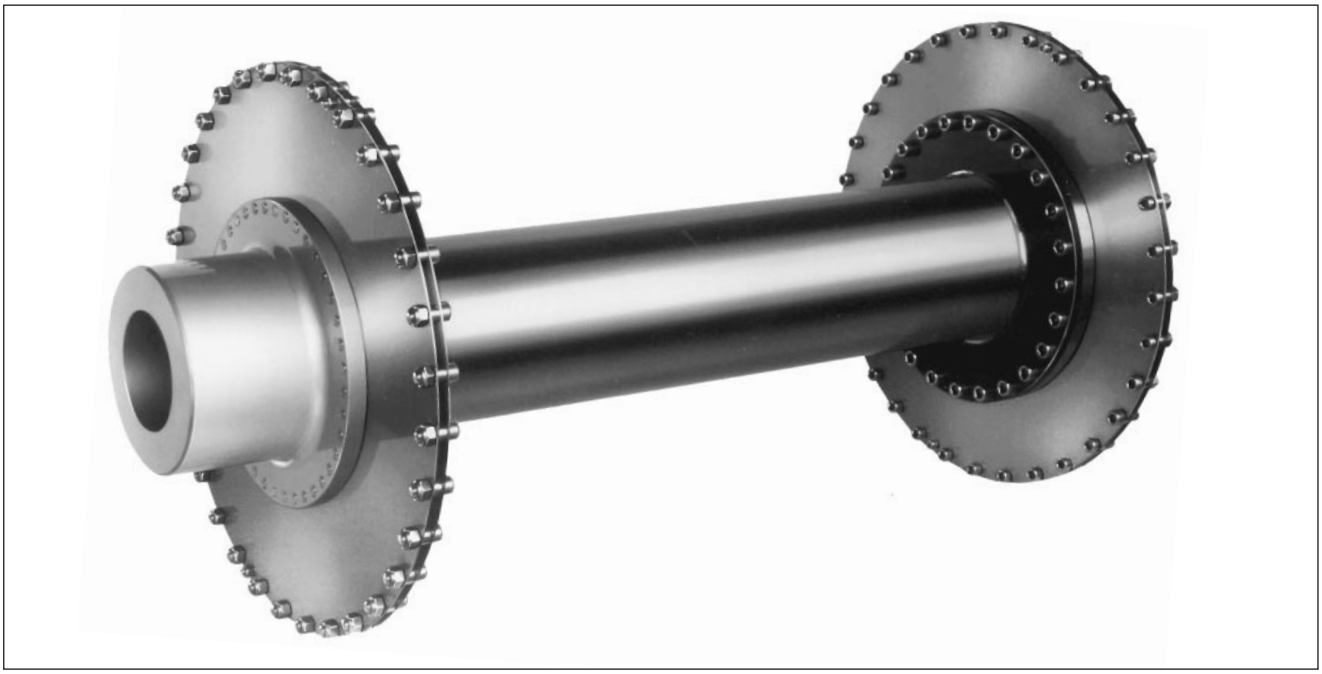
CENTADISC®

Lightweight flexible shafts



The patented design of the CENTA-membrane couplings has proven its reliability on numerous applications for several years.

The arrangement of 2 sets of such membranes with a spacer provides a flexible and wearfree double cardanic system with outstanding advantages and it is marketed under the registered tradename CENTADISC.

The CENTADISC flexible shafts are torsionally stiff, free of backlash, but they compensate for axial, radial and angular misalignment.

On each set of the CENTA tandem membrane coupling 2 membranes are arranged in series, thus providing the following advantages:

high flexibility, low reacting forces with linear characteristics, low internal stress inside the membranes under misalignment, because the 2 membranes can adjust their outer diameter jointly, since they are not rigidly clamped.

The CENTADISC flexible shafts with 2 tandem membrane couplings have the following, positive features:

* High axial and angular flexibility. The single tandem membrane is radially stiff, however, as a double cardanic system it is also radially flexible, because all radial misalignments are converted into angular misalignments. The allowable radial displacement is in proportion to the distance between the membranes.
* Compensation for substantial misalignments, displacements, and alignment errors of all kind with low reacting forces.
* Economical design with compact dimensions, low weight, low inertias, high grade of balance and temperature resistance.
* Free of wear and maintenance, easy to assemble, all components can be radially assembled and disassembled without disturbing the connected shafts. All parts are safely clamped for reliable transmission of the torque by friction.
* The spacer is radially secured by positive engagement, therefore it can not fly away in case of a membrane failure. Furthermore as an option a fail safe device is available.
* Modular design, therefore all components can easily be provided and exchanged.

