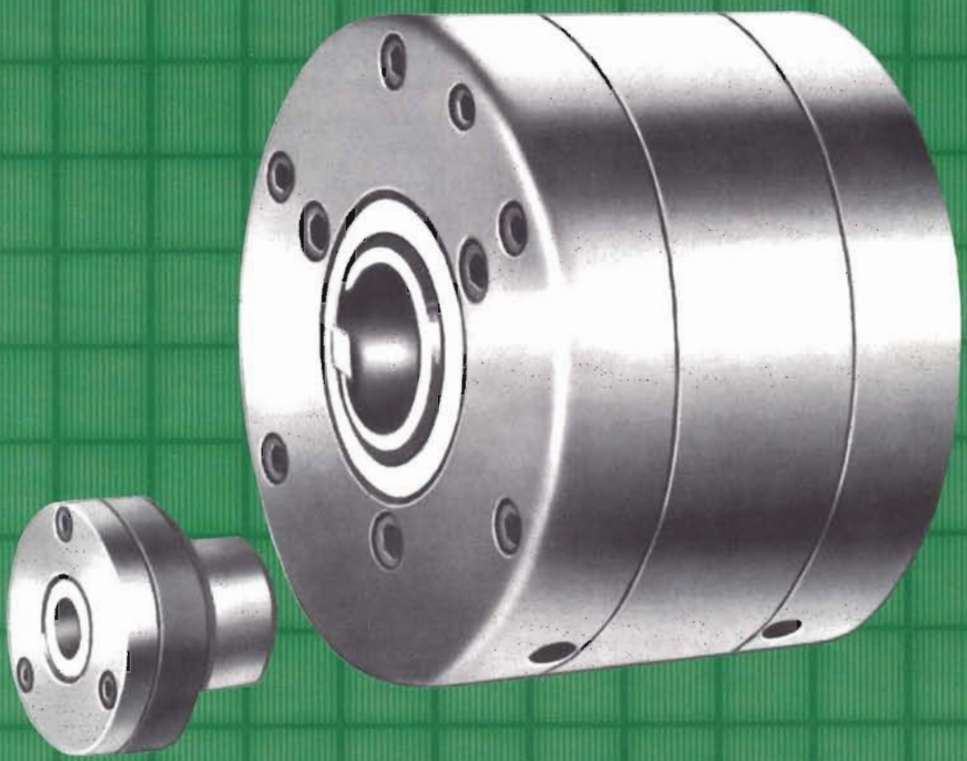
OVER-RUNNING CLUTCHES AND COUPLINGS



For AUTOMATIC CONTROL of

- *Dual Drives*
- *Two Speed Drives*
- *Backstop Service*
- *Infinite Ratchet Action*

Hilliard

HILLIARD

OVER-RUNNING CLUTCHES and COUPLINGS

the dependable roller type

ARE COMPLETELY AUTOMATIC, POSITIVE AND NOISELESS AND HAVE THESE CONSTRUCTION FEATURES . . .

NO BACKLASH . . . Because of individual springs behind each roll.

NO JAMMING . . . Round rollers have no localized wear points.

EXTENDED LIFE . . . Because of renewable cam surfaces merely by re-assembly of the mechanism in most clutch sizes.

RELIABLE . . . The roller type clutch construction is one of the oldest over-running or free wheeling designs. The dependability has been proven over the years. Hilliard over-running clutch couplings were installed in a tunnel ventilating system in 1938 and 1940. They have operated continuously ever since without repair or replacement.

CLUTCHES	15 Sizes—2 Types
COUPLINGS	15 Sizes—5 Types
LOAD RANGE	1/20 HP to 394 HP per 100 RPM
BORE SIZES	3/8" Dia. to 7-15/16" Dia.

PLUS SPECIAL ASSEMBLIES
Combining Gears, Sheaves or Sprockets to suit specific installations serving practically all fields of industry.

Hilliard Over-Running Clutches and Couplings are used to transmit power between a shaft and a gear, sprocket, sheave or pulley mounted on the clutch or to directly connect two shaft ends. The design is simple, based on established and proven principles.

ADVANTAGES OF HILLIARD ROUND ROLLERS ON FLAT CAM SURFACES

In a clutch assembly cylindrical rollers operate with a stable center of gravity because only truly round rolls are balanced with respect to the action of centrifugal force. Merely light spring pressure holds the rollers in correct operating position.

The rollers remain round for maximum driving action throughout the life of the parts, since they are cylindrical and free to turn in continuously changing contact points.

