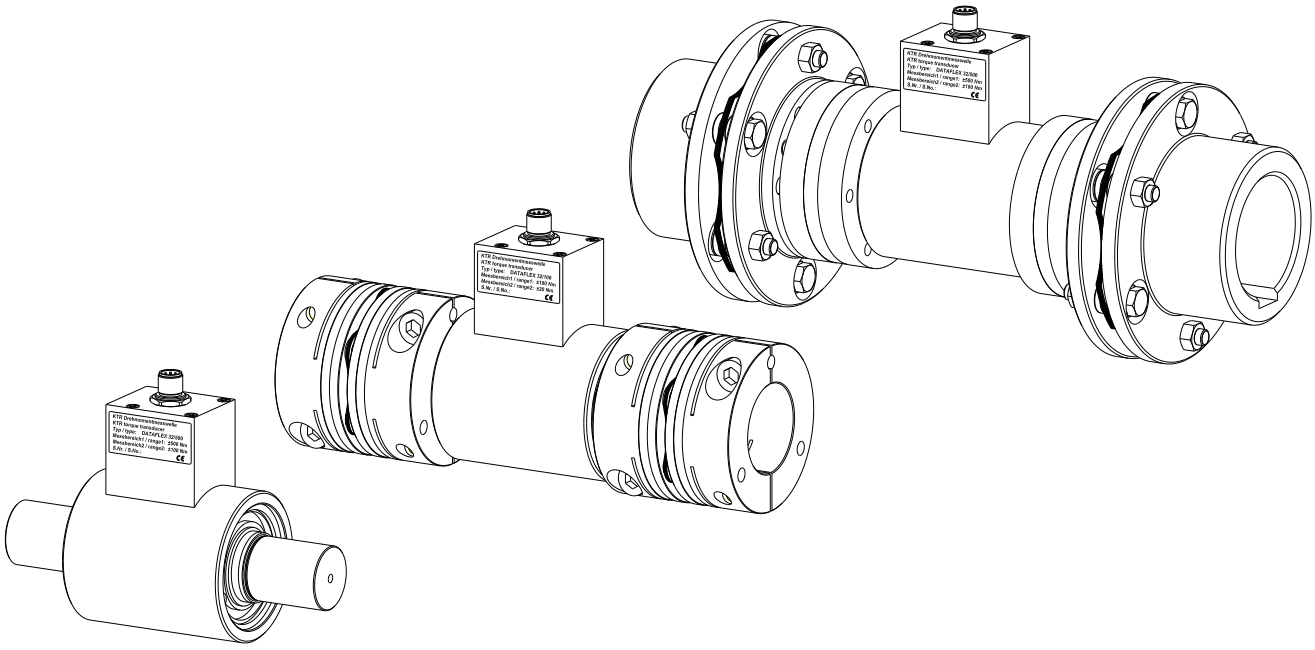
DATAFLEX®

Torque measuring shaft type 32/…



DATAFLEX® is a maintenance-free torque measuring shaft with two measuring ranges and integrated speed measurement. Combined with the steel laminae coupling **RADEX®-NC** or **RADEX®-N** 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

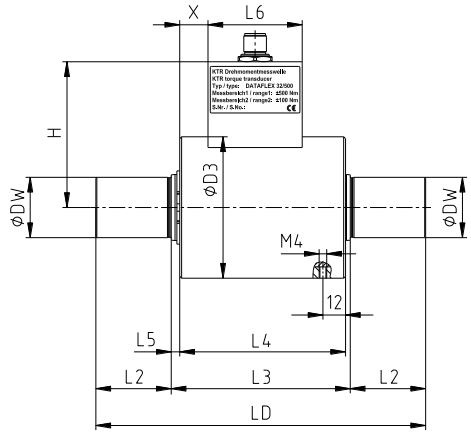


Illustration 1: DATAFLEX® torque measuring shaft

Table 1: Dimensions

DATAFLEX® type	Dimensions [mm]									
	DW	D3	LD	L2	L3	L4	L5	L6	H	X
32/100 32/300 32/500	32	75	175	40	95	88	4.5	50	77.3	15

Table 2: Technical data

Coupling size of DATAFLEX®	32/100	32/300	32/500
Electrical data			
Measuring range 1 - rated torque T_{KN} [Nm]	-100 ... +100 Nm	-300 ... +300 Nm	-500 ... +500 Nm
Measuring range 2 - rated torque T_{KN2} [Nm]	-20 ... +20 Nm	-60 ... +60 Nm	-100 ... +100 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 720		
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]	11	32	53
Max. radial force [N]	110	320	530
Max. axial force [kN]	5.0	10.4	14.6
Weight [kg]	1.9		
Torsion spring stiffness C_T [Nm/rad]	18000	46000	60000
Torsion angle with T_{KN} [degrees]	0.32	0.37	0.48
Mass moment of inertia [kgmm²]	219	221	224
Max. speed [rpm]	7500		

