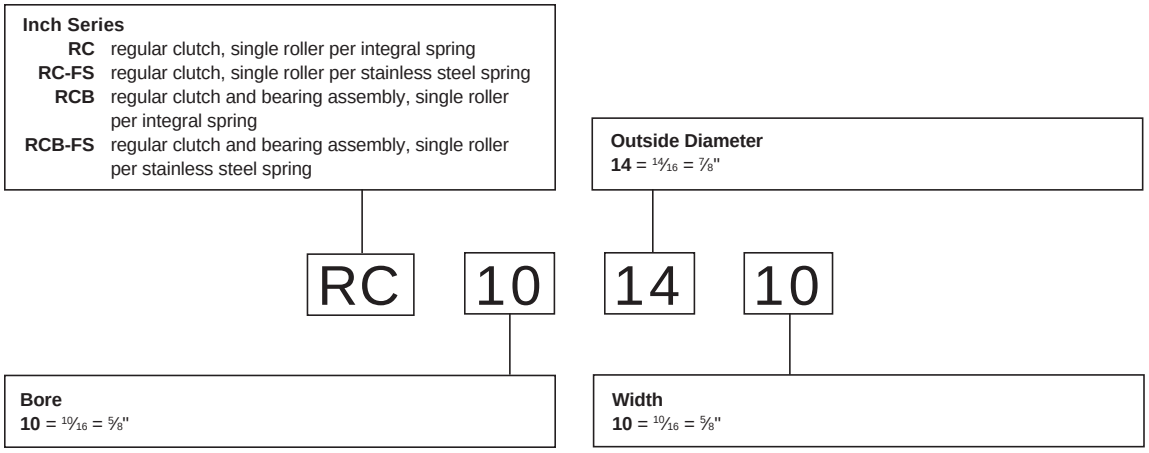
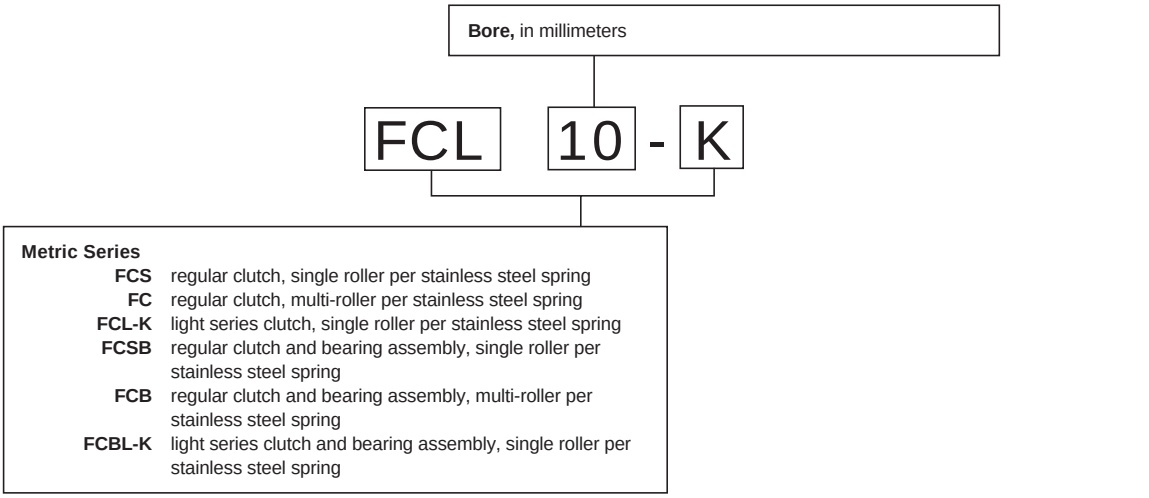
Drawn Cup Roller Clutches





Drawn Cup Roller Clutches

INTRODUCTION

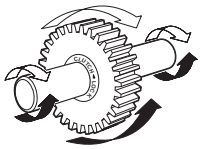
Function

The Torrington drawn cup roller clutch transmits torque between the shaft and housing in one direction and allows free overrun in the opposite direction. When transmitting torque, either the shaft or the housing can be the input member. Applications are generally described as indexing, backstopping or overrunning.

Lock Function

Shaft Drives Gear

Clockwise (White arrows)

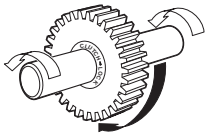


or Gear Can Drive Shaft Counter-Clockwise (Black arrows)

Overrun Function

Shaft Overruns In Gear

Counter-Clockwise (White arrows)



or Gear Overruns on Shaft Clockwise (Black arrow)

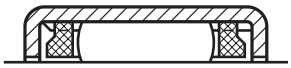
DESIGN

The patented design utilizes the same low profile radial section as drawn cup needle roller bearings. The units are compact, light in weight and operate directly on a hardened shaft. Proper mounting is easily accomplished with a simple press fit in the housing.

Precisely formed interior ramps provide surfaces against which the rollers wedge to positively lock the clutch with the shaft when rotated in the proper direction. Transition from the overrun to locked operation normally occurs with minimal lost motion(backlash).

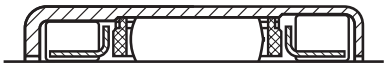
Two basic configurations are produced:

clutch only - Use with external radial support (usually two drawn cup needle roller bearings). Separate bearings position the shaft and housing concentrically and carry the radial load during overrun.



Clutch Only

clutch and bearing assemblies - Use without additional radial support. An integral assembly within a single drawn cup, in which two roller bearings straddle the clutch.

