Properties of torque measuring shafts

DATAFLEX® 16, 32, 42, 70, 110 - High precision with each revolution

With the new size of DATAFLEX® 110 KTR extend their range of precision measuring shafts for bigger torques. Along with the established sizes of DATAFLEX® 16 to DATAFLEX® 75 measuring ranges from 10 Nm to 20,000 Nm are covered.
With the new series the torque is measured using the approved technology of wire strain gauges DMS while processing contactlessly with a revolution of 24 bit. Thus, the inaccuracy of torque measuring is reduced to less than 0.1 % of the measuring range. By integrating a high-resolution speed sensor the new series combines four measurements in one: Measuring the torque, speed, rotation angle and rotation direction is part of the standard equipment.

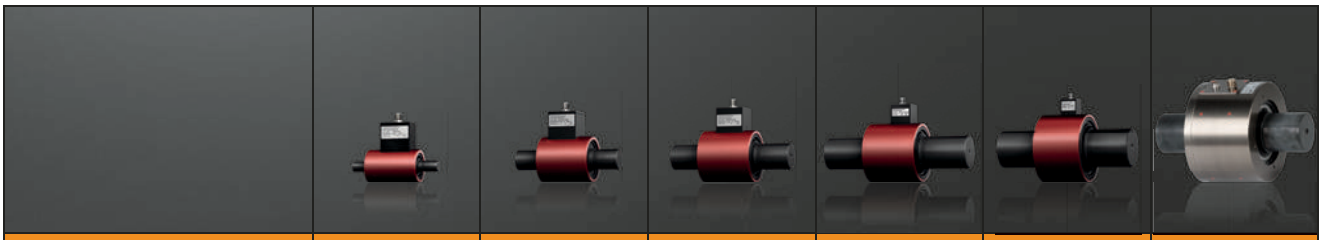
DATAFLEX® 140 - Patented technology at top prices

The DATAFLEX® torque measuring shafts size 140 measure the torque contactlessly and free from wear. Their secret is a patented measuring method sensing twisting of the torsion shaft by light quantity measurement. Here the light is directed through two disks the transparency of which changes proportionately to the torque. The overall electronics are installed in a stationary housing to make sure that no signals have to be transmitted by the rotating shaft and the torque is available completely with a high band width of 16 kHz. This allows to measure and analyze highly dynamic processes accurately.
The analog output values are available both as a voltage signal from 0 - 10 V and as a current signal from 4 - 20 mA. In addition a speed encoder is fitted as a standard providing a signal at a resolution of 60 pulses per revolution.

Couplings adjusted to every application

Matching with all series of DATAFLEX® we recommend to use the servo lamina coupling RADEX®-NC and the steel lamina coupling RADEX®-N. Together they form a compact solution which is easy to integrate while having a high stiffness. Basically it is also possible to use backlash-free, plug-in types of couplings such as ROTEX® GS or to fit an overload coupling.

Product finder of torque measuring shafts



Product	DATAFLEX® 16	DATAFLEX® 32	DATAFLEX® 42	DATAFLEX® 70	DATAFLEX® 110	DATAFLEX® 140
Maintenance-free	●	●	●	●	●	●
For rotating applications	●	●	●	●	●	●
Torque range T_{KN} [Nm]	10, 30, 50	100, 300, 500	1000	3000, 5000	10000, 20000	50000
Measuring inaccuracy [% of final value]	0.1	0.1	0.1	0.1	0.1	1
Torque output	-10 … 10 V	-10 … 10 V	-10 … 10 V	-10 … 10 V	-10 … 10 V	0 … 10 V, 4 … 20 mA
Speed output						
Square-wave signal [pulses/rev.]	2 x 360	2 x 720	2 x 720	2 x 450	2 x 720	1 x 60
DC - direct voltage signal [0 ... 10V]	●	●	●	●	●	●
Direction signal	●	●	●	●	●	–
Maximum speed [rpm]	10,000	7,500	6,500	4,000	3,000	2,000
Coupling recommended	RADEX®-NC 20, 25	RADEX®-N 42, 60	RADEX®-N 80	RADEX®-N 90, 115	as specified	as specified
Connection housing DF2	●	●	●	●	●	●

Connection housing DF2 - All Inclusive

The connection housing DF2 can easily be combined with all DATAFLEX® torque measuring shafts disposing of a retainer for top hat rail assembly as well as terminal screws for an easy connection of external devices.
The following features save the purchase of expensive measuring amplifiers and converters:

- The torque output can be filtered over 5 steps so that short torque peaks in the display can be reduced.
- The pulsed outputs of the speed signals can be configured both for 5V (TTL) and 24V (HTL) controls. This makes the outputs compatible with data logging boards and SPS controls.
- In parallel with the pulse signal an integrated frequency voltage converter supplies a DC voltage from 0 – 10 V proportionally to the speed, the scaling of which can be individually adapted. This makes an expensive counter superfluous so that the signal can either be processed as a voltage or displayed.
- A direction signal indicates the rotational direction of the drive (with DATAFLEX® 16, 32, 42, 70 and 110).

