

LOR Series Trig-O-Matic Lite Overload Release Clutch

Installation and Operation

P-3029-BG
LOR Series



 **Boston**[®]
Gear

An **Altra Industrial Motion** Company

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Overload Release Clutch

Installation and Maintenance Instructions

I. Introduction

A. Operating Principle

The LOR Series Trig-O-Matic Lite is an automatic reset roller detent style clutch. It was designed to be cost-effective without sacrifice to accurate and dependable disconnect protection for mechanical power transmission equipment. Refer to Figure 1.

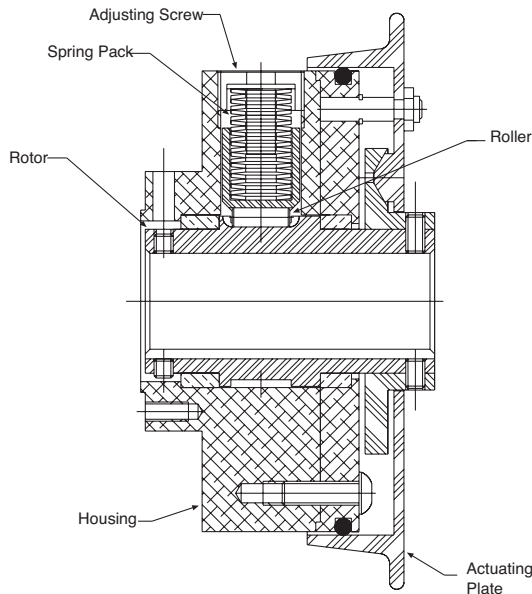


Figure 1 – General Operation

Torque transmission between the roller and the rotor is the key to the disengagement of the clutch. The roller is forced into the detent of the rotor by a radial load generated by compressing a spring pack. This load is what decides the torque capacity of the clutch. Increasing or decreasing the spring compression provides an adjustment to the torque capacity. When a torque overload condition occurs, the roller moves out of the detent and freewheels much like a needle bearing. This rolling action increases the efficiency in which the clutch operates and reduces any fluctuation of torque setting caused by frictional changes. Refer to Figure 2.

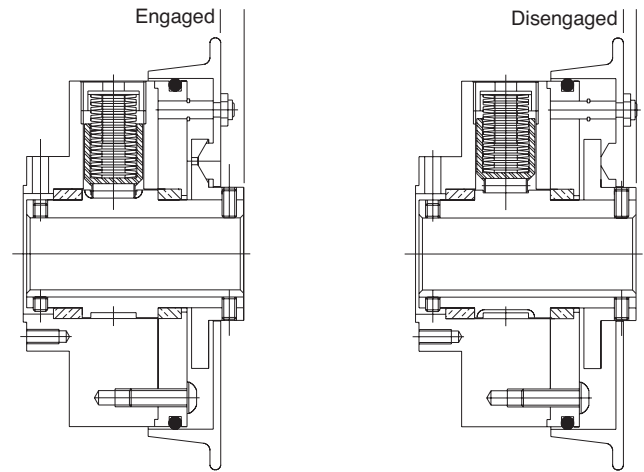


Figure 2

The movement of the actuating plate during disengagement can be used to trip a limit switch and signal a torque overload condition. Sensing an overload condition, the drive should be shut down immediately and the source of the overload detected and cleared. The automatic reset feature of the clutch allows it to reengage without manual assistance. Simply restart the drive and the clutch is again ready to provide accurate and dependable disconnect protection for your equipment.

B. Torque Adjustment

Each clutch is tested throughout the torque range then set at the minimum range value at the factory. The torque dial label is indexed to a match mark on the clutch at the number “1” location. The torque dial label has eight hash marks evenly spaced at 45 degrees. To increase the torque, loosen the locking screw and turn the adjusting screw clockwise. Refer to Table 1 for the approximate change in torque per location on the dial. When the desired torque value is achieved secure the torque adjustment screw by tightening the locking screw. Refer to Figure 3.

