

CROWNGEAR



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Rota Free India Pvt Ltd

CROWNGEAR

Steel gear couplings

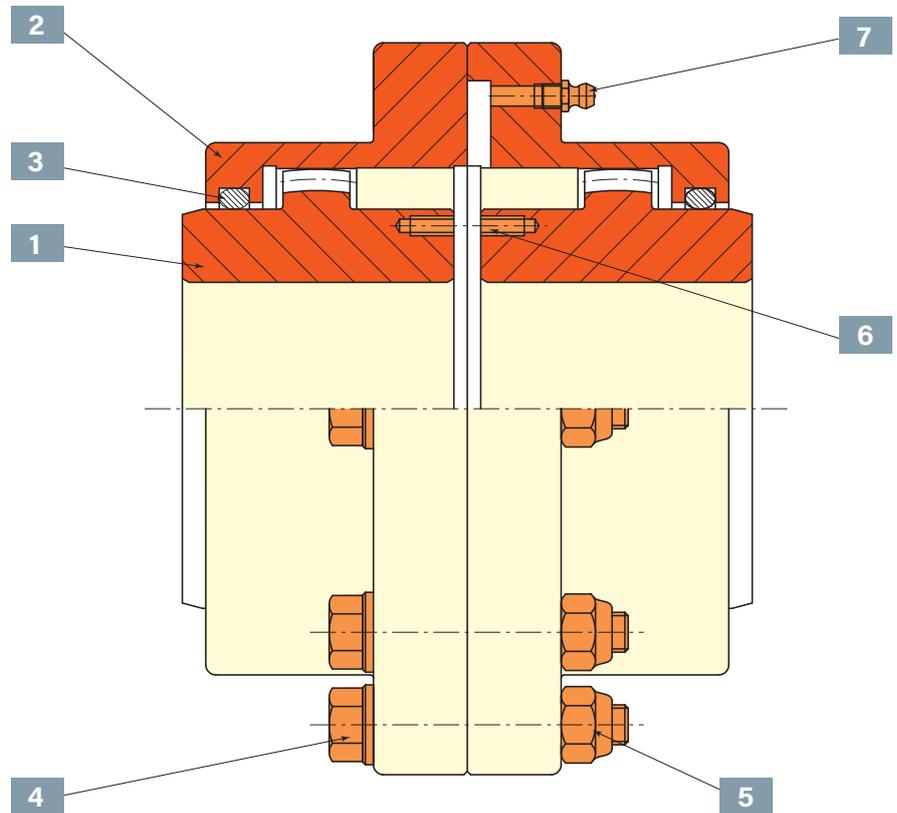
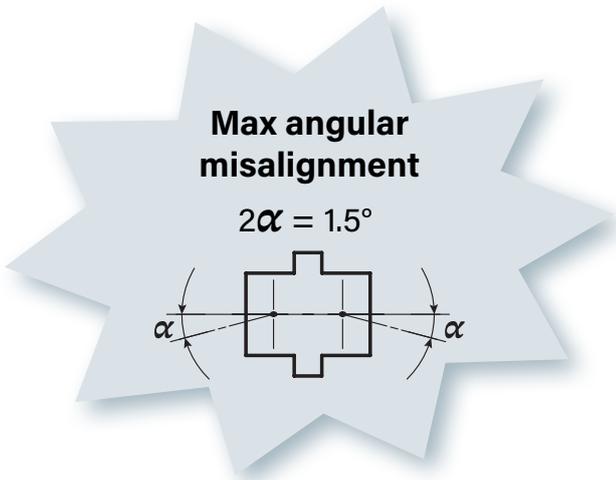


Fig. 1

1	Hub	5	Nut
2	Flange	6	Threaded extraction hole
3	O-Ring	7	Grease Nipple
4	Bolt		

Crowngear: How it works

CROWNGEAR is a double joint coupling manufactured from forged steel using as transmission element two crowned tooth geared hubs which engage two internal straight teeth flanges.

The hub's teeth curvature is designed in order to allow a torsional stiff transmission, and to compensate angular, radial and axial shafts misalignments; the special shape of the teeth grants an optimized contact area and a reduced surface pressure.

