D2C
Designed to Customer

Reich

FLEXDUR - HighSpeed

Torsionally Rigid Coupling for Test Benches

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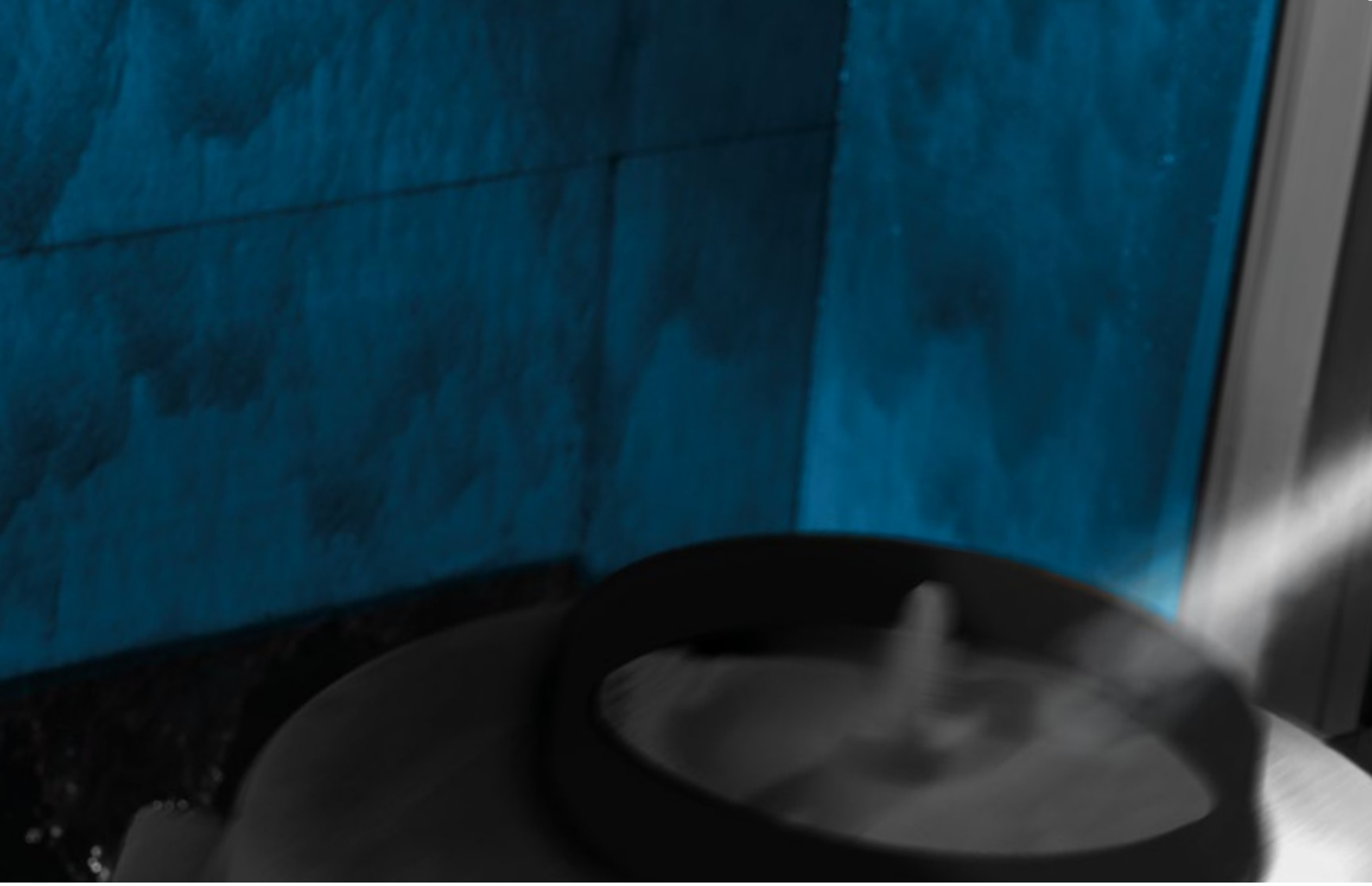
SIMPLY **POWERFUL.**



D2C – Designed to Customer

The guiding principle of Designed to Customer is the recipe for success behind REICH. In addition to the catalogue products, we supply our customers with couplings developed to their specific requirements. The designs are mainly based on modular components to provide effective and efficient customer solutions. The special nature of our close cooperation with our partners ranges from; consulting, development, design, manufacture and integration to existing environments, to customer-specific production, logistics concepts and after-sales service - worldwide.
This customer-oriented concept applies to both standard products and production in small batch sizes.

