DE-STA-CO

A DOVER COMPANY

Automation

Robohand FERGUSON

CAMCO

SERVICE MANUAL
RITE-TORQ OVERLOAD CLUTCHES
(TORQUE LIMITERS)

WARNING

This is a controlled document. It is your responsibility to deliver this information to the end user of the CAMCO or FERGUSON product. Failure to deliver this could result in your liability for injury to the user or damage to the machine. For copies of this manual, call your Customer Service Representative at 800-645-5207

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General Information

The FERGUSON Torque Limiter is a high quality, precision mechanism. To gain the optimum benefits, the guidelines described in this manual should be used.

Safety

*Read and follow all **Warnings** and **Cautions** prior to any service or repair.*

1. Read your Overload Clutch Installation-Operation Instructions thoroughly before operating the unit, for your safety and the protection of your unit.
2. FERGUSON Overload Clutches are designed to protect the Index Drive only and will not protect against bodily injury.
3. Double check to be sure the power is off and cannot be turned on while working on the equipment.
4. Use extreme caution with jammed or unbalanced loads, which when cleared may set the machine in motion.
5. Keep all objects such as hands, clothing, and tools away from rotating or moving parts.
6. Use safety glasses or equivalent to protect your eyes.
7. Dowel pins and mounting screws must not protrude from the drive plate or driven member, as the clutch could become a solid coupling.
8. High humidity, contaminants, or wash down applications may cause rust within the clutch, resulting in operational failure. Lubricate every six months or more frequently as the application requires.
9. The FERGUSON clutch is not a "FAIL SAFE" device and cannot be used on "overhauling" or "holding" load applications.
10. When using chain drives, incorporate an idler sprocket to eliminate any slack.

NOTE: The above list includes major safety points to be observed, but should not be considered as limiting in safety precautions to be followed.

NOTE: In the event the unit is damaged, contact Industrial Motion Control's Wheeling factory or your local representative, for replacement.

Operating Environment

This product is intended to operate in a clean environment. Excessive coolant, chips, dust, dirt or debris can adversely affect its performance and life. If this device does operate in a dirty environment periodic cleaning must be practiced and careful inspection of seals and accessories is necessary.

Application Recommendations

1. On applications other than the output of an IMC Index Drive, clutch speeds must not exceed 100 RPM.
2. High humidity, contaminants, or wash down applications may require special protection. If rust forms within the clutch, it may act as a solid coupling and will not release under overload conditions. Lubricate every six months or more frequently as the application requires.
3. Use bronze bushings on sprockets, dials, gears or pulleys when used at the high end of the speed range (100 RPM) to reduce wear.
4. Clutch couplings require accurate shaft alignment of .003" TIR. Insure that a clearance gap is maintained between the body and the drive plate around the full circumference to the clutch (Type RT S/S).
5. Use flange mounted clutches and clutch couplings whenever possible. These models provide superior mounting reliability (Type RT F/F or D).
6. Dowel pins should not protrude from the drive plate or driven members, as they may lock against the adjacent surface.
7. Do not operate without the detector limit switch electrically disconnecting the prime mover (motor), as galling of the contacting surfaces may result.
8. On high inertia applications, braking the prime mover is recommended in the dwell cycle of the INDEX DRIVE to minimize over travel.
9. IMC recommends using limit switches with rated travel not exceeding .008" for actuation.
10. The torque required to re-engage the clutch is usually 25% of the rating. Contact IMC for special design, anti-friction materials if the clutch is to be used with very low torque settings.
11. Never use the clutch with a torque setting close to the calculated operating torque. Actual torques may be higher. Torque spring tolerances and coefficients of friction vary with temperature and application. Allow 130% (1.3 service factor) when applying a FERGUSON clutch.

Requesting Service

Call our Technical Service Department in Wheeling, IL, USA at 800-645-5207 or 847-459-5200 between 8:00AM and 4:30PM CST. When requesting service, always provide the following information:

1. The model number of the torque limiter.
2. A clear description of the problem, including as much detail as possible of the circumstances leading up to the problem.

