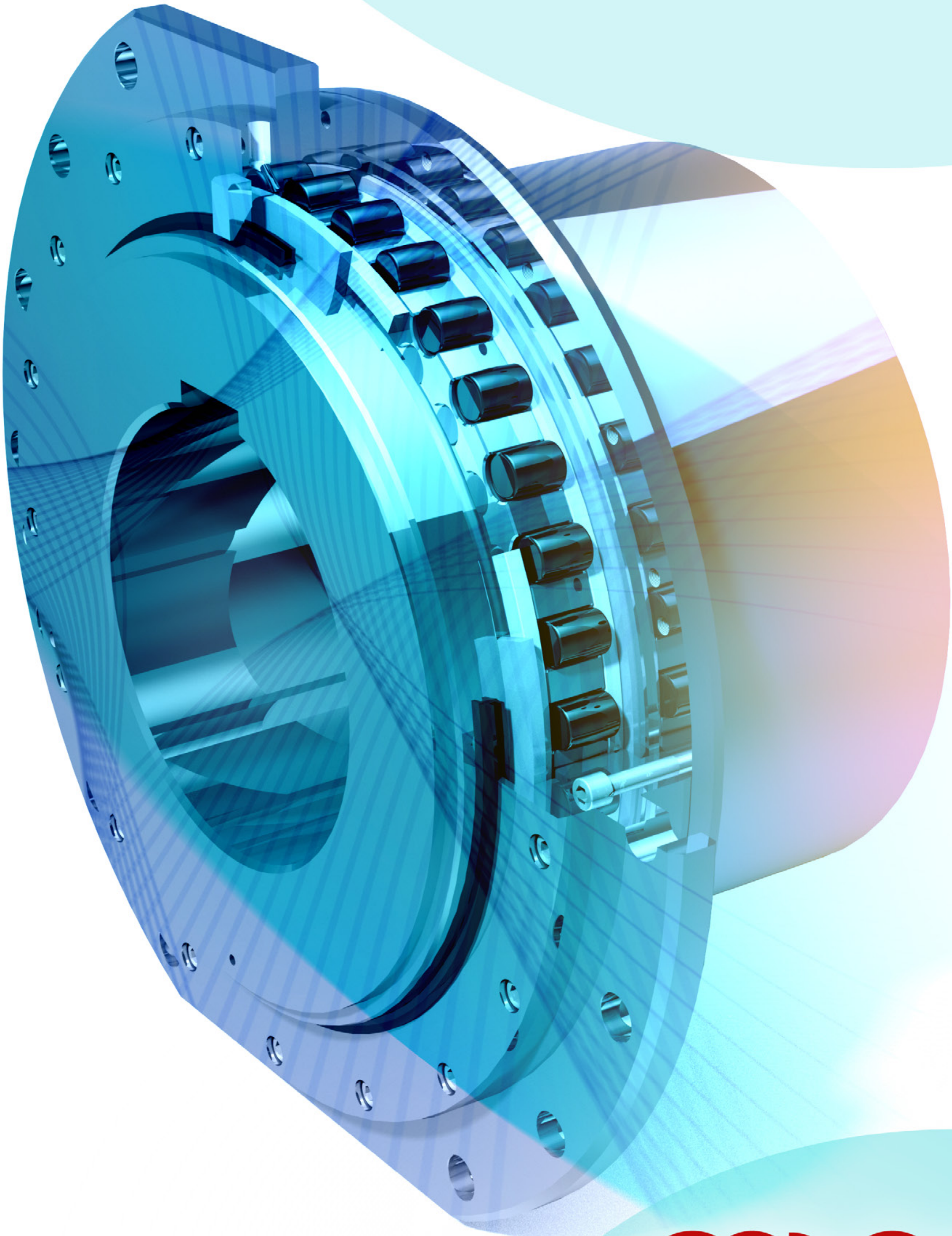
NOVOTON®-NT

Barrel Coupling



ETRON®

Aplicaciones Industriales S.L

APPLICATION

NOVOTON® “barrel” couplings type **NT**... in their several executions, are recommended for its setting-up in the drives of rope drums for cranes, capstans or conveyors.

Its setting-up eliminates the occurrence of a statically indeterminate case which appears when there is a rigid coupling between the shaft of the reducer and the drum *(figure 1)*. This sort of installation requires a considerable time of initial alignment and even so, the prejudicial effect over bearings and over gear-wheels produced by additional stresses as a consequence of deformations in supports and wear and tear of operating parts can not be prevented. In the recommended installation, *(figure 2)*, the barrel coupling plays the role o a knuckle, making the assembly statically determined. The jointed coupling operates as axially free and this is why the support-bearing of the opposite side of the drum has to bear the axial loads which can be generated. As a special application the barrel coupling can be designed, under demand, as a joint which can withstand axial loads in itself (model NTB page 12).

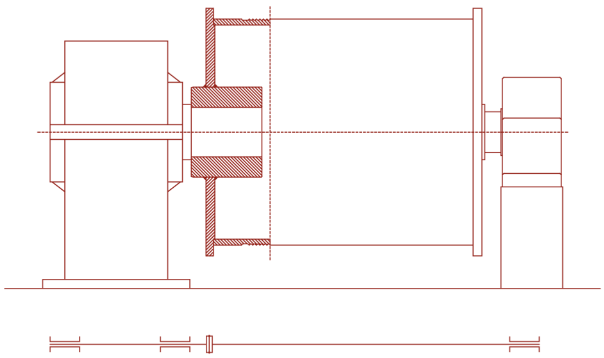


Figure 1: rigid connection Reducer-Drum

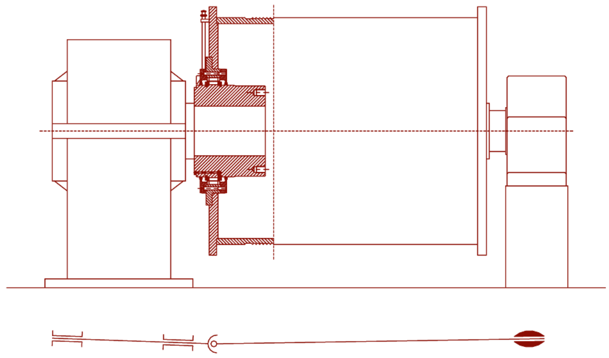


Figure 2: articulated joint Reducer-Drum

CONSTRUCTIVE CHARACTERISTICS

The barrel coupling is basically made up by a sleeve-flange with semicircular internal teeth, a hub having external teeth with the same shape and a series of hardened steel rollers which are housed between both parts. The internal transmission area is made tight by mounting a cover at each side with their corresponding retainers, preventing, in this way, any foreign substances from getting in as well as preventing the lubricant from leaking. Two retainer rings mounted on the hub, one at each side of the teeth, limit the axial displacement of the barrel rollers inside their housing. To this regard there are 2 different constructive models. Basic models, named as NT..., in which retainer rings are directly in contact with the barrels and new generation models, named NTSG..., in which extra thrust rings are installed in between the barrels and retainer rings. These NTSG... models comply with German Steel Industry standard SEB 666212 (issue January 1991) (Stahl-Eisen-Betriebsblatt) as well as French Steel Industry standard. The crowned shape of the rollers, which we call “barrels”, and the internal spaces in the teeth permit to accept **±1° of angular misalignement** in the coupling and an axial displacement gap which ranges ±3mm up to ±10mm depending on the sizes, for **angular aligned position** (see table 11 page 13).
The Torque is transmitted to the receiving flange of the drum, usually, through two diametrically opposed flat carrier faces which can be found at the periphery of the coupling flange. The friction effect of the attachment screws of both flanges also takes part in this transmission. Other systems, as adjusted bolts or similar, can also be used preparing the flanges accordingly.
The described design can withstand big Radial Loads, being distributed over wide barrel support surfaces, and it minimizes the reversed bending stress of the Torque over the teeth, which are short and have a wide root section. Apart from this, due to “flatness polishing” of the hardened barrel over the tooth profile, the resistance to wear is greatly improved.

