Autogard

ATEX
APPROVAL DIRECTIVE
94/9/EC

320

TORQUE LIMITER

SERIES 320 MR

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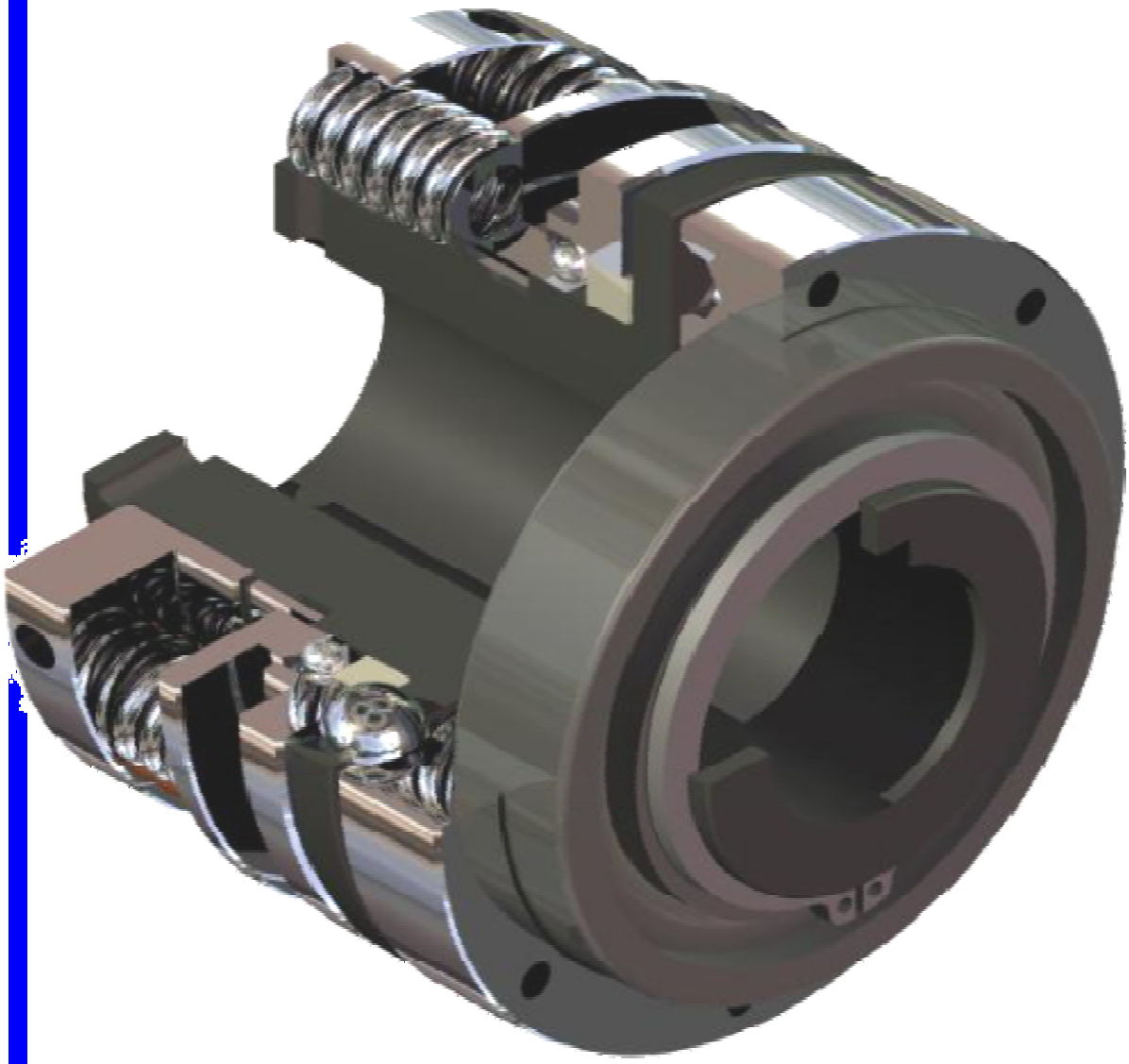
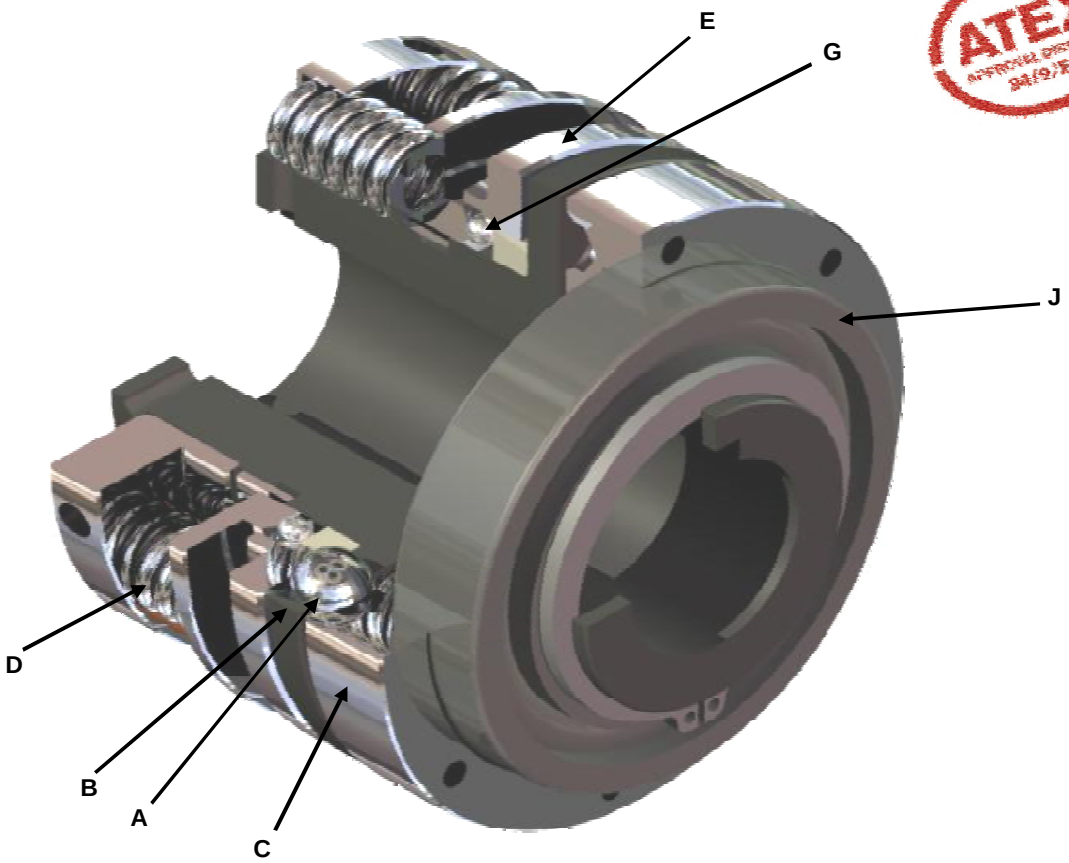