In the clutch assembly each round roll carries an equal share of the load because cylindrical rolls are easy to produce with uniform dimensions in close tolerance.

Irregularly shaped pieces used in some clutch designs are difficult to produce with the same high degree of accuracy. Slight dimensional variation can cause unequal load distribution in an assembly and develop damaging stresses.

Round rollers operating on flat cam surfaces have a larger contact zone than shaped pieces on a curved surface. The advantage is less stress and longer life with the round roller construction.

PURPOSE

The purpose of an over-running clutch or coupling is to allow the driven member of a machine to "over run" or "free wheel" either because the driver is stopped or because another source of power increases the speed of the driven mechanism. Over-running clutches are also used in ratchet operations or for positive "back-stops."

CONSTRUCTION

All Hilliard Over-Running Clutches and Couplings are comprised of two main members — the outer housing member and the inner hub member.

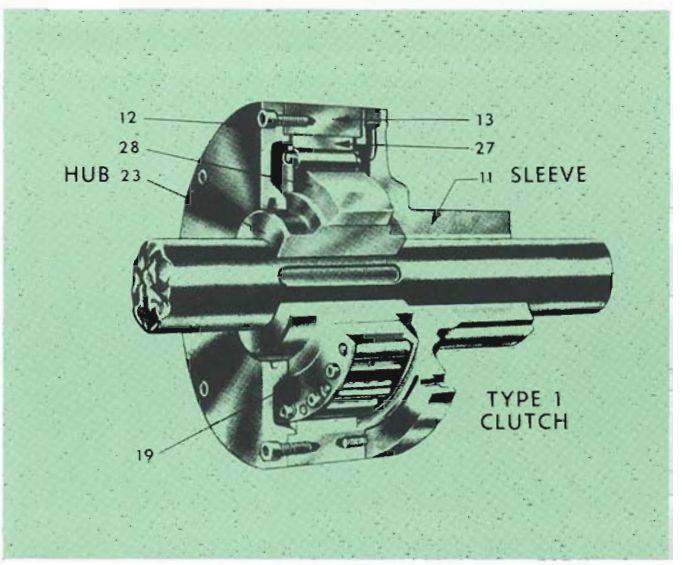
The outer member consists of the sleeve (11), cover (12), housing (13) and the hardened steel circular race (27) which is a press fit and keyed in the housing.

The inner member consists of the hub (23), cam (28), cage plate (19), and roller mechanism attached to the cage plates. The cam is pressed on and keyed to the hub and is hardened and ground with a series of equal flats on its surface. The rollers are suspended between the outer race and inner cam and held in working position with individual light coil springs which are anchored in spacer bars between the cage plates.

The standard clutch has rollers bearing on every other cam flat but where additional capacity is required, rollers are used on all cam flats. The "double roller" construction doubles the normal clutch power rating.

The construction described, and as illustrated below for the Type 1 clutch, is typical for all types of over-running clutches and couplings in size No. 6 and larger. The variation in types is merely an alteration in the cover and sleeve to provide ball bearing or bronze bearing mounting or for coupling arrangement. The inner hub is also modified to suit the type of clutch or coupling.

There is some variation in design for size No. 4 and smaller units and the changes are indicated on the following pages.



The inner member for all sizes except Nos. H4, 3 and smaller is a self contained unit without loose parts. When necessary, the entire inner member can easily be removed for inspection or reversing the direction of rotation. In the smaller sizes, the rollers are not held in position by the cage plates and some means of restraining them must be employed when the inner member is withdrawn from the housing. (A rubber band snapped around the roller pack, as the mechanism is withdrawn, will usually suffice.)

INSTALLATION

The over-running clutches and clutch couplings are designed for mounting on horizontal shafts. Vertical installation may require modifications in the clutch design to provide thrust bearings and different lubrication procedure. We suggest you submit the operating details to our engineering department for a recommendation.

It is intended that the inner hub (23) for both clutches and couplings will be a light press fit on the shaft. In the case of ball bearing mounted units it is especially important that the fit be not too tight. We suggest an interference of not over .0005" and an even fit is preferable to eliminate danger of distorting the hub and bearing races. The shaft key may also distort the hub and bearing race if the fit is too tight.

For couplings, the flexible member (or the sleeve on Type 3 couplings) is also intended to be a light press fit on the shaft.

The Type 1 clutch sleeve member is bronze bushed and should be a free running fit on the shaft. It is a good plan to use a collar on the shaft at the end of the clutch sleeve, adjusted to allow running clearance between the inner hub and the sleeve. The collar will serve to absorb any possible thrust and prevent the inner face of the cover from bearing against the hub shoulder.

