

Trig-O-Matic Mechanical Overload Clutches ORC Series



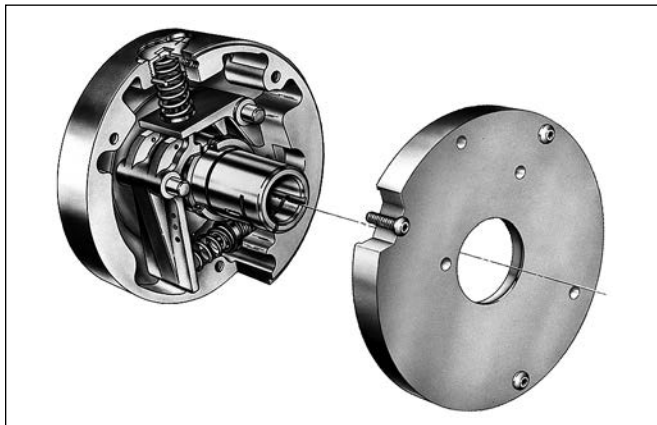
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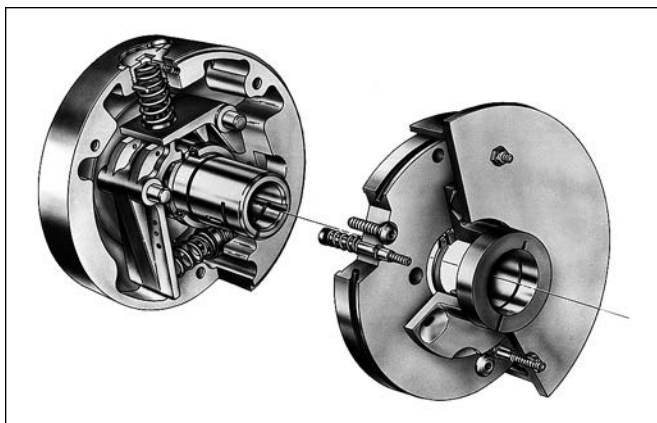
Trig-O-Matic Overload Clutches ORC Series

Features

- Bi-directional operation
- Single positioning for re-engagement at the exact cycle point at which it released
- Limit switch actuation for remote detection of overload condition
- Completely enclosed for dirty applications
- Automatic or manual reset
- Various configurations for direct and indirect drives
- Six sizes (Model F - five sizes) to accommodate various bore and torque ranges



Standard Model S



Fully Automatic Model F

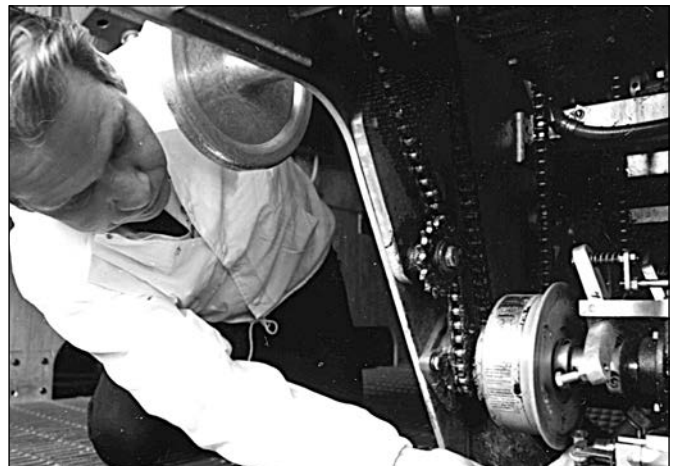
The Trig-O-Matic's unique "Trigger" action design disconnects the load at the instant an overload occurs and at the exact torque limit you set. When the overload condition is corrected, the clutch resets at the exact cycle point and torque at which it released.

The ORC Series Trig-O-Matic Overload Clutch is available in two models: the Standard Model S and the Fully Automatic Model F. Both provide single position engagement and a means to signal an overload condition. Each model is available in various sizes and types to adapt to your drive train. They incorporate reliability, repeatability and adjustability to protect your machinery from costly damage or downtime.

Applications

The ORC Series Trig-O-Matic Overload Release Clutch can be applied on any drive train where the protection of reducers, indexers, chain, sprockets or product is required. It can replace less precise and less reliable devices such as shear pins and friction clutches.

Typical applications include: packaging machinery, paper converting machinery, baking equipment, bottling and capping machinery, indexing machinery, labeling machinery, conveyors, presses and water treatment equipment.



Trig-O-Matic Overload Clutches

Selection

- Determine the overload release torque by one of these methods:
 - Use the torque formula with horsepower and RPM specific to the selected clutch location. A service factor may be required for high inertia starts, reversing or peak load conditions, (refer to Page 98 for service factor information. For average applications, a service factor "SF" of 1.25 is recommended):

$$\text{Torque (Lb. In.)} = \frac{\text{HP} \times 63025}{\text{RPM}} \times \text{SF}$$
 - Determine the "weak link" in the drive train, (i.e. chain, reducer, belt or shaft). Select an overload release torque that is below the "weak link's" maximum torque rating.
 - Physically measure the drive torque with a torque wrench and size accordingly.
- Determine the bore size(s) and keyway(s):
 - Shaft size at the clutch location determines the clutch bore.
 - Shaft size at the coupling location determines the coupling bore (if applicable).
- Choose the appropriate Model (S or F), based upon the drive layout and the application's requirements.
- Refer to the Basic Selection Chart for the appropriate clutch size.
- Refer to Part Numbering System to complete selection.

The Standard Model S is Boston Gear's basic low-cost unit on which various optional features can be added. The clutch mechanism is available in automatic or manual reset. Typically, a manual reset clutch is used where it will run disengaged for extended periods of time. The automatic reset is generally used in conjunction with a limit switch to shut the drive down. The Standard Model is typically used to replace shear pins and where access to the clutch is available. See page 19.

The Fully Automatic Model F includes all the features available in the Standard Model plus an automatic switch actuating mechanism, an automatic clutch mechanism and three mounting styles. The Model F is generally used where the unit is not easily accessible. This model is a complete overload clutch designed especially for production and packaging machinery. See page 27.

Trig-O-Matic Model Feature Comparisons

ORC Series Model S	ORC Series Model F
Bi-directional	Bi-directional
Single Position	Single Position
Manual Clutch Reset	Automatic Clutch Reset
Automatic Clutch Reset	Automatic Clutch Reset
Clutch Types C, N, R, T	Clutch Types C, N, R, T
One Mounting Style	Three Mounting Styles
Limit Switch Pin	Fully Automatic
Limit Switch Plate Actuator	Limit Switch Plate Actuator
Additional Features: Torque Selector Dial Max. Torque Limit Stop Grease Pack & Relief Fittings	Additional Features: Torque Selector Dial Max. Torque Limit Stop Grease Pack & Relief Fittings Locking Collar Mounting
Optional: Pressure Lube Bearings Balancing Locking Collar Mounting	Optional: Balancing One-Directional Feature

Basic Selection Chart

Standard Model S					Fully Automatic Model F				
Clutch Size	Max. Bore (Inch)*	Torque Code	Torque Range (Lb. In.)		Clutch Size	Max. Bore (Inch)*	Torque Code	Torque Range (Lb. In.)	
			Min.	Max.				Min.	Max.
1	0.8750	L	35	100	1	0.7500	L	70	140
		M	75	275			M	110	275
		H	200	400			H	260	400
2	1.1875	L	50	200	2	1.1250	L	100	200
		M	200	600			M	200	600
		H	400	1,000			H	400	1,000
3	1.8120	L	200	850	3	1.7500	L	200	850
		M	800	2,200			M	800	2,200
		H	1,200	3,000			H	1,200	3,000
4	2.3120	L	600	1,400	4	2.1250	L	600	1,400
		M	1,200	3,000			M	1,200	3,000
		H	2,850	5,000			H	2,850	5,000
5	3.0000	L	1,600	3,000	5	2.7500	L	1,600	3,000
		M	2,500	6,000			M	2,500	6,000
		H	4,000	10,000			H	4,000	10,000
6	3.9375	L	4,000	8,000	—	—	—	—	—
		M	7,500	14,000			—	—	—
		H	12,500	25,000			—	—	—

*Larger bores may require flat keys (supplied with unit).

Trig-O-Matic Overload Clutches ORC Series

Standard Model S

Operating Principles

The Standard Model S ORC Series Trig-O-Matic Overload Release Clutch consists of two basic components: the rotor and the housing assembly. The clutch rotor is keyed and secured to the drive shaft with a setscrew.

The housing assembly includes a drive pawl and a reset pawl which are pivoted within the clutch housing. The drive pawl is held engaged in the rotor notch by the combined pressure of the drive and reset springs as shown in Figure 1. The combined pressure of these two springs determines the maximum torque which is transmitted without overload. With the clutch mechanism in the engaged position shown in Figure 1, the rotor and housing are held together and the entire unit rotates with the drive shaft at the same speed.

