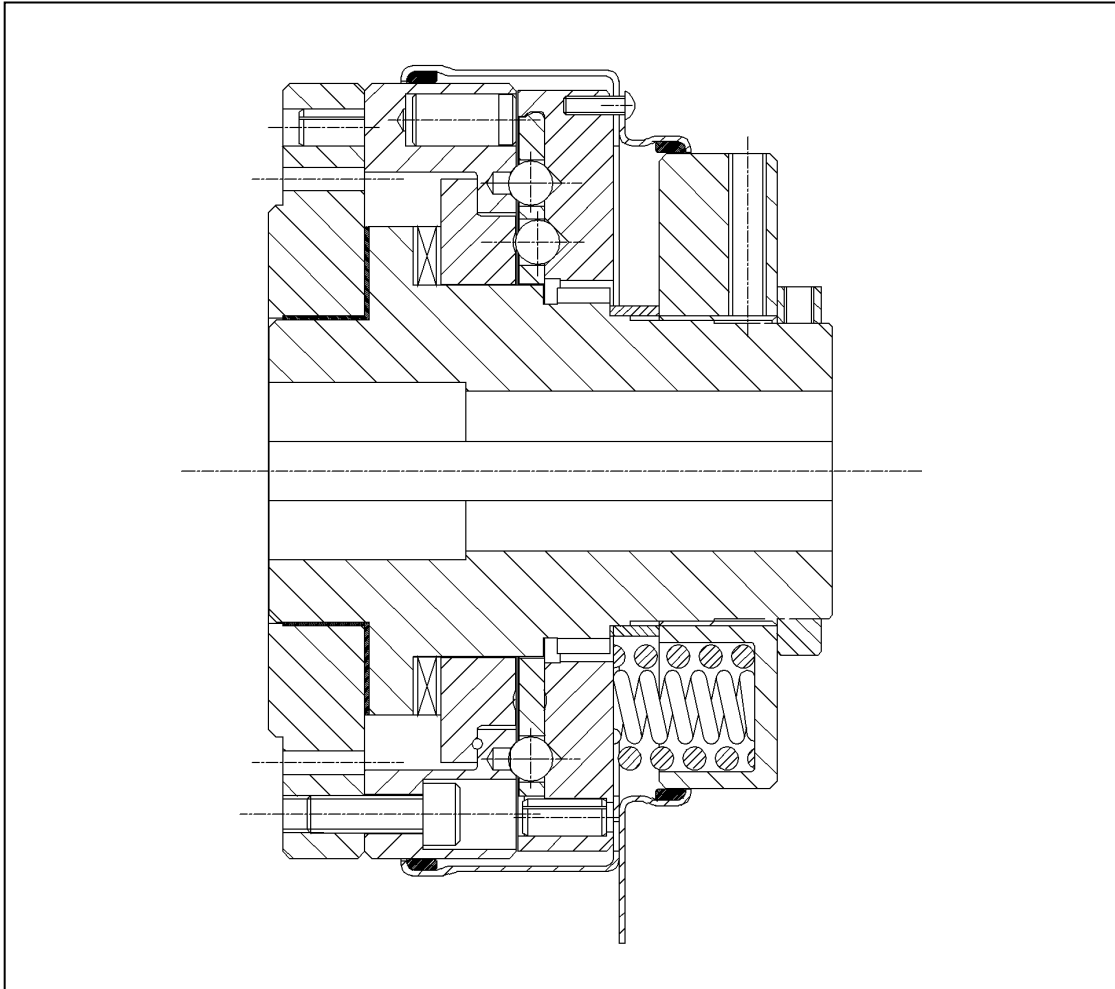


**AUTOGARD 400 SERIES TORQUE LIMITER**

**Installation and Maintenance  
Instructions**



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## 1. Technical Data

### 1.1 Standard parts (Figure 1)

Part Number	Description	Spares Code	Part Number	Description	Spares code
21	Hub	B	42	Pawl	B
22	Slide plate	B	43	Tape journal bearing	A
23	Adjusting nut	C	44	Tape thrust bearing	A
24	Strut ring	C	45	Adapter ball bearing	B
25	Drive plate	B	46	Cage plate spring	C
26	Cage plate	B	52	Clamp collar	C
27	Calibration spacer	C	53	Adjustment spacer	C
28	Adapter	C	54	Adjuster screw	C
29	Pawl spring	A	55	Washer	C
30	Torque spring outer (spring stack > size 5)	C	56	Spring pillar	C
31	Torque spring inner	C	57	Ball bearing (SR strut ring only)	A
32	Drive balls	A	58	Switch plate / cover	B
33	Needle thrust bearing	A	59	Switch plate fixing screw	B
34	-		60	Felt strip – switch plate cover	A
35	Roll pin for SR pawl	B	61	Drive plate cover	B
36	Stop pin outer	B	62	Felt strip – drive plate cover	A
37	Adapter bolt	A	63	-	
38	-		64	Locking peg	C
39	Adapter dowel pin	A	65	Locking peg screw	C
40	Adjusting nut locking screw	A	66	-	
41	Stop pin inner	B	67	Bearing spacer	C

#### Spares Codes:

A = Standard service item – spares stock is recommended

B = Potential service item – spares stock is recommended in critical applications

C = Spares stock is not normally required

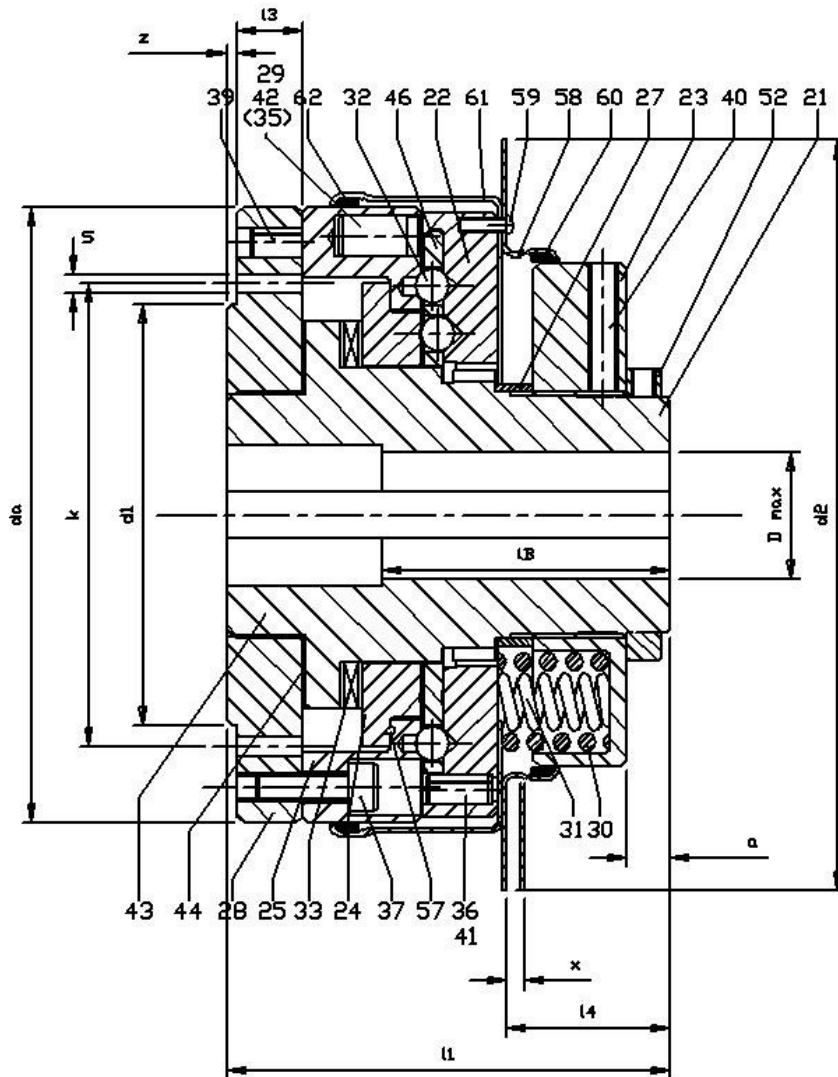
For details of specifications, part number and quantities required for specific sizes and models, please contact Rexnord.

## 1.2 General Technical Data

### 1.2.1 Size 1-5

- Type RR (Rapid Reset) is supplied as standard.
- Type SR (Synchronous Reset) if supplied is specified with order.
- In the case of Type RR, Part 57 is omitted.
- In the case of type RR, parts 35 (anti-rotation pins from pawls) are omitted.
- Cage plate spring (46) is only used in Type SR Size 1
- Protective cover (61) and sealing strips (60,62) are special equipment
- Figure 1 refers to a model 403. Refer to section 1.3 for other models.

RR Top



SR Bottom

Figure 1

Size	Max Torque Setting $T_{max}$ Nm	Speed (3) $N_{max}$ 1/min	$D_{max}$ mm	$d_a$ mm	$d_1$ mm	$d_2$ mm	$x$ mm	$z$ mm	$k$ mm	$s$	$l_B$ mm	$l_1$ mm	$l_3$ mm	$l_4$ (1) mm	Wt. (2) kg
1	28	3000	16	62	30	110	1.5	1.5	41.3	5xM4	30	59	9.2	22.4	1
2	225	3000	28	112	75	140	2.8	4.8	92	6xM8	50	108	15.8	43.7	5.5
3	680	3000	40	146	95	184	3.5	4.8	114	7xM10	70	114	15.8	44.7	10.5
4	1130	2000	50	168	122	203	3.5	4.8	144	8xM12	75	121	15.8	45.9	15
5	2540	2000	75	222	155	280	4.4	6.4	184	8xM16	110	163	25.4	68.9	36

Table 1: Maximum actuating torque  $T_{max}$ , speed  $n_{max}$ , weights and dimensions

- 1) Dimension without cover 61
- 2) Weights apply to maximum bore size
- 3) Higher speeds may be permitted – consult Rexnord.