The company policy at REICH embraces, first and foremost, principles such as customer satisfaction, flexibility, quality, prompt delivery and adaptability to the requirements of our customers.

REICH supplies not only a coupling, but a solution:
Designed to Customer – SIMPLY **POWERFUL.**

D2C
Designed to Customer

FLEXDUR - HighSpeed

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FLEXDUR - HighSpeed

Torsionally Rigid Coupling for Test Benches

The FLEXDUR - HighSpeed (short form: FD-HS) All-metal couplings are developed and manufactured to the highest standards, especially for applications with higher speeds. The coupling uses bushed flexible disc packs of stainless spring steel as power transmitting elements. The special shape of the precision bushes results in a uniform tension distribution of the disc pack when assembled. The torque is transmitted backlash-free by means of high-strength fitting screws.

The disc pack is designed so that it combines high torque transmission capacity with suitability for high speeds; it has been specially designed for use in test benches. Nominal torques range from 320 Nm to 12 500 Nm. The permissible speeds are adapted to the requirements of the test specimens.

The FLEXDUR - HighSpeed has been designed with modular components. Therefore the coupling can be fitted to many different installation situations: As a torsionally rigid double-jointed coupling with two flexible disc packs it compensates for axial, radial and angular displacement and is therefore flexible in all directions.

Different mounting lengths are available as standard. For a completely backlash-free connection between shaft and hub, the FLEXDUR - HighSpeed is equipped as standard with clamping hubs as a shrink disc connection.

FLEXDUR - HighSpeed

Nominal torques from 320 Nm to 12 500 Nm

FLEXDUR - HighSpeed
Advantages

The salient attributes and advantages of the FLEXDUR - HighSpeed coupling:

- Torsionally rigid and backlash-free torque transmission
- Can be directly adapted to torque sensors
- Suitable for very high speeds
- Compensation of axial, radial and angular shaft displacements
- Small restoring forces at shaft displacement
- Low mass inertia due to high power density
- For use at ambient temperatures from -35 °C to +110 °C
- Neither maintenance, nor lubrication required
- Almost unlimited lifetime and wear-free at proper shaft alignment
- Modular type

FLEXDUR - HighSpeed

General Technical Data

Standard Type

Coupling size	Nominal torque	Impact torque	Maximum speed	Permissible displacement			Moment of inertia	Mass	Dynamic torsional stiffness
				Axial	Radial	Angular			
	T_{KN}	T_{Est}	n_{max} 1)	ΔK_a 4)	ΔK_r 4)	ΔK_w 4)	J 2)	m 2)	C_T 3)
	[Nm]	[Nm]	[min^{-1}]	[±mm]	[mm]	[°]	[kgm^2]	[kg]	[MNm/rad]
FD-HS 85-6	320	480	33 000	1.7	0.3	0.75	0.007	4.2	0.12
FD-HS 120-8	1200	1800	26 000	1.7	0.3	0.5	0.020	7.5	0.46
FD-HS 145-8	3100	4650	21 000	2.0	0.35	0.5	0.058	14.1	1.13
FD-HS 180-8	7500	11250	17 000	2.3	0.4	0.5	0.127	22.0	2.28
FD-HS 210-8	12 500	18 750	14 000	2.8	0.5	0.5	0.366	41.8	3.65

1) At speeds above 5 000 min^{-1} a limitation of the total displacement to max. 30% is necessary. The maximum permissible speed is calculated for the main components (clamping hub adapter spacer) with standard dimensions. Other types and lengths on request

2) Mass and inertia J refer to the standard coupling dimensions (see page 12)

3) The torsional stiffness is specified for standard dimensions and refers to the coupling unit installed between the clamping hubs consisting of adapter, flange, spacer and disc pack with screw connection

4) The permissible axial displacement depends on the radial displacement and vice versa (see Fig. 1 on p. 10). The value for the axial displacement is given for a coupling with two elements. The specification of the angular displacement refers in each case to a flexible element

Technical Note

The technical data applies only to the complete coupling or the corresponding coupling elements. It is the customer's/user's responsibility to ensure there are no inadmissible loads acting on any of the components. In particular, existing connections, e.g. bolted connections, must be checked with regard to the torques to be transmitted. If necessary, further measures, such as additional reinforcement with pins, may be necessary. It is the customer's/user's responsibility to make sure the dimensioning of the shaft and keyed or other connection, e.g. shrinking or clamping connection, is correct. All components that can rust are protected against corrosion as standard.