DATAFLEX® 16/10, 16/30, 16/50
Torque measuring shafts

For torques from 10 to 50 Nm

General properties				
Type of DATAFLEX®	Rated torque T_{KN} [Nm]	Supply voltage [V]	Current consumption [mA]	Operating temperature range [°C]
16/10	-10 ... +10			
16/30	-30 ... +30	24 ±4	<100	0 ... 55
16/50	-50 ... +50			

Technical data of torque signal					Technical data of speed signal				
Type of DATAFLEX®	Inaccuracy [1, 2] [%]	Output voltage [V]	Band width [kHz]	Influence of temperature [1] [%/10 °C]	Resolution [pulses/rev.]	Number of channels	Square-wave signal [3] [Vss]	Direct voltage signal [3] [V]	Direction signal [3] [V]
16/10									
16/30	<0.1	-10 ... 10	2	0.05	360	2. 90° offset	5/24	0 ... 10, scalable	5/24
16/50									

Mechanical data of torque measuring shaft										
Type of DATAFLEX®	Static load limit [1] $T_{K\,max}$ [%]	Breaking load $T_{K\,break}$ [1] [%]	Max. bending torque [Nm]	Max. radial force [N]	Max. axial force [kN]	Weight [kg]	Torsion spring stiffness C_T [Nm/rad]	Torsion angle with T_{KN} [°]	Mass moment of inertia [kgmm²]	Max. speed [rpm]
16/10			1.07	12	1.1		910	0.63		
16/30	150	300	3.2	37	2.3	0.7	2840	0.61	22.6	10000
16/50			5.3	61	3.1		4100	0.7		

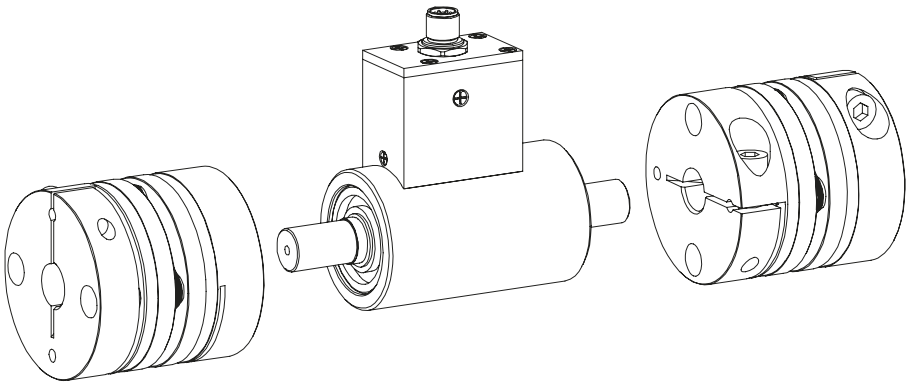
Mechanical data of combination DATAFLEX® 16 and RADEX®-NC							
Type of DATAFLEX®	Coupling			Mechanical data of combination			
	RADEX®-NC size	Clamping screw M		Mass moment of inertia [kgmm²]	Torsion spring stiffness C_T [Nm/rad]	Weight [kg]	Max. speed [4] [rpm]
		M	T_A [Nm]				
16/10	20	M6	10	330.5	860	1.30	
16/30	25	M8	25	809	2600	1.75	7500
16/50					3600	1.75	

[1] Referring to rated torque T_{KN}
[2] Error in linearity incl. hysteresis
[3] See page 332: with connection housing DF2
[4] Higher speed on request; with high speeds please use coupling hubs that are balanced

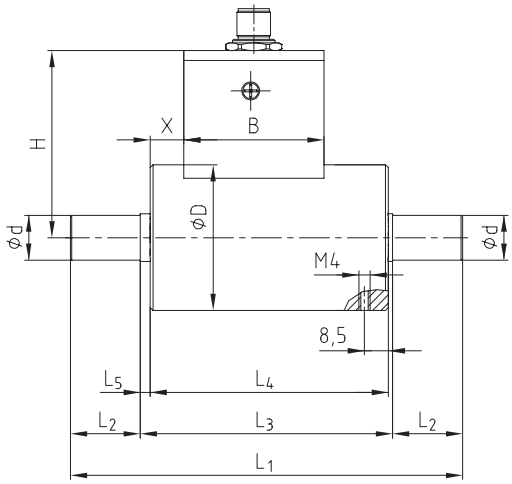
Ordering example:

DATAFLEX® 16/30	DF2	2 m, 5 m and 10 m	RADEX®-NC 25 EK Ø16/20-Ø16/30
Type of measuring shaft with measuring range	Connection housing (is required)	Connection cable	If accessories are requested: coupling type, finish bores d/d_1-d/d_2

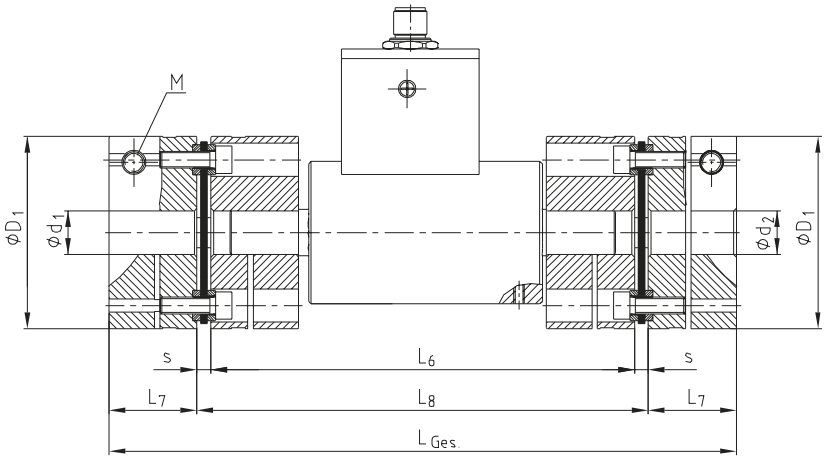
Components



DATAFLEX® 16



Combination of DATAFLEX® 16 with RADEX®-NC



Dimensions [mm] of torque measuring shaft and coupling combination																		
Type of DATAFLEX®	d	D	L_1	L_2	L_3	L_4	L_5	H	B	X	RADEX®-NC size	D_1	d_1/d_2 max.	s	L_6	L_7	L_8	L_{total}
16/10	16	52	140	25	90	85	3.5	67	50	12	20	59	25	4	138	24	146	194
16/30											25	70	35	5	154	32	164	228
16/50																		

