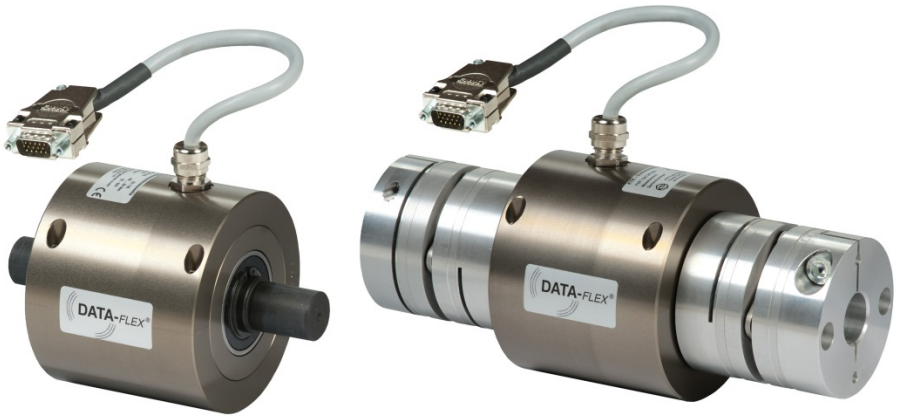
DATAFLEX®

Torque measuring shaft type 22/…



DATAFLEX® is a maintenance-free torque measuring shaft with integrated speed measurement. Combined with the steel lamina 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

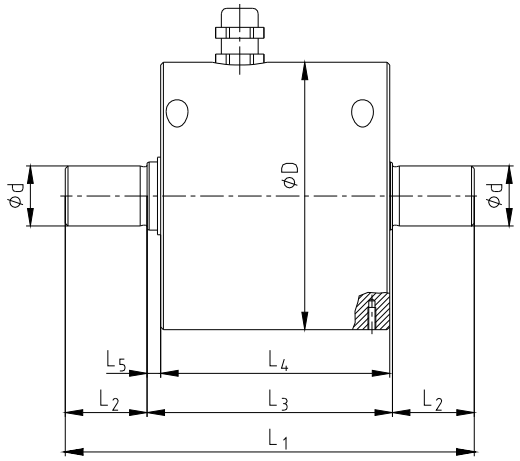


Illustration 1: DATAFLEX® torque measuring shaft

Table 1: Dimensions

DATAFLEX® type	Dimensions [mm]						
	d	D	L_1	L_2	L_3	L_4	L_5
22/20 22/50 22/100	22	98	150	30	90	84	5

Table 2: Technical data

Coupling size of DATAFLEX®	22/20	22/50	22/100
Electrical data			
Rated torque T_{KN} [Nm]	-20 .. +20 Nm	-50 .. +50 Nm	-100 .. +100 Nm
Band width of torque signal [kHz] (-3dB)	16		
Error in linearity incl. hysteresis [%] 1)	< ±0.5		
Influence of temperature [%/10K]	0.5		
Nominal temperature range [°C]	0 - 55		
Supply voltage [V] DC	24 ± 4		
Max. current consumption [mA]	100		
Torque output			
Output voltage torque [V]	0 ... 10		
Output current torque [mA]	4 ... 20		
Speed output 2)			
Number of pulses / revolution	60		
Amplitude [V]	24/5V		
Direct voltage output [V]	0 - 10		
Scale of direct voltage output	16fold via micro switch		
Inaccuracy of direct voltage output [%] 3)	± 0.2		
Direction signal [V]	not applicable		
Mechanical data			
Static load limit $T_{Kmax.}$ 1) [%]	150		
Breaking load $T_{K\ break}$ 1) [%]	300		
Max. bending torque [Nm]	5	10	18
Max. radial force [N]	42	84	150
Max. axial force [kN]	3	5	7.5
Weight [kg]	1.5		
Torsion spring stiffness C_T [Nm/rad]	2865	7163	14325
Torsion angle with T_{KN} [degrees]	0.4		
Mass moment of inertia [kgmm²]	131	132	134
Max. speed [rpm]	8000		

