

Power Transmission Solutions



Overload Protection Clutches



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The Company

Cross & Morse was established in 1984 through the amalgamation of two long standing and well respected companies in the Power Transmission Industry, T.D. Cross and Morse Chain.

T.D. Cross & Sons was founded in 1870 in Birmingham, concentrating in the production of bicycle components under the direction of the Cross family. They moved to the current factory site in 1950 and developed into production of a popular range of roller chain sprockets and gearing. The competitive pricing and quality of product soon established the Company as a major supplier to both Agricultural and Industrial markets.

The Morse Chain Company was founded in 1894 also for the manufacture of bicycles in Pennsylvania, U.S.A. The company moved into production of inverted tooth chain drives and established a manufacturing plant in London in 1907, moving to the new Garden City of Letchworth, Herts. in 1918. The product range in the U.K. was developed to include Roller Chain and Sprockets, Couplings, Torque Limiters, Sprag Clutches and Timing Belt Drives, whilst in the U.S.A. by acquisition Morse also included the Denver Gearbox Range and the Sealmaster Bearing Products.

In 1987 Cross & Morse closed the Letchworth plant and centralised all production at the 10,000 sq. metre factory in Great Barr, Birmingham where current production of Roller Chains, Sprockets, Gears, Timing Belt Pulleys, Torque Limiters, Sprag Clutches and other specialised power transmission equipment is undertaken. In addition to manufactured products, Cross & Morse are main agents for Morse-Emerson, U.S.A.; and Stieber Formsprag, Germany; providing an extensive range of power transmission products.

The company operates a policy of continued assessment to develop and improve its products and customer service. In pursuance of these objectives Cross & Morse has been successfully assessed by Lloyds, and is registered, as an approved manufacturer of power transmission products to BS EN ISO 9001.



Shaft Clamping Elements

Sealmaster Bearings

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Overload Protection Devices



Development of manufacturing methods and production techniques has led to machinery and equipment being more automated, and systematically combined to provide the best material flow and production efficiency. In these conditions any small accident which could damage either machinery or drive lines can result in extended downtime of the total plant. Cross & Morse range of overload protection devices are designed to prevent damage of machinery or drive line in the event of an overload, so avoiding the need of costly repairs and minimising production downtime.

Several methods of overload protection are available, these being as classified below, all of which provide various levels of protection. Cross & Morse units are all of mechanical operation for minimum maintenance and simplicity of operation.

Classification of Overload Protection Types



Cross & Morse Overload Clutches

All Cross & Morse protection devices are available as shaft mount units for mounting sprockets, pulleys or gears, or as couplings for shaft to shaft connection. The basic features of the units offered are as shown in the table below. For detailed design specification and selection of units refer to catalogue pages of the relevant series.

FEATURE	Torque Limiter	Sheargard	Crossgard CG	Crossgard CGX	Crossgard CGZ	Safegard CSF	Safegard CSL	Safegard CSY	Safegard CSZ	Safegard CZF/CNF	Safegard CZY/CNY	Safegard CPF/CPY
DRIVE SYNCHRONISATION	NO	YES	YES	YES	YES	NO	YES	YES	YES	NO	YES	YES
DRIVE DISENGAGEMENT	NO	YES	1 REV	1 REV	YES	RATCHET	NO	1 REV	YES	TEMP	1 REV	1 REV
RESETTING METHOD	AUTO	MANUAL	AUTO	AUTO	MANUAL	AUTO	AUTO	AUTO	MANUAL	AUTO	AUTO	PNEU
BACKLASH	NONE*	NONE	MINIMAL	NONE*	MINIMAL	MINIMAL	MINIMAL	MINIMAL	MINIMAL	NONE*	NONE*	NONE*
OVERLOAD INDICATOR	NONE	OPTIONAL	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
CAN PROVIDE SOFT START	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
SET TORQUE ACCURACY %	15%	10%	10%	3%	10%	10%	10%	10%	10%	5%	5%	5%
SHAFT RANGE mm	5-120	10-215	8-130	7-70	8-50	7-110	7-110	7-110	7-110	6-60	6-60	8-55
MAX. TORQUE Nm	10000	125000	7154	785	450	8200	8200	8200	4400	740	740	550
MAX SHAFT SPEED rpm	3000	1500	700	1400	1800	3300	4000	1000	5000	4000	4000	5000

*Within Torque Range

Cross & Morse Torque Limiters



Cross & Morse Torque Limiters are low cost protection devices that limit torque in a drive system by slipping when a preset value is exceeded, in order to:-

Prevent machine and drive damage. Eliminate costly machine downtime.

The Torque Limiter is a protective device that limits torque transmitted in a drive system by slipping when a preset value is exceeded as a result of shock load, overload or machine jam. It automatically re-engages, when the overload is removed, no setting being required, Torque is transmitted by spring loaded friction faces, the value being preset by adjustment of the spring force by simple setting of the adjustment nuts and bolts. The Torque Limiter is suitable to use with sprockets, gears, pulleys or a flange plate as the centre member clamped between the friction facings. The Torque Limiter is not a new product with Cross & Morse. In 1949 Morse introduced the first spring loaded, friction type protective device which was developed to today's line of products consisting of 7 sizes, the models 200M to 700M being the most popular units. To further extend the capabilities of our products a new metric series of clutches, consisting of 6 sizes from M30 to M280 has been added, to cater for higher torque applications, and areas where space is limited. As originator of the Torque Limiter, Morse gained vast experience in the design and application of these units as trouble free and long lasting protective devices. Many thousand units have been fitted to conveyors, mechanical handling equipment and agricultural machines.



Morse Torque Limiters incorporate design features for long life and reliability. **Correct Spring Selection and Ratings**

Torque Limiter capacities are directly proportional to



the spring force applied to the friction surfaces and it is a simple matter to increase capacity by increasing spring force - but not without a sacrifice. The higher the unit load or pressure (psi) on the friction surfaces, the quicker the friction facings will deteriorate as they slip against the pressure plates and centre member. Morse ratings are realistic and are consistent with optimum spring loads and face pressures that permit longer slip time, maintain re-engagement at pre-set torque, and provide long-lasting protection. The spring is designed so that its force varies little over a wide deflection range at the rated capacity of the torque limiter. This assures load re-engagement near the pre-set torque level as the friction facing wears. It is characteristic of a disc spring that it is more unstable and erratic in the lower end of its load vs. deflection curve; Morse therefore established minimum torque ratings consistent with spring characteristics.





Cross & Morse Torque Limiters offer you the following Benefits:

- Simple Design
 - Minimum Maintenance
 - Corrosion Resistant

- Easy Adjustment
- Wide Torque Range Infinite Torque Adjustment Settings Dependable
- Economical

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• Durable

- Compact

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- Conclusion The incorporation of an inexpensive Cross & Morse Torque Limiter improves machine design, safeguards production, and minimises the downtime so ensuring increased productivity and profits.

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- Low Cost
- 3

Standard Torque Limiters



Original Morse Series Torque Limiters

Developed from the original Torque Limiters produced in 1949, these well proven units are based on Imperial dimensions. Imitated by many over the years these units provide the ideal low cost solution to overload protection for torques between 3 & 1500 Nm. For Torque Limiter selection refer to page 6.



Models 200M, 250M & 350M





Models 500M & 700M

Models 13 & 20

Dimensions

*Model	Torque min	Torque max	Stock min plain bore	Stock Finish bores	Max Bore with Std Keyway	†Standard Bush Lengths (Ref.)	Set Screw	A	В	C (max)	D	F	G	L	M A/F	Р	Weight
	Nm	Nm	mm	mm	mm	mm		mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
200M1 200M2	3 6	13 25	9.5	19 20	22	(275, 365, 480, 551) 7.0, 9.5, 11.5, 13.4	M5	52	48	9	16	4.0	3.5	34.9	46		0.4
250M1 250M2	7 12	34 67	9.5	15 19 20	22	(275, 365, 480, 551) 7.0, 9.5, 11.5, 13.4	M5	64	48	9	16	4.0	3.5	34.9	46		0.5
350M1 350M2	20 34	100 200	18	20 24 25	25	(365, 480, 551, 628, 829) 9.5, 11.5, 13.4 16.0, 20.3	M6	89	62	16	19	4.0	3.5	42.9	60		1.1
500M1 500M2	48 88	283 566	22	25 28 30 35 38 40	41	(480, 551, 628, 829) 11.5, 13.4, 16.0, 20.3	M8	127	76	16	22	6.5	3.5	63.5	-	92	3.0
700M1 700M2	110 224	770 1540	24	$40 \ 45 \ 48 \ 50 \ 60$	64	(520, 580, 667, 868, 966, 1187, 1375) 13.2, 14.7, 16.9, 22.3, 24.6, 30.2, 34.9	M10	178	98	29	24	8.0	5.0	95.3	-	133	6.8
13-8 ⁽¹⁾ 13-16 ⁽¹⁾	678 1356	1966 3120	38.1		82	(375, 500, 562) 9.5, 12.7, 14.3	-	330	146	22	36	9.5	4.8	114.3	-	279	38.6
20-5 ⁽¹⁾ 20-10 ⁽¹⁾	2135 4270	4270 8540	50.8		124	(500, 625) 12.7, 15.9	-	508	184	24	46	12.5	4.8	165.1	-	413	115.0

*M1 Torque Limiters Fitted One Disc Spring. M2 Torque Limiters Fitted Two Disc Springs. †Torque Limiter supplied standard without Bush, which is supplied with Platewheel. If Bush required, specify on order which length (size) required.

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For procedure to select Torque Limiters refer to page 6. For range of standard platewheels refer to page 7.

⁽¹⁾ Sizes 13 & 20 Torque Limiters for replacement purposes only Refer Metric sizes M200 - M280 for new applications.

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Standard Torque Limiters



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Metric Series Torque Limiters

To extend the range of torque capability a new series of Torque Limiters is offered providing both smaller and larger sized units with a range of 1.5 to 10,000 Nm. These units are all to metric dimensions, and as with the original series are available with a roller chain coupling for shaft to shaft connection. For Torque Limiter selection refer to page 6.



Models M40 & M45

	Torque	Torque	Stock	Max Bore		DL7	c	Bush	F	=	G	L	ц	Approx.
Model	mín	máx	bore	with Std Keyway	A	DK/	U	Length	min	max			п	Weight
	Nm	Nm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
M30-2	3*	10*	4.5	11	30	21	31	5.8	6.0 ⁽²⁾	7.2	2.5	9.0	18	0.10
M40-1 M40-2 M40-3	4 7 10	15 28 40	7.0	14	40	26	28	7.0	3.5	5.0 ⁽¹⁾	2.8	8.0	22	0.16
M45-1 M45-2 M45-3	7 13 17	30 55 70	7.0	20	45	35	33	8.8	4.5	5.8 ⁽¹⁾	3.0	8.5	32	0.19
M200-24(A)† M200-24(B)†	440 800	2200 4000	35.0	80	200	120	105	28.0	20.0(2)	22.0	5.0	27.0	110	16.50
M254-32(A)† M254-32(B)†	760 1350	3800 6800	48.0	90	254	140	120	31.8	23.8(2)	26.0	5.0	33.0	125	21.00
M280-32(A)† M280-32(B)†	1100 2000	5500 10000	48.0	120	280	170	120	31.8	23.8(2)	26.0	5.0	33.0	155	26.00

*Torque values can be halved by facing springs towards one another.

+Torque values determined by positioning of springs, refer to drawings.

⁽¹⁾Torque Limiters with 1 & 2 springs can accommodate thicker platewheels, (up to 2mm max), but extra care must be exercised to ensure that bush supports both friction facings, and use second bush if required.

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⁽²⁾Min. width can be reduced by reducing bush length.

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Torque Limiters Selection



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Selection Procedure

- **1.** Determine if the Torque Limiter is to be mounted on input (driver) or output (driven) shaft. Mounting on input shaft is normally lowest cost, and spreads load on Limiter body in overload slip, but if frequent slip occurs longer wear life of friction facings is obtained with the Torque Limiter on the output shaft.
- **2.** Determine normal Drive Torque from input Power and Shaft Speed using formulae:-

Torque Nm =
$$\underline{H.P. x 7124}_{R.P.M.}$$
 Torque Nm = $\underline{kW x 9550}_{R.P.M.}$

3. Decide on required Slip Torque, normally between 1.2 and 1.5 times Drive Torque dependant on frequency of machine stop-start cycles.

- 4. Refer to pages 4 and 5, select size of Torque Limiter where Rated Torque slightly exceeds Slip Torque. Confirm Selected Torque Limiter will accept drive shaft diameter.
- 5. Using capacity below, confirm selection of Torque Limiter. For machines under constant supervision or with motor overload sensors the 10 sec values should be used. For unmanned machines combination of torgue and speed should always be within power ratings over 5 min to avoid deterioration of components parts due to temperature build-up. If necessary a larger Torque Limiter may have to be selected to provide sufficient heat dissipation.
- 6. Check Sprocket Tables below, to ensure that required size will fit selected Torque Limiter.

Torque	Maximum O	perating RPM			kW Ratings accordi	ng to max slip time		
Model	At Minimum Torque	50% Plus Torque Rating	Over 5 min	5 min	2 min	1 min	30 sec	10 sec
200M	1800	800	0.06	0.11	0.20	0.38	0.55	0.90
250M	1450	430	0.08	0.16	0.30	0.56	0.80	1.30
350M	1050	280	0.19	0.37	0.70	1.30	1.85	3.00
500M	750	250	0.47	0.93	1.70	3.25	4.65	7.50
700M	530	200	1.02	2.04	3.80	7.15	10.20	16.30
M30	3000	310	0.01	0.02	0.04	0.07	0.10	0.16
M40	2300	210	0.02	0.04	0.08	0.14	0.20	0.32
M45	2000	140	0.03	0.05	0.10	0.18	0.25	0.40
M200	475	100	1.29	2.50	4.80	9.00	12.90	20.60
M254	375	90	2.40	4.80	8.90	16.80	24.00	38.50
M280	340	80	2.95	5.85	10.80	20.50	29.25	47.00

Dimensions

Note: If your drive requirements do not permit selection of a Standard Torque Limiter by the above procedure contact Technical Department, Cross & Morse.

Minimum Sprocket Teeth and Bush Lengths for BS and ANSI Roller Chains

Chair	n Size	³/8" Of	6B/35	1/2" O	8B/40	⁵ /8" 1	DB/50	³/4" 12	2B/60	1" 16	6B/80	1 ¹ /4" 2	0B/100	1 ¹ /2" 24	4B/120	1³/4" 2	8B/140	2" 32	B/160
Model No.	Bore Dia. mm	Sprocket Min. Teeth	Bush Length mm																
200M	41.33 41.38	21	(365) 9.5	17	(480) 11.5	14	(551) 13.4												
250M	41.33 41.38	25	(365) 9.5	20	(480) 11.5	16	(551) 13.4												
350M	49.28 49.33	33	(365) 9.5	26	(480) 11.5	21	(551) 13.4	18	(628) 16.0	15	(829) 20.3								
500M	73.10 73.15			35	(480) 11.5	29	(551) 13.4	25	(628) 16.0	19	(829) 20.3								
700M	104.88 104.93			48	(520) 13.2	39	(580) 14.7	33	(667) 16.9	25	(868) 22.2	21	(966) 24.6	18	(1187) 30.2	16	(1187) 30.2	15	(1375) 34.9
13-	161.99 162.05									44	(375) 9.5	36	(500) 12.7	31	(562) 14.3	27	(562) 14.3	24	(562) 14.3
20-	222.33 222.40											54	(500) 12.7	46	(625) 15.9	40	(625) 15.9	35	(625) 15.9
M30	21.10 21.05	14	4.5(3)	12	6.0														
M40	26.10 26.05	17	8.0	14	8.0														
M45	35.12 35.07	19	9.0	15	9.0														
M200	120.18 120.10					43	15.5 ⁽³⁾	36	17.0 ⁽³⁾	28	22.5 ⁽³⁾	23	25.0 ⁽³⁾	20	29.0	17	29.0(1)	15	29.0(1)
M254	140.20 140.12							45	17.0 ⁽³⁾	35	22.5 ⁽³⁾	29	25.0 ⁽³⁾	24	31.8	21	31.8 ⁽²⁾	19	35.0 ⁽⁴⁾
M280	170.20 170.12							50	17.0 ⁽³⁾	38	22.5 ⁽³⁾	31	25.0 ⁽³⁾	26	31.8	23	31.8 ⁽²⁾	21	35.0 ⁽⁴⁾

⁽¹⁾Platewheels require recess to fit Torque Limiter.