The torque settings are applicable to:

- Daily operation up to 24 hours between operations.
- Operation in the temperature range from  $-15\text{ C}$  to  $+80\text{ C}$  (ambient temperature of shaft ends)

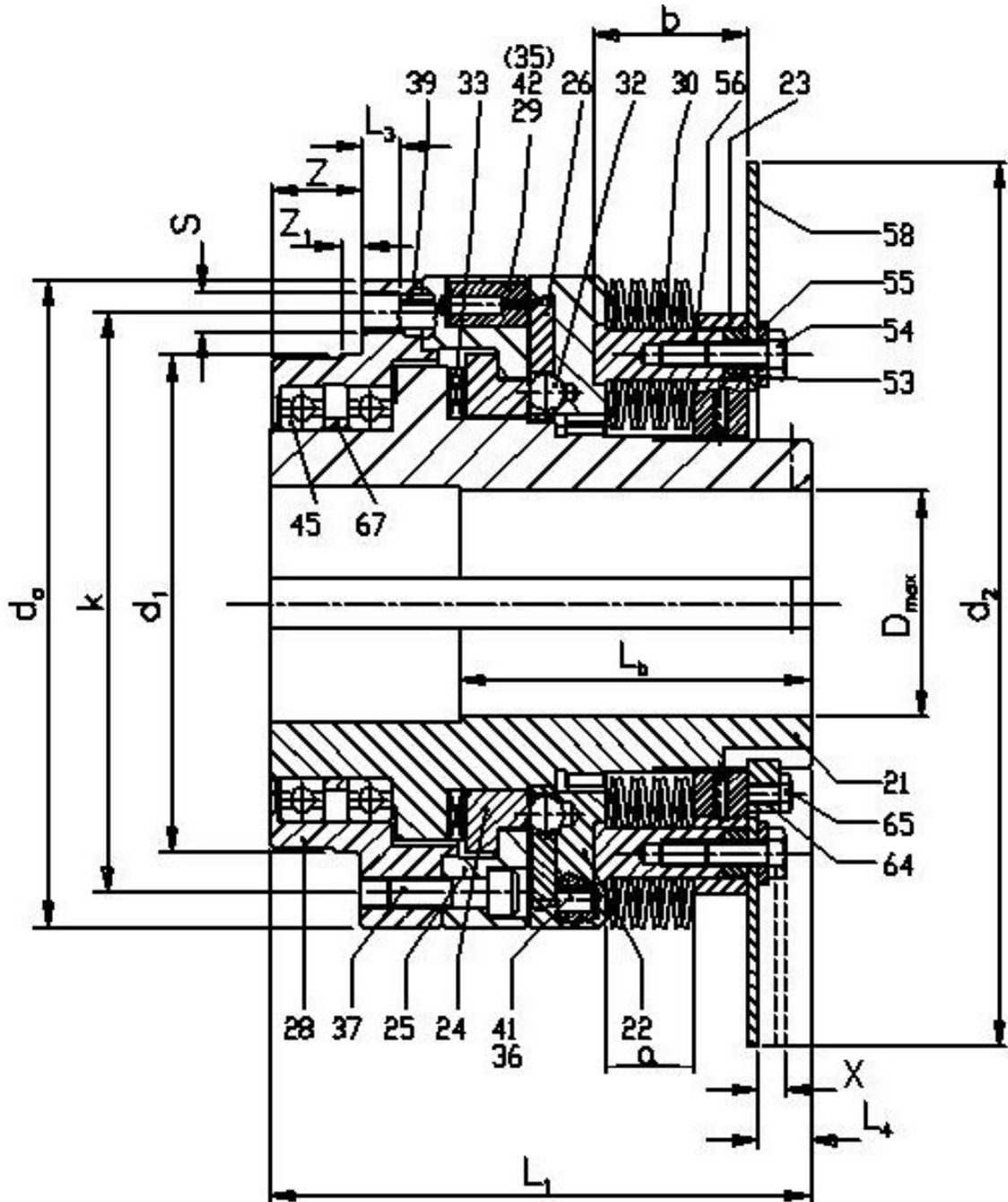
### Caution

- Note that the set torque must be high enough to withstand start up torques.
- Rexnord Autogard Torque Limiters are supplied with a durable surface protection, so that no painting is necessary. If however, paint is applied by the customer, the following points should be observed:
  - Do not clean the coupling by pressure washing or solvent dip. It may be wiped clean only. Grease and oil might be washed off which can only be replaced by disassembly of the torque limiter.
  - The torque limiter may only be painted on its outer surfaces. When doing so, ensure that no paint is allowed to penetrate into the unit or into gaps between components.
- **To ensure sustained trouble-free operation, the torque limiter must be designed for the application involved. In the event of any change in the operating conditions (Power, speed, modifications to prime mover and driven machine), it is essential to check the design.**

### 1.2.2 Size 6-8

\* In the case of type RR, parts 35 (anti-rotation pins for pawls) are omitted

403-RR Top  
403-SR Bottom



Size	Max Torque Setting $T_{max}$ Nm	Speed $N_{max}$ 1/min	$D_{max}$ mm	$d_a$ mm	D1 J6 Mm	$d_2$ mm	$w$ mm	$x$ mm	$z$ mm	$k$ mm	$s$	$l_b$ mm	$l_1$ mm	$l_3$ mm	$l_4$ mm	Wt. (1) kg
6	5650	1500	100	263	200	304.8	9.5	5.3	36.5	228	9x M16	150	217	24	79	55
7	8600 11300	1500 1500	125	480 520	265 295	406.4	12.7	6.3	6	440 480	10x M20	210	245	35	87.3	125 140
8	13800 17600 24850	1000 1000 1000	150	575 615 655	325 355 370	476.2	NA	8.1	8	528 568 608	10x M24	240	300	38	120	225 235 250
9	31600 40800 56500	1000 1000 950	175	730 780 830	410 440 480	546.1	NA	10	8	670 720 770	10x M30	270	410	40	158	530 550 570

Table 2: Maximum actuating torque  $T_{max}$ , speeds  $n_{max}$ , weights and dimensions

1) Weights apply to maximum hole sizes

The torque settings are applicable to:

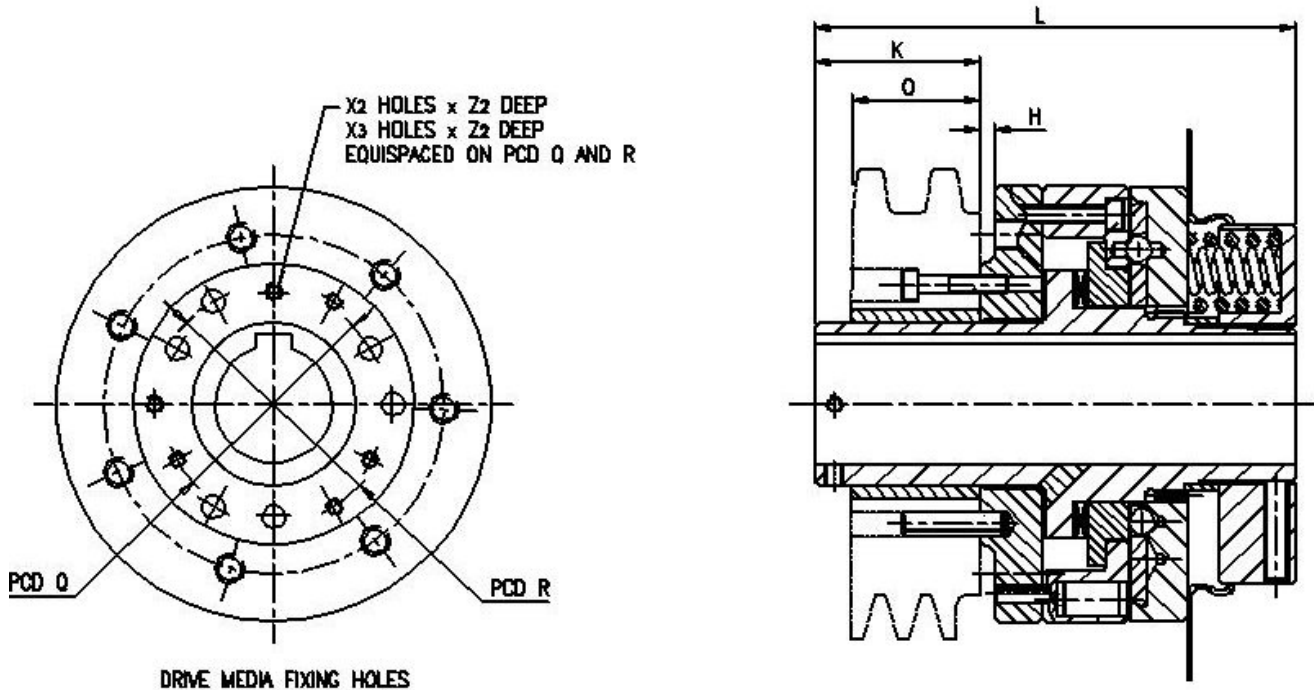
- Daily operation up to 24 hours between operations.
- Operating in the temperature range from  $-15\text{ C}$  to  $+80\text{ C}$  (ambient temp or temp of shaft ends.)

**Caution**

- Note that the set torque must be high enough to withstand start up torques.
- Rexnord Autogard Torque Limiters are supplied with a durable surface protection, so that no painting is necessary. If however, paint is applied by the customer, the following points should be observed:
  - Do not clean the coupling by pressure washing or solvent dip. It may be wiped clean only. Grease and oil might be washed off which can only be replaced by disassembly of the torque limiter.
  - The torque limiter may only be painted on its outer surfaces. When doing so, ensure that no paint is allowed to penetrate into the unit or into gaps between components.
- **To ensure sustained trouble-free operation, the torque limiter must be designed for the application involved. In the event of any change in the operating conditions (Power, speed, modifications to prime mover and driven machine), it is essential to check the design.**

### 1.3 Other Models

#### 1.3.1 Model 402 for sprockets, pulley and gears



Size	Lmax	Kmax	Omax	H	X2	X3	Z2	G	P	Q	R
1	83	33.5	25	0	3xM3	3x $\phi$ 4	6	25	30	35	38
2	148	57	44.5	0	3xM4	3x $\phi$ 4	9	40	46	52	61
3	160	55	43	4.76	3xM6	3x $\phi$ 8	11	55	63	75	80
4	212	100	84	4.76	3xM8	3x $\phi$ 10	11	65	72	85	90
5	284	134	116	6.35	4xM8	4x $\phi$ 10	11	100	107.95	120	125
6	373	181	-	-	-	-	-	-	-	-	-

Table: 3  
dimensions in mm

For customer fitted drive media, a suitable oil filled bronze bearing is supplied with the unit. Bore the drive medium to  $\phi$ P (H7) to provide a housing for the bearing. The bearing may be shortened to suit the actual length of the drive medium.

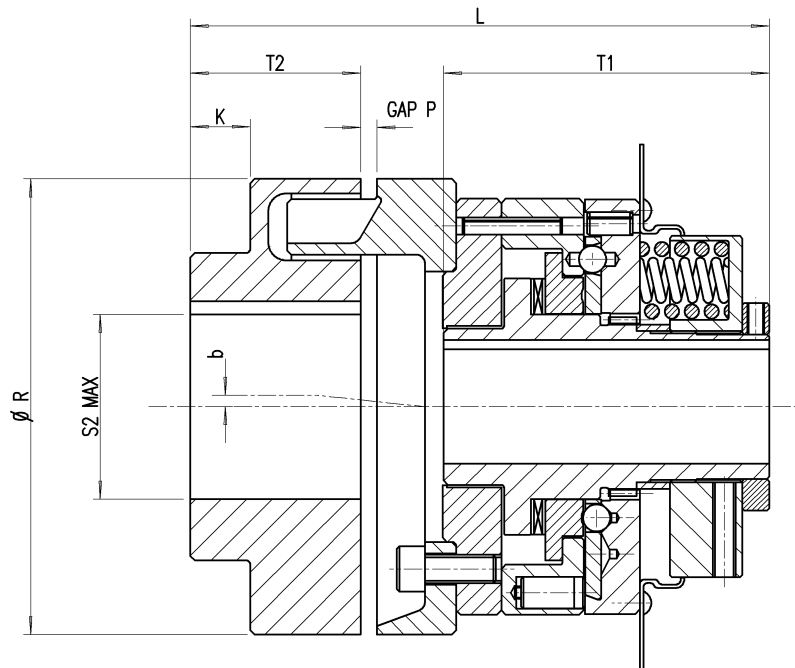
Before fitting make sure that all sharp edges are removed. The bearing must be free from grit and dust. Wash in oil to clean and re-oil if the bearing has dried out. To re-oil, immerse in mineral oil ISO VG68 or VG150 (SAE 30 or 40) at 60-70°C for 10-15 minutes, then cool in cold oil.