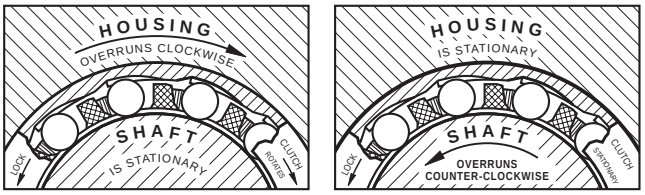


Clutch and Bearing Assembly

OPERATION

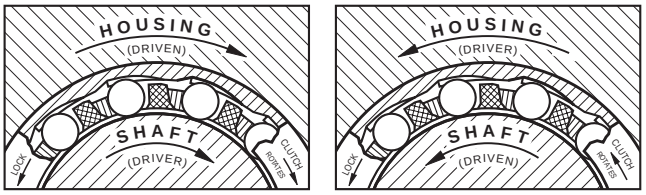
Operation is in two modes; the **overrun** mode and the **lock** mode. Operational mode is controlled by the direction of the clutch or shaft rotation with respect to the locking ramps.

In the **overrun** mode shown in the drawings below, the relative rotation between the housed clutch and the shaft causes the rollers to move away from their locking position against the locking ramps in the drawn cup. The housing and the clutch are thus free to overrun in one direction, or the shaft is free to overrun in the other direction.



Clearance between the rollers and cup ramps is exaggerated in these drawings.

In the **lock** mode shown in the drawings below, the relative rotation between the housed clutch and the shaft is opposite to that in the overrun mode. The rollers, assisted by the leaf type springs, become wedged between the locking ramps and the shaft to transmit torque between the two members. Either the member housing the clutch drives the shaft in one direction, or the shaft can drive the clutch and its housing member in the other direction.



IDENTIFICATION

The prefix letters in the designation of the Torrington drawn cup roller clutches and drawn cup roller clutch and bearing assemblies denote whether these are manufactured to inch or metric nominal dimensions. Designation codes for clutches and clutch and bearing assemblies with inch nominal dimensions begin with the letter “R”. Those for clutches and clutch and bearing assemblies with metric nominal dimensions begin with the letter “F”.

The basic types of clutches and clutch and bearing assemblies are listed below:

Inch Series

RC – regular clutch, single roller per integral spring
RC-FS – regular clutch, single roller per stainless steel spring
RCB – regular clutch and bearing assembly, single roller per integral spring
RCB-FS – regular clutch and bearing assembly, single roller per stainless steel spring

Metric Series

FCS – regular clutch, single roller per stainless steel spring
FC – regular clutch, multi-roller per stainless steel spring
FCL-K – light series clutch, single roller per stainless steel spring
FCSB – regular clutch and bearing assembly, single roller per stainless steel spring
FCB – regular clutch and bearing assembly, multi-roller per stainless steel spring
FCBL-K – light series clutch and bearing assembly, single roller per stainless steel spring

CONSTRUCTION

In many respects, construction is similar to that of drawn cup bearings. Design and manufacture of drawn cup clutches, just as with drawn cup bearings, was pioneered and developed by Torrington.

The interior ramps which control the lockup and free run of the clutch are formed during the operation of drawing the cup. The ramps are case hardened to assure long wear life. The incorporation of ramp forming into the cup drawing operation is a manufacturing innovation that contributes much to the units low cost.

Two types of precision molded clutch cages are employed. Types RC and RCB utilize a one-piece cage of acetal resin plastic with integral leaf style springs. Types FC, FCS, FCL-K, RC-FS, FCB, FCBL-K and RCB-FS use a glass fiber reinforced nylon cage equipped with inserted stainless steel leaf springs. The stainless steel springs permit higher rates of engagement, and achieve a greater spring life. The nylon cage permits operation at higher temperatures than the acetal resin cage.

Types RCB, FCB, FCBL-K and RCB-FS clutch and bearing assemblies have cages for retention and guidance of the rollers in the bearings located on both sides of the clutch unit.

Drawn Cup Roller Clutch Type FC with Steel Springs

Drawn Cup Clutch and Bearing Assembly Type FCB with Steel Springs

Drawn Cup Roller Clutch Types FCS, FCL-K and RC-FS with Steel Springs

Drawn Cup Clutch and Bearing Assembly Types FCBL-K and RCB-FS with Steel Springs

Drawn Cup Roller Clutch Type RC with Integral Springs

Drawn Cup Clutch and Bearing Assembly Type RCB with Integral Springs

SPECIAL CLUTCHES

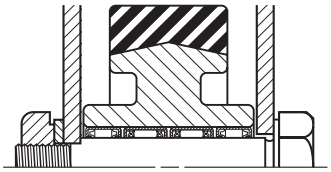
Torrington manufactures many special clutches not listed in this catalog. Where volume justifies tooling costs, special clutches may result in a lower unit cost or, in the event of additional costs, may provide an economical solution to an unusual design problem. If you think a special clutch is indicated, please contact your local Torrington representative for a review of your application.

APPLICATION

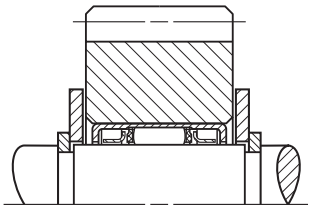
Torrington clutches and clutch and bearing assemblies are successfully applied in a wide range of commercial products where indexing, backstopping and overrunning operations must be performed reliably. The sketches on these pages illustrate some of the many possible uses.

When applying the clutch-only unit, separate bearings on each side of the clutch are required to position the shaft concentrically with the housing and to carry the radial loads during overrun. Drawn cup needle roller bearings with the same radial section as the clutch should be used in the through bored housings for simplicity and economy. Two clutches can be used side by side for greater torque capacity.

Where the radial loads are light, the clutch and bearing assembly can be used without additional support bearings. This reduces the overall assembly width, the number of stocked and ordered parts, and assembly costs as well.