DATAFLEX® 32/100, 32/300, 32/500
Torque measuring shafts

For torques from 100 to 500 Nm

General properties				
Type of DATAFLEX®	Rated torque T_{KN} [Nm]	Supply voltage [V]	Current consumption [mA]	Operating temperature range [°C]
32/100	-100 ... +100	24 ±4	<100	0 ... 55
32/300	-300 ... +300			
32/500	-500 ... +500			

Technical data of torque signal					Technical data of speed signal				
Type of DATAFLEX®	Inaccuracy [1, 2] [%]	Output voltage [V]	Band width [kHz]	Influence of temperature [1] [%/10 °C]	Resolution [pulses/rev.]	Number of channels	Square-wave signal [3] [Vss]	Direct voltage signal [3] [V]	Direction signal [3] [V]
32/100								0 ... 10, scalable	
32/300	<0.1	-10 ... 10	2	0.05	720	2. 90° offset	5/24		5/24
32/500									

Mechanical data of torque measuring shaft										
Type of DATAFLEX®	Static load limit [1] $T_{K\,max}$ [%]	Breaking load $T_{K\,break}$ [1] [%]	Max. bending torque [Nm]	Max. radial force [N]	Max. axial force [kN]	Weight [kg]	Torsion spring stiffness C_T [Nm/rad]	Torsion angle with T_{KN} [°]	Mass moment of inertia [kgmm²]	Max. speed [rpm]
32/100			11	110	5.0		18000	0.32	219	
32/300	150	300	32	320	10.4	1.9	46000	0.37	221	7500
32/500			53	530	14.6		60000	0.48	224	

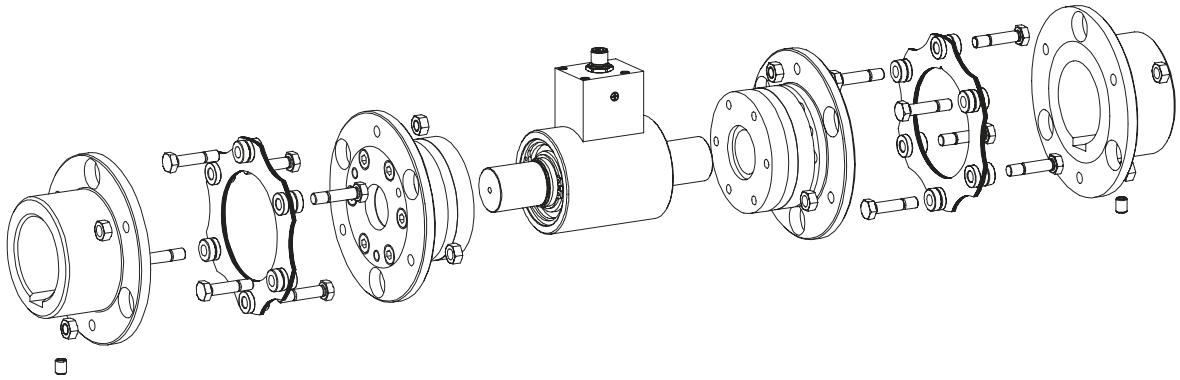
Mechanical data of combination DATAFLEX® 32 and RADEX®-N								
Type of DATAFLEX®	Coupling				Mechanical data of combination			
	RADEX®-N size	Setscrew			Mass moment of inertia [kgmm²]	Torsion spring stiffness C_T [Nm/rad]	Weight [kg]	Max. speed [4] [rpm]
		G	t	T_A [Nm]				
32/100	42	M8	20	10	5900	16000	6.95	7500
32/300	60				17900	40000	11.65	6700
32/500						49000	11.70	

[1] Referring to rated torque T_{KN}
[2] Error in linearity incl. hysteresis
[3] See page 332: with connection housing DF2
[4] Higher speed on request

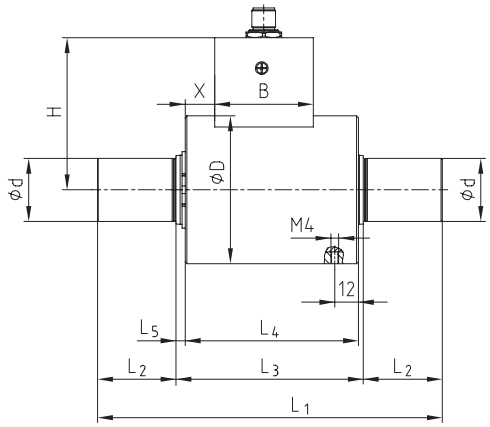
Ordering example:

DATAFLEX® 32/300	DF2	2 m, 5 m and 10 m	RADEX®-N 60 NN Ø32/50NnD Ø32/60NnD
Type of measuring shaft with measuring range	Connection housing (is required)	Connection cable	If accessories are requested: coupling type, finish bores d/d_1-d/d_2