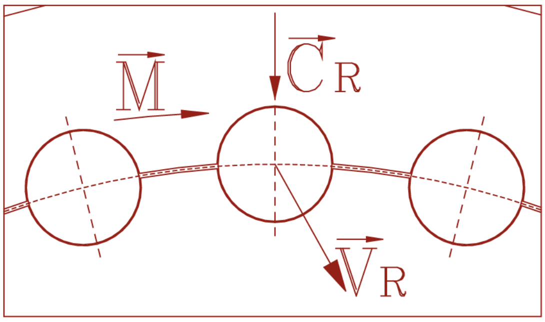
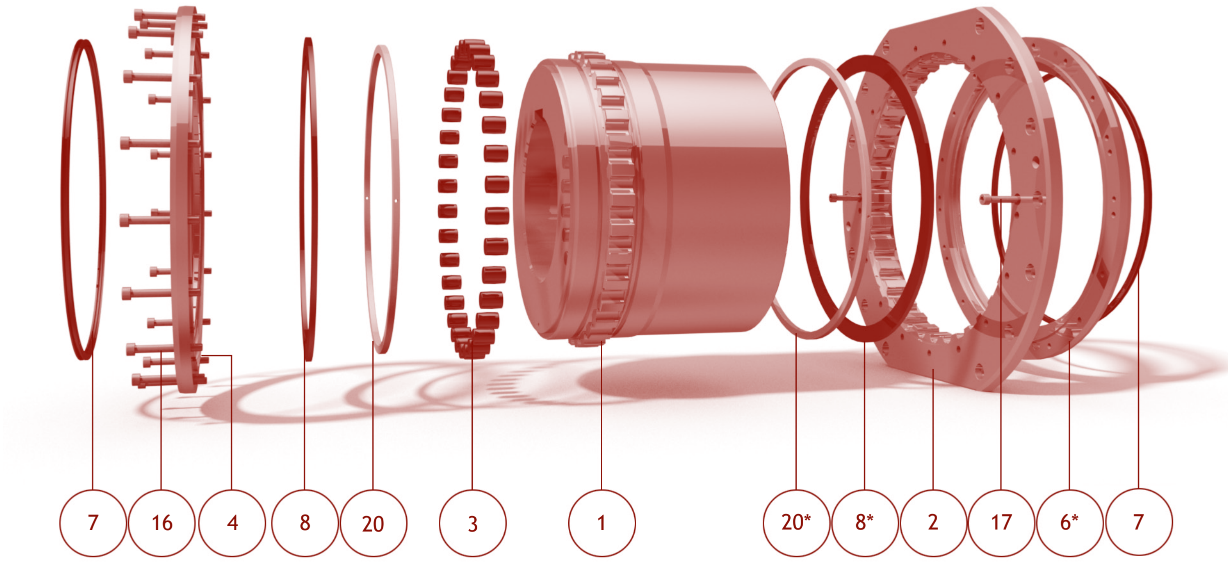


Figure 3

In Figure 3 is shown the composition of vector Torque M and Radial Load C_R which gives a resultant vector V_R over each semicircular tooth. Value and orientation of this vector changes for each position of tooth turning travel around the circle.
The control of the teeth internal wear can be carried out without disassembling any part, since there is a pointer fixed to the external cover, linked to the sleeve-flange, which displaces, depending on the wear, in relation to certain marks existing in the hub. The same pointer is used in order to control the axial position of the sleeve-flange in relation to the hub. See details in page 13.

PARTS



** Only sizes ≤620*

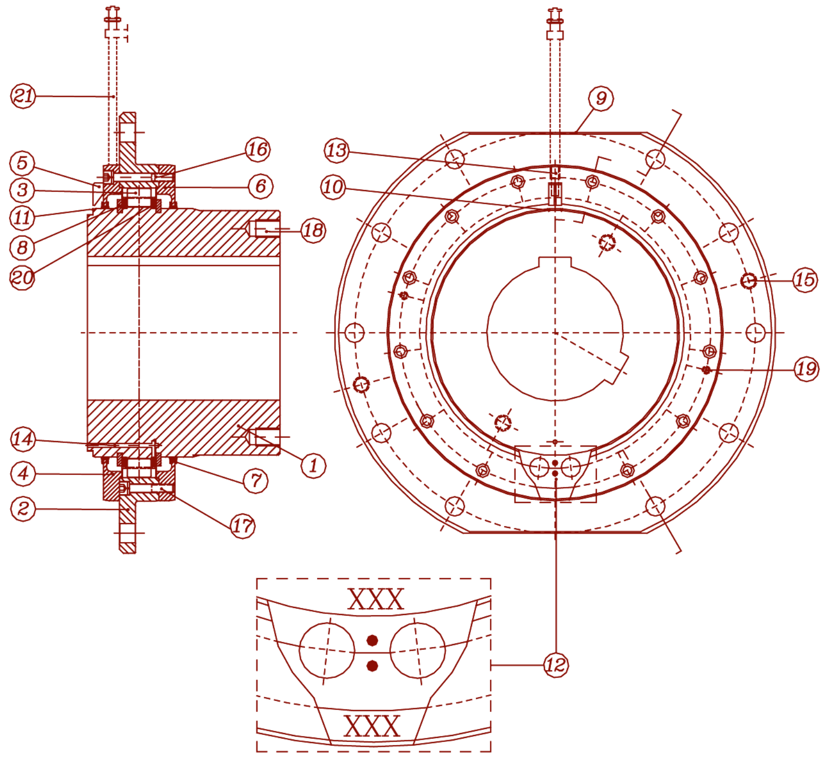


Figure 4

1 Hub
2 Sleeve-flange
3 Barrel
4 External cover
5 Pointer
6 Internal cover
7 Joint
8 Retainer ring
9 Carrier face
10 Wear control marks
11 Axial adjustment mark
12 Pair numbers and assembly points
13 Lubricant filler
14 Lubricant overflow hole
15 Flange pulling hole
16 External fixing screw
17 Internal fixing screw
18 Hub pulling hole
19 Cover pulling hole
20 Thrust ring (only for models NTSG...)
21 Lubricant adaptor (only on request)

SELECTION OF THE SIZE

To select correctly a "barrel" coupling it is necessary to know the transmitted Torque, supported Radial Load, the geometry and type of fitting of joined shaft, as well as type of application to which normally is assigned one Working Group according to standards in force. See in Table 1 a summary of historical Working Group in different periods.

According to the Working Group corresponding to each application, orientative security factors are established to be applied in the selection procedure which follows later.

Working Group			Factor
DIN 15020 Part 1	FEM (1970)	FEM 1.001 (1998) BS466 (1984)	F_1
1 Bm	IB	M1, M2, M3	1,12
1 Am	IA	M4	1,25
2 m	II	M5	1,40
3 m	III	M6	1,60
4 m	IV	M7	1,80
5m	V	M8	2,00
L4-T8-M8 ; L3-T9-M8 ; L4-T9-M8			2.20

Table 1: Torque security factors

BS466 (1984) FEM 1.001 (1998)				
Load spectrum	L1	L2	L3	L4
F_2	1,05	1,10	1,15	1,20

Table 2: Radial Load security factors

Determination of the selection Torque Ms

Based on the installed power Ni:

$$M_i\ (Nm) = \frac{N_i(kW)}{n(rpm)} \cdot 9550$$

$$M_s = M_i \cdot F_1$$

Based on the consumed power Nc:

$$N_c\ (kW) = \frac{T_c\ (N) \cdot V_c\ (m/min)}{60000}$$

$$M_c\ (Nm) = \frac{N_c\ (kW)}{n(rpm)} \cdot 9550$$

$$M_s = M_c \cdot F_1$$

Being:

N_i (kW)= Installed motor power

M_i (Nm)= Motor torque in the drum shaft

n(rpm)= Rotating speed on the drum

M_S(Nm)= Selection Torque

F_1= Service factor (Table 1)

N_c(kW)= Consumed power

M_c(Nm)= Consumed torque in the drum shaft

T_c(N)= Total pulling of cables including performances

V_c(m/min)= Rope displacement speed in the drum

D(m)= Effective winding diameter in the drum

Note. The use of basic values M_i and M_c, which are normally known, could give as a result a relatively conservative selection. If more details about the application are known, as load spectrum, cycle speed and duration, an "average" Torque value could be used for the selection, although it should be taken into consideration that other security factors has to be applied according to FEM 1.001, such as the dynamic factor and the maximum load factor.

Once selection Torque M_S has been calculated, a preliminary reference can be chosen either from Table 5 *(page 7)* or Table 7 *(page 9)*, (model **NT...** in basic material, model **NTR...** in reinforced material), that complies:

$$\mathbf{Mmáx \geq Ms}$$

Nevertheless in page 5 is explained the use, as option, of he Corrected Torque value, M_R, which may bring the opportunity to use a smaller size in some particular cases.
Once the Radial Load is calculated in the following chapter, and depending on the drum shaft and flange dimensions, all the information will be at disposal to establish which model is the most convenient.

Determination of the selection Radial Load Cs

The value to be calculated always refers to the fraction of the total Radial Load the coupling has to withstand, this one being understood as one of the two drum's supports. The said fraction will be the resultant vector of two components: the pulling of cables and the own weight of the drum with its ropes. In the most common case both components will have same orientation and direction (vertical to down, figure 5). If they made a certain angle between them, resultant vector should be calculated according to Figure 6 and that one will be the value and main orientation of the Radial Load over the coupling.