To fit the bearing, apply steady pressure using a flanged fitting pin. Never use hammer blows. The fitting pin shaft should be machined to  $\phi$ G m5. The bearing is made to ISO 2795 tolerances. When fitted in a rigid H7 housing using an m5 fitting pin, the resulting bore will be H7 which will provide a running fit on the torque limiter hub.

If a different bearing is used or for sizes 6 and over, refer to drawings or consult Rexnord.



### 1.3.2 Model 406N with N-Eupex elastomeric coupling.



Size	L	T1	T2	K	S2 max	R	P min	P max	ΔP	b
1	88.4	59	20	0	24	68	2	4	0.2	0.2
2	179	108	50	19	55	125	2	4	0.25	0.25
3	203	114	60	21	65	160	2	6	0.3	0.3
4	232	121	80	33	85	200	2	6	0.3	0.3
5	305	164	100	40	100	250	3	8	0.35	0.35
6	357	217	125	55	120	315	3	8	0.4	0.4
7	463	245	180	94	160	440	5	10	0.6	0.6

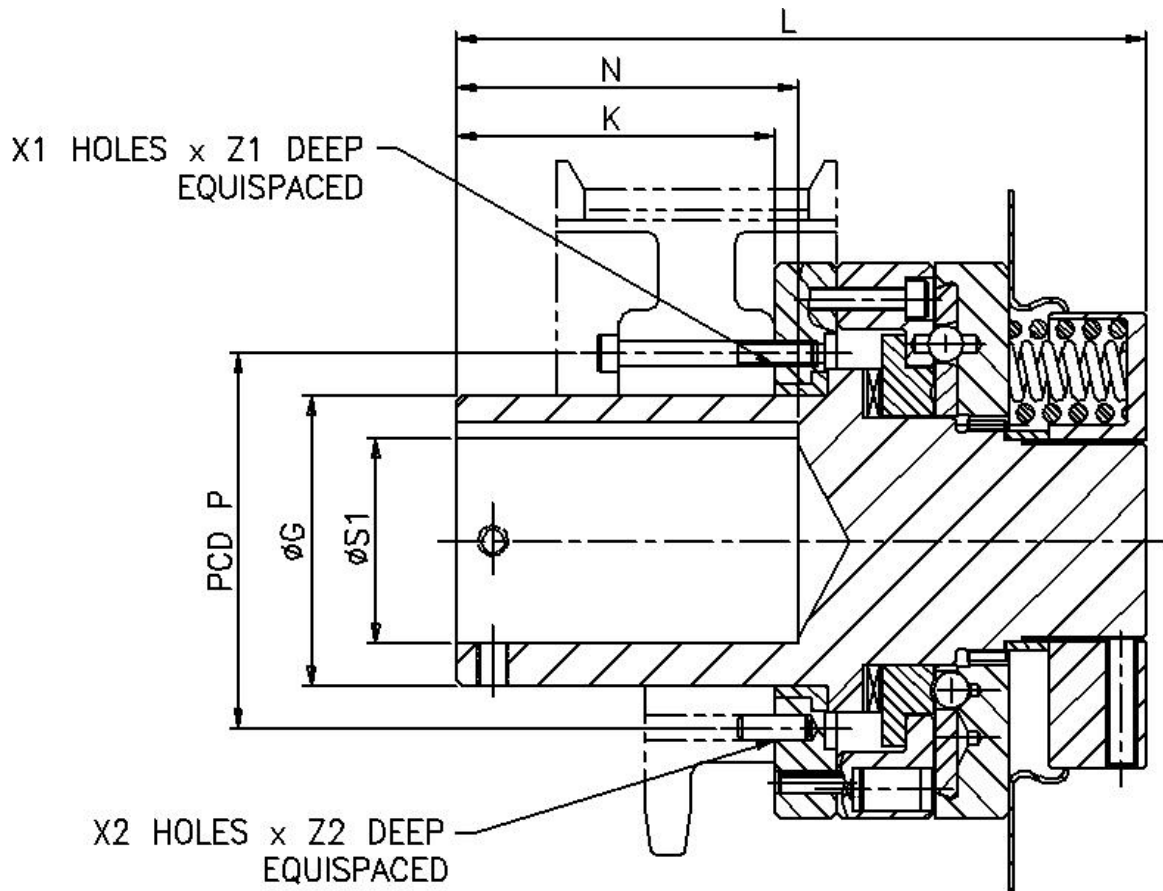
Table: 6  
dimensions in mm

Misalignment data is valid for 1500rpm. For other speeds please use this formula:

$$\Delta P = b = \left( 0.1 + \frac{R}{1000} \right) \times \frac{40}{\sqrt{n}}$$

Where n is speed in rpm and R is taken from Table 6.

1.3.3 Model 409 with large bore hub



Size	L	N	K	S1 max	G	P	X1 UNC	X2	Z1	Z2
1	94	51	43.9	28.6	38.1	53.98	8-32	3x4.75	7.9	7.1
2	148	65	57.2	41.3	57.2	76.2	10-24	6x4.75	9.5	9.5
3	181	90	84.1	54.0	76.2	98.43	½ -20	6x6.35	11	9.5
4	232	127	125.5	19.4	104.8	127	5/16 -18	6x7.94	12.7	12.7
5	303	165	164.3	102	139.7	165.1	3/8 -16	6x9.52	14.3	12.7

Table: 7  
dimensions in mm

UNC threaded holes are 3 off equispaced.  
 For size 1, the pin and screw holes are equispaced in a pattern of 6.  
 For sizes 2-5, the 3 x screw holes are positioned at 30° to the 6 x pin holes.

## 2. General Notes

### 2.1 General

These Operating Instructions constitute part of the torque limiter supply. They should be kept in the vicinity of the torque limiter at all times.

Only precise knowledge of the Operating Instructions will ensure trouble-free operation of the coupling. It is therefore in the interest of the customer for the Operating Instructions to be read, understood and observed in all respects by the persons responsible for handling, assembly and operation.

Note: We assume no liability for damage resulting from non-observance of the Operating Instructions.

The torque limiter dealt with in these Operating Instructions has been designed for use in general engineering. It is intended for use in protecting industrial machinery and is not to be regarded as a safety device.

The torque limiter described here is in accordance with the state of the art at the time of printing these Operating Instructions.

In the interest of further development, we reserve the right to introduce modifications which we consider appropriate, while retaining the essential features, to increase efficiency and reliability.

All technical questions should be referred to Rexnord at,

British Autogard Ltd	Telephone:	+44 (0)1285 640333
Cirencester	Fax:	+44 (0)1285 659476
	E-mail:	autogard.uk@rexnord.com

## 3. Safety Notes

### 3.1 Safety Notes

- The torque limiter is constructed in accordance with the state of the art and is reliable in the state as shipped. Unauthorized modifications which impair reliability are not permissible. This also applies to safety devices which are fitted as protection against accidental contact.
- The torque limiter may only be used and operated under the conditions specified in the performance and supply contract.
- The customer has to ensure that the persons entrusted with installation, operation care and maintenance, as well as repair, have read and understood these Operating Instructions and observe them in all respects in order:
  - To prevent hazard to life and limb on the part of the user and third parties.
  - To ensure the reliability of the torque limiter.
  - To prevent failure and environmental contamination resulting from improper handling.
  - To comply with essential health and safety requirements.

### 3.2 Safety Notes - Continued

- During the course of handling, assembly and disassembly, operation, as well as care and maintenance, the relevant regulations regarding industrial safety and pollution control are to be observed.
- The coupling may only be operated, maintained and repaired by authorised, trained and suitably supervised personnel.
- All work should be carried out with due care and with the safety aspect in mind.
- Work on the coupling may only be carried when it is stationary. The drive unit must be isolated to prevent accidental start-up (for example by locking the key switch or removing the fuses from the power supply). A notice should be affixed to the start-up point stating that work on the torque limiter is in progress.
- During operation, the drive unit should be shut off immediately if changes in the torque limiter are detected, such as for example changes in operating noises.
- The torque limiter must be protected to prevent accidental contact by means of a suitable guard.
- When the torque limiter is installed in equipment or systems, the manufacturer of the equipment or systems is obliged to include the instructions, notes and description contained in these Operating Instructions in his own Operating Instructions.
- It is the responsibility of the manufacturer of the equipment or system to ensure that local codes of safety are complied with. (e.g. EC Safety of Machinery Regulations in Europe).

### 3.3 Notes used in the Operating Instructions

Important instructions contained in these Operating Instructions which concern operating safety are emphasised as follows:



This symbol draws attention to measures which **MUST** be observed to prevent personal injury.

Caution

This symbol draws attention to measures which **MUST** be observed to prevent malfunction or damage to the torque limiter.

**Note:** This note draws attention to general operating notes which special attention should be given.

## 4. Handling and Storage

### 4.1 Scope of supply

The scope of supply of the shipment is listed in the despatch documents. It should be checked for completeness on receipt. Any shipping damage and/or missing parts should be reported immediately in writing.

### 4.2 Handling

Packing of the torque limiter will differ, dependent on methods of shipment and size. The packing will, unless agreed to the contrary, comply with Rexnord standards.

The symbols applied to the packing should be noted. Their significance is as follows:

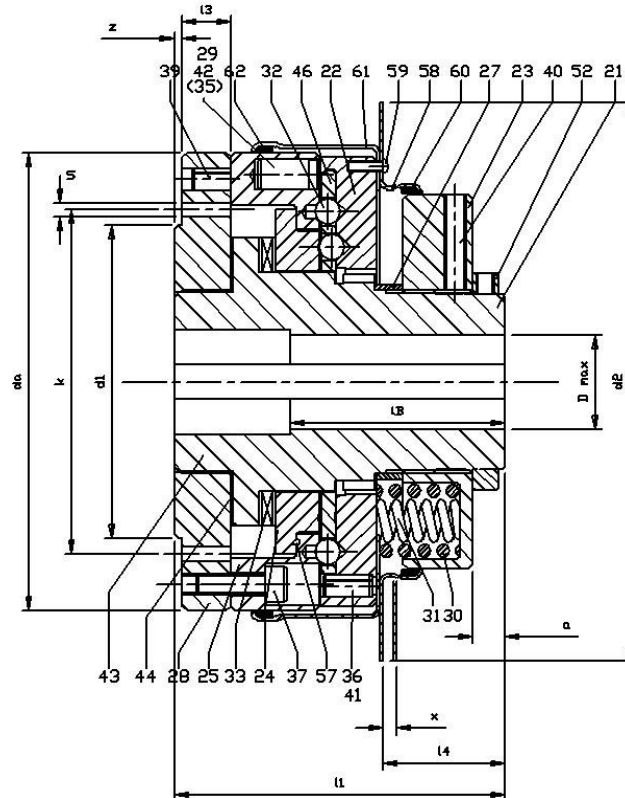
**Caution** Ensure that a suitable hoist is used

### 4.3 Storage

Rexnord Autogard Torque Limiters are supplied manganese-phosphated and oiled and can be stored in a dry place for long periods of time. In the case of prolonged storage, the torque limiter should be covered to prevent excessive contamination. Long-term preservation is only necessary for the finish bore.

**Caution** If dirty, the torque limiter **MUST** be cleaned. However, avoid complete wash down as this can wash oil and grease out of the interior of the torque limiter, necessitating complete disassembly and re-lubrication.