Areas of application:

Ship propulsion, especially between gear and waterjet in fast ships, pump drives, cooling tower drives, printing machines, paper mills, general engineering.

CENTADISC®

Technical Data

CENTADISC Size	Nominal Torque	Max. Torque	Continuous Vibr. Torque at 10 Hz	Dyn. Torsional Stiffness of membranes	Dyn. Torsional Stiffness of tube	Allowable axial Shaft Displacement	Axial Stiffness	Allowable angular Displacement	Angular Stiffness	Max. Speed
	T_{KN} [kNm]	T_{Kmax} [kNm]	T_{KW} [kNm]	C_m [kNm/rad]	C_{tube} [kNm²/rad]	$\triangle K_a$ [mm]	C_a [kN/mm]	$\triangle K_w$ [∢ °]	C_w [kNm/degree]	n_{max} [min⁻¹]
70	12.5	37.5	6.25	17000	2370	± 10	0.25	1.0		2300
72	17.5	52	8.25	34000	6650	± 12	0.41	1.0		2200
75	25	75	12.5	34200	10300	± 12	0.38	1.0		2000
78	35	105	17.5	52000	10300	± 12	0.47	1.0	on request	1800
80	50	150	25.0	68000	12600	± 12	0.45	1.0		1600
84	85	250	42.5	96000	54500	± 14	0.43	1.0		1500
86	120	360	60	116000	54500	± 15	0.48	1.0		1400
88	160	450	80	163000	54500	± 16	0.50	1.0		1200

Allowable radial misalignment:
$\triangle$ wr = L · tan α

α = angular deflection

for α = 1° ⟶ $\triangle$ wr = L · 0.0175

L = length of the spacer
~ distance between the hubs

dyn. torsional stiffness:

$$\frac{1}{C_{Tdyn}} = \frac{1}{C_M} + \frac{1}{C_R}$$

C_M = torsional stiffness of 2 sets of tandem membranes

C_{tube} = torsional stiffness of tube per 1000 mm length

Values for composite tubes on request

The values for the axial and angular misalignments are the max. allowable values for continuous duty and they are considered as 100% of the allowable values which may not occur fully at the same time. The total of both kinds of misalignment may not exceed 100%, e.g. if 40% of the allowable value for the axial misalignment is absorbed, then only 100% – 40% = 60% can be accepted for the angular misalignment.

Axial misalignment is mostly statical and therefore less onerous for the coupling, whereas angular misalignment is always dynamical and therefore it should be kept as low as possible in the interest of a long service life.

For occasional shocks or transient conditions for a short time the values of the angular misalignment can be doubled.

Torque range:

12.5 to 160 kNm.

On demand higher and lower torques are possible as well.

CENTADISC

Types

CENTADISC - S
with thin wall **steel** tube, either welded to the end pieces or made as one piece for short lengths.

CENTADISC - C
with tube made from **carbon fibre** reinforced composites. The composite tubes have the following advantages:
very low weight, corrosion resistance, high critical speed.

Therefore larger distances can be spanned (up to 10 metres) and / or higher speeds can be accepted. With intermediate bearings shaft lines of any length can be provided. On such long shaft lines with more than one section and an intermediate bearing, we always connect each section with membranes, thus we keep the shafts, bearings etc. absolutely free from dangerous bending forces, they have nothing to transmit except pure torque. (Please see sample on page 4)

CENTA has developed its own unique clamping device for the connection of the composite tube with the steel adaptors. It grips the tube from inside and outside and it is reliable, dynamically strong and does not require any glue.

CENTADISC flexible shafts with composite tubes are very lightweight and therefore the ideal component for fast ferries and ships. They can be supplied with approval by all leading classification societies.