REICH have an extensive range of couplings and coupling systems to cover nearly every drive configuration. Customized solutions can be developed and manufactured even in small batches or as prototypes. In addition calculation programs are available for all necessary dimensioning.

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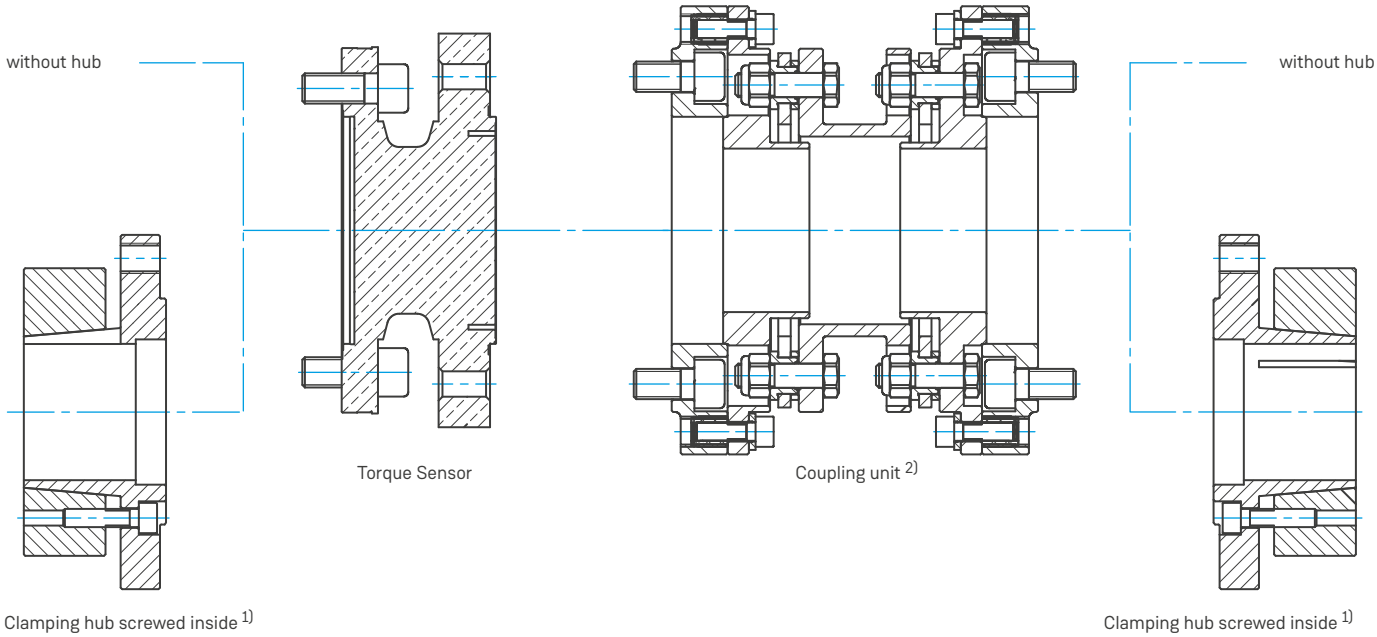
Principals of Construction

Standard Types



1) Clamping hub, consisting of clamping ring, hub body and screws

2) Coupling unit, consisting of adapter, flange, spacer and disc pack with screw connection

FLEXDUR - HighSpeed

Selection of the Coupling Size

The coupling is selected using the nominal torque of the engine T_{AN}. The torque T_{AN} to be transmitted can be calculated as follows on the basis of the continuous power:

$$T_{AN}\,[Nm] = 9\,550 \frac{P_{AN}\,[kW]}{n_{AN}\,[min^{-1}]}$$

In addition to the load on the coupling due to the drive torque T_{AN} the coupling can also be subjected to additional loads which depend on the type of driven machine and the mode of operation of the prime mover. The service factor is determined as a function of the input and output (see table Service factor). To determine the appropriate size, the product of service factor (S_f) and transmittable torque T_{AN} must be smaller than the nominal torque T_{KN} of the coupling (according to table "**Technical data**").

$$T_{KN} \geq T_{AN} \cdot S_f$$

For proper operation, the coupling must be selected according to the **Service factor** table with a service factor suitable for the application and the working environment.