AUTOGARD SERIES 320 MR TORQUE LIMITER

Quality and Autogard are synonymous with overload protection. The company's reputation for high quality products is derived from over 40 years of design innovation and production. Autogard products are manufactured to meet ISO 9001 using the latest machine tools and high quality materials.



The Autogard Series 320 MR (Manual Reset) mechanical torque limiter is specifically designed to run at high speed and capable of running continuously in the disengaged condition.

The Series 320 MR torque limiter is a state of the art mechanical device that will disengage at a pre-set torque value. The trip torque is set above the normal start-up and operating torque, but below a torque setting which would normally damage the driving and /or driven equipment.

In the event of a jam, the torque limiter eliminates the threat of damage by disconnecting the inertia in the drive train.

The complete range of 320 MR torque limiters meet the requirements of ATEX approval under EU Directive 94/9/EC, for Category 2 equipment.

Disengagement on Overload
In the normal drive condition, torque is transmitted through drive balls (A) which are located in holes in flange (B) and detents in drive plate (C). The drive balls are held in the detents under pressure from springs (D)

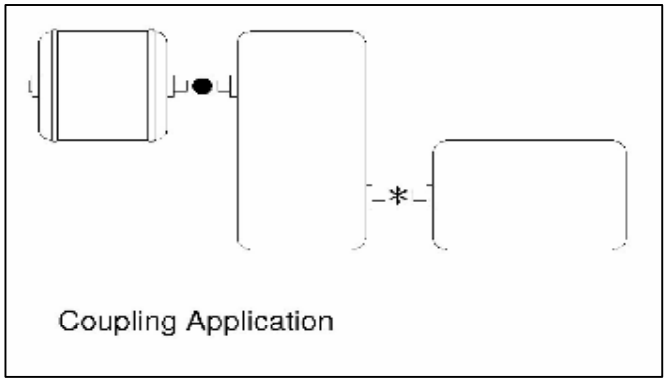
When the driven machine either jams or an overload occurs which is greater than the torque setting, the balls roll out of their seats pushing the pressure plate (E) and control balls (G) into a position such that the drive balls are held away from the drive plate seats and the torque limiter can run freely on bearing (J)