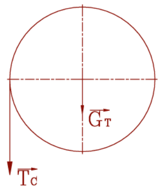


Figure 5: Vertical to down pulling of cables

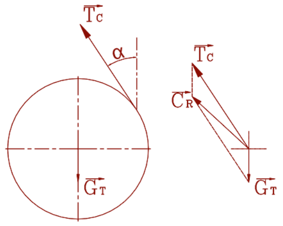


Figure 6: Pulling of cables in angle

$$ig = \frac{\text{Total amount of strands in the hoist mech.}}{\text{Total amount of strands getting out of the drum}}$$

ig	Efficiency η_F	
	Bronze bushing	Bearing
2	0.92	0.97
3	0.90	0.96
4	0.88	0.95
5	0.86	0.94
6	0.84	0.93
7	0.83	0.92
8	0.81	0.91

Table 3: Hoist and drum efficiency

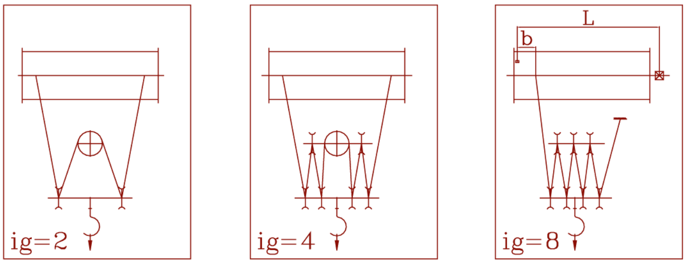


Figure 7: Examples of hoist ratios

Vector Total pulling of cables:

$$\vec{T}_c = \frac{\vec{Q} + \vec{G}}{ig \cdot \eta_F}$$

Vector Radial Load withstand:

Case two strands in drum

$$\vec{C}_R = \frac{\vec{T}_C + \vec{G}_T}{2}$$

Case one strand in drum

$$\vec{C}_R = \vec{T}_C \cdot \left(1 - \frac{b}{L}\right) + \frac{G_T}{2}$$

$$\vec{C}_S = \vec{C}_R \cdot F_2$$

Being:

$\vec{Q}$(N)= Max. useful load in the hook

$\vec{G}$(N)= Hoist mechanism's own weight

$\vec{G}_T$(N)= Drum's (with its cables) own weight

ig= Transmission gain ratio of the hoist

F_2= Radial Load security factor (Table 2)

η_F= Hoist and drum efficiency (Table 3)

L(m)= Distance between drum supports

b(m)= Strand minimum distance to the barrel's centre

$\vec{T}_c$(N)= Total pulling of cables to the drum

$\vec{C}_R$(N)= Supported Radial Load

$\vec{C}_s$(N)= Selection Radial load

Once value C_S has been calculated we can proceed to confirm which one of the pre-selected models on page 3 is suitable. Going back to the Table 5 or Table 7 (model **NT...** in basic material, model **NTR...** in reinforced material), it has to comply:

$$S_T \geq C_S$$

When any of these models does not comply this requirement, on page 5 is given the Corrected Radial Load option R_C higher than value S_T for the same size in the corresponding table.
If several pre-selected models are suitable last geometrical and shaft fixing type verification must be carried on.

Option of Corrected Radial Load R_C

When the value of the selection Radial Load C_S for one pre-selected model is higher than the maximum value S_T of corresponding table, and still the selection Torque M_S does not reach the maximum Mmax, in the above same table, before selecting a higher size a final verification can be done by using the Corrected Radial Load R_C.

$$R_C = S_T + (Mmáx - M_s) \cdot \frac{C}{F_2}$$

Being:

C= Proportionality between involved load vectors depending on the size *(Table 4)*
F_2= Radial Load security factor *(see Table 2, page 3)*

Table 4: proportionality factors between involved load vectors

NT-NTR	2,5	5	7,5	10	13	16	20	30	40	50	60	100	150	210	260	340	420	620	820	920	1020
C	14,8	13,7	11,4	10,8	9,0	8,7	7,4	7,2	6,1	5,3	4,8	4,4	3,7	3,6	3,3	3,3	2,9	2,6	2,4	2,2	1,9

Top limit for Corrected Radial Load R_C

In a practical way, it is established as maximum absolute value for R_C one increase of **50%** related to S_T value in tables for each model.

For values out of this top limit, please submit your query to ЄTRON.

Option for Corrected Torque M_R

As announced in page 3, it is accepted the possibility to verify suitability of any of the pre-selected models using the option of Corrected Torque M_R higher than the value Mmax in the corresponding table, when still the Radial Load C_S does not reach the maximum S_T allowed in the same table.

$$M_R = M_{max} + \frac{(S_T - C_S)}{C \cdot F_1}$$

Being:

C= Factor as per Table 4
F_1= Torque security factor *(see Table 1, page 3)*

Top limit for Corrected Torque M_R

In this case, it is established as maximum absolute value for M_R one increase of **8%** related to Mmax value in tables for each model.

For values out of this top limit, please submit your query to ЄTRON.

Shaft capacity to install

Logically any of the models and sizes selected according to the previous paragraphs has to comply with the geometric condition of max acceptable shaft. Tables 5 *(page 7)*, 7 *(page 9)* and 10 *(page 12)* show the acceptable maximums for shafts connection by key as per DIN 6885/1. For other connection systems such as splines as per DIN 5480, shrink fit, etc... please ask for advice.

In any case, the values for the shafts housings indicated on the table do not presuppose that the pressures over the key or keys used are correct. This is something that will have to be verified in every case.

Selection within options

In some cases could happen that at the end of selection procedure more than one size of models NT... or NTR... comply with requested conditions. If idoneity among models can not be decided by possible geometrical advantages, as for example: better adapt to dimensions of the drum, reducer shaft length, distance from the flange to hub's face, etc, we suggest to submit your query to ЄTRON demanding the best Technical and/or Commercial choice.

SELECTION EXAMPLE

Data (Application according to Steel Industry Standard)

$\vec{Q}$ = 40T = 392400N Max useful load in the hook
$\vec{G}$ = 12000N Hoist own weight
$\vec{G}_T$ = 15000N Drum and cables own weight
N_i = 55kW Motor power
n = 12rpm Drum speed

D = 0.7m Drum diameter
ig = 4 (*Figure 7*) Hoist ratio
V_C = $\pi \cdot D \cdot n(m/min)$ Cable speed on drum
d = 200mm Gearbox output shaft with keyways
FEM Working Group= **L4T5M7** *(F_1=1,8 // F_2=1,2)*

Pulling of strands and consumed power

$$\vec{T}_C = \frac{\vec{Q} + \vec{G}}{ig \cdot \eta_F} = \frac{392400 + 12000}{4 \cdot 0{,}95} = 106421N$$

$$N_C = \frac{T_C \cdot V_C}{60000} = \frac{106421 \cdot \pi \cdot 0{,}7 \cdot 12}{60000} = 46{,}8kW$$

Selection Torque

Based on consumed power

$$M_S = \frac{N_C}{n} \cdot 9550 \cdot F_1 = \frac{46{,}8}{12} \cdot 9550 \cdot 1{,}8 = 67041Nm$$

Based on installed power

$$M_S = \frac{N_i}{n} \cdot 9550 \cdot F_1 = \frac{55}{12} \cdot 9550 \cdot 1{,}8 = 78788Nm$$

Selection Radial Load

$$\vec{C}_R = \frac{\vec{T}_C + \vec{G}_T}{2} = \frac{106421 + 15000}{2} = 60710N$$

Supposed vectors as per Figure 5

$$\vec{C}_S = C_R \cdot F_2 = 60710 \cdot 1{,}2 = 72852N$$

Selection of possible sizes (M_S based on installed power) (Page 9, table 7)

a) NTRSG-50 *(Mmax. 91000Nm / STmax 118000N)*
b) NTSG-100 *(Mmax. 127000Nm / STmax 129000N)*
c) NTSG-60 *(Mmax. 78000Nm / STmax 118000N)*) if Corrected Torque option allows

Corrected Torque (MR) for NTSG-60 (option c)

$$M_R = Mmax + (Smax - C_S)/(C \cdot F_1)$$

$$M_R = 78000 + (118000 - 72852)/(4{,}8 \cdot 1{,}8)$$

$$M_R = 83225Nm$$

Top limit value *(page 5)*

$$M_R = Mmax + 8\% = 84240Nm$$

$$83225Nm > 78788Nm$$

The selection Torque is within the corrected limit so NTSG-60 choice would also be ok

Hypothesis for Corrected Radial Load (Rc) for NTSG-60

Let us suppose that the selection values were:

$$C_S = 128000\ N$$

$$M_S = 75000\ Nm$$

$$R_C = S_T + (Mmax - M_S) \cdot (C/F_2)$$

$$R_C = 118000 + (78000 - 75000) \cdot (4{,}8\ /\ 1{,}2)$$

$$R_C = 130000\ N$$

Top limit value *(page 5)*

$$R_C = Smax + 50\% = 177000N$$

$$130000N > 128000N$$

The selection Radial Load value would be within the corrected limit so for this hypothesis the option would also be ok

Shaft capacity verification

The 3 pre-selected models comply in principle with shaft condition, dmax *(Page 9, table 7)* > d = 200mm.
Check for each model if pressure stress over the key/keyways is OK. For this purpose take into consideration that core material in the hub for models NTRSG has higher stress capacity than material for the NTSG models so this sometimes gives a good option to mount, if required, high resistance quality keys.