Overview

The drawings contained in this document are for illustrative purposes only. They are not intended to accurately represent the components and therefore are not to scale. The various models may be different than shown, depending upon options chosen or the particular configuration.

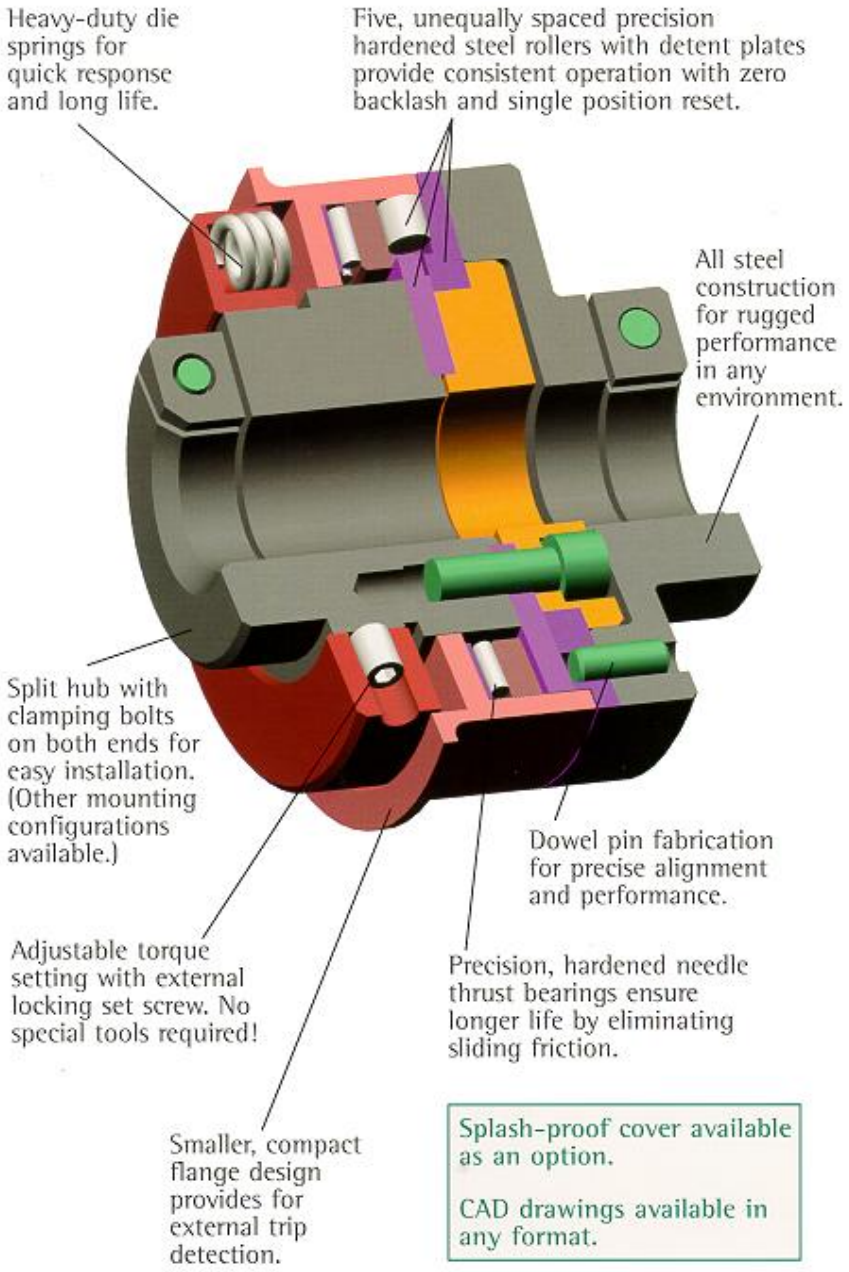
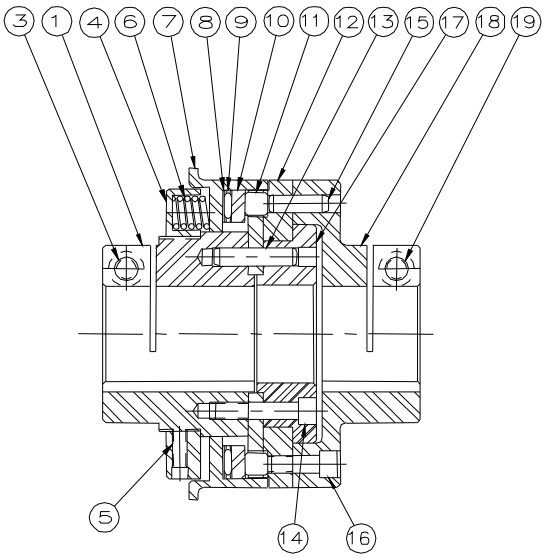
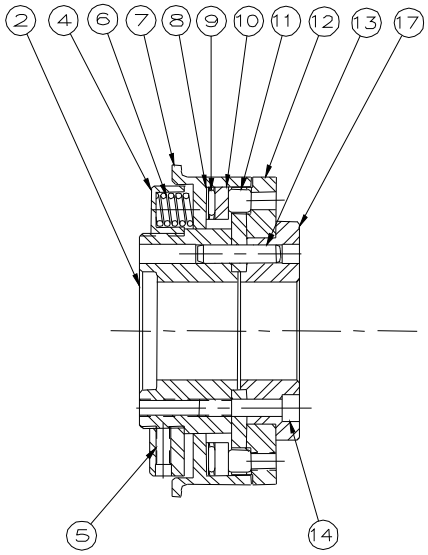