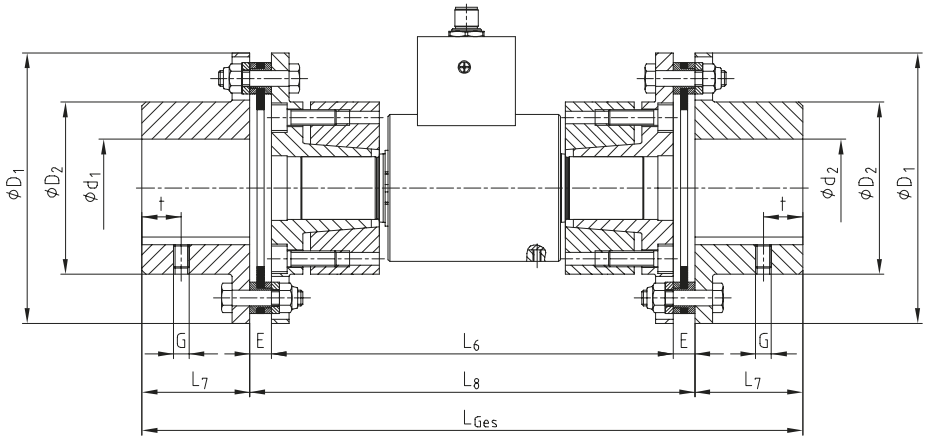
Components



DATAFLEX® 32



Combination of DATAFLEX® 32 with RADEX®-N



Dimensions [mm] of torque measuring shaft and coupling combination																		
Type of DATAFLEX®	d	D	L_1	L_2	L_3	L_4	L_5	H	B	X	RADEX®-N size	D_1	D_2	d_1/ d_2 max.	E	L_6	L_7	L_8	L_{total}
32/100	32	75	175	40	95	88	4.5	77.3	50	15	42	104	68	42	10	185	45	205	295
32/300											60	138	88	60	11	205	55	227	337
32/500																			

DATAFLEX® 42/1000
Torque measuring shafts

For torques up to 1000 Nm

General properties				
Type of DATAFLEX®	Rated torque T_{KN} [Nm]	Supply voltage [V]	Current consumption [mA]	Operating temperature range [°C]
42/1000	-1000 ... +1000	24 ±4	<100	0 ... 55

Technical data of torque signal					Technical data of speed signal				
Type of DATAFLEX®	Inaccuracy [1, 2] [%]	Output voltage [V]	Band width [kHz]	Influence of temperature [1] [%/10 °C]	Resolution [pulses/rev.]	Number of channels	Square-wave signal [3] [Vss]	Direct voltage signal [3] [V]	Direction signal [3] [V]
42/1000	<0.1	-10 ... 10	2	0.05	720	2. 90° offset	5/24	0 ... 10, scalable	5/24

Mechanical data of torque measuring shaft										
Type of DATAFLEX®	Static load limit [1] $T_{K\,max}$ [%]	Breaking load $T_{K\,break}$ [1] [%]	Max. bending torque [Nm]	Max. radial force [N]	Max. axial force [kN]	Weight [kg]	Torsion spring stiffness C_T [Nm/rad]	Torsion angle with T_{KN} [°]	Mass moment of inertia [kgmm²]	Max. speed [rpm]
42/1000	150	300	107	780	24	3.43	132000	0.43	710	6500

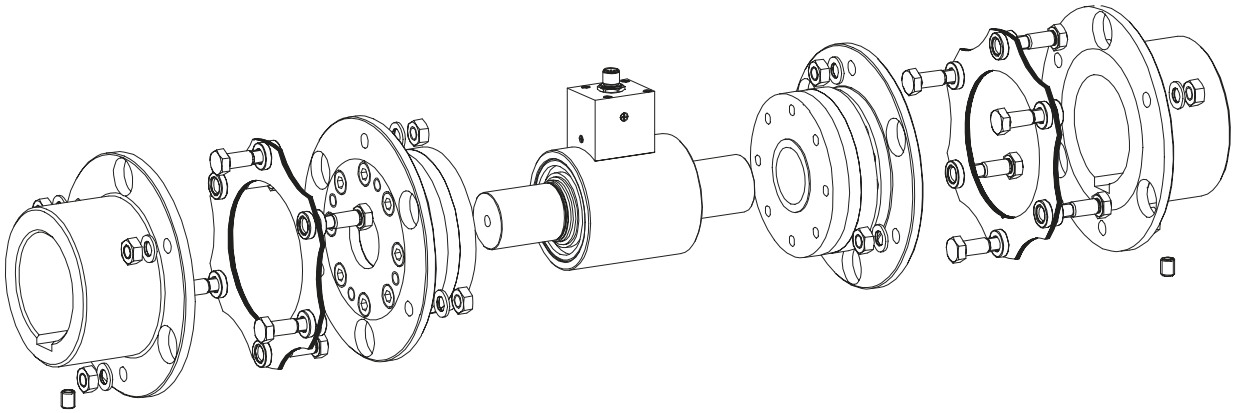
Mechanical data of combination DATAFLEX® 42 and RADEX®-N								
Type of DATAFLEX®	Coupling				Mechanical data of combination			
	RADEX®-N size	Setscrew			Mass moment of inertia [kgmm²]	Torsion spring stiffness C_T [Nm/rad]	Weight [kg]	Max. speed [rpm] [4]
		G	t	T_A [Nm]				
42/1000	80	M10	20	17	61000	107000	23.1	5100

[1] Referring to rated torque T_{KN}
[2] Error in linearity incl. hysteresis
[3] See page 332: with connection housing DF2
[4] Higher speed on request

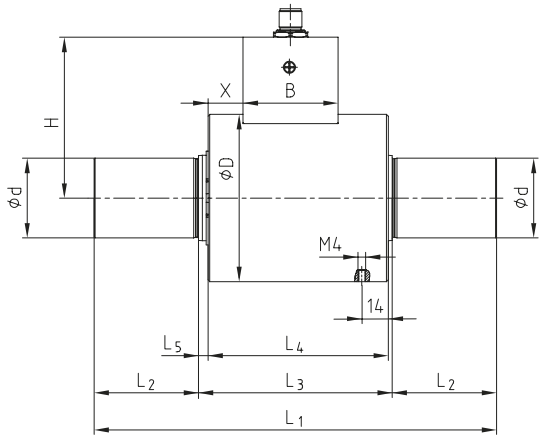
Ordering example:

DATAFLEX® 42/1000	DF2	2 m, 5 m and 10 m	RADEX®-N 80 NN Ø42/50NnD Ø42/60NnD
Type of measuring shaft with measuring range	Connection housing (is required)	Connection cable	If accessories are requested: coupling type, finish bores d/d_1-d/d_2