NT / NTR (Basic construction)

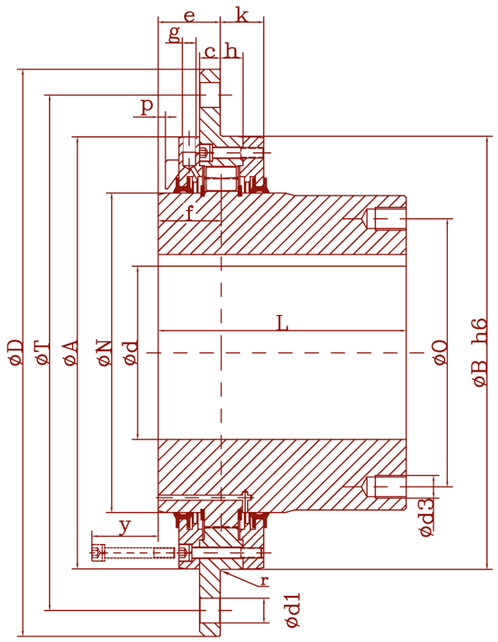


Table 5: Capacities

Size	**NT** (Basic material)		**NTR** (Reinforced material)		d max(2) mm	d stock ≈
	Torque Mmax.(1) Nm	Radial Load S_T max(1) N	Torque Mmax.(1) Nm	Radial Load S_T max(1) N		
2,5	4700	14500	6500	17650	66	20
5	6200	16500	8400	20000	77	20
7,5	7800	18500	10500	21500	88	20
10	10000	20000	16000	28000	98	20
13	16000	31000	21500	37000	112	47
16	20000	35000	27000	42500	126	47
20	24000	38500	31500	48000	140	47
30	28500	42000	39000	53000	155	47
40	39000	49000	53500	75000	183	47
50	64000	94000	91000	118000	210	77
60	78000	118000	127000	132000	220	77
100	127000	129000	180000	145000	250	102
150	180000	150000	241000	184000	295	102
210	275000	245000	360000	283000	305	102
260	328500	265000	425000	330000	315	102
340	400000	300000	529000	366000	335	178
420	500000	340000	660000	420000	380	208
620	685000	380000	815000	490000	425	238

Table 5: Dimensions (mm)

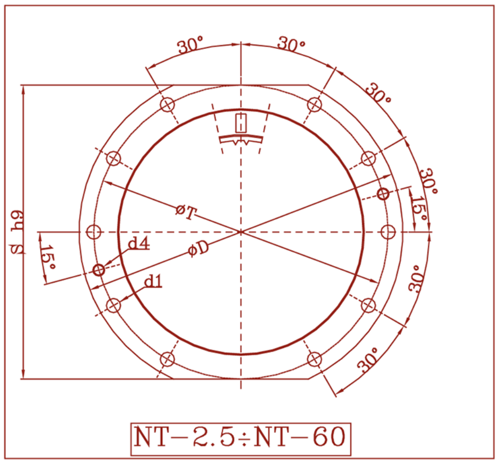
Size NT NTR	D	L	L min.	N	A	B h6	S h9 Page 8	O	d3	p	e	f	c	h	k	r	y	g(3) G" gas	T	d1	Axial gap max. (4)	weight Kg (5)	J kgm2 (5)
2,5	250	95	85	95	159	160	220	-	-	5	42	44	12	16	31	2,5	50	1/8	220	15	±3	12	0,06
5	280	100	85	110	179	180	250	-	-	5	42	44	12	16	31	2,5	50	1/8	250	15	±3	16	0,09
7,5	320	110	95	125	199	200	280	-	-	5	45	46	15	17	32	2,5	60	1/8	280	19	±4	23	0,17
10	340	125	95	140	219	220	300	-	-	5	45	46	15	17	32	2,5	60	1/8	300	19	±4	29	0,23
13	360	130	95	160	239	240	320	-	-	5	45	47	15	19	34	2,5	60	1/8	320	19	±4	35	0,32
16	380	145	95	180	259	260	340	-	-	5	45	47	15	19	34	2,5	60	1/8	340	19	±4	45	0,44
20	400	170	95	200	279	280	360	165	M16	5	45	47	15	19	34	2,5	60	1/8	360	19	±4	59	0,61
30	420	175	95	220	309	310	380	180	M16	5	45	47	15	19	34	2,5	60	1/8	380	19	±4	73	0,85
40	450	185	120	260	339	340	400	215	M20	9	60	61	20	22	40	2,5	70	1/4	400	24	±4	101	1,45
50	510	220	125	295	399	400	460	255	M20	7	60	61	20	22	42	2,5	70	1/4	460	24	±6	152	2,86
60	550	240	125	310	419	420	500	260	M20	7	60	61	20	22	42	2,5	70	1/4	500	24	±6	180	3,73
100	580	260	130	350	449	450	530	290	M24	7	60	61	20	22	42	2,5	70	1/4	530	24	±6	228	5,35
150	650	315	140	415	529	530	580	350	M24	7	65	66	25	27	47	2,5	80	1/4	600	24	±6	379	11,64
210	665	330	145	430	544	545	590	365	M30	7	65	69,5	25	34	54	4	90	1/4	615	24	±6	426	13,79
260	680	350	145	445	559	560	600	375	M30	7	65	69,5	25	34	54	4	90	1/4	630	24	±6	477	16,07
340	710	380	165	475	599	600	640	395	M30	13	81	85,5	35	34	59	4	90	1/4	660	28	±8	545	22,73
420	780	410	165	535	669	670	700	445	M30	13	81	85,5	35	34	59	4	90	1/4	730	28	±8	725	35,26
620	850	450	165	600	729	730	760	500	M30	13	81	85,5	35	34	59	4	90	1/4	800	28	±8	961	59,65

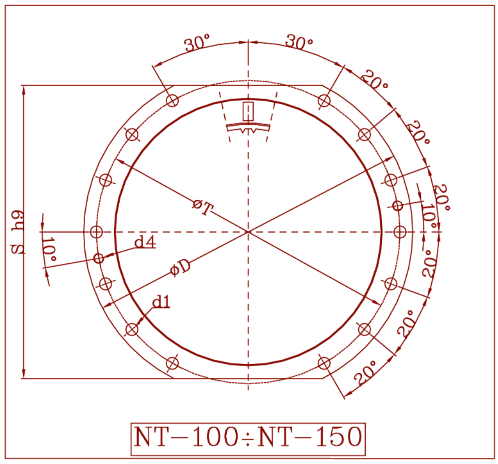
(1) Reference maximum values according to size selection procedure
(2) Maximum values for keyways s/DIN 6885-1. For other methods, please ask
(3) Radial grease input hole for sizes up to 260. Front grease input hole for sizes ≥340
(4) Values for angularly aligned coupling
(5) Values for d stock

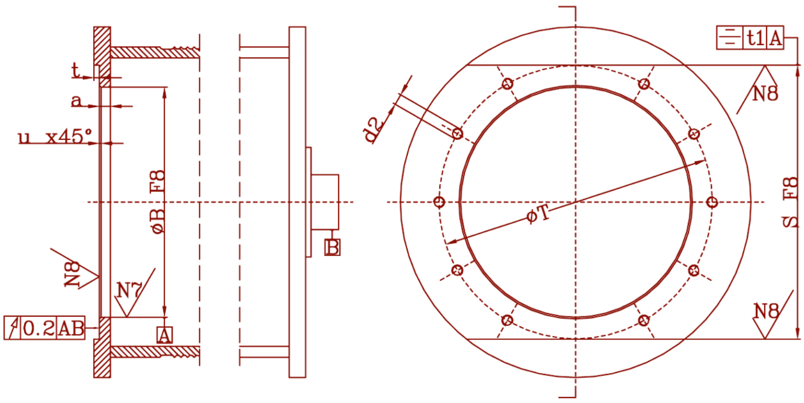
COUPLING AND DRUM JOINT

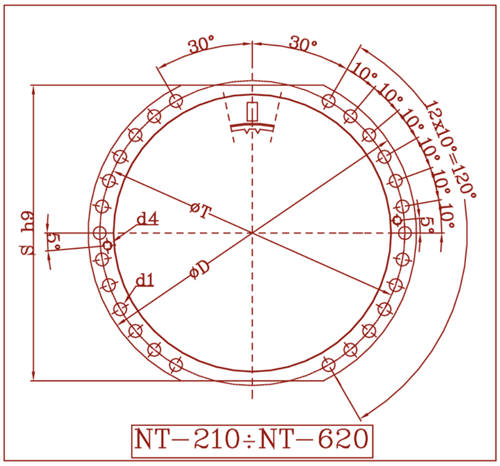
Table 6: Dimensions (mm)