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 or RADEX®-N

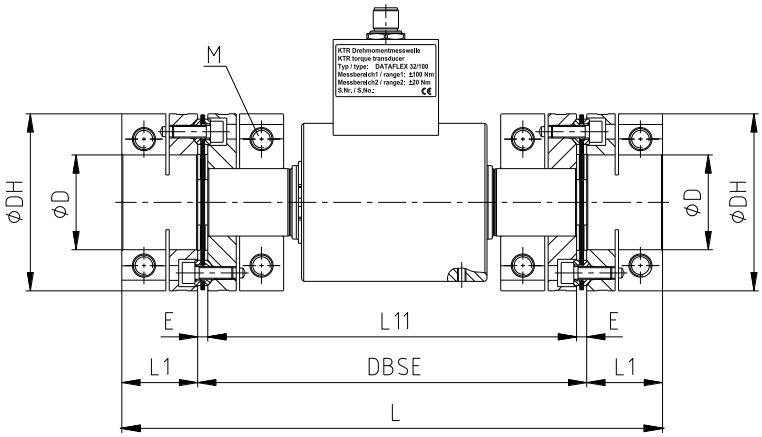


Illustration 2: DATAFLEX® with RADEX®-NC

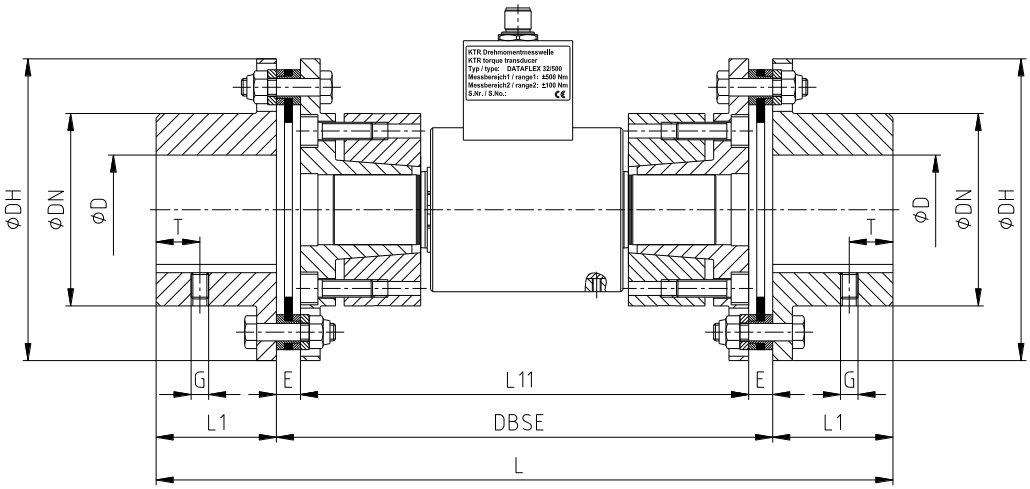


Illustration 3: DATAFLEX® with RADEX®-N

Table 3: Dimensions and technical data

Coupling size of DATAFLEX®	32/100	32/300	32/500
Coupling size of RADEX®-NC	36	-	
Coupling size of RADEX®-N	-	60	
Dimensions [mm]			
Dimension DH	84	138	
Dimension DN	-	88	
Dimension $D_{max.}$	45	60	
Dimension DBSE	184.6	227	
Dimension L	256.6	337	
Dimension L1	36	55	
Dimension L11	175	205	
Dimension E	4.8	11	
Clamping screw or setscrew [mm]			
Dimension G	-	M8	
Dimension T	-	20	
Dimension M	M10	-	
Tightening torque T_A [Nm]	49	10	
Mechanical data of combination (DATAFLEX® with RADEX®-NC or RADEX®-N)			
Mass moment of inertia [kgmm²]	1097	17900	
Torsion spring stiffness [Nm/rad]	15800	40000	49000
Weight [kg]	3.80	11.65	11.70
Max. speed [rpm] 1)	7500	6700	

1) Higher speeds on request.

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** or **RADEX®-N** couplings are supplied in preserved condition. Both **DATAFLEX®** and **RADEX®-NC** or **RADEX®-N** 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 shaft has to be inspected for completeness.
The mounting position of **DATAFLEX®** is variable. The measurement system can be mounted both horizontally and vertically.

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 (coupling size 32/100)
2	2	RADEX®-NC type EK

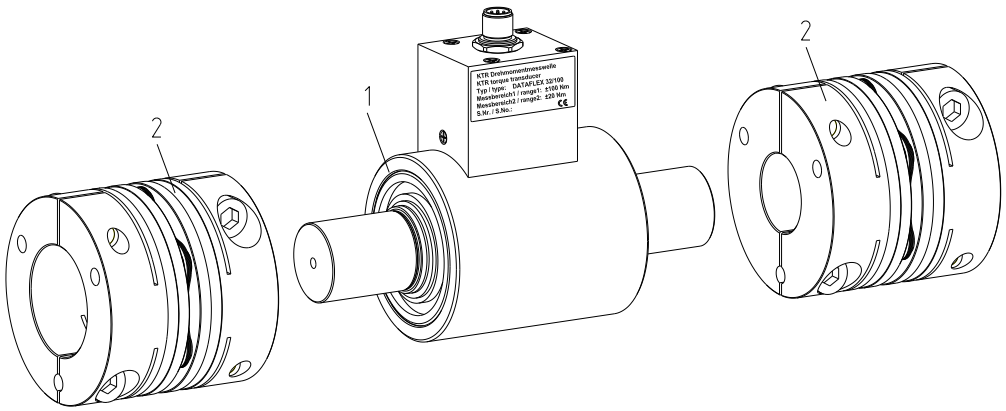


Illustration 4: DATAFLEX® 32 torque measuring shaft with RADEX®-NC

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

4 Assembly

4.1 Components of DATAFLEX® torque measuring shaft

Components of DATAFLEX® torque measuring shaft with RADEX®-N coupling

Component	Quantity	Component assembly
1	1	DATAFLEX® torque measuring shaft (coupling size 32/300 or 32/500)
3	2	Flange hub
4	2	Laminae set
5	2	Clamping ring hub with clamping ring
6	2	Setscrew DIN EN ISO 4029