Clutch and Bearing Arrangement Heavy Loads



Clutch and Bearing Assembly Light Loads

Torrington Drawn Cup Roller Clutches are manufactured to commercial hardware standards and are used extensively in appliances, business machines, industrial and recreation equipment and a wide range of other applications.

In any application where our clutch may be considered, it will be part of a system in which the operating conditions and the clutch mounting will affect its function. Therefore, before any clutch selection is made, it is important that the following catalog section be carefully studied to understand the effects of these factors.

Consideration should be given to operating conditions such as:

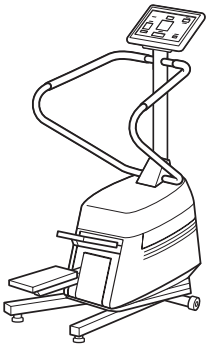
- Magnitude of externally applied torque as well as inertial torque
- Magnitude of applied radial loads during overrunning
- Potential for vibration or axial shaft movement within the clutch during engagement
- Engagement rate, as it pertains to the selection of stainless steel or plastic leaf springs
- Oil lubrication supply during high overrunning speeds
- External and internal environmental temperatures that can affect clutch performance
- Lubricant selection effect on clutch engagement
- Indexing inaccuracies resulting from backlash (lost motion)

Consideration should be given to the Shaft and Housing design requirements such as:

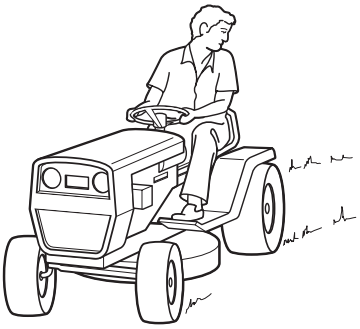
- Shaft hardness and strength particularly when approaching torque rating limits
- Shaft roundness, taper and surface finish necessary to ensure sufficient fatigue life and torque carrying ability
- Housing strength (hardness and cross section) to support the applied torque loads
- Housing roundness, taper and surface finish necessary to ensure uniform torque and load distribution

A test program under all expected operating conditions should be carried out before putting a new application into production. Torrington application engineers are constantly working with and testing new applications, therefore, their experience can be of great help to the designer considering the use of a drawn cup roller clutch.

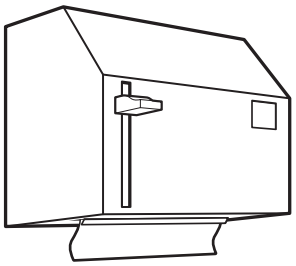
Stair Steppers Nordic Trak and other Athletic Equipment



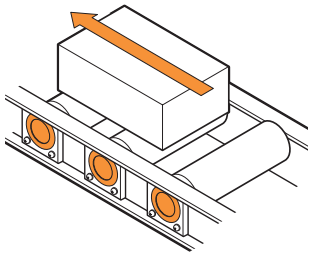
Lawnmower Differential



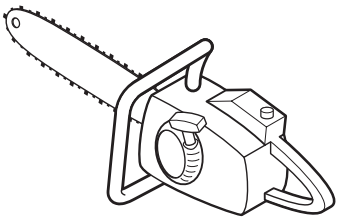
Tape Dispensers and Similar Web Roll Feed Mechanisms



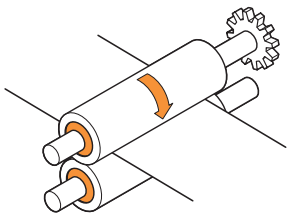
Conveyor Rollers

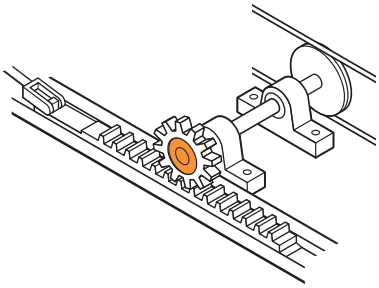


Chainsaw Starters

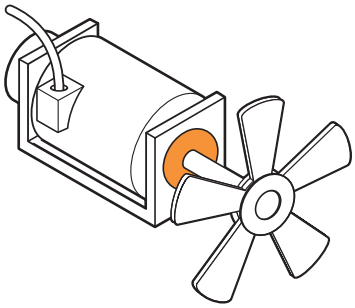


Paper Feed Rolls in Business Machines

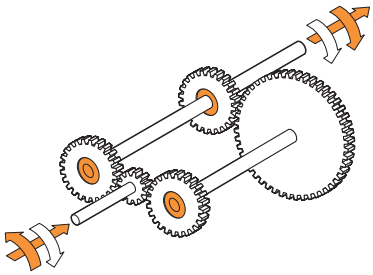




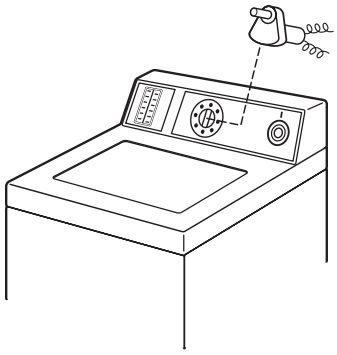
Rack Indexing Drive



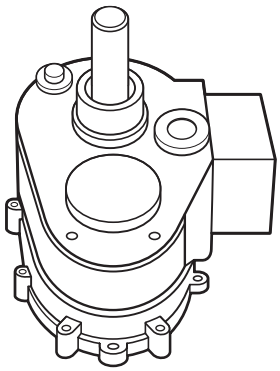
Motor Backstops



2-Speed Gearbox with Reversing Input



Timing Motor Freewheels



Washing Machine Transmission

HOUSING DESIGN

Drawn cup clutches and clutch and bearing assemblies are mounted with a simple press fit in their housings. Through bored and chamfered housings are preferred. Provisions for axial location, such as shoulders or snap rings, are not required. The case hardened cups have a long fatigue life, but must be properly supported to realize this benefit. Steel housings are preferred and must be used for applications involving high torque loads to prevent radial expansion of the clutch cups. The recommended minimum housing outside diameters in the tables of dimensions are for steel.