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

1 Technical data

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

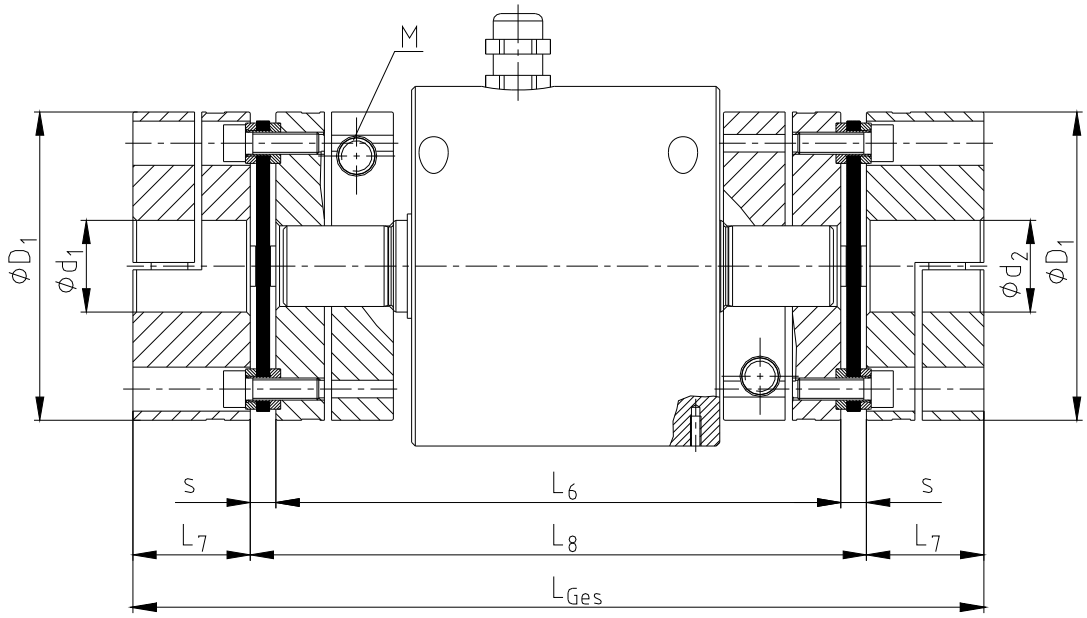


Illustration 2: DATAFLEX® with RADEX®-NC

Table 3: Dimensions and technical data

Coupling size of DATAFLEX®	22/20	22/50	22/100
Coupling size of RADEX®-NC	**25**	**35**	
Dimensions [mm]			
Dimension d_1 / d_2 max.	35	40	
Dimension D_1	70	84	
Dimension L_6	154	160	
Dimension L_7	32	35	
Dimension L_8	164	174	
Dimension L_{total}	228	244	
Dimension s	5	7	
Clamping screw [mm]			
Dimension M	M8	M10	
Tightening torque T_A [Nm]	25	49	
Mechanical data of combination (DATAFLEX® with RADEX®-NC)			
Mass moment of inertia [kgmm²]	940	2000	
Torsion spring stiffness [Nm/rad]	2521	6383	11448
Weight [kg]	2.56	3.15	3.16
Max. speed [rpm] 1)	6000		

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.
Please pay special attention to the safety instructions!
The assembly instructions are part of your product. Please store them carefully and close to the measuring shaft.
The copyright for these assembly instructions remains with **KTR** Kupplungstechnik GmbH.

2.2 Safety and advice symbols

D A N G E R ! **Danger of injury to persons.**

C A U T I O N ! **Damages on the machine possible.**

A T T E N T I O N ! **Pointing to important items.**

2.3 General hazard warnings

D A N G E R !
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. Please 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".
- Please 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. Please provide for the necessary protection devices and covers.

2.4 Intended use

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

- have carefully read through the assembly instructions and understood them
- had technical training
- are authorized by your company

The measuring shaft may only be used in accordance with the technical data (see table 1 to 3). Unauthorized modifications on the measuring shaft design 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 technical status at the time of printing of these operating/assembly instructions.

3 Storage

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

C A U T I O N !
Humid storage rooms are not suitable.
Please make sure that condensation is not generated. The best relative air humidity is less than 65 %.

4 Assembly

The measuring shaft and the couplings are supplied as single pre-assembled component assemblies. Before assembly the measuring shaft along with coupling has to be inspected for completeness.
The position of **DATAFLEX®** is variable. The measurement system can be mounted horizontally as well as vertically.

4.1 Components of the DATAFLEX® torque measuring shaft

Components of the DATAFLEX® torque measuring shaft

Com-ponent	Quantity	Components assembly
1	1	DATAFLEX® torque measuring shaft

Components of RADEX®-NC coupling

Com-ponent	Quantity	Components assembly
2	2	RADEX®-NC type EK

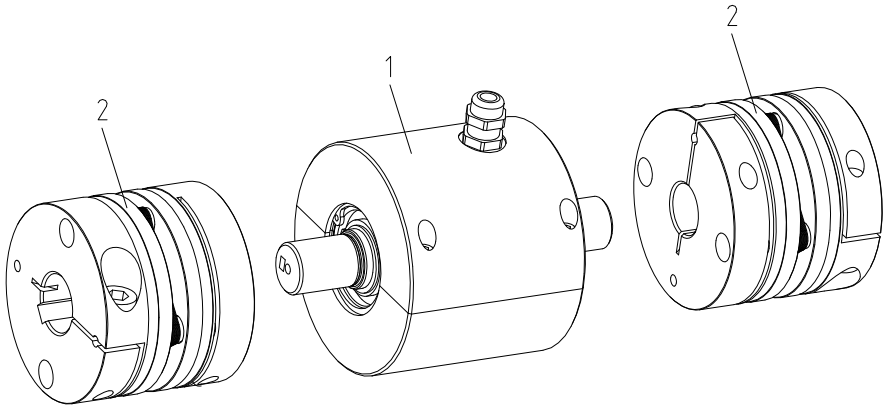


Illustration 3: DATAFLEX® 22 torque measuring shaft with RADEX®-NC

4.2 Advice for finish bore

D A N G E R !
The maximum permissible bore diameters d_{1max} and d_{2max} (see RADEX®-NC catalogue) 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 or axial runout, respectively (see illustration 4).
- Please make absolutely sure to observe the figures for Ø d_{1max} and Ø d_{2max}.
- Carefully align the clamping hubs when the finish bores are drilled.