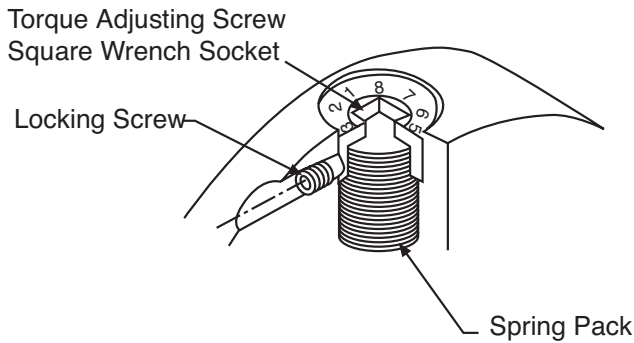


Figure 3 – Torque Adjustment

Table 1 – Torque Adjustment

Size	Minimum Torque	Maximum Torque	Change Per 1/8 Turn	Change Per Full Turn
060	200 in-lb	700 in-lb	25 in-lb	200 in-lb
200	600 in-lb	2000 in-lb	50 in-lb	400 in-lb
400	2000 in-lb	5000 in-lb	60 in-lb	480 in-lb

For applications requiring a precise release torque, the torque setting of the clutch should be tested as shown in Figure 4. Verification of the release torque several times in both directions is recommended.

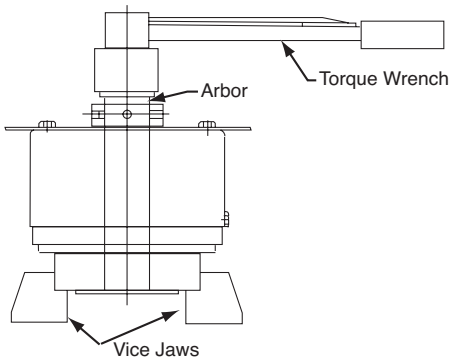


Figure 4 – Torque Verification

II. Mounting Sprockets or Sheaves to Clutch

Inspect mating pilots on clutch and sprocket or sheave for nicks or burrs and remove as required. Attach sprocket or sheave to housing with mounting bolts and high collar lockwashers. Refer to Table 2 and 3 for recommended seating torques and minimum acceptable plate sprocket mounts.

⚠ WARNING Large sprockets or sheaves should be supported with an auxiliary bearing, i.e. sleeve, needle roller, radial ball. Refer to Figure 5.

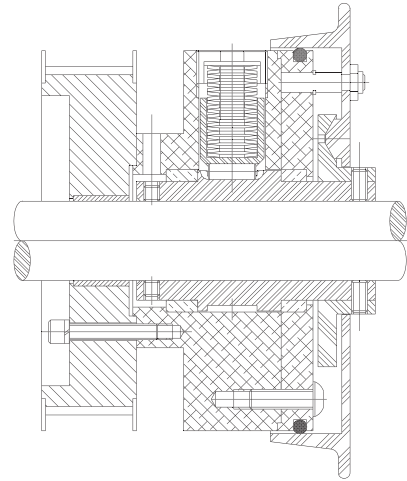


Figure 5 – Bearing Support

Table 2 – Mounting Information

Size	Thread	Depth	Bolt Circle	Pilot +.000/- .002	Seating Torque	Qty.
060	1/4-20	.56	2.875	2.375	150 in-lb	3
200	3/8-16	.75	4.500	3.250	545 in-lb	3
400	1/2-13	1.12	6.500	4.500	1,300 in-lb	3

Note: Mounting bolts must be minimum 160,000 PSI tensile, Rc 36-43.

Table 3 – Minimum Acceptable Plate Sprocket Mounts*

Size	#25 1/4 in. Pitch	#35 3/8 in. Pitch	#40 1/2 in. Pitch	#50 5/8 in. Pitch	#60 3/4 in. Pitch	#80 1 in. Pitch	#100 1-1/4 in. Pitch
060	47	32	25	21	18	–	–
200	–	48	37	30	26	20	–
400	–	–	51	42	35	27	23

* Please contact Boston Gear for Sprocket Clutch Assemblies.

III. Locating and Mounting Clutch to Shaft

A. Location

The clutch should always be located as close as possible to the source of an overload condition. Figures 6 and 7 indicate both the preferred and the not preferred locations for mounting the Trig-O-Matic Lite, LOR Series overload release clutch.