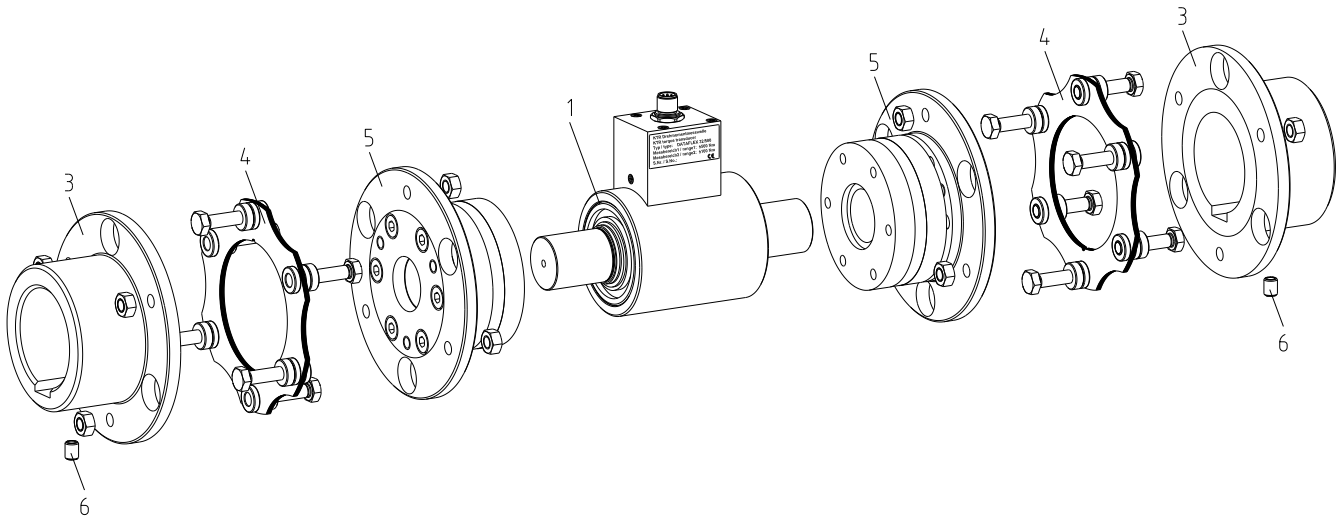


Illustration 5: DATAFLEX® 32 torque measuring shaft with RADEX®-N

Please consider our operating/assembly instructions KTR-N 47110 additionally when using the RADEX®-N coupling.

4.2 Advice for finish bore

Only valid with RADEX®-NC:

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 6).
- Make absolutely sure to observe the figures for ØD.
- Carefully align the clamping hubs when the finish bores ar drilled.

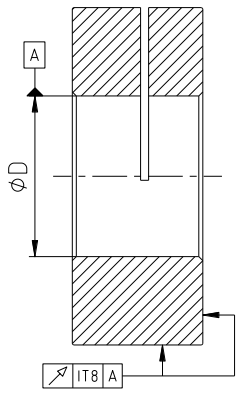


Illustration 6: Concentricity and axial runout of RADEX®-NC

4 Assembly

4.2 Advice for finish bore

Only valid with RADEX®-N:

STOP

The maximum permissible bore diameters D (see RADEX®-N catalogue) must not be exceeded. If these figures are disregarded, the coupling may tear. Rotating particles may cause danger to life.

- Hub bores machined by the customer have to observe concentricity resp. axial runout (see illustration 7).
- Make absolutely sure to observe the figures for ØD.
- Carefully align the hubs when the finish bores are drilled.
- Provide for a setscrew according to DIN EN ISO 4029 with a cup point or an end plate to fasten the hubs axially.

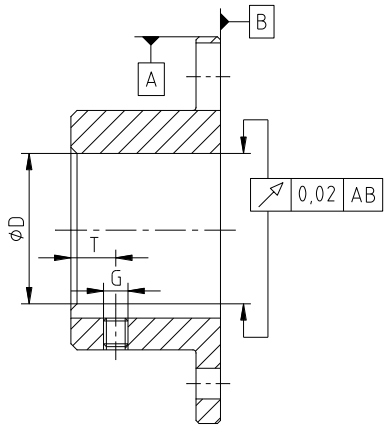


Illustration 7: Concentricity and axial runout of RADEX®-N

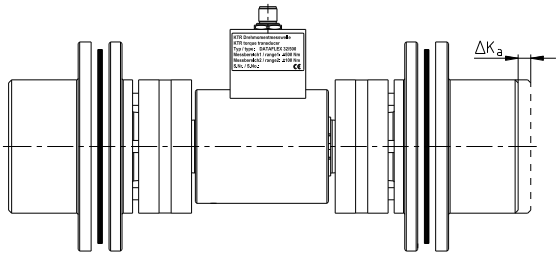
4.3 Displacements - alignment of the torque measuring shaft

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

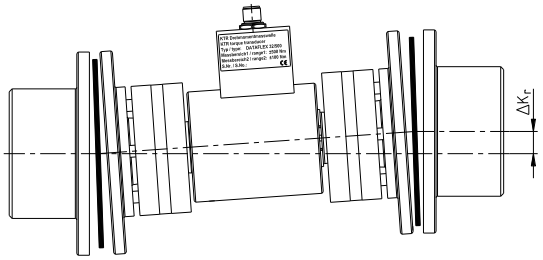
In order to ensure a long service life of the measuring shaft, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures specified (see table 4). If the figures are exceeded, the measuring shaft with coupling will be damaged.

Please note:

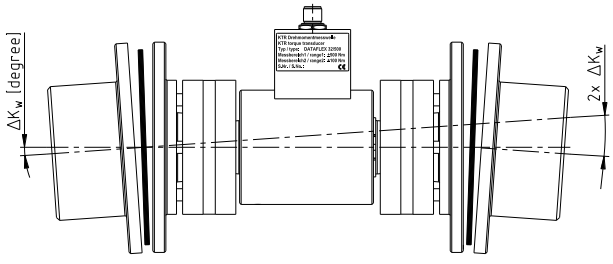
- The displacement figures specified in table 4 are maximum figures which must not arise in parallel. If axial, radial and angular displacement arises at the same time, these values must be reduced (see illustration 9).
- Inspect with a dial gauge, ruler or feeler gauge whether the permissible displacement figures specified in table 4 can be observed.