## 5. Technical description



### 5.1 General description

The Rexnord Autogard Torque Limiter is an overload protection coupling which protects motors, gear units and machines from overload and destruction due to excessive torque and automatically interrupts the power train when the torque setting is exceeded.

The actuating torque is directly dependent on the spring force which can be continuously adjusted by means of adjuster nut (23). Dependent on the size of the torque limiter, either helical springs or disc springs are used.

Type RR and SR are the basic types giving rapid reset and synchronous reset respectively.

With both types, reengagement is effected automatically by reversing the direction of rotation, manually or by motor. They differ in their different angles of reengagement.

In the case of Type RR, the reengagement angle is a maximum of 67 degrees, according to size.

The reengagement angle of Type SR is a maximum of 360 degrees. Torque limiters of this type will reengage in every case in the same angular shaft position, hence the term synchronous reset.

Caution

**When disengagement has occurred, investigate the cause and rectify before re-engagement. In the case of motor-operated reengagement, it is essential to ensure a low reengagement speed (<100 rpm). This applies particularly to Type SR.**

### 5.2 Torque transmission

The torque is transmitted by means of balls (32) which are located in conical recesses between two plates pressed together by spring pressure (drive plate –25- and slide plate –22).

A second set of balls (32) on a smaller pitch circle lies in recesses in the slide plate (22) and is unloaded when the coupling is engaged. The cage plate (26) retains the balls in position in relation to one another after disengagement of the coupling. Thus, it assumes a function similar to that of the cage of a ball bearing.

## 5.3 Disengagement process

When the running torque reaches a value which exceeds the set torque, the balls (32) of the outer pitch circle roll under load out of their recesses. The disengagement process is now commenced and the drive path between input and output sides of the drive is completely interrupted.

At the same time, the balls of the inner pitch circle are also rolled out of their recesses by the cage plate (26). Then, the slide plate (22) and the drive plate (25) rotate in relation to one another until the outer balls (32) engage in recesses (or escape seats) which are only present in the slide plate. Apart from any minimal residual torque, caused by the friction in the journal bearings (43 and 44), no further torque is transmitted.

The balls (32) of the inner pitch circle are now positioned between ball seats and support the full load generated by the springs (30 & 31). They maintain the slide plate (22) and the drive plate (25) at a distance by resting against the strut ring (24). The balls on the outer pitch circle, previously responsible for torque transmission, are at this moment unloaded. A pin (36) in the slide plate (22) prevents any further rotation of the slide plate in relation to the cage plate (26). Reengagement of the outer balls in their recesses is prevented and as a result the drive plate (25) can rotate freely on the hub. As a result of the disengagement of the torque limiter, the slide plate (22) moves axially and with it, the limit switch plate (58). This axial movement (x) should be monitored with a limit switch or a proximity switch.

Caution

**Rexnord Autogard 400 Series Torque Limiters should be monitored with a limit switch or a proximity switch in order to prevent unnecessary wear. Although these couplings can run for some time in the disengaged state, periods exceeding several minutes should be avoided (particularly with high-speed drive units).**

## 5.4 Reengagement

Re-engagement takes place automatically as a result of reversing the direction of rotation of the drive unit or of the output drive continuing to rotate with the drive motor stationary. When this happens, one of the spring-loaded pawls (29) extends by following a ramp on the slide plate (22) into a cut out in the cage plate (46) and turns the latter back until the balls (32) align with their original recesses in the drive plate. At this point, the pawl is forced back into its hole in the drive plate (25) by a second ramp on the slide plate (22). The slide plate then continues to rotate relative to the cage and drive plates until the slide plate seats are aligned with the balls. The mechanism then snaps back into re-engagement.

Caution

**Resetting must be done at low speed (<100rpm) to permit the engaging mechanism to function properly in either direction and to prevent potential damage. It should be done manually or by slowly inching the motor in reverse. Other methods are possible, but it is essential to ensure slow differential speed between input and output during re-setting.**

## 6. Installation

### 6.1 Finish boring

Rexnord Autogard Torque Limiters are normally supplied bored and keywayed. Couplings without bore and keyway cannot be set to an exact actuating torque. Please contact Rexnord for advise.

### 6.2 Securing axially on the shaft

The coupling halves are secured by means of setscrews (cup point) or with an end plate and central locking screw.



The length of the setscrews should be such that it fills the tapped hole, but does not project past the outside diameter ( $L_{\min} = \text{setscrew diam} \times 1.2$ ).

### 6.3 Balancing

Rexnord Autogard Torque Limiters are generally supplied without special balancing. If a special application (for example high rpm and large coupling size) necessitates balancing or it is required by the customer, this balancing can be carried out at our works and must be specified at the time of order. Type SR must be specified if the unit is to be balanced.

## 6.4 General installation notes

During installation, the Safety Notes in Section 3 should be observed. Installation should be carried out with extreme care by specialist personnel. Ensure right at the planning stage that there is adequate space available for installation and subsequent care and maintenance. Adequate hoists must be available when installation is commenced.

## 6.5 Mounting a sprocket, gear or pulley (Models 402, 409)

If not supplied with the unit, a sprocket, gear or pulley may be mounted by bolting to the adaptor. Fixing dimensions are given in tables 3 and 7.

In the case of Model 402, a bearing is supplied, which the customer may fit in the sprocket, gears or pulley. The required boring dimensions are given in the table. The bearing may be shortened to suit.

For 402 size 6 and above a suitable bearing must be supplied by the customer.

For 409, the customer should supply and fit their own bearing to suit the dimensions shown in Table 7.

Caution

**It is essential that fixing bolts or pins do not protrude through the adaptor and interfere with the internal mechanism of the torque limiter.  
Please select all bolts and pin lengths carefully.**

## 6.6 Mounting Torque Limiter on the Shaft

Before commencing installation, the shaft ends and the torque limiter bores should be carefully cleaned. Avoid oil and grease being washed out of the interior of the torque limiter; this will necessitate complete disassembly and re-lubrication.

### 6.6.1 Models 402, 409

With the torque limiter completely assembled, carefully engage the hub bore on the shaft. The standard clearance fit bore should permit the hub to be pushed or lightly tapped in place on the shaft.

Caution

**Do not strike with heavy hammer blows on the hub. On no account must direct heat be applied to the torque limiter.**

Once on the shaft, the torque limiter should be moved axially to obtain proper alignment of the sprocket, gear or pulley. Once in position, tighten the set screws.

### 6.6.2 Model 406

Mount the torque limiter on one shaft as described in 6.6.1. Mount the in-line coupling hub to the other shaft in a similar manner. Bring the shafts together and assemble the coupling, observing the shaft alignment requirements shown in tables 4, 5 and 6.

### 6.6.3 Model 403

For Model 403, the driven member is supplied by the customer. If used for an offset drive, the sprocket, pulley or gear must be mounted on its own bearing. If a coupling hub is fitted, follow the manufacturer's recommendations for alignment.



**Nonobservance of these notes can lead to torque limiter damage and in extreme cases break up of parts. Flying fragments are a serious hazard and must be prevented.**



## 7. Startup

### 7.1 Before startup

The tightness of the setscrews should be checked and the coupling guard fitted.

### 7.2 Torque adjustment

Rexnord Autogard Torque Limiters are supplied set to a fixed torque value in accordance with the customer's requirements if specified at time of order, otherwise it will be set near minimum trip torque. If the exact actuating torque cannot be determined beforehand, an actuating torque range can also be stated.

In the case of Sizes 1-5, the torque limiter can then be set experimentally, but a calibration spacer (27) designed for the max torque will be fitted. This will make it possible to adjust the actuating torque without the necessity for removing the coupling from the shaft.

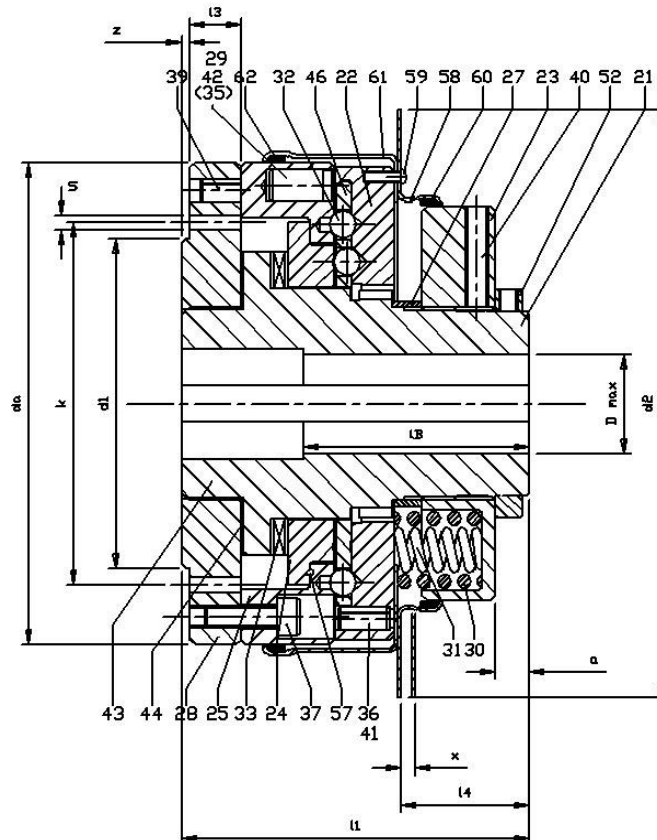
To set experimentally, start up the drive at a low torque setting. If the torque limiter disengages before normal operating load is reached, progressively increase the torque setting until the drive will start and run without tripping, under normal conditions. An approximate torque setting may also be determined from standard calibration curves which are available from Rexnord Autogard.

For couplings of Sizes 6-8, an individual calibration curve is normally provided. Generally, a Rexnord Autogard Torque Limiter can only be adjusted within the range stated on the calibration curve.

Caution

**Response of the Rexnord Autogard Torque Limiter should never be interpreted as a malfunction, but as an indication of the fact that higher torque values are occurring in practical operation than were previously determined theoretically. In this case the cause should be determined and the torque setting increased only if the reason for disengagement is fully understood.**

#### 7.2.1 Actuating torque adjustment with Sizes 1-5



Caution

**ON NO ACCOUNT** should calibration spacers (27) be removed, as otherwise no guarantee can be given of disengagement of the coupling. Replacement of springs with a stronger or weaker set, and shortening the calibration sleeve are **ONLY** permissible with the EXPRESS approval of Rexnord Autogard.

- First of all, the locking screws (40) of the adjusting nut (23) should be slackened. These locking screws prevent accidental rotation of the adjusting nut during operation.
- **Increasing the set torque;**
  - The torque is increased by turning the adjustment nut (23) clockwise. The calibration spacer (27) underneath the adjusting nut restricts the maximum set torque.