Note: Clutch mounted sprockets should be positioned as close to a supporting bearing as possible to minimize overhung loads. A minimum shaft engagement of 1-1/2 times the shaft diameter is recommended for the clutch. Refer to Figures 8 and 9 for different mounting configurations.

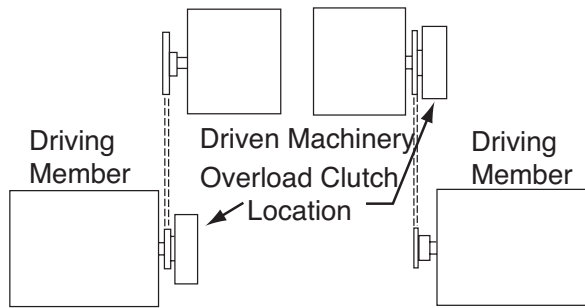


Figure 6 – Preferred Mounting

Either location of the clutch shown in Figure 6 is preferred in indirect drive applications. Locating the clutch as shown in Figure 7 is not preferred. Here, the clutch is mounted on the high-speed side of the reducer. Generally, mounting in this

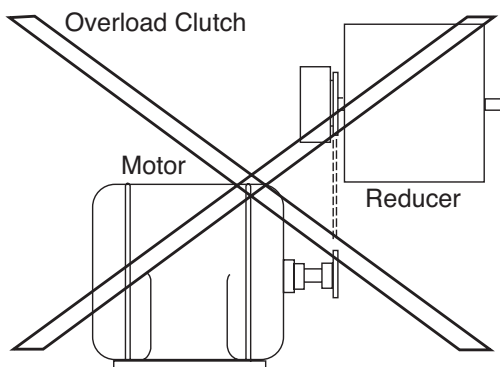


Figure 7 – Not Preferred Mounting

manner requires the clutch to be hypersensitive to perform satisfactorily.

B. Mounting Clutch - Bore Bushing Model

1. Determine whether your drive configuration requires a bushing insert to step down the standard clutch bore to the shaft diameter. The standard clutch bores and keyways are shown in Table 4. Bushing kits as well as bored to order clutches are available from the factory.

Table 4 – Standard Clutch Bores

Size	Bore +.001/-0.000	Keyway	Setscrew Thread	Seating Torque	Qty.
060	1.2500	1/4 x 1/8	1/4-28	87 in-lb	6
200	1.9375	1/2 x 1/4	1/4-28	87 in-lb	6
400	2.4375	5/8 x 5/16	3/8-24	290 in-lb	6

Note: Setscrews are provided with a self-locking patch to prevent loosening after installation.

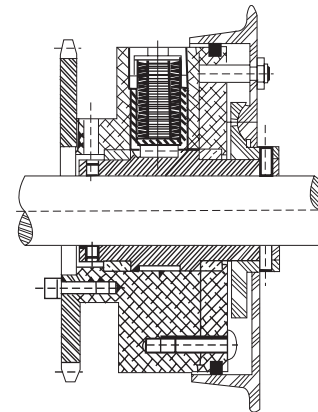


Figure 8 – Through Shaft Mounting Configuration

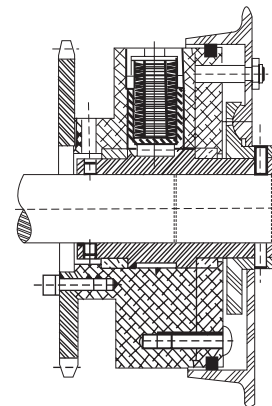


Figure 9 – Limited Shaft Length Mounting Configuration

2. Inspect shaft and key for any nicks or burrs and remove as required.
3. Position shaft key(s) and slide clutch onto shaft. It may be necessary to stake the inner key to the shaft if you are using a sleeve bushing with dual offset keys. This can be done by raising a dimple on the key with a center punch. The dimple will cause a slight interference and hold the key in place.
4. Align sprocket or sheave mounted to clutch with mating sprocket or sheave in drive train. Refer to installation and alignment instructions furnished with sprocket or sheave.
5. Secure clutch to drive shaft by tightening setscrews. Refer to Table 4 for proper seating torques. There are three screws at each end of the clutch. Depending on your mounting configuration it may be necessary to only tighten three of the screws at either end of the clutch. Access holes for limited shaft length mountings line up with the setscrews when the clutch is in an engaged position.