Axial displacement



Radial displacement



Angular displacement

Illustration 8: Displacements
(Example: DATAFLEX® 32 torque measuring shaft with RADEX®-N)

4 Assembly

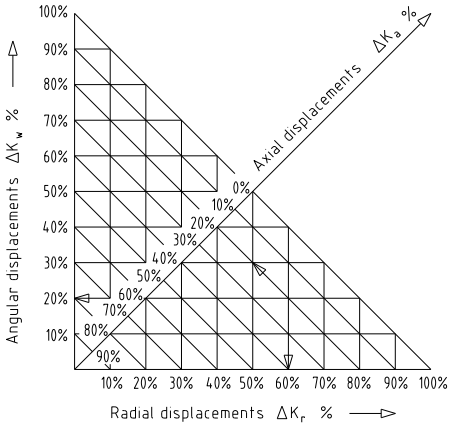
4.3 Displacements - alignment of the torque measuring shaft

Table 4: Displacement figures

DATAFLEX® size	RADEX®-N size	RADEX®-NC size	Max. axial displacement ΔK_a [mm]	Max. radial displacement ΔK_r [mm]	Max. angular displacement ΔK_w [degree] 1)
32/100	-	36	1.0	3.1	1.0
32/300	60	-	2.0	3.7	
32/500					

1) each laminae set

Illustration 9: Combinations of displacement



Examples of the displacement combinations specified in illustration 9:

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

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

4.4 Assembly of the hubs

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

4 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 unscrew 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 10).
- 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 11).

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 excepted.

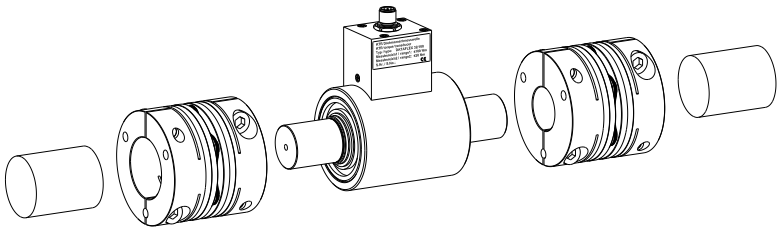


Illustration 10: Assembly of clamping hubs

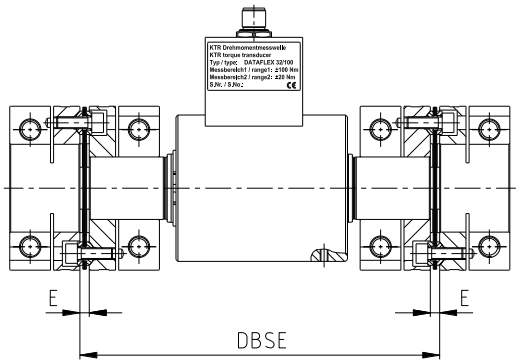


Illustration 11: Adjusting to dimension E and DBSE

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 transmitted 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	32/100	DATAFLEX® size	32/100
RADEX®-NC size	36	RADEX®-NC size	36
Clamping screw M	M10	Clamping screw M	M10
Tightening torque T_A [Nm]	49	Tightening torque T_A [Nm]	49
Bore and transmittable torques of clamping hubs [Nm]		Bore and transmittable torques of clamping hubs [Nm]	
Ø19	188	Ø33	326
Ø20	198	Ø34	336
Ø21	207	Ø35	346
Ø22	217	Ø36	356
Ø23	227	Ø37	365
Ø24	237	Ø38	375
Ø25	247	Ø39	385
Ø26	257	Ø40	395
Ø27	267	Ø41	405
Ø28	277	Ø42	415
Ø29	286	Ø43	425
Ø30	296	Ø44	435
Ø31	306	Ø45	444
Ø32	316		

4.5.1 Advice for assembly of the RADEX®-NC coupling

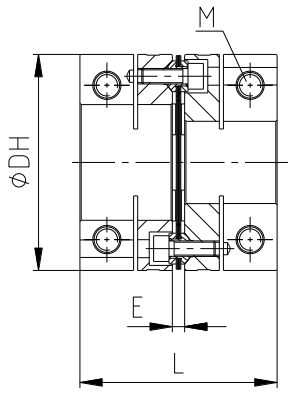


Illustration 12: Assembly of coupling

Table 6:

DATAFLEX® size	32/100
RADEX®-NC size	36
Assembly dimensions	
Dimension E	4.8
Dimension DH	84
Dimension L	74.8
Screws of laminae set	
Thread size M	M10
Tightening torque T_A [Nm]	49

4 Assembly

4.6 Assembly of the RADEX®-N on the DATAFLEX® torque measuring shaft

4.6.1 Assembly of the RADEX®-N clamping ring hubs (Component 5)

The power transmission is frictionally engaged. Fit pair of shaft-clamping ring hub is specified as H7/h6.

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 unscrew the clamping screws, push the clamping ring hub on the shaft of the measuring shaft and align to dimension L11.
- Tighten the clamping screws evenly crosswise. Increase the tightening torque gradually. Repeat this process until all clamping screws have reached the tightening torque specified in table 7.