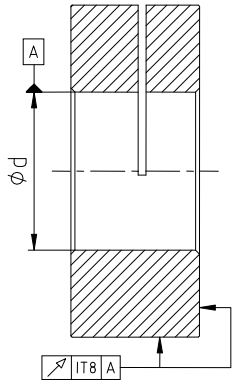


Illustration 4: Concentricity and axial runout

4 Assembly

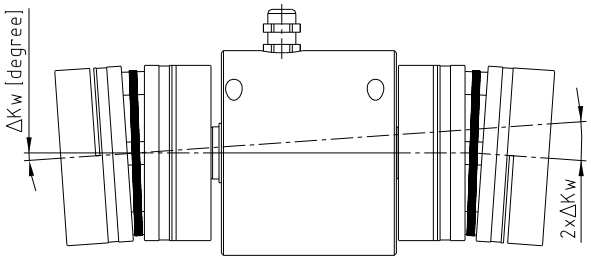
4.3 Displacements - alignment of the torque measuring shaft

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

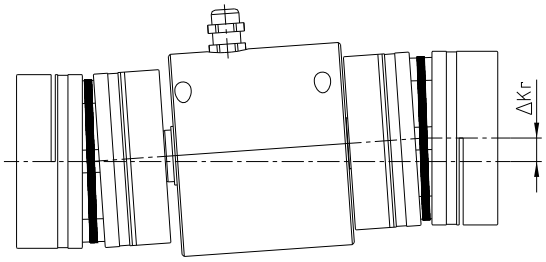
C A U T I O N !
In order to ensure a long service life of the measuring shaft, the shaft ends have to be accurately aligned. Please absolutely observe the displacement figures indicated (see table 4). If the figures are exceeded, the measuring shaft with coupling will be damaged.

Please note:

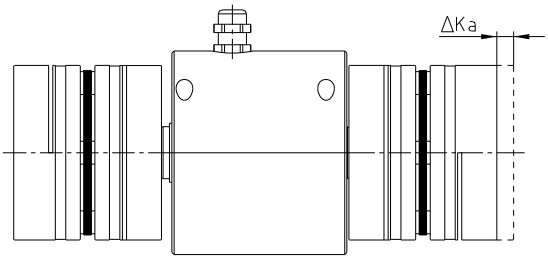
- The displacement figures specified in table 4 are maximum figures which must not arise in parallel. If radial, axial and angular displacement arises at the same time, these values must be reduced (see illustration 6).
- Please inspect with a dial gauge, ruler or feeler whether the permissible displacement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



Angular displacements



Radial displacements



Axial displacements

Illustration 5: Displacements

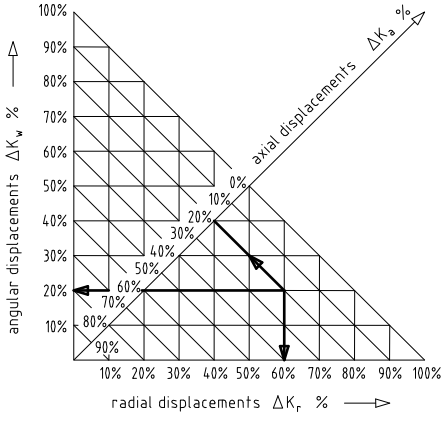
Table 4: Displacement figures

DATAFLEX® size	RADEX®-NC size	Max. axial displacement ΔK_a [mm]	Max. radial displacement ΔK_r [mm]	Max. angular displacement ΔK_w [degree]
22/20	25	1.6	2.8	1.0
22/50	35	2.0	2.9	
22/100				

Examples of the displacement combinations specified in illustration 6:

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

Illustration 6: Combinations of displacement



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

4 Assembly

4.4 Assembly of the hubs

A T T E N T I O N !
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:

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

C A U T I O N !
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 drive 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 s or L_8 is reached. If the power packs have already been fixed, adjust the dimension s or L_8 (see illustration 8) by shifting the hubs axially on the shafts.

C A U T I O N !
When tightening the clamping screws please make sure that the torque measuring shaft is not loaded and the danger of bending or overload by torque can be excluded.