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Service Factor

Service factor S_f according to the following table

Service factor: S_f	Electric motor Steam or gas turbine	Steam engines or water turbine	Combustion engine
Consistent torque Centrifugal pumps, light conveyors, alternators, fans	1.0	1.5	3.0
Low torque fluctuations Machine tools, screw compressors, screw pumps, liquid ring centrifuges, rotary dryers	1.5	2.0	3.0
High torque fluctuations Piston pumps, low-viscosity mixers, cranes, winches	2.0	2.5	4.0
Exceptionally high torque fluctuations Carousel presses, reciprocating compressors, high-viscosity mixers, ship propellers	3.0	3.5	5.0

i Caution! In the event of a change in the operating condition (e.g. power, speed, starting frequency, change in drive and driven machines, ambient temperature of the coupling), it is necessary to check the selection of the coupling size.

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Permissible Shaft Displacements

The values for permissible displacement, given in the table "General technical data" are maximum values which may not occur simultaneously (sum $\Delta K_a + \Delta K_r + \Delta K_w \leq 100\%$).
An existing axial displacement ΔK_a as shown in Fig. 1 reduces the permissible values for angular displacement ΔK_w and radial displacement ΔK_r.

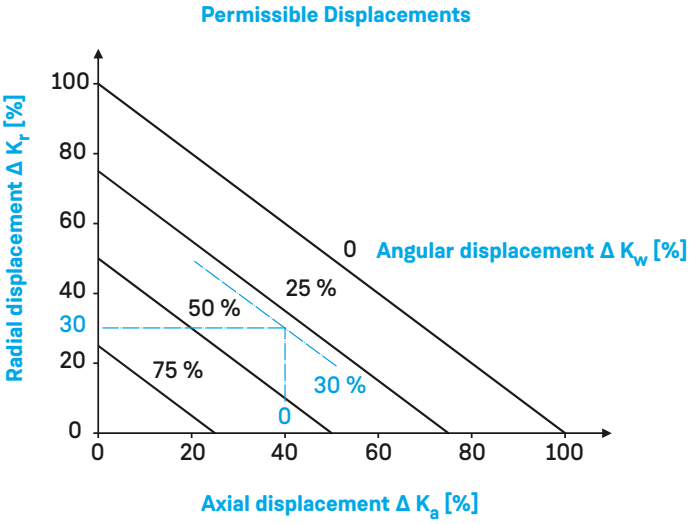

Fig. 1

Fig. 1:
For coupling versions whose length deviates from the catalogue version, the permissible radial displacement with plate pack length S and spacer length L_2 is calculated as follows:

$$\Delta K_r = \tan \alpha \cdot (L_2 + S)$$

(Values L_2 and S according to figure p. 12)

Example for the combination of displacements

Coupling size FD-HS 120-8:

An occurring axial displacement of $\Delta K_a = 0.68$ corresponds to 40% of the permissible maximum value $\Delta K_a = 1.7$ mm.
A simultaneously occurring angular displacement in the disc pack $\Delta K_w = 0.15°$ corresponds to 30% of the permissible maximum value $\Delta K_w = 0.5°$.

Both displacements result in a permissible radial displacement of 30% of the maximum value $\Delta K_r = 0.3$.
This means that a maximum of $\Delta K_r = 0.09$ mm is permissible.

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Torque Sensor

Assignment of torque sensors

FLEXDUR - HighSpeed couplings for higher speeds are suitable as standard for mounting on standard torque sensors, but can also be adapted to customer requirements.

	Measuring flange			
Coupling size	TB2	T10FS	T12/T12HP	T40/T40B
85-6	0.1/0.2 kNm	0.1/0.2 kNm	0.1/0.2 kNm	0.1/0.2 kNm
120-8	0.5/1 kNm	0.5/1 kNm	0.5/1 kNm	0.5/1 kNm
145-8	2/3 kNm	2/3 kNm	2/3 kNm	2/3 kNm
180-8	5 kNm	5 kNm	5 kNm	5 kNm
210-8	10 kNm	10 kNm	10 kNm	10 kNm

Balancing

The couplings are balanced to a balancing quality of G 2.5 according to DIN ISO 21940. Alternative balancing grades on request.