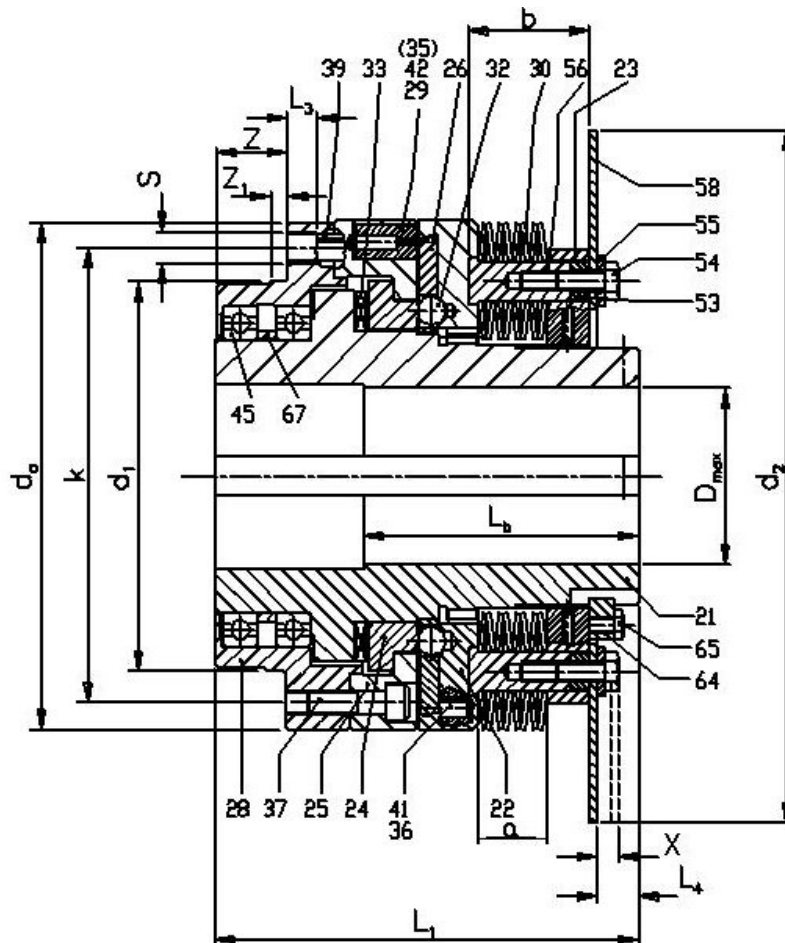


**When increasing the set torque, it is ESSENTIAL to note that the torque may only be increased to the extent that even the weakest component in the drive train is still adequately protected.**

- **Reducing the set torque**
  - The set torque is reduced by turning the adjustment nut (23) anticlockwise. When reducing the torque, a minimum actuating torque should be observed which must be maintained, as otherwise proper actuation of the torque limiter cannot be ensured.
- After carrying out the torque adjustment, the locking screws (40) should be cleaned and smeared with Loctite 243 and then retightened.

### 7.2.2 Torque adjustment with Sizes 6-8

403-6RR



403-6SR

**Caution**

The maximum and minimum torque of the torque limiter and the spring set installed (30) is specified by the setting curve. Further increase or reduction is not possible, as otherwise the proper function of the Rexnord Autogard Torque Limiter cannot be guaranteed. It may still be possible to fit a different spring set. In such cases, Rexnord should be consulted.

- Take into account the minimum space required P. Torque adjustment can be carried out without removing the coupling from the shaft.
- For the purpose of torque adjustment, slacken the two screws (65) holding the locking peg (64) against the adjustment nut (23). This locking peg locks the position and setting of the adjustment nut during operation.
- After removing the screws (54) and the adjustment spacers (53), the screws (54) should be screwed into the spring pillars (56) again, with washer (55) fitted. Omit the switch plate (58) if fitted. Tighten the screws (54), so that each spring stack is compressed in sequence. According to the size and torque range, between 4 and 12 spring stacks are fitted.
- **Increasing the set torque**
  - When the spring stacks (30) have been compressed, ensure that the hexagonal flange of the spring pillar (56) is not pulled out of the annular groove in the slide plate (22), that is to say that each screw (54), should after contact with the washer (55) on the adjustment nut (23), only be tightened 1.5 turns in the case of coupling sizes 6 and 7 and 1 turn in the case of size 8.
  - The adjustment nut (23) can now be turned freely clockwise in order to increase the actuating torque, until turning resistance is encountered (after approximately 1.25 – 1.4 turns). The maximum actuating torque is reached when the end of the spring pillar (56) is flush with the end of the adjusting nut (23). If the end of the spring pillar is projecting, proper function of the Rexnord Autogard Torque Limiter can no longer be ensured.



**When increasing the actuating torque, it is ESSENTIAL to note that the actuating torque may only be increased to the extent that even the weakest component in the power train is still adequately protected.**

- **Reducing the set torque**
  - When pretensioning the spring stacks (30), ensure that the hexagonal flange of the spring pillar (56) is not pulled out of the annular groove of the slide plate. Each screw (54), should only be tightened 1.0 turns in the case of coupling size 6 and 7, and 0.5 turns in the case of size 8 after contact with washer (55).
  - When all the spring stacks (30), have been pretensioned, the adjusting nut (23) can be turned freely anti-clockwise in order to reduce the torque, but only by a maximum of 0.5 turns, so that the hexagonal flanges of the spring pillar (56) are not pulled out of the groove in the slide plate.
- The adjusting nut must be positioned after adjustment so that it can be locked by means of the locking peg (64). To do this, align the tapped holes in the adjusting nut (23) either side of the groove in the hub.
- Next slacken the screws (54) to release the tension in springs (30). The spring pressure now acts directly on the slide plate (22) and the torque is now re-set.
- Install the adjustment spacers (53), screw the screws into the spring locating pin (56) again and tighten fully. The torque can not be adjusted with adjustment spacers fitted.

**Caution**

**When the adjustment spacer (53) is fitted, a small gap must always be present between the washer (53) and the adjusting nut (23).**

- By means of a test run check whether the system can be operated as required. If further torque adjustment is necessary, the adjustment procedure should be repeated.
- When adjustment is complete, the adjustment nut (23) should be locked in the required position again by means of the locking peg (64). The screws (65) should be cleaned, smeared with Loctite 243 and fully re-tightened.

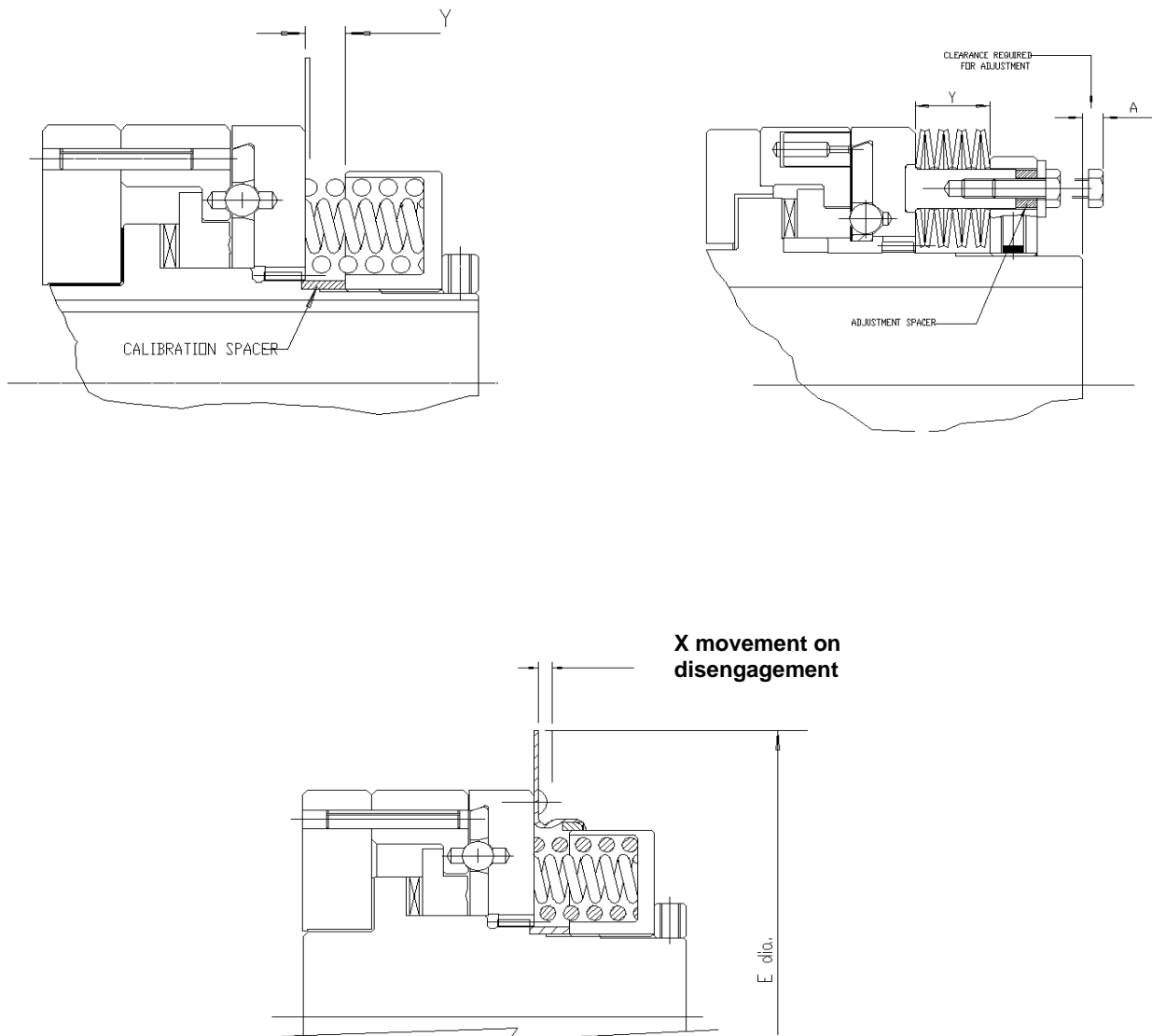
Table 7.1 – Torque ranges and spring sets

Size	Torque range		Designation of helical spring set		Gap 'Y' mm		Clearance movement For Adjustment A Disengage	X to
	From Nm	To Nm	Qty	Pos.	Torque Max	Min		
1	15	28	8	outer	1.9	2.8	N/A	1.5
	11	21	6	outer				
	6	14	4	outer				
	3	7	2	outer				
2	80	220	8	outer	5.1	10.2	N/A	2.9
	60	170	6	outer				
	40	115	4	outer				
3	250	678	6	inner +outer	5.1	10.2	N/A	3.5
	160	450	6	outer				
	110	300	4	outer				
	60	150	2	outer				
4	500	1130	8	inner +outer	5.1	10.2	N/A	3.5
	350	750	8	outer				
	260	560	6	outer				
	160	375	3	outer				
	75	190	2	outer				
5	1200	2540	8	inner +outer	5.1	15.2	N/A	4.4
	900	2000	8	outer				
	680	1500	6	outer				
	450	1000	4	outer				
	225	500	2	outer				
6	2250	5650	8 Spring Stacks		26.7	38.1	9.5	5.3
	1700	4250	6	" "				
	1100	2800	4	" "				
7	4500	11300	12 Spring Stacks		29.2	---	12.7	6.3
	3000	7500	8	" "				
	2250	5650	6	" "				
	1500	3800	4	" "				
8		24860 max	12 Spring Stacks		52.1	---	25.4	8.0
		18645 max	8	" "				
		12430 max	6	" "				

**Refer to figures on the following page for Gap Y, Clearance A and movement X.**

Caution

Calibration spacers (27) may NOT ON ANY ACCOUNT be completely removed, as otherwise no guarantee can be accepted for disengagement of the coupling. Replacing a helical spring set with a stronger or weaker spring set, installing additional disc springs or removing disc springs, and shortening a calibration sleeve should ONLY be carried out with the EXPRESS approval of Rexnord.