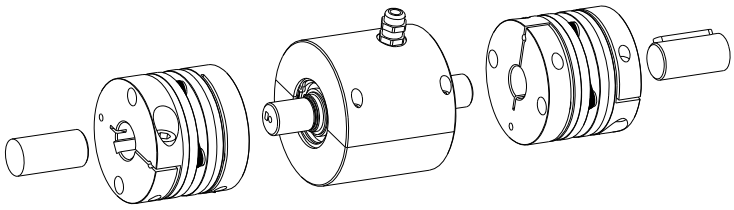


Illustration 7: Assembly of clamping hubs

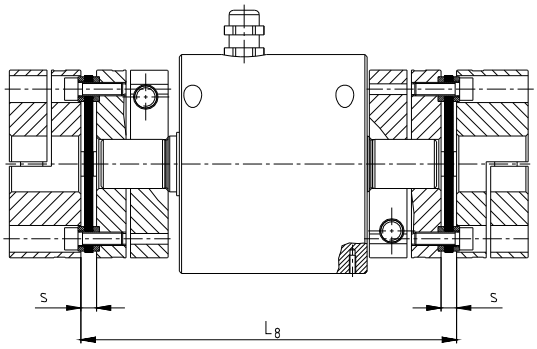


Illustration 8: Adjusting to dimension s and L_8

C A U T I O N !
With the assembly please make sure that the dimension s or L_8 (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 at the tightening torques T_A specified in table 5.

C A U T I O N !
The frictionally engaged transmittable torques of the clamping hubs depend on the bore diameter.

4 Assembly

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

Table 5:

DATAFLEX® size	22/20	22/50	22/100
RADEX®-NC size	25	35	
Clamping screw M	M8	M10	
Tightening torque T_A [Nm]	25	49	
Bore and transmittable torques of clamping hubs [Nm]			
Ø15	81.7		
Ø16	82.9		
Ø17	84.2		
Ø18	85.4	153.3	
Ø19	86.6	155.2	
Ø20	87.9	157.2	
Ø21	89.1	159.2	
Ø22	**90.3**	**161.1**	
Ø23	91.6	163.1	
Ø24	92.8	165.1	
Ø25	94.1	167.0	
Ø26	95.3	169.0	
Ø27	96.5	171.0	

DATAFLEX® size	22/20	22/50	22/100
RADEX®-NC size	25	35	
Clamping screw M	M8	M10	
Tightening torque T_A [Nm]	25	49	
Bore and transmittable torques of clamping hubs [Nm]			
Ø28	97.8	172.9	
Ø29	99.0	174.9	
Ø30	100.2	176.9	
Ø31	101.5	178.8	
Ø32	102.7	180.8	
Ø33	104.0	182.7	
Ø34	105.2	184.7	
Ø35	106.4	186.7	
Ø36		188.6	
Ø37		190.6	
Ø38		192.6	
Ø39		194.5	
Ø40		196.5	

4.6 Advice for assembly of the RADEX®-NC coupling

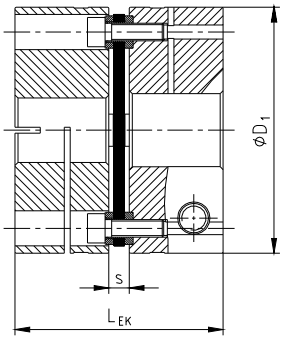


Illustration 9: Assembly of coupling

Table 6:

DATAFLEX® size	22/20	22/50	22/100
RADEX®-NC size	25	35	
Assembly dimensions			
Dimension s	5	7	
Dimension D_1	70	84	
Dimension L_{EK}	69	77	
Screws of lamina set			
Thread size	M6	M6	
Tightening torque T_A [Nm]	14	14	

4.7 Advice for assembly of the DATAFLEX® torque measuring shaft

- **Fixing the housing**

C A U T I O N !
The housing must be protected from rotation. For this purpose there is a thread size M4 at the bottom side. Please make absolutely sure to avoid a rigid fixing of the housing!

C A U T I O N !
Opening the housing is not required and may cause damage to the measurement shaft.

- **Degree of protection**
  All DATAFLEX® measuring shafts of type 22 correspond to the Protection IP50 according to DIN EN 60529.

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

- **Calibration**
  The transmitter is calibrated when being supplied. We recommend to inspect calibration every six months.

4 Assembly

4.8 Technical description

1. General description

All of the electronic measuring equipment is mounted in the fixed housing so that no additional equipment is needed to send the signal. The measuring shaft can be wired by the connection housing DF2 available as accessory or manually by the 15-pole High Density Sub-D coupling (for connection diagram see table 7). The measurement system includes three measurement outputs which the analog output values for torque and speed can be tapped from. The current operating condition is displayed via two digital outputs while two digital inputs can be used for calibration.

☞ **A T T E N T I O N !**
The measuring shaft should not be switched on before all connections have been properly connected. After initial switch-on the measuring shaft will need about 5 minutes until this warm-up period is finished and the measurement device will have its standard accuracy.