The two flanges are connected through high resistance bolts and, through four grease nipples, filled with grease which reduces teeth friction and wearing.

Standard O-ring in the sleeves ensures the seal and the coupling's long life; the grease must be refilled every 1000 working hours and changed every 5000 hours.

The standard CROWNGEAR range is designed for horizontal working position; vertical mounting requires a special drawing.

The working temperature can range from -10°C up to +80°.

Crowngear: The advantages of the system

- Very high torque density and low mass moment of inertia
- High torsional stiffness
- High shafts misalignment compensation with low restoring forces
- High speeds
- The 2 flanges drawing allow the radial dismounting of the motor without any displacement of the driven side and the axial displacement of the flanges to control the shafts alignment, the gears condition, the grease level
- The serie CROWNGEAR SD is a combination of a coupling and 2 Shrink Discs, with the further advantage of a higher fatigue resistance, a limited angular backlash, a much easier mounting and disassembly, avoiding the interference mounting by pressing, hubs heating and the disassembly by high pressure oil
- CROWNGEAR is supplied as standard with an excellent rust protective oil, and a multi-layer painting Blue RAL 5003, granting a 480 hours resistance in salt fog is available upon request.

Mounting, operating instructions and maintenance

Mounting

Clean carefully all the parts of the coupling.

Flanges must be located before to mount the hubs on the shafts.

Align the shaft using a dial indicator.

A good shafts alignment maximize the coupling's lifetime.

The distance between the hubs "s" must be according with the table (2). Tighten the screws with tightening torque T_s (table 2).

Shafts-Bore fits

The stress on the hubs must be controlled.

For medium or heavy duty:

- with 1 keyway H7-p6 hub-shaft tolerance and P9 keyway tolerance are recommended, and $C/d_{max} > 1,40$ (see table 2)

Mounting by press and heating the hubs up to 100°C, if necessary.

- with 2 keyways H7-p6 hub-shaft tolerance and Js9 keyway tolerance are recommended.

Lubrication

Use lithium greases with extreme pressure characteristics:

AGIP GR-MU EP	SHELL ALVANIA EP	ESSO BEACON EP	MOBILTEMP 78	CHEVRON DURA-LIGHT EP
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The coupling must be filled with the grease quantity listed in the table (1), through the 4 grease nipples.

The grease must be refilled every 1000 working hours and changed every 5000 hours.

Working temperature can range from -10°C up to +80°.

Type A/C - Type B - Type SD

Horizontal working position

Type A - C

Type A - Basic shape
Type C - Long hubs

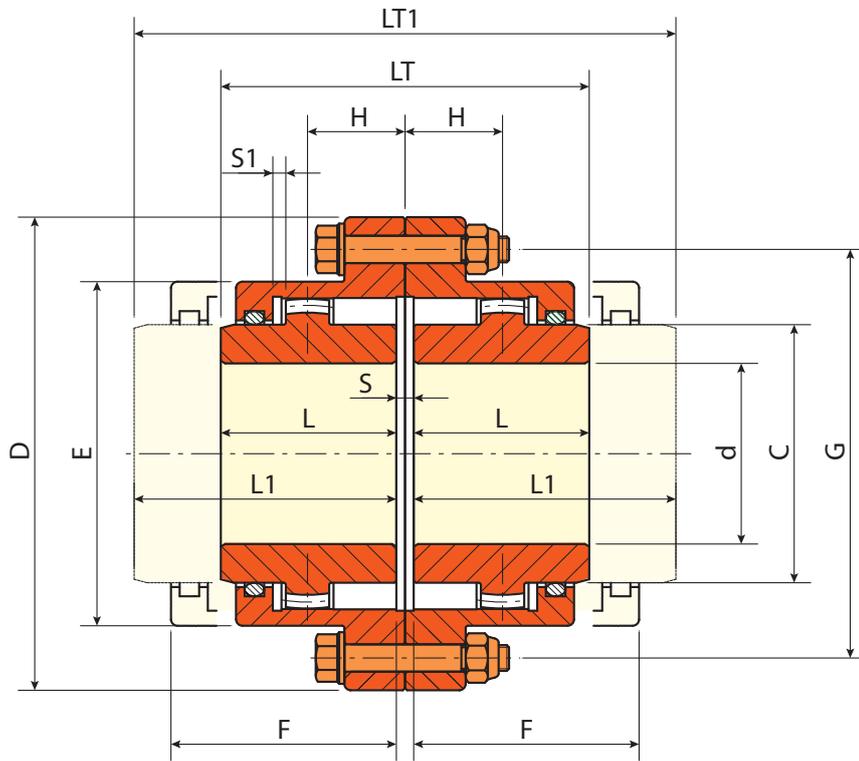
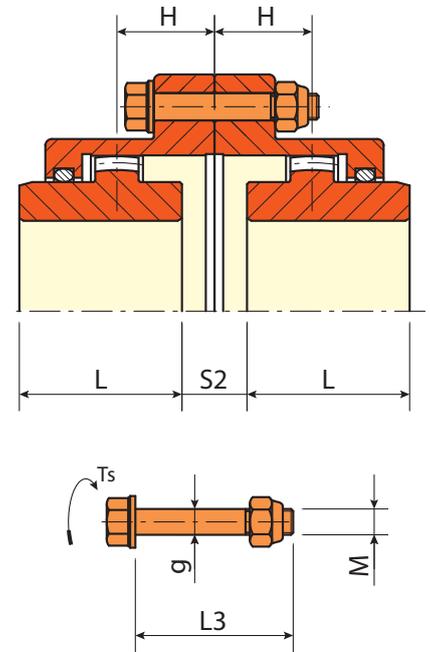