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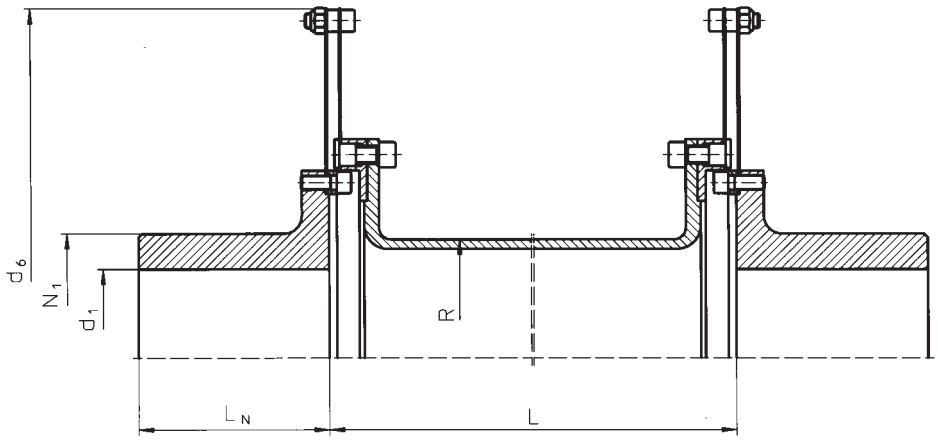
Dimensions

Masses

Inertias



CENTADISC Size	T_{KN} [kNm]	d_1 min	d_1 max	N_1	d_6	L_N	R	Weight m (kg) complete shaft without tube	Weight m (kg) per 100 mm tube	moment of inertia J [kgm²] complete shaft without tube	moment of inertia J [kgm²] per 100 mm tube
70	12.5	65	150	210	584	160	200	101.6	3.8	2.13	0.035
72	17.5	70	165	235	673	180	280	151.8	3.4	4.8	0.064
75	25	70	175	245	722	200	280	189.1	5.4	6.89	0.1
78	35	80	210	290	800	220	280	258.5	5.4	10.73	0.1
80	50	90	230	320	885	250	280	376	6.5	17.89	0.12
84	85	90	280	388	1095	280	450	597.9	10.9	45.91	0.53
86	120	160	300	420	1175	320	450	772.5	10.9	61.15	0.53
88	160	160	320	450	1260	385	450	1012	10.9	91.91	0.53

The values in the table are for steeltubes. Values for composite tubes on request.

Outer dia of membranes:

The o.d. of the membranes (dimension d_6) can be reduced, if necessary.

Length of the middle part:

The length of the middle section (dimension L) will be made to order within the limits of what is technically possible. There are no standard lengths.

Versions of the hubs:

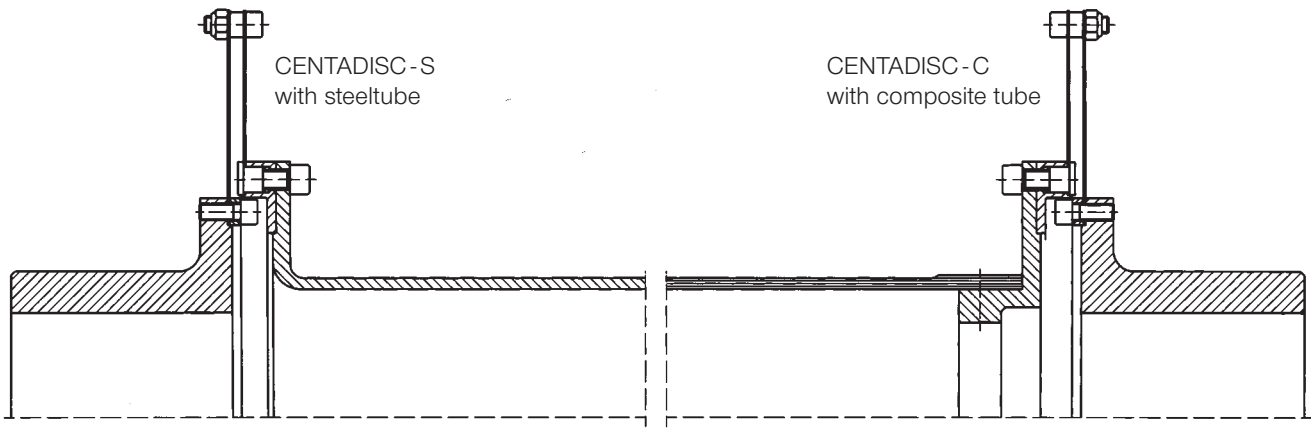
The hubs can be delivered with finished bores and keyways or with tapered bore for oil press fit. In order to reduce the weight the diameter N_1 can be reduced depending upon the relevant finished bore.

Adaptors to suit existing flanges can also be supplied instead of the hubs.