The housing bore should be round within one-half of the diameter tolerance.

The taper within the length of the outer ring should not exceed 0.0005 inch or 0.013 mm.

The surface finish of the housing bore should not exceed 125 microinches, a.a. (arithmetic average) or 3.2μm (on the R_a scale).

Low strength housings (non-steel, sintered metals and some plastics) may be entirely satisfactory in lightly loaded applications. When using non-steel housings, thoroughly test designs.

Adhesive compounds can be used to prevent creeping rotation of the clutch in plastic housings with low friction properties. Adhesives will not provide proper support in oversized metallic housings. When using adhesives, care must be taken to keep the adhesive out of the clutches and bearings.

SHAFT DESIGN

The clutch or clutch and bearing assembly operates directly on the shaft whose specifications of dimensions, hardness and surface finish are well within standard manufacturing limits.

Either case hardening or through hardening grades of good bearing quality steel are satisfactory for raceways. Steels which are modified for free machining, such as those high in sulfur content and particularly those containing lead, are seldom satisfactory for raceways.

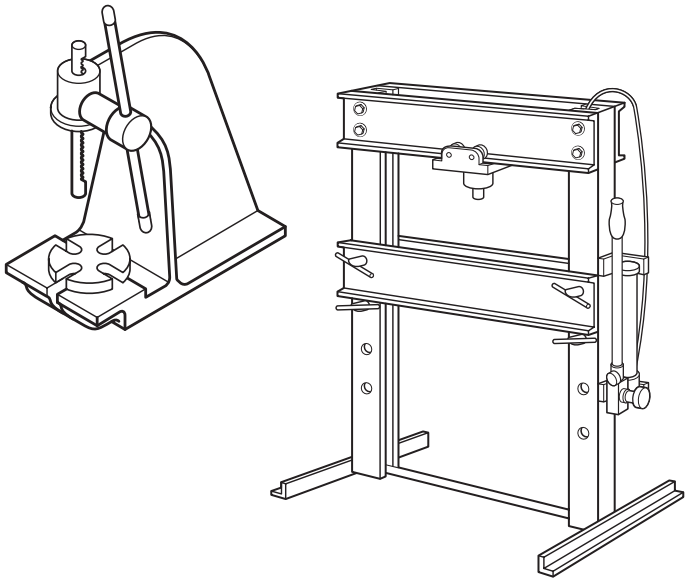
For long fatigue life, the shaft raceway, must have a hardness equivalent to 58 HRC (ref, ASTM E-18), and ground to the recommended diameter shown in the tables of dimensions. It may be through hardened, or it may be case hardened, with an effective case depth of 0.030 inch (0.8 mm) (Effective case depth is defined as the distance from the surface inward to the equivalent of 50 HRC hardness level after grinding.)

Taper within the length of the raceway should not exceed 0.0003 inch (0.008 mm), or one-half the diameter tolerance, whichever is smaller. The radial deviation from true circular form of the raceway should not exceed .0001 inch (0.0025 mm) for diameters up to and including 1 inch (25.4 mm). For raceways greater than 1.0 inch or 25mm the allowable radial deviation may be greater than .0001 inch (0.0025 mm) by a factor of raceway diameter (in inches) divided by 1.0 or a factor of raceway diameter (in mm) divided by 25.4. Surface finish on the raceway should not exceed 16 microinches a.a. (arithmetic average) or 0.4 µm (on the Ra scale). Deviations will reduce the load capacity and fatigue life of the shaft.

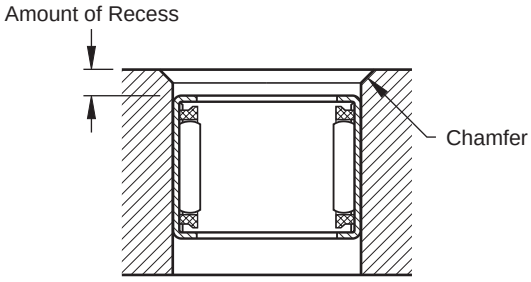
INSTALLATION

Simplicity of installation promotes additional cost savings. The drawn cup roller clutch, or the clutch and bearing assembly, must be pressed into its housing. Procedures are virtually identical with those for installing drawn cup bearings as detailed on page 361. The unit is pressed into the bore of a gear hub or pulley hub, or housing of the proper size, and no shoulders, splines, keys, screws or snap rings are required.

Installation procedures are summarized in the following sketches:

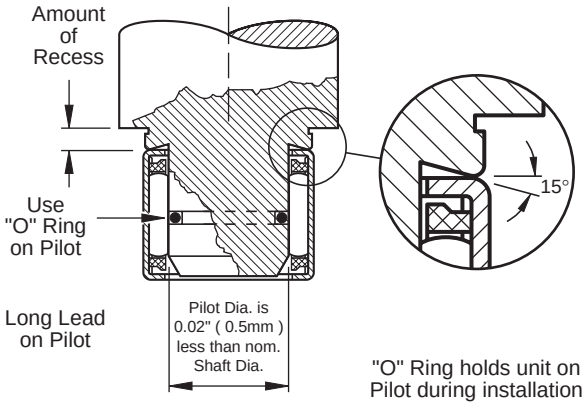


Use an arbor press or hydraulic ram press which will exert steady pressure. Never use a hammer or other tool requiring pounding to drive the clutch into its housing.