Fig. 2

Type B

Reversed hubs



Flange connection bolts

Fig. 3

Type SD

With Shrink Discs

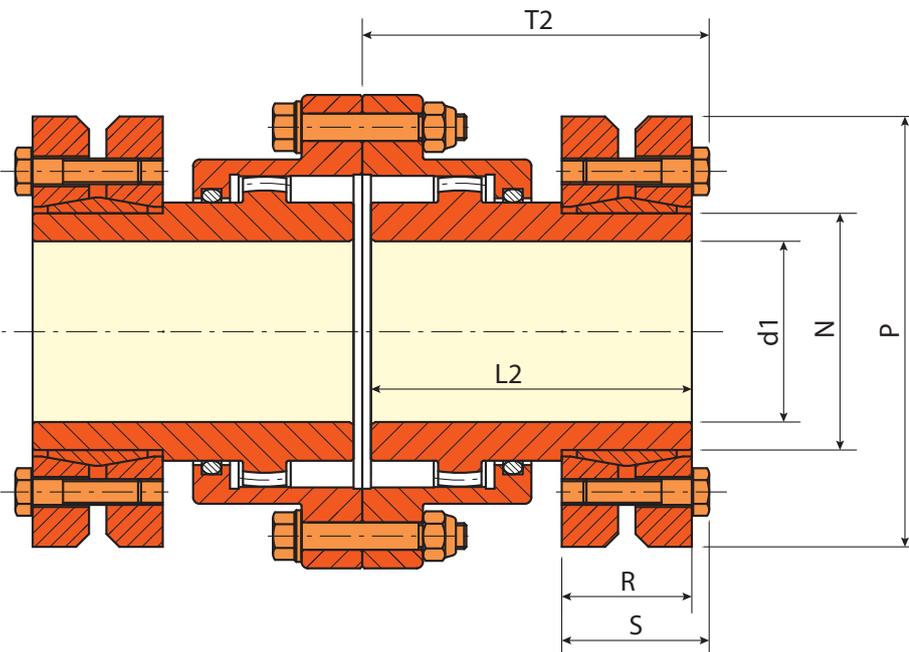
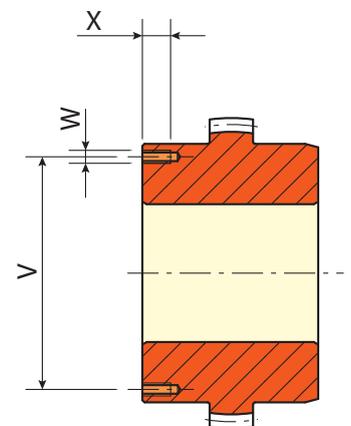