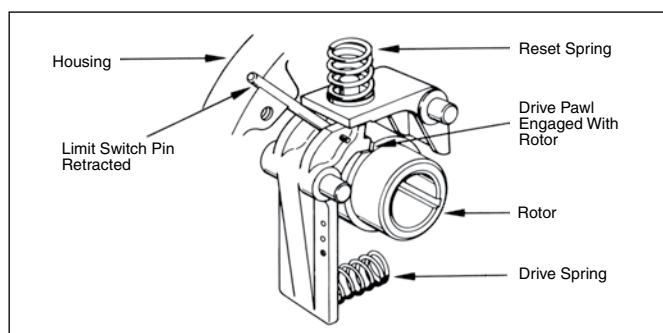


Figure 1 – Engaged

The Standard Model Trig-O-Matic is available in two clutch reset types: Manual and Automatic.

Manual Reset

The instant an overload occurs, the pressure of the drive and reset springs is overcome by the extra force applied to them. The drive pawl is forced out of its engaged position from the rotor and as it pivots up, the reset pawl lifts and locks it out of contact with the rotor as shown in Figure 2. The clutch then rotates freely.

When the overload condition has been corrected, the clutch is reset by inserting a hexagon wrench in the reset screw and turning the screw clockwise until the reset pawl releases the drive pawl. When the drive pawl re-engages with the rotor, the reset screw must be backed out to its original stop position. This is essential to restore the torque to its original setting.

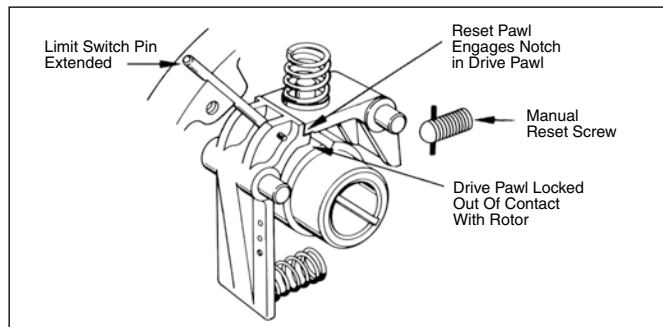


Figure 2
Disengaged - Manual

Fully Automatic or Semi-Automatic

The instant an overload occurs, the pressure of the drive and reset springs is overcome by the extra force applied to them. The drive pawl is forced out of its engaged position from the rotor. After one revolution the drive pawl will automatically return to its engaged position. If the overload is still present, it will not seat and will continue to rotate until overload has been removed. The drive should be stopped as soon as possible. After the overload condition has been corrected the drive must be “jogged” until the drive pawl engages with the rotor.

Note: Models “SB” and “SC” are semi-automatic because the actuating plate must be manually reset. See models F (page 27) or SA for fully automatic operation.

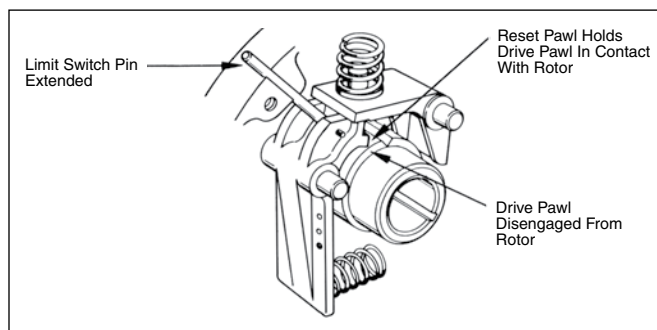


Figure 3
Disengaged - Automatic

Limit Switch Pin

A Limit Switch Pin is furnished as a standard item for model SA and SM to activate a limit switch that triggers the electrical controls. The travel of the Limit Switch Pin protruding radially from the clutch housing is controlled by the drive pawl motion upon disengagement. The Limit Switch Pin can only be effective if the housing continues to turn when an overload occurs and the rotor stops, (i.e., the housing is the driver and the rotor is the driven). The housing RPM must be considered to determine the time for the Limit Switch Pin to revolve around before contacting the limit switch.

The standard Limit Switch Pin extension is 1-inch, however, it can be made flush with the housing when engaged. If the Limit Switch Pin is not required, it can be omitted from the assembly with a “Z1” suffix.

If instantaneous operation of a limit switch is required or if the housing stops upon overload, see Page 25 for the Limit Switch Plate Actuator or the Model F on page 27. Units which include this device do not have the Limit Switch Pin.

Trig-O-Matic Overload Clutches

Torque Selector Dial

The torque selector dial shown in Figure 4 is a standard feature on all Standard Model S Trig-O Matic clutches. Each clutch is individually calibrated to specific torque values. The housing has two milled marks indicating minimum and maximum torque. In addition, these values are stamped on the housing adjacent to each mill mark. To adjust the torque, loosen the “lock screw”, turn the torque adjusting screw (stamped #9) until it is flush with the milled depth and the red scribed lines match the required output position. Additional marks can be indicated upon request.

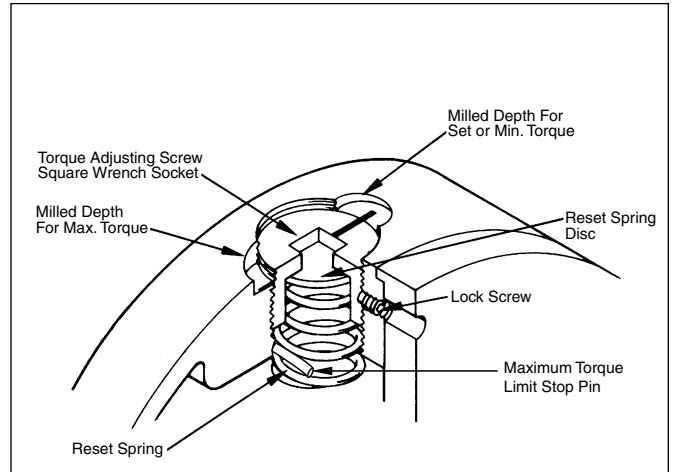


Figure 4

Maximum Torque Limit Stop

A maximum torque limit stop is supplied to prevent clutch lock-up. In conjunction with a torque selector dial, the maximum value indicated by the deepest milled mark can not be exceeded.

Grease Pack Fittings

Grease pack fittings are supplied countersunk into the clutch housing to pack the clutch cavity, preventing corrosion. This feature is especially suitable for outdoor or washdown service.

ORC Model S Series Part Numbering System

ORC	2	SA	C	-	L	P16	-	P20	XX
Series	Size	Model	Type		Torque Range			Coupling Bore (Type C, N or R Only)	
Overload Release Clutch	1 2 3 4 5 6	SA = Standard Model, Fully Automatic Reset with Pin Actuator SB* = Standard Model, Semi-Automatic Reset with Plate Actuator SM = Standard Model, Manual Reset with Pin Actuator SP* = Standard Model, Manual Reset with Plate Actuator	T = Sprocket Mount C = Flexible Coupling N = Indexing Coupling R = Rigid Coupling		L = Light M = Medium H = Heavy 9 = Special Contact Boston Gear Engineering			P = Bored to Size (in 1/16") M = Metric Bored to Size (mm) (Leave Blank for Non-Coupled Units)	Special Options TX = Special Features Contact Boston Gear Engineering B1 = Ball Bearings for High Speed Applications F2 = Steel IT Paint and Food Grade Grease G1 = High Temperature Grease L1 = Pressure Lubed Bearings (Sizes 3-6 Only) S1 = Static Balance Z1 = Pin Removed on "SA" and "SM" Models Only
					Unit Bore				
					P = Bored to Size (in 1/16") M = Metric Bored to Size (mm)				

*Dimensions shown on page 25

How to Order — Standard Model S

When ordering an ORC Series Trig-O-Matic Overload Clutch, please include code letters for series, size, model, type, torque range, unit bore and coupling bore (if applicable). Not all combinations are possible.