FIGURE 1

Location Map – RT & RTM Series



MODEL RT –S/S



MODEL RT –F/F

ITEM	PART NAME	CLUTCH TYPE			
		S/S	S/F	F/S	F/F
1	CLUTCH HOUSING – SPLIT CLAMP FOR SHAFT	ü	ü		
2	CLUTCH HOUSING – PILOT FOR FLANGE MTG			ü	ü
3	CLAMP SCREW	ü	ü		
4	TORQUE ADJUSTING RING NUT	ü	ü	ü	ü
5	LOCKING SET SCREW	ü	ü	ü	ü
6	SPRINGS	ü	ü	ü	ü
7	PRESSURE/TRIP DETECTION RING	ü	ü	ü	ü
8	THRUST RACE – THIN	ü	ü	ü	ü
9	THRUST BEARING	ü	ü	ü	ü
10	THRUST RACE – THICK	ü	ü	ü	ü
11	ROLLER	ü	ü	ü	ü
12	DETENT PLATE SET	ü	ü	ü	ü
13	DOWEL PIN – CLUTCH	ü	ü	ü	ü
14	SCREW – CLUTCH	ü	ü	ü	ü
15	DOWEL PIN – COUPLING	ü		ü	
16	SCREW – COUPLING	ü		ü	
17	RETAINER	ü	ü	ü	ü
18	COUPLING	ü		ü	
19	CLAMP SCREW	ü		ü	