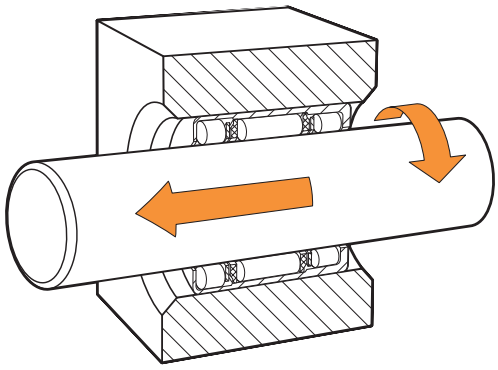


Make sure that the housing bore is chamfered to permit easy introduction of the clutch and bearing or the clutch unit. Press unit slightly beyond the chamfer in the housing bore to assure full seating. Through bored housings are always preferred. If the housing has a shoulder, never seat the clutch against the shoulder. For further details see page 361.

IMPORTANT: The mounted clutch or clutch and bearing assembly engages when the housing is rotated relative to the shaft in the direction of the arrow and LOCK marking (← LOCK) stamped on the cup. Make sure that the unit is oriented properly before pressing it into its housing.



Use an installation tool as shown in the diagram above. If clutch is straddled by needle roller bearings, press units into position in proper sequence and preferably leave a small clearance between units.



When assembling the shaft, it should be rotated during insertion. The end of the shaft should have a large chamfer or rounding.

APPLIED LOADS

The clutch-only unit is designed to transmit purely torque loads. Applied torque should not exceed the catalog ratings which are based on the compressive strength of well-aligned clutch components. Bearings on either side of the clutch are required to assure concentricity between the shaft and the housing and to support radial loads during clutch overrun. Integral clutch and bearing assemblies are available for this purpose where the radial loads are light.

In determining the total torque load on a clutch, it is essential to consider the torque due to inertial forces developed in the mechanism, in addition to the externally applied torque. The larger the clutch and the greater the mass of the mechanism controlled by it, the more important this consideration becomes.

Clutch lockup depends upon static friction. For this reason applications involving severe vibrations or axial motion of the shaft within the clutch are to be avoided. Applications in which there are overhanging or overturning loads should incorporate bearings which will maintain alignment between the shaft and the clutch housing. Consult your Torrington Engineering Sales Office for recommendations.

LUBRICATION

Oil is the preferred lubricant, as it minimizes wear and heat generation. For those applications where oil is not practical, clutches are packed with a soft grease containing mineral oil. Thick grease will retard roller engagement and can cause individual rollers to slip, possibly overloading any engaged rollers.

TEMPERATURE

Temperature extremes can cause clutch malfunctions and failure. The molded acetal resin plastic cage with integral springs holds its necessary resiliency and strength when the operating temperature within the clutch is kept below 200°F (93°C). The clutch with reinforced nylon cage and separate steel springs operates well at temperatures up to 250°F (121°C) continuously and to 300°F (150°C) intermittently. Excessive thickening of the lubricant at low temperatures may prevent some or all of the rollers from engaging. New applications should be tested under expected operating conditions to determine whether or not temperature problems exist.

BACKLASH

Backlash, or lost motion, prior to engagement is minimal. The variation in backlash from one cycle to another is extremely low. Grease lubrication or improper fitup (housing bore and shaft diameter) may increase backlash. Angular displacement between the shaft and housing increases as an applied torque load is increased.

RATE OF ENGAGEMENT

Clutch lockup depends upon static friction. Axial motion between shaft and clutch rollers prevents lockup.

Clutches with integral springs engage satisfactorily at cyclic rates up to 200 engagements per minute. Intermittent operation at higher rates has been successful. The steel spring type clutches have proven dependability at rates up to 6000 or 7000 engagements per minute. Even higher cyclic rates may be practical. Since grease may impair engagement at high cyclic rates, a light oil should be used.

OVERRUN LIMIT SPEED

Exacting limiting speeds are not easily predictable. The value for each clutch given in the tabular data is not absolute but serves as a guide for the designer. Oil lubrication is absolutely necessary for high speed operations. Consultation with the Engineering Sales Office is recommended when overrunning speeds are high.

INSPECTION

Although the outer cup of the clutch is accurately drawn from strip steel, it can go slightly out of round during heat treatment. When the assembly is pressed into a ring gauge or properly prepared housing of correct size and wall thickness, it becomes round and is properly sized. Direct measurement of the outside diameter of a drawn cup assembly is an incorrect inspection procedure. The proper inspection procedure is as follows:

1. Press the assembly into a ring gauge of the proper size as given in the tabular data.
2. Gauge the bore with the specified plug gauges of the proper size, as given in the tables of dimensions.
    a. The **locking plug** is rotated to insure lockup when the clutch is operated on a low limit shaft and is mounted in a high limit housing strong enough to properly size the clutch.
    b. The **overrun plug** is rotated to insure free overrunning when the clutch is operated on a high limit shaft and is mounted in a low limit housing.
    c. The **go plug** and **no go plug** insure proper size of the bearings in the clutch and bearing assemblies.

Gauge sizes are listed in the tables of dimensions. Plug gauge sizes reflect adjustment for the loose and tight conditions resulting from high or low housings and shafts. Inch to metric and metric to inch conversions are listed for the convenience of the user, but the designer should understand that the controlling dimensions are in inches for nominal inch assemblies and millimeters for nominal metric assemblies.