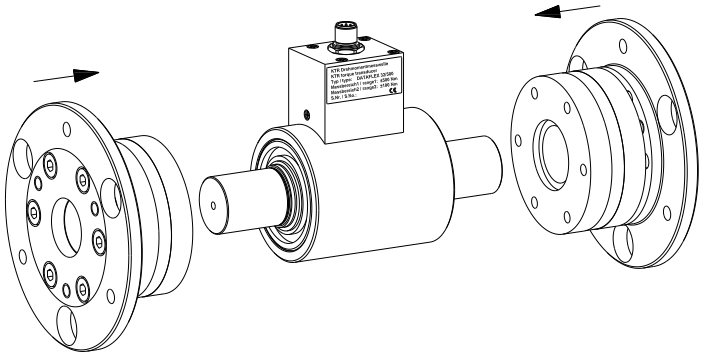


Illustration 13: Assembly of clamping ring hubs

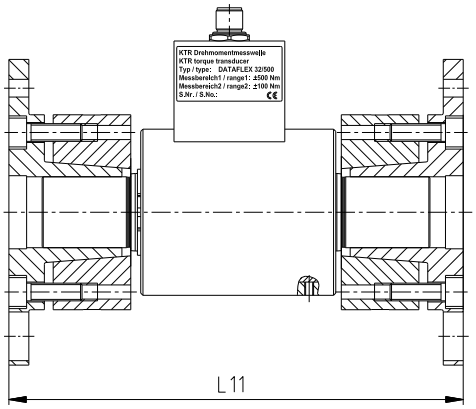


Illustration 14: Alignment to dimension L11

Table 7: Tightening torques of clamping screws

Coupling size of DATAFLEX®	32/300	32/500
Coupling size of RADEX®-N	60	
Size of clamping screws	M8	
Tightening torque T_A [Nm]	35	
Transmittable torque [Nm] 1) (frictional torque)	598	

1) H7/h6 shaft/hub fit

4.6.2 Assembly of the RADEX®-N flange hubs (Component 3)

- Mount the hubs on the shaft of driving and driven side (see illustration 15). The shaft ends must not protrude on the internal sides of the hubs.
- Shift the power packs in axial direction until the distance dimension DBSE is achieved.
- If the power packs have already been firmly assembled, shifting the hubs axially on the shafts allows for adjusting the DBSE dimension (see illustration 16).

4 Assembly

4.6 Assembly of the RADEX®-N on the DATAFLEX® torque measuring shaft

4.6.2 Assembly of the RADEX®-N flange hubs (Component 3)

On request the hubs can be provided with a bore for setscrews for axial fastening. Please specify in your order.

With the assembly make sure that the distance dimension DBSE (see table 3) is observed. Disregarding this advice may cause damage to the measuring shaft (coupling).

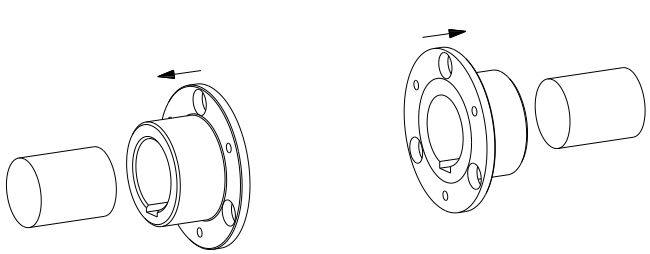


Illustration 15: Assembly of the hubs on the driving and driven side

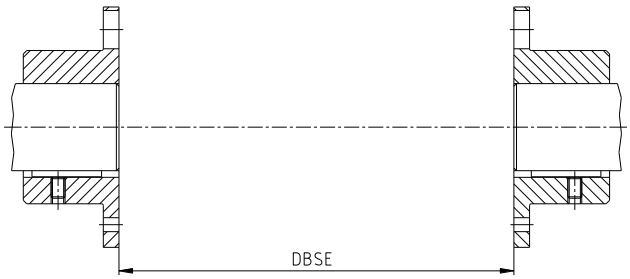


Illustration 16: Alignment to dimension DBSE

4.6.3 Assembly of the RADEX®-N laminae sets (Component 4)

With the assembly make sure that the laminae sets are installed free from distortion in axial direction. Disregarding this advice may cause damage to the coupling.

- Insert the laminae sets and the DATAFLEX® measuring shaft.
- Hand-tighten the components first, with the dowel screws to be assembled displaced from left to right (see illustration 17).
- Tighten the dowel screws to the tightening torques specified in table 8 by means of a suitable torque wrench.

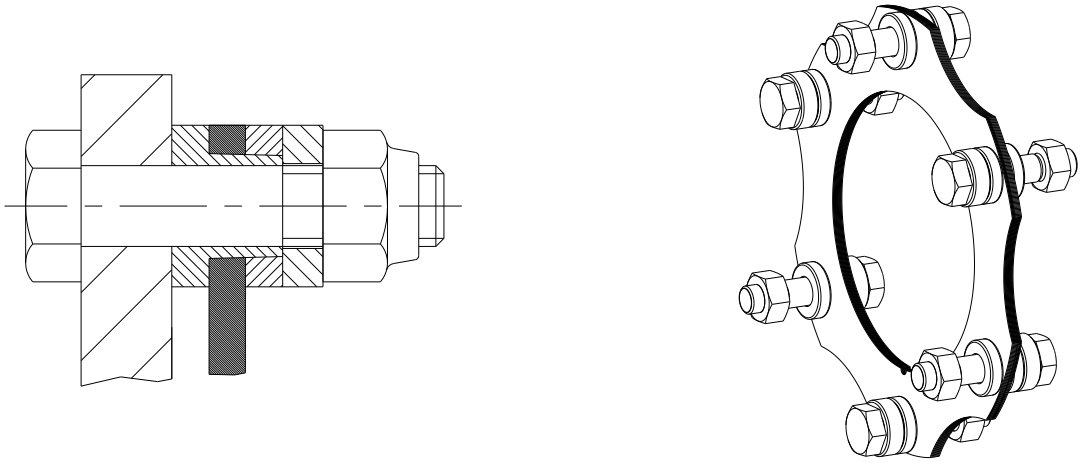


Illustration 17: Assembly of the laminae sets

4 Assembly

4.6 Assembly of the RADEX®-N on the DATAFLEX® torque measuring shaft

4.6.4 Tightening torque of dowel screws

The dowel screws have to be tightened to the tightening torques T_A specified in table 8.