Location Map - RTL Series

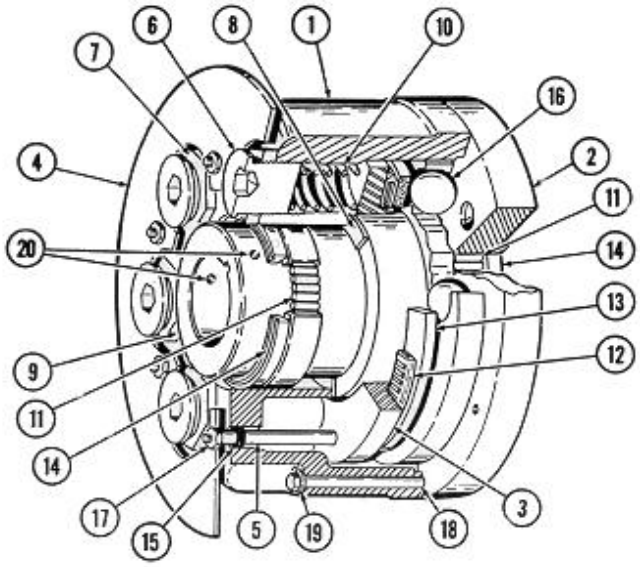


FIGURE 2

Item No.	Part Name	Rite-Torq Number			
		5	20	60	120
		Part Number			
1	Housing Body	51	201	601	1201
2	End Plate	52	202	602	1202
3	Pressure Ring	53	203	603	1203
4	Actuator Plate	54	204	604	1204
5	Spacer Stud	55	205	605	1205
6	Torque Adj. Screw	56	206	606	1206
7	Locking Nut	57	207	607	1207
8	Thrust Washer	58	208	608	1208
9	Hub	59	209	609	1209
10	Spring	510	2010	6010	12010
11	Needle Bearing	511	2011	6011	12011
12	Thrust Bearing	512	2012	6012	12012
13	Thrust Race	513	2013	6013	12013
14	Oil Seal	514	2014	6014	12014
15	“O” Ring	515	2015	6015	12015
16	Ball	516	2016	6016	12016
17	Locknut	517	2017	6017	12017
18	Hex Head Bolt	518	2018	6018	12018
19	Lock Washer	519	2019	6019	12019
20	Set Screw	520	2020	6020	12020

CHART 1

Specifications

Model	Bore Sizes	Trip Torque Range	Approximate Weight (less crating)	Polar Moment of Inertia	Maximum RPM (See Installation Section)	Limit Switch Travel
	(in.) *(mm)*	*(in-lb)* *(Nm)*	*(lb)* *(kg)*	*(lb-in-sec^2)* *(kgm^2)*		*(in.)* *(mm)*
RT-3 RTM-3	.500-.750 11,0-19,0	100-500 11,3-56,5	4-6 2-3	.019-.024 0,003-0,003	N/A	0.06 1,5
RT-5 RTM-5	.750-1.250 16,0-32,0	500-3500 56,5-339,1	13-16 5,9-7,3	.111-.141 0,013-0,016	N/A	0.08 1,7
RT-6 RTM-6	1.000-2.000 25,0-50,0	2000-8500 113,0-960,7	28-37 12,7-16,8	.322-.441 0,036-0,05	N/A	0.09 2,4
RT-8 RTM-8	1.500-2.750 38,0-63,0	2500-12000 452,1-1751,8	51-72 1-32,7	1.19-1.68 0,130-0,190	N/A	0.11 2,9
	(in)	*(in-lb)*	*(lb)*	*(lb-in-sec^2)*		*(in.)*
RTL-5 RTL-5FCB	.750-1.250 (same)	100-150 (same)	11 17	.085 0,140	1800	.073
RTL-20 RTL-20FCB	1.00-1.750 (same)	400-2000 (same)	20 33	.250 0,437	1200	.092
RTL-60 RTL-60FCB	1.000-2.250 (same)	1200-6000 (same)	33 60	.624 1,154	900	.110
RTL-120 RTL-120FCB	1.500-2.750 (same)	2400-12000 (same)	56 97	1.327 2,500	600	.146

CHART 2

Installation

NOTE: ***Ferguson detent style torque limiters are single positioning, and will re-engage on each revolution. Avoid continuous tripping as it will cause serious damage to the mechanisms.***

NOTE: ***Use of a limit switch (mechanical or proximity) provided by the user is required to shut down the power after the initial trip. Ferguson torque limiters are provided with a switch actuating plate or flange to detect the axial tripping movement. IMC recommends using limit switches with rated travel not to exceed .008" for actuation.***