⚠ WARNING

1. Setscrews on the actuating plate side must remain installed even for limited shaft length installation.
2. Setscrews must clear housing and actuating plate for clutch to function properly.

C. Mounting Clutch - Taper Bore Bushing Model

1. Inspect shaft and key for any nicks or burrs and remove as requires.
2. Insert split-taper bushing into clutch and align mounting holes. Start several threads of capscrews to hold them in place. Position shaft key and slide clutch onto shaft. You may need to slightly wedge the split of the

bushing flange to slide it freely on the shaft.

3. Align sprocket or sheave mounted to clutch with mating sprocket or sheave in drive train. Refer to installation and alignment instructions furnished with sprocket or sheave.
4. Secure clutch to drive shaft by tightening capscrews and lock washers evenly and progressively. Do not use any thread lubricants! Refer to Table 5 for proper seating torques.

Table 5 – Split-Taper Bushing Mounting

Size	Capscrew Thread	Seating Torque	Qty.
060	10-24	40 in-lb	3
200	1/4-20	150 in-lb	4
400	5/16-18	305 in-lb	4

5. To remove an existing bushing from a clutch, remove all capscrews from the bushing. Thread two screws into the back off holes in the bushing flange and separate the bushing from clutch.

IV. Limit Switches

The LOR Series Trig-O-Matic Lite is an automatic reset device. Because of this feature it is important that the drive be shut down immediately upon a torque overload condition. Figure 10 utilizes a single limit switch to detect an overload. The switch should be able to operate within the 3/16” disengagement travel of the clutch. Upon an overload, the actuating plate will move axially triggering the switch to shut down the drive.

Size	Tracking Radius
060	3.25
200	4.18
400	5.25

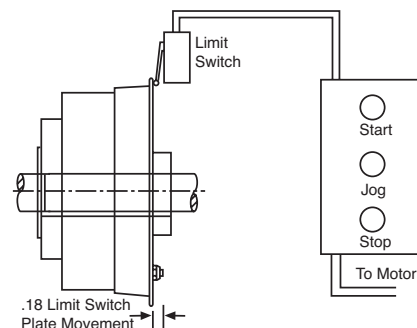


Figure 10 – Limit Switch Layout

V. General Maintenance

The LOR Series Trig-O-Matic Lite clutch is designed for endurance with minimal maintenance. The clutch is pre-lubricated at the factory. The internal bearings have a built-in reservoir of oil and are corrosion resistant. No additional lubrication should be required during normal operation. A scheduled annual inspection of internal components is suggested. However, the actual frequency should be in accordance with good operating practices for the equipment on which the clutch is installed.

VI. Repair Instructions

A. General Disassembly

1. Place the clutch preferably in a three jaw chuck with the actuating plate facing up.
2. Remove the return pin nuts from the return pins. This is accomplished by holding the return pin steady with a screwdriver while turning the return pin nut counterclockwise with a box or an open end wrench.
3. Lift the actuating plate off of the clutch.
4. Remove the three setscrews from the cam plate.
5. Remove the cam plate from the face of the rotor. Do not pry on the outer edge of the cover. Excessive force may damage the lip of cover. Refer to Figure 11.
6. Remove the cover screws.
7. Refer to Figure 11 and pry off the cover. Use care as excessive force may damage the cover.