Type DC Roller Clutches

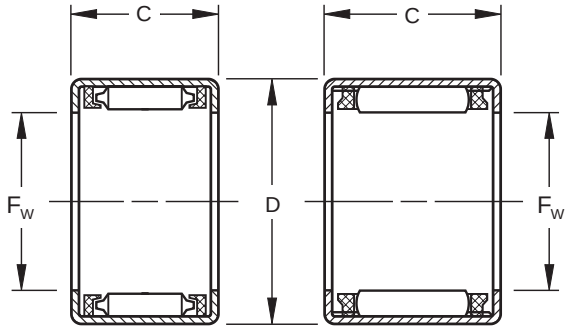
Before ordering any clutch check for availabliity.

Nominal dimensions with rounded conversions are shown below. Shaft raceway and housing bore diameters necessary for proper mounting and operation are listed on the opposite page.

Types FC, FCS, FCL-K and RC-FS clutches have stainless steel springs inserted in the, molded cage to position the rollers for instantaneous lockup.

Type RC clutches have springs integrally molded with the cage to position the rollers for instantaneous lockup.

The mounted clutch engages when the housing is rotated relative to the shaft in the direction of the arrow marking (←LOCK) stamped on the cup.



Type FC | **Types FCS, FCL-K, RC and RC-FS**

DIMENSIONS AND RATINGS

F_W Bore (nominal)		D O.D. (nominal)		C Width +0.000 -0.010		Clutch Designation with Stainless Steel Springs	Clutch Designation with Integral Springs	Torque Rating †	Z Minimum O.D. of Steel Housing for Rated Torque		Overrun Limiting Speed
inch	mm	inch	mm	inch	mm			lbf • in.	inch	mm	rpm
1/8	3,18	9/32	7,14	0.250	6,35	—	RC-02	2.86	0.44	11	50000
0.16	4	0.31	8	0.236	6	FC-4-K	—	2.78	0.44	11	50000
0.24	6	0.39	10	0.472	12	FCS-6	—	18.60	0.55	14	39300
1/4	6,35	7/16	11,11	0.500	12,70	—	RC-040708	17.20	0.62	16	38000
0.31	8	0.47	12	0.472	12	FCL-8-K	—	28.70	0.67	17	28700
0.31	8	0.55	14	0.472	12	FC-8	—	35.80	0.79	20	30500
3/8	9,52	5/8	15,88	0.500	12,70	RC-061008-FS*	RC-061008	45.40	0.88	22	25300
0.39	10	0.55	14	0.472	12	FCL-10-K	—	39.10	0.77	20	22700
0.39	10	0.63	16	0.472	12	FC-10	—	50.40	0.98	25	23700
0.47	12	0.71	18	0.630	16	FC-12	—	118	1.10	27	19300
1/2	12,70	3/4	19,05	0.500	12,70	RC-081208-FS*	RC-081208	73.60	1.10	28	18700
5/8	15,88	7/8	22,22	0.625	15,88	RC-101410-FS*	RC-101410	143	1.20	30	14700
0.63	16	0.87	22	0.630	16	FC-16	—	182	1.20	31	14000
3/4	19,05	1	25,40	0.625	15,88	RC-121610-FS*	RC-121610	196	1.40	36	11300
0.79	20	1.02	26	0.630	16	FC-20	—	274	1.50	38	10700
0.98	25	1.26	32	0.787	20	FC-25	—	605	1.80	46	8670
1	25,40	1 5/16	33,34	0.625	15,88	RC-162110-FS*	RC-162110	412	1.90	48	8670
1.18	30	1.46	37	0.787	20	FC-30	—	845	2.0	51	7330

*** Suffix "-FS" is not always stamped on the clutch cup. Type RC-FS with stainless steel springs is always readily identified by RED clutch cage.**

†Torque ratings are given in pound force inches: 1 lbf • in = 0.113 N • m = 0.0115 kgf • m

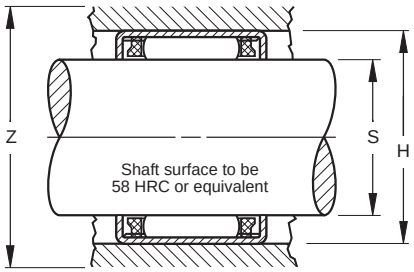
Proper inspection requires installation of the clutch in a ring gauge and then checking the bore with the appropriate plug gauges. Please read the section on “INSPECTION” on page 499.

Types FC, FCS and FCL-K clutch series are manufactured to metric dimensions. Inch dimensions shown are for the convenience of the designer. The controlling dimensions are in millimeters.

Types RC and RC-FS clutch series are manufactured to inch dimensions. Metric dimensions shown are for the convenience of the designer. The controlling dimensions are in inches.

When applying these clutches, it is important that separate bearings be used adjacent to the clutches to carry radial loads and assure concentricity between the shaft and the housing.

For full details on “INSTALLATION” see page 498.



GAUGING

Ring gauge		Clutch Locking Plug		Clutch Overrun Plug	
inch	mm	inch	mm	inch	mm
0.28170	7,1552	0.12440	3,1598	0.12580	3,1953
0.31433	7,9840	0.15669	3,9800	0.15764	4,0040
0.39307	9,9840	0.23543	5,9800	0.23638	6,0040
0.43800	11,1252	0.24950	6,3373	0.25130	6,3830
0.47165	11,9800	0.31402	7,9760	0.31516	8,0050
0.55039	13,9800	0.31402	7,9760	0.31516	8,0050
0.62550	15,8877	0.37450	9,5123	0.37630	9,5580
0.55039	13,9800	0.39276	9,9760	0.39390	10,0050
0.62913	15,9800	0.39276	9,9760	0.39390	10,0050
0.70787	17,9800	0.47142	11,9740	0.47268	12,0060
0.75050	19,0627	0.49950	12,6873	0.50130	12,7330
0.87550	22,2377	0.62450	15,8623	0.62630	15,9080
0.86520	21,9760	0.62882	15,9720	0.63016	16,0060
0.99950	25,3873	0.74850	19,0119	0.75030	19,0576
1.02268	25,9760	0.78622	19,9700	0.78768	20,0070
1.25874	31,9720	0.98295	24,9670	0.98453	25,0070
1.31200	33,3248	0.99850	25,3619	1.00030	25,4076
1.45559	36,9720	1.17980	29,9670	1.18138	30,0070