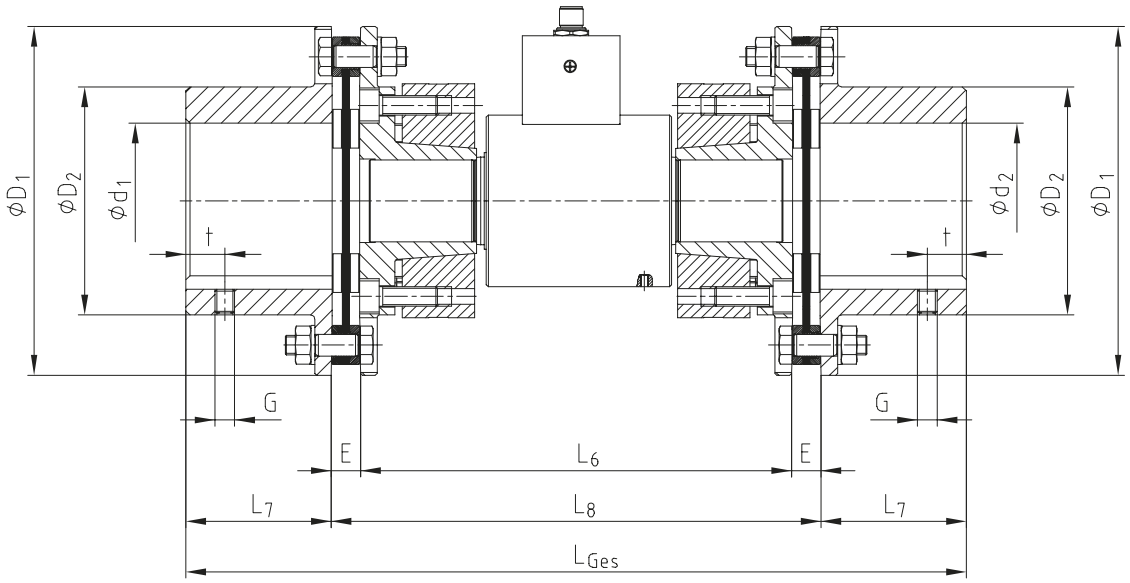
Components



DATAFLEX® 42



Combination of DATAFLEX® 42 with RADEX®-N



Dimensions [mm] of torque measuring shaft and coupling combination																			
Type of DATAFLEX®	d	D	L_1	L_2	L_3	L_4	L_5	H	B	X	RADEX®-N size	D_1	D_2	d_1/ d_2 max.	E	L_6	L_7	L_8	L_{total}
42/1000	42	88	212	55	102	95	5	84.7	50	18.5	80	179	117	80	14	222	75	250	400

DATAFLEX® 70/3000, 70/5000
Torque measuring shafts

For torques from 3000 to 5000 Nm

General properties				
Type of DATAFLEX®	Rated torque T_{KN} [Nm]	Supply voltage [V]	Current consumption [mA]	Operating temperature range [°C]
70/3000	-3000 ... +3000	24 ±4	<100	0 ... 55
70/5000	-5000 ... +5000			

Technical data of torque signal					Technical data of speed signal				
Type of DATAFLEX®	Inaccuracy [1] [%]	Output voltage [V]	Band width [kHz]	Influence of temperature [1] [%/10 °C]	Resolution [pulses/rev.]	Number of channels	Square-wave signal [2] [Vss]	Direct voltage signal [2] [V]	Direction signal [2] [V]
70/3000	< 0.1	-10 ... 10	2	0.05	450	2, 90° offset	5/24	0 ... 10, scalable	5/24V
70/5000									

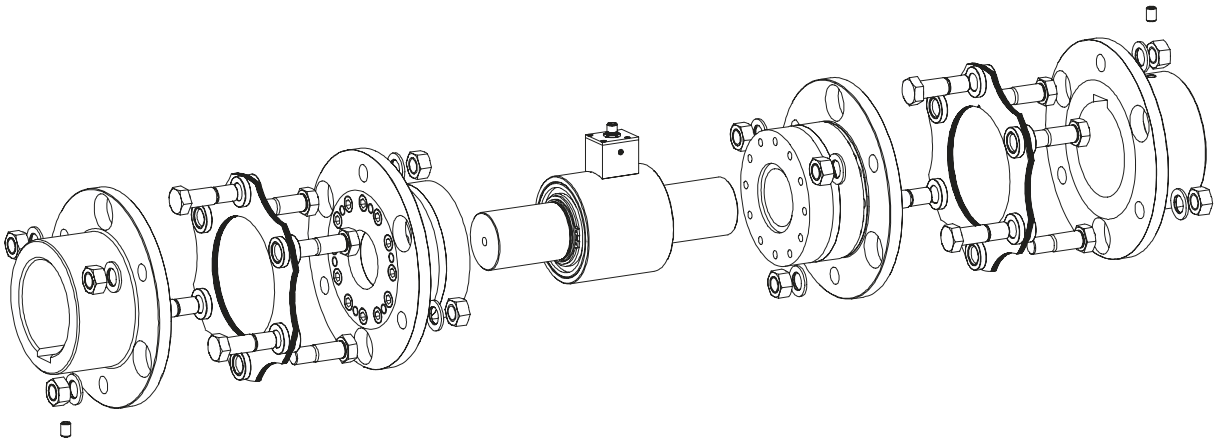
Mechanical data of torque measuring shaft										
Type of DATAFLEX®	Static load limit [1] $T_{K\,max}$ [%]	Breaking load $T_{K\,break}$ [1] [%]	Max. bending torque [Nm]	Max. radial force [N]	Max. axial force [kN]	Weight [kg]	Torsion spring stiffness C_T [Nm/rad]	Torsion angle with T_{KN} [°]	Mass moment of inertia [kgmm²]	Max. speed [rpm]
70/3000	150	300	320	1700	48	12.30	395000	0.44	7200	4000
70/5000			520	2800	66	12.45	500000	0.57	7300	