Type 1 clutches should normally be mounted on the driving shaft. Over-running couplings should be mounted with the hub installed on the driving shaft, and the flexible member (or sleeve on Type 3) installed on the driven shaft.

The opposite mounting is possible except that there are speed limitations which must be observed. Note the comments under "Operating Speed" and consult our representatives or The Hilliard Corporation in Elmira regarding special applications.

LUBRICATION

Hilliard Over-Running Clutches and Couplings should be lubricated with any good grade of machine oil (not an additive type) equivalent to SAE 10, 20 or 30. The quantity required for most sizes and types is given in the selection tables. Sizes 1, 1½, and 1¾ require 10 to 20 drops originally and a few drops periodically while in service. Grease is not recommended.

OPERATION

The driving action in Hilliard Over-Running units is accomplished by wedging the rollers in a series of acute angles formed between the outer race and the inner cam flats. The rollers make non-slip driving contact yet will "roll" out of engagement and release instantly without shock. The actual roller movement, from engaged to released position, is so small that backlash is negligible.

Either member of the over-running clutch or coupling can be the driver but there are certain speed limitations which must be considered when designing an installation.

OPERATING SPEED

The driving speed is unlimited as far as all normally encountered operations are concerned but the maximum free-wheeling speed is governed by the clutch or coupling size and the operating conditions. (See tables.) Higher speeds are possible when the outer member over-runs the inner member than when the inner member is the rotating part. The limiting factors are roller pressure on the outer race and the type of clutch bearings used.

When the outer member rotates the rollers are held in contact with the race by light spring pressure. Some heat will be generated due to the partial sliding action of the rollers against the race but will not reach serious degree unless continuous high speed free-wheeling is encountered. When the inner member over-runs, however, the rate of heat generation is greatly increased since the rollers revolve with the hub and are thrown against the stationary outer race with considerable pressure due to centrifugal force. Consequently the maximum permissible speed is sharply reduced.

Ball bearings have a maximum operating speed as recommended by the manufacturer and bronze bearings are limited by the amount of lubrication they receive. These factors have all been considered in establishing the speed tables.

Wear on the clutch mechanism occurs mainly during the periods of free-wheeling. When the clutch is "locked" and driving, there is no heat generated and practically no wear.

ROTATION

All standard Hilliard Over-Running Clutches and Couplings can be assembled for either clockwise or counter-clockwise rotation. The rotation should be established when ordering so that the unit can be assembled at the factory for proper operation. Rotation is reversible in the field by turning the hub or cam and roller mechanism end for end in the housing. Partial disassembly and reassembly is necessary as explained in Bulletin 262.

When specifying rotation of Types 1 and 3, always look at the cover end of the assembly and indicate whether the inner hub keyed on the shaft or the outer sleeve member is the driver. The cover is on the large end of Types 1 and 3 and opposite from the coupling end in flexible coupling assemblies.

Specify the rotation of flexible couplings when looking from the driving shaft toward the driven shaft.

The direction of rotation must be the same for both driving and freewheeling. For example: If the hub drives in a clockwise rotation, the sleeve can over-run in a clockwise rotation but not in a counter-clockwise direction. It is possible for the driving member to drive in one direction and freewheel in the other, as in a ratchet application.

SELECTION

Hilliard Clutches and Couplings are rated on the basis of torque or horse-power per 100 RPM. To determine the size clutch required for any application, simply convert the driving power (as applied to the clutch) to a 100 RPM basis or determine the torque required and select the clutch having the nearest higher rating. To make the conversion, multiply the driving horsepower by 100 and divide by the operating speed. The procedure is outlined on Page 12.

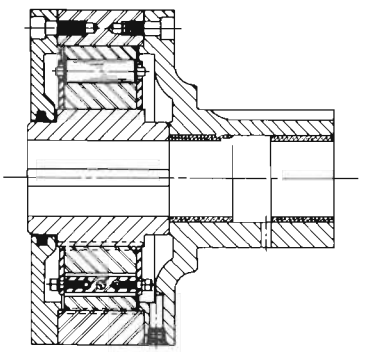
The clutch ratings include a generous safety factor but pulsating or severe shock loads or unusual operating conditions may require a larger size clutch.

We recommend that clutch applications for indexing or ratcheting be referred to our engineering department. Include, if possible, a sketch or drawing of the proposed installation indicating the driving power, direction of drive rotation, shaft size, number of strokes per minute and length of stroke or degrees of rotation per cycle.