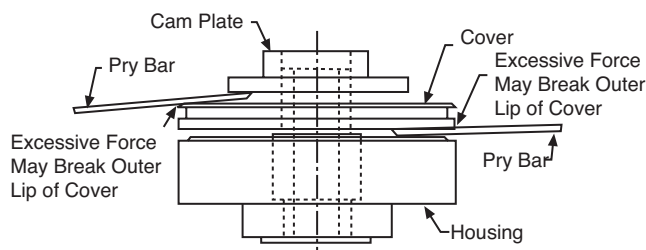


Figure 11 – Cam Plate and Cover Removal

8. Remove the return pin snap rings from the face of the cover. Then, remove the return pins and return pin springs.

9. Loosen the locking screw over the adjusting screw.
10. Turning counterclockwise, back out the adjusting screw.
11. Remove the spring guide pin, spring pack, roller guide pin and roller.
12. Pull the rotor from the housing.
13. Inspect and replace worn or damaged parts as required.

B. General Assembly

1. Coat components during assembly with a quality all-purpose grease as they are assembled. A Bentone type, NLGI grade \emptyset grease or equivalent is recommended.
2. Slip the rotor, short end down, into the housing. Line up the roller detent with the adjusting screw hole in the housing.
3. Insert roller into the slot of the roller guide pin and slide subassembly into the adjusting screw hole of the housing. Check the orientation of the roller to the detent of the rotor. Apply light pressure to the roller guide pin and turn the rotor. The roller should be displaced from the detent if the orientation is correct.
4. Stack springs and insert them into adjusting screw hole. Cellophane packing tape can be used to keep the springs in alignment.

⚠ WARNING It is critical that the springs be stacked as shown in Figure 12 and the roller is resting in the detent of the rotor.

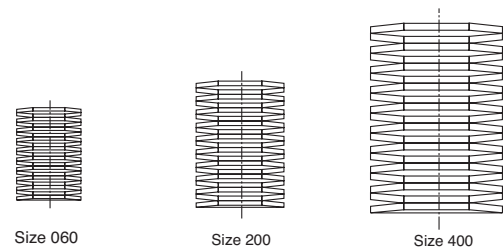


Figure 12 – Spring Pack Orientation

5. Install spring guide pin and turn adjusting screw clockwise until it is near flush with the outside diameter of the housing. This position should approximate the minimum torque setting for the range of the clutch.

6. Set a return pin spring over each return pin. Locate the return pin holes of the cover by orienting it over the housing.
7. Once the return pin hole locations have been established, insert the return pins and springs through the holes of the cover.
8. Install a snap ring into the groove on the end of each return pin.
9. With the return pins facing down, slide the cover subassembly on the rotor.
10. Install the cover screws and tighten to the recommended seating torques in Table 6.

Table 6 – Cover Screw Seating Torques

Size	Screw Thread	Seating Torque	Qty.
060	5/16-18	200 in-lb	3
200	3/8-16	350 in-lb	3
400	1/2-13	850 in-lb	4

11. Rest the actuating plate on the cam plate and counter rotate the two items until they fall into alignment. This will be when the actuating plate sits lowest on the cam plate.
12. Position the actuating and cam plates on the rotor as shown in Figure 13.
13. Install the three setscrews that hold the cam plate in place.

⚠ WARNING

1. Setscrews on the actuating plate side must remain installed even for a limited shaft length installation.
2. Setscrews must clear housing and actuating plate for clutch to function properly.

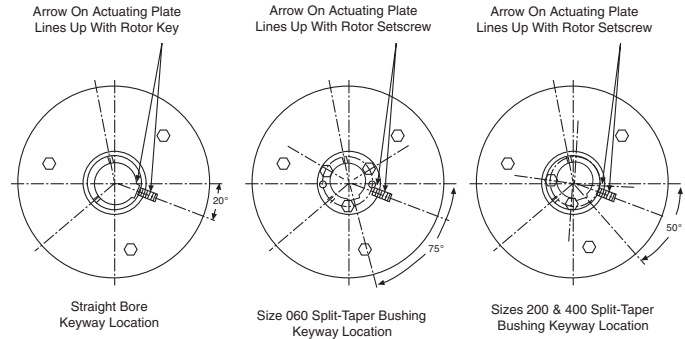


Figure 13 - Actuating Plate Orientation

14. Install return pin nuts on ends of return pins. Hold the pin steady with a screwdriver while turning the nut clockwise with a box or open end wrench.
15. Refer to previous section on how to install sprockets, mount clutch and set the overload release torque.