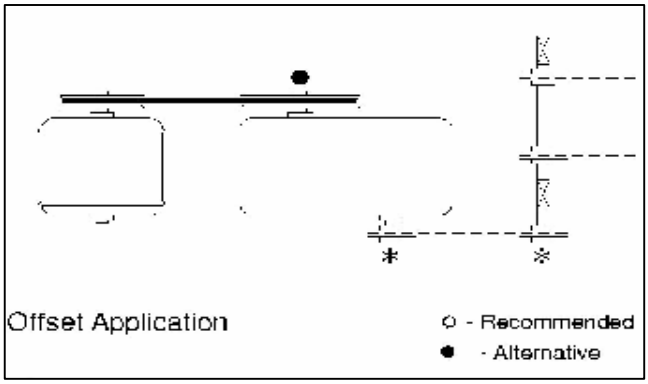
The axial movement of balls (A) during this process causes pressure plate (E) to move and thereby provides a means of detecting disengagement. An option sensor plate (H) may be attached to the pressur plate.

Re-engagement (Rapid Reset)
The re-engagement of the torque limiter could not be easier, simply insert a screwdriver (or similar) between the pressure plate and spring plate and twist slightly, the unit will snap back into engagement, at any position.

AUTOGARD SERIES 320 MR TORQUE LIMITER

The Autogard torque limiter acts like a mechanical "circuit breaker" to protect the weakest member of the drive train. The most effective location for the torque limiter is as close as possible to the component being protected. Drive trains having large reduction ratios should be given special consideration if the torque limiter is to be mounted at the high speed end. Consult Autogard for final drives with 300:1 reduction or higher. When locating the torque limiter on the high speed side of the drive, allow for starting torque. The Autogard torque limiter is suitable for chain, belt and gear drives and is also available with rigid and flexible couplings.





Features and Benefits:

ATEX Approved - under EU Directive 94/9/EC for Cat. 2 equipment

Manual Reset - after tripping can be easily reset, at any position.

High Speed - on disengagement allows continuous high speed free running.

Backlash Free - operation

Synchronous - reset option available.

Accurate torque limitation - prevents costly downtime caused by overloads.

Wide range - of torque settings and bore sizes are available

Compact Design - reduces weight and inertia on the equipment.

Fine-Thread Adjusting Nut – Allows accurate torque setting.

Instantaneous Disengagement - protects equipment from damaging inertias.

Bi-directional operation.

Springs can be inspected and changed - without removing the clutch from the drive train.

Large Number of Styles - ensures the optimum connection solution is available for all applications

Bore options - with conventional bore and key or cone clamp sleeve for keyless connection.

Selection:

Data required for torque limiter selection.

- Power and rpm of the driver.
- Shaft details of the driving and driven equipment.
- Drive medium

(1) Calculate the nominal torque.

Torque (Nm) = Power (kW) x 9550 / rpm

Consideration should then be given to start torque or other special circumstances depending on the position chosen in the drive train. Choose a set torque with a suitable margin over nominal.

Select the torque limiter which has a higher torque rating.

(2) Check Limiting Conditions:

(a) Check running speed

(b) Check hub bore capacity.

(c) Check the torque limiter dimensions such as the overall length and outside diameter.

(3) Select and specify the appropriate drive medium or coupling.

All Autogard Torque Limiters may be supplied from the factory at a pre-set torque and with required drive medium assembled to the unit

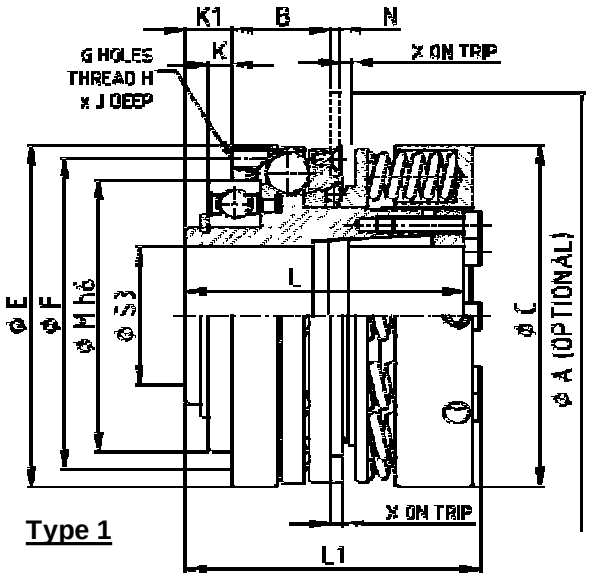
Ordering the Series 320 MR Torque Limiter	Example: 320 MR / Size 2 / Type 8 / S1 - 42 mm / S2 - 38 mm
When ordering please provide the following designation Model / Size / Type / S1 Bore / S2 Bore	Refers to a Series 320MR Size 2 Type 8 Torque Limiter Bore S1 = 42 mm Bore S2 = 38 mm
S1 Bore & S2 Bore – Please specify metric or imperial. Standard bore tolerance = ISO H8.	- Torque setting or Torque range required. - Pulley or sprocket details where required.