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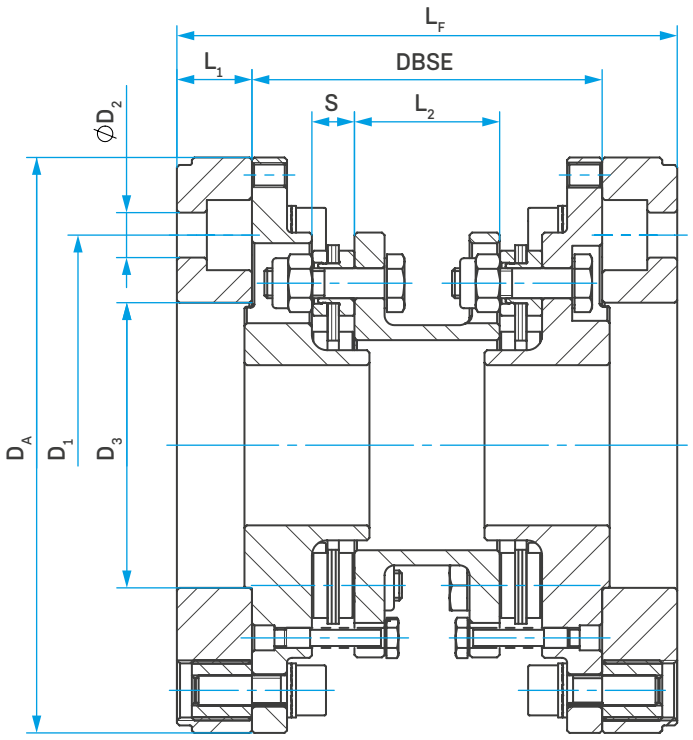
Coupling Unit



Dimensions

Coupling size	L_1 [mm]	D_A [mm]	D_1 [mm]	D_2 [mm]	D_3 [mm]	L_2 [mm]	S [mm]	DBSE [mm]	L_F [mm]	J [kgm²]	m [kg]
85-6	15	Ø115	Ø84	6x8	Ø57 H6	29	8.5	70	100	0.003	1.6
120-8	18.5	Ø148	Ø101.5	8x10	Ø75 H6	37	9.5	84	121	0.01	3.3
145-8	25	Ø185	Ø130	8x12	Ø90 H6	48	11.5	100	150	0.026	5.7
180-8	28	Ø222	Ø155.5	8x14	Ø110 H6	49	14.5	114	170	0.069	10.6
210-8	32	Ø270	Ø196	8x16	Ø140 H6	62	15.5	136	200	0.166	17.4

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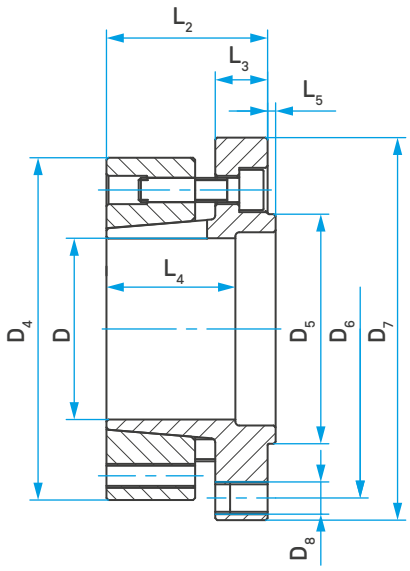
Clamping Hub



Transmittable torque [Nm] Clamping set/clamping hub

Size	D [mm]	T_L Limited torque [Nm]
780	25-30-35-40-**45**	430-520-610-700-**780**
2750	45-50-55-60-65-**70**	1750-1950-2150-2350-2550-**2750**
6050	50-55-60-65-70-75-80-**85**	3600-3950-4300-4650-5000-5350-5700-**6050**
8950	60-65-70-75-80-85-90-95-**100**	5350-5800-6250-6700-7150-7600-8050-8500-**8950**
17000	70-75-80-85-90-95-100-105-110-115-**120**	9900-10600-11300-12000-12700-13400-14100-14800-15500-16200-**17000**

Dimensions

Size	D_4 [mm]	D_5 [mm]	D_6 [mm]	D_7 [mm]	D_8 [mm]	L_2 [mm]	L_3 [mm]	L_4 [mm]	L_5 [mm]	J [1)] [kgm²]	m [1)] [kg]
780	85	57	84	95	6xM8	40	13	32	2	0.002	1.3
2750	117	75	101.5	117	8xM10	45	13	37	2	0.005	2.1
6050	150	90	130	150	8xM12	50	15	42	2	0.016	4.2
8950	175	110	155.5	175	8xM14	50	15	42	2	0.029	5.7
17000	225	140	196	225	8xM16	60	17	50	2	0.1	12.2