VII. Troubleshooting

	Check Load	Increase Clutch Torque Setting	Check Roller and Rotor For Excessive Wear	Check Actuating Plate For Excessive Wear	Relocate Or Adjust Sensor	Jog Clutch Into Re-engagement
Excessive Clutch Overloading	X	X	X			
Excessive Clutch Backlash	X	X	X			
Limited Actuating Plate Movement				X		
Clutch Will Not Re-engage			X			X
Sensor Detecting False Overloads		X			X	

Part Identification – LOR Series, Trig-o-Matic Lite, Bored To Size

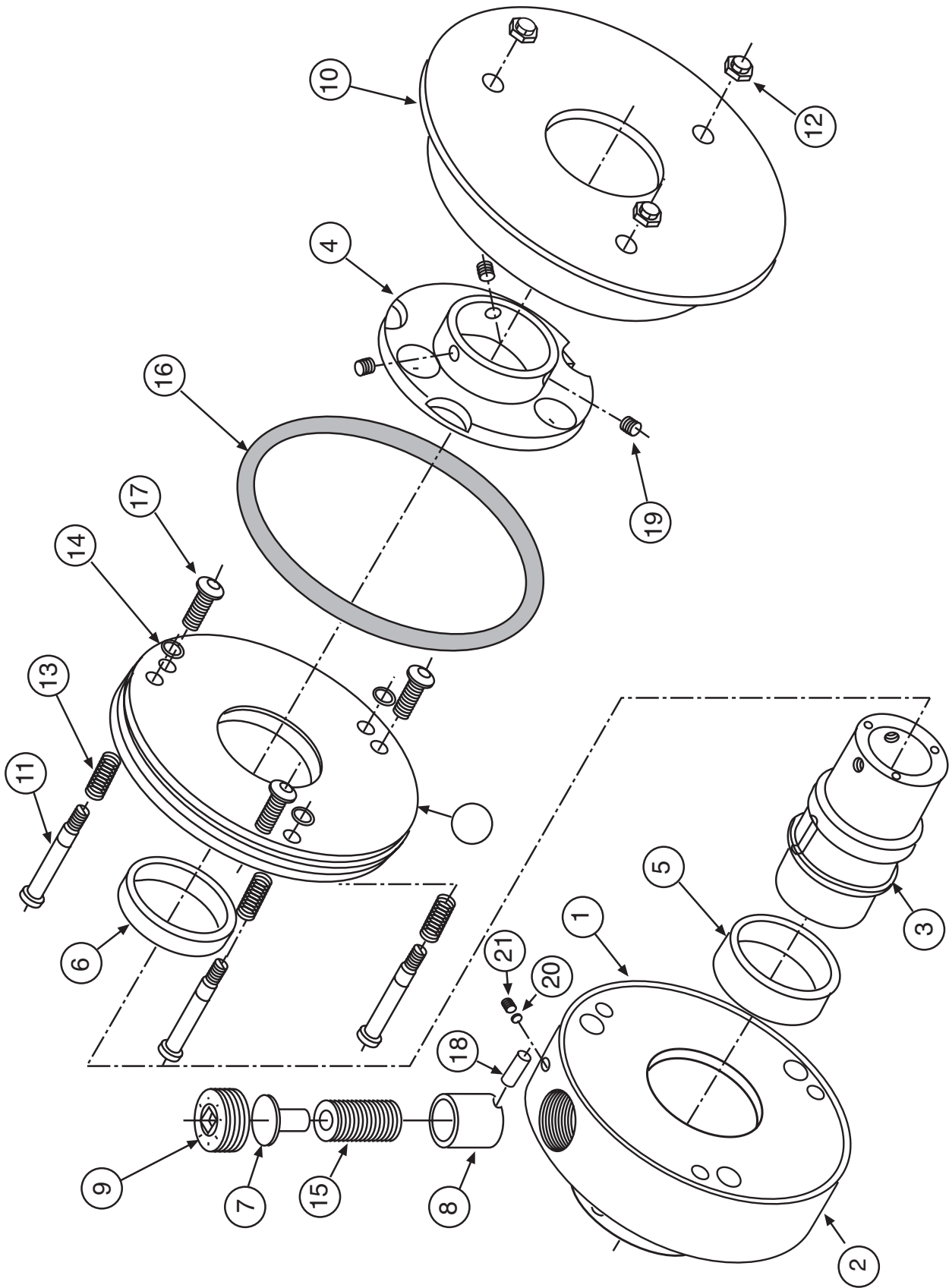
Key No.	Name	Qty.	Size 060	Qty.	Size 200	Qty.	Size 400
1	HOUSING	1	732011-001	1	732017-001	1	732023-001
2	COVER	1	732012-001	1	732018-001	1	732024-001
3	ROTOR (Bore Size Req'd)	1	732013-001	1	732019-001	1	732025-001
4	CAM PLATE	1	732014-001	1	732020-001	1	732026-001
5	HOUSING BEARING	1	731607-005	1	731607-007	1	731607-009
6	COVER BEARING	1	731607-006	1	731607-008	1	731607-010
7	SPRING GUIDE PIN	1	732016-001	1	732021-001	1	732027-001
8	ROLLER GUIDE PIN	1	732015-001	1	732022-001	1	732028-001
9	ADJUSTING SCREW	1	730382-002	1	730382-003	1	730382-005
10	ACTUATING PLATE	1	730727-001	1	730730-001	1	730733-001
11	RETURN PIN	3	730498-001	3	730498-001	4	730498-002
12	RETURN PIN NUT	3	730499-001	3	730499-001	4	730499-002
13	RETURN SPRING	3	730500-001	3	730500-001	4	730500-002
14	SNAP RING	3	040682-033	3	040682-033	4	040682-030
15	SPRING PACK	1	712381-001	1	712382-001	1	712383-001
16	"O" RING	1	023750-336	1	023750-096	1	023750-097
17	COVER SCREW	3	041315-062	3	041315-077	4	041315-106
18	ROLLER	1	023921-020	1	023921-006	1	023921-008
19*	SET SCREW	6	Various	6	Various	6	Various
20	LOCKING INSERT	1	730389-002	1	730389-002	1	730389-002
21	LOCKING SCREW	1	040940-031	1	040940-031	1	040940-031