Unless otherwise stated, units are supplied as Rapid Reset, for Synchronous Reset, please consult Autogard.

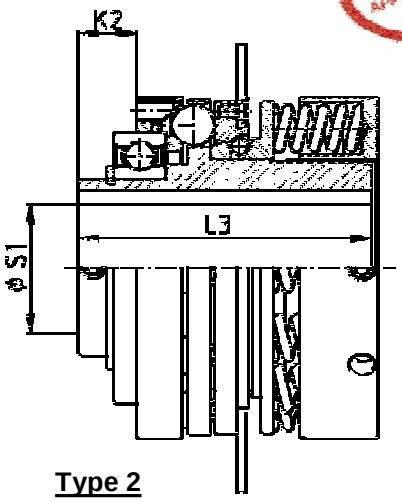
AUTOGARD SERIES 320 MR TORQUE LIMITER

STANDARD HUB

For use with sprockets, pulleys or gears.



Type 1



Type 2

Technical Details

Size				01	0	1	2	3	4	5
Torque	(Nm)	(1)	Minimum	6	10	20	40	80	160	320
	(Nm)	(1)	Maximum	60	130	220	500	800	1,800	6,000
Speed	(rpm)	(2)		8,000	7,000	6,000	5,000	3,600	3,000	1,500
Weight	(Kg)	(3)		1.0	1.9	2.9	4.5	7.4	13	33
Mass Moment of Inertia			($Kg.m^2$) (3)	0.0005	0.001	0.003	0.006	0.013	0.040	0.200

(1) See Page 7 for spring and torque ranges with specific springs.
(2) Higher speeds may be allowed under certain conditions. Please consult Autogard.
(3) Weights and Inertias apply to unbored units with a full set of springs and excludes sprockets, pulleys etc.

Dimensional Details (mm)

Size		01	0	1	2	3	4	5
Bore S3 - Clamped	Minimum	10	15	22	32	35	42	60
	Maximum	20	29	35	45	55	65	90
Bore S1 - Keyed (4)	Maximum	20	24	32	42	50	61	95
A		100	115	130	150	165	200	280
B		16	21	26	34	34	42	60
C		64	79	94	114	126	159	230
E		64	79	94	111	126	159	230
K		5	7	7	9	8	8	14
K1		8	11	12	12	16	16	25
K2		15	19	19	23	26	26	42
L		47	61	71	88	96	112	153
L1		50	66	77	94	102	120	165
L3		54	69	78	98	106	123	170
N		1.5	1.5	2	3	3	3	4
X		2.2 - 2.7	2.5 - 3.3	3.0 - 4.0	3.6 - 4.7	4.0 - 5.3	4.9 - 6.5	6.9 - 8.9

(4) Rectangular keys must be used for maximum bore diameters

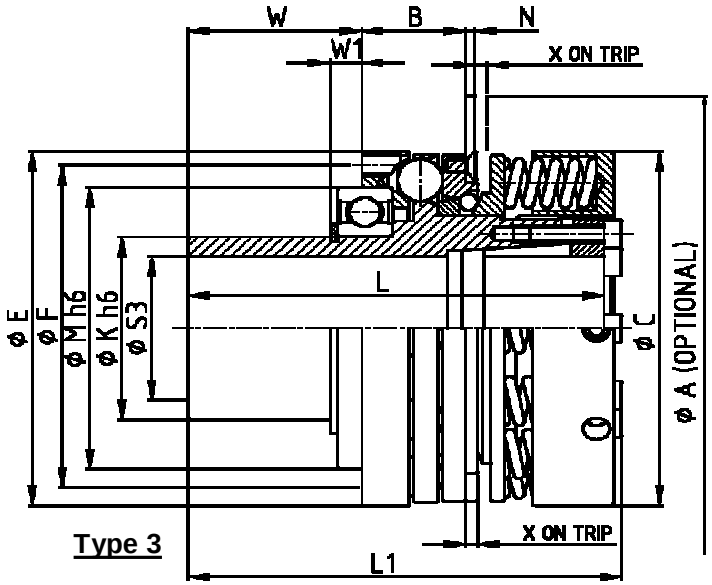
Size	Smallest Sprocket (Number of teeth)					Smallest Pulley (6)	Drive Media Fixing Details				
	3/8" Pitch	1/2" Pitch	5/8" Pitch	3/4" Pitch	1" Pitch	Dia. (mm)	F (mm)	G (Holes)	H (mm)	J (mm)	M (h6 mm)
01	24	19	16	14	11	60	56	8	M4	5.5	47
0	29	23	19	16	13	76	71	8	M5	7.3	62
1	34	27	22	19	15	91	85	8	M6	10	75
2	40	31	25	22	17	106	100	8	M6	10	90
3		35	29	24	19	124	116	8	M8	13	100
4			35	29	23	154	144	8	M10	18	115
5			50	50	42	221	205	6	M16	22	180

(5) The drive media must be bored to suit dimension "M". Clutches may be ordered complete with drive media (V-Belt Pulleys, Timing Pulleys, etc.)
(6) The pulley diameter quoted is to the bottom of the V-pulley groove or the inside diameter for the flange of the timomg pulley.