2. Pin assignment of plug - measuring shaft

Table 7: Pin assignment of D-Sub-connection

Connection		Sub-D-Pin	Characteristic
Input operating voltage			
Supply voltage +	$24V_{IN}$	14	24 V DC ± 4 V / 100 mA
Supply voltage -	GND	15	
Torque output			
Output voltage +	U_{OUT}	11	0 ... 10 V (R_A = 1 kΩ)
Output voltage -	GND	6	
Output current +	I_{OUT}	1	4 ... 20 mA ($R_A \leq 500\ \Omega$)
Output current -	I_{OUT-}	2	
Speed output			
Output Speed +	DRZ	12	24 V / 60 pulses/rev. / 5 mA
Output Speed -	GND	13	
LED Output			
Program-LED	U_{LED1+}	10	5 V / 5 mA prepared for LED
	U_{LED1-}	9	
Fault Signal	U_{LED2+}	5	24 V / 5mA prepared for LED
	GND	15	
Calibration Input			
Auto-Offset	T1	8	Active on connection with GND (Pin 15)
Program	T2	3	

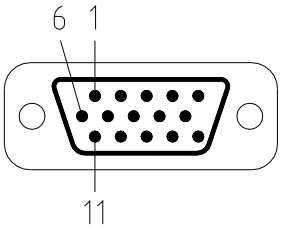


Illustration 10: Plug-in connection DATAFLEX®

4 Assembly

4.8 Technical description

3. Connection housing DF2

The connection housing DF2 has 12 screw terminals for power supply, display equipment and switches.
The torque signal is displayed as proportional direct voltage from 0 … 10 V and as current from 4 … 20 mA.
For speed output a square wave signal and a scalable voltage signal is available (for pin configuration see table 8).
The switch T1 serves for programming and can be bridged externally from GND via the terminal 12 (T1).

Table 8: Pin assignment of the connection housing DF2

No.	Description	Function	Features
		Input operating voltage	
10	24V	Supply voltage +	24 V DC ± 4 V / 100 mA
11	GND	Supply voltage -	
		Torque output	
4	M-U	Output voltage +	0 V ... 10 V (R_A = 1 kΩ)
5	GND	Ground torque output	
6	M-I	Output current	4 mA … 20 mA
		Speed output pulse signal	
7	N1	Speed output channel 1	HTL (24V, 60 pulses /rev.) TTL (5V, 60 pulses /rev.)
8	GND	Ground for pulse speed output	
9	N2	Without function	
		Speed output DC-voltage	
1	R/L	Without function	
2	GND	Ground for DC speed output	
3	N-U	Speed output DC-voltage	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	Push button T1, T2	Push button for programming
15	TP	Switch low pass filter	On/off switch low-pass
16	-	Connection measuring shaft	1:1 Connection cable
17	-	Switch for speed scaling	see table 12

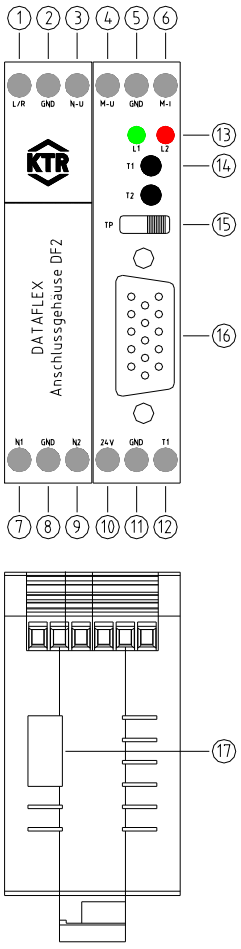


Illustration 11:
Connection housing DF2

4. Description of connections

a) Supply voltage 24V

The supply voltage is 24V DC with a maximum current consumption of 100 mA.

b) Torque output U, I

To record the torque a voltage and a current output are available. Both outputs can be used at the same time.

4 Assembly

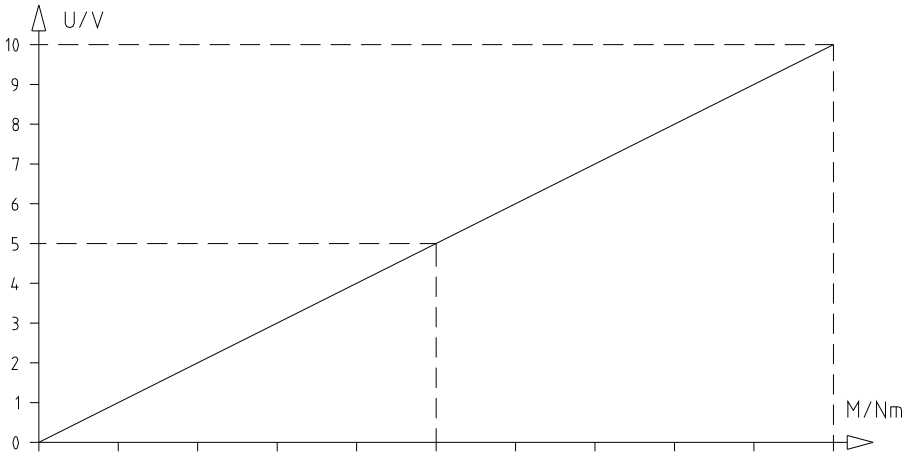
4.8 Technical description

Table 9: Assignment of torque - output values

DATAFLEX® size	ΔU / ΔM	ΔI / ΔM
22/20	2.5 V / 10 Nm	4 mA / 10 Nm
22/50	1 V / 10 Nm	1.6 mA / 10 Nm
22/100	0.5 V / 10 Nm	0.8 mA / 10 Nm