WARNING:

TORQUE LIMITERS:

- **ARE NOT TO BE USED AS A SAFETY DEVICE.**
- **ARE NOT MEANT TO PROTECT TOOLING.**
- **SHOULD NOT BE USED FOR OVERHAULING OR LIFTING LOADS SUCH AS VERTICAL CONVEYORS OR TRUNNION-TYPE FIXTURING.**
- **SHOULD NOT BE OPERATED MOTOR SPEEDS.**
- **IF PROPERLY SET, WILL PROTECT THE INTERNAL MECHANISM OF THE INDEX DRIVE.**

RT & RTM Series

NOTE: ***Clutch torque is preset at the factory for application, if known, or the users request. Final adjustment is required by the user after the load is applied. Adjustment procedures can be found on page 13 of this manual.***

1. RT & RTM Series torque limiters do not have flexible couplings. For shaft/shaft models it is necessary to align mating shafts before installation of clutches. Use a dial indicator or similar instrument.
2. Fit and install key(s) into shaft keyway(s) and hand apply a light coat of anti-seize compound to shaft surface. (Never Seize® is a brand of such product.)
3. Loosen bolt in clamping hub(s) and slide torque limiter onto driving shaft to required depth. Tighten bolt in clamp hub securely. Either end of shaft/shaft clutches can be installed on driving shaft. Slide driven shaft into clutch and tighten bolt in clamping hub securely.
4. Assemble sprockets, pulleys, etc. onto flange side of shaft/flange or flange/flange torque limiter using tapped holes and dowel holes provided by Ferguson. Torque limiter should be assembled to slow speed shaft of reducers, indexers, etc. for greatest sensitivity. Slide clutch onto shaft with sprocket side as close as possible to bearing in reducer, etc. Tighten bolt in clamping hub securely.
5. Mount and adjust limit switch into proper position with clutch trip flange.
6. Turn on power and inspect.

NOTE: Steps 1-8 apply to RTL-FCB type clutch.

1. RTL-FCB (shaft/shaft) torque limiters are furnished with a flexible coupling to tolerate moderate angular and/or parallel misalignment. The maximum acceptable angular misalignment is 0.5 degree and maximum acceptable parallel offset is 0.005".
2. Determine angular alignment by checking the gap between the coupling and the torque limiter with a ruler, caliper or gauge. The gap should be even all around but not exceed 0.5 degree, as previously mentioned (see Figure 3).
3. Determine parallel alignment by use of a straight edge or indicator. A straight edge should lie evenly on both members but not to exceed .005" (see Figure 4).
4. Fit key into shaft keyways and hand apply thin coat of anti-seize compound.
5. NOTE: *Torque limiter and coupling with maximum bores have shallow* keyways.
6. Separate torque limiter & coupling hub by pulling or prying apart (FCB Series only).
7. Mount the torque limiter to the driving or driven shaft on the slow speed side of the reducer and secure it by tightening the two set screws. The use of Loctite® 242 or similar adhesive on the set screws is recommended.
8. Slide the coupling hub onto the shaft to be connected. Align the studs on the torque limiter and hub with the holes in the elastomer bushings (Figure 6) in the opposing members and slide the hub towards the torque limiter until the members are seated together. Align the shafts per the above tolerances and tighten the coupling hub to the shaft using the furnished standard QD type bushing.

NOTE: Steps 9-10 apply to basic RTL-type clutch.

9. Assemble the sprocket, pulley, etc. to the torque limiter using the tapped holes provided by Industrial Motion Control.