Size NT/NTR	T	S F8/h9	B F8/h6	a min.	t min.	u	d1	nº	d2 Thread	d4 2x
2,5	220	220	160	18	12	3	15	10	M12	M12
5	250	250	180	18	12	3	15	10	M12	M12
7,5	280	280	200	25	15	3	19	10	M16	M16
10	300	300	220	25	15	3	19	10	M16	M16
13	320	320	240	25	15	3	19	10	M16	M16
16	340	340	260	25	15	3	19	10	M16	M16
20	360	360	280	25	15	3	19	10	M16	M16
30	380	380	310	25	15	3	19	10	M16	M16
40	400	400	340	30	20	3	24	10	M20	M20
50	460	460	400	30	20	3	24	10	M20	M20
60	500	500	420	30	20	3	24	10	M20	M20
100	530	530	450	30	20	3	24	14	M20	M20
150	600	580	530	30	25	3	24	14	M20	M20
210	615	590	545	30	25	5	24	26	M20	M20
260	630	600	560	30	25	5	24	26	M20	M20
340	660	640	600	36	35	5	28	26	M24	M20
420	730	700	670	36	35	5	28	26	M24	M20
620	800	760	730	36	35	5	28	26	M24	M20









t1= 0,10mm NT-2.5 ÷ NT-50
0,20mm NT-60 ÷ NT-1020

- The flange material must be S355JR EN-10025-2 or higher
- The drum and flange fixing screws must be in quality 8.8 or higher for NT... models and quality 10.9 or higher for NTR... models

NTSG / NTRSG (Construction as per Steel Industry standard SEB 666212)

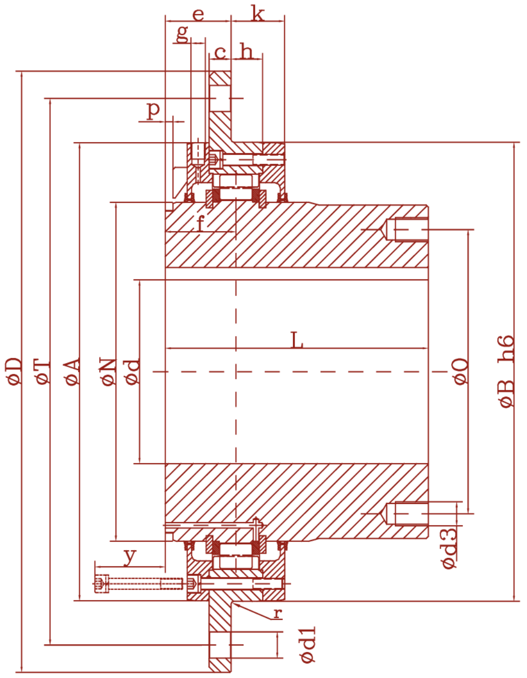


Table 7: Capacities

Size (1)	NTSG (Basic material)		NTRSG (Reinforced material)		d max(3) mm	d stock ≈
	Torque Mmax.(2) Nm	Radial Load S_T max(2) N	Torque Mmax. (2) Nm	Radial Load S_T max(2) N		
20	24000	38500	31500	48000	140	47
30	28500	42000	39000	53000	155	47
40	39000	49000	53500	75000	183	47
50	64000	94000	91000	118000	210	77
60	78000	118000	127000	132000	220	77
100	127000	129000	180000	145000	250	102
150	180000	150000	241000	184000	295	102
210	275000	245000	360000	283000	305	102
260	328500	265000	425000	330000	315	102
340	400000	300000	529000	366000	335	178
420	500000	340000	660000	420000	380	208
620	685000	380000	815000	490000	425	238
820	-	-	930000	525000	460	-
920	-	-	1100000	550000	490	-
1020	-	-	1390000	670000	550	-

Table 7: Dimensions (mm)

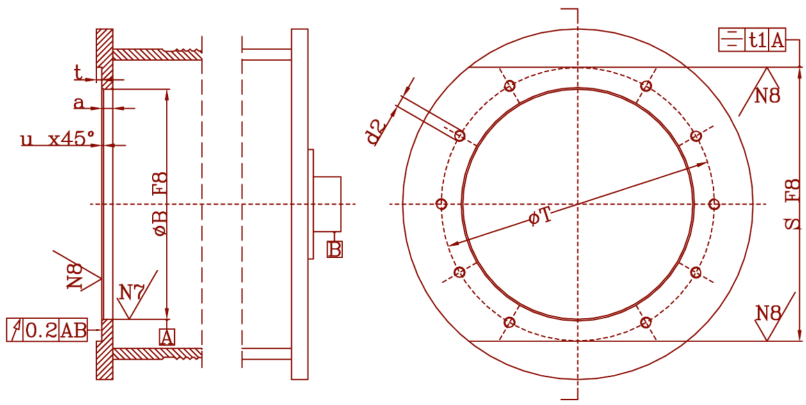
Size NTSG NTRSG (1)	D	L	L min	N	A	B h6	S h9 Page 10	O	d3	p	e	f	c	h	k	r	y	g(4) G" gas	T	d1	Axial gap max. (5)	Weight Kg (6)	J kgm2 (6)
20	400	170	100	200	279	280	360	165	M16	4	45	48	15	20,5	37	2,5	60	1/8	360	19	±4	60	0,63
30	420	175	100	220	309	310	380	180	M16	5	45	50	15	25	40	2,5	60	1/8	380	19	±4	74	0,87
40	450	185	120	260	339	340	400	215	M20	9	60	60,5	20	21	39	2,5	70	1/4	400	24	±4	101	1,45
50	510	220	135	295	399	400	460	255	M20	7	60	64,5	20	29	49	2,5	70	1/4	460	24	±6	154	2,92
60	550	240	135	310	419	420	500	260	M20	7	60	64,5	20	29	49	2,5	70	1/4	500	24	±6	182	3,79
100	580	260	140	350	449	450	530	290	M24	7	60	65	20	29,5	49,5	2,5	70	1/4	530	24	±6	227	5,41
150	650	315	145	415	529	530	580	350	M24	7	65	68,5	25	31,5	51,5	2,5	80	1/4	600	24	±6	380	11,68
210	665	330	155	430	544	545	590	365	M30	6	65	74	25	43	64	4	90	1/4	615	24	±6	427	13,90
260	680	350	155	445	559	560	600	375	M30	6	65	74	25	43	64	4	90	1/4	630	24	±6	478	16,55
340	710	380	175	475	599	600	640	395	M30	10	81	86	35	38	63	4	90	1/4	660	28	±8	548	22,93
420	780	410	175	535	669	670	700	445	M30	10	81	87,5	35	40	66	4	90	1/4	730	28	±8	725	37,48
620	850	450	175	600	729	730	760	500	M30	10	81	87,5	35	42	66	4	90	1/4	800	28	±8	960	59,58
820	940	500	191	650	796	800	830	570	M30	10	86	92	40	44	62	4	95	1/4	875	28	±10	911	88,21
920	1025	500	191	695	856	860	900	630	M30	10	86	92	40	44	62	4	95	1/4	945	34	±10	1062	118,92
1020	1120	500	191	780	946	950	1000	660	M36	10	86	92	40	44	62	4	95	1/4	1040	34	±10	1315	181,97

(1) Sizes 30, 50, 210 , 820, 920 and 1020 not included in the standard SEB-666212 (January 1991)
(2) Reference maximum values according to size selection procedure
(3) Maximum values for keyways s/DIN 6885-1. For other methods, please ask
(4) Radial grease input hole for sizes up to 260. Front grease input hole for sizes ≥340
(5) Values for angularly aligned coupling
(6) Values for d stock. ***Except sizes 820, 920 and 1020, calculated for dmax***

COUPLING AND DRUM JOINT

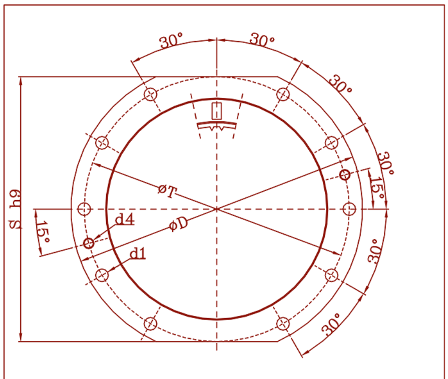
Table 8: Dimensions (mm)