Table 8: Tightening torques of dowel screws

Coupling size of DATAFLEX®	**32/300**	**32/500**
Coupling size of RADEX®-N	**60**	
Screw size	M8	
Tightening torque T_A [Nm]	33	

Having started up the coupling, the tightening torque of the dowel screws has to be inspected at regular maintenance intervals.

4.6.5 Advice for assembly of the RADEX®-N coupling

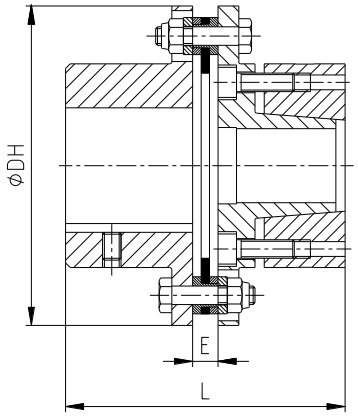


Illustration 18: Assembly of coupling

Table 9:

DATAFLEX® size	32/300	32/500
RADEX®-N size	60	
Assembly dimensions		
Dimension E	11	
Dimension DH	138	
Dimension L	121	

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.

- **Level of protection**
  All DATAFLEX® measuring shafts type 32 correspond to 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® 32 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 720 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 10).
The button T1 serves for programming and can be bridged externally from GND via the terminal 12 (T1).

Table 10: 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, 720 pulses/rev.) TTL (5V, 720 pulses/rev.)
8	GND	Ground of pulsed output	
9	N2	Pulsed output speed track 2	HTL (24V, 720 pulses/rev.) TTL (5V, 720 pulses/rev.)
Speed output DC-voltage			
1	R/L	Direction signal speed	HTL (24V, clockwise = 0) 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 14

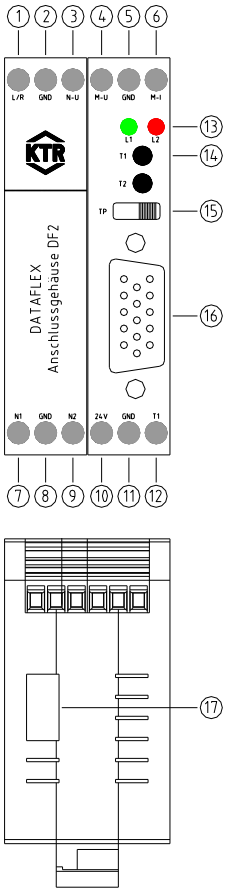


Illustration 19: Connection housing DF2

4 Assembly

4.8 Technical description

3. Description of connections

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

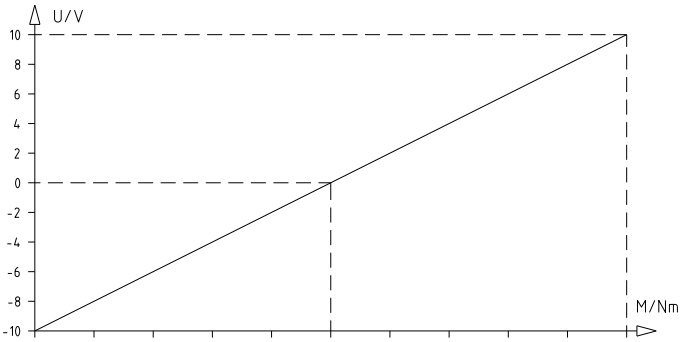
The supply voltage is 24V ± 4V direct current voltage (DC). The current consumption is 100 mA at the maximum.

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 11 shows the relation between torque and output voltage.

Table 11: Assignment of torque - output values

DATAFLEX® size	Measuring range 1 ΔM / ΔU	Measuring range 2 ΔM / ΔU
32/100	10 Nm / V	2 Nm / V
32/300	30 Nm / V	6 Nm / V
32/500	50 Nm / V	10 Nm / V



DATAFLEX 32/100	-100 (-20)	-80 (-16)	-60 (-12)	-40 (-8)	-20 (-4)	0 (0)	20 (4)	40 (8)	60 (12)	80 (16)	100 (20)
DATAFLEX 32/300	-300 (-60)	-240 (-48)	-180 (-36)	-120 (-24)	-60 (-12)	0 (0)	60 (12)	120 (24)	180 (36)	240 (48)	300 (60)
DATAFLEX 32/500	-500 (-100)	-400 (-80)	-300 (-60)	-200 (-40)	-100 (-20)	0 (0)	100 (20)	200 (40)	300 (60)	400 (80)	500 (100)

Illustration 20: 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 12: 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 21) inside the connection housing:

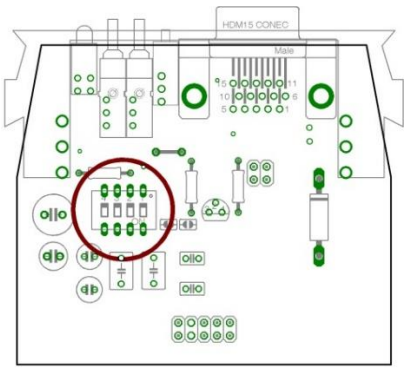


Illustration 21: Position of DIP switch

Table 13: 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)

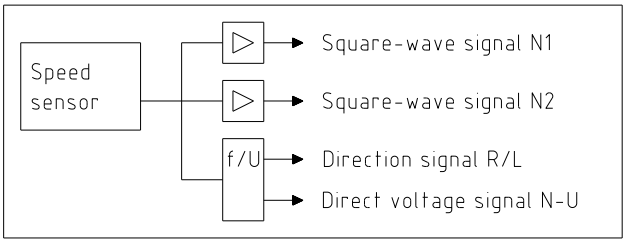


Illustration 22

Outputs N1 and N2

Each of the speed outputs N1 and N2 provide a square-wave signal with a resolution of 720 periods per revolution (see illustration 23).