MOUNTING

Inch Mounting				Metric Mounting			
S Shaft Raceway Diameter inches		H Housing Bore inches		S Shaft Raceway Diameter millimeters		H Housing Bore millimeters	
max	min	min	max	max	min	min	max
0.1250	0.1247	0.2812	0.2817	3,175	3,167	7,142	7,155
0.1575	0.1572	0.3142	0.3148	4,000	3,992	7,981	7,996
0.2362	0.2359	0.3930	0.3935	6,000	5,992	9,981	9,996
0.2500	0.2495	0.4370	0.4380	6,350	6,337	11,100	11,125
0.3150	0.3146	0.4715	0.4722	8,000	7,991	11,977	11,995
0.3150	0.3146	0.5503	0.5510	8,000	7,991	13,977	13,995
0.3750	0.3745	0.6245	0.6255	9,525	9,512	15,862	15,887
0.3937	0.3933	0.5503	0.5510	10,000	9,991	13,977	13,995
0.3937	0.3933	0.6290	0.6297	10,000	9,991	15,977	15,995
0.4724	0.4720	0.7078	0.7085	12,000	11,989	17,977	17,995
0.5000	0.4995	0.7495	0.7505	12,700	12,687	19,037	19,062
0.6250	0.6245	0.8745	0.8755	15,875	15,862	22,212	22,237
0.6299	0.6295	0.8650	0.8659	16,000	15,989	21,972	21,993
0.7500	0.7495	0.9995	1.0005	19,050	19,037	25,387	25,412
0.7874	0.7869	1.0225	1.0233	20,000	19,987	25,972	25,992
0.9843	0.9838	1.2585	1.2595	25,000	24,987	31,967	31,992
1.0000	0.9995	1.3120	1.3130	25,400	25,387	33,325	33,350
1.1811	1.1806	1.4554	1.4564	30,000	29,987	36,967	36,992

Type DC Roller Clutch and Bearing Assemblies

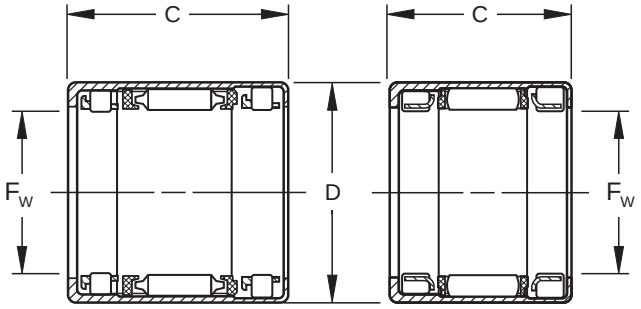
Nominal dimensions with rounded conversions are shown below. Shaft raceway and housing bore diameters necessary for proper mounting and operation are listed on the opposite page.

Types FCB, FCBL-K and RCB-FS clutch and bearing assemblies have stainless steel springs inserted in the molded cage to position the rollers for instantaneous lockup.

Type RCB clutch and bearing assemblies have springs integrally molded with the cage to position the rollers for instantaneous lockup.

Before ordering any clutch and bearing assemblies check for availability.

The mounted clutch and bearing assemblies engages when the housing is rotated relative to the shaft in the direction of the arrow marking (←LOCK) stamped on the cup.



Type FCB | **Types RCB, FCBL-K, and RCB-FS**

DIMENSIONS AND RATINGS

F_w Bore (nominal)		D O.D. (nominal)		C Width 0.000 -0.010	+0,00 -0,25	Clutch and Bearing Assembly Designation with Stainless Steel Springs	with Integral Springs	Torque Rating †	Z Minimum O.D. of Steel Housing for Rated Torque		Bearing Basic Dynamic Load Rating § Cr (T)	ISO 281 (max)	Bearing Working Load	Overrun Limiting Speed
inch	mm	inch	mm	inch	mm			lbf • in.	inch	mm	lbf	lbf	lbf	rpm
0.31	8	0.47	12	0.866	22	FCBL-8K	—	29	0.67	17	523	717	344	28 700
0.31	8	0.55	14	0.787	20	FCB-8	—	35.8	0.79	20	541	742	322	30 500
3/8	9,52	5/8	15,88	0.875	22,22	RCB-061014-FS*	RCB-061014	45.4	0.88	22	848	1 160	566	25 300
0.39	10	0.63	16	0.787	20	FCB-10	—	50.4	0.98	25	628	861	388	23 700
0.47	12	0.71	18	1.024	26	FCB-12	—	118	1.1	28	882	1 210	634	19 300
1/2	12,70	3/4	19,05	0.875	22,22	RCB-081214-FS*	RCB-081214	73.6	1.1	28	1 020	1 400	720	18 700
5/8	15,88	7/8	22,22	1.000	25,40	RCB-101416-FS*	RCB-101416	143	1.2	30	1 140	1 560	914	14 700
0.63	16	0.87	22	1.024	26	FCB-16	—	182	1.2	30	951	1 300	742	14 000
3/4	19,05	1	25,40	1.000	25,40	RCB-121616-FS*	RCB-121616	196	1.4	36	1 270	1 740	1 030	11 300
0.79	20	1.02	26	1.024	26	FCB-20	—	274	1.5	38	1 180	1 610	974	10 700
0.98	25	1.26	32	1.181	30	FCB-25	—	605	1.8	46	1 580	2 170	1 350	8 670
1	25,40	1 5/16	33,34	1.063	27	RCB-162117-FS*	RCB-162117	412	1.9	48	2 240	3 060	1 890	8 670
1.18	30	1.46	37	1.181	30	FCB-30	—	845	2.0	51	1 620	2 210	1 510	7 330

* Suffix "-FS" is not always stamped on the clutch cup. Type RC-FS with stainless steel springs is always readily identified by RED clutch cage.