Mechanical data of combination DATAFLEX® 70 and RADEX®-N								
Type of DATAFLEX®	Coupling				Mechanical data of combination			
	RADEX®-N size	Setscrew			Mass moment of inertia [kgmm²]	Torsion spring stiffness C_T [Nm/rad]	Weight [kg]	Max. speed [rpm] [4]
		G	t	T_A [Nm]				
70/3000	90	M12	25	40	155200	283000	44.7	4000
70/5000	115		30		470000	389000	77.6	3400

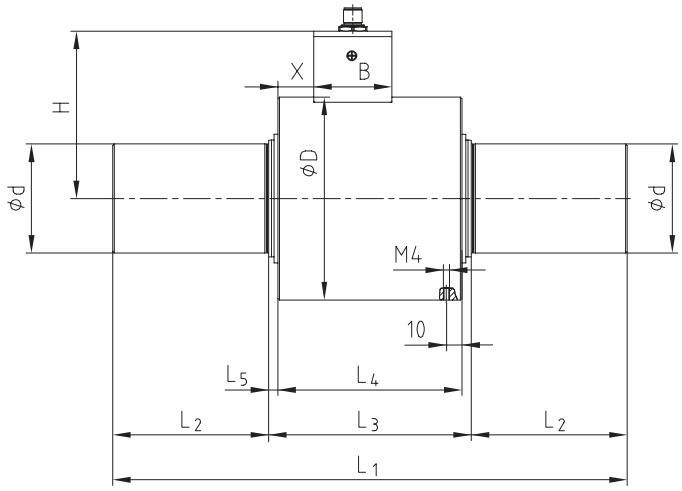
[1] Referring to rated torque T_{KN}
[2] See page 332: with connection housing DF2
[3] Higher speed on request

Ordering example:	DATAFLEX® 70/5000	DF2	2 m, 5 m and 10 m	RADEX®-N 115 NN Ø65/60NnD Ø65/70NnD
	Type of measuring shaft with measuring range	Connection housing (is required)	Connection cable	If accessories are requested: coupling type, finish bores d/d_1-d/d_2

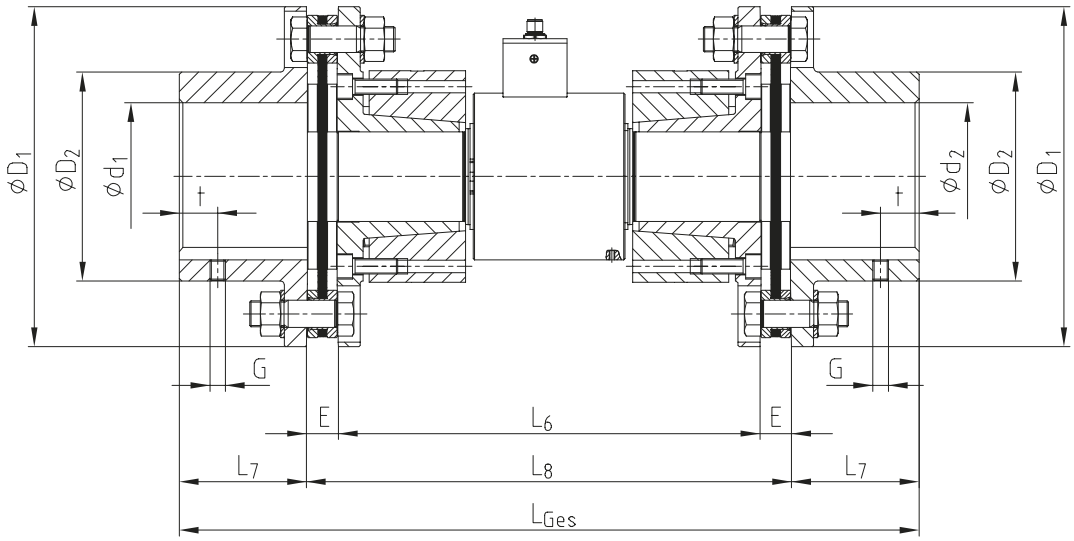
Components



DATAFLEX® 70



Combination of DATAFLEX® 70 with RADEX®-N

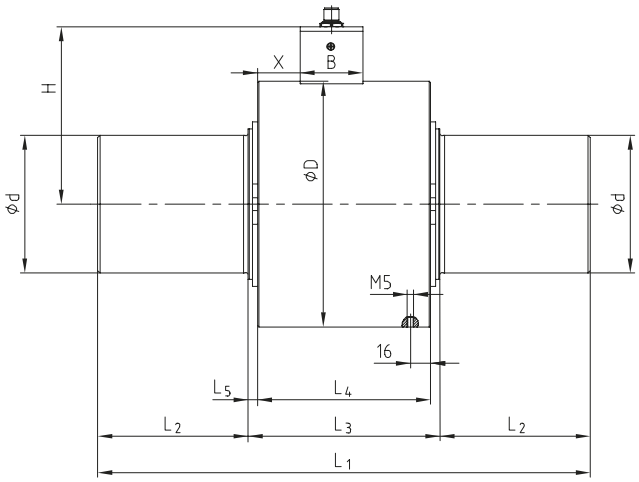


Dimensions [mm] of torque measuring shaft and coupling combination																			
Type of DATAFLEX®	d	D	L_1	L_2	L_3	L_4	L_5	H	B	X	RADEX®-N size	D_1	D_2	d_1/d_2 max.	E	L_6	L_7	L_8	L_{total}
70/3000	70	130	330	100	130	118	6	107.35	50	23	90	210	132	90	15	330	80	360	520
70/5000											115	265	163	115	23		100	376	576