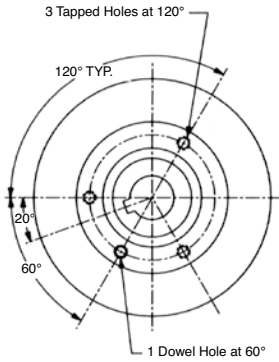
Example:

Required Size 2 Trig-O-Matic Overload Clutch, Standard Model S, automatic reset with pin actuator, flexible coupling, light torque range, with a one inch unit bore and a one inch coupling bore:

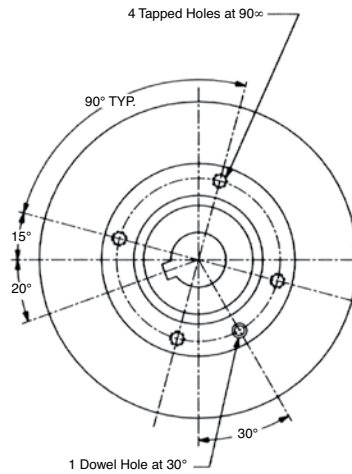
ORC 2 SA C — L P16 — P20 (Only include second bore "P20" if clutch is a coupling style)

Trig-O-Matic Overload Clutches ORC Series

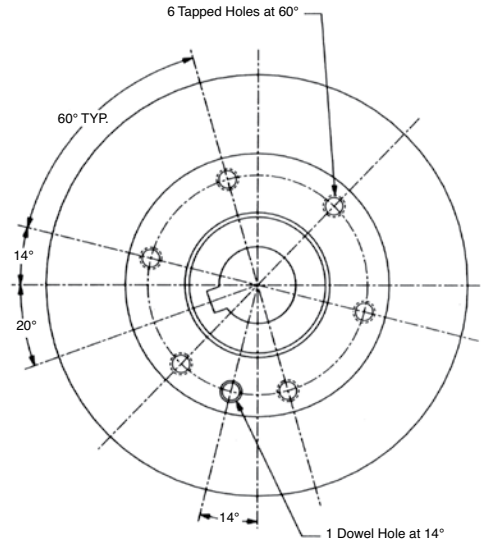
Model S and F Type T Mounting Hole Patterns



Clutch Sizes 1 and 2



Clutch Sizes 3 and 4



Clutch sizes 5 and 6

Clutch Size	Mounting Holes					
	Qty.	Thread Size	Tap Depth	Bolt Circle	Pilot Dia. +.000 -.002	Dowel Size
1	3	1/4-20	.50	2.375	1.875	.25
2	3	5/16-18	.50	3.000	2.250	.31
3	4	3/8-16	.62	4.125	3.250	.37
4	4	1/2-13	.87	5.000	3.203	.50
5	6	5/8-11	1.00	6.250	4.125	.62
6	6	5/8-11	1.00	8.750	6.000	.62

Minimum Number of Teeth Adaptable to Type T Clutches

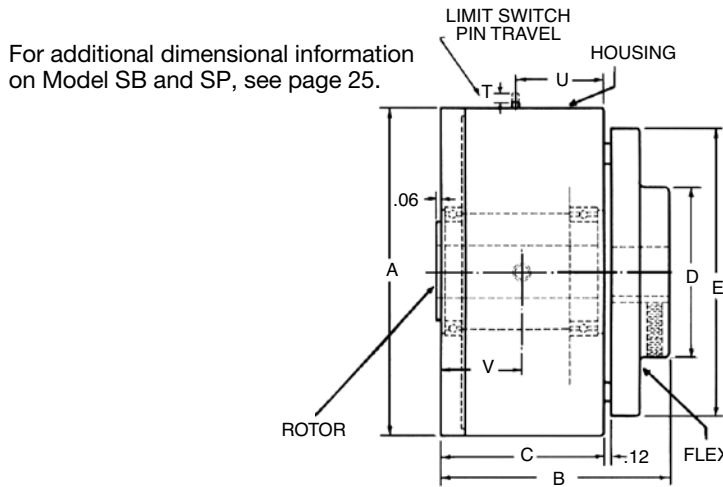
Clutch Size	Standard Chain Size and Pitch										
	#25 1/4 Pitch	#35 3/8 Pitch	#40 1/2 Pitch	#41 1/2 Pitch	#50 5/8 Pitch	#60 3/4 Pitch	#80 1 Pitch	#100 1-1/4 Pitch	#120 1-1/2 Pitch	#140 1-3/4 Pitch	#160 2 Pitch
1	40	28	22	22	18	Not Recommended					
2	54	36	28	28	22	19	Not Recommended				
3	45		34	36	28	25	19	Not Recommended			
4	42			45	36	30	23	19	Not Recommended		
5	Consult Factory				42	36	30	22	19	17	Not Recommended
6	Consult Factory					48	36	30	24	21	19

For smaller sprockets, consult Boston Gear Engineering at 800-816-5608.

Trig-O-Matic Overload Clutches ORC Series

Model SA and SM

Type C Flexible Coupling



For additional dimensional information on Model SB and SP, see page 25.

All Dimensions in Inches

Clutch Size	A	B	C	D	E	U	T	V	Angular Misalignment*	Max. Parallel Offset*	Weight (Lbs.)
1	4.50	3.94	2.31	2.00	4.25	1.28	.13	1.03	< 1°	.012	10
2	6.00	4.62	2.75	2.56	5.25	1.53	.13	1.22	< 1°	.015	18
3	8.00	5.87	3.50	3.50	5.87	1.94	.13	1.56	< 1°	.016	39
4	10.00	7.71	4.47	4.87	9.12	2.66	.13	1.81	< 1°	.027	94
5	12.00	8.87	5.12	5.68	10.50	3.00	.13	2.12	< 1°	.031	163
6	16.00	11.12	6.25	7.63	13.25	3.68	.25	2.56	< 1°	.045	354

*Parallel offset and angular misalignment are proportionally reduced if both are present

Ratings

Clutch Size	Torque Range (Lb. In.)			Max. RPM*	WR ² (Lb.-In. ²)	
	L	M	H			
1	Min.	35	75	200	1,800	25
	Max.	100	275	400		
2	Min.	50	200	400	1,200	80
	Max.	200	600	1,000		
3	Min.	200	800	1,200	1,200	300
	Max.	850	2,200	3,000		
4	Min.	600	1,200	2,850	900	1,190
	Max.	1,400	3,000	5,000		
5	Min.	1,600	2,500	4,000	600	2,850
	Max.	3,000	6,000	10,000		
6	Min.	4,000	7,500	12,500	600	10,900
	Max.	8,000	14,000	25,000		

Clutch and Coupling Bores

Clutch Size	Type	Bores (inch)		
		Min.	Max. (1)	Max. (2)
1	Clutch	0.5000	0.7500	0.8750
	Coupling	0.5000	1.5000	1.5625
2	Clutch	0.6250	1.1250	1.1875
	Coupling	0.6250	1.8125	1.9375
3	Clutch	0.7500	1.7500	1.8125
	Coupling	0.7500	2.5000	2.6250
4	Clutch	1.1250	2.2500	2.3125
	Coupling	1.1250	3.6875	3.8125
5	Clutch	1.5000	2.7500	3.0000
	Coupling	1.5000	4.2500	4.5000
6	Clutch	2.0000	3.7500	3.9375
	Coupling	2.0000	5.5000	5.7500

Refer to Page 96 for a complete list of bore codes.

(1) Square Key

(2) Flat Key

Clutches are shipped set for the minimum torque value of the selected range.

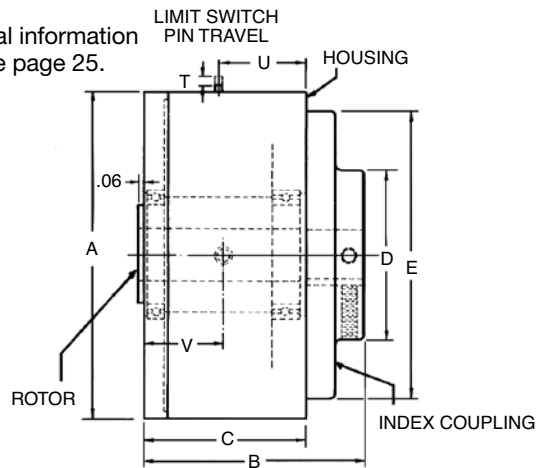
*For speeds exceeding 75% of the maximum RPM, ball bearings and balancing are recommended.

Refer to Page 19 for ordering information.

Trig-O-Matic Overload Clutches ORC Series

Model SA and SM Type N Indexing Coupling

For additional dimensional information on Model SB and SP, see page 25.