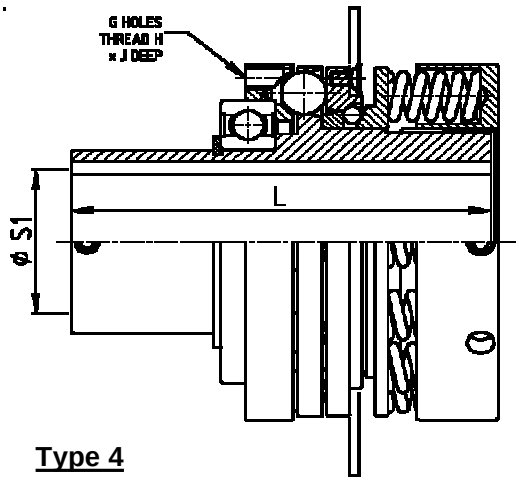
AUTOGARD SERIES 320 MR TORQUE LIMITER

LONG PROJECTING HUB

For use with sprockets, pulleys or gears.



Type 3



Type 4

Technical Details

Size				01	0	1	2	3	4	5
Torque	(Nm)	(1)	Minimum	6	10	20	40	80	160	320
	(Nm)	(1)	Maximum	60	130	220	500	800	1,800	6,000
Speed	(rpm)	(2)		8,000	7,000	6,000	5,000	3,600	3,000	1,500
Weight	(Kg)	(3)		1.2	2.3	3.5	5.6	9.1	16	39
Mass Moment of Inertia			($Kg.m^2$) (3)	0.0006	0.002	0.003	0.010	0.020	0.040	0.210

(1) See Page 7 for spring and torque ranges with specific springs.
(2) Higher speeds may be allowed under certain conditions. Please consult Autogard.
(3) Weights and Inertias apply to unbored units with a full set of springs and excludes sprockets, pulleys etc.

Dimensional Details (mm)

Size		01	0	1	2	3	4	5
Bore S3 - Clamped	Minimum	10	15	22	32	35	42	60
	Maximum	20	29	35	45	55	65	90
Bore S1 - Keyed (4)	Maximum	20	24	32	42	50	61	95
A		100	115	130	150	165	200	280
B		16	21	26	34	34	42	60
C		64	79	94	114	126	159	230
E		64	79	94	111	126	159	230
K		30	35	45	55	65	75	120
L		72	94	114	144	153	187	223
L1		75	99	119	150	159	195	235
N		1.5	1.5	2	3	3	3	4
W		33.0	44.0	55	68	73	91	95
W1		6.4	8.7	8.7	11.2	10.5	10.5	18.0
X		2.2 - 2.7	2.5 - 3.3	3.0 - 4.0	3.6 - 4.7	4.0 - 5.3	4.9 - 6.5	6.9 - 8.9

(4) Rectangular keys must be used for maximum bore diameters

Size	Smallest Sprocket (Number of teeth)					Smallest Pulley (6)	Drive Media Fixing Details				
	$^3/_8$" Pitch	$^1/_2$" Pitch	$^5/_8$" Pitch	$^3/_4$" Pitch	1" Pitch	Dia. (mm)	F (mm)	G (Holes)	H (mm)	J (mm)	M (h6 mm)
01	18	15	12	11	9	45	56	8	M4	5.5	47
0	20	16	13	11	9	55	71	8	M5	7.3	62
1	24	19	16	13	11	70	85	8	M6	10	75
2	28	22	18	16	12	85	100	8	M6	10	90
3		26	21	18	14	100	116	8	M8	13	100
4			23	20	16	110	144	8	M10	18	115
5			35	35	29	175	205	6	M16	22	180