Fig. 4



Threaded extraction holes

Fig. 5

Tab. 1

Size	CROWNGEAR Technical Data					
	Nominal torque T Nm	Pick torque T _{max} Nm	Max speed n _{max} rpm	Mass kg		Grease kg
				Type		
	A	C				
50	1750	3500	6000	7	12	0,08
60	2750	5500	4600	13	21	0,09
75	5500	11000	4200	23	37	0,15
95	8500	17000	4000	42	66	0,26
110	13500	27000	3850	62	98	0,46
130	22000	44000	3700	99	150	0,70
155	35000	70000	3200	151	233	0,90
170	43000	86000	2900	114	178	1,50
190	68000	136000	2600	124	223	2,30
210	82000	164000	2300	207	308	3,20
230	150000	300000	2100	263	374	4,00
270	195000	390000	1800	410	530	6,00

Misalignments: see table 5

Tab. 2

Size	CROWNGEAR Overall dimensions															Flange connection bolts				
	Min. bore d min mm	Max. bore d max * mm	C mm	D mm	E mm	F** mm	G mm	H mm	L mm	L1 mm	LT mm	LT1 mm	S mm	S1 mm	S2 mm	M	g mm	L3 mm	Qt. nr	Ts Nm
50	-	50	69	111	82	58	96	24	43	105	89	213	3	1,5	7	M8	9	39	6	35
60	-	60	85	150	104	68	122	29	50	115	103	233	3	1,5	13	M10	11	51	8	68
75	-	75	107	174	128	87	150	38	62	130	127	263	3	1,5	25	M12	13	55	6	115
95	-	95	133	212	157	95	184	44	76	150	157	305	5	2,5	19	M16	17	65	6	280
110	-	110	152	238	182	120	208	57	90	170	185	345	5	2,5	43	M16	17	65	8	280
130	-	130	178	278	210	130	242	66	105	185	216	376	6	3	48	M20	21	80	8	540
155	-	155	209	316	246	135	280	76	120	215	246	436	6	3	58	M20	21	80	8	540
170	80	170	234	345	275	155	305	86	135	245	278	498	8	4	66	M20	21	80	10	540
190	90	190	254	384	308	195	345	100	150	295	308	598	8	4	92	M20	21	80	10	540
210	100	210	279	420	335	220	368	114	175	300	358	608	8	4	98	M20	21	80	14	540
230	120	230	305	455	367	236	406	124	190	305	388	618	8	4	108	M24	25	80	14	800
270	130	270	355	525	424	273	460	146	220	310	450	630	10	5	134	M24	25	80	16	800

* 6885/1 keyway

** Minimum dimension to align the hubs

Tab. 3

Size	CROWNGEAR SD for max. available shaft									
	Types SD	d1 max mm	N mm	P mm	R mm	S mm	L2 mm	T2 mm	T1 max Nm	Ts1 Nm
50	62x110	52	62	110	30	34	72	77,5	2400	12
60	80x145	70	80	145	32	37,5	80	87	4600	30
75	100x170	80	100	170	44	49,5	106	113	9000	30
95	125x215	95	125	215	52	58,5	123	132	15000	59
110	140x230	105	140	230	60	67,5	145	155	20000	100
130	170x290	130	170	290	71	81	166	179	40000	250
155	200x350	160	200	350	86	96	194	207	85800	250
170	220x370	170	220	370	104	114	223	237	110000	250
190	240x405	190	240	405	109	121,5	248	264,5	160000	490
210	260x430	210	260	430	120	132,5	275	291,5	204000	490
230	280x460	230	280	460	134	146,5	301	317,5	270000	490

Order form

1	Type	CROWNGEAR
2	Size	95
3	Shape	C
4	d ₁ + Kw	80
5	d ₂ + Kw	90

Crowngear size 95 - shape C (with long hubs) - d₁ ø 80 + keyway - d₂ ø 90 + keyway

Tab. 4

Size	Threaded extraction holes		
	V mm	W M	X mm
50	-	-	-
60	-	-	-
75	-	-	-
95	-	-	-
110	-	-	-
130	-	-	-
155	180	M16	25
170	204	M16	25
190	220	M20	35
210	240	M20	35
230	268	M24	45
280	316	M24	45

Size selection CROWNGEAR

To make a correct selection of the CROWNGEAR coupling firstly it's necessary to check the load factor f_2 (Tab.6), according to the type of load and the operating machine, then multiply it by the torque to be transmitted (T_n).