All Dimensions in Inches

Clutch Size	A	B	C	D	E	T	U	V	Weight (Lbs.)
1	4.50	3.81	2.31	2.00	4.25	.13	1.28	1.03	10
2	6.00	4.44	2.75	2.56	5.25	.13	1.53	1.22	18
3	8.00	5.75	3.50	3.00	7.00	.13	1.94	1.56	39
4	10.00	7.59	4.47	4.87	9.12	.13	2.66	1.81	94
5	12.00	8.68	5.12	5.68	10.50	.13	3.00	2.12	163
6	16.00	10.94	6.25	8.18	13.25	.25	3.68	2.56	354

Ratings

Clutch Size	Torque Range (Lb. In.)			Max. RPM*	WR ² (Lb.-In. ²)	
	L	M	H			
1	Min.	35	75	200	1,800	25
	Max.	100	275	400		
2	Min.	50	200	400	1,200	80
	Max.	200	600	1,000		
3	Min.	200	800	1,200	1,200	300
	Max.	850	2,200	3,000		
4	Min.	600	1,200	2,850	900	1,190
	Max.	1,400	3,000	5,000		
5	Min.	1,600	2,500	4,000	600	2,850
	Max.	3,000	6,000	10,000		
6	Min.	4,000	7,500	12,500	600	10,900
	Max.	8,000	14,000	25,000		

Clutch and Coupling Bores

Clutch Size	Type	Bores (inch)		
		Min.	Max. (1)	Max. (2)
1	Clutch	0.5000	0.7500	0.8750
	Coupling	0.5000	1.5000	1.5625
2	Clutch	0.6250	1.1250	1.1875
	Coupling	0.6250	1.8125	1.9375
3	Clutch	0.7500	1.7500	1.8125
	Coupling	0.7500	1.7500	1.8125
4	Clutch	1.1250	2.2500	2.3125
	Coupling	1.1250	3.6875	3.8125
5	Clutch	1.5000	2.7500	3.0000
	Coupling	1.5000	4.2500	4.5000
6	Clutch	2.0000	3.7500	3.9375
	Coupling	2.0000	5.5000	5.7500

Clutches are shipped set for the minimum torque value of the selected range.

*For speeds exceeding 75% of the maximum RPM, ball bearings and balancing are recommended.

Refer to Page 96 for a complete list of bore codes.

(1) Square Key

(2) Flat Key

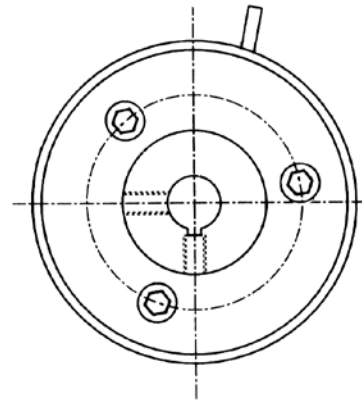
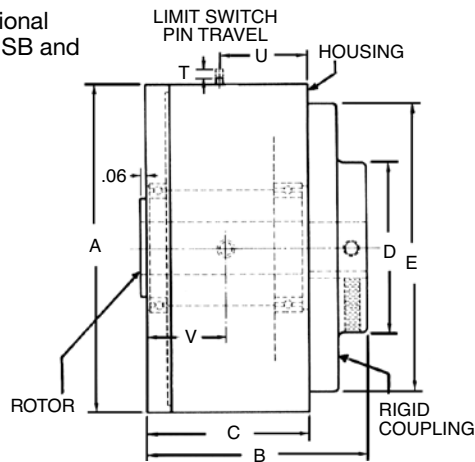
Refer to Page 19 for ordering information.

Trig-O-Matic Overload Clutches ORC Series

Model SA and SM

Type R Rigid Coupling

For additional dimensional information on Model SB and SP, see page 25.



All Dimensions in Inches

Clutch Size	A	B	C	D	E	T	U	V	Weight (Lbs.)
1	4.50	3.81	2.31	2.00	4.25	.13	1.28	1.03	10
2	6.00	4.44	2.75	2.56	5.25	.13	1.53	1.22	18
3	8.00	5.75	3.50	3.00	7.00	.13	1.94	1.56	39
4	10.00	7.59	4.47	4.87	9.12	.13	2.66	1.81	94
5	12.00	8.68	5.12	5.68	10.50	.13	3.00	2.12	163
6	16.00	10.94	6.25	8.18	13.25	.25	3.68	2.56	354

Ratings

Clutch Size	Torque Range (Lb. In.)			Max. RPM*	WR ² (Lb.-In. ²)
	L	M	H		
1	Min.	35	75	1,800	25
	Max.	100	275		
2	Min.	50	200	1,200	80
	Max.	200	600		
3	Min.	200	800	1,200	300
	Max.	850	2,200		
4	Min.	600	1,200	900	1,190
	Max.	1,400	3,000		
5	Min.	1,600	2,500	600	2,850
	Max.	3,000	6,000		
6	Min.	4,000	7,500	600	10,900
	Max.	8,000	14,000		

Clutches are shipped set for the minimum torque value of the selected range.

*For speeds exceeding 75% of the maximum RPM, ball bearings and balancing are recommended.

Clutch and Coupling Bores

Clutch Size	Type	Bores (inch)		
		Min.	Max. (1)	Max. (2)
1	Clutch	0.5000	0.7500	0.8750
	Coupling	0.5000	1.5000	1.5625
2	Clutch	0.6250	1.1250	1.1875
	Coupling	0.6250	1.8125	1.9375
3	Clutch	0.7500	1.7500	1.8125
	Coupling	0.7500	1.7500	1.8125
4	Clutch	1.1250	2.2500	2.3125
	Coupling	1.1250	3.6875	3.8125
5	Clutch	1.5000	2.7500	3.0000
	Coupling	1.5000	4.2500	4.5000
6	Clutch	2.0000	3.7500	3.9375
	Coupling	2.0000	5.5000	5.7500

Refer to Page 96 for a complete list of bore codes.

(1) Square Key

(2) Flat Key

Refer to Page 19 for ordering information.

Trig-O-Matic Overload Clutches ORC Series

Model S Options

Semi-Automatic Model SB and SP Proximity Plates

Limit Switch Plate Actuator, Models SB/SC and SP/SS

Available for all types, the Standard Model S Trig-O-Matic Limit Switch Plate Actuator provides instant operation of a limit switch to shut down the drive or to actuate an alarm should an overload occur. When an overload occurs, the drive pawl motion releases the actuating plate and it trips a limit switch. The total motion of the plate is .31 of an inch (See Figure 5).

After the overload has been cleared and the clutch is re-engaged, the actuating plate is manually returned to its normal operating position by applying equally spaced pressure to the surface of the plate.

A limit switch should be able to operate within the plate travel of .31 of an inch. Wire the switch in parallel with a jog circuit so that the drive can then be indexed to the start/run circuit.

Balancing

Static balancing is available for applications that exceed 50% of the catalog maximum RPM. Always consult the factory with complete drive details and layout for these high speed applications. Ball bearings are recommended for speeds exceeding 75% of maximum rating and is available with a "B1" suffix.

Custom Variations

Sprockets, sheaves, pulleys and gears can be supplied and mounted to the clutch. Contact Boston Gear Engineering at 800-816-5608.

Bores and keyways (i.e. metric, non-standard)

Special Finishes

All clutches are supplied with a standard lacquer finish. Special coatings, finishes, or paints are also available upon request. Adding suffix - F2 to the model number will provide Steel-It paint and food grade grease.

Pressure Lube Model

Pressure lube bronze bearings are preferred for use in harsh environments such as wastewater treatment plants or installations requiring wash-down service. Grease fittings are furnished to permit periodic lubrication to the inside diameter of the sleeve bearings.

The Pressure Lube Model Trig-O-Matic is available with either the Limit Switch Pin or the Limit Switch Plate Actuator and is available by adding an L1 suffix to the model number. Available on sizes 3, 4, 5, and 6 only.

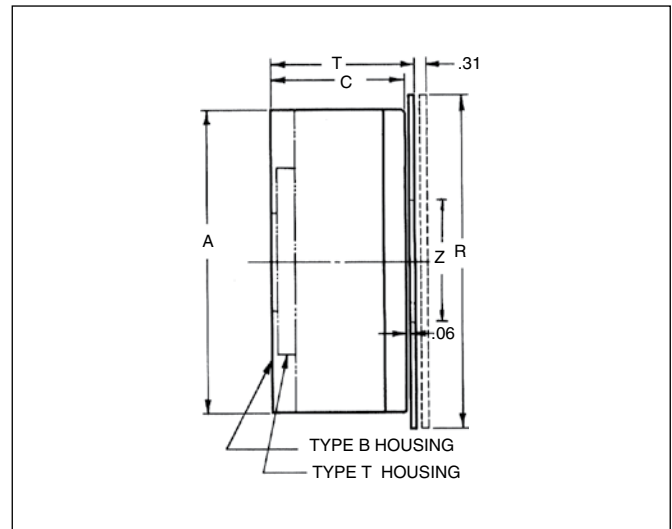


Figure 5

All Dimensions in Inches

Clutch Size	A	C	R*	T	Z
1	4.50	2.31	5.50	2.53	2.00
2	6.00	2.75	7.00	2.97	3.25
3	8.00	3.50	9.50	3.72	4.50
4	10.00	4.47	11.50	4.69	5.75
5	12.00	5.12	13.50	5.34	5.50
6	16.00	6.25	17.50	6.50	7.25

*The R dimension may be reduced to the A dimension if required, specify SC for a semi-automatic clutch with a reduced plate and SS for a manual reset with a reduced diameter plate. Example: ORC2SCTMP16

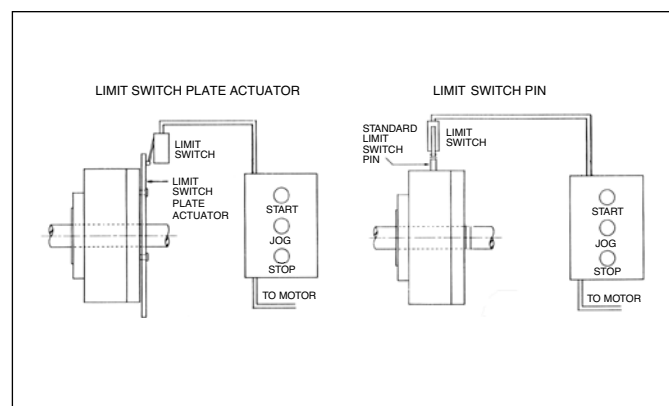


Figure 6

Figure 6 illustrates two methods of utilizing a single limit switch to detect an overload condition.