⁽²⁾Platewheels for BS series chains requires recess to fit Torque Limiter. ⁽³⁾Bushes require shortening to length indicated.

⁽⁴⁾Two bushes required to total length indicated. For standard stock platewheels refer to page 7.

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Torque Limiters Platewheels

Fits

Torque Limiter Number

M30

M40

M45

200M



Weight

kq

0.06 0.09

0.09 0.12

0.12 0.18

0.11

0.13 0.18

Fel:

+44 1

| 2 |

Bush

Length

mm

5.0 5.0

7.0 7.0

8.8 8.8

9.5

9.5 11.5

Bush

Size

365

365 480

Morse recommend and offer as stock items, specially machined platewheels for use with Torque Limiters. Both faces of Morse Torque Limiter Platewheels are machined to $1.6\mu m$ surface finish. Uniform surfaces and parallel faces ensure that Morse Torque Limiters will reliably maintain correct torque release and re-engagement. For the most economical drive design, select a platewheel from the increased range of standard stock platewheels.





For accurate torque setting and applications where slippage ma frequent, it is essential that a gr plate sprocket is used. Rated to capacity can only be obtained w friction facings and a ground pl sprocket which has been run-ir revolutions at 50% maximum to rating for the single spring unit speed not exceeding 120 r.p.m.

	250M	250G06B1-25 250G06B1-38 250G08B1-21 250G08B1-21 250G08B1-22 250G08B1-23 250G08B1-25 250G08B1-30 250G08B1-57 250G10B1-21 250G10B1-23 250G10B1-25 250G10B1-25 250G10B1-57	$\begin{array}{c} 0.375\\ 0.375\\ 0.500\\ 0.500\\ 0.500\\ 0.500\\ 0.500\\ 0.500\\ 0.500\\ 0.500\\ 0.500\\ 0.625\\ 0.$	25 38 20 21 22 23 30 38 57 19 21 23 25 38 57	80.0 119.4 85.8 90.4 94.5 106.4 127.5 159.0 236.1 104.1 114.1 114.1 1124.2 134.4 199.6 296.0	41.38 -0.05	5.33 5.33 7.24 7.24 7.24 7.24 7.24 7.24 7.24 7.24	365 365 480 480 480 480 480 480 480 480 551 551 551 551 551 551 551	$\begin{array}{c} 9.5\\ 9.5\\ 11.5\\ 11.5\\ 11.5\\ 11.5\\ 11.5\\ 11.5\\ 11.5\\ 11.5\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\end{array}$	$\begin{array}{c} 0.14\\ 0.36\\ 0.21\\ 0.23\\ 0.32\\ 0.36\\ 0.54\\ 0.91\\ 2.15\\ 0.41\\ 0.50\\ 0.64\\ 0.75\\ 1.78\\ 4.29\\ \end{array}$	50 0155 Fax: +
	350M	350G06B1-38 350G08B1-27 350G08B1-30 350G08B1-38 350G08B1-57 350G10B1-21 350G10B1-23 350G10B1-25 350G10B1-25 350G10B1-76 350G10B1-76 350G12B1-21 350G12B1-21 350G12B1-25 350G12B1-25 350G12B1-25 350G12B1-76	0.375 0.500 0.500 0.500 0.625 0.625 0.625 0.625 0.625 0.625 0.625 0.750 0	38 27 30 38 57 21 23 24 25 38 57 76 19 21 23 25 38 57 76	119.4 114.5 127.5 159.0 236.1 114.1 124.2 129.3 134.4 199.6 296.0 392.1 125.2 137.2 150.2 161.3 239.8 355.4 469.9	49.33 -0.05	5.33 7.24 7.24 7.24 9.02 9.02 9.02 9.02 9.02 9.02 9.02 9.02	365 480 480 551 551 551 551 551 551 551 551 628 628 628 628 628 628 628 628 628	$\begin{array}{r} 9.5\\ 11.5\\ 11.5\\ 11.5\\ 11.5\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 13.4\\ 16.0\\ 10.0\\ $	$\begin{array}{c} 0.38\\ 0.40\\ 0.53\\ 0.91\\ 2.14\\ 0.47\\ 0.62\\ 0.68\\ 0.73\\ 1.73\\ 4.27\\ 7.72\\ 0.73\\ 0.91\\ 1.15\\ 1.38\\ 3.04\\ 7.58\\ 13.65\end{array}$	44 IZI 323 IU/9 E
	500M	500G08B1-38 500G08B1-57 500G08B1-76 500G10B1-38 500G10B1-37 500G12B1-25 500G12B1-28 500G12B1-28 500G12B1-76 500G12B1-76 500G12B1-76 500G16B1-21 500G16B1-23 500G16B1-25 500G16B1-23	$\begin{array}{c} 0.500\\ 0.500\\ 0.500\\ 0.625\\ 0.625\\ 0.750\\ 0.750\\ 0.750\\ 0.750\\ 0.750\\ 1.000\\ 1.000\\ 1.000\\ 1.000\\ 1.000\\ \end{array}$	38 57 76 38 57 76 25 28 38 57 76 19 21 21 23 25 38	159.0 236.1 312.4 199.6 296.0 392.1 161.3 179.6 239.8 355.4 469.9 166.6 184.9 200.7 216.7 320.5	73.15 -0.05	$\begin{array}{c} 7.24\\ 7.24\\ 7.24\\ 9.02\\ 9.02\\ 9.02\\ 10.97\\ 10.97\\ 10.97\\ 10.97\\ 10.97\\ 16.08\\ 16.08\\ 16.08\\ 16.08\\ 16.08\\ \end{array}$	480 480 551 551 628 628 628 628 628 628 829 829 829 829 829 829	$\begin{array}{c} 11.5\\ 11.5\\ 13.4\\ 13.4\\ 13.4\\ 16.0\\ 16.0\\ 16.0\\ 16.0\\ 20.3\\$	0.82 2.10 3.70 1.54 4.24 7.69 2.81 7.52 13.59 2.31 2.81 3.20 3.81 7.42	mall: sales@crossm
ny be ound rque vith dry late	700M	700G10B1-39 700G10B1-57 700G10B1-76 700G12B1-38 700G12B1-57 700G12B1-76 700G16B1-28 700G16B1-38 700G16B1-57 700G20B1-21	$\begin{array}{c} 0.625\\ 0.625\\ 0.750\\ 0.750\\ 0.750\\ 1.000\\ 1.000\\ 1.000\\ 1.250\\ \end{array}$	39 57 76 38 57 76 28 38 57 21	205.0 295.7 392.1 239.8 355.4 469.9 240.5 320.5 474.0 230.9	104.93 -0.05	9.02 9.02 9.02 10.97 10.97 10.97 16.08 16.08 16.08 18.57	580 580 667 667 868 868 868 868 966	14.7 14.7 16.9 16.9 22.2 22.2 22.2 24.6	1.54 3.85 7.65 2.72 7.47 13.55 3.72 7.39 17.90 3.76	norse.com
for 500	M200	M200G16B1-30	1.000	30	254.0	120.18 -0.08	16.08		28.0	4.20	
at a	M254	M254G24B1-24	1.500	24	306.8	140.2 -0.08	24.10		31.8	9.30	
	M280	M280G24B1-30	1.500	30	379.5	170.2 -0.08	24.10		31.8	14.50	
for runni 30 oil. To	ng in c orque I	il. As a gene Limiters to ru	eral rule an in o	e the to il shoul	rque cap d have tł	acity wil ne frictio	l be red n facing	luced te gs soak	o .25 of ed in oi	the il	7

Stock Machined Platewheels for BS Roller Chain

Bore Dia.

over Bushing

mm

21.1

26.1 -0.05

35.12 -0.05

41.38 -0.05

Outside

Diameter

mm

52.3 61.3

61.3 71.0

71.0 82.3

67.8

73.5 82.3

Max. Width

mm

5.33 5.33

5.33 5.33

5.33 7.24

5.33

5.33 7.24

Chain Pitch

inches

0.375

0.375 0.375

0.375 0.500

0.375

0.375 0.500

Catalogue Number

M30G06B1-16 M30G06B1-19

M40G06B1-19 M40G06B1-22

M45G06B1-22 M45G08B1-19

200G06B1-21

200G06B1-23 200G08B1-19

Number

of

Teeth

16 19

19 22

22 19

21 23 19

Torque Limiters are suitable stated torque when using SAE before assembly.

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Torque Limiter Couplings



Torque Limiter combined with Roller Chain Flexible Coupling

The Torque Limiter Coupling combines overload protection with ability to connect in-line shafts. The unit consists of a standard Torque Limiter and platewheel connected to a special coupling sprocket by duplex Roller Chain. Available in eleven standard sizes, they are easy assembly units providing protection and reliability. For selection refer to page 6.





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Capacities and Dimensions

Catalogue	Misalig	nment	Torque Ca	pacity Nm	Minimum	Plain Bore	Maxim	um Bore	Sprocket			Dimensi	ions mm			Weight*
Number	Max. Pall. mm	Max. Angle	Min.	Max.	Limiter mm	Coupling mm	Limiter mm	Coupling mm	Size	Α	В	C	D	E	F	Kg
M30-2C	0.20	30'	3	10	4.5	11	11	22	06B-16	55.0	57.1	37.0	22.5	31.0	1.5	0.5
M40-1C M40-2C M40-3C	0.20	30'	4 7 10	15 28 40	7	8	14	35	06B-22	55.0	75.2	55.0	25.0	28.0	2.0	0.8
M45-1C M45-2C M45-3C	0.20	30'	7 13 17	30 55 70	7	8	20	40	06B-22	59.5	75.2	55.0	25.0	33.0	1.5	0.9
200M-1C 200M-2C	0.25	30'	3 6	13 25	11	14	22	42	08B-20	73.3	93.0	66.0	22.0	47.6	3.7	1.8
250M-1C 250M-2C	0.25	30'	7 12	34 67	11	11	22	50	08B-22	76.7	101.0	75.4	25.4	47.6	3.7	2.0
350M-1C 350M-2C	0.31	30'	20 34	100 200	18	18	25	70	10B-24	103.7	136.5	104.4	38.1	61.9	3.7	5.2
500M-1C 500M-2C	0.38	30'	48 88	283 566	22	22	41	95	12B-28	121.2	186.8	149.3	41.3	76.2	3.7	12.2
700M-1C 700M-2C	0.51	30'	110 224	770 1540	24	24	64	135	16B-28	168.1	247.5	199.4	66.7	98.4	3.0	31.3
M200-24C	0.51	30'	440 800	2200 4000	35	35	80	100	16B-30	194.0	264.0	150.0	85.0	105.0	3.0	41.5
M254-32C	0.76	30'	760 1350	3800 6800	48	51	90	150	24B-24	214.0	326.0	232.0	90.0	120.0	4.0	74.6
M280-32C	0.76	30'	1100 2000	5500 10000	48	51	120	200	24B-30	214.0	398.0	302.0	90.0	120.0	4.0	98.2
M280-32C	0.76	30'	1100 2000	5500 10000	48	51	120	200	24B-30	214.0	398.0	302.0	90.0	120.0	4.0	98.2

*Weights are for Torque Limiter and Coupling unbored.

Good Reasons to fit a Morse Torque Limiter on your Equipment.

Design

Protection for expensive components within the drive system or structural framework, gives longer machine life with increased reliability in service, and reduction of expensive downtime.

Maintenance

Maintenance is reduced by the inherent protection offered by the torque limiter, which in itself is inexpensive, corrosion resistant, and extremely easy to maintain.

Product Improvement

Many existing machines can be fitted with a torque limiter, without modification to the design, by replacing a sprocket with a torque limiter fitted with a platewheel, or for in-line drives by replacing existing coupling with a torque limiter coupling.

Sheargard Overload Clutches



The Cross Sheargard clutch complements the range of Torque Limiters by providing machinery protection on applications where accurate torque control and shaft synchronisation are necessary; and when in the event of an overload, total disengagement of driving and driven members is required.

The design of the Sheargard Clutches provides for the transmission of high torques (up to 125,000 Nm) with a compact, low inertia unit. Standard stock products enables prompt delivery, at low cost of shearpin chain sprockets and flexible shaft couplings. The provision of an optional motor monitor plate enables disconnection of the power supply and / or operation of alarm signals in the event of an overload when used in conjunction with a limit switch or proximity switch.

The basic advantages of the well proven "Howdon" wedge shearpin, have been combined with a clutch designed for economic production, with component parts sized to enable the use of the existing range of torque limiter platewheel and chain flexible coupling to enable supply from stock of complete drive assemblies. For higher speed applications a rubber coupling is available.

In the diagram Hub "A" and Flange "B" have matching tapered slots cut axially in their periphery, into which the "Howdon" wedge-shaped shearpins "C" are inserted and firmly clamped by two self-locking screws. Torque is transmitted by the wedge which has a reduced diameter neck in mid-span "D" designed to shear when the pre-determined torque is exceeded, so allowing the sleeve to rotate freely on the hub.





The Cross Sheargard by virtue of its design offers a number of advantages over alternate overload protection systems

1. Simple Design

In a Shearpin the full shear strength is directly available as a frictionless driving force. The use of up to three shearpins provides high torque capacity within a compact unit, keeping both inertias and costs to a minimum. Several ratings of pin for each clutch size provides over 200 stock torque ratings. The Sheargard can be used with chain sprockets, gears, belt drives or shaft couplings. In the event of an overload, the wedge shaped shearpins are easy to locate, and quickly replaced by removal of two self-locking screws and broken halves of shearpin, and replacement with a new wedge pin.

2. Accurate Torque Ratings

Inaccuracy of torque setting in conventional shearpin couplings is caused by non-uniform shear necks, and poor fit of the pin with its mating surfaces. The "Howdon Wedge" pins are precision turned to a constant form and can be expected to fracture within $\pm 10\%$ of catalogue rating. The wedge pins are rigidly located in the mating grooves so totally eliminating fretting fatigue failures, and ensuring zero backlash making it ideal for indexing and reversing drives. The clamping of the pin into the wedge angle ensures positive radial and axial location. The design also ensures load sharing is achieved when a number of pins are used for higher torque drives, enabling different rated pins to be used in one clutch.

3. Reliability

The "Howdon Wedge" pins are naturally "fail-safe" under all conditions. They are not affected by changes in temperature or humidity and are tolerant of most environment conditions. Sizes 350-900SG standard pins are manufactured from brass to avoid sparking in the event of overload, thus making them suitable in volatile atmospheres. The unconventional shape of the wedge pins prevents the fitment of alien pins ensuring safety and product liability requirements are met at all times. The peripheral location of the wedge pins enables easy inspection, and clear colour coding of the pins ensures simple checking of torque setting.

4. Availability

Cross Sheargard Clutches and Couplings are carried in stock with minimum pilot bore. Units can be finished bored and keyed to customer's specifications through a 48 hour rework service. A large stock of standard rated wedge pins, colour coded according to capacity ensures instant spares availability.