CAUTION: ***SCREW THREAD DEPTH MUST NOT EXCEED THAT LISTED IN CHART 3.***

IMPERIAL INSTALLATION SPECIFICATIONS

	Trip Torque (IN-LBS)		Max.	Actuator Plate	Sprocket Mounting				Max.
Model	MIN.	MAX	RPM	Travel	Thread*	B.C.	NO.	Pilot Dia.	Bore
5	100	500	1800	.073 IN.	¼-20X5/8 dp.	3.750 IN.	4	2.500	1.250 IN.
20	400	2000	1200	.092 IN.	¼-20X3/4 dp.	4.875 IN.	6	3.375	1.750 IN.
60	1200	6000	900	.110 IN.	5/16-18X3/4 dp.	6.000 IN.	6	4.000	2.250 IN.
120	2400	12000	600	.146 IN.	3/8-16X1 dp.	7.000 IN.	6	4.750	2.750 IN.

CHART 3

METRIC INSTALLATION SPECIFICATIONS

Model	Trip Torque (Nm) MIN.	Trip Torque (Nm) MAX	Max. RPM	Actuator Plate Travel	Sprocket Mounting Thread*	Sprocket Mounting B.C.	Sprocket Mounting NO.	Sprocket Mounting Pilot Dia.	Max. Bore
5	11,3	56,5	1800	1,85 mm	N/A	95,3 mm	4	63,5 mm	31,8 mm
20	58,4	113,0	1200	2,34 mm	N/A	123,8 mm	6	85,7 mm	44,5 mm
60	175,2	875,9	900	2,79 mm	N/A	152,4 mm	6	101,6 mm	57,2 mm
120	350,4	1751,8	600	3,71 mm	N/A	177,8 mm	6	120,7 mm	69,9 mm

CHART 4

NOTE: ***RTL & RTL FCB Torque Limiters are built in English dimensions unless otherwise noted. Metric measures above are approximate conversion from English only.***

10. Slide torque limiter onto shaft of reducer, etc. with sprocket side as close as possible to the bearing of the unit without rubbing. Secure torque limiter in place by tightening the two set screws provided. Again, the use of Loctite® is recommended. Additional clamping can be provided by using an arrestor bolt and washer to hold the unit against a shaft shoulder or clamping collar (see Figure 5).

NOTE: Steps 11-12 apply to both RTL and RTL-FCB clutches.