DATAFLEX® 110/10000, 110/20000
Torque measuring shafts

For torques from 10000 to 20000 Nm

DATAFLEX® 110



General properties				
Type of DATAFLEX®	Rated torque T_{KN} [Nm]	Supply voltage [V]	Current consumption [mA]	Operating temperature range [°C]
110/10000	- 10000 ... + 10000	24 ±4	<100	0 ... 55
110/20000	- 20000 ... + 20000			

Technical data of torque signal					Technical data of speed signal				
Type of DATAFLEX®	Inaccuracy [1] [%]	Output voltage [V]	Band width [kHz]	Influence of temperature [1] [%/10 °C]	Resolution [pulses/rev.]	Number of channels	Square-wave signal [2] [Vss]	Direct voltage signal [2] [V]	Direction signal [2] [V]
110/10000	< 0.1	-10 ... +10	2	0.05	720	2, 90° offset	5/24	0 ... 10, scalable	5/24
110/20000									

Mechanical data of torque measuring shaft										
Type of DATAFLEX®	Static load limit [1] $T_{K\,max}$ [%]	Breaking load $T_{K\,break}$ [1] [%]	Max. bending torque [Nm]	Max. radial force [N]	Max. axial force [kN]	Weight [kg]	Torsion spring stiffness C_T [Nm/rad]	Torsion angle with T_{KN} [°]	Mass moment of inertia [kgmm²]	Max. speed [rpm]
110/10000	150	300	1033	4700	106	35.72	2270000	0.25	0.0562	3000
110/20000			2037	9300	166	36.20	3550000	0.32	0.0569	

Dimensions [mm] of torque measuring shaft										
Type of DATAFLEX®	d	D	L_1	L_2	L_3	L_4	L_5	H	B	X
110/10000	110	196	393	120	153	138	7.5	141.4	50	34
110/20000										

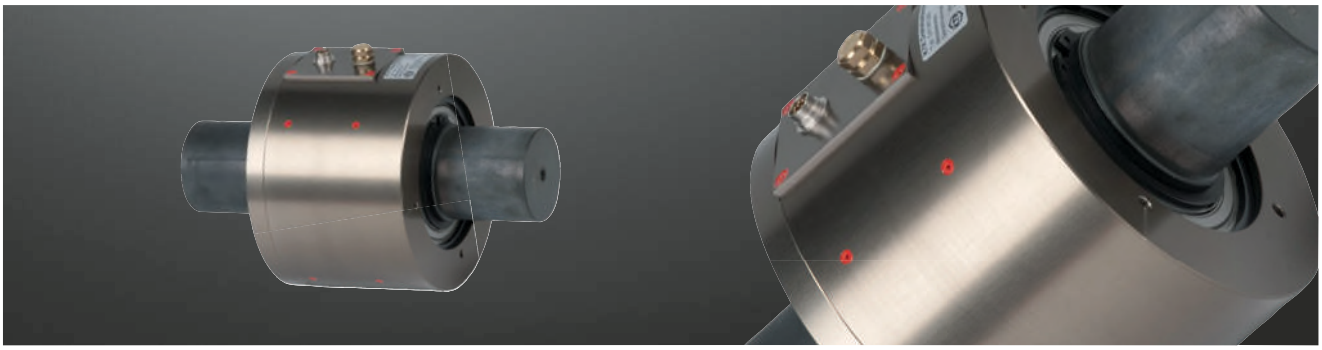
[1] Referring to rated torque T_{KN}
[2] See page 332: with connection housing DF2
[3] Higher speed on request

Ordering example:

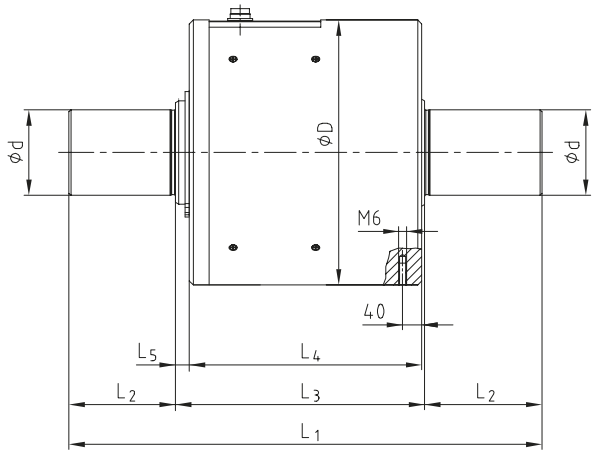
DATAFLEX® 110/10000	DF2	2 m, 5 m and 10 m
Type of measuring shaft with measuring range	Connection housing (is required)	Connection cable

DATAFLEX® 140/50000
Torque Measuring Shaft

For torques up to 50000 Nm



DATAFLEX® 140



General properties				
Type of DATAFLEX®	Rated torque T_{KN} [Nm]	Supply voltage [V]	Current consumption [mA]	Operating temperature range [°C]
140/50000	-50000 ... +50000	24 ±4	<100	0 ... 55

Technical data of torque signal						Technical data of speed signal				
Type of DATAFLEX®	Inaccuracy [1] [%]	Output voltage [V]	Output current [mA]	Band width [kHz]	Influence of temperature [1] [%/10 °C]	Resolution [pulses/rev.]	Number of channels	Square-wave signal [2] [Vss]	Direct voltage signal [2] [V]	Direction signal [2] [V]
140/50000	<±0.5	0 ... 10	4 ... 20	16	0.5	60	1	5/24	0 ... 10, scalable	–