## 8. Operation

### 8.1 General data

During operation, the coupling should be checked for changes in running conditions.

Caution

If irregularities are detected during operation, the drive unit should be shut off at once. The cause of the fault should be located with the aid of the Troubleshooting Table (Section 9). The Troubleshooting Table lists possible malfunctions, their causes and suggestions for remedying them. If the cause cannot be established or it is not possible to remedy it with in-house equipment, we recommend that you contact Rexnord for assistance.

## 9. Troubleshooting

### 9.1 General

The items listed below can only serve as a guide to troubleshooting, in relation to the torque limiter. With a complex system, all other components must also be included in any investigation. In particular, if there are unusual noises, other equipment should be examined even if the sound seems to be coming from the torque limiter. Our experience is that such noises can be emitted from the torque limiter even though it is not the source of the problem.

### 9.2 Normal Operation

The torque limiter should run silently and without vibration in normal operation.

In the event of an overload, the torque limiter will disengage when the set torque is exceeded. During disengagement, a sharp snapping action may be heard which occurs when the spring load transfers from the outer drive balls (32) to the inner strut balls. When running disengaged, a clicking noise will be heard which is caused by the pawls (29) running on the slide / cage plate assembly (22/26). On resetting, a noise will be heard as the balls (32) re-engage in their seats.

Any other behaviour should be investigated and remedied at once to avoid damage to the torque limiter and other equipment.

 **Frequent disengagements of the Rexnord Autogard Torque Limiter should be investigated, as otherwise premature wear may occur.**



**Before carrying out maintenance, repairs or other work, the operator has to ensure that the entire drive train is stationary. In particular, the drive motors should be secured to prevent accidental startup. In addition, we would draw attention to the Health and Safety Regulations applicable on site.**

### 9.3 Troubleshooting Guide

Problem	Possible Cause	Remedy
Torque limiter disengages unexpectedly	Initial torque setting too low	Adjust torque setting according to section 7.2
	Change in running conditions	Check drive line for increased loading, loss of lubricant, bearing failure, etc. and remedy as required.
	Worn ball seats in torque limiter	Replace worn parts as per section 10.
	Adjusting nut has moved.	Re-adjust torque according to section 7.2 and ensure nut locking screws are tightened.
Torque limiter fails to disengage on overload.	Initial torque setting too high	Adjust torque setting (section 7.2).
	Loss of lubricant	Re-lubricate as per section 10.
	Increase friction in drive seats, splines or needle bearings due to fretting corrosion.	Check drive line for any source of vibration and remedy. Replace damage parts as per section 10. Relubrication of seats and splines may be sufficient if damage is slight.
	Adjusting nut has moved.	Re-adjust torque according to section 7.2 and ensure nut locking screws are tightened. Fit calibration spacer to avoid overtightening.
	On model with taper bushings on adapter - bushing overtightened and has locked adapter to hub	Loosen clamp screws and re-torque according to the bushing suppliers instructions.

Change in noise level during normal operation.	Change in alignment of attached equipment.	Remedy reason for change in alignment (check mounting bolts, bearing housings etc.)
Change in noise level after disengaging.	<p>Bearing(s) damaged</p> <p>Faulty disengagement (ratcheting) due to:</p> <p>(a) jammed cage plate:</p> <p>(b) torque setting too low:</p> <p>(c) adjusting nut over-tightened so that slide plate cannot move properly on trip:</p>	<p>Dismantle the unit, clean and check; replace damaged parts as per section 10.</p> <p>Dismantle and replace parts or relubricate as required.</p> <p>Examine parts and check for damage – replace as necessary. Reduce number of springs and reset torque.</p> <p>Examine parts and check for damage – replace as necessary. Add springs if possible and re-set, or reduce torque setting. Check pillars are properly seated in groove. (Size 6+).</p>
Torque limiter cannot be re-engaged and torque limiter freewheel in reverse.	Pawls are jammed down.	Spray light (penetrating) oil around pawls and tap OD of drive plate. If pawls do not pop out, dismantle and replace damaged parts. See section 10.
Torque limiter cannot be re-engaged and rotation cannot be reversed. (comes to a hard stop)	<p>Cage plate jammed in disengaged position due to wear caused by prolonged disengaged running.</p> <p>Pawl(s) jamming on raised stop pin instead of engaging with cage plate.</p>	<p>Dismantle and replace damaged parts. See section 10.</p> <p>For an emergency remedy (RR only), try rotating the drive forward until a click is heard as a pawl engages the cage plate. Then reverse the drive to re-engage. Otherwise, dismantle and replace damaged parts.</p>
Torque limiter does not fit on shaft, even though normal bore correct.	For large bores, the hub wall thickness under the nut is quite thin so it is possible to distort the hub if the adjustment nut set screws are over-tightened.	Loosen the adjustment nut set screws before installation on the shaft. Re-tighten when the torque limiter is in place.

## 10. Maintenance and servicing

### 10.1 General

Maintenance and servicing may ONLY be carried out by trained personnel.

If suitable specialist personnel are not available, the torque limiter may be returned to Rexnord to ensure proper workmanship.

Rexnord Autogard Torque Limiters can be used as standard in ambient temperatures of  $-15\text{ C}$  to  $+80\text{ C}$ .

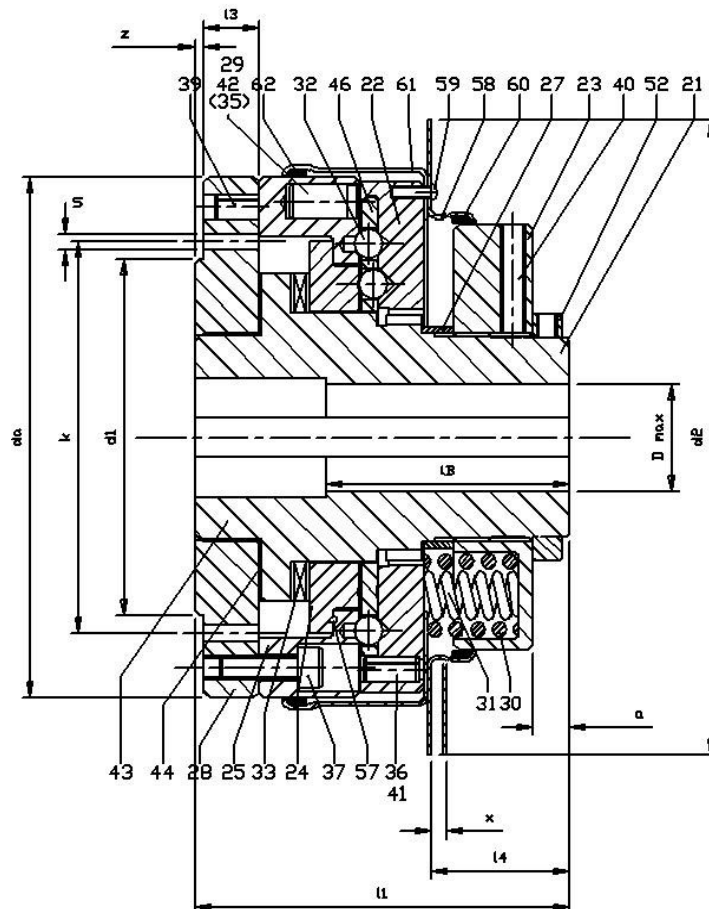
Dependent upon environment and number of trips, the torque limiter should be inspected and serviced every 2000 hrs. Under adverse conditions in dirty environments and with frequent trips a shorter service interval is recommended. In any event, when a machine is subjected to a major overhaul, the Rexnord Autogard Torque Limiter should be checked at the same time.

The journal bearings used are of high-grade P.T.F.E. or oil-impregnated bronze and are maintenance-free. Ball bearings are sealed for life.

It should be checked that all components are firmly attached to one another and that all components locate firmly on the coupling hub. For the purpose of checking the lubrication, the adjuster nut (23) and the slide plate (22) should be removed from the torque limiter. To do this, or any other service operation, it will normally be necessary to remove the complete torque limiter from the shaft.

Lubricants described under section 10.6 or equivalent should be used.

### 10.2 Disassembly of sizes 1 - 5





If any gears, sprocket, pulley or coupling is fitted, we recommend this is removed first.

The torque limiter should be placed on a suitable clean work bench such that the adjusting nut is on top. Scrupulous cleanliness should be observed when working on the torque limiter.

Caution

**Before the torque limiter is disassembled for cleaning or maintenance, the dimension “a” must be measured and recorded and the position of the adjusting nut marked to permit the torque to be reset again after re-assembly.**

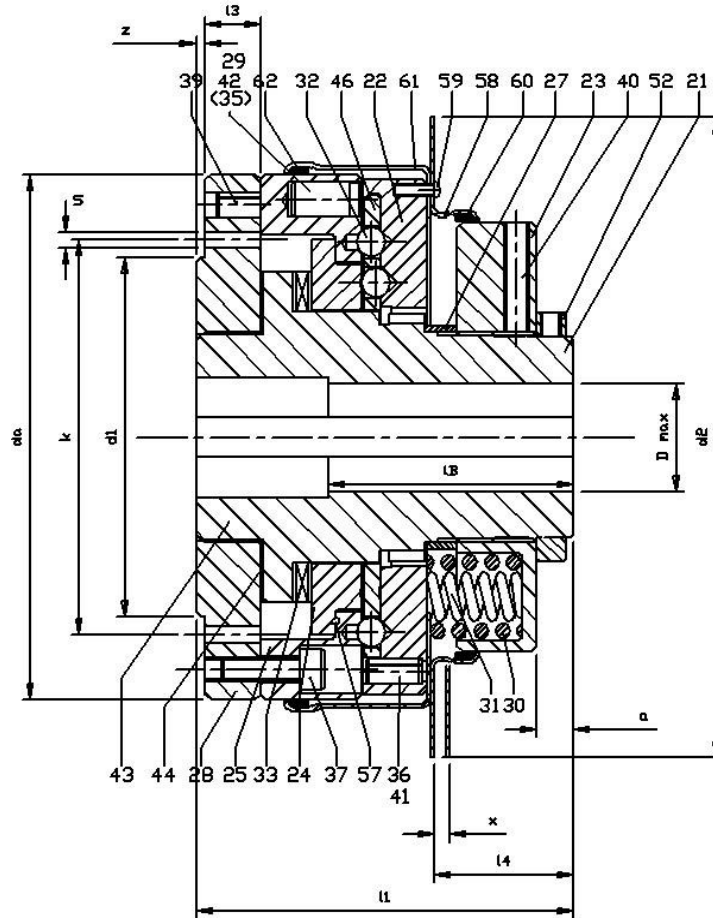
**All the components of the torque limiter should be kept in a safe place to ensure that none are lost.**

Disassembly should be carried out in the following sequence:

- After unscrewing the two setscrews, the clamp collar (52) should be removed.
- Slacken the locking screws (40) of the adjusting nut (23) and unscrew the adjusting nut with the torque springs (30,31) from the hub (21).
- Remove the calibration spacer(s) (27) from the hub (21).
- After undoing the screws (59), the limit switch plate (58) and, if present, the cover (61) can both be lifted off the slide plate (22). Then, the slide/cage plate assembly (22/26) should be removed from the hub. In the case of Type SR size 1, a cage plate spring (46) is fitted which should be removed.
- Remove the balls (32) from their seats in the drive plate (25) and from the strut ring (24) if they have not lodged in the cage plate.
- Remove the pawls (29) and the pawl springs (42) from their holes.
- The drive plate (25) is attached with screws (37) and dowel pins (39) to the adapter (28). The screws should be slackened and pins tapped out of their holes with a suitable drift.
- Remove the drive plate (25) from the hub (21).
- Remove the strut plate (24) from hub (21). In the case of Type SR, the annular groove in the strut ring is filled with balls (57).
- Remove the needle roller thrust bearing (33) and the two thrust washers from the hub (21).
- Withdraw the hub (21) from the adapter (28). Detach the adapter tape bearing (43) and the tape thrust washer (44).