Size NTSG/ NTRSG	T	S F8/h9	B F8/h6	a min.	t min.	u	d1	n°	d2 Thread	d4 2x
20	360	360	280	25	15	3	19	10	M16	M16
30	380	380	310	25	15	3	19	10	M16	M16
40	400	400	340	30	20	3	24	10	M20	M20
50	460	460	400	30	20	3	24	10	M20	M20
60	500	500	420	30	20	3	24	10	M20	M20
100	530	530	450	30	20	3	24	14	M20	M20
150	600	580	530	30	25	3	24	14	M20	M20
210	615	590	545	30	25	5	24	26	M20	M20
260	630	600	560	30	25	5	24	26	M20	M20
340	660	640	600	36	35	5	28	26	M24	M20
420	730	700	670	36	35	5	28	26	M24	M20
620	800	760	730	36	35	5	28	26	M24	M20
820	875	830	800	36	40	6	28	32	M24	M20
920	945	900	860	45	40	6	34	32	M30	M20
1020	1040	1000	950	45	40	6	34	32	M30	M20

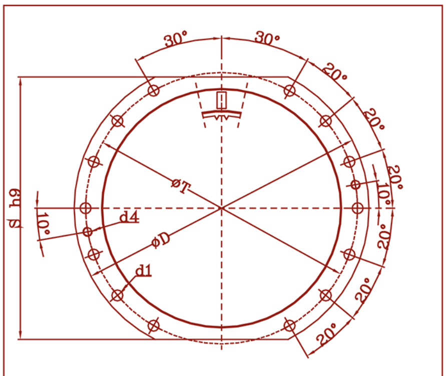


t1= 0,10mm NT-2.5 ÷ NT-50
0,20mm NT-60 ÷ NT-1020

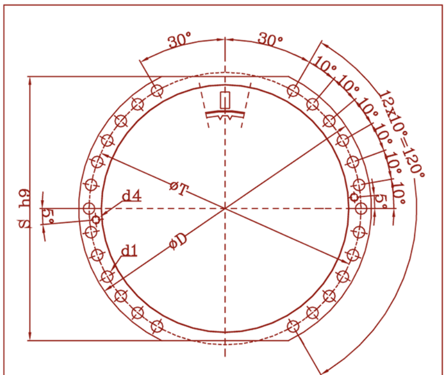
- The flange material must be S355JR EN-10025-2 or higher
- The drum and flange fixing screws must be in quality 8.8 or higher for NT... models and quality 10.9 or higher for NTR... models



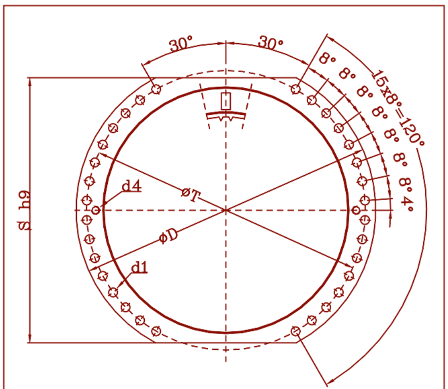
NTSG−20÷NTSG−60



NTSG−100÷NTSG−150



NTSG−210÷NTSG−620



NTSG−820÷NTSG−1020

NTN / NTNR (Basic construction)

NTNSG / NTNRSG (as per standard SEB-666212)*

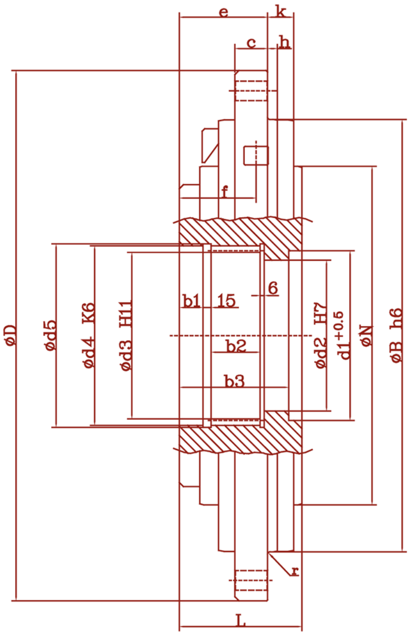


Table 9: Dimensions (mm)

Note: *Other dimensions and capacities, see table 5 on page 7 and table 7 on page 9*

Size (1)	D	L	N	B h6	f	e	c	h	k	r
20	400	125	200	280	76,5	90	32	10	25	2,5
30	420	120	220	310	71,5	85	32	10	25	2,5
40	450	130	260	340	79,5	92	32	10	27	2,5
50	510	130	295	400	74,5	92	32	10	29	2,5
60	550	129	310	420	73,5	89	32	10	30	2,5
100	580	131	350	450	75	91	32	10	30	2,5
150	650	150	415	530	89	108	40	12	32	2,5
210	665	162	430	545	92	108	40	19	39	4
260	680	162	445	560	93	111	40	19	37	4
340	710	162	475	600	91	109	50	19	41	4
420	780	190	535	670	116	137	50	19	39	4
620	850	190	600	730	114	137	50	19	39	4
820	940	219	650	800	131	137	50	30	52	4
920	1025	219	695	860	131	137	50	30	52	4
1020	1120	219	780	950	131	137	50	30	52	4

Table 9: Reference hub machining. Other options as per customer requirements (2)

Size (1)	b1	b2	b3	d1 +0,5	d2 H7	d3 H11	Tooth m x z DIN 5480 (2)	d4 K6	d5	Weight (3)	J kgm2 (3)
20	39	32	110	101	85	90	N100x5x30x18x9H	100	105	53	0,79
30	39	32	110	121	105	110	N120x5x30x22x9H	120	125	59	1,02
40	40	40	121	141	125	130	N140x5x30x26x9H	140	145	72	1,42
50	38	42	121	161	145	150	N160x5x30x30x9H	160	165	102	2,7
60	38	42	121	166	150	154	N170x8x30x20x9H	170	175	115	3,45
100	26	50	116	200	180	184	N200x8x30x24x9H	200	205	132	4,5
150	27	60	129	240	220	224	N240x8x30x28x9H	240	245	190	8,6
210	26	70	138	250	230	234	N250x8x30x30x9H	250	255	215	10
260	26	70	138	280	260	264	N280x8x30x34x9H	280	285	214	11
340	26	70	138	300	280	284	N300x8x30x36x9H	300	305	253	15
420	33	80	161	350	320	324	N340x8x30x41x9H	340	345	339	24
620	38	80	161	390	360	364	N380x8x30x46x9H	380	385	409	35
820	35	100	190	410	380	384	N400x8x30x48x9H	400	405	564	56
920	35	100	190	450	420	424	N440x8x30x54x9H	440	445	642	75
1020	35	100	190	490	460	464	N480x8x30x58x9H	480	485	803	114

(*) Design of barrels retaining inside according to SEB-666212 (January 1991)

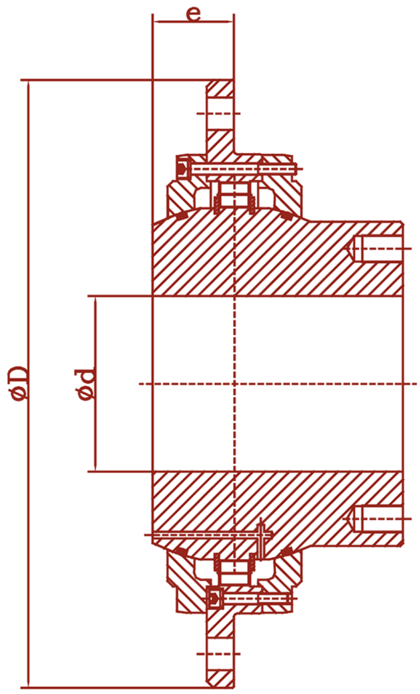
(1) Sizes 30, 50, 210 , 820, 920 and 1020 not included in the standard SEB-666212 (January 1991)

(2) For other tooth values, ask ETRON

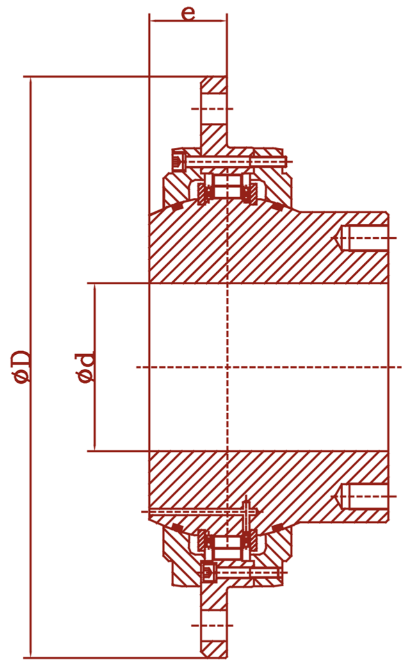
(3) Values for boring according to table data