In this way, the torque T_{nf} necessary for the selection of the coupling is obtained.

After this operation it is necessary to choose a coupling that transmits a torque \geq the calculated one (see T values in table 1 of the technical data):

$$T \geq T_n \times f_2$$

Ex. 1

Torque to be transmitted	$T_n = 5100 \text{ Nm}$
Coupling speed	$\text{rpm} = 1500$
Load factor	$f_2 = 1,8$
Torque with load factor	$T_{nf} = 5100 \times 1,8 = 9180 \text{ Nm}$
Coupling selected	CROWNGEAR 110 T = 13500 Nm Maximum Speed n_{max} 3850 rpm

Calculation of the maximum angular misalignment Δ_{tot} (°)

Calculation speed factor f_v $f_v = \frac{1500}{3850} = 0,39$

Max. angular misalignment Δ_{tot} (°) = $2 \times 0,23^\circ = 0,46^\circ$ (See Diagr.1) ← Misalignment selected

Calculation service factor f_T $f_T = \frac{9180}{13500} = 0,68$

Max. angular misalignment Δ_{tot} (°) = $2 \times 0,27^\circ = 0,54^\circ$ (See Diagr.2)

Ex. 2

Torque to be transmitted	$T_n = 4000 \text{ Nm}$
Coupling speed	$\text{rpm} = 800$
Load factor	$f_2 = 1,5$
Torque with load factor	$T_{nf} = 4000 \times 1,5 = 6000 \text{ Nm}$
Coupling selected	CROWNGEAR 95 T = 8500 Nm Maximum Speed n_{max} 4000 rpm

Calculation of the maximum angular misalignment Δ_{tot} (°)

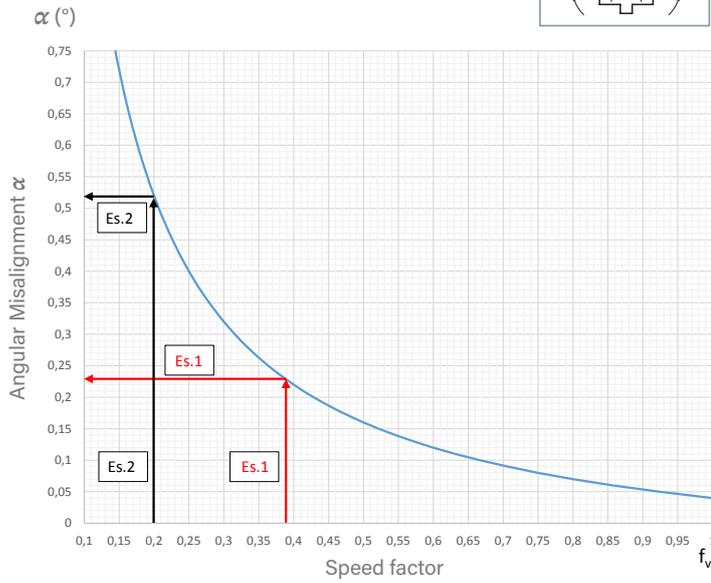
Calculation speed factor f_v $f_v = \frac{800}{4000} = 0,20$

Max. angular misalignment Δ_{tot} (°) = $2 \times 0,52^\circ = 1,04^\circ$ (See Diagr.1)