Trig-O-Matic Overload Clutches ORC Series

Fully Automatic Model F

Operating Principles

The Fully Automatic Model F Trig-O-Matic Overload Release Clutch consists of three basic components: the rotor, the housing assembly and the automatic limit switch actuating plate assembly. The clutch rotor is keyed and secured with a locking collar (Models FJ and FG) or, with a setscrew (Model FR).

The housing assembly includes a drive pawl and a reset pawl which are pivoted within the clutch housing. The drive pawl is held in its engaged position by the combined pressure of the drive and reset springs as shown in Figure 7. The combined pressure of these two springs determines the maximum torque which is transmitted without overload. With the clutch mechanism in the engaged position, the rotor and housing are held together and the entire unit rotates with the drive shaft at the same speed.

When an overload occurs, the rotor rotates from its normal position within the housing. At this instant, the combined pressure of the drive and reset springs is overcome by the extra force applied to them and the drive pawl disengages from the rotor. The pressure applied by both springs holds the drive pawl in contact with the rotor, (See Figure 8). After one revolution, the drive pawl will automatically re-engage.

The automatic limit switch actuating plate assembly is incorporated to provide a means by which an external limit switch can be actuated to stop the drive.

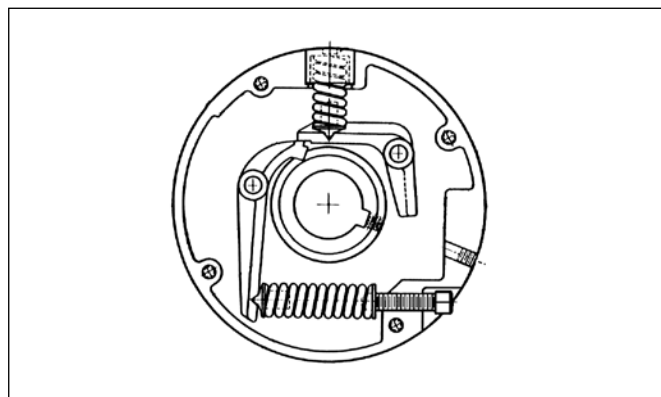


Figure 7 – Engaged

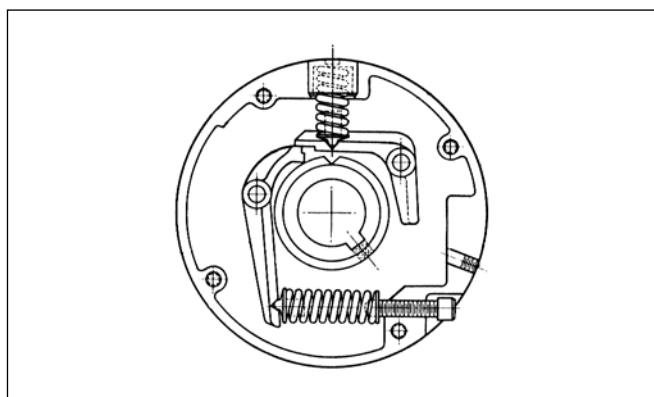


Figure 8 – Disengaged

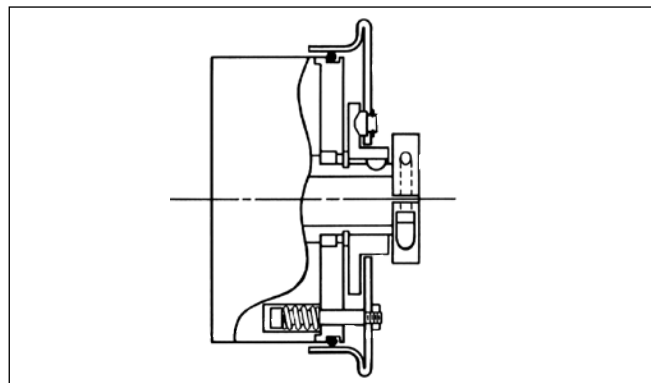


Figure 9 – Switch Actuating Plate Assembly

After the overload condition has been corrected, the drive must be “jogged” until the drive pawl engages with the rotor. The clutch has now reindexed itself to its original position.

The fully automatic Model F includes, as standard, a limit switch actuating plate assembly. Upon overload, the rotor is released from its engaged position within the housing. The resulting rotation causes the cam plate, which is keyed to the rotor, to exert pressure on the lift-out buttons forcing them to move the actuating plate axially away from the clutch housing, (See Figure 9).

When the clutch re-engages, the actuating plate is automatically returned to its original position by the return spring’s pressure on the return pins.

The actuating plate can only retract completely to its original position upon re-engagement of the drive pawl with the rotor.

Locking Collar Mounting

Three clutch models are available for mounting. Models FJ and FG incorporate a locking collar design which provides a positive clamp on the key and shaft. Model FR uses a standard setscrew mounting arrangement, (See Figure 10).

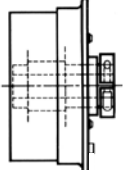
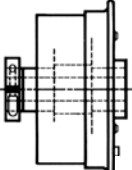
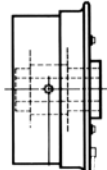
<p>Model FJ</p> 	<p>Model FJ is used where full shaft length is available.</p> <p>Collar Mounted</p>
<p>Model FG</p> 	<p>Model FG is used where shaft length is limited.</p> <p>Collar Mounted</p>
<p>Model FR</p> 	<p>Model FR is used where overall space is limited.</p> <p>Set Screw Mounted</p>

Figure 10 – Model F Styles

Trig-O-Matic Overload Clutches ORC Series

Fully Automatic Model F

Torque Selector Dial

The torque selector dial shown in Figure 11 is a standard feature on all Fully Automatic Model F Trig-O-Matic clutches. Each clutch is individually calibrated to specific torque values. The housing has two milled marks indicating minimum and maximum torque. In addition, these values are stamped on the housing adjacent to each mill mark. To adjust the torque, loosen the “lock screw”, turn the torque adjusting screw (stamped #9) until it is flush with the milled depth and the red scribed lines match the required output position. Additional marks can be indicated upon request.

Maximum Torque Limit Stop

A maximum torque limit stop is supplied to prevent clutch lock-up. In conjunction with a torque selector dial, the maximum value indicated by the deepest milled mark can not be exceeded.

Grease Pack Fittings

Grease pack and relief fittings are supplied countersunk into the clutch housing to pack the clutch cavity, preventing corrosion. This feature is especially suitable for outdoor or washdown service.

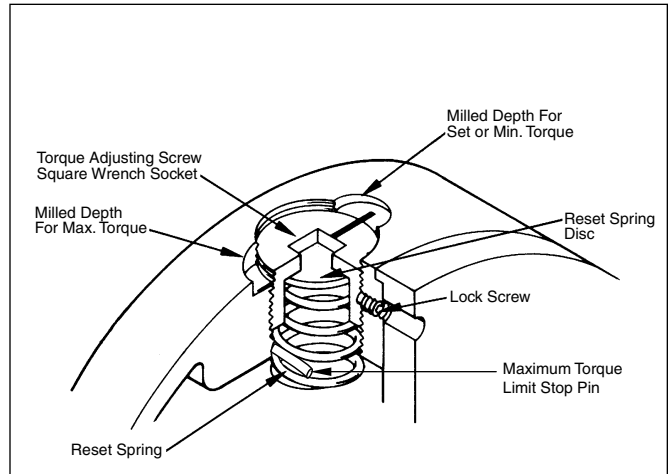


Figure 11

ORC Model F Series Part Numbering System

ORC	2	FG	C	-	L	P16	-	P20	XX
Series Overload Release Clutch	Size 1 2 3 4 5	Model FJ = Model F, Full Available Shaft Length FG = Model F, Limited Available Shaft Length FR = Model F, Overall Limited Space	Type T = Sprocket Mount C = Flexible Coupling N = Indexing Coupling R = Rigid Coupling		Torque Range L = Light M = Medium H = Heavy 9 = Special Contact Boston Gear Engineering	Unit Bore P = Bored to Size (in 1/16") M = Metric Bored to Size (mm)		Coupling Bore (Type C, N or R Only) P = Bored to Size (in 1/16") M = Metric Bored to Size (mm) (Leave Blank for Non-Coupled Units)	Special Options TX = Special Features Contact Boston Gear Engineering B1 = Ball Bearings for High Speed Applications F2 = Steel IT Paint and Food Grade Grease G1 = High Temperature Grease

How to Order — Standard Model F

When ordering an ORC Series Trig-O-Matic Overload Clutch, please include code letters for series, size, model, type, torque range, unit bore and coupling bore (if applicable). Not all combinations are possible.