5. Low Cost Protection

The cost of Sheargard Clutches is kept low by volume production techniques, so providing the customer with a low cost synchronised, reliable overload protection device.

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Sheargard Overload Clutches



Standard Stock Sheargard Clutches are available in five sizes providing a torque range from 27 to 13,700 Nm. Other units with torque ratings to 125,000 Nm are available to order, on short lead time. For further details contact Cross & Morse Sales Office.







Dimensions

Clutch	Wedge ⁽⁴⁾ *	Drive		Torque F	Rating ⁽¹⁾ *		Bore	Dia d
Size	Pins	radius R	M Nm	in Ib ft	Ma Nm	ax Ib ft	Min	Мах
250SG	2 x W25	26	27	20	336	248	10	25
350SG	3 x W37	34.5	33	24	1509	1113	19	28
500SG	3 x W37	47	45	33	2028	1496	24	45
700SG	3 x W50	66.5	251	185	5580	4115	28	65
800SG	3 x W50	81	306	225	6798	5013	30	80
950SG	3 x W75	97	830	612	16740	12345	45	100
1000SG	4 x W100	128	3468	2558	63920	47138	55	115
1200SG	4 x W100	147	3982	2937	73400	54140	60	150
1400SG	4 x W120	160	12240	9025	100000	73750	70	180
1600SG	4 x W120	200	15300	11285	125000	92200	100	215

Clutch Size	Outside Dia. A	Length Through Bore L	Overall Length B ¹	Overall Length B ²	Spigot Dia. C	Bolt PCD D	Bolts P	Spigot Length E ⁽²⁾ *	Position Back Face F
250SG	63	36	36	-	38.90 / 38.85	50	6 x M5	11.5	15.5
350SG	85	57	57	78	49.25 / 49.20	65	6 x M6	16	21
500SG	105	72	72	93	73.08 / 73.03	92	6 x M8	25	31
700SG	148	92	92	113	104.85 / 104.80	128	6 x M10	35	40
800SG	175	112	112	133	119.86 / 119.80	146	6 x M12	40	50
950SG	215	130	130	156	149.85 / 149.80	185	6 x M14	54	64
1000SG	280	175	191	217	164.85 / 164.80	220	8 x M16	75*(3)	91* ⁽³⁾
1200SG	320	200	220	246	224.85 / 224.80	260	8 x M20	100*(3)	120* ⁽³⁾
1400SG	350	270	295	321	254.85 / 254.80	300	8 x M24	125* ⁽³⁾	150* ⁽³⁾
1600SG	425	300	325	351	304.85 / 304.80	360	12 x M24	148*(3)	173* ⁽³⁾

*⁽¹⁾For standard Torque Ratings see table page 12.
 *⁽³⁾Dimensions E & F can be adjusted to suit sprocket widths.

*⁽²⁾The drive sprocket/pulley can overhang spigot.
*⁽⁴⁾W37, W50, & W75 Brass Std, others steel.

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Minimum Number of Teeth on Sprockets for Standard Roller Chains

Chain Pitch	1/2"	5/8"	3/4"	1"	1 1/4"	1 1/2"	2"
Clutch Size							
250SG	27	22	18				
350SG	25	27	24	18			
500SG	30	24	21	16	18		
700SG	40	33	28	22	18	19	
800SG		38	34	25	21	23	20
950SG			40	31	25	26	23
1000SG				35	29	28	26
1200SG					36	30	29
1400SG					40	34	25
1600SG						38	29

Sheargard Flexible Couplings



Sheargard Chain Couplings

The standard Cross Sheargard unit combines with the Chain Coupling to provide stock overload couplings with minimum backlash and a high reliability. This construction provides a simple, reliable, easy to assemble flexible coupling capable of transmitting high loads and accommodating shaft misalignment with continuous overload protection. Motor monitor assemblies can also be used to switch off power in the event of an overload.

Sheargard ES & KE Couplings

For high speed drives (over 500 rpm) low inertia rubber elastic couplings are offered to enable quiet operation with torsional elasticity to damp vibration and absorb shock loads. The ES Couplings consists of two close grained cast iron jaws with hard rubber drive elements interposed between them, retained by a reinforced thermoplastic cap. The KE Coupling also has close grained cast iron jaws with a Pebax Polyester elastomeric gear ring interspaced to damp vibration and torsional loads. This series can be provided with taper-bore bushes on the coupling end. The KE Coupling provides a lower cost solution.







Chain Coupling Dimensions

Coupling	Misali	gnment	Torque	Ratings	Shearg	ard Bore	Couplin	ng Bore						
Ref.	Parallel	Angular	Min Nm	Max Nm	Min	Max	Min	Max	A	В	C	D	E	F
350SG-C	0.31	1/2°	33	1509	19	28	18	57	106	137	104	38	57	11
500SG-C	0.38	1/2°	45	2028	24	45	22	70	119	187	149	41	72	5
700SG-C	0.51	1/2°	251	5580	28	65	24	102	162	248	199	67	92	3
800SG-C	0.75	1/2°	306	6796	30	80	51	120	186	278	175	77	100	9
950SG-C	0.75	1/2°	830	16740	45	100	51	150	222	326	232	83	130	9
1000SG-C	1.00	1/2°	3468	37500	45	115	60	200	286	462	320	106	175	5
KE She	argard C	Coupling	Dimen.	sions										
Coupling	Misali	gnment	Torque	Ratings	Shearg	ard Bore	Coupling	Taper	*(4)			*(4)		
Ref.	Parallel	Angular	Min Nm	Max Nm*(1)	Min	Max	Max *(2)	Size *(3)	Α	В	C	D	E	F
350SGKE13	0.4	1.0°	33	725	19	28	55	1610	140	130	90	50	57	33
350SGKE15	0.4	1.0°	33	1490	19	28	65	2012	151	150	104	58	57	36
500SGKE15	0.4	1.0°	45	1490	24	45	65	2012	179	150	104	58	72	49
500SGKE18	0.4	1.0°	45	2026	24	45	75	2517	185	180	120	68	72	45
	0.5	1 00	251	4800	28	65	95	3020	241	225	150	85	92	64
700SGKE23	0.5	1.0	201	4000	20	00	00	0020					02	0.

ES Sheargard Coupling Dimensions

	0													
Coupling	Misali	gnment	Torque	Ratings	Shearga	ard Bore	Coupling Bore							
Ref.	Parallel	Angular	Min Nm	Max Nm*(1)	Min	Max	Max *(2)	Α	В	C	D	E	F	н
350SGES	0.6	0.7°	33	300	19	28	45	114	115	72	48	57	9	85
500SGES	0.7	0.7°	45	1200	24	45	60	143	158	96	61	72	10	105
700SGES	0.9	0.8°	251	3000	28	65	75	183	202	120	75	92	16	148
800SGES	1.0	0.8°	306	4800	30	80	80	208	202	130	82	100	26	175
950SGES	1.4	0.8°	830	12000	45	100	100	249	294	160	97	130	22	215

Except as indicated all dimensions in mm

*⁽ⁱ⁾Running Torque should not exceed 50% of this figure. *⁽²⁾Coupling half manufactured with blind bore.

*⁽³⁾Coupling half can be supplied for taper-bush fitted either from hub end (type H) or from coupling end (type F).

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Sheargard Torque Ratings



Selection of Wedges for Torque Rating

For each size of Sheargard clutch a selection of Standard wedge pins are available, which can be combined together to provide the desired torque setting. Standard Howdon wedges are coloured coded for identification. Sizes 350SG to 900SG use brass pins as standard (steel optional), other clutches use steel as standard pin material.

A representative selection of standard torque settings possible with standard wedges is shown in the table below, all torque ratings being accurate within $\pm 10\%$. Additional torque settings can be provided with standard or special wedge pins. To avoid unnecessary tripping of the clutch the design torque should be at least 15% above max. starting torque of the drive. To minimise downtime and costs, use selections with minimum number of wedges, for simplicity of maintenance and stock control use selections with wedges one colour, as shown in the table. If torque setting is critical, intermediate ratings can be obtained by mixing colours. For drives with shaft speed above 120 rpm, or for improved protection of drive and machinery, use optional monitor plate with a limit switch or proximity sensor to switch off motor on overload.

Torque Ratings - Nm

				Num	iber of	Wedge	es in Cl	utch						T	orque l	Rating	agains	t each	Clutch	size ar	ıd Pin I	Vateria	I (Stan	dards	in Bold)	
Orange	Orange/ White	Gold	White	White/ Yellow	Yellow	Yellow/ Blue	Blue	Blue/ Green	Green	Green/ Red	Red	Black	250 Steel	350 Brass	350 Steel	500 Brass	500 Steel	700 Brass	700 Steel	800 Brass	800 Steel	950 Brass	950 Steel	1000 Steel	1200 Steel	1400 Steel	1600 Steel
1														33	46	45	62	115	160	140	200						
	1													46	63	62	85										
		1												62	86	84	115										
2														66	92	90	124										
			1										27	86	119	116	169	251	345	306	420	830	1140	3468	3983		
	2													92	126	124	170										
3														99	138	135	186										
		2												124	172	168	230										
				1										125	171	187	230	341	469	415	571	1165	1600	5160	5926		
	3													138	189	186	255										
					1								82	165	226	221	303	446	645	543	786	1476	2027	6942	7972	12240	15300
			2										54	172	238	232	338	502	690	612	840	1660	2280	6936	7966		
		3												186	258	252	345	050	000		1001	0010	0700	0740	10010		
				•		1								199	2/3	267	367	652	896	794	1091	2012	2763	8/18	10012		
				2									107	250	342	3/4	400	002	938	830	1142	2330	3200	10320	11002	17600	00040
			2				1						01	207	257	343	4/4 507	090	1025	010	1490	2409	2420	9024	11040	1/032	22040
			3					1					01	200	411	J40 402	507	1110	1626	1262	1200	2490	2000	11607	10000		
					2			1					16/	300	411	402	606	802	1200	1000	1572	2040	4054	1388/	150//	24480	30600
					2				1				136	370	508	/07	682	1388	1876	1601	2285	3570	/100/	13875	15035	20240	25300
				3									100	375	513	561	690	1023	1407	1245	1713	3495	4800	15480	17778	20240	20000
				0		2								398	546	534	734	1304	1792	1588	2182	4024	5526	17436	20024		
						-				1				447	815	600	825	1727	2371	2104	2888	4190	5723	17 100	20021		
					3								246	495	678	663	909	1338	1935	1629	2358	4428	6081	20826	23916	36720	45900
					-						1		168	503	891	676	928	1785	2452	2174	2987	4810	6606	15980	18352	24992	31240
							2						214	514	706	690	948	1792	2460	2182	2996	4818	6618	19648	22564	35264	44080
												1						1860	2555	2266	3112	5580	7683	16922	19434	31344	39180
						3								597	819	801	1101	1956	2688	2382	3273	6036	8289	26154	30036		
								2						600	822	804	1124	2238	3072	2726	3742	5692	7816	23214	26660		
									2				272	740	1016	994	1364	2776	3752	3382	4570	7140	9808	27750	31870	40480	50600
																								27768	31888	48960	61200
							3						321	771	1059	1035	1422	2688	3690	3273	4494	7227	9927	29472	33846	52896	66120
										2				994	1630	1200	1650	3454	4742	4208	5776	8380	11446				
								3						900	1233	1206	1686	3357	4608	4089	5613	8538	11724	34821	39990		
											2		336	1006	1782	1352	1856	3570	4904	4348	5974	9620	13212	31960	36704	49984	62480
												2						3720	5110	4532	6224	11160	15366	33844	38868	62688	78360
						4																		34872	40048		
							4																	39296	45128	70528	88160
									3				408	1110	1524	1491	2046	4164	5628	5073	6855	10710	14712	41625	47805	60720	75900
										3				1341	2445	1800	2475	5181	7113	6312	8664	12570	17169	10.105			
								4															10015	46428	53320		
											3		504	1509	2673	2028	2784	5355	7356	6522	8961	14430	19818	47940	55056	/4976	93720
												3						5580	/665	6798	9336	16740	23049	50/66	58302	94032	11/540
									4		4													55500	63/40	80960	101200
											4													63920	/3408	AAAR8	124960

Note:- Torque capacity of size 250SG controlled by unit size, and not wedge capacity. Sizes 1000SG and above are designed to accept up to four wedges, size 250SG only has two wedge slots.

Wedge Replacement following Overload:

To return Sheargard to service after overload, first remove all broken halves of wedges by removing their locking screws. Rotate hub on body until wedge grooves are in line (for drives where synchronisation is essential rotate until alignment marks on body and hub flanges are in line). Ensure wedge grooves are clean. Fit new wedges of same colour identification as parts removed and fix firmly into place by tightening locating screws.

Servicing Sheargard Clutches

Sheargard units require minimal servicing. Routine checks that wedge locating screws and monitor plate screws are securely locked down is generally all that is required. If the clutch has suffered a number of overloads, or at major maintenance shutdowns disassembly of the clutch, cleaning with paraffin and light greasing of bearing surfaces will ensure long service life.

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Crossgard Overload Couplings



The Crossgard series of overload protection clutches all use sprung loaded balls locked in detents to provide drive and overload control. The balls are random positioned in the clutch so drive can only be engaged in one relative angular position between driver and driven shafts, so ensuring full synchronisation of the drive at all times. In the event of an overload the balls are driven out of their detents to release the torque, and cause axial movement of the pressure plate which can be used to actuate a limit switch or proximity sensor to isolate the drive. All units are fitted with a torque indicator to enable simple setting of the desired torque rating. There are three basic types of Crossgard Clutches all of which are available as flexible shaft couplings, types CG, CGX and CGZ.

Crossgard Principles of Operation

During normal operation torque is transmitted between hub and driving flange by a number of balls located in the flange engaged in detents in the hub under load applied by disc springs. The balls are arranged in irregular angular positions to ensure re-engagement can only occur at one angular position between hub and flange. When an overload occurs the balls are driven out of their detents and then roll between the hub and pressure plate. The pressure plate moves axially a sensor plate which can be used to activate a proximity or limit switch. Torque is varied by adjusting the spring load on the pressure plate by tightening or loosening adjusting nuts.

Design Features

Crossgard clutches have been designed to provide the customer with a reliable, simple to operate clutch, all three types incorporating the following design features.

Drive Synchronisation

Non symmetrical arrangement of the drive balls and pockets allows only one angular position of engagement of drive, ensuring input and output are always synchronised.

Bi-directional drive

The clutches function equally in either direction of rotation, and are suitable for reversing drives.

Visual Torque Meter

All units have a scale on the adjusting nut to enable the set torque to be determined by reference to torque charts. Setting can also be verified at any time by visual check.

Simple Torque setting and adjustment

Required torque is set by turning the adjusting nut, and setting off torque scale.

Overload Monitoring

All units incorporate a sensor plate which moves axially when overload occurs to trigger a proximity or limit switch to isolate power to motor and activate failure indicators.

Stock availability

All standard Crossgard clutches are carried in stock with pilot bore. Units can be supplied with finished bore, keyseat and setscrews, fitted with platewheels; or complete with flexible coupling on 72 hours lead time.

Type CG Crossgard Clutch Pages 15-17

CG Crossgard Clutches are a low cost, simple design suitable for general purpose applications. The clutches provide full overload protection of drives which require synchronisation to be maintained at all times. Following overload the clutches are automatically reset by slow rotation of input drive once the overload cause is cleared. Seven sizes of clutch provide a torque range 10Nm to 7150Nm with operating speeds to 700rpm. Torque settings are accurate to $\pm 10\%$ even after repeated tripping. Also can be supplied with roller chain or elastomeric coupling.

Use CG Clutch:

- For general purpose applications.
- Where drives are inaccessible.
- For chain and low speed belt drives.
- In wrapping and packaging machines.
- On bakery and bottling machines.For conveyors and on sliding door drives.