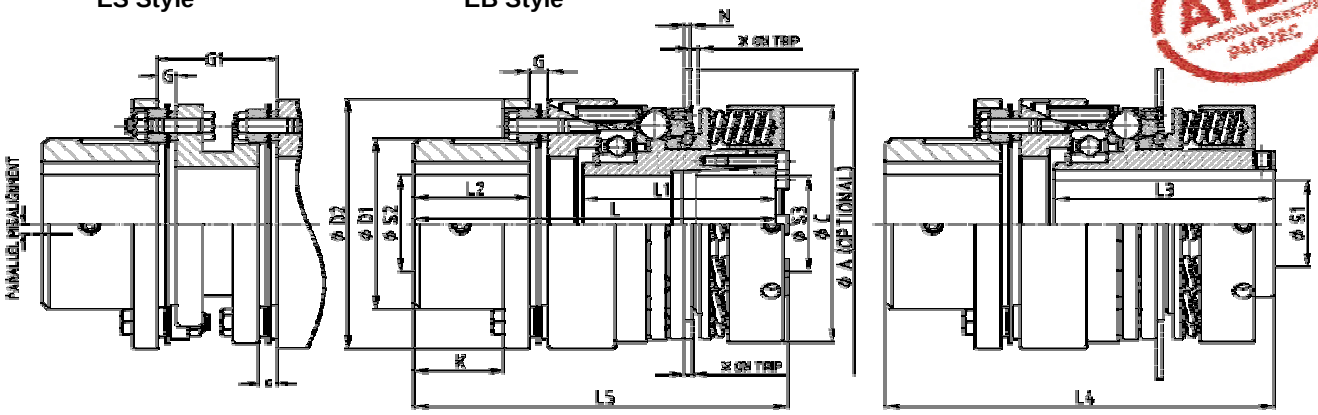
(5) The drive media must be bored to suit dimension "M". Clutches may be ordered complete with drive media (V-Belt Pulleys, Timing Pulleys, etc.)
(6) The pulley diameter quoted is to the bottom of the V-pulley groove or the inside diameter for the flange of the timomg pulley.

AUTOGARD SERIES 320 MR TORQUE LIMITER

TORSIONAL RIGID AUTOFLEX COUPLING

This model includes the Autoflex EB torsionally rigid metal membrane coupling for angular and axial misalignment. The Autoflex ES double flex spacer coupling can also be supplied which accommodates angular,axial and parallel offset misalignment

ES Style **EB Style**



Type 5 **Type 6**

Technical Details

Size			01/8	0/8	1/15	2/35	3/70	4/150	5/480
Torque	(Nm) (1)	Minimum	6	10	20	40	80	160	320
	(Nm) (1)	Maximum	60	130	220	500	800	1,800	6,000
Speed	(rpm) (2)		8,000	7,000	6,000	5,000	3,600	3,000	1,500
Weight	(Kg) (3)		2.2	3.0	4.8	8.0	13	25	60
Mass Moment of Inertia	(Kg.m^2) (3)		0.0020	0.003	0.007	0.020	0.040	0.120	0.380
Maximum Coupling Misalignments	Angular -EB	(°)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Angular -ES	(°)	1	1	1	1	1	1	1
	Axial - EB	(mm)	0.3	0.3	0.4	0.5	0.6	0.7	1.0
	Axial - ES	(mm)	0.6	0.6	0.8	1.0	1.2	1.4	2.0
	Parallel - EB	(mm)	0	0	0	0	0	0	0
	Parallel - ES	(mm)	0.3	0.3	0.0	0.0	0.0	0.1	0.7
	Combined	(mm) (4)	0.3	0.3	.04	.05	.06	.07	1.0

(1) See Page 7 for spring and torque ranges with specific springs.
(2) Higher speeds may be allowed under certain conditions. Please consult Autogard.
(3) Weights and Inertias apply to EB version with unbored hubs and a full set of springs.
(4) This is the maximum variation in G measured around the periphery. It corresponds to the maximum combined angular, axial and parallel misalignments.

Dimensional Details (mm)