Example:

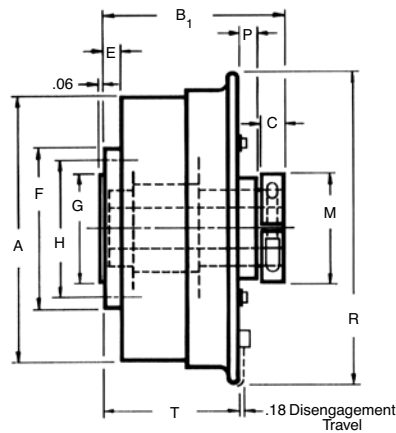
Required Size 2 Trig-O-Matic Overload Clutch, Model F automatic reset, limited available shaft length, flexible coupling, light torque range, with a one inch unit bore and a one inch coupling bore:

ORC 2 FG C — L P16 — P20 (Only include second bore “P20” if clutch is a coupling style)

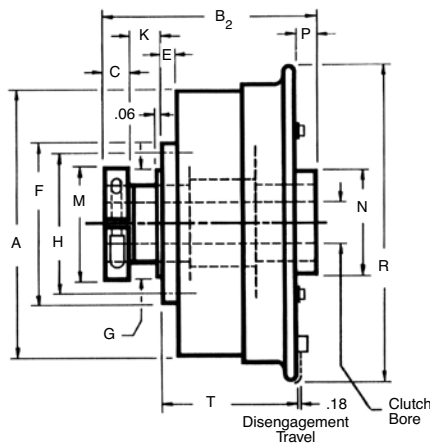
Trig-O-Matic Overload Clutches ORC Series

Model FJ, FG, and FR

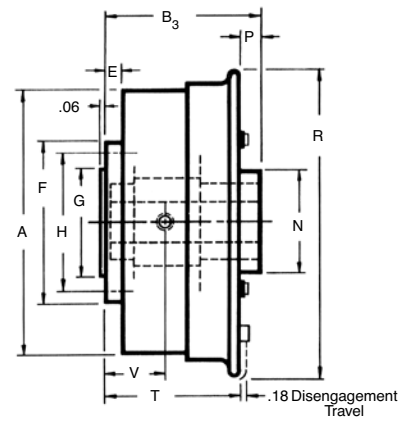
Type T Sprocket, Sheave, Pulley Mounting



Model FJ



Model FG



Model FR

All Dimensions in Inches

Clutch Size	A	B ₁	B ₂	B ₃	C	E	F	G +.000/-002	H Bolt Circle	K	M	N	P	R	T	V	Weight (Lbs.)
1	4.50	3.72	4.49	3.20	.50	.37	2.87	1.875	2.375	0.78	1.87	1.56	.38	5.50	2.83	1.22	7
2	6.00	4.22	4.96	3.66	.56	.43	3.68	2.250	3.000	0.74	2.37	2.25	.38	7.50	3.28	1.47	14
3	8.00	5.46	6.38	4.66	.75	.50	4.87	3.250	4.125	0.97	3.25	3.00	.59	9.50	4.08	1.88	30
4	10.00	6.79	7.50	5.94	.87	.68	6.12	3.203	5.000	0.72	4.25	4.00	.82	11.50	5.12	2.60	66
5	12.00	7.76	9.32	6.70	.87	.81	7.50	4.125	6.250	1.75	5.00	5.25	.86	14.00	5.85	2.93	123

Sprockets, sheaves, pulleys, and gears can be mounted upon request. Refer to Page 29 for maximum sprocket sizes and mounting hole patterns.

Ratings

Clutch Size	Torque Range (Lb. In.)			Max. RPM	WR ² (Lb.-In. ²)
	L	M	H		
1	Min.	70	110	1400	18
	Max.	140	275		
2	Min.	100	200	1000	65
	Max.	200	600		
3	Min.	200	800	1000	238
	Max.	850	2,200		
4	Min.	600	1,200	700	815
	Max.	1,400	3,000		
5	Min.	1,600	2,500	500	2,170
	Max.	3,000	10,000		

Clutches are shipped set for the minimum torque value of the selected range.

Clutch Bores

Clutch Size	Bores (inch)		
	Min.	Max. (1)	Max. (2)
1	0.5000	0.7500	—
2	0.6250	1.0000	1.1250
3	0.7500	1.6250	1.7500
4	1.1250	2.0000	2.2500
5	1.5000	2.6250	2.7500

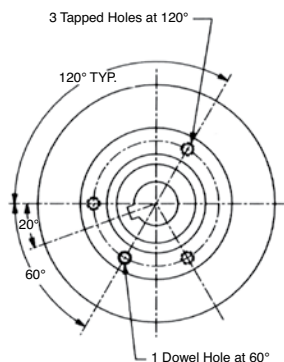
Refer to Page 96 for a complete list of bore codes.

- (1) Square Key
- (2) Flat Key

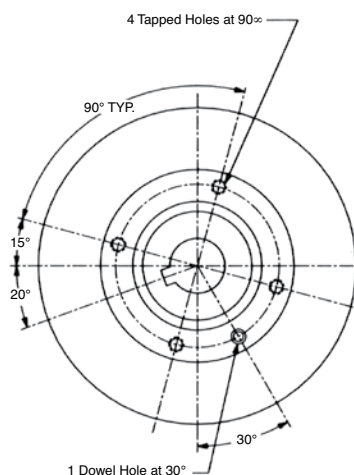
Refer to Page 27 for ordering information.

Trig-O-Matic Overload Clutches ORC Series

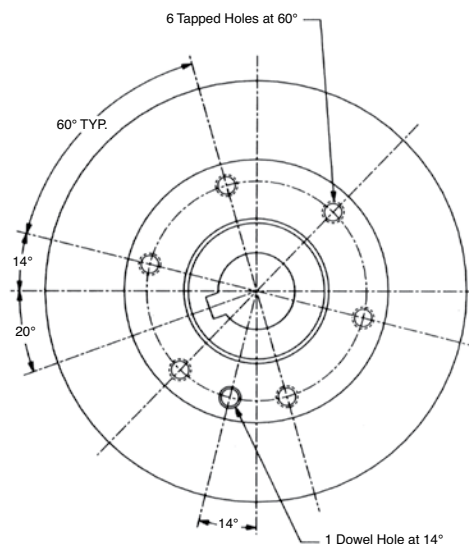
Model S and F Type T Mounting Hole Patterns



Clutch Sizes 1 and 2



Clutch Sizes 3 and 4



Clutch Sizes 5 and 6

Clutch Size	Mounting Holes					
	Qty.	Thread Size	Tap Depth	Bolt Circle	Pilot Dia. +.000 - .002	Dowel Size
1	3	1/4-20	.50	2.375	1.875	.25
2	3	5/16-18	.50	3.000	2.250	.31
3	4	3/8-16	.62	4.125	3.250	.37
4	4	1/2-13	.87	5.000	3.203	.50
5	6	5/8-11	1.00	6.250	4.125	.62
6	6	5/8-11	1.00	8.750	6.000	.62