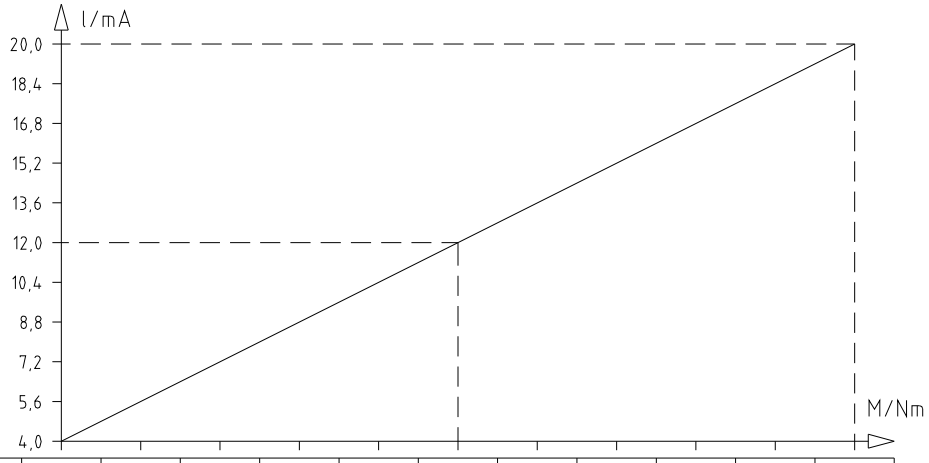
The characteristic curves of the output are shown in illustration 12.1 and 12.2.

The characteristic curves of the output values (see illustration 12.1 and 12.2)



DATAFLEX 22/20	-20	-16	-12	-8	-4	0	4	8	12	16	20
DATAFLEX 22/50	-50	-40	-30	-20	-10	0	10	20	30	40	50
DATAFLEX 22/100	-100	-80	-60	-40	-20	0	20	40	60	80	100

Illustration 12.1: Assignment of voltage to torque



DATAFLEX 22/20	-20	-16	-12	-8	-4	0	4	8	12	16	20
DATAFLEX 22/50	-50	-40	-30	-20	-10	0	10	20	30	40	50
DATAFLEX 22/100	-100	-80	-60	-40	-20	0	20	40	60	80	100

Illustration 12.2: Assignment of current to torque

4 Assembly

4.8 Technical description

- **Filter voltage output (No. 15)**

If the connection housing DF2 is used, the signal of the voltage output can be filtered.

Table 10: Low pass button (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 13) inside the connection housing:

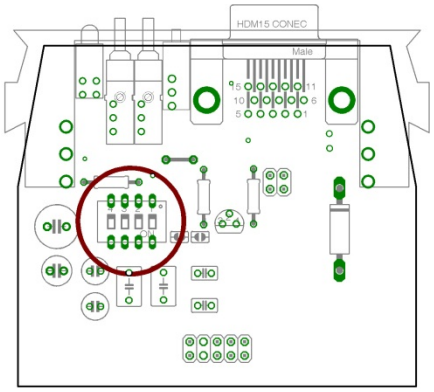


Illustration 13: Location of DIP switch

Table 11: Adjustment of the requested filter frequency

Limit frequency [Hz]	Switch 1	Switch 2	Switch 3	Switch 4
15000	**OFF**	**OFF**	**OFF**	**OFF**
1000	OFF	OFF	OFF	**ON**
100	OFF	OFF	**ON**	OFF
10	OFF	**ON**	OFF	OFF
1	**ON**	OFF	OFF	OFF

A filter frequency of 1000 Hz is preset.

c) Output speed N1 (No. 7)

To record the speed a square wave signal with a frequency of 60 pulses per revolution is available. The voltage level is 24 volts.

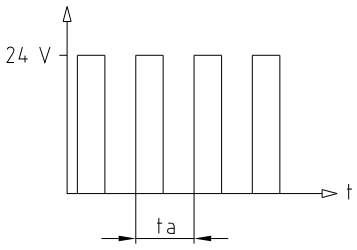


Illustration 14

Speed (rpm) = 1 / ta(s)

Speed (rpm) = f (1/s)

4 Assembly

4.8 Technical description

Output circuit (connection N1)

The speed output N1 has short-circuit-proof push-pull amplifier 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 15).

The output voltage of speed lines can be amended by modifying the jumper position in the connection housing to 5V level (see illustration 16).