**Note:** Screws and pins should be replaced by new ones of the same strength class and type.

### 10.3 Assembly of sizes 1 – 5



Before assembling the torque limiter, ensure that all components to be assembled are clean and in satisfactory condition. ONLY original Autogard components may be used, otherwise any form of warranty will be voided. Uses lubricants as specified in 10.6.

Assembly should be carried out in reverse order to disassembly as described under item 10.2

- Smear both sides of the tape thrust washer (44) and the adapter tape bearing (43) with oil. Locate the tape thrust washer against the flange of the hub (21). Position the adapter tape bearing in the adapter (28) against the small shoulder.
- The hub (21) should be pushed carefully into the adapter, without squashing the tape bearing.
- Pack the needle roller thrust bearing (33) with grease and with the thrust washers positioned on both sides, guide over the vertically positioned hub (21) until it abuts the hub flange.
- Place the strut ring (24) on the needle roller thrust bearing. In the case of the Type SR, the annular groove should be almost filled with the balls (57). When doing so, ensure that overfilling does not on any account take place.
- Bolt the drive plate (25) to the adapter (28) and apply oil to the ball seats. The screws (37) should be cleaned and lightly smeared with loctite 243. Before the screws are fully tightened, the dowel pins (39) must be tapped in. Ensure that the dowels are recessed 3 – 5 mm in the holes.

Caution



The drive plate (25) must rotate freely on the hub (21). In the same way, the strut ring (24) must rotate freely between drive plate and hub.

The dowel pins (39) must NOT protrude through the drive plate!

- For pawls with counterbores, the pawl springs (42) should be greased and inserted in the pawls (29). The pawls and the pawl springs should then be inserted in the holes of the drive plate (25). Type SR pawls are secured by means of a roll pin (35), thus preventing incorrect assembly. When this pin is fitted, ensure that the seam of the pin faces away from the pawl. After assembly, check that the pawls can move freely in the holes. They should extend freely under spring pressure alone.
- A calibration spacer (27) suitable for the actuating torque should be placed over the hub and rest against the spline.

Caution

Calibration spacers (27) may NOT ON ANY ACCOUNT be completely removed, as otherwise no guarantee can be accepted for disengagement of the coupling. Replacing a helical spring set with a stronger or weaker spring set, installing or removing disc springs, and shortening a calibration sleeve are ONLY permissible with the EXPRESS approval of Rexnord.

If the cage plate (26) has been removed from the slide plate (22), it should be refitted as follows. Apart from size 1 type SR, a bayonet design is used for cage plate retention. There are cutouts to facilitate initial insertion of the cage plate, which is then rotated to engage the bayonet features. For type SR, the cage plate is initially inserted at 90° to its final position and for type RR it is inserted at 180° to its final position.

Caution

The correct angular position of the cage plate (26) relative to the slide plate (22) is most important. All the inner and outer ball seats should be visible through the cage plate holes and the ramped recess(es) in the slide plate must be aligned with cut-out(s) in the cage plate. On SR units, it is the straight edged cut-out which is aligned with the ramps. With the cage plate in this position, the stop pins will be centrally positioned in the correct cutout(s) in the cage plate.

Lightly smear the faces of the plates with oil, including ball seats. Fit the cage plate and rotate to the correct position as above. The stop pins (36,41) should now be inserted. On all but size 1, an inner and an outer pin is used. The split line on the outer pin must face outwards. The inner pin is inserted so that its split line is opposite the split line in the outer. Check that the cage plate can rotate freely between the stop pins.

In the case of size 1, type SR, the cage plate is retained by cage plate spring (46) which should be fitted over the hub and resting on the strut ring (24). The cage plate must be fitted with the turned location groove for the cage plate spring being visible. Oil the faces as above and insert in the correct position as previously described, i.e. straight edged cut-out aligned with the ramps on the slide plate (22). Fit the single stop pin with its split line facing outwards.

- Whatever the model, assembly can now proceed as follows. The balls (32) should then be inserted in the lightly greased holes. The grease facilitates assembly on the hub (21). The hub splines should be smeared with the correct grease before assembly (See 10.6). After inserting the slide plate onto the splines, the hub should be held in position and the drive plate turned until the balls engage in their seats.

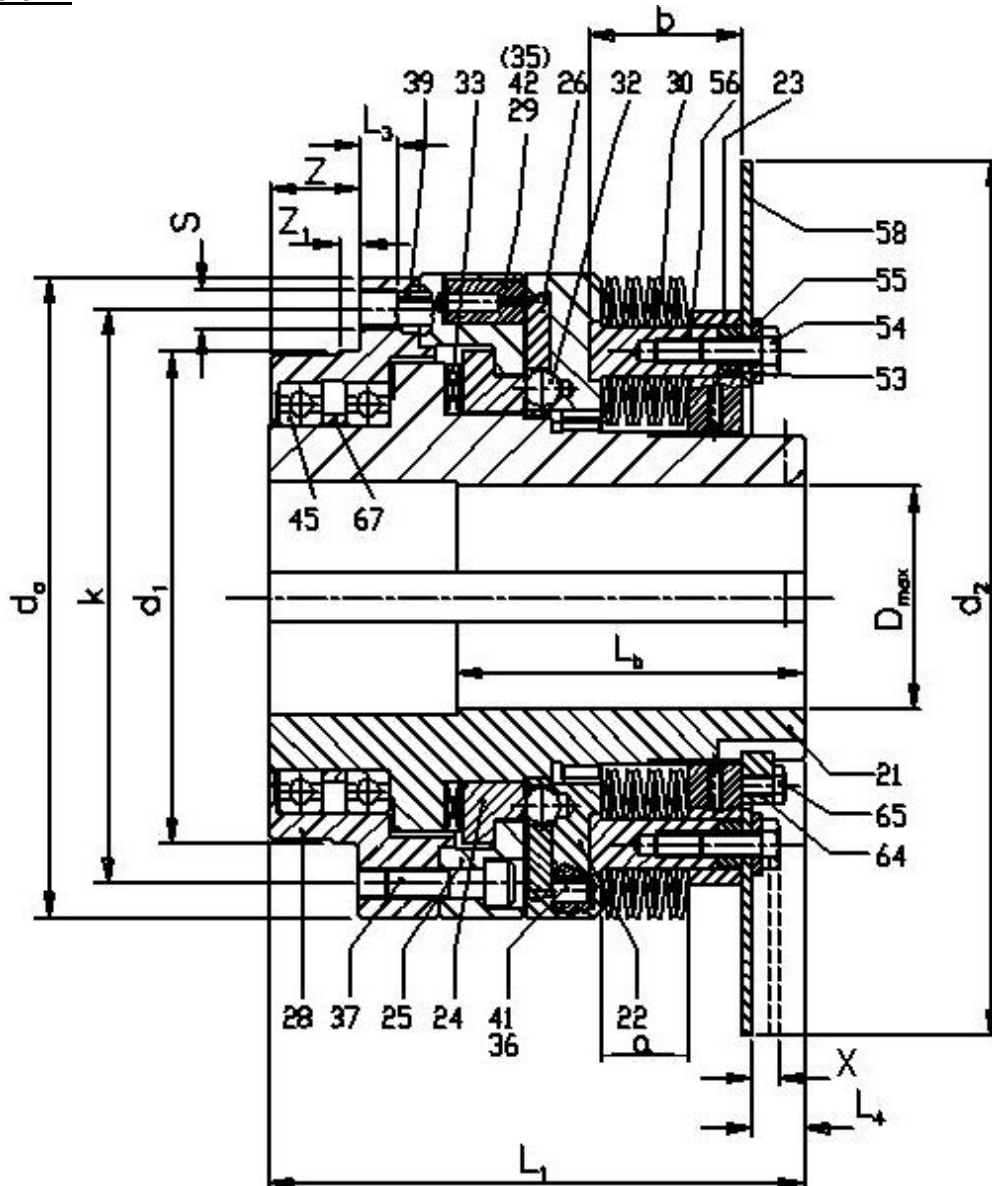
The slide plate must be held down against the pawl springs while the adjusting nut (with the torque springs) is screwed on.

- The torque springs (30, 31) should be inserted into the adjusting nut with grease to hold them in place. Ensure that the springs are uniformly distributed. Before the adjusting nut is screwed onto the hub (21), the threads on both components should be smeared with grease.
- The switch plate (58) and, if fitted, the cover (61) should be bolted onto the slide plate with the screws (59). After cleaning, the screws should be smeared with Loctite 243 and fully tightened. During assembly of the cover (61) and the switch plate (58), ensure that if felt strips (60, 62) are inserted, they are not crushed. New felt strips should be soaked in oil before assembly of the cover.

- If the coupling is being reassembled after a service, ensure that the adjusting nut (23) is positioned exactly as before disassembly, in order to ensure the same actuating torque (see item 10.2: Disassembly). The adjusting nut (23) should now be locked in position by tightening the locking screws (40). The locking screws should be cleaned, smeared with Loctite 243 and fully tightened. Note: do not overtighten as this may crush the bore of the hub.
- The clamp collar (52) should be placed on the hub (21) and the setscrews inserted. When assembling the torque limiter on the shaft, the hub should be located on the shaft with these setscrews.
- Before re-installing on the shaft, any gear, sprocket, pulley or coupling should be re-fitted.

## 10.4 Disassembly of sizes 6 - 8

### 403-6RR



### 403-6SR

Before starting the disassembly, it is recommended that any gears, sprocket, pulley or coupling fitted to the torque limiter is removed.

The torque limiter should be placed on a suitable clean bench such that the adjusting nut is on top. Scrupulous cleanliness should be observed when working on the torque limiter.