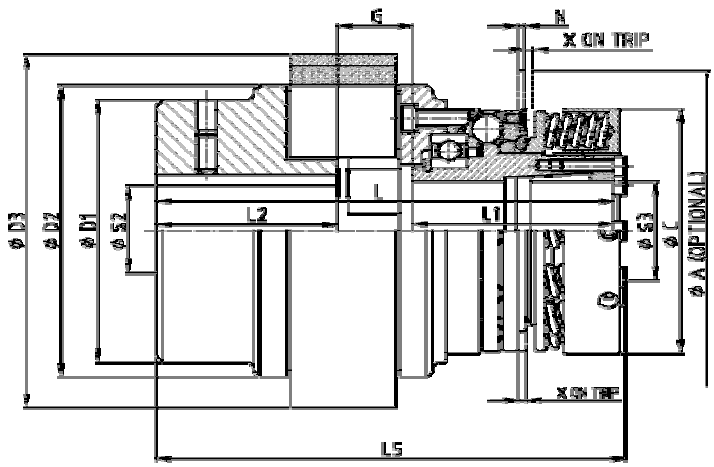
Size			01/8	0/8	1/15	2/35	3/70	4/150	5/480
Bore S3 - Clamped		Minimum	10	15	22	32	35	42	60
		Maximum	20	29	35	45	55	65	90
Bore S1- Keyed	(5)	Maximum	20	24	32	42	50	61	95
Bore S2 - Keyed	(5)	Maximum	30	30	40	50	66	90	110
A			100	115	130	150	165	200	280
C			64	79	94	114	126	159	230
D1			44	44	53	71	91	123	150
D2			80	80	89	110	133	170	230
G			7.3	7.3	7.3	9.4	9.4	8.8	15
G1	(6)		48	48	48	58	58	64	109
K			23	23	27	33	45	59	75
L			99	118	131	165	181	216	295
L1			47	61	71	88	96	112	153
L2			32.5	32.5	36.5	46.0	57.5	73.5	95.0
L3			57	71	84	105	112	130	179
L4			109	128	144	182	197	234	321
L5			103	123	137	171	187	224	307
N			1.5	1.5	2	3	3	3	4
X			2.2 - 2.7	2.5 - 3.3	3.0 - 4.0	3.6 - 4.7	4.0 - 5.3	4.9 - 6.5	6.9 - 8.9

(5) Rectangular keys must be used for maximum bore diameters
(6) G1 is for minimum DBSE, longer spacers are available.
(7) Clamp bushes and Shrink Discs may be supplied upon request - Please consult Autogard

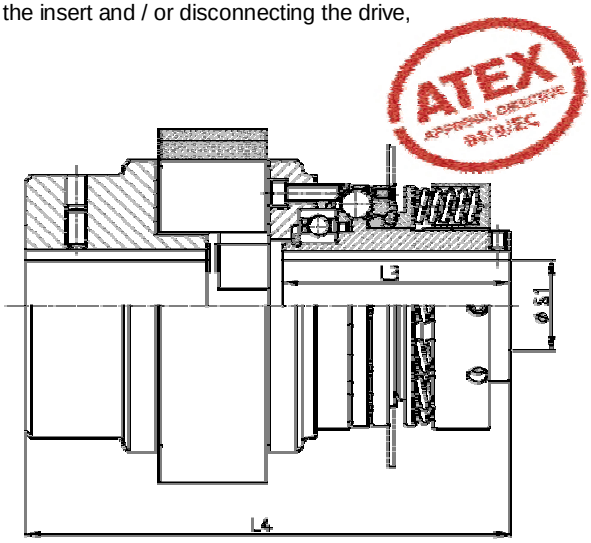
AUTOGARD SERIES 320 MR TORQUE LIMITER

TORSIONAL SOFT COUPLING

This model includes the Autoflex Samiflex coupling which accommodates angular, axial and parallel offset misalignments
The Autoflex Samiflex coupling provides a quick and easy method of replacing the insert and / or disconnecting the drive,



Type 7



Type 8

Technical Details

Size			01/A1	0/A2	1/A3	2/A3	3/A4	4/A45	5/A6
Torque (Nm) (1)	Minimum		6	10	20	40	80	160	320
Torque (Nm) (1)	Maximum		60	130	220	500	800	1,800	6,000
Max. Speed (rpm) (2)	Unbalanced		7,250	5,440	4,200	4,200	3,275	2,800	2,000
	Balanced		8,000	6,500	4,800	4,800	3,600	3,000	2,000
Weight (Kg) (3)			1.9	4.0	7.1	8.6	16	25	73
Mass Moment of Inertia ($Kg.m^2$) (3)			0.0020	0.009	0.034	0.037	0.130	0.220	0.620
Maximum Coupling Misalignments	Angular	(^{o})	2.0	2.0	2.0	2.0	1.3	1.3	1.3
	Axial	(mm)	+ 0.5	+ 0.5	+ 0.5	+ 0.5	+ 0.7	+ 0.7	+ 0.8
	Parallel	(mm)	0.3	0.5	0.5	0.5	0.7	0.7	0.8

(1) See Page 7 for spring and torque ranges with specific springs.
(2) Higher speeds may be allowed under certain conditions. Please consult Autogard.
(3) Weights and Inertias apply to units with unbored hubs and a full set of springs.