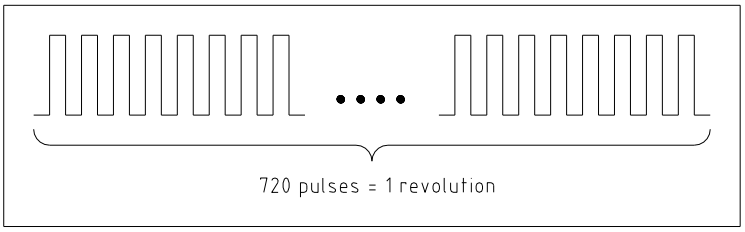
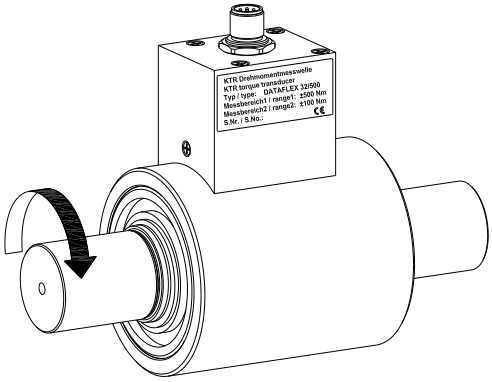


Illustration 23

The speed is calculated as follows: **N [rpm] = f [Hz] / 12**

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 24).



Clockwise

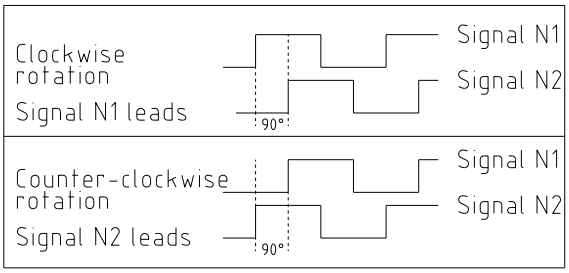


Illustration 24

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 25).

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 26).

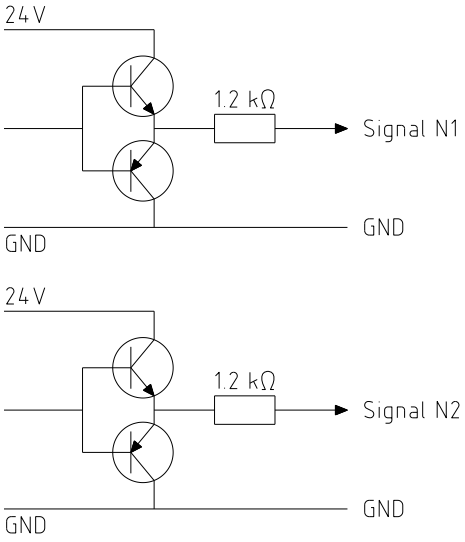
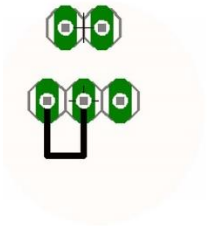
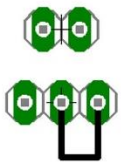


Illustration 25: Output circuit of speed outputs

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



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



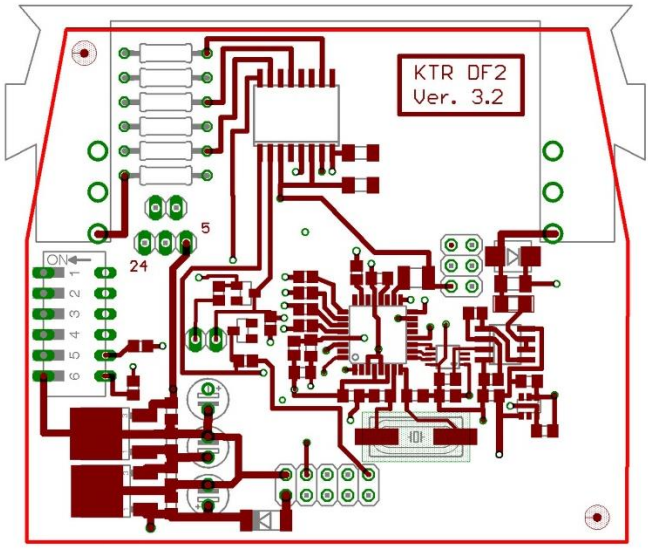


Illustration 26: Modification of voltage level for the speed signal/direction signal

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 19 and 27).

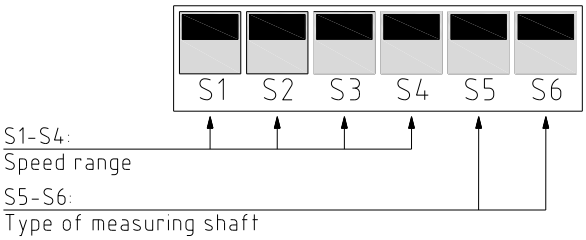


Illustration 27: Switch positions

Scaling of the speed direct voltage output

Table 14: 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

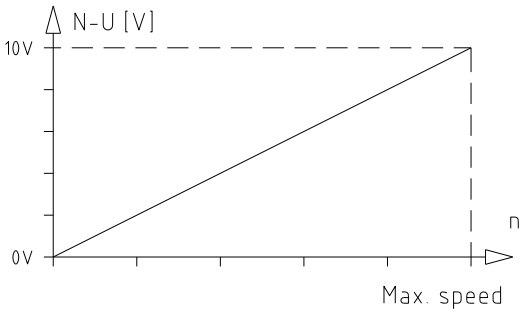


Illustration 28

Table 15: 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 16: 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 16).