Minimum Number of Teeth Adaptable to Type T Clutches

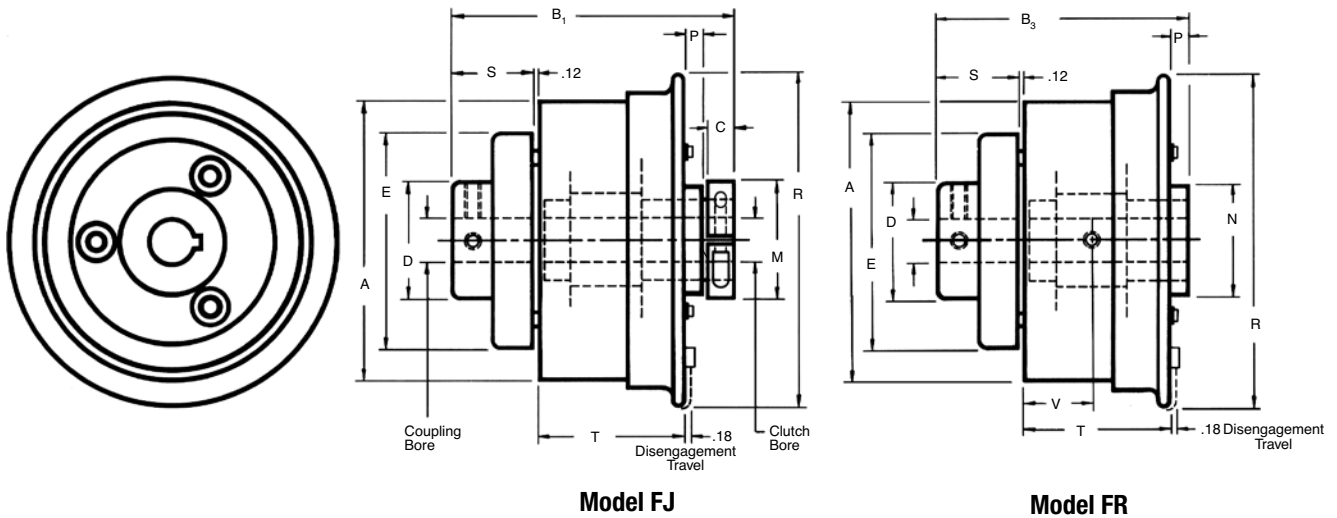
Clutch Size	Standard Chain Size and Pitch										
	#25 1/4 Pitch	#35 3/8 Pitch	#40 1/2 Pitch	#41 1/2 Pitch	#50 5/8 Pitch	#60 3/4 Pitch	#80 1 Pitch	#100 1-1/4 Pitch	#120 1-1/2 Pitch	#140 1-3/4 Pitch	#160 2 Pitch
1	40	28	22	22	18	Not Recommended					
2	54	36	28	28	22	19	Not Recommended				
3	45		34	36	28	25	19	Not Recommended			
4	42			45	36	30	23	19	Not Recommended		
5	Consult Factory				42	36	30	22	19	17	Not Recommended
6	Consult Factory					48	36	30	24	21	19

For smaller sprockets, consult Boston Gear Engineering at 800-816-5608.

Trig-O-Matic Overload Clutches ORC Series

Model FJ and FR

Type C Flexible Coupling



All Dimensions in Inches

Clutch Size	A	B ₁	B ₃	C	D	E	M	N	P	R	S	T	V	Angular Misalignment*	Max. Parallel Offset*	Weight (Lbs.)
1	4.50	5.41	4.89	.50	2.00	4.25	1.87	1.56	.38	5.50	1.50	2.89	1.28	< 1°	.012	10
2	6.00	6.15	5.59	.56	2.56	5.25	2.37	2.25	.38	7.50	1.75	3.34	1.53	< 1°	.015	20
3	8.00	7.89	7.09	.75	3.50	5.87	3.25	3.00	.59	9.50	2.25	4.14	1.93	< 1°	.016	42
4	10.00	10.09	9.23	.87	4.87	9.12	4.25	4.00	.82	11.50	3.12	5.18	2.66	< 1°	.027	103
5	12.00	11.57	10.51	.87	5.68	10.50	5.00	5.25	.86	14.00	3.62	5.91	3.00	< 1°	.031	180

*Parallel offset and angular misalignment proportionately reduced if both are present.

Ratings

Clutch Size	Torque Range (Lb. In.)			Max. RPM	WR ² (Lb.-In. ²)	
	L	M	H			
1	Min.	70	110	260	1400	26
	Max.	140	275	400		
2	Min.	100	200	400	1000	89
	Max.	200	600	1,000		
3	Min.	200	800	1,200	1000	327
	Max.	850	2,200	3,000		
4	Min.	600	1,200	2,850	700	1,270
	Max.	1,400	3,000	5,000		
5	Min.	1,600	2,500	4,000	500	3,160
	Max.	3,000	6,000	10,000		

Clutches are shipped set for the minimum torque value of the selected range.

Clutch and Coupling Bores

Clutch Size	Type	Bores (inch)		
		Min.	Max. (1)	Max. (2)
1	Clutch	0.5000	0.7500	—
	Coupling	0.5000	1.5000	1.5625
2	Clutch	0.6250	1.0000	1.1250
	Coupling	0.6250	1.8125	1.9375
3	Clutch	0.7500	1.6250	1.7500
	Coupling	0.7500	2.5000	2.6250
4	Clutch	1.1250	2.0000	2.2500
	Coupling	1.1250	3.6875	3.8125
5	Clutch	1.5000	2.6250	2.7500
	Coupling	1.5000	4.2500	4.5000

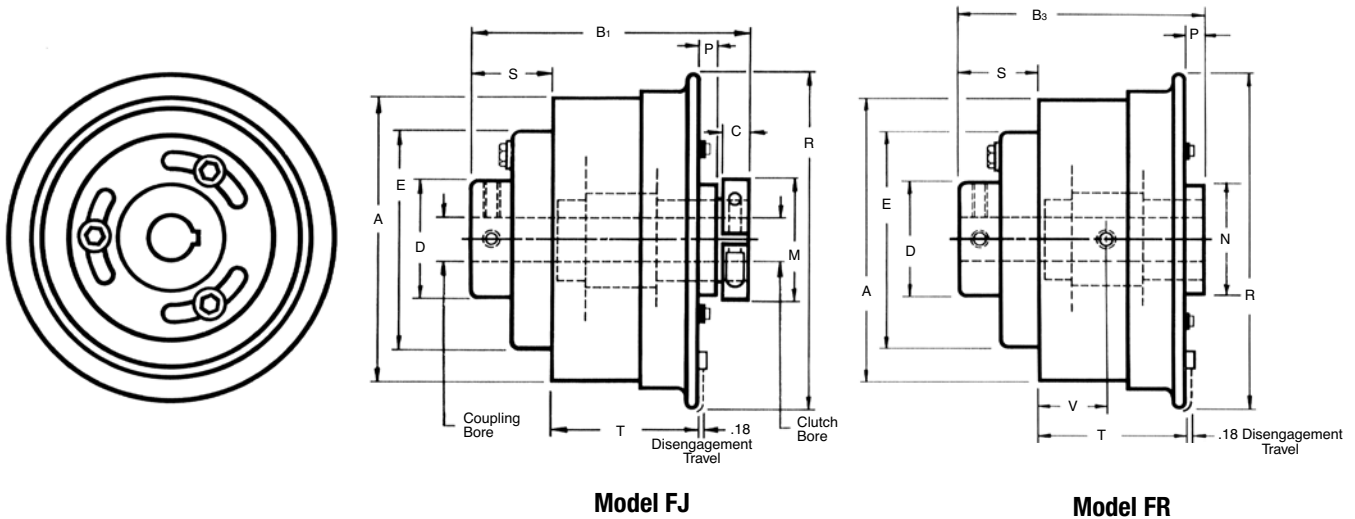
Refer to Page 96 for a complete list of bore codes.

- (1) Square Key
- (2) Flat Key

Refer to Page 27 for ordering information.

Trig-O-Matic Overload Clutches ORC Series

Model FJ and FR Type N Indexing Coupling



All Dimensions in Inches

Clutch Size	A	B ₁	B ₃	C	D	E	M	N	P	R	S	T	V	Weight (Lbs.)
1	4.50	5.28	4.76	.50	2.00	4.25	1.87	1.56	.38	5.50	1.50	2.89	1.28	10
2	6.00	5.96	5.41	.56	2.56	5.25	2.37	2.25	.38	7.50	1.69	3.34	1.53	20
3	8.00	7.77	6.97	.75	3.00	7.00	3.25	3.00	.59	9.50	2.25	4.14	1.93	42
4	10.00	9.97	9.12	.87	4.87	9.12	4.25	4.00	.82	11.50	3.12	5.18	2.66	103
5	12.00	11.44	10.38	.87	5.68	10.50	5.00	5.25	.86	14.00	3.62	5.91	3.00	180

Ratings

Clutch Size	Torque Range (Lb. In.)			Max. RPM	WR ² (Lb.-In. ²)
	L	M	H		
1	Min.	70	110	1400	26
	Max.	140	275		
2	Min.	100	200	1000	89
	Max.	200	600		
3	Min.	200	800	1000	327
	Max.	850	2,200		
4	Min.	600	1,200	700	1,270
	Max.	1,400	3,000		
5	Min.	1,600	2,500	500	3,160
	Max.	3,000	6,000		

Clutches are shipped set for the minimum torque value of the selected range.