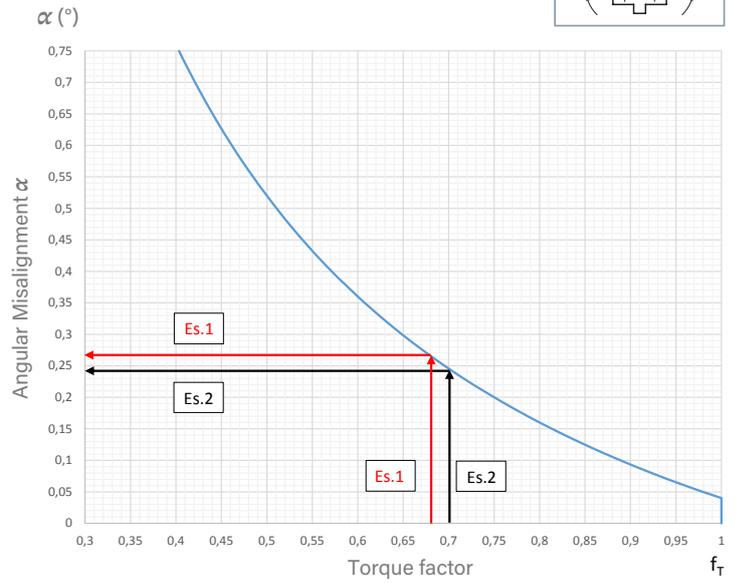
Calculation service factor f_T $f_T = \frac{6000}{8500} = 0,71$

Max. angular misalignment Δ_{tot} (°) = $2 \times 0,27^\circ = 0,54^\circ$ (See Diagr.2) ← Misalignment selected

Diagr. 1



Diagr. 2



Maximum angular misalignment of shafts

$\Delta\text{ang Max} = 1,5^\circ (2 \times 0,75^\circ - \text{fig. 6 - 7})$

Maximum angular misalignment of the coupling for shafts with radial misalignment

$\Delta\text{ang Max} = 0,75^\circ (\text{fig. 8})$

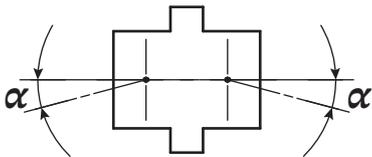


Fig. 6

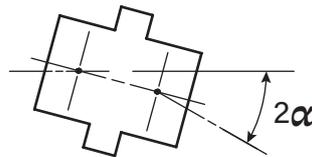


Fig. 7

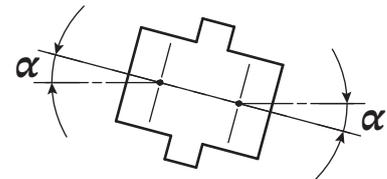


Fig. 8

Shafts misalignments check

The combined total angular misalignment ΔTOT is a function of the angular misalignment Δang and offset misalignment Δrad of the shafts, according to the following formulas:

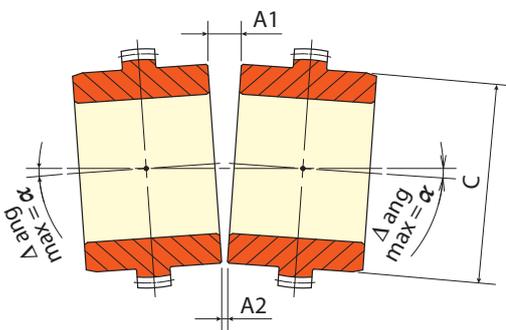


Fig. 6a

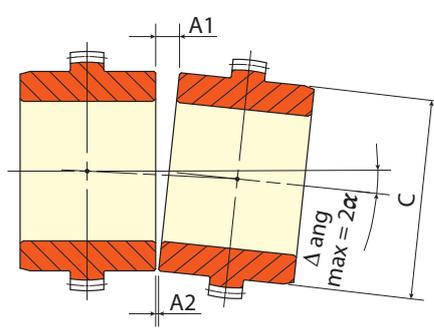


Fig. 7a

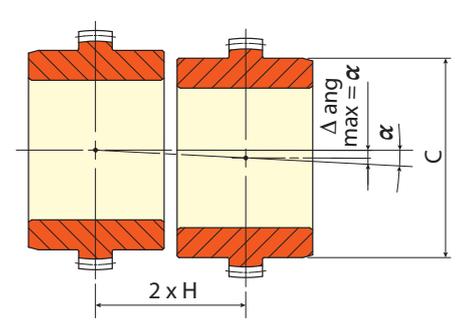


Fig. 8a

$$\Delta\text{ang} = \arcsin \frac{[A1 - A2] \times 0,5}{C}$$

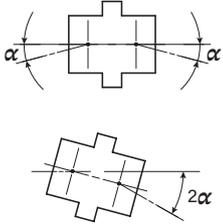
$$\Delta\text{ang} = \arcsin \frac{[A1 - A2]}{C}$$