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Crossgard Overload Clutches and Selection Procedure

Type CGX Crossgard Clutch Pages 18/19

High technology and precision is demanded in indexing and the position of equipment in modern machinery. The CCX Crossgard satisfies the demands for precision and performance and provides overload protection for modern machinery. CGX Clutches through their unique design provide backlash free, fail-safe, overload protection. High precision of trip torque is obtained with settings within $\pm 3\%$ accuracy, and very little motion is lost during tripping. An innovative ball and wedge mechanism is used to prevent backlash, and this is further employed in the coupling version to compensate for angular or parallel error or axial displacement with no loss in torsional rigidity. Five sizes of clutches and couplings have range 1.7 Nm to 785 Nm with maximum shaft speeds of 1400rpm. Units automatically reset after overload by slow shaft rotation.

Use CGX Clutch:

- For precision positioning indexing drives.
- For accurate mechanical overload protection.
- For zero backlash drives.
- On output shafts on cam boxes and Geneva mechanisms.
- On servo motor drives and robotics.
- In printing machinery.
- On N.C. machine tools and machining centres.

Type CGZ Crossgard Clutch Pages 20/21

The CGX Clutches incorporate a locking mechanism which restrains spring pressure being applied to the driving balls following an overload. Following an overload the input drive can continue to rotate freely enabling the clutch to be used for shaft speeds up to 1800 rpm. After the machine has been stopped following an overload the CGZ can only be reset by applying an axial load on the pressure plate. The clutch can also be used as an on-off clutch. Four sizes have torque range 2.4 Nm to 450 Nm, with accuracy $\pm 10\%$. An elastomeric coupling is also available.

Use CGZ Clutch:

- For high speed drives direct motor shaft.
- Where manual re-engagement preferred.
- As ON-OFF clutch.
- For machine tool drives.
- On textile and paper making machinery.

Crossgard Selection

Like other overload devices, it is best to position the Crossgard nearest the driven equipment where the overload is most likely to occur. Tripping torque should be at least 25% greater than the operating torque to compensate for motor starting torque and intermittent, shock and reversing loads.

Selection Method

1. Selecting the trip torque.

Trip torque should be set equal to the maximum amount of torque which can be applied based on such conditions as the strength of the machine and load. When it is not clear what the maximum amount of torque is, calculate the rated torque from the rated output and the rpm of the shaft onto which the Crossgard is to installed, and multiply this figure by the service factor. The result may be taken as the trip torque.

Tripping Torque = Operating x SF

- 2. Select Clutch or Coupling where torque is mid range of rating to allow maximum on-site adjustment.
- 3. Check shaft diameters can be accommodated, if not a larger unit will be required.
- 4. Ensure shaft speeds are within limits of unit selected.
- 5. For coupling check alignment requirements.
- 6. Select proximity sensor switch, see page 29.

Determination of Service Factor

SF	Operating Conditions
1.25	Normal starting and stopping, intermittent motion
1.50	Load with light shocks, forward and reverse motion
1.70	Load with heavy shocks, frequent torque reversals

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Type CG Crossgard Clutch



Provides low cost overload protection with simple setting and operation, whilst maintaining synchronisation of driving elements





195

230

30.0

35.0

25

27

105

130

CG110

CG130

Assembly

Dimensions for Mounting Drive Sprockets

325

360

287

319

355

400

Model	A mm	B mm	C mm	D mm	N
CG20	65	78	90.06/ 90.02	5.5	4
CG30	85	100	113.08/113.02	6.5	6
CG50	125	142	160.10/160.02	9.0	6
CG70	175	200	220.10/220.02	11.0	6
CG90	241	265	295.10/295.02	13.0	8
CG110	292	325	355.12/355.02	17.0	6
CG130	324	360	400.12/400.02	17.0	8

345

390

278

316

266

304

M16

M16

6

8

155

184

Driving members can be Timing Belt Pulleys, Vee-Belt Pulleys, Spur Gears or most common, Roller Chain Sprockets. For roller chain the minimum number of teeth sprocket which can be used is shown in the table below:

Model				CHAIN	I PITCH (II	ICHES)			
Mouer	1/4	8mm	3/8	1/2	5%	3/4	1	1 ½	2
CG20	48	40	34	26	22				
CG30	60	48	41	32	26	22			
CG50			57	43	35	30	24		
CG70				58	47	40	31		
CG90						47	36	25	
CG110							44	30	26
CG130								33	29

A B D. Diameter N. Number of Holes

295

330

6.0

6.6

17.0

17.0



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Type CG Crossgard Flexible Couplings



Two basic types of couplings are being offered, Type ES Rubber Elastic Coupling, and Type CC Roller Chain Coupling. Both combine the full overload protection capabilities of the CG Crossgard with facility of shaft to shaft connection.

Crossgard CG-CC Couplings

A standard roller chain sprocket is connected by a duplex roller chain to a platewheel mounted on the CG Clutch. This construction provides a simple, reliable, low cost means of transmitting drive with minimum backlash, and accommodating reasonable shaft misalignment. Both Taper-bored and pilot bore sprockets are available.



CG-CC Crossgard Chain Coupling

Model	Torqu	ie NM	Max. Speed	Misali	gnment	Clutch E	Bore Size	Coupling	Bore Size			Dime	nsions			Weight	Inertia kgfm²
	Min	Мах	RPM	Parallel	Angular	Min	Max	Min	Max	Α	В	C	D	E	F	Kg.	x10-2
CG20-CC	10	44	700	0.25	½°	8	20	16	53	81	118	70	30	47	3.5	2.6	1.43
CG30L-CC CG30H-CC	20 54	54 167	500	0.31	½°	12	30	20	60	99	147	85	35	60	4	4.8	3.7
CG50L-CC CG50M-CC CG50H-CC	69 137 196	147 412 539	300	0.38	1½°	22	50	20	63	123.5	199	95	40	81	2.5	12.3	16.9
CG70-CC	294	1080	160	0.51	½°	32	70	25	80	174.5	265	120	50	110	14.5	29.2	81.7
CG90L-CC CG90H-CC	441 931	1323 3136	120	0.76	½°	42	90	30	107	257	374	160	80	157	20	79.5	491
CG110L-CC CG110H-CC	686 1568	1960 5096	100	0.76	1⁄2°	52	110	40	107	310	446	160	100	195	15	125.5	1063
CG130L-CC CG130H-CC	1176 2646	3038 7154	80	1.00	1⁄2°	60	130	60	150	368	495	225	120	230	18	188.5	2002

Dimensions in mm.

CG-CC Crossgard Taper Bored Chain Coupling

Model	Torqu	ue NM	Max. Speed	Misali	gnment	Clutch I	Bore Size	Coupling	Bore Size			Dime	nsions			Weight	Inertia kgfm²
	Min	Max	RPM	Parallel	Angular	Min	Max	Min	Max	Α	В	C	D	E	F	Kg.	x10-2
CG20-CC	10	44	700	0.25	½°	8	20	16	53	76	118	76	25	47	3.5	2.4	1.43
CG30L-CCTB CG30H-CCTB	20 54	54 167	500	0.31	½°	12	30	20	60	95	147	90	31	60	4	4.2	3.7
CG50L-CCTB CG50M-CCTB CG50H-CCTB	69 137 196	147 412 539	300	0.38	½°	22	50	20	63	128	199	108	44	81	2.5	11.5	16.9
CG70-CCTB	294	1080	160	0.51	½°	32	70	25	80	175	265	159	51	110	14.5	29	85

For further dimensions of Crossgard Clutch refer to page 15.

Dimensions in mm.

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Crossgard Overload Couplings



Crossgard CG-ES Couplings

The ES Couplings consist of two close grained cast iron jaws with hard rubber drive elements interposed. It is a low inertia coupling combining quiet operation with torsional elasticity to absorb shock loads and damp vibration.



CG-ES Crossgard Coupling

Model	Setting Torque	Max	Misali	gnment	Clu	tch	Cou	pling		D	c	п	E	E	Weight	Inertia
MOUCI	Ňm	RPM	Parallel	Angular	Pilot Bore	Max Bore	Pilot Bore	Max Bore	~	D	U	J	E	Г	kg	x10 ⁻²
CG20-ES	9.6 - 45	700	0.5	0.7°	8	20	-	40	118	92	65	45	47	26	2.7	0.38
CG30L-ES CG30H-ES	19.8 - 54 53.6 - 167	500	0.7	0.7°	12	30	-	55	146	143	88	57	60	29	6.3	1.49
CG50L-ES CG50M-ES CG50H-ES	68 - 147 136 - 407 196 - 540	300	0.9	0.6°	22	50	-	75	199	202	120	75	81	43	16.6	9.2
CG70-ES	294 -1080	160	1.2	0.5°	32	70	-	90	261	257	145	89	110	62	37.6	30.3

Dimensions in mm.

For further dimensions of Crossgard Clutch refer to page 15.

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Crossgard Couplings can be supplied with both clutch and coupling hub finish bored, keyseated, with setscrew to customers' requirements on 48-hour re-work service.

Installation of Crossgard CG Clutches

For optimum performance of CG Clutches and couplings it is necessary to have a good fit(transition) between shafts and hubs. Drives should be via a parallel key with interference fit with ideally two set screws to maintain axial position on shaft.

The chain/belt drive should be accurately aligned to avoid axial loading of the clutch; and coupling assemblies should be carefully aligned at installation to minimise operating loads.

All units should be installed with a limit switch or proximity switch to shut down the drive in the event of an overload, refer to page 29 for details standard units available.

Installation of Crossgard Couplings

Prior to installation it is necessary to separate the Crossgard and Coupling half by either removing the duplex chain, or for the ES Coupling removing the outer cover and the rubber element. Fit Crossgard and Coupling half to shafts, for ES Coupling ensure cover is fitted to hub prior to installation. Adjust distance between Crossgard and Coupling according to catalogue dimensions, and align shafts as accurately as possible. Refit duplex chain or rubber element and cover, ensure chain is free to move, and shafts rotate freely.

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Type CGX Crossgard Clutch



Provides complete overload protection of drives with accurate positioning and zero backlash. Suitable for gears, cams and index table drives.

These clutches can be supplied with pilot bore, finish bore and keyseat, or fitted with clamping elements to clamp directly to keyless shafts. The use of clamping elements ensures total elimination of backlash in the complete assembly within the operating torque range, but does require an increase to the overall length of clutch in order to accommodate. Clutch and clamping element assemblies are supplied from stock to suit specific metric shaft sizes as indicated in the table, using clamping elements types ACE81 & RCK80.







For Selection of Crossgard CGX Clutches refer to page 14, always use with proximity sensor switch, refer to page 29

Model	Setting Torque Range Nm	Max Running Speed RPM	Colour of Spring x Number	Pilot Bore mm	Max Bore mm	Shaft Clamping Element † Std. Bore Sizes (mm)	*Weight kg	Inertia kgfm² (x10²)
CGX10 L	1.7 - 6.5		Yellow x 3					
CGX10 M	5.5 - 15	1400	Red x 3	7	15	8, 9, 10, 11, 12	0.75	0.177
CGX10 H	11 - 30		Red x 6					
CGX20 L	6.5 - 24		Yellow x 6					
CGX20 M	13 - 35	1100	Red x 3	8.5	25	11, 12,14, 15, 16, 18, 19, 20	1.67	0.535
CGX20 H	26 - 68		Red x 6					
CGX35 L	23 - 68		Red x 5					
CGX35 M	44 - 100	800	Green x 5	12	35	19, 20, 22, 24, 25, 28, 30	2.51	1.33
CGX35 H	89 - 200		Green x 10					
CGX50 L	46 - 120		Red x 5					
CGX50 M	92 - 200	600	Green x 5	18	55	24, 25, 28, 30, 32, 35, 38, 40, 42	7.03	7.32
CGX50 H	180 - 400		Green x 10					
CGX70 L	130 - 370		Red x 8					
CGX70 M	270 - 520	480	Green x 8	23	70	28, 30, 32, 35, 38, 40, 42, 45	11.4	19.5
CGX70 H	400 - 785		Green x 12			48, 50, 55, 60		

Weight and inertia values for clutches with max. bore.
 Clamping elements protrude from end of clutch 17.5mm (CG X 10 & 20), 25.0mm (CGX 35 & 50), 31mm(CGX 70)

Madala			•		-	G	н		J		м	0	P Sc	rews	Р		P Sc	rews
wodels	A	В	L.	U	F	h7	PCD	1	PCD	IVI	N	U	No.	Size	ĸ	3	No.	Size
CGX10	53	22	1.4	7.5	+0.3	62	54	42	34	56	56	61.8	4	M4x6	5	10	4	M4x7
CGX20	64	35	1.6	10	+0.7	86	74	60	50	70	73	86	6	M5x8	5	10	6	M4x7
CGX35	68	37.5	2.0	11	-0.5	107	88	70	60	88	91	107	6	M6x7	6	10	6	M5x8
CGX50	92	54.8	2.6	15	+0.3	148	130	105	-	123	129	148	6	M8x13	9	17	-	-
CGX70	98	61	3.5	15	+1.0	185	164	135	-	148	153	185	6	M10x13	10	18	-	-

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Type CGX-C **Crossgard** Couplings



Provides complete overload protection of drives with accurate positioning and zero backlash. For shaft to shaft connection.

These couplings can be supplied with pilot bore, finish bore and keyseat and setscrews, or fitted with clamping elements to clamp directly to keyless shafts. The use of clamping elements eliminates all backlash in the drive line within the operating torque range, but does require an increase to the overall length of coupling in order to accommodate. Coupling and clamping element assembly are supplied to suit specific metric shaft sizes as indicated in the table. Clutch and Coupling half can have different bush sizes.



*Weight and inertia values for couplings with max. bore.

+ Clamping elements protrude from end of clutch/coupling 17.5mm to 34.0mm dependant on size.

Models	A	В	C	D Min. Pointed Position	E PCD	F PCD	G	Н	I	J	М	N	0	P Screws x Length	Q Screw x Length	R	S
CGX10-C	69	24	1.3	+0.3	62	42	33	25	2	42	56	-	74	M4x18	M4x10	5	10
CGX20-C	84	24	1.6	+0.3	89	66	55	35	3	46	70	-	98	M5x20	M5x12	5	10
CGX35-C	88	24	1.9	- 0.5	113	83	70	35	3	50	88	-	125	M6x25	M6x15	6	10
CGX50-C	114	34	2.4	+0.9	158	112	92	45	4	65	123	128	174	M8x32	M8x20	9	17
CGX70-C	124	36	3.3	+0.6	200	145	116	50	4	70	148	152	218	M10x22	M10x38	10	18

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Type CGZ Crossgard Clutch



Provides total disengagement in event of overload. Suitable for mounting gears, cams sprockets and timing belt pulleys





*Weight and inertia values for clutches with max. bore.

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For Selection of Crossgard CGZ Clutches refer to page 14.

Model	Setting Torque Range Nm	Max Running Speed RPM	Colour of Spring x Number	Pilot Bore mm	Max Bore mm	*Weight kg	Inertia kgfm² (x10²)
CGZ20 L	2.4 - 8.3		Yellow x 3				
CGZ20 M	4.1 - 15.7	1800	Blue x 3	8	20	2.57	1.09
CGZ20 H	8.2 - 31.4		Blue x 6				
CGZ30 L	6 - 20		Yellow x 4				
CGZ30 M	20 - 52	1800	Red x 4	12	30	4.17	2.78
CGZ30 H	39 - 108		Red x 8				
CGZ40 L	26 - 93		Blue x 5				
CGZ40 M	44 - 127	1800	Red x 5	17	40	8.71	9.60
CGZ40 H	88 - 245		Red x 10				
CGZ50 L	63 - 157		Red x 5				
CGZ50 M	128 - 304	1800	Red x 10	22	50	13.7	21.2
CGZ50 H	245 - 450		Green x 10				

Dimensions in mm.