Mechanical data of torque measuring shaft										
Type of DATAFLEX®	Static load limit [1] $T_{K\,max}$ [%]	Breaking load $T_{K\,break}$ [1] [%]	Max. bending torque [Nm]	Max. radial force [N]	Max. axial force [kN]	Weight [kg]	Torsion spring stiffness C_T [Nm/rad]	Torsion angle with T_{KN} [°]	Mass moment of inertia [kgmm²]	Max. speed [rpm]
140/50000	150	300	5500	16000	160	76.5	6750000	0.42	175000	2000

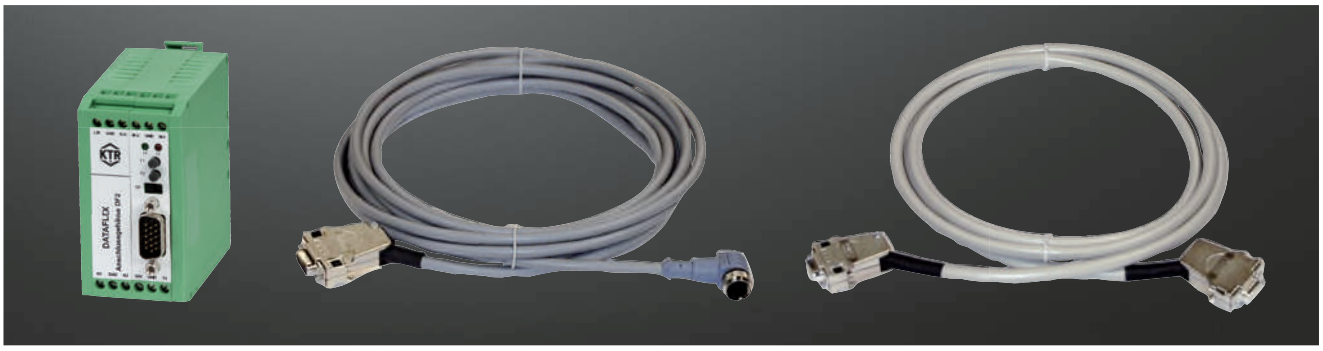
Dimensions [mm] of torque measuring shaft							
Type of DATAFLEX®	d	D	L_1	L_2	L_3	L_4	L_5
140/50000	140	280	486	140	206	191	13

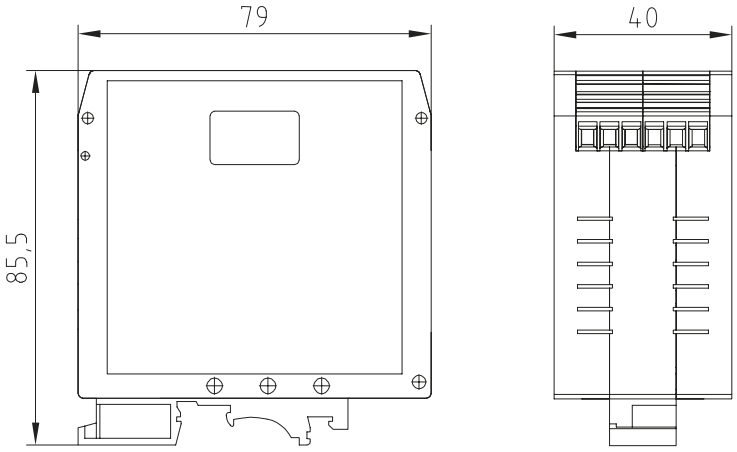
[1] Referring to rated torque T_{KN}
[2] See page 332: with connection housing DF2

Ordering example:

DATAFLEX® 140/50000	DF2	2 m, 5 m and 10 m
Type of measuring shaft with measuring range	Connection housing (is required)	Connection cable

Connection housing DF2 and connection cable





Connection cable and connection housing DF2							
Designation	Function	DATAFLEX® 16	DATAFLEX® 32	DATAFLEX® 42	DATAFLEX® 70	DATAFLEX® 110	DATAFLEX® 140
Connections DF2							
Input operating voltage							
24V	Supply voltage +	24 V DC ± 4V / 100mA max.					
GND	Supply voltage -						
Torque output							
M-U	Voltage output +	-10 V ... 10V					0 V ... 10 V
GND	Mass of torque output						
M-I	Current output	-	-	-	-	-	4 mA ... 20 mA
Pulsed output of speed							
N1	Pulsed output speed track 1	HTL, TTL (24V, 5V, 360 pulses/rev.)	HTL, TTL (24V, 5V, 720 pulses/rev.)	HTL, TTL (24V, 5V, 720 pulses/rev.)	HTL, TTL (24V, 5V, 450 pulses/rev.)	HTL, TTL (24V, 5V, 720 pulses/rev.)	HTL, TTL (24V, 5V, 1 x 60 pulses/rev.)
GND	Mass of pulsed output						
N2	Pulsed output speed track 2	HTL, TTL (24V, 5V, 360 pulses/rev.)	HTL, TTL (24V, 5V, 720 pulses/rev.)	HTL, TTL (24V, 5V, 720 pulses/rev.)	HTL, TTL (24V, 5V, 450 pulses/rev.)	HTL, TTL (24V, 5V, 720 pulses/rev.)	–
Speed of direct voltage output							
R/L	Direction signal speed	HTL, TTL (24V, 5V, CW = 1)					–
GND	Mass of direct voltage output speed						
N-U	Voltage output speed	0 V ... 10 V (scalable)					
Other connections / operating devices							
T1	Sensor T1 - connection	External sensor connection T1					
L1, L2	Signal LEDs	Condition monitoring					
T1, T2	Sensor T1, T2	Sensor for programming					
TP	Switch low pass	Filter for torque signal to be set in four stages					
Connection cable							
Lengths of connection cable		2, 5, 10 m, other lengths on request					