Caution

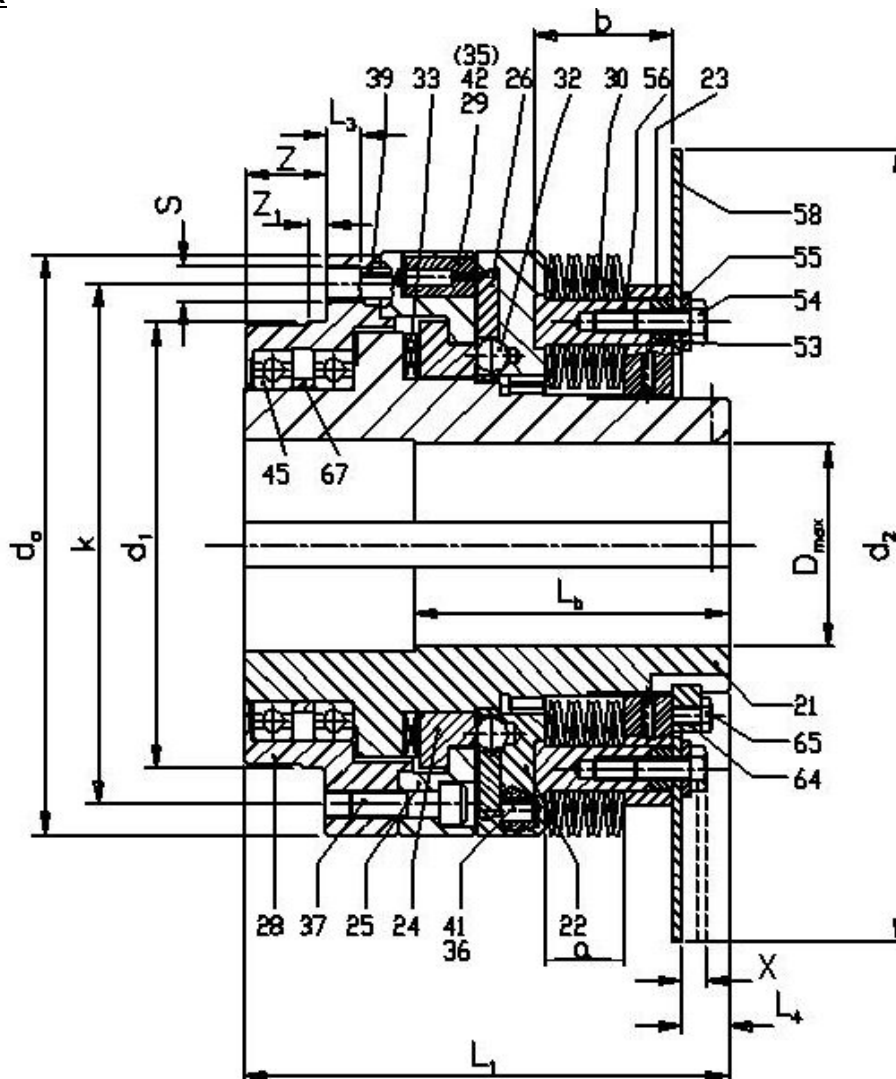
**Before the torque limiter is disassembled for cleaning or maintenance, the dimension “a” must be measured and recorded and the position of the adjusting nut marked to permit setting exactly the same actuating torque again after assembly.  
All the components of the torque limiter should be kept in a safe place to ensure that none is lost.**

Disassembly should be carried out in the following sequence:

- First of all, unscrew the two screws (65) and remove the locking peg (64).
- After slackening and unscrewing the screws (54) remove the switch plate (58) (if fitted) and the adjustment spacers (53). The screws (54) together with the washer (55) should be screwed back into the spring pillars (56). Each spring stack should now be pretensioned in sequence by tightening the screws (54). According to size and actuating torque range, between 4 and 12 springs stacks may be fitted. See Section 7.
- When pretensioning the spring stacks (30) ensure that the hexagonal flange of the spring pillar (56) is not pulled out of the annular groove in the slide plate (22). Each screw (54) should be tightened 1.5 turns in the case of coupling Sizes 6 and 7, and 1 turn in the case of Size 8.
- Unscrew the adjusting nut (23) together with the spring stacks (30) from hub (21). By slackening the screws (54) again, the spring stacks can, if necessary, be disassembled from the adjusting nut. In this case, it is ESSENTIAL to measure dimension “b” beforehand.
- Remove the slide / cage plate assembly (22/26) from the hub.
- Remove the balls (32) from their seats in the drive plate (25) and from the strut ring (24) if they have not lodged in the cage plate.
- Remove the pawls (29) with the pawl springs (42) from their holes.
- The drive plate (25) is attached with screws (37) and dowel pins (39) to the adapter (28). The screws should be slackened and pins tapped out of their holes with a suitable drift.
- Remove the drive plate (25) from the hub (21).
- Remove the strut ring (24) from the hub (21).
- Remove the needle roller thrust bearing (33) with the two thrust washers from hub (21).
- Withdraw the hub (21) from the adapter (28); pull the two ball bearings (45) and the spacer (67) off the hub and out of the adapter. When disassembling the ball bearings the manufacturer’s instructions should be followed.

## 10.5 Assembly of sizes 6 - 8

### 403-6RR



### 403-6SR

Before assembling the torque limiter, ensure that all components to be assembled are clean and in satisfactory condition. ONLY original Autogard components may be used, otherwise any form of warranty will be void.

Assembly should be carried out in reverse order to disassembly as described under Item 10.4.

- Assemble the two ball bearings (45) and the spacer (67) on the hub (21) and into the adapter (28), observing the bearing manufacturer's instructions.
- Pack the needle roller thrust bearing (33) with grease and, with the thrust washers placed on both sides, guide over the hub (21) while it is positioned upright.
- Place the strut ring (24) on the needle roller thrust bearing.
- Bolt the drive plate (25) to the adapter (28) and apply oil to the ball seats. The screws (37) used for this purpose should be cleaned and lightly smeared with Loctite 243. Before the screws are fully tightened, the dowel pins (39) must be tapped in. When doing so, ensure that the dowels are recessed 3-5 mm in the holes.

Caution

The drive plate (25) must rotate freely on the hub (21). In the same way, the strut ring (24) must rotate freely between drive plate and hub.



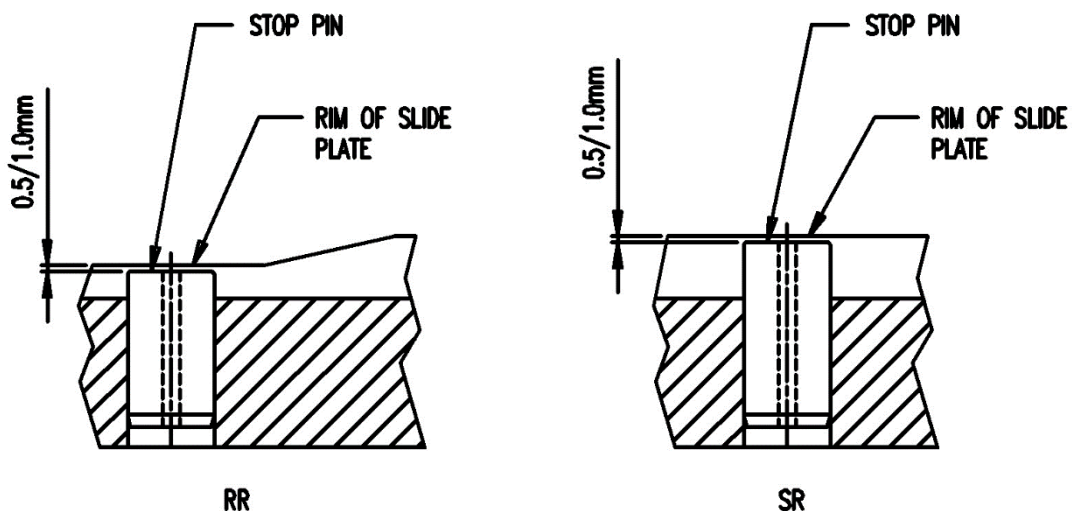
The dowel pins (29) must NOT stand proud of the drive plate!

- The pawl springs (42) should be inserted with grease in the pawls (29) and should then be inserted in the holes of the drive plate (25). Type SR pawls are secured by means of a dowel pin (35), thus preventing incorrect assembly. When this dowel pin is fitted, ensure that the seam of the pin faces away from the pawl. After assembly, check that the pawls can move freely in their holes. They should extend under spring pressure alone.
- If the cage plate (26) has been removed from the slide plate (22), it should be refitted as follows. A bayonet design is used for cage plate retention. There are cutouts to facilitate initial insertion of the cage plate, which is then rotated to engage the bayonet features. For type SR, the cage plate is initially inserted at 90° to its final position and for type RR it is inserted at 180° to its final position.

Caution

The correct angular position of the cage plate (26) relative to the slide plate (22) is most important. Ball seats in the slide plate should be visible through **all** the cage plate holes (inner and outer) **and** the ramped recess(es) in the slide plate must be aligned with cut-out(s) in the cage plate. On SR units, it is the straight edged cut-out which is aligned with the ramps. With the cage plate in this position, the stop pins will be centrally positioned in the correct cutout(s) in the cage plate.

Lightly smear the faces of the plates with oil, including ball seats. Fit the cage plate and rotate to the correct position as above. The stop pins (36,41) should now be inserted to the dimension shown in the diagram below. The reverse side of the slide plate must be supported on a flat, hard surface during this operation. An inner and an outer pin are used. The split line on the outer pin must face outwards. The inner pin is inserted so that its split line is opposite the split line in the outer. Check that the cage plate can rotate freely between the stop pins.



- Whatever the model, assembly can now proceed as follows. The balls (32) should then be inserted in the lightly greased holes. The grease facilitates assembly of the slide plate (22) on the hub (21). The splines on the slide plate and the hub should be smeared with grease (see 10.6) before assembly. After fitting the slide plate onto the splines, the hub should be held in position and the drive plate turned until the balls engage in their seats.
- If the spring stacks (30) have previously been disassembled, they should be placed in their previous arrangement on the spring pillars (56) and assembled with screws (54), using washers (55), on the adjusting nut (23). When retensioning the individual spring stacks, it is **ESSENTIAL** to maintain the previously measured dimension 'b'. In addition, ensure symmetrical distribution of the spring stacks.

- Smear the thread of the adjusting nut (23) and the hub (21) with grease and screw the adjusting nut onto the hub. Ensure that the hexagonal flange of each spring pillar (56) is located in the annular groove in the slide plate.
- The adjustment spacers (53) should be re-fitted and the switch plate (58) repositioned (if present). The screws (54) should be cleaned, smeared with Loctite 243 and fully tightened.
- If the coupling is being reassembled after a service, ensure that the adjusting nut (23) is positioned exactly as before disassembly, in order to maintain the original actuating torque (see Item 10.4: Disassembly). The adjusting nut (23) should now be secured to prevent rotation by fitting the locking peg (64). The screws (65) should be cleaned, smeared with Loctite 243 and fully tightened.
- Any gears, sprocket, pulley or coupling can now be refitted to the torque limiter.

## 10.6 Lubricants

For general purpose application, use Shell Alania R3, BP Energrease LS3 or any good quality Lithium grease NLGI #3. Power-up Thixogrease (NLGI #2) may also be used.

For splines use Rocol Sapphire Hi-Pressure (Formerly MTS1000) or equivalent.

For oiling PTFE bearings and ball seats, use Mobil Vactra No. 2 or equivalent.

## 11. Stocking spare parts, Customer facility addresses

A stock of the most essential spare and wearing parts on site is an important precondition for serviceability of the torque limiter at all times.

Please refer to table 1.1 shown on page 3 for ordering spare parts. For full details of part numbers and quantities, please consult Rexnord.

Our warranty only covers original spare parts supplied by Rexnord.

Caution

**We would expressly point out that spare parts and accessories not supplied by Rexnord have not been tested and approved. Installation and/or use of such products can under certain circumstances adversely affect the specified structural properties of the torque limiter and thus impair its active and/or passive safety. No form of liability or warranty is accepted on the part of Rexnord for damage which occurs as a result of the use of non-original spare parts and accessories.**

Please note that special manufacturing and supply specifications frequently exist for components and that we always supply spare parts in accordance with the state of the art and in accordance with the latest legal requirements.

When ordering spare parts, the following data should be stated:

Order No.	Part	Quantity
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