									I								T So	crew			
Model	A	В	C	D	E	F	G	H	Travel when tripping	J	K PCD	L h7	N	Q	R	S	No.	Size x length	V	W	SIZE
CGZ20	74	73	1	8	6	13.5	0.8	11	4.1	96	86	72	24.5	58	70	88	4	M5x10	5	10	M5x10
CGZ30	83.5	82	1.5	8	6	14.5	1.1	11.5	4.7	118	106	87	27.5	76	88	108	4	M6x12	6	10	M6x10
CGZ40	101	100	1	9	8	20	1.1	14	5.9	152	139	114	32.5	104	119	141	6	M6x12	8	14	M8x10
CGZ50	114.5	112	2.5	10	9	20.2	1.2	16	7	178	162	133	37	114	138	166	6	M8x16	9	14	M8x10

Type CGZ clutches totally disengage on overload, and will not re-engage drive without external axial force being applied to the pressure plate when the clutch is correctly aligned. The clutch must be stationary when re-engaged, otherwise the clutch may be damaged.

The CGZ clutch can be used as a mechanical engage/disengage clutch, but whilst the clutch can be dis-engaged at full speed by applying an axial force to the pressure plate, it can only be engaged whilst stationary. These clutches are designed for use on horizontal shafts, but may be applied to vertical shaft applications providing the driven flange plate is uppermost.

Type CGZ Crossgard **Flexible** Couplings



For shaft to shaft connection the CGZ Couplings provides total disengagement in the event of overload. Suitable for mounting on high speed shafts. The coupling consists of two close grain cast iron jaws with hard rubber drive elements interposed. A low inertia coupling which combines quiet operation with torsional elasticity to absorb shock loads and damp vibrations.





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For Selection of Crossgard CGZ Clutch Couplings refer to page 14.

	Setting Torque	Max	Colours of		Max /	Allowable Misalig	Inment			٦
Model	Range Nm	Running Speed x RPM	Spring x Number	Coupling Model	Parallel mm	Angular	Axial mm	Weight kg	Inertia kgfm² (x10²)	ר ב מ
CGZ20 L-ES	2.4 - 8.3		Yellow x 3							7.7
CGZ20 M-ES	4.1 - 15.7	1800	Blue x 3	10SF	0.6	0.7°	±1.0	4.87	1.29	a
CGZ20 H-ES	8.2 - 31.4		Blue x 6							a.
CGZ30 L-ES	6 - 20		Yellow x 4							đ
CGZ30 M-ES	20 - 52	1800	Red x 4	25SF	0.7	0.7°	±1.0	8.5	3.5	U G
CGZ30 H-ES	39 - 108		Red x 8							8
CGZ40 L-ES	26 - 93		Blue x 5							
CGZ40 M-ES	44 - 127	1800	Red x 5	63SF	0.8	0.6°	±1.2	17.5	11.5	C V
CGZ40 H-ES	88 - 245		Red x 10							U.
CGZ50 L-ES	63 - 157		Red x 5							
CGZ50 M-ES	128 - 304	1800	Red x 10	100SF	0.9	0.6°	±1.2	25.7	26.6	-
CGZ50 H-ES	245 - 450		Green x 10							u d
*Weight and in	ertia values for	couplings w	vith max bore							

D. .

Dimension	ns in mm									
Madal	Cros	sgard	*Coupling	Δ	D	c	n	E	E	C
wodei	Pilot Bore	Max Bore	Max Bore	A	В	U	D	E	г	u
CGZ20-ES	8	20	45	142	73	48	21	96	114	72
CGZ30-ES	12	30	55	167	82	57	28	118	143	88
CGZ40-ES	17	40	70	202	100	67	35	152	181	110
CGZ50-ES	22	50	75	229	112	75	42	178	202	120

For detail dimensions of CGZ Clutch refer to page 20.

*Couplings halves are stocked unbored and centred.

Stock Couplings can be reworked to customers' bore and keyway requirements on short delivery lead time.

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Cross Safegard Overload Clutches



The Safegard CS series Overload Clutches were developed to provide overload protection for the transmission of high torques within a compact unit. Directly interchangeable with other units in the market, this series offers low cost protection with a minimum of maintenance and long reliable service life. Safegard CS series are offered in two basic types, the standard type, available in 6 sizes for bores up to 65mm, with torque range of 2.5 to 1800Nm, see pages 24/25, provide optimum speed and torque capabilities; and the Mini type, available in 4 sizes for bores up to 45mm, with torque range 2.5 to400Nm, see pages 26/27, for a lower cost option for slower speed drives. Both types are available as basic clutch, and also as shaft couplings. The basic clutch is offered in three basic designs to enable alternate methods for connecting driven components.

Four modes of drive operation are available, to suit the requirements of different applications, as outlined below, the principles of operation of each being detailed opposite.



The Safegard CSF Clutch uses a large number of equally spaced balls to provide the drive, and the clutch ratchets from one drive position to the next in the event of an overload. The design allows for high operating speeds, and the possibility to recapture drive in the event of an inertia created overload during starting, but do not provide any synchronisation between input and output.

The Synchron CSY Clutch uses 7 rollers unequally spaced to provide the drive, ensuring that there is only one position of engagement of the drive, enabling full synchronisation between driver and driven shafts.

The Safe Lift CSL Clutch has a retaining ring to prevent disengagement of the drive, but allowing sufficient movement to actuate a limit switch. This clutch is ideal on applications where components cross one another's path, as synchronisation is maintained even when clutch has overloaded. The clutch also controls forward inertia drives.

The Contact-Free CSZ Clutch totally disengages in the event of an overload, and requires an outside force to be re-engaged. This enables the clutch to be operated at higher speeds, and also to be used on applications where it is undesirable to stop the motor quickly. The requirement of an external force to re-engage ensures the machine can be checked prior to a restart.

Safegard Series Clutches offer the following operating advantages:

- Long Service Life
- Cater for Frequent Overloads
- No Maintenance required
- Standardised Sizes

- Continued Operating Reliability Maintained Torque Accuracy
- Rapid Drive Disengagement
- Very Fine Torque Adjustment

Method of Torque Adjustment

Torque Adjustment on Safegard series Clutches is relatively simple process by the following procedure.

Refer to diagram below, to adjust the Torque on a Clutch first remove screws 8 or 8A to permit free rotation of adjusting nut 7.

If first adjustment manually tighten the adjusting nut 7 until it is in contact with the springs. Insert a C spanner 'A' into slots D, or a face wrench 'C' into holes D and tighten the nut clockwise to achieve desired Torque as indicated by the number of indents E moved. Replace screw 8 or 8A in thread hole G or G1 with adjusting nut positioned so this lines up with one of the holes H in the locking washer L.



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Cross Safegard CS Clutch Types







During normal operation the drive is transmitted by the sliding hub 2, which is connected by a spline to the main hub 1, and via a ring of balls 4a to the output flange 3. Drive is maintained by the springs 6 exerting pressure on flange 2, so keeping the balls in their respective indents in flange 2 & 3.

When an overload occurs the balls ride up the indents pushing flange 2 back which will actuate limit switch 9. During overload conditions plain bearing 5 maintains concentricity and ensures free running. The balls will re-engage in the nearest indents when the overload is removed. Torque adjustment is by rotation of nut 7.



The Safelift clutch is of identical design and operation to the Synchron clutch with the addition of a restricting ring 10 which prevents full dis-engagement of the clutch in the event of an overload; thus maintaining drive at all times. An overload still causes the rollers to ride up the detents sufficient to activate the limit switch 9, but they are prevented from totally disengaging. On these units it is essential that a limit switch is used to turn off the drive. These units are ideal when high inertia loads are involved to prevent on running of the driven equipment, also they can be electrically isolated during starting to ignore tripping at that time.

Torque adjustment is by rotation of nut 7.

Synchron CSY



The Synchron clutch functions in much the same way as the Safegard, and has similar construction in except the balls 4a are replaced by seven rollers 4b. The rollers are unequally spaced so the clutch will only engage drive in one angular position, providing full synchronisation of the drive.

When an overload occurs the rollers ride up the indents pushing flange 2 back which will actuate limit switch 9. During overload conditions plain bearing 5 maintains concentricity and ensures free running. The rollers will re-engage in the nearest indents when the overload is removed. Torque adjustment is by rotation of nut 7.



The Contact-free clutch is based on the Synchron clutch with modification to the outer flange 2, and the addition of locking assembly parts 10/11/12. In normal drive mode the pressure from the spring is conveyed to the flange 2 via the pressure plate 11and locking ball race 12. In the event of an overload the flange 2 is still pushed back, but this action also forces the locking balls inwards forcing the pressure plate 11 to move back from the locking ring 10. In the tripped condition the locking balls 12 apply no axial load to the outer flange 2 and thus the clutch will not re-engage, but instead runs totally free. To re-engage drive the outer flange 2 and output flange 3 must be correctly aligned, and then a light axial load applied to the outer flange to move it back into engagement.

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Cross Safegard Overload Clutches



CS Standard Series Clutches

The standard series of clutches are available in 8 sizes offering three modes of operation, simple overload, synchronous overload, and safelift, and in 7 sizes of the total dis-engagement design. All are available with three methods of supporting drive sprockets, pulleys, or gears, to provide flexibility in application design. Type A - allows simple connection of a driven gear with its own bearing support. Type B - has an integral needle roller bearing providing full support of driven gear. Type C - has extended inner race to mount larger pulleys with plain bearings. Up to Four torque ranges are available on each size of clutch, controlled by selection of the actuating spring set, providing a wide range of torque capacities to select from. Inertias are provided for each half of the clutch in dis-engaged condition, the hub inertia incorporating all items that revolve free with the hub, and the flange inertia all those items that stay with the flange connection.



CS Standard Series - Technical Capacities

Models*	Torque	e Range ac	cording to	Spring Se	election	M	ax. Spe	ed	Bore	Size		Weight kį]	Hub	Inertia k	gcm²	Flang	e Inertia	kgcm²
A, B & C	S Nm	M Nm	L Nm	U Nm	R Nm	S/M rpm	L/U rpm	'R' rpm	min mm	max mm	Type A	Type B	Type C	Type A	Type B	Type C	Type A	Type B	Type C
CSF20 CSY20 CSL20	2.5-5.0 5-10 5-10	5-10 10-20 10-20	10-20 20-40 20-40	20-40		3300 1000 4000	1800 500 3000		7	20	0.5	0.7	0.6	1.0	1.1	1.1	0.9	1.2	0.9
CSF25 CSY25 CSL25 CSZ25	6-12 12-25 12-25 12-25 12-25	12.3 25-50 25-50 25-50 25-50	25-55 50-100 50-100 50-100	55-100		2900 950 3900 5000	1450 450 2900 5000		10	25	1.5	2.0	1.8	6.7	7.0	7.2	6.2	9.1	6.2
CSF35 CSY35 CSL35 CSZ35	12-25 25-50 25-50 25-50	25-50 50-100 50-100 50-100	50-120 100-200 100-200 100-200	120-200		2400 800 3300 4000	1200 400 2400 4000		14	35	2.9	3.2	3.0	19.0	20.5	21.4	14.9	18.2	14.9
CSF45 CSY45 CSL45 CSZ45	25-50 50-100 50-100 50-100	50-100 100-200 100-200 100-200	100-250 200-400 200-400 200-400	250-400		2000 650 2800 3500	1000 300 2000 3500		18	45	5.0	6.0	5.8	51.7	54.1	57.0	38.0	48.4	38.0
CSF55(R) CSY55(R) CSL55(R) CSZ55	50-100 100-200 100-200 100-200	100-200 200-400 200-400 200-400	200-500 400-800 400-800 400-800	500-800	800-2000 800-2000 800-2000	1600 550 2300 3000	850 250 1600 3000	90 90 700	24	55	9.8	11.8	11.5	163	171	177	100	143	100
CSF65(R) CSY65(R) CSL65(R) CSZ65	85-200 170-400 170-400 170-400	170-500 350-900 350-900 350-900	300-1000 700-1800 700-1800 700-1800	700-1800	1200-3400 1200-3400 1200-3400	1400 400 1800 2300	700 150 1400 2300	70 70 600	30	70*	16.0	20.0	19.0	416	428	439	235	310	235
CSF80(R) CSY80(R) CSL80(R) CSZ80	180-480 300-750 300-750 300-750	360-960 600-1500 600-1500 600-1500	720-1950 1200-3000 1200-3000 1200-3000	1600-3300	2900-5800 2900-5800 2900-5800	1200 150 1500 1600	600 80 1000 1600	40 40 400	40	80	21.0	26.0	25.5	769	789	825	396	547	396
CSF100(R) CSY100(R) CSL100(R) CSZ100	250-520 550-110 550-110 550-110	500-1050 1100-2200 1100-2200 1100-2200 1100-2200	1000-2100 2200-4400 2200-4400 2200-4400	2000-3600	3000-8200 3000-8200 3000-8200	950 100 1300 1400	480 50 800 1400	30 30 300	50	110*	37.0	44.0	45.0	1968	2030	2109	969	1238	969

*For clutch Part No. for ordering refer to page 27.

CS Standard Series Dimensions

Models CSE/CSV											D	imensio	ons mn	n											
and CSL/CSZ	Ag7	В	C	D	E	F	G	н	J	к	L	Lı	L2	N	Р	R	U	v	V1	Wh6	W1	Х	X 1	Y	z
20	41.0	4.0	48	6xM5	6.5	55	50	9	3.0	7.5	38.5	51.5	66	35.0	3.1	6	21	8	27.5	38	28	15	25.5	2	0.1
25	60.0	4.0	70	6xM5	8.0	82	73	9	6.0	11.5	52.0	70.0	83	48.0	3.1	6	26	10	33.0	50	38	20	35.0	2	0.1
35	78.0	5.0	89	6xM6	10.0	100	91	9	6.0	12.0	61.0	78.0	100	56.0	3.6	8	36	12	39.0	60	52	25	45.0	2	0.1
45	90.5	5.0	105	6xM8	12.0	120	112	10	8.5	21.0	78.0	96.0	125	72.0	4.1	10	46	12	47.0	80	65	30	59.0	2	0.1
55	105.0	6.5	125	6xM10	15.0	146	140	9	11.0	27.0	100.0	124.5	153	93.5	4.1	12	56	16	52.5	100	78	30	60.0	2	0.1
65	120.5	6.5	155	6xM12	17.0	176	170	9	12.0	33.0	113.5	140.0	171	107.0	4.6	14	66	18	57.5	120	90	30	60.0	2	0.1
80(not CS-Z)	136.0	7.0	160	6xM12	20.0	200	190	9	14.0	39	119	150	183	112.0	5.3	16	82	20	64	130	108	25	55.0	2	0.1
CSZ 80	136.0	7.0	160	6xM12	20.0	200	190	9	29.0	53	134	165	198	127.0	5.3	16	82	20	64	130	108	40	70.0	2	0.1
100(not CS-Z)	168.0	8.0	200	6xM16	25.0	240	230	9	15.0	46	141	175	213	133.0	5.8	18	111	25	72	160	135	35	70.0	2	0.1
CSZ 100 (168.0	8.0	200	6xM15	25.0	240	230	9	33.0	64	159	193	231	151.0	5.8	18	111	25	72	160	135	53	88.0	2	0.1

For Limit Switch location and operation refer to page 29. Always use limit switch for long service life.