Mass m and inertia J refer to standard clamping hub with maximum bore

Ordering example

Coupling type	Coupling size	Mounting situation	Hub type	Clamping hub type
		Distance between shaft ends (DBSE)	Z = Clamping hub - = without clamping hub	6050 = clamping hub size 70 = bore diameter
FD-HS	145 - 8	100	Z	6050.70/6050.85

Coupling designation: FD-HS 145 - 8 100 Z 6050.70 - Z 6050.85

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Data Required for Coupling Size Selection

From (stamp):

Contact person: _____
Department: _____
Telephone: _____
Fax: _____

Dipl. - Ing. Herwarth Reich GmbH
Vierhausstrasse 53
44807 Bochum

☐ **Enquiries** ☐ **Orders**

General system details:

Place of installation/environmental conditions: _____
Load: ☐ uniform ☐ medium ☐ heavy
Ambient temperature at the coupling: _____ [°C]
Daily period of operation: _____ Hours/day
Starting frequency: _____ per day
Shaft displacement:
ΔK_a: _____ [mm]/ΔK_r: _____ [mm]/ΔK_w: _____ [°]

Drive side:

Prime mover: ☐ Diesel- / ☐ Hydraulic- / ☐ E-Motor
Others: _____
Nominal power: _____ kW at speed:[min^{-1}] _____
Speed range: from _____ to _____ [min^{-1}]
max. starting/shock torque: _____ [Nm]

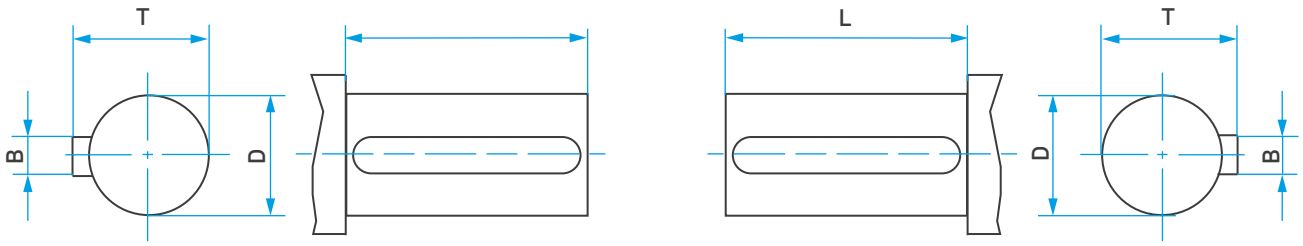
Output side:

Driven machine: _____
Nominal power: _____ [kW]
max. load torque: _____ [Nm]
in case of uneven torque load:
from _____ to _____ [Nm]

Balancing: ☐ yes ☐ no

Balancing speed: _____ [min^{-1}]/grade: G _____
Balancing with keyway: ☐ yes ☐ no
Annotations: _____

Shaft dimensions:



Further coupling design specifications (e.g. with brake drum/brake disc/material):

Further details of the complete system/principle sketch of installation situation:

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Notes

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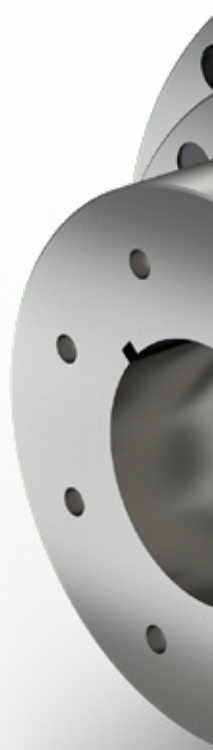

Industrial solutions:

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- Mobile applications
- Test benches
- Pumps & compressors
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- Ship & port engineering

Headquarter:

Dipl.- Ing. Herwarth Reich GmbH
Vierhausstrasse 53 · 44807 Bochum
+49 234 95916-0
mail@reich-kupplungen.com
www.reich-kupplungen.com

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The present FLEXDUR - HighSpeed catalogue edition renders parts of the previous FLEXDUR - HighSpeed catalogues obsolete. All dimensions in millimetres. We reserve the right to change dimensions and/or design without prior notice. Texts and illustrations, dimensional and performance data have been compiled with the utmost care. There is no guarantee, however, that the information is accurate; in particular, there is no guarantee that products will match the illustrations in terms of technology, colour, shape and configuration or that the products will correspond to the proportions of the illustrations. We also reserve the right to make changes due to printing errors or mistakes.