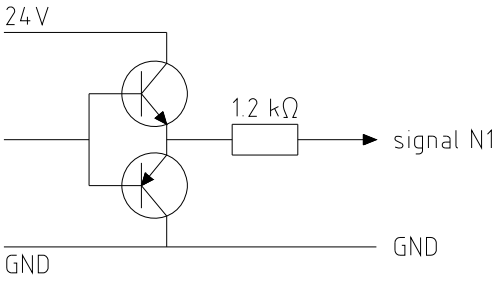


Illustration 15: Output circuit of speed outputs

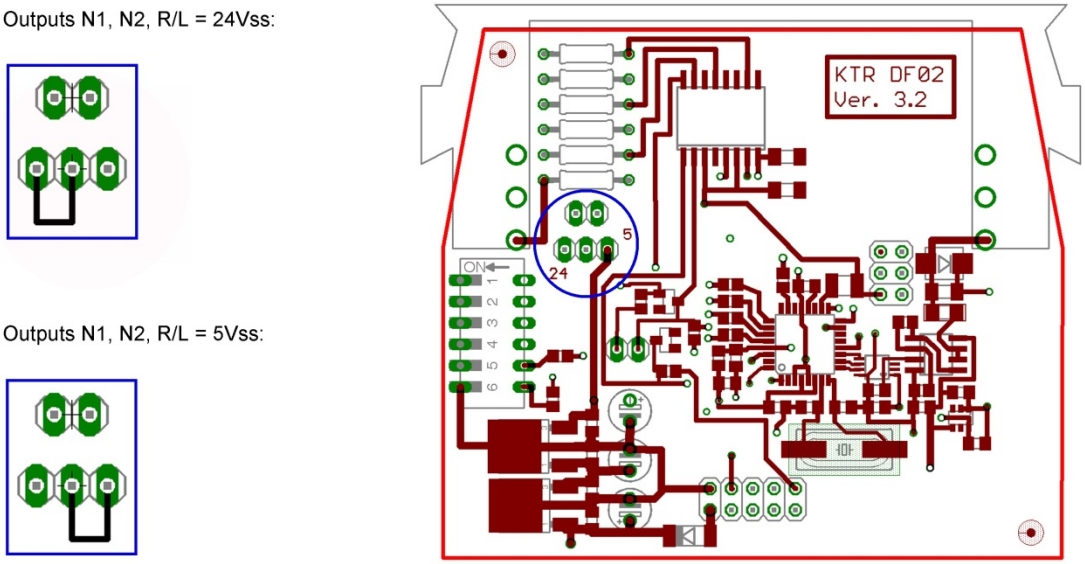


Illustration 16: Modification of voltage level for the speed signal

d) Outputs N-U

The KTR connection housing DF02 has an integrated f/U converter which converts the square wave signals of the encoder into a linear DC-voltage output (terminal N-U).
On the bottom side of the connection housing DF02 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 9 and 17).

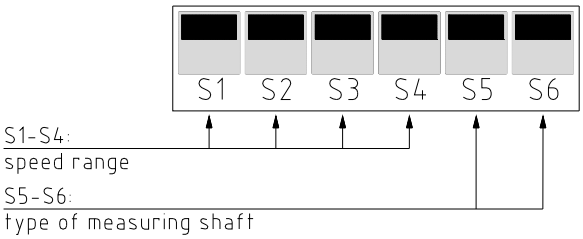


Illustration 17: Switch positions

4 Assembly

4.8 Technical description

Scaling of the speed direct voltage output

Table 12: 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

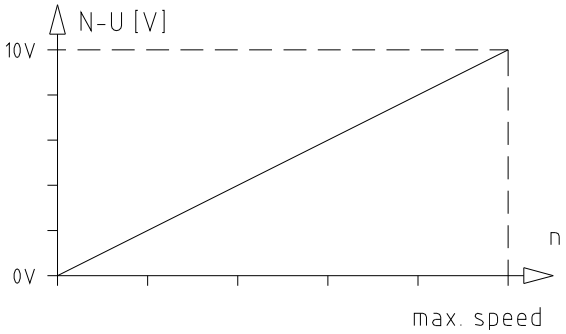


Illustration 18

Table 13: Selection of DATAFLEX® series

DATAFLEX® type	S5	S6
DATAFLEX® 22, 42, 85, 140	0	0
DATAFLEX® 16	1	1
DATAFLEX® 32	0	1

e) Digital input and output

All parameters for calibrating the measuring shaft are stored electronically and can be changed by operating the external calibration input T1 and T2. As realized in the connection housing DF2, the connections of the LED output and the calibration input are wired as shown in illustration 19 (see table 7).

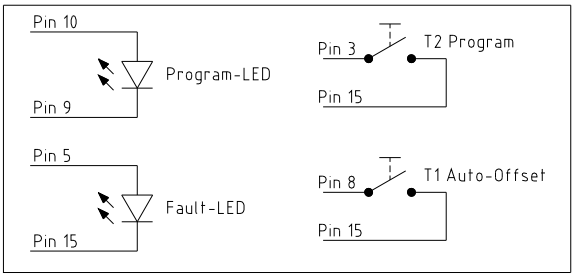


Illustration 19

LED 1 (Program)

For calibrating the measuring shaft the factors for amplification and offset can be set in steps. According to the procedure described in chapter 4 *calibration,* the PROGRAM-LED displays a change in the mode of operation.