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Cross CS Overload Shaft Couplings



CS Standard Series Couplings

For shaft to shaft connection CS Standard series clutches are available with an elastomeric coupling for all the sizes and modes of operation, simple overload, synchronous overload, or safe lift and total dis-engagement. The elastomeric Coupling permits up to 1/2 degree angular misalignment, with 0.3mm radial and a maximum of 0.5mm axial. The rubber element absorbs peak shocks, providing greater accuracy in overload protection. Up to five torque ranges are available on each size of clutch, controlled by selection of the actuating spring set, providing a wide range of torque capacities to select from. Inertias are provided for each half of the clutch in dis-engaged condition, the hub inertia incorporating all items that

revolve free with the hub, and the coupling inertia all those items that stay with the flexible coupling.



CS Standard Series Couplings - Technical Capacities

*alohoM	Torq	ue Range a	according to	o Spring Sel	ection	l l	Max. Speed	I		Bore Size r	nm	Wei	aht	Ir	iertia kg	cm ²
MOUCIS	S	М	L	U	R	S/M	L/U	'R'	Clut	ch M	Cplg. M1	kn	1	Huh Side		Colo Side
	Nm	Nm	Nm	Nm	Nm	rpm	rpm	rpm	min	max	max		,			opig olde
CSF20 CSY20 CSL20	2.5-5.0 5-10 5-10	5-10 10-20 10-20	10-20 20-40 20-40	20-40		3300 1000 4000	1800 500 3000		7	20	30	1.2	2	1.0		6.1
CSF25 CSY25 CSL25 CSZ25	6-12 12-25 12-25 12-25	12.3 25-30 25-50 25-50	25-55 50-100 50-100 50-100	55-100		2900 950 3900 5000	1450 450 2900 5000		10	25	50	5.0)	6.7		71.8
CSF35 CSY35 CSL35 CSZ35	12-25 25-50 25-50 25-50	25-50 50-100 50-100 50-100	50-120 100-200 100-200 100-200	120-200		2400 800 3300 4000	1200 400 2400 4000		14	35	50	6.4	1	19.0		81.0
CSF45 CSY45 CSL45 CSZ45	25-50 50-100 50-100 50-100 50-100	50-100 100-200 100-200 100-200	100-250 200-400 200-400 200-400	250-400		2000 650 2800 3500	1000 300 2000 3500		18	45	60	10.	6	51.7		148.5
CSF55(R) CSY55(R) CSL55(R) CSZ55	50-100 100-200 100-200 100-200	100-200 200-400 200-400 200-400	200-500 400-800 400-800 400-800	500-800	800-2000 800-2000 800-2000	1600 550 2300 3000	850 250 1600 3000	90 90 700	24	55	60 90 (R type)	15 26		163		279 500
CSF65(R) CSY65(R) CSL65(R) CSZ65	85-200 170-400 170-400 170-400	170-500 350-900 350-900 350-900	300-1000 700-1800 700-1800 700-1800	700-1800	1200-3400 1200-3400 1200-3400	1400 400 1800 2300	700 150 1400 2300	70 70 600	30	70*	70 90 _{(over 1000N} 115 (R type	m) 416)	6	27 36 42		734 980 1350
CSF(80R) CSY80(R) CSL80(R) CSZ80	180-480 300-750 300-750 300-750	360-960 600-1500 600-1500 600-1500	720-1950 1200-3000 1200-3000 1200-3000	1600-3300	2900-5800 2900-5800 2900-5800	1200 150 1500 1600	600 80 1000 1600	40 40 400	40	80	115	48	ł	769		1580
CSF100(R) CSY100(R) CSL100(R) CSZ100	250-520 550-1100 550-1100 550-1100	500-1050 1100-2200 1100-2200 1100-2200	1000-2100 2200-4400 2200-4400 2200-4400	2000-3600	3000-8200 3000-8200 3000-8200	950 100 1300 1400	480 50 800 1400	30 30 300	50	110*	125	70)	1968		2500
CSY100(R) CSL100(R) CSZ100 The maxin	550-1100 550-1100 550-1100 550-1100 mum bor	1100-2200 1100-2200 1100-2200 1100-2200 re on the	2200-4400 2200-4400 2200-4400 ese clutch	nes is onl	3000-8200 3000-8200 y possible	1300 1300 1400 e with ke	50 800 1400 eyways t	30 300	50 885 sheet	110* 3	125	70)	1968		2500
Models CSF/CSY					1			Dim	ensions							
and	C	ц	1	K	1 1	14	N	D	e	т	т	То		147	v	7

CS Standard Series Couplings - Dimensions

Models								Dime	nsions							
CSF/CSY and CSL/CSZ	G	н	J	к	L	L1	N	R	S	т	T 1	T2	U	w	Y	z
20A-CC 25A-CC 35A-CC 45A-CC 55A-CC 55A(R)-CC 65A-CC 65A-CC(1000Nm+) 65A(B)-CC	50.0 72.5 90.5 112.0 140.0 140.0 170.0 170.0 170.0	9 9 10 9 9 9 9	3.0 6.0 5.0 8.5 11.0 11.0 12.0 12.0 12.0	7.50 11.50 12.00 21.00 27.00 27.00 33.00 33.00 33.00	38.5 52.0 61.0 78.0 100.0 110.0 113.5 113.5 113.5	86.0 137.5 147.0 176.5 211.5 257.0 242.5 272.0 312.0	34.5 48.0 56.0 73.0 93.5 93.5 107.0 107.0 107.0	55 82 100 120 146 146 176 176 176	67 112 128 148 198 177 198 225	46 79 90 90 140 107 140 180	3.0 3.5 4.0 5.5 5.5 5.5 5.5 5.5	7 8 10 13 13 13 13 13	33 50 60 70 70 90 90 90 113	38.5 54 70 84 108 108 129 129 129	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1 0.1
80(not CSZ)A-CC CSZ 80A-CC 100(not CSZ)A-CC CSZ 100A-CC	190.0 190.0 230.0 230.0	9 9 9	14.0 29.0 15.0 33.0	39.00 53.00 46.00 64.00	119.0 134.0 141.0 159.0	299.5 314.5 339.0 357.0	183.0 198.0 213.0 231.0	112 127 133 151	225 225 255 255	180 180 200 200	15.0 15.0 21.0 21.0	24 24 30 30	113 113 127 127	150 150 186 186	2222	0.1 0.1 0.1 0.1

For details on Limit Switch location and operation refer to page 29. Always use limit switch for long service life. *For clutch Part No. for ordering refer to page 27.

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Cross Safegard Overload Clutches



CS Mini Series Clutches

The CS Mini series of clutches is available in 4 basic sizes with simple overload, and synchronous overload facility These lower cost units are offered with two methods to attach sprockets. gears, or pulleys.

Type E - allows connection of driven gear with its own external bearing support.

Type F - has extended inner race suitable to mount larger pulleys with a bronze or needle roller bearing. Four torque ranges are available on standard units, and three on the synchronous version, providing a wide range of torque capacity to select from.

The series is suitable for moderate speed applications with low radial forces and infrequent tripping. The design is suited to inline stop switch, or proximity switch.





For Clutch Part No. for ordering refer to page 27

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CS Mini Series - Technical Capacities

* slaboM	Torque R	ange accordi	ng to Spring	Selection	Max.	Speed	Bore	size	Weight	Inertia
E & F	S Nm	M Nm	L Nm	U Nm	S/M rpm	L/U rpm	min mm	max mm	kg	kgcm ²
CSF20	2.5-5.0	5-10	10-20	20-40	800	800	_			
CSY20	5-10	10-20	20-40		700	500	1	20	0.5	2.7
CSF25	6-12	12-25	25-55	55-100	800	700	10	05	4.5	7.0
CSY25	12-25	25-50	50-100		700	450	10	25	1.5	7.0
CSF35	12-25	25-50	50-120	120-200	800	600	1/	25	25	25.0
CSY35	25-50	50-100	100-200		700	400	14	- 55	2.0	23.0
CSF45	25-50	50-100	100-250	250-400	800	500				
CSY45	50-100	100-200	200-400		650	300	18	45	5.0	81.0

CS Mini Series Dimensions

Models									Dime	nsions i	mm								
CSF & CSY	Ah8	Bh8	C	D	E	E1	F	G	H	K	L	L2	N	Р	R	v	V1	Wh7	CH
20	36	55	46	6xM5	11.5	4.5	5.5	21.7	53	38	50	83.5	3	2.8	80	47.5	40.5	30	7
25	46	70	59	6xM5	16.5	5.5	7.0	23.2	74	54	57	94.0	4	3.5	100	59.0	48.0	35	8
35	64	90	80	6xM6	16.5	6.5	7.0	29.0	88	70	65	108.0	4	4.0	120	85.5	53.0	50	10
45	78	115	100	6xM6	22.0	8.0	8.0	34.5	114	86	81	127.0	5	4.0	150	98.5	60.0	65	10

Emergency Stop Switch Location and Operation - Switch CSS2 The Stop Switch (available separately) should be used on all applications.



(1) Safegard Mini - (2) Synchron Mini

CS Mini Series Couplings



CS Mini Series Couplings

For shaft to shaft connection CS Mini series clutches are available with an elastomeric coupling for all the sizes and modes of operation, simple overload, synchronous overload.

The elastomeric Coupling permits up to 1/2 degree of angular misalignment, with 0.3mm radial, and a maximum of 0.5mm axial. The rubber element absorbs peak shocks, providing greater accuracy in overload protection. Up to four torque ranges are available on each size of clutch, controlled by selection of the actuating spring set, providing a wide range of torque capacities to select from

providing a wide range of torque capacities to select from. The series is suitable for moderate speed applications with low radial forces and infrequent tripping. The design is suited to inline stop switch, or proximity switch, see page 26.



CS Mini Series Couplings - Technical Capacities

Models*	Torque R	ange accordi	ng to Spring S	Selection	Max.	Speed		Bore Size	mm	Weight	Inertia
WIDUCIS	S	М	L	U	S/M	L/U	Clut	ch M	Cplg. M1	kn	know?
	Nm	Nm	Nm	Nm	rpm	rpm	min	max	max	9	Kgcm-
CSF20E-CC	2.5-5.0	5-10	10-20	20-40	800	800	7	20	30	12	8
CSY20E-CC	5-10	10-20	20-40		700	500	,	20		1.2	Ŭ
CSF25E-CC	6-12	12-25	25-55	55-100	800	700	10		25		
CSY25E-CC	12-25	25-50	50-100		700	450	10	25	35	2.5	21
CSF35E-CC CSY35E-CC	12-25 25-50	25-50 50-100	50-120 100-200	120-200	800 700	600 400	14	35	50	5.2	91
CSF45E-CC CSY45E-CC	25-50 50-10	50-100 100-200	100-250 200-400	250-400	800 650	500 300	18	45	60	10.0	205

*For clutch Part No. for ordering refer below

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CS Mini Series Couplings - Dimensions
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Madala							Dimension	S					
CSF/CSY	E	F	G	к	L1	N	R	S	т	T1	T2	U	w
20E-CC	11.5	5.5	53	21.7	84.5	50	80	67	46	2.8	7	37	38
25E-CC	16.5	7.0	74	23.2	98.0	57	100	82	53	3.5	8	48	54
35E-CC	16.5	7.0	88	29.0	132.0	65	120	112	79	4.0	10	66	70
45E-CC	22.0	8.0	114	34.5	155.0	81	150	128	90	4.0	10	81	86

Catalogue Part Numbers

To order Safegard series clutches it is essential to identify clutch type, size (refers to max bore capacity), connection flange design, and spring ratings for correct torque, (see rating for each clutch).

Examples Clutch Reference **CSF 35A/M** is a Safegard (type CSF) size 35, design A with M rated springs (25-50 Nm). **CSY 25E/L** is a Synchron (type CSY) size 25, design E (Mini Series) with L rated springs (50-100 Nm).

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Couplings are identified by suffix - CC, e.g. *CSY 25E/L* - *CC* is coupling version of above clutch. Clutches come with pilot bores, but can be supplied finish bored if specified on order.

Series CZ and CN Zero Backlash Safegard Overload Clutch



Zero backlash Overload Clutches and Couplings, series CZ and CN, available in 8 different basic types, and 12 basic sizes, for shaft diameters from 8mm to 60mm; providing Overload Protection for Torque values from 5Nm to 740Nm.

The CZ series Safegard overload clutches were developed to provide a totally backlash free transmission of power with a very responsive overload protection. These compact units are directly interchangeable with existing designs in the market providing a cost advantage with long reliable service life. Two basic modes of operation are available, the basic CZF/CNF Safegard ratchetting design with the driving balls equally spaced so that clutch can re-engage after a small angle of rotation, and the Synchron CZY/CNY design with the balls unequally spaced so that clutch can only re-engage after a full revolution so providing full synchronisation between driver and driven. Responsive overload reaction is obtained by the use of negative functioning Disc Springs to apply drive load. In the event of an overload the spring load actually decreases, allowing faster dis-engaging of the drive, and minimal pressure on the driving surface in the dis-engaged mode, reference diagrams below.



Method of Operation

During normal operation the CZ/CN Overload Clutches transmits the torque from the Hub (1) to the Flange (3) by a number of hardened steel balls (4) located in pockets in the Hub, and forced into matching seats in the Flange by the Disc Spring (6) applying load to the Pressure Flange (2). In the event that the Driving Torque exceeds the pre-set value, the reaction forces on the Steel Balls exceeds the force applied by the Pressure Flange, and the Balls start to ride-up out of their seats in the Flange (3). This action reduces the spring load, so allowing the Balls to quickly come out of their seats, so releasing the drive. The action of the Balls dis-engaging moves the Pressure Flange to the right so activating the stop switch (9). Re-engagement is automatic once the torque level drops below the pre-set value. The Synchron design re-engages only at one angular position to keep Hub and Flange accurately synchronised at all times. The Disc Springs work only in the negative area of their characteristics so unscrewing the Adjusting Nut (7) increases the axial load of the Spring

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so unscrewing the Adjusting Nut (7) increases the axial load of the Springs, so increasing dis-engaging torque. When desired Torque setting is achieved the Adjusting Nut is locked by the Bolt (8) being screwed into the locking Collar (10).

Series CZ and CN Safegard **Overload** Clutch



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CZ/CN Series Clutches and Couplings Torque Adjustment B

Referring to drawing alongside Torque setting of the Clutches can be made using either a suitable size 'C' Spanner (A), or a correct size Pin Wrench (C). First release Adjusting Nut (7) by removing the Locking Screw (8), then rotate the Nut clockwise until at end of stroke (do not apply excess force). Then rotate nut back anti-clockwise by one indent to reach the neutral position, corresponding to minimum torque. Then continue to turn Adjusting Nut anti-clockwise for the number of indents indicated on the label (F) on the outside of Clutch for required Torque. Put Threadlock on Locking Screw, and replace in one of the threaded holes (G) which aligns with a hole in the Locking Plate behind.



Overload Sensor Switches

It is strongly recommended that all installations should include a Limit Switch or Sensor to switch off the power in event of an overload. The following are standard units available with mounting instructions.



Series CZ Safegard Overload Clutches Standard Plain Bore Units



Standard Zero Backlash Clutches types H&K

These clutches are intended for keyway connection to shafts where pre-machined synchronisation is the preferred design. Type H is used to mount compact drive systems with minimal overhung load, the single deep groove ball bearing providing full radial support for the sprocket, pulley, or gear.

Type K has an extended inner race to support a second Bearing to allow fitment of wider transmission elements, and where high radial loads may be encountered.



