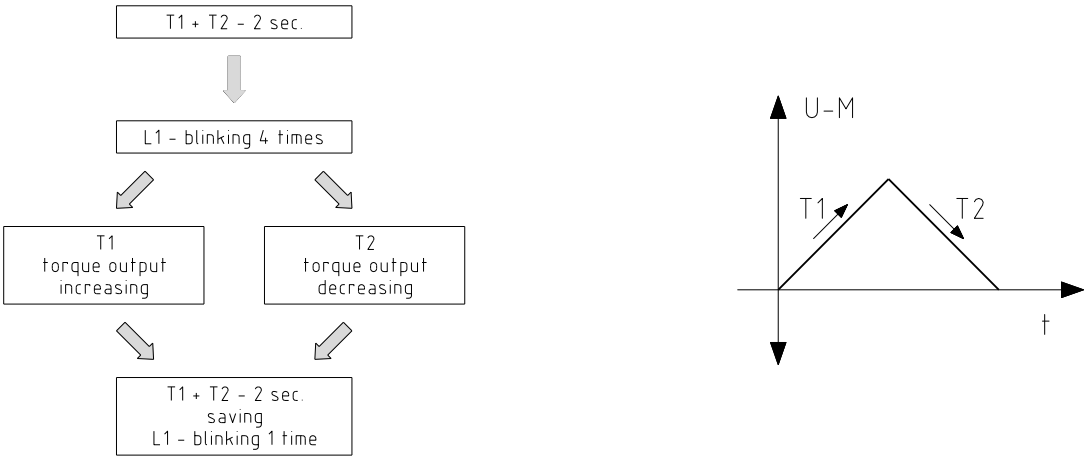



Illustration 23: Manual zero adjustment

## 6 Disposal

In respect of environmental protection we would ask you to dispose of the packaging resp. products on termination of their service life in accordance with the legal regulations resp. standards that apply.

## 7 Maintenance and service

**DATAFLEX®** is a low-maintenance torque measuring shaft. We recommend to perform a visual inspection on the torque measuring shaft **at least once a year**. Pay special attention to the condition, alignment and screw connection of the torque measuring shaft and the condition of the laminae sets of the RADEX®-NC coupling.

**Having started up the torque measuring shaft the tightening torques of the screws have to be inspected during the usual inspection intervals.**

**Please consider our operating/assembly instructions KTR-N 47210 additionally when using the RADEX®-NC coupling.**

## 8 Services, customer service addresses

If requested, we are pleased to perform the calibration of your torque measuring shaft and other services.

Contact addresses of the KTR partners for spare parts and orders can be obtained from the KTR homepage at www.ktr.com.

☞ **KTR does not assume any liability or warranty for the use of spare parts and accessories which are not provided by KTR and for the damages which may incur as a result.**

**KTR Systems GmbH**
Carl-Zeiss-Str. 25
D-48432 Rheine
Phone: +49 5971 798-0
E-mail: mail@ktr.com

# 9 Declarations of conformity

## 9.1 EU Declaration of conformity

# EU Declaration of conformity

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

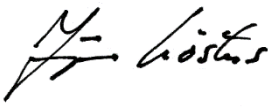
**DATAFLEX® torque measuring shaft**

described in the present operating/assembly instructions is in accordance with the following directive:

| | |
|---|---|
| *2014/30/EU* | *Directive of the European Parliament and European Council dated February 26, 2014 for harmonizing the legal provisions of the member states regarding electromagnetic compatibility* |

Standards applied:

| | |
|---|---|
| EN IEC 61000-6-2: | Immunity standard for industrial environments |
| EN 61000-4-2: | Electrostatic discharge immunity test (ESD) |
| EN IEC 61000-4-3: | Radiated, radio-frequency, electromagnetic field immunity test |
| EN 61000-4-4: | Electrical fast transient/burst immunity test |
| EN 61000-4-6: | Immunity to conducted disturbances, induced by radio-frequency fields |
| EN IEC 61000-6-4: | Emission standard for industrial environments |
| EN 55011: | Intensity of radio interference area (class B) |



| | | | |
|---|---|---|---|
| Rheine, | 2022-08-18 | i. V. | i. A. |
| Place | Date | Reinhard Wibbeling<br>Engineering/R&D | Jürgen Kösters<br>Product Manager |

## 9 Declarations of conformity

### 9.2 UK Declaration of conformity

# UK Declaration of conformity

The manufacturer - KTR Systems GmbH, Carl-Zeiss-Str. 25, D-48432 Rheine - states that the

**DATAFLEX® torque measuring shaft**

described in the present operating/assembly instructions is in accordance with the following directive:

*SI 2016/1091 Electromagnetic Compatibility Regulations 2016*

Standards applied:

| | |
|---|---|
| EN IEC 61000-6-2: | Immunity standard for industrial environments |
| EN 61000-4-2: | Electrostatic discharge immunity test (ESD) |
| EN IEC 61000-4-3: | Radiated, radio-frequency, electromagnetic field immunity test |
| EN 61000-4-4: | Electrical fast transient/burst immunity test |
| EN 61000-4-6: | Immunity to conducted disturbances, induced by radio-frequency fields |
| EN IEC 61000-6-4: | Emission standard for industrial environments |
| EN 55011: | Intensity of radio interference area (class B) |

Authorised representative:

KTR U.K. Ltd.
Robert House
Unit 7, Acorn Business Park
Woodseats Close
Sheffield
United Kingdom, S8 0TB

Year of UKCA marking: 2022

| | | | |
|---|---|---|---|
| Rheine, | 2022-08-18 | i. V. | i. A. |
| Place | Date | Reinhard Wibbeling<br>Engineering/R&D | Jürgen Kösters<br>Product Manager |