NTB / NTBR
(Basic construction)

NTBSG / NTBRSG
(as per standard SEB-666212)*



NTB
NTBR



NTBSG
NTBRSG

Table 10: Capacities and dimensions (mm)

Note: *Other dimensions, see table 5 on page 7 and table 7 on page 9*

Axial Load max kN	Size (1)	NTB NTBSG (Basic material)		NTBR NTBRSG (Reinforced material)		D	e	d max.(3) H7
		Torque Mmax.(2) Nm	Radial Load S_T max(2) N	Torque Mmax.(2) Nm	Radial Load S_T max(2) N			
61	**20**	24000	38500	31500	48000	400	45	135
67	**30**	28500	42000	39000	53000	420	45	145
79	**40**	39000	49000	53500	75000	450	60	175
96	**50**	64000	94000	91000	118000	510	60	200
113	**60**	78000	118000	127000	132000	550	60	210
132	**100**	127000	129000	180000	145000	580	60	240
149	**150**	180000	150000	241000	184000	650	65	280
161	**210**	275000	245000	360000	283000	665	65	290
175	**260**	328500	265000	425000	330000	680	65	300
200	**340**	400000	300000	529000	366000	710	81	315
220	**420**	500000	340000	660000	420000	780	81	355
250	**620**	685000	380000	815000	490000	850	81	400
275	**820**	-	-	930000	525000	940	86	430
300	**920**	-	-	1100000	550000	1025	86	460
323	**1020**	-	-	1390000	670000	1120	86	520

(*) Design of barrels retaining inside according to SEB-666212 (January 1991)
(1) Sizes 30, 50, 210 , 820, 920 and 1020 not included in the standard SEB-666212 (January 1991)
(2) Reference maximum values according to size selection procedure
(3) Maximum values for keyways s/DIN 6885-1. For other methods, please ask

ADDITIONAL INFORMATION

- Barrel couplings **NOVOTON® NT...** are supplied as a whole unity, ready to be mounted, but **without lubricant**. Therefore, before putting it into service it must be lubricated in the required quantity with the appropriate lubricant as indicated in the corresponding paragraph stated on the *Mounting and Maintenance Instruction's Document* given separately.
- Fixing screws of the coupling to the drum must have a minimum quality 8.8 for model NT...models and 10.9 for models NTR... models.
- In case it is necessary to dismantle the coupling supplied (i.e. for the machining of the housing when this one has been supplied in pilot bored condition or for the shrink fit setting-up) it is very important to make sure that when setting it up again the hub and sleeve-flange pair off without taking place a possible mixture between different unities and it will also have to be done in the same relative position as it was supplied. This is achieved by matching the marked tooth of the hub with the corresponding marked tooth of the sleeve-flange (page 2, reference part Nº12 in Figure 4)

Axial position mark

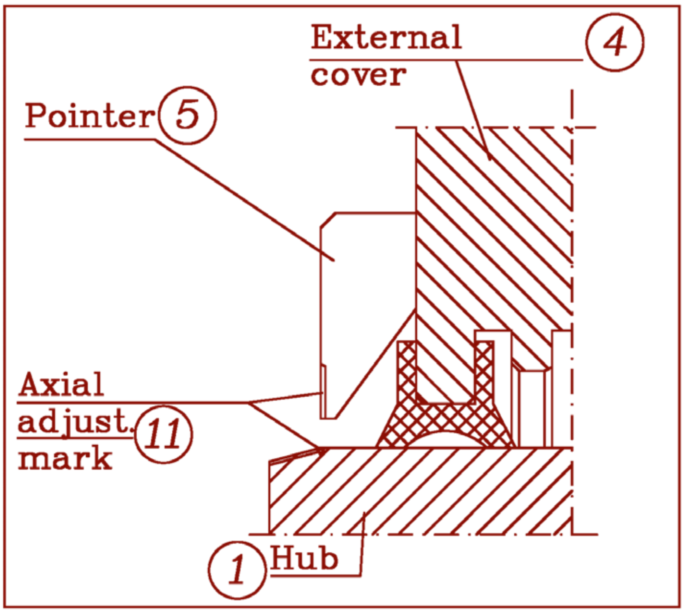


Figure 8

The bearing-support of the drum at the opposite side of the coupling must absorb the axial efforts generated during the service and must convey them to the structure. If this one suffered a bending deformation, the axial component must not surpass the acceptable maximum axial displacement for the coupling as indicated on Table 11 (**valid values for coupling supposed angularly aligned**).

Once the coupling has been fixed to the drum flange, its correct axial position is indicated by coincidence of the mark face at the pointer with the mark of the hub *(Figure 8)*. At that position the setting of the opposite support of the drum is defined.

Table 11: Maximum axial displacement (mm) ***(valid values for angularly aligned supposed coupling)***

NT/NTR	2,5	5	7,5	10	13	16	20	30	40	50	60	100	150	210	260	340	420	620	820	920	1020
± mm	3	3	4	4	4	4	4	4	4	6	6	6	6	6	6	8	8	8	10	10	10

Wearing marks

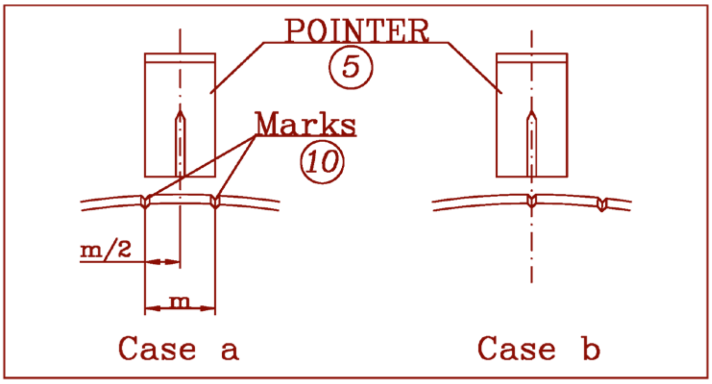


Figure 9

The position of the mark over the pointer in relation to the marks over the hub, Figure 9, will be an indicator of the state of the teeth flanks wear. When the equipment is new, the pointer mark is centered *(case a)*. When it reaches the limit *(case b)* the whole coupling has to be replaced.

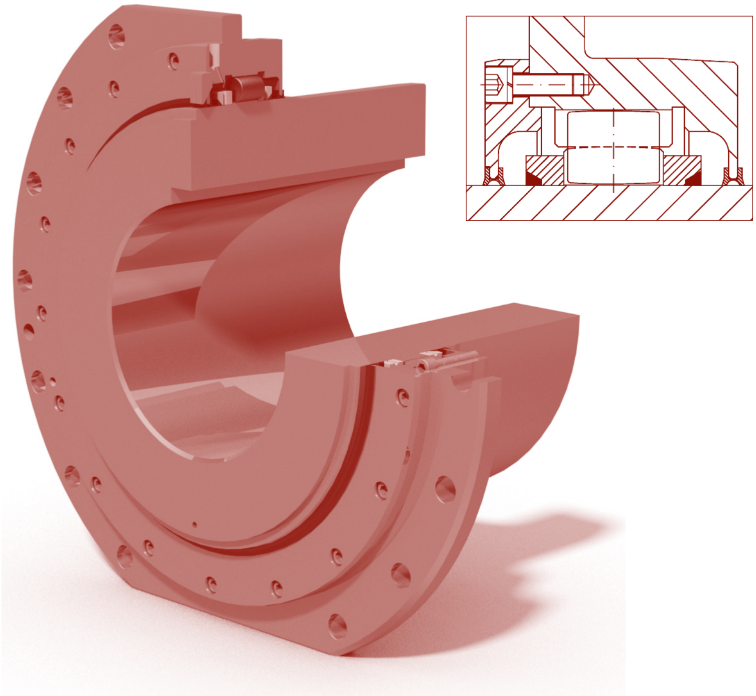
Table 12 shows the maximum permissible wear values "m/2", for applications which imply only one sense of loading (typical case of the hoisting in cranes). With applications of reversible loading sense the amplitude between the marks must be divided by 2. Unless it is expressly asked for, couplings are standardly supplied with the marks according to the aforementioned table and therefore, it is advisable to modify then, if application requires so, in order to correctly assess the wear evolution.