Type H

Type K



CZ Series types H & K - Technical Capacities

Models	Torque Ran	ge according to Spr	ing selection	Max.Speed	Bore S	ize 'M'	Weig	ht kg	Hub Iner	tia kgcm2	Flange
H&K Clutch Size	S Nm	M Nm	U Nm	rpm	min mm	max mm	Туре Н	Туре К	Туре Н	Туре К	lnertia kg m2
25	3-14	6-28	13-56	4000	8	20	0.74	0.83	2.15	2.22	0.95
30	9-35	18-70	40-140	3000	10	30*	1.37	1.41	5.30	5.58	2.35
40	19-65	38-130	78-260	2500	14	35*	2.28	2.56	13.68	14.58	6.45
50	35-110	80-220	160-440	2000	18	45*	3.29	3.74	27.62	29.88	13.07
60	80-185	160-370	320-740	1200	24	50	5.12	5.73	66.45	72.01	26.52

*For clutch Part No. for ordering refer bottom of page

*max bore achievable only with keyway according to DIN 6885 Sheet 3

CZ Series types H & K - Dimensions

Clutch	A	В	C	D	E	E1	F	G	G 1	Н	J	K	L	L1	ſ	M	N	Р	R	Т	T1	Z	CH
Size			h5												min	max			h6				A/F
25	65	56	47	8x M4	5	33	7.5	8	6.5	7	54.5	12	40	65	8	20	63	70	30	5	2.8	1.2	7
30	80	71	62	8x M5	7	43	8.0	11	8.8	8	69.0	14	48	80	10	30*	77	85	40	5	2.8	1.5	7
40	95	85	75	8x M6	9	55	10.5	14	11.5	9	77.0	16	59	100	14	35*	88	100	45	5	3.5	1.8	8
50	110	100	90	8x M6	10	67	12.0	16	13.0	10	87.5	17	64	115	18	45*	100	115	55	6	4.0	2.0	10
60	130	116	100	8x M8	10	73	12.0	18	14.0	12	106.0	21	75	130	24	50	122	135	65	7	4.0	2.2	10

For Limit Switch location and operation refer to page 29. Always use limit switch for long service life.

Clutch Part Numbers for Ordering

To correctly order CZ series clutches it is essential to identify the clutch operating mode, size, type, spring ratings (torque range), and for clutches and couplings using Clamping Elements for shaft connection, the shaft diameters. **Operating Mode:** CZ series clutches are available with two operating modes, ratchetting type CZF for applications where synchronisation of input to output is not required, and single position type CZY for full synchronisation. **Clutch Size:** The clutch size generally indicates the max bore size, and is identified in the tables. **Clutch Type:** A letter from H to T indicates the clutch/coupling design, as shown in the respective drawings. For couplings type M and N it is required to indicate the coupling size also, e.g. for Coupling size 40-72 type M the reference is M72, for couplings P,R & T it is necessary to indicate rubber shore value ie. P92 is with rubber 92 shore. Spring Rating: following a /' the letter S,M, or U indicates the Spring sizes selected, which controls the torque range. **Bore Sizes:** Except for pilot bored types H,K and M it is essential that the finish bore sizes of the Clutch/Coupling are provided to enable supply of the unit. Types H,K and M can be supplied with finish bores also if specified.

Examples

CZF40H/M CZY50L/S-40 CSY40N89/U-35/40 CSY50M89/S-38/48

is a Ratchetting size 40 clutch type 'H' with spring selection M.
is a Synchronous size 50, type L, with spring set S, fitted with 40mm clamping bush.
is a Synchronous Coupling size 40, type N, with spring set U, with the clutch half
fitted with a 35mm clamping bush, and the coupling half with a 40mm clamping bush.
is a Synchronous Coupling size 50, type M, with spring set S, with the clutch half
bored and keyed for a 38mm shaft, and the coupling half bored and keyed for 48mm.

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Series CZ Safegard Overload Clutches



Standard Units With Expanding Bush Shaft Connection

Zero Backlash Clutch for keyless shaft connection types J & L. These clutches provide totally backlash free connection of drive gears and sprockets to shafts. A selection of clamping inserts provides a wide range of shaft diameters to be accommodated. Type J can be used to mount compact drive systems, with minimal overhung load, the single deep groove ball bearing providing full radial support.

Type L has extended inner race to support a second bearing to enable fitting of wider transmission elements.



CZ Series types J & L - Technical Capacities

Models*	Torque Ran	ge according to Spr	ing selection	Max.Speed	Bore S	ize 'M1'	Weig	ht kg	Hub Iner	tia kgcm2	Flange
J & L Clutch Size	S Nm	M Nm	U Nm	rpm	min mm	max mm	Type J	Type L	Type J	Type L	lnertia kgcm2
25	3-14	6-28	13-56	4000	10	25	0.72	0.81	2.29	2.36	0.95
30	9-35	18-70	40-140	3000	15	30	1.26	1.50	5.90	6.17	2.35
40	19-65	38-130	78-260	2500	19	40	2.11	2.39	14.75	15.66	6.45
50	35-110	80-220	160-440	2000	32	50	2.98	3.43	30.34	32.60	13.07
60	80-185	160-370	320-740	1200	32	60	4.75	5.36	71.94	77.18	26.52

*For clutch Part No. for ordering refer to page 30.

CZ Series types J & L - Dimensions

			1.	,																					
Clutch	Α	В	C	D	E	E 1	F	G	G 1	K 1	L2	L3	I	/ 11	Р	R	S	T2	U	U 1	V	V 1	W	Z	CH1
Size			h5										min	max		h6									A/F
25	65	56	47	8x M4	5	33	7.5	8	6.5	12	40	65	10 19	20 25	70	30	40.5 42	2.8	42	67	47	72	26.5 26	1.2	7
30	80	71	62	8x M5	7	43	8.0	11	8.8	12	46	78	15	30	85	40	57	4	49	81	56	88	31	1.5	10
40	95	85	75	8x M6	9	55	10.5	14	11.5	14	57	98	19 32	30 40	100	45	57 64	4 3.5	60	101	67	108	40 31	1.8	10 8
50	110	100	90	8x M6	10	67	12.0	16	13.0	16	63	114	32	50	115	55	73.5	4	66.5	118	73	124	29	2	10
60	130	116	100	8x M8	10	73	12.0	18	14.0	21	75	130	32 55	50 60	135	65	73.5 89	4	78.5 78	134 133	85 86	140 141	29 45.5	2.2	10
																		1. 6							

For Limit Switch location and operation refer to page 29. Always use limit switch for long service life.

Standard Bore sizes available on J & L type clamping hubs, with respective maximum transmittable Torques

								9				1 (•			-									1
Clutch							A	vailab	le Bore	sizes	in mm	(Figure	s indic	ate ma	x. trans	smittab	le Torq	ue Nm)						Bolt
Size	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	lorque Nm
25	65	70	75	90	95	100	115	120	130	140	150	160													3
30					120	130	150	160	180	190	210	220	240	260											10
40								240	260	290	310	320	360	390											10
40															440	480	520	550							5.9
50															620	680	730	770	810	870	930	970			10
60															620	680	730	770	810	870	930	970	1070	1160	10

Shaft tolerance required for correct operation is h6 up to 40mm dia., h7 for over 40mm.

Typical Mounting Arrangements with Timing Pulleys







BACK

Series CZ Safegard Overload Couplings



Standard CZ series Zero Backlash Overload Clutches combined with a Torsionally stiff. Steel Disc Coupling for ultimate shaft to shaft positional accuracy, with full overload protection. Available with keyed shaft connection, or totally keyless with shaft clamping elements.





CZ Series Couplings types M & N - Technical Capacities

Models	To	rque Ran	ge	Speed	Coupl	ling Type	M Bore	Sizes	Coupl	ing Type	N Bore	Sizes	Wei	ght	Hub I	nertia	Flange	Inertia	Max. Misa	alignment
M & N	Accordi	ng to Spri	ng Type	wax.	Clutch	ı Hub	Couplir	ng Hub	Clutch	Hub	Coupli	ng Hub	Туре	Туре	Туре	Туре	Туре	Туре	Coup	oling
Size	S Nm	M Nm	U Nm	rpm	M min mm	M max mm	M2 min mm	M2 max mm	M1 min mm	M1 max mm	M3 min mm	M3 max mm	M kg	N kg	M kgcm2	N kgcm2	M kgcm2	N kgcm2	Angular degrees	Axial mm
25-53	3-14	6-28	13-56	4000	8	20	6	25*	10	25	11	20	1.2	1.2	2.15	2.22	2.42	2.47	1	0.4
30-72	9-35	18-70	40-140	3000	10	28	10	35	15	30	19	30	2.4	2.0	5.30	5.58	6.92	7.06	1	0.5
40-72	19-65	38-130	78-260	2500	12	35*	10	35	19	40	19	30	3.5	3.4	13.68	14.58	16.55	16.88	1	0.5
40-89	19-65	38-130	78-260	2500	12	35*	14	50*	19	40	24	42	4.3	3.6	13.68	14.58	16.55	26.12	1	0.6
50-89	35-110	80-220	160-430	2000	16	45*	14	50*	32	50	24	42	5.5	4.8	27.62	29.88	34.03	34.71	1	0.6
60-118	80-185	160-370	320-740	1200	22	50	15	65	32	60	32	60	9.4	7.8	66.45	72.01	43.52	44.39	1	0.8

For clutch Part No. for ordering refer to page 30. *max bore achievable only with keyway according to DIN 6885 Sheet 3

CZ Series Couplings types M & N - Dimensions

Models												Din	nensior	IS												
M & N Size	K	K 1	L	L4	L5	L8	N	P	P 1	P2	Рз	S max	S1 Max	T1	T2	Тз	V	W MIN	W1 MIN	Х	Y Max	Y1 Max	Z	CH	CH1	CH2
25-53	12	12	40	87.5	95.5	28	63	70	65	53	32	42	42	2.8	2.8	4	47	26	26.5	41.5	24.5	25.5	1.2	7	7	3
30-72	14	12	48	113.0	114.5	34	77	85	80	72	47	57	58	2.8	4.0	6	56	31	31	50.0	39.5	33.0	1.5	7	10	5
40-72	16	14	59	126.5	128.0	43	88	100	97	72	47	57	58	3.5	4.0	6	67	40	31	62.0	39.5	33.0	1.8	8	10	5
40-89	16	14	59	142.5	150.0	43	88	100	97	89	62	64	72	3.5	3.5	6	67	31	45	62.0	45.0	44.5	1.8	8	8	5
50-89	17	16	64	145.0	153.5	47	100	115	111	89	62	74	72	4.0	4.0	6	73	29	45	66.5	45.0	44.5	2.0	10	10	5
60-118	21	21	75	172.5	172.5	54	122	135	131	118	82	89	92	4.0	4.0	6	86	29	29	76.5	55.0	35.0 44.0	2.2	10	10	5

Standard Bore sizes available on N type Clutch clamping hubs, with respective maximum transmittable Torques

Clutch							P	vailabl	e Bore	sizes iı	n mm (Figures	indica	te max	. transr	nittable	e Torqu	e Nm)							Bolt
Size	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	Torque Nm
25 30 40 40 50 60	65	70	75	90	95 120	100 130	115 150	120 160 240	130 180 260	140 190 290	150 210 310	160 220 320	240 360	260 390	440 620 620	480 680 680	520 730 730	550 770 770	810 810	870 870	930 930	970 970	1070	1160	3 10 10 5.9 10 10

Standard Bore sizes available on N type Coupling half clamping hubs, with respective maximum transmittable Torques

Clutch							P	vailabl	e Bore	sizes i	1 mm (Figures	indica	te max	. transı	nittable	e Torqu	e Nm)				Element	Disc
Size	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	Bolt Torque Nm	Bolt Torque Nm
25-53 30-72 40-72 40-89 50-89 60-118	80	87	102	108 146	116 155	130 175	138 210 210	145 220 220	242 242	265 265 529 529	276 276 552 552	309 309 618 618	331 331 662 662	706 706 730	772 772 798	839 839 866	883 883 912	926 926 958	1026	1094	1140	5 17 17 17 17 17	6 8 15 15 33

Shaft tolerances required for correct operation is h6 up to 40mm dia., h7 for over 40mm., for both Clutch and Coupling Disc Bolt Torque is for the bolts on the Flexible Disc Plate

Series CZ Safegard Overload Couplings



Tel:

Fax: +44 121 325

Standard Keyless Connection Overload Clutches with Elastomeric Couplings



Couplings type T is identical to type P except coupling hub is not split, and hub suitable for standard reworking Couplings are supplied standard with 92 Shore rubber inserts, but 98 shore can be supplied to order

CZ Series Couplings types P, R & T - Technical Capacities

Models	To	rque Ran	ge	Nomina	l Torque	Speed	Clutch	h Hub	(Coupling	Hub Boi	re Sizes'	۲.	Wei	ght	Hub	Flange	Ма	x. Misalig	nment of	f Couplin	g
P, K&I	Accordi	ng to Spri	ng Type	Flexible	Coupling	wax.	Bore a	Sizes"	Cplg	Types P	& T	Cplg T	'ype R	Туре	Туре	Inertia	Inertia	Axial	92 Sho	re A	98 Sh	ore A
Size	S Nm	M Nm	U Nm	92 Sh.A Nm	98 Sh.A Nm	rpm	M1 min mm	M1 max mm	M4 min mm	M4 (P) max mm	M4 (T) max mm	M₅ min mm	M₅ max mm	P&T kg	R kg	kgcm2	kgcm2	mm	Radial mm	Ang. deg.	Radial mm	Ang. deg.
25	3-14	6-28	13-56	70	120	4000	10	25	10	28	28	15	28	1.38	1.53	2.2	4.00	1.4	0.14	1	0.10	0.9
30	9-35	18-70	40-140	190	320	3000	15	30	14	38	38	19	38	3.47	3.67	5.6	10.00	1.5	0.15	1	0.11	0.9
40	19-65	38-130	78-260	380	650	2500	19	40	15	45	45	20	45	4.48	4.48	14.6	20.00	1.8	0.17	1	0.12	0.9
50	35-110	80-220	160-440	530	900	2000	32	50	20	48	55	28	50	6.59	6.59	29.9	50.00	2.0	0.19	1	0.14	0.9
60	80-185	160-370	320-740	620	1050	1200	32	60	25	55	60	30	55	10.71	10.71	72.0	114.00	2.1	0.23	1	0.16	0.9

For Clutch Part No. for ordering refer to page 30. *max bore achievable only with keyway according to DIN 6885 Sheet 3

CZ Series Couplings types P, R & T - Dimensions

Models												Din	nension	IS												
P & R Size	AA	AB	AC	Η	J	K 1	L6 Max	L7 MAX	N	Р	P 5	P6	P 7	P8	S max	Т	T 1	T2	V MIN	W MAX	X 2	Z	CH	CH1	CH3	CH4
25	30	-	10.5	7	54.5	12	102	102	63	70	70	55	-	55	42.0	5	2.8	2.8	47	26.5	47.0	1.2	7	7	5	4
30	35	-	11.5	8	69.0	12	120	120	77	85	85	65	-	65	57.0	5	2.8	4.0	56	31.0	54.5	1.5	7	10	6	4
40	45	-	15.5	9	77.0	14	146	146	88	100	100	80	-	80	64.0	5	3.5	4.0	67	40.0	67.0	1.8	8	8/10	6	5
50	50	28	18.0	10	87.5	16	159	159	100	115	115	95	85	95	73.5	6	4.0	4.0	73	29.0	73.0	2	10	10	8	6
60	56	32	21.0	12	106	21	213	213	122	135	135	105	95	105	89.0	7	4.0	4.0	85	45.5	87.0	2.2	10	10	10	8

Standard Bore sizes available on P, R & T type Clutch clamping hubs, with respective maximum transmittable Torques