11. Mount and adjust limit switch into proper position with switch trip plate.
12. Turn on power and inspect.

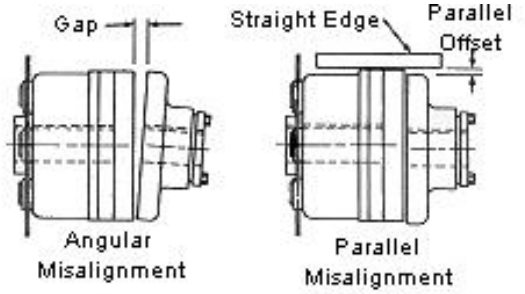


FIGURE 3

FIGURE 4

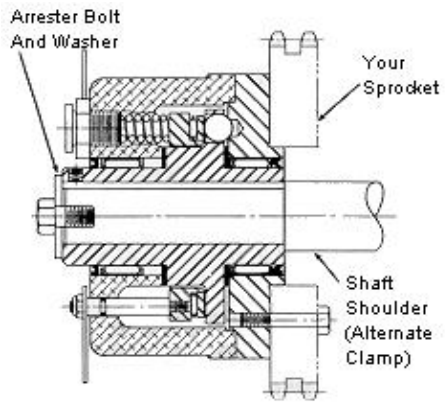


FIGURE 5

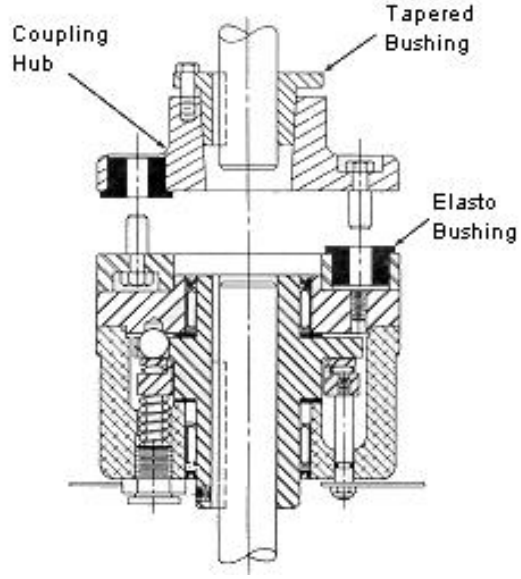


FIGURE 6

Adjustments

RT & RTM Series

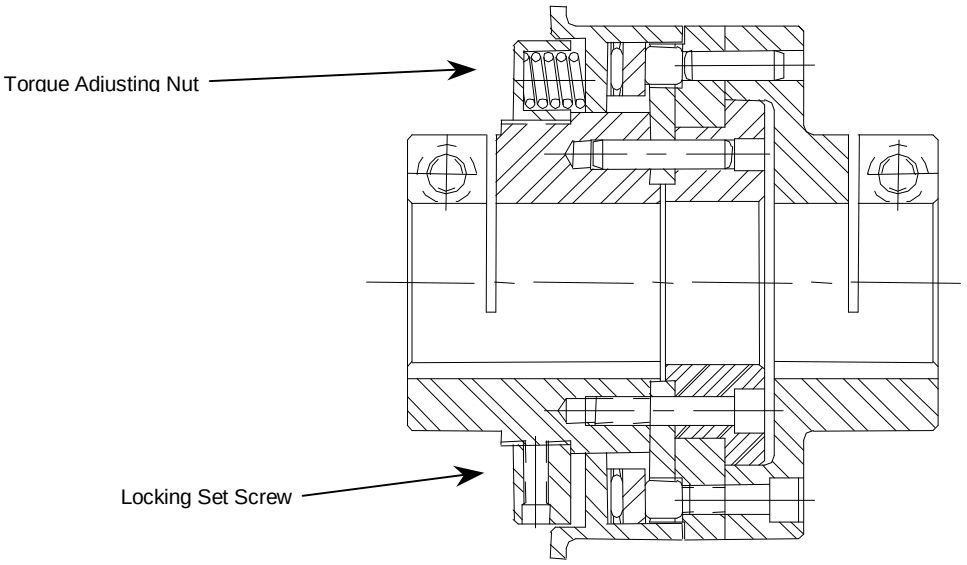


FIGURE 7

1. To adjust trip torque, remove locking set screw. Use spanner wrench to adjust nut position. Turn clockwise to increase torque or counterclockwise to decrease. See Chart 5 for torque adjustment values.

2. Replace locking set screw after achieving required torque.

NOTE: ***1) Total torque range in the different models is achieved by a combination of different spring groups and applied pressure through the adjusting nut. Chart 5 below show the different torque ranges available for each spring group. When re-ordering, specify model # (e.g. RT3-6001, etc.) for your required spring range.***

NOTE: ***2) If a tamper proof setting is desired, apply a permanent adhesive, such as Loctite® 680, to the set screw after achieving the required trip torque value.***

Spring Sets for RT Clutches

RT Clutch	Range	Torque Range		Nut Adjustment	
		in-lbs	Nm	in-lbs*	Nm*
RT/RTM3-6001	1	100 – 175	12 – 20	10	1,13
RT/RTM3-6002	2	175 – 275	20 – 31	15	1,69
RT/RTM3-6003	3	250 – 350	28 – 40	20	2,26
RT/RTM3-6004	4	325 – 500	37 – 56	30	3,39
RT/RTM5-6001	1	500 – 850	56 – 96	50	5,56
RT/RTM5-6002	2	800 –1700	90 – 192	100	11,30
RT/RTM5-6003	3	1600 – 3000	181 – 339	200	22,60
RT/RTM6-6001	1	1000 – 2700	113 – 305	275	31,07
RT/RTM6-6002	2	2500 – 5000	282 – 565	525	59,22
RT/RTM6-6003	3	4000 – 8500	452 – 960	950	107,34
RT/RTM8-6001	1	4000 – 9500	455 – 1073	600	67,79
RT/RTM8-6002	2	6000 – 15500	678 – 1750	900	101,69

NOTE:** ***Torque per ¼ turn of nut.