Table 12: Maximum wear values (mm)

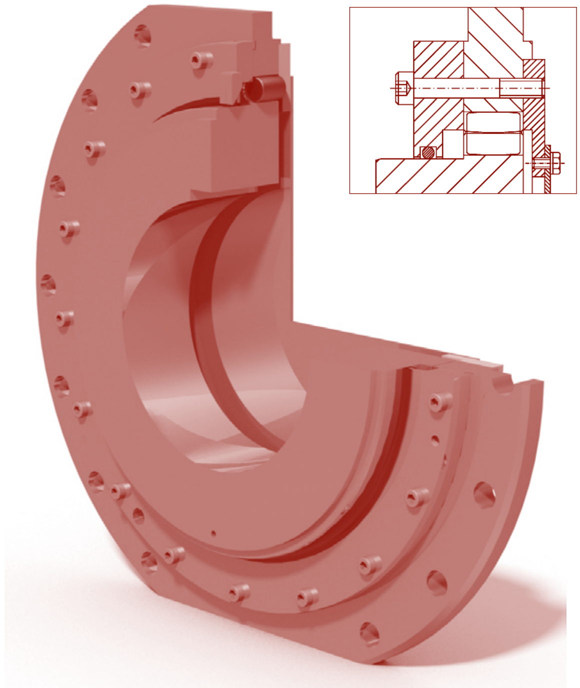
NT/NTR	2,5	5	7,5	10	13	16	20	30	40	50	60	100	150	210	260	340	420	620	820	920	1020
"m/2" (mm)	4	4	4	4	6	6	6	6	6	8	8	8	8	8	8	8	8	8	8	10	10

SPECIAL EXECUTIONS

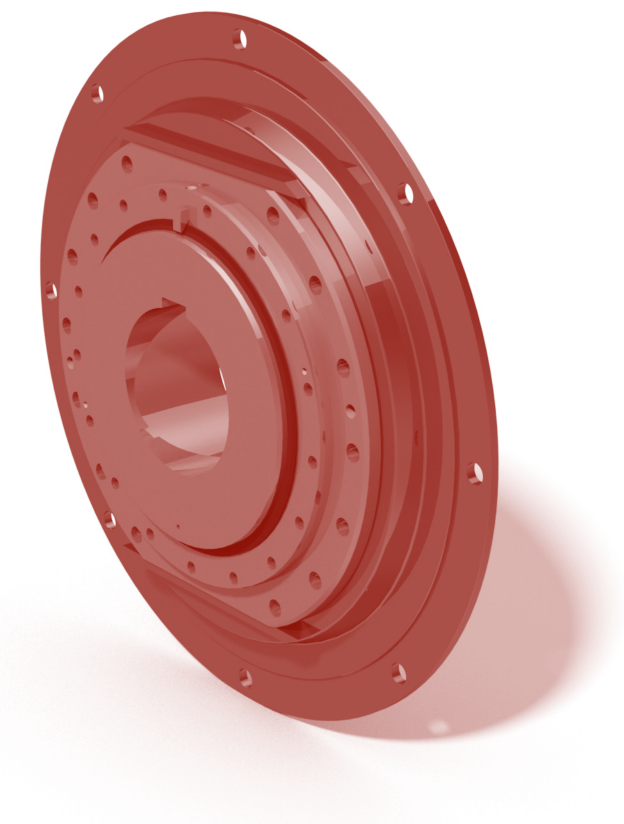
Type NTSI
Standard SIDMAR BR3-550 (01-10-1989Rev.D)



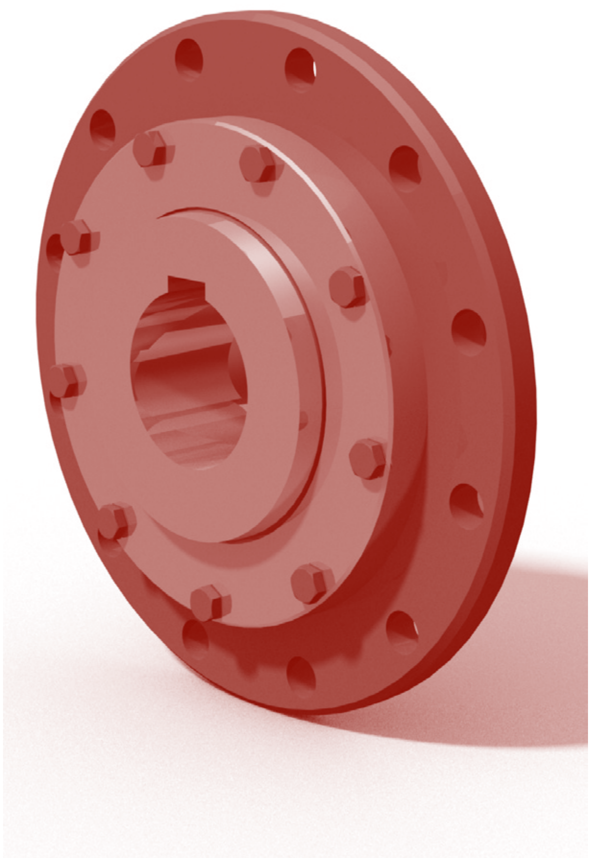
Type NTH

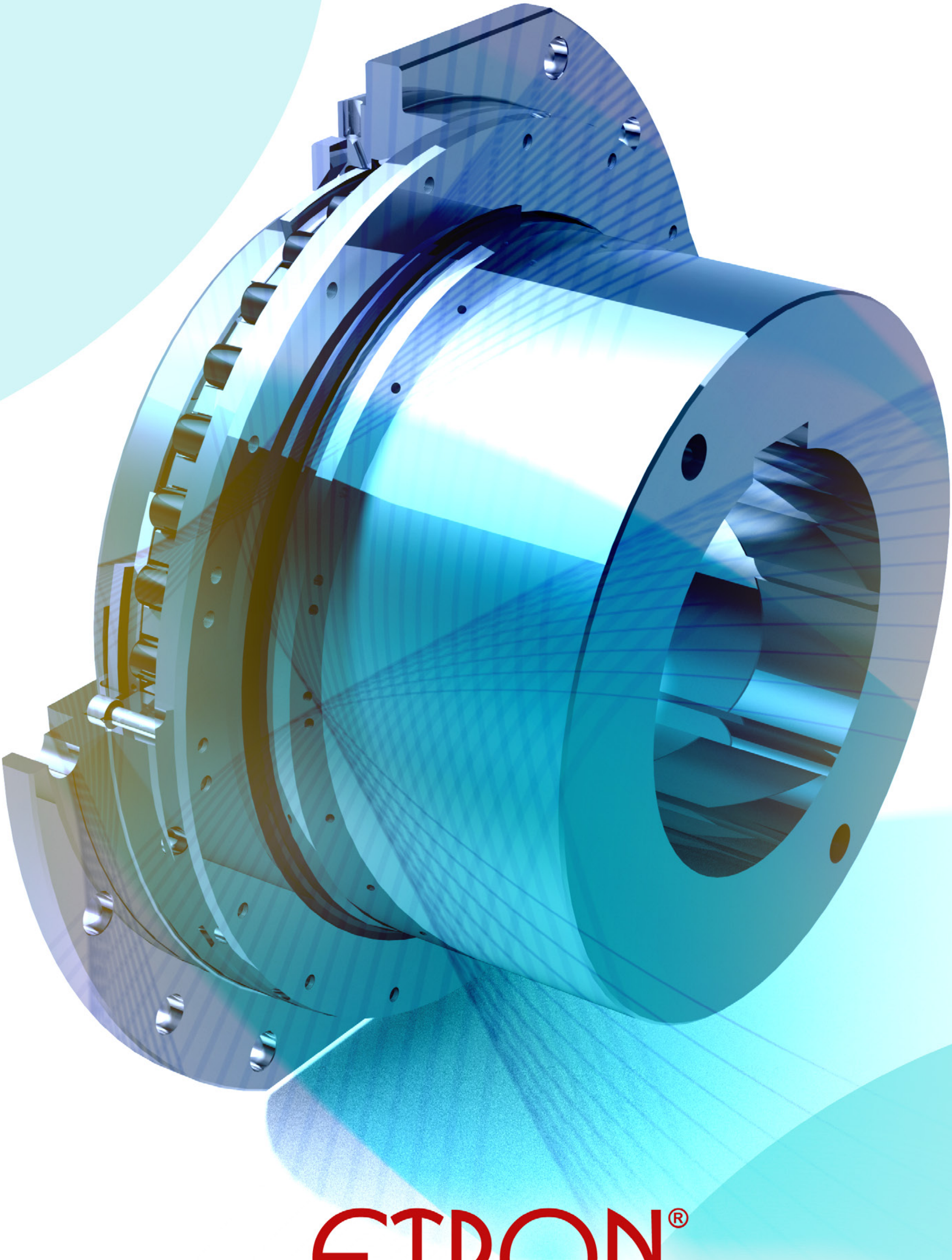


Coupling + Flange



Special flange without carrier faces





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