TYPICAL MOTION CONTROL APPLICATIONS

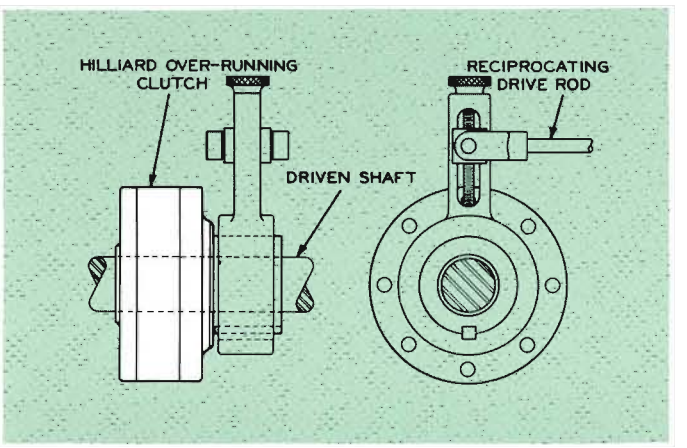
- Dual drives for pumps, fans, blowers and boiler stokers.
- Two speed drives for dry cleaning machines, laundry equipment, conveyors, paper processing machines, slitters, forming rolls and automatic machinery.

CLUTCH-TYPE 1

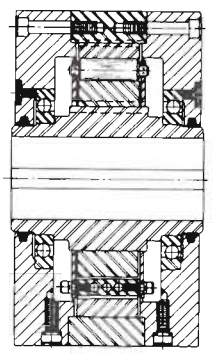


For ordinary installations with normal speed ranging from 1750 RPM downward. Outer member to free wheel. Use on 2 speed drives and for ratchet action.

See pages 6 and 7 for ratings and dimensions.

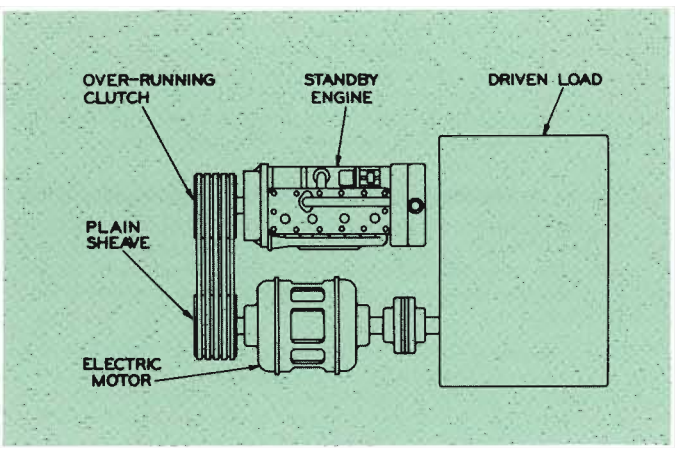


CLUTCH-TYPE 8

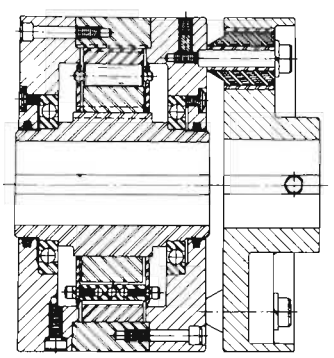


Ball bearing construction permits higher speeds ranging from 3600 RPM downward. Use for long life in ratchet operation. Requires less lubrication maintenance. Mount in combination with sheave or sprocket for 2 speed drives. Outer member to free wheel.

See page 8 for ratings and dimensions.

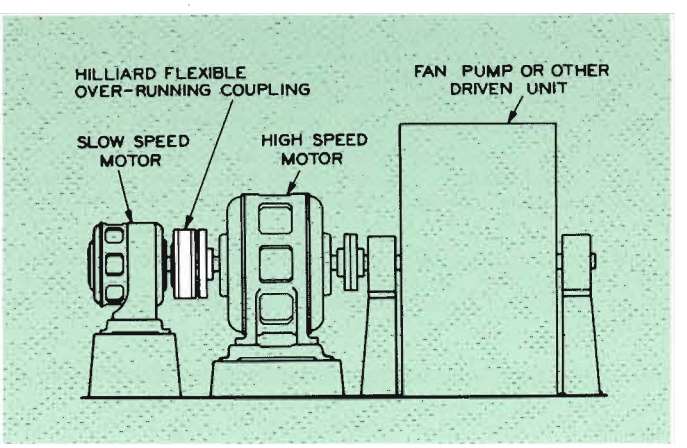


COUPLING-TYPE 83



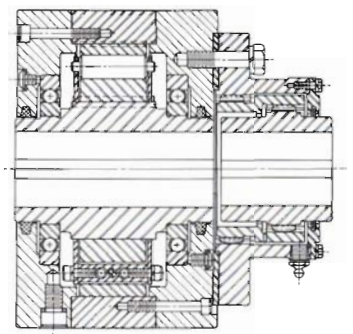
For dual drives in normal speed ranges. Outer member to free wheel. Shaft alignment should be within ½° angular and .003" parallel. Will not accommodate end float but can be modified to do so.