*The setscrew selection and orientation is critical to the successful operation of the clutch.

Note: Please include clutch catalog number when ordering any spare parts.

⚠ CAUTION Rotating equipment is potentially dangerous and could cause injury or damage if not properly protected. Follow all applicable codes and regulations.

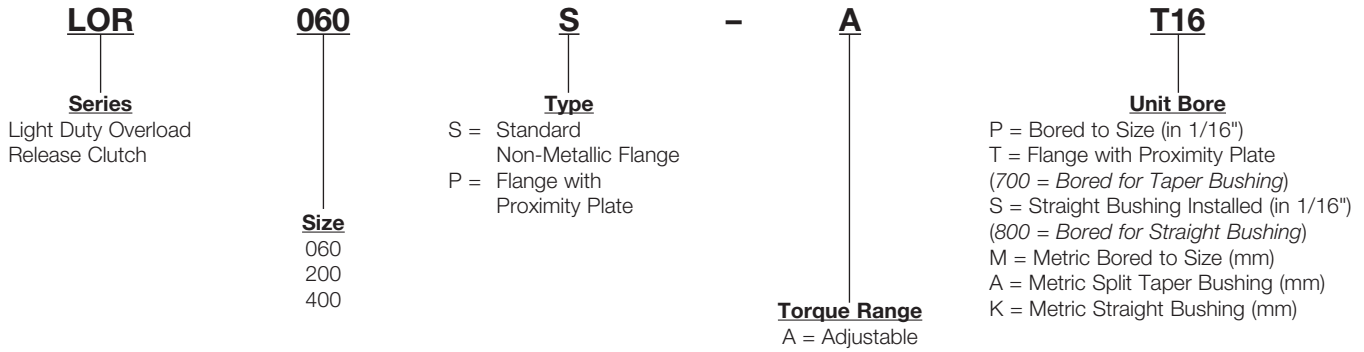
In accordance with our established policy to constantly improve our products, the specifications contained herein are subject to change without notice.