LED 2 (Error) / Error signal

The perfect operation of the measuring system is permanently inspected.
An electronic failure is displayed by an error signal. If an error is shown permanently in spite of short-term current interruption, the measuring system is damaged and must be returned to KTR.

4 Assembly

4.8 Technical description

Table 14:

Condition	LED 2
Normal Operation	OFF
Error	ON

Automatic offset - correction

If an incorrect value is displayed during torqueless state (≠ 5.0V), an automatic offset alignment can be performed by pressing the button **T1-Auto-Offset**.
For this purpose the torque is reduced to 0 and the button **T1-AUTO-OFFSET** must be pressed for 2 seconds.
After successful alignment the saving of the new values is confirmed by 6 times blinking of the program LED and the standard measuring operation is continued automatically.
For an easy connection in control systems the Auto-Offset-Connection is accessible in the connection housing DF2 (No. 12).

5. Calibration (Manual adjustment of amplification and offset)

☞ **A T T E N T I O N !**
The measurement shaft is delivered in calibrated state.
We recommend to inspect the calibration every six months.

The amplification defines the correct assignment between the torque and the output voltage as well as the output current. It influences the incline of the curves shown in illustration 12.1 and 12.2. The displacement of the curves in vertical direction depends on the offset alignment.
Both parameters can be set and saved permanently one after another (see illustration 20).

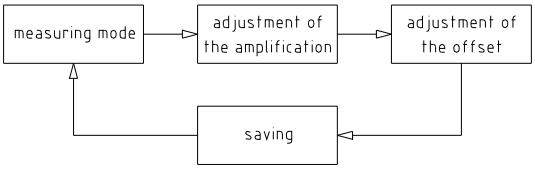


Illustration 20: Flow of manual setting

Instructions for a new calibration:

1. Press the button of **T2-Program** for 2 seconds. The PROGRAM-LED will blink two times. An adjustment of the **amplification factor** is possible now.
2. The measurement shaft is now alternately loaded and unloaded at a defined torque. The **difference** between the output values should be compared to the **actual difference** between load and load relieving.
3. Pressing the button **T1-AUTO-OFFSET** shortly allows to amend the amplification factor roughly, while a fine-tuning adjustment of the amplification factor can be made pressing the button **T2-PROGRAM** shortly. One after the other all amplification factors can be adjusted (see illustration 21.1).
4. If the **difference** of the displayed measurement values with load and load relieving complies with the outside torque **difference**, the adjustment of amplification is completed.
5. Press the button **T2-Program** for 2 seconds. The PROGRAM-LED will blink 4 times. The **manual offset setting** can start now.
6. As described in point 3 the keys can be pressed **quickly** to set all of the values (see illustration 21.2). With a torqueless state the measurement shaft should be adjusted to an output voltage of 5.0V or rather an output current of 12.0 mA.
7. When the offset adjustment is completed, pressing the button **T2-PROGRAM** for two seconds shortly will **save** the new parameters. The PROGRAM-LED will blink one time. The measuring shaft is in its **standard operating mode** again.

4 Assembly

4.8 Technical description

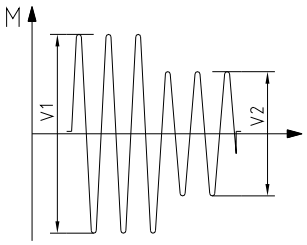


Illustration 21.1

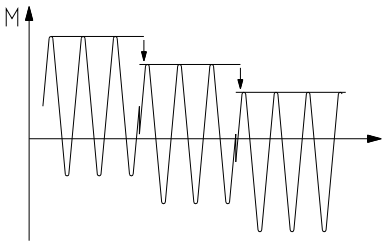


Illustration 21.2

C A U T I O N !
With saving the old data are overwritten.

A T T E N T I O N !

- **The calibration can be interrupted if the measurement device is switched off short-term and then switched on again. The parameters saved previously are reproduced.**
- **The safe measurement operation can be carried out on completion of saving (item 7) or on completion of interrupting the power supply.**
- **After saving the new parameters (item 7) the parameters are preserved even after interruption of the power supply.**

4.11 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.

A T T E N T I O N !
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.

5 EC Certificate of conformity

EC Certificate of conformity

The manufacturer - KTR Kupplungstechnik GmbH, D-48432 Rheine - states that the

DATAFLEX® torque measuring shaft

described in the present operating instructions is in accordance with the following standard:

2004/108/EG council directive of 15th December 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing directive 89/336/EEC.

Standards applied:

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

Rheine, Place — 28.05.2013 Date

i. V. Reinhard Wibbeling, Head of Engineering

i. V. Jürgen Kösters, Product Manager