Clutch and Coupling Bores

Clutch Size	Type	Bores (inch)		
		Min.	Max. (1)	Max. (2)
1	Clutch	0.5000	0.7500	-
	Coupling	0.5000	1.5000	1.5625
2	Clutch	0.6250	1.0000	1.1250
	Coupling	0.6250	1.8125	1.9375
3	Clutch	0.7500	1.6250	1.7500
	Coupling	0.7500	1.7500	1.8125
4	Clutch	1.1250	2.0000	2.2500
	Coupling	1.1250	3.6875	3.8125
5	Clutch	1.5000	2.6250	2.7500
	Coupling	1.5000	4.2500	4.5000

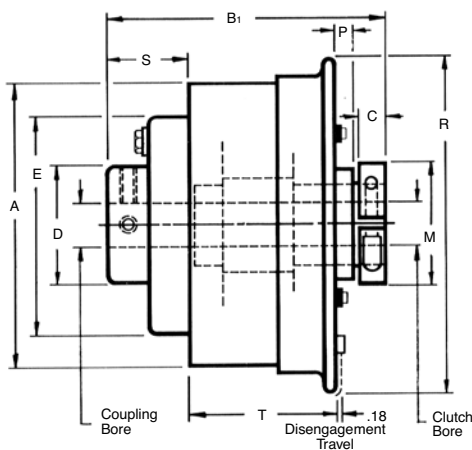
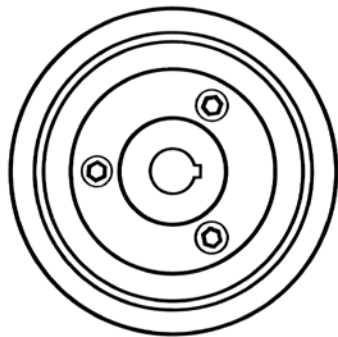
Refer to Page 96 for a complete list of bore codes.
(1) Square Key
(2) Flat Key

Refer to Page 27 for ordering information.

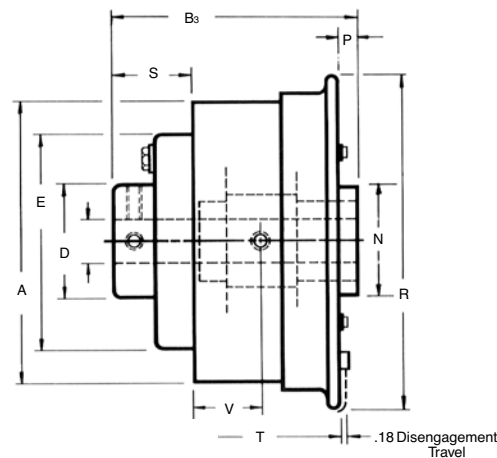
Trig-O-Matic Overload Clutches ORC Series

Model FJ and FR

Type R Rigid Coupling



Model FJ



Model FR

All Dimensions in Inches

Clutch Size	A	B ₁	B ₃	C	D	E	M	N	P	R	S	T	V	Weight (Lbs.)
1	4.50	5.28	4.76	.50	2.00	4.25	1.87	1.56	.38	5.50	1.50	2.89	1.28	10
2	6.00	5.96	5.41	.56	2.56	5.25	2.37	2.25	.38	7.50	1.69	3.34	1.53	20
3	8.00	7.77	6.97	.75	3.00	7.00	3.25	3.00	.59	9.50	2.25	4.14	1.93	42
4	10.00	9.97	9.12	.87	4.87	9.12	4.25	4.00	.82	11.50	3.12	5.18	2.66	103
5	12.00	11.44	10.38	.87	5.68	10.50	5.00	5.25	.86	14.00	3.62	5.91	3.00	180

Ratings

Clutch Size	Torque Range (Lb. In.)			Max. RPM	WR ² (Lb.-In. ²)	
	L	M	H			
1	Min.	70	110	260	1400	26
	Max.	140	275	400		
2	Min.	100	200	400	1000	89
	Max.	200	600	1,000		
3	Min.	200	800	1,200	1000	327
	Max.	850	2,200	3,000		
4	Min.	600	1,200	2,850	700	1,270
	Max.	1,400	3,000	5,000		
5	Min.	1,600	2,500	4,000	500	3,160
	Max.	3,000	6,000	10,000		

Clutches are shipped set for the minimum torque value of the selected range.

Clutch and Coupling Bores

Clutch Size	Type	Bores (inch)		
		Min.	Max. (1)	Max. (2)
1	Clutch	0.5000	0.7500	-
	Coupling	0.5000	1.5000	1.5625
2	Clutch	0.6250	1.0000	1.1250
	Coupling	0.6250	1.8125	1.9375
3	Clutch	0.7500	1.6250	1.7500
	Coupling	0.7500	1.7500	1.8125
4	Clutch	1.1250	2.0000	2.2500
	Coupling	1.1250	3.6875	3.8125
5	Clutch	1.5000	2.6250	2.7500
	Coupling	1.5000	4.2500	4.5000

Refer to Page 96 for a complete list of bore codes.

- (1) Square Key
- (2) Flat Key

Refer to Page 27 for ordering information.

Trig-O-Matic Overload Clutches ORC Series

Fully Automatic Model F Options

One-Direction Option

For applications with oscillating torque loads, a one-directional clutch is available to prevent needless disengagement of the clutch due to back-loading conditions.

The unique rotor/drive pawl configuration permits the clutch to disengage in the normal running direction in the event of an overload. It back stops any load in the opposite direction and is virtually a solid connection when driven in the opposite direction (see Figure 12).

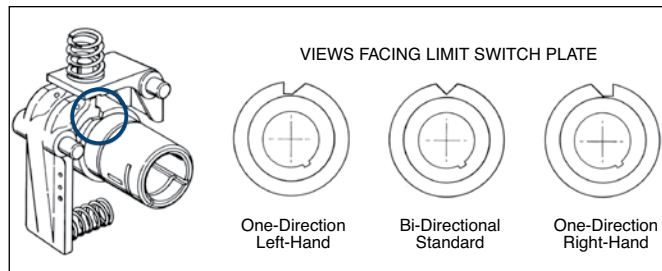


Figure 12

To select either the RIGHT-HAND or LEFT-HAND configuration:

- Determine the normal direction of rotation facing either
 - the limit switch plate, or
 - the housing
- Determine whether the input is driving through either
 - the rotor, or
 - the housing
- With this information, select the correct configuration from the chart below.

Clockwise Running Rotation Facing Limit Switch Plate	
Rotor Driving (input) Right-Hand Clutch	Housing Driving (input) Left-Hand Clutch
Clockwise Running Rotation Facing Housing	
Rotor Driving (input) Left-Hand Clutch	Housing Driving (input) Right-Hand Clutch
Counter Clockwise Running Rotation Facing Limit Switch Plate	
Rotor Driving (input) Left-Hand Clutch	Housing Driving (input) Right-Hand Clutch
Counter Clockwise Running Rotation Facing Housing	
Rotor Driving (input) Right-Hand Clutch	Housing Driving (input) Left-Hand Clutch

Custom Variations

Sprockets, sheaves, pulleys and gears can be supplied and mounted to the clutch.

See page 21 or contact Boston Gear Engineering at 800-816-5608 for additional information.

Bores and keyways (i.e. metric, non-standard).

Special Finishes

All clutches are supplied with a standard lacquer finish. Special coatings, finishes, or paints are also available upon request. Adding suffix - F2 to the model number will provide steel IT paint and food grade grease.

Typical Limit Switch Layout

The layout in Figure 13 uses a single limit switch to detect an overload condition. The switch should be able to operate within the travel of the limit switch plate. Upon overload the limit switch plate will move to actuate the limit switch and shut down the drive.

The switch should be wired in parallel with a jog circuit so that the drive can be indexed for re-engagement. After the clutch has been re-engaged, the limit switch will be reset and the drive can be restarted.

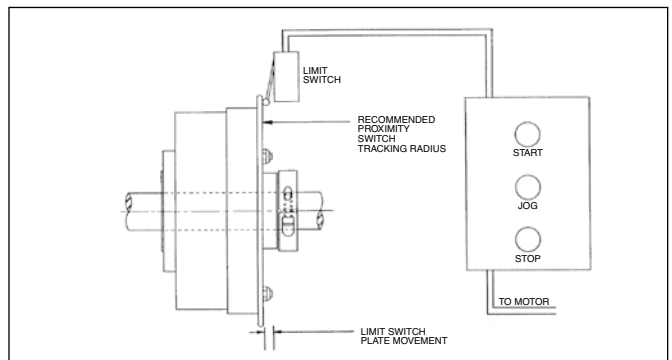


Figure 13

The limit switch actuating plate supplied with the Model F Trig-O-Matic Overload Clutch is furnished with a mild steel plate suitable for use with a proximity sensor.

Limit Switch

Clutch Size	Movement (Inch)	Tracking Radius (Inch)
1	.18	2.38
2	.18	3.25
3	.18	4.18
4	.18	5.25
5	.18	6.25