LOR Series, Trig-o-Matic Lite Bored To Size

LOR Series, Trig-O-Matic Lite Overload Clutch Assemblies

LOR Series Part Numbering System



Bore Bushing Model

Size	Catalog Number	Item Code
060	LOR-060S-A500	44862
200	LOR-200S-A500	44863
400	LOR-400S-A500	44865

Taper Bore Bushing Model

Size	Catalog Number	Item Code
060	LOR-060S-AT00	44866
200	LOR-200S-AT00	44867
400	LOR-400S-AT00	44877

Size	Bore	Catalog Number	Item Code
060	0.7500	712375-001-07500	77148
	0.9375	712375-001-09375	42656
	1.0000	712375-001-10000	77149
	1.1250	712375-001-11250	77150
	1.2500	None Required	

Size	Bore	Catalog Number	Item Code	
200	0.9375	712376-001-09375	42661	
	1.0000	712376-001-10000	42657	
	1.0625	712376-001-10625	42658	
	1.1250	712376-001-11250	42659	
	1.1875	712376-001-11875	42660	
	1.2500	712376-001-12500	77151	
	1.3125	712376-001-13125	55679	
	1.3750	712376-001-13750	42662	
	1.4375	712376-001-14375	42663	
	1.5000	712376-001-15000	42664	
	1.6250	712376-001-16250	42665	
	1.6875	712376-001-16875	42666	
	1.7500	712376-001-17500	42667	
	1.9375	None Required		

Size	Bore	Catalog Number	Item Code	
400	1.3750	712377-001-13750	57819	
	1.4375	712377-001-14375	59056	
	1.5000	712377-001-15000	77152	
	1.6250	712377-001-16250	84702	
	1.6875	712377-001-16875	76497	
	1.7500	712377-001-17500	76498	
	1.8750	712377-001-18750	76499	
	1.9375	712377-001-19375	76500	
	2.0000	712377-001-20000	76501	
	2.1250	712377-001-21250	76502	
	2.1875	712377-001-21875	76503	
	2.2500	712377-001-22500	76504	
	2.4375	None Required		

Centric Split-Taper Bore Bushing Kits

Size	Bore	Catalog Number	Item Code
060	0.7500	712378-001-07500	41023
	0.9375	712378-001-09375	41024
	1.0000	712378-001-10000	77153
	1.1250	712378-001-11250	77154

Size	Bore	Catalog Number	Item Code
200	0.9375	712379-001-09375	41025
	1.0000	712379-001-10000	41026
	1.1250	712379-001-11250	77155
	1.2500	712379-001-12500	77156
	1.3750	712379-001-13750	41027
	1.4375	712379-001-14375	41025
	1.5000	712379-001-15000	77157
	1.6250	712379-001-16250	41029
	1.7500	712379-001-17500	77158

Size	Bore	Catalog Number	Item Code
400	1.3750	712380-001-13750	41030
	1.4375	712380-001-14375	41032
	1.5000	712380-001-15000	41033
	1.6250	712380-001-16250	41034
	1.7500	712380-001-17500	41035
	1.8750	712380-001-18750	41036
	1.9375	712380-001-19375	41037
	2.0000	712380-001-20000	77159
	2.1250	712380-001-21250	41038
	2.2500	712380-001-22500	41039

Notes:

1. All stock bore bushing kits shown are in inches.
2. Additional bores, including metric sizes, are available. Please contact the factory.

Warranty

Boston Gear warrants that products manufactured or sold by it shall be free from defects in material and workmanship. Any products which shall within two (2) years of delivery, be proved to the Company's satisfaction to have been defective at the time of delivery in these respects will be replaced or repaired by the Company at its option. Freight is the responsibility of the customer. The Company's liability under this limited warranty is limited to such replacement or repair and it shall not be held liable in any form of action for direct or consequential damages to property or person. THE FOREGOING LIMITED WARRANTY IS EXPRESSLY MADE IN LIEU OF ALL OTHER WARRANTIES WHATSOEVER, EXPRESS, IMPLIED AND STATUTORY AND INCLUDING WITHOUT LIMITATION THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS.

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