CHART 5

NOTE: ***Trip torque should be less than the maximum the machine can absorb without risk but great enough to prevent undesirable nuisance tripping due to inertia or starting loads. Ideally, trip torque should be approximately 40% higher than the operating torque of the machine.***

WARNING: ***IF THE DRIVE HAS A BRAKE MOTOR, THE TRIP SETTING MUST BE WELL ABOVE THE BRAKE TORQUE; OTHERWISE WITH A HIGH INERTIA DRIVE, THE CLUTCH MAY TRIP WHEN THE BRAKE IS APPLIED, ALLOWING THE MACHINE TO RUN UNCONTROLLED BY THE BRAKE.***

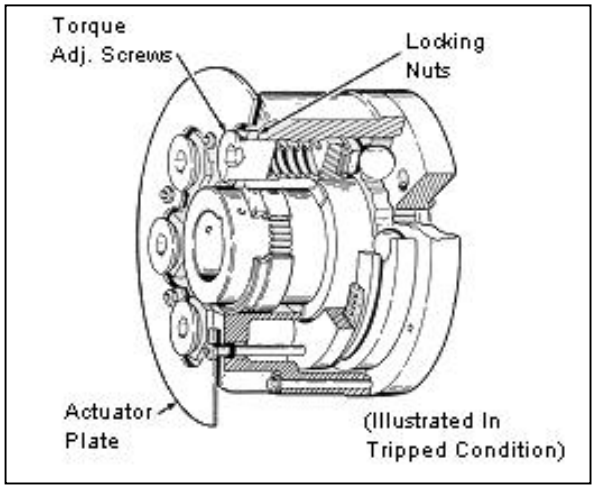


FIGURE 8

Number Of Turns	Approximate Static Trip Torque (IN-LBS)			
	RTL-5	RTL-50	RTL-60	RTL-120
0	500	2000	6000	12000
½	450	1900	5500	11500
1	375	1700	5000	10500
1 ½	300	1500	4500	9500
2	225	1300	4000	9000
2 ½	150	1200	3500	8000
3	100	1000	3000	7000
3 ½	-----	800	2500	6000
4	-----	600	2000	5000
4 ½	-----	500	1700	4500
5	-----	400	1400	4000
5 ½	-----	-----	1200	3500
6	-----	-----	-----	3000
6 ½	-----	-----	-----	2400

CHART 6

1. Adjust trip torque (Figure 8) by loosening locknuts.
2. Tighten torque adjusting screws all the way down.
3. Back torque adjusting screws off the number of turns in Chart 6 to the desired torque range.
4. Tighten locking nuts to maintain setting.
5. Check the distance between torque adjusting screw heads and locking nuts. All must be the same to insure even spring compression.

NOTE: ***All Industrial Motion Control detent clutches are reset by:***

1. ***Turning the power off.***
2. ***Clear jam condition.***
3. ***Rotate machine manually or slow jog until clutch snaps back in the home position. Torque limiter will re-engage from either direction.***

Maintenance

NOTE: ***FERGUSON detent torque limiters are factory lubricated and sealed. Unless the unit is subjected to severe loads, frequent tripping, or harsh environment, replenishment of lubricant is seldom necessary more often than once a year.***

1. Annually disassembly unit, clean and inspect parts. Check bearings and seals and replace if necessary. Inspect detents and detent plate for wear. If necessary, replace torque limiter.

2. Apply a general-purpose lithium based NLGI grade 2 grease to bearings, thrust washers, detent seats and track, rubbing surfaces and the threads of adjusting nut or screws.

Automation

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