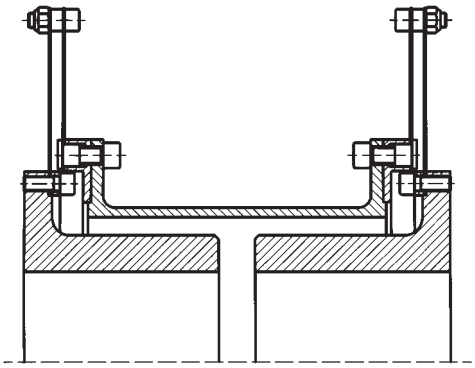
We reserve the right to amend any dimension or detail specified or illustrated in this publication without notice and without incurring any obligation to provide such modification to such couplings previously delivered. Please ask for an application drawing and current data before making detailed coupling selection.

We would like to draw your attention to the need to prevent accidents or injury. No safety guards are included in our supply. Copyright to this technical document is held acc. DIN 34.

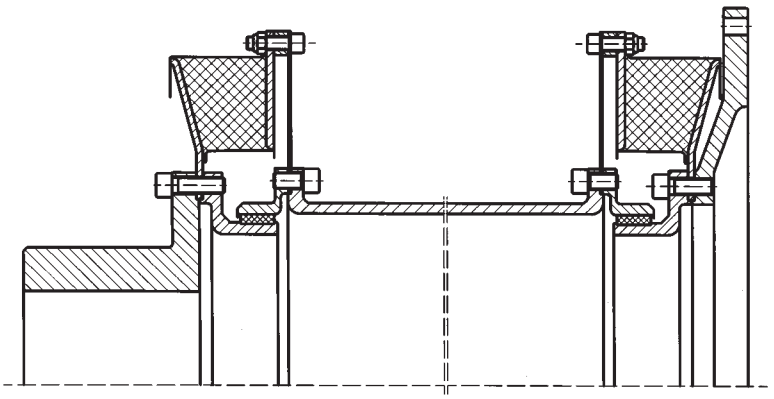
CENTADISC® registered trademark of CENTA Antriebe.



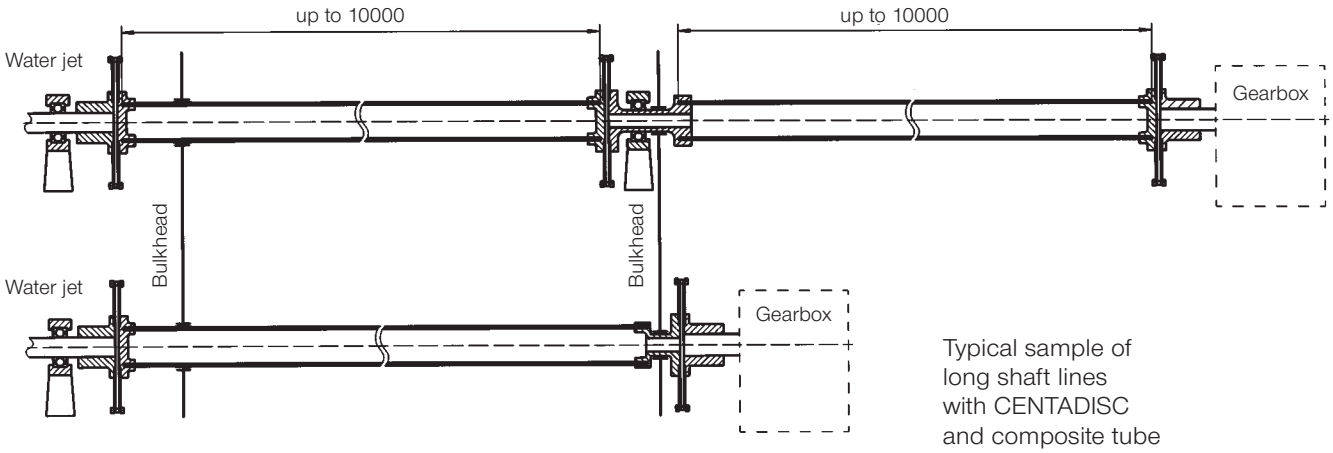
Special types



CENTADISC – short version with hubs inside the tube. Radial exchange not possible.



CENTADISC-flexible shaft, combined with torsionally soft CENTAX couplings in order to dampen torsional vibrations.
Typical area of application: Diesel engines on very soft mounts.



Typical sample of long shaft lines with CENTADISC and composite tube

Further flexible shafts from CENTA:

CENTALINK-C
torsionally stiff flexible shafts

With tubes either from steel or carbon fibre composite, as shown in this picture. Torques up to 540 KNm.

CENTAFLEX Series A
Types G or GZ

Torsionally soft flexible shafts. Torques up to 8 KNm.

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