Size 10 11 12 14 15 16 18 19 20 22 24 25 28 30 32 35 38 40 42 45 48 50 55 60 Torque Nm 25 65 70 75 90 95 100 115 120 130 140 150 160 220 240 250 260 360 390 40 42 45 48 50 55 60 Torque Nm Nm 30 40 45 48 50 150 160 140 150 160 220 240 260 360 390 40 480 520 550 50 50 59 10 10 10 59 59 59 59 59 59 59 59 59 600 100 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10 10	Clutch							P	vailabl	e Bore	sizes i	n mm (Figures	indica	te max	. transı	nittable	e Torqu	e Nm)							Bolt
25 65 70 75 90 95 100 115 120 130 140 150 160 220 240 260 390 40 <td>Size</td> <td>10</td> <td>11</td> <td>12</td> <td>14</td> <td>15</td> <td>16</td> <td>18</td> <td>19</td> <td>20</td> <td>22</td> <td>24</td> <td>25</td> <td>28</td> <td>30</td> <td>32</td> <td>35</td> <td>38</td> <td>40</td> <td>42</td> <td>45</td> <td>48</td> <td>50</td> <td>55</td> <td>60</td> <td>Torque Nm</td>	Size	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	55	60	Torque Nm
	25 30 40 40 50 60	65	70	75	90	95 120	100 130	115 150	120 160 240	130 180 260	140 190 290	150 210 310	160 220 320	240 360	260 390	440 620 620	480 680 680	520 730 730	550 770 770	810 810	870 870	930 930	970 970	1070	1160	3 10 10 5.9 10 10

Standard Bore sizes available on P type Coupling clamping hubs, with respective maximum transmittable Torques

Clutch							Ava	ailable	Bore si	izes in	mm (Fi	gures i	ndicate	max. t	ransmi	ttable 1	forque	Nm)					Bolt
Size	10	11	14	15	16	19	20	24	25	28	30	32	35	38	40	42	45	48	50	55			Torque Nm
25	34	35	36	38	39	39	41	43	45	46													10.5
30			80	81	81	85	87	91	92	97	99	102	105	109									25
40				92	94	98	99	104	105	109	112	113	118	122	123	126	130						25
50							232	244	246	255	260	266	274	283	288	294	301	309					69
60									393	405	413	421	434	445	454	462	473	486	494	514			120

Standard Bore sizes available on R type Coupling clamping hubs, with respective maximum transmittable Torques

Clutch							Av	ailable	Bore s	izes in	mm (F	igures	indicate	e max.	transm	ittable	Torque	Nm)				Bolt
Size	11	14	15	16	19	20	24	25	28	30	32	35	38	40	42	45	48	50	55			Torque Nm
25 30 40 50 60	48	67	74 142	72 154	90 188	97 189 269	112 237 337	120 250 356 399	143 280 398 445	307 436 470 775	310 442 506 819	353 501 566 955	389 533 581 999	572 630 1090	585 647 1091	644 728 1230	836 1334	858 1381	1540			6 6 10 35 69

Shaft tolerance required for correct operation is h6 up to 40mm dia., h7 for over 40mm.

BACK NEXT

Series CN Safegard Overload **Clutches Standard Plain Bore** Units

Standard Zero Backlash Clutches types H&K

These clutches are intended for keyway connection to shafts where pre-machined synchronisation is the preferred design. Type H is used to mount compact drive systems with minimal overhung load, the single deep groove ball bearing providing full radial support for the sprocket, pulley, or gear.

Type K has an extended inner race to support a second Bearing to allow fitment of wider transmission elements, and where high radial loads may be encountered.



Type H

Sizes Type K



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NEXT

CN Series types H & K - Technical Capacities

Models	Tor	que Range accord	ing to Spring selec	tion	Max. Speed	Bore S	Size 'M'	Weig	jht kg	Hub Iner	rtia kgcm²	Flange
H&K Clutch Size	S Nm	M Nm	L Nm	U Nm	rpm	min mm	max mm	Type H	Type K	Type H	Type K	Inertia kg m²
11	0.65 - 3.0	1.3 - 6	2 - 9	2.6 - 12	4000	6	11	0.17	0.19	0.27	0.26	0.08
16	2 - 5	4 - 10	6 - 15	8 - 20	4000	8	16*	0.26	0.30	0.54	0.55	0.2
20	4 - 10	8 - 20	12 - 30	16 - 40	4000	9	20	0.51	0.59	1.8	1.8	0.6
25	4 - 14	8 - 28	12 - 42	16 - 56	4000	12	20	0.89	1.06	4.6	4.8	1.8
30	9 - 35	18 - 70	27 - 105	40 - 140	3000	15	25	1.62	1.77	11.8	12.1	3.9
40	19 - 65	38 - 130	57 - 195	78 - 260	2500	22	35*	2.86	3.28	27.0	27.6	7.7
50	35 - 110	80 - 220	120 - 330	160 - 440	2000	32	45	3.72	4.80	61.5	65.3	17.3

*For clutch Part No. for ordering refer bottom of page

*max bore achievable only with keyway according to DIN 6885 Sheet 3

CN Series types H & K - Dimensions

Clutch Size	A	В	C h⁵	D	E	E1	F	G	G1	Н	J	K	L	Ľ	H1	H²	P°	N	Р	R h⁰	Т	T ¹	Z	CH A/F
11	40	35	30	6XM3	2	20.5	5	4.5	3.0	6	32	7.0	24	40	-	-	-	39.5	45	17	4	2.1	0.8	5.5
16	47	42	37	6xM3	2	25	6	5.0	5.0	8	36.5	9.5	29	49	-	-	-	43	50	25	4	2.1	1.0	5.5
20	60	53	47	6XM4	3	31	7	5.0	5.0	9	36.5	9.5	33	58	-	-	-	43	65	30	4	2.1	1.2	5.5
25	77	69	62	6XM5	4	35	7.5	5.5	5.5	-	54.5	10.2	41	68	14.9	7.5	75	63	80	35	5	2.8	1.2	7.0
30	90	80	68	6xM6	5	40	8	6.5	6.5	-	69	11.0	47	77	17.4	7.5	90	77	95	40	5	4.0	1.5	7.0
40	106	90	80	6XM6	5	48	9	7.0	7.0	-	77	12.6	52	90	20.0	8.0	105	88	110	50	5	4.0	1.8	8.0
50	125	112	100	6XM8	5	60	11	7.5	7.5	-	87.5	14.7	59	109	23.5	9.0	125	100	130	65	6	4.0	2.0	10

For Limit Switch location and operation refer to page 29. Always use limit switch for long service life.

Clutch Part Numbers for Ordering

To correctly order CN series clutches it is essential to identify the clutch operating mode, size, type, spring ratings (torque range), and for clutches and couplings using Clamping Elements for shaft connection, the shaft diameters. **Operating Mode:** CN series clutches are available with two operating modes, ratchetting type CNF for applications where synchronisation of input to output is not required, and single position type CNY for full synchronisation. **Clutch Size:** The clutch size generally indicates the max bore size, and is identified in the tables. **Clutch Type:** A letter from H to L indicates the clutch design, as shown in the respective drawings. **Spring Rating:** following a / the letter S, M, L or U indicates the Spring sizes selected, which controls the torque range. **Bore Sizes:** Except for pilot bored types H and K it is essential that the finish bore sizes of the Clutch/Coupling

are provided to enable supply of the unit. Types H, K and M can be supplied with finish bores also if specified.

Examples

CNF40H/M	is a Ratchetting size 40 clutch type 'H' with spring selection M.
CN Y50L/S-40	is a Synchronous size 50, type L, with spring set 5, fitted with 40mm clamping bush.



CROSS+MORSE

Series CN Safegard Overload Clutches

Standard Units With Expanding Bush Shaft Connection

Zero Backlash Clutch for keyless shaft connection types J & L. These clutches provide totally backlash free connection of drive gears and sprockets to shafts. A selection of clamping inserts provides a wide range of shaft diameters to be accommodated. Type J can be used to mount compact drive systems, with minimal overhung load, the single deep groove ball bearing providing full radial support.

Type L has extended inner race to support a second bearing to enable fitting of wider transmission elements.



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CN Series types J & L - Technical Capacities

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Models	Toi	rque Range accord	ing to Spring selec	tion	Max. Speed	Bore S	Size 'M''	Wei	ght kg	Hub Iner	rtia kgcm²	Flange	
J&L Clutch Size	S Nm	M Nm	L Nm	U Nm	rpm	min mm	max mm	Туре	Type L	Type J	Type L	Inertia kgcm²] :
11	0.65 - 3.0	1.3 - 6	2 - 9	2.6 - 12	4000	6	11	0.18	0.2	0.25	0.28	0.08].
16	2 - 5	4 - 10	6 - 15	8 - 20	4000	8	16*	0.28	0.32	0.51	0.58	0.2	1
20	4 - 10	8 - 20	12 - 30	16 - 40	4000	9	20	0.55	0.63	1.7	1.8	0.6	1.
25	4 - 14	8 - 28	12 - 42	16 - 56	4000	12	20	0.94	1.11	4.6	4.9	1.8	1
30	9 - 35	18 - 70	27 - 105	40 - 140	3000	15	25	1.63	1.78	11.5	12.5	3.9	1
40	19 - 65	38 - 130	57 - 195	78 - 260	2500	22	35*	3.03	3.45	26.3	28.4	7.7	
50	35 - 110	80 - 220	120 - 330	160 - 440	2000	32	45	3.95	5.03	59.5	67.1	17.3	

*For clutch Part No. for ordering refer bottom of page 34

*max bore achievable only with keyway according to DIN 6885 Sheet 3

CN Series types J & L - Dimensions

Clutch Size	A	В	C h⁵	D	E	E	F	G	G1	K1	L²	L³	Р	R h⁰	H'	H²	P	M ¹ min	M ¹ max	S	T ²	V	V ¹	w	Z	CH ¹ A/F
11	40	35	30	6xM3	2	21	5	4.5	3.0	7	24	40	45	17	-	-	-	6	12	25	2.1	29	45	13	0.8	5.5
16	47	42	37	6xM3	2	25	6	5.0	5.0	9.5	29	49	50	25	-	-	-	8	16	30	2.1	34	54	19	1.0	5.5
20	60	53	47	6xM4	3	31	7	5.0	5.0	9.5	33	58	65	30	-	-	-	9	16	30	2.1	38	63	19	1.2	5.5
25	77	69	62	6xM5	4	35	7.5	5.5	5.5	10	41	68	80	35	14.9	7.5	75	10 19	20 25	41 42	2.8	46	75	26	1.2	7.0
30	90	80	68	6xM6	5	40	8	6.5	6.5	11	47	77	95	40	17.4	7.5	90	15	30	57	4.0	57	87	31	1.5	10
40	106	90	80	6xM6	5	48	9	7.0	7.0	13	52	90	110	50	20.0	8.0	105	19 32	30 40	57 64	4.0 3.5	62	100	40 31	1.8	10
50	125	112	100	6xM8	5	60	11	7.5	7.5	15	59	109	130	65	23.5	9.0	125	32	50	74	4.0	69	119	29	2.0	10

For Limit Switch location and operation refer to page 29. Always use limit switch for long service life.

Standard Bore sizes available on J & L type clamping hubs, with respective maximum transmittable Torques

Clutch							A	vailabl	e Bore	sizes i	n mm	(Figure	es indic	ate ma	ax. trar	ismitta	ble Tor	que Nr	n)							Bolt
Size	6	8	9	10	11	12	14	15	16	18	19	20	22	24	25	28	30	32	35	38	40	42	45	48	50	Nm
11	13	18	20	23	25	28																				2.2
16		28	30	34	37	41	48	51	54																	1.7
20		28	30	34	37	41	48	51	54																	1.7
25				65	70	75	90	95	100	115	120	130	140	150	160											3
30								95	100	115	160	180	190	210	220	240	260									10
40											240	260	290	310	320	360	390									10
40																		440	480	520	550					5.9
50																		620	680	730	770	810	870	930	970	10

Shaft tolerance required for correct operation is h⁶ up to 40mm dia., h⁷ for over 40mm.

CROSS+MOR

Π

Series CP Safegard Pneumatically operated Overload Clutch

CP Pneumatic Overload Clutches operating features CP Clutches are zero backlash units which provide remote accurate

adjustment of the overload torque by air pressure adjustment. The torque can be constantly adjusted throughout a production cycle providing optimum machine protection.

CP Overload Clutches can be integrated into complex control systems with substantial advantage in automatic machinery with continuous changes of operating conditions. A stop switch is integrated in the torque limiter detecting the axial movement of the unit in event of an overload, providing a signal to cut off the air feed, to disconnect the drive. When overloaded, the CP Clutch has no connection between drive and driven sides providing a long maintenance free service life. After the cause of the overload has been removed the clutch can be automatically re-engaged by resumming the air pressure. Standard finish on the clutches is black phosphate exterior, but can supply in Nickel plated.

Method of Operation During normal operations, (fig. 1+2), the PC clutch transmits a backlash-free torque, proportional to the air pressure, from the input hub(1) to the output flange(18), through balls(16), forced by the air pressure on the moving flange(11) into the seats on the parts(1) and (18). A torque arm(5B) is required to avoid the rotation of the stator(5). When overload occurs(fig. 3), the input hub(1) and the output flange(18) disengage, and axial movement of the flange(11) against the air pressure activates the stop switch(14), which gives a signal to cut off the air; input and output of the clutch are then disconnected. CP units can be used as a clutch. The air pressure can be switched on or off, transmitting torque when on and remotely disconnecting the drive when not. CP clutches must be engaged under no load condition at slow speed or when stationary. Disengagement torque is proportional to air pressure, according to the torque/pressure diagram on the label on the clutch outer diameter. Filtered, oiled air kept at a constant pressure during normal operations will ensure the accuracy of the overload torque.

Series CP Pneumatic Clutches and Couplings Technical Features

					1 2	S							-		
Clutch	Clutch	Torque	Coupling	j Torque	Max		Misalignmer	nt	Clutch	Bore M	Coupling	Bore M ⁶	l.	nertias kgc	m²
Size	Min Nm	Max Nm	Nominal Nm	Max Nm	Speed	Axial mm	Radial mm	Angular deg	Min mm	Max mm	Min mm	Max mm	Hub Side	Type V Flange	Type W Coupling
V/W 20	3.8	47	35	70	5000	1.4	0.14	1	10	22*	8	28	0.28	0.17	3.07
V/W 25	15	80	95	190	4000	1.5	0.15	1	12	25	10	38	0.56	0.34	7.68
V/W 35	25	180	265	530	2500	2.0	0.19	1	15	35	14	55	2.12	0.90	37.01
V/W 45	50	250	310	620	2000	2.1	0.23	1	20	45	15	60	4.88	2.11	87.68
V/W 50	90	550	310	620	2000	2.1	0.23	1	20	55*	15	60	10.37	5.02	87.97

*d max with keyway according to DIN6885/3







Cluto Sizo	e B	A	В	C	D	Е	F	G	H	J	K	Ľ	L	L٩	N	Р	P⁵	P ⁶	P ⁷	R	S	т	U	V	W	Х	Y	AA	AB	AE	AF	AG
20	6	68	56	47	6xM5	11	7	15	13	1/8"	5	85	85	148	65	76	70	55	-	4xM5	10	24	23	53	19	30	-	30	-	75	45	10
25	8	32	72	62	6xM5	24	6	28	13	1/8"	4	104	105	169	82	90	85	65	-	4xM4	8	29	26	60	22	40	1.0	35	-	85	51	15
35	1	02	92	80	6xM5	28	7	34	19	1/8"	4	125	126	194	102	115	115	95	85	4xM5	10	34	36	69	22	50	1.5	41	19	96	63	15
45	1	23	110	95	6xM6	30	8	36	23	1/8"	5	133	135	219	122	130	135	105	95	4xM5	10	37	46	71	22	55	2.0	53	29	104	71	15
50	1	51	139	110	6xM8	33	9	40	23	1/4"	6	151	153	247	140	160	157	105	95	4xM6	12	40	51	84	22	60	2.5	53	29	119	86	15

7) (10) (12)(13)(14)(15)(16)(17) (6) 8) 9) (11)(5B) (18) (5) (19 4 ์ 3 2 1

Fig.1









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