$$\alpha = \arctang \frac{\Delta\text{rad}}{2 \times H}$$

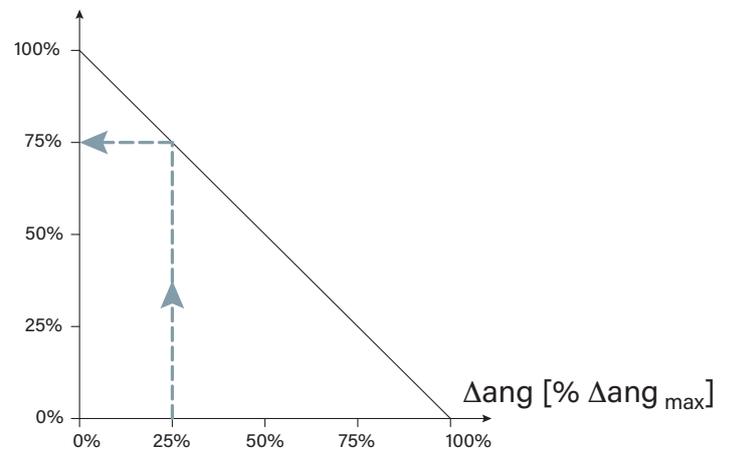
$$\Delta\text{tot} [^\circ] = \Delta\text{ang } \alpha + \Delta\text{rad} (\alpha)$$

The value **H** (mm) is given in the overall dimensions table (2).

Misalignments table

Size	$\Delta\text{ang}_{\text{max}}$	$\Delta\text{rad}_{\text{max}}$
50	$2\alpha_{\text{max}} = 1,5^\circ$ $(2 \times 0,75^\circ)$ 	0,6
60		0,8
75		1,0
95		1,2
110		1,5
130		1,7
155		2,0
170		2,3
190		2,6
210		3,0
230	3,2	
270	3,8	

$\Delta\text{rad} [\% \Delta\text{rad}_{\text{max}}]$



The $\Delta\text{ang}_{\text{max}}$ misalignment of $0,75^\circ$ between flange and hub and $\Delta\text{rad}_{\text{max}}$ cannot co-exist at the same time, therefore an angular misalignment Δang reduces the possibility of a radial misalignment according to the table.

Load factor f_2

The coupling size depends also on the type of machine to be coupled, where different types of loads can be involved, from "uniform" to "heavy duty with high and frequent shocks"

Load factor f_2 - Tab. 6

Type of load (driver: electric motor)	Example of operating machine	Type of load f_2
<ul style="list-style-type: none"> Continuous without overloads 	<ul style="list-style-type: none"> Agitators and centrifuges for liquids 	1,1 ÷ 1,3
<ul style="list-style-type: none"> Continuous with light overloads 	<ul style="list-style-type: none"> Packaging and bottling machines 	1,4 ÷ 1,7
<ul style="list-style-type: none"> Intermittent with medium overloads 	<ul style="list-style-type: none"> Reciprocating compressors 	1,75 ÷ 2,4
<ul style="list-style-type: none"> High and frequent overloads 	<ul style="list-style-type: none"> Mining crushers 	2,5 ÷ 3

The load factor f_2 must be increased:

- $f_2 + 1$ for machines operating by piston engines with 4 or 5 pistons
- $f_2 + 0.5$ for machines operating by piston engines with 6 pistons or hydraulic turbines or with start torque > 2
- repetitive high peak torque applications:
 - non reversing duty: $T > \text{Peak torque}$
 - reversing duty: $T > 1.5 \text{ Peak torque}$.

All the Rota Free India products are not machines but components and can be installed only onto machines in conformity to the existing EC directives.

To prevent damages to people or to machinery:

- only specialists should work on our units;
- all the moving parts must be covered;
- repeated tightening may decrease the locking effect of the screws and the hexagon nuts: replace them when necessary;
- all the data on the catalogue are non-binding and cannot be used for legal claims: it is customer's responsibility to establish whether the selected products meet the requirement of his machinery.

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We reserve the right to implement modifications without notice.