Dimensional Details (mm)

Size		01/A1	0/A2	1/A3	2/A3	3/A4	4/A45	5/A6
Bore S3 - Clamped	Minimum	10	15	22	32	35	42	60
(4)	Maximum	20	29	35	45	55	65	90
Bore S2 - Keyed	Minimum	15	18	20	20	25	26	40
(4)	Maximum	28	35	42	42	55	65	90
Bore S1 - Keyed (4)	Maximum	20	24	32	42	50	61	95
A		100	115	130	150	165	200	280
C		64	79	94	114	126	159	230
D1		65	80	85	85	110	125	180
D2		65	86	116	116	150	170	233
D3		83	111	144	144	182	202	265
G		15	21	28	30	36	34	59
L		97	127	155	174	195	216	307
L1		47	61	71	88	96	112	153
L2		35	45	56	56	63	70	95
L3		57	71	84	105	112	130	179
L4		107	137	168	191	211	234	333
L5		101	132	161	180	201	224	319
N		1.5	1.5	2	3	3	3	4
X		2.2 - 2.7	2.5 - 3.3	3.0 - 4.0	3.6 - 4.7	4.0 - 5.3	4.9 - 6.5	6.9 - 8.9

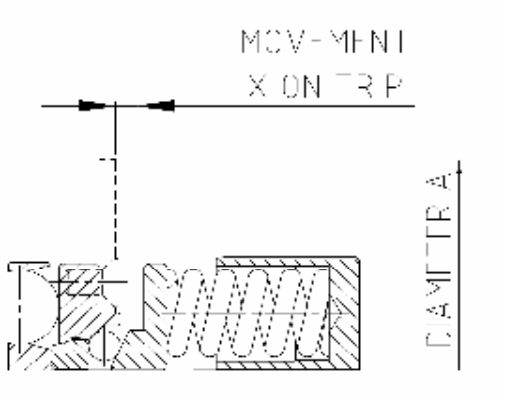
(4) Rectangular keys must be used for maximum bore diameters
(5) Clamp bushes and Shrink Discs may be supplied upon request - Please consult Autogard

AUTOGARD SERIES 320 MR TORQUE LIMITER

Drive Shutdown on Disengagement

The 320 MR is designed to run continuously in the disengaged condition, however switching off the drive upon disengagement will prevent unnecessary wear which could shorten the working life of the Autogard torque limiter.

The operation of the limit switch is effected by the movement of the pressure plate on disengagement. A flat switch plate may be attached to the pressure plate as shown.



Size		01	0	1	2	3	4	5
X	(mm)	2.2 - 2.7	2.5 - 3.3	3.0 - 4.0	3.6 - 4.7	4.0 - 5.3	4.9 - 6.5	6.9 - 8.9
A	(mm)	100	115	130	150	165	200	280

Torque Adjustment

The Autogard torque limiter can be supplied with the torque preset at the factory. However, in many cases the exact torque requirements are difficult to calculate with any reasonable degree of accuracy. Therefore the recommended installation procedure is to start the drive with a low torque setting and progressively tighten the adjustment nut until the torque limiter starts the mechanism without disengaging. Before attempting to turn the adjustment nut, ensure that the locking screw is loosened and is relocked after final adjustment.

Spring Selection

Size	01	0	1	2	3	4	5
No. of Springs	Torque Range (Nm)						
2	6 - 12	10 - 20	20 - 40	40 - 80	80 - 160	160 - 320	320 - 1,000
4	12 - 30	20 - 40	40 - 80	80 - 160	160 - 330	320 - 640	640 - 2,000
8	25 - 60	40 - 80	80 - 150	160 - 330	320 - 530	640 - 1,200	1,280 - 4,000
12		60 - 130	120 - 220	240 - 500	480 - 800	960 - 1,800	1,920 - 6,000

Protective Finish

The standard phosphate and oil finish provides a high level of corrosion resistance. Units can be supplied with a suitable alternative finish for special machinery requirements, or for adverse environmental conditions.

Please contact Autogard to discuss special requirements.

Maintenance

The Autogard 320 MR torque limiter uses sealed for life deep groove ball bearings. Other working surfaces are lightly greased on assembly. Under reasonably clean conditions the unit will operate with a minimum of maintenance and re-lubrication. The frequency of maintenance is dependent on many operating factors, but in adverse conditions please consult Autogard.

General Safety

The Autogard Torque Limiter is a reliable unit, built to high standards of workmanship. Similar to all mechanical devices, each application must be considered on its own merits with reference to safety (i.e. lifting equipment, explosive conditions, etc.). As a rotating component, adequate guarding must be provided, in accordance with local codes. Autogard staff are always available to discuss particular applications.

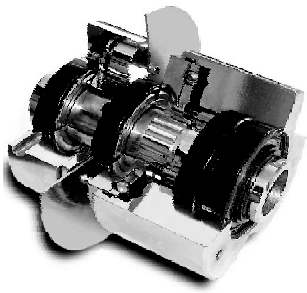
OTHER AUTOGARD PRODUCTS

Autoflex Couplings

Samiflex Elastic Coupling

Autogard Series 200 Torque Limiters

Autogard Series 400 Torque Limiters



Autogard Series 600 Torque Limiters

Autogard Series 800 Torque Limiters

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