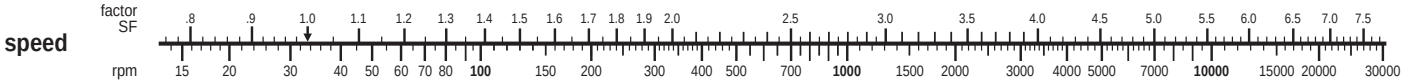
† Torque ratings are given in pound force inches: 1 lbf • in = 0.113 N • m = 0.0115 kgf • m

§ Bearing load ratings are given in pounds-force: 1 lbf = 0.454 kgf = 4.448N. For single roller path use one-half the listed rating.

Required Basic Dynamic Load Rating (C_r) = Applied Load • SF • LF

(T) Symbol denotes Torrington Basic Dynamic Load Rating to be used in load-life calculations taking into consideration the application guidelines and limitations given in this catalog. Applications involving loads approaching this rating or the tabulated working load, whichever is the smaller, should be referred to your Engineering Sales Office before a final selection is made.

Load Ratings are based on a minimum raceway hardness of 58 HRC or equivalent.

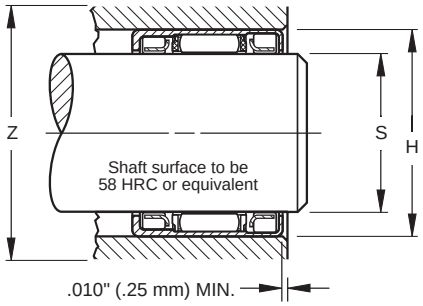


Proper inspection requires installation of the clutch and bearing assembly in a ring gauge and then checking the bore with the appropriate plug gauges. Please read the section on “INSPECTION” on page 499.

Types FCB and FCBL-K clutch and bearing assemblies are manufactured to metric dimensions. Inch dimensions shown are for the convenience of the designer. The controlling dimensions are in millimeters.

Types RCB and RCB-FS clutch and bearing assemblies are manufactured to inch dimensions. Metric dimensions shown are for the convenience of the designer. The controlling dimensions are in inches.

For full details on “INSTALLATION” see page 498.



GAUGING

Ring gauge		Clutch Locking Plug		Clutch Overrun and Bearing Go Plug		Bearing No Go Plug	
inch	mm	inch	mm	inch	mm	inch	mm
0.47165	11,9800	0.31402	7,9760	0.31516	8,0050	0.31626	8,0330
0.55039	13,9800	0.31402	7,9760	0.31516	8,0050	0.31626	8,0330
0.6255	15,8877	0.37450	9,5123	0.37610	9,5529	0.37750	9,5885
0.62913	15,9800	0.39276	9,9760	0.39390	10,0050	0.39500	10,0330
0.70787	17,9800	0.47142	11,9740	0.47268	12,0060	0.47386	12,0360
0.7505	19,0627	0.49950	12,6873	0.50110	12,7279	0.50250	12,7635
0.8755	22,2377	0.62450	15,8623	0.62610	15,9089	0.62750	15,9385
0.8652	21,9760	0.62882	15,9720	0.63016	16,0060	0.63134	16,0360
0.9995	25,3873	0.74850	19,0119	0.75010	19,0525	0.75150	19,0881
1.02268	25,9760	0.78622	19,9700	0.78768	20,0070	0.78909	20,0430
1.25874	31,9720	0.98295	24,9670	0.98453	25,0070	0.98594	25,0430
1.312	33,3248	0.99850	25,3619	1.00010	25,4025	1.00150	25,4381
1.45559	36,9720	1.17980	29,9670	1.18138	30,0070	1.18280	30,0430

MOUNTING

Inch Mounting				Metric Mounting			
S Shaft Raceway Diameter		H Housing Bore		S Shaft Raceway Diameter		H Housing Bore	
inches		inches		millimeters		millimeters	
max	min	min	max	max	min	min	max
0.3150	0.3146	0.4715	0.4722	8,000	7,991	11,977	11,995
0.3150	0.3146	0.5503	0.5510	8,000	7,991	13,977	13,995
0.3750	0.3745	0.6245	0.6255	9,525	9,512	15,862	15,888
0.3937	0.3933	0.6290	0.6297	10,000	9,991	15,977	15,995
0.4724	0.4720	0.7078	0.7085	12,000	11,989	17,977	17,995
0.5000	0.4995	0.7495	0.7505	12,700	12,687	19,037	19,062
0.6250	0.6245	0.8745	0.8755	15,875	15,862	22,212	22,237
0.6299	0.6295	0.8650	0.8659	16,000	15,989	21,972	21,993
0.7500	0.7495	0.9995	1.0005	19,050	19,037	25,387	25,412
0.7874	0.7869	1.0225	1.0233	20,000	19,987	25,972	25,992
0.9843	0.9838	1.2585	1.2595	25,000	24,987	31,967	31,992
1.0000	0.9995	1.3120	1.3130	25,400	25,387	33,325	33,350
1.1811	1.1806	1.4554	1.4564	30,000	29,987	36,967	36,992