* Switching between 5V and 24V possible (see illustration 26 *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 29)

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.

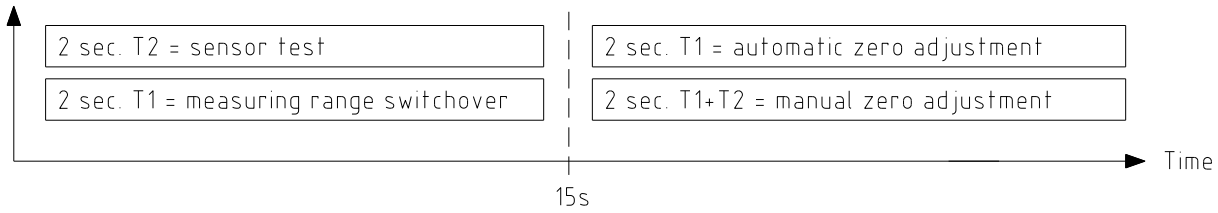


Illustration 29

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.**

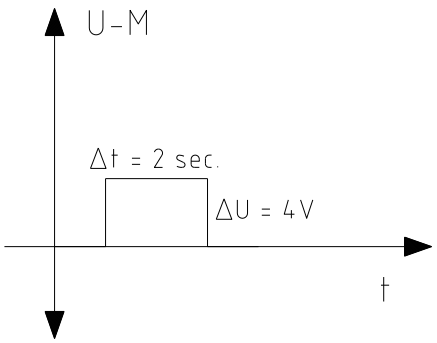


Illustration 30: Sensor test

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.**

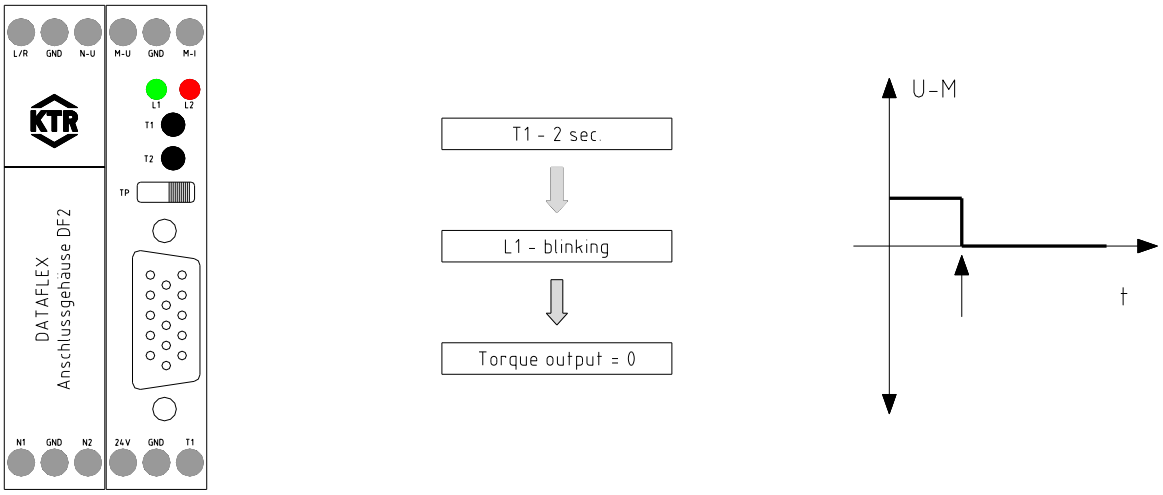


Illustration 31: Automatic zero adjustment

5.4 Manual zero adjustment

The zero point of the torque output can be manually adjusted. 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 stored lastingly 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.**

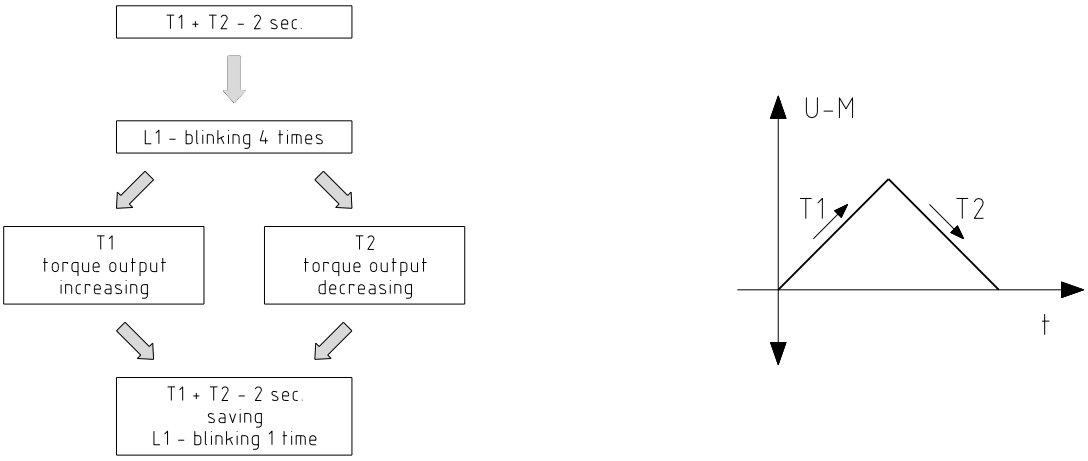


Illustration 32: Manual zero adjustment

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 or RADEX®-N 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.

Please consider our operating/assembly instructions KTR-N 47110 additionally when using the RADEX®-N 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

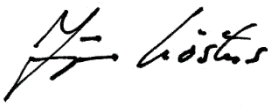
DATAFLEX® torque measuring shaft

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 Engineering/R&D	Jürgen Kösters 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:

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Sheffield
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Year of UKCA marking: 2022

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