See page 9 for ratings and dimensions.



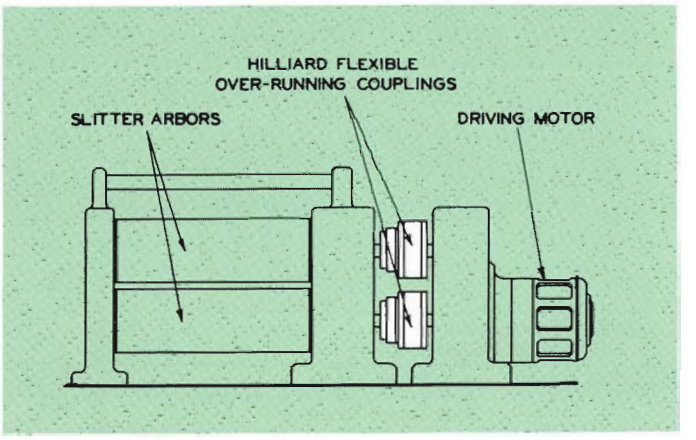
- Ratchet action for printing press ink rolls, coal feeders, press feeds, honing machines, bakery equipment and conveyors.
- Backstop service on textile machines, speed reducers, elevating conveyors and in combination with ratchet feeds.

COUPLING-TYPE 98

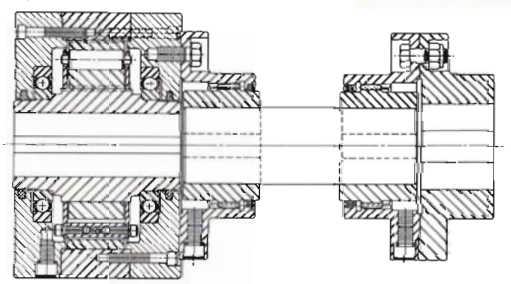


Gear type flexible member for heavy duty. Maximum misalignment 1° angular and .005" parallel. Will permit end float of approximately 1/16" maximum.

See page 9 for ratings and dimensions.

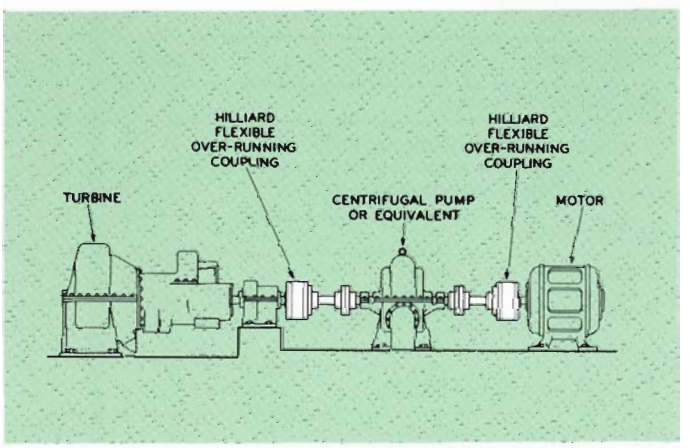


COUPLING-TYPE 95

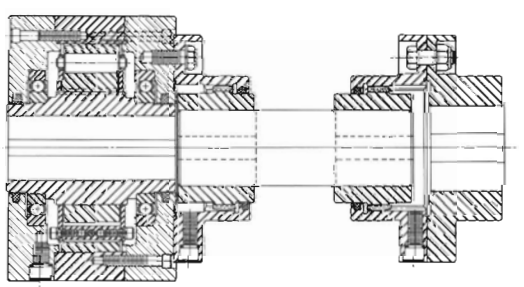


Designed particularly for fan drives and similar installations to accommodate extreme misalignment that may result from expansion or deflection due to heat. Also permits easy maintenance without disturbing main mounts simply by removing the floating shaft. Will permit end float of approximately ⅛" maximum.

See page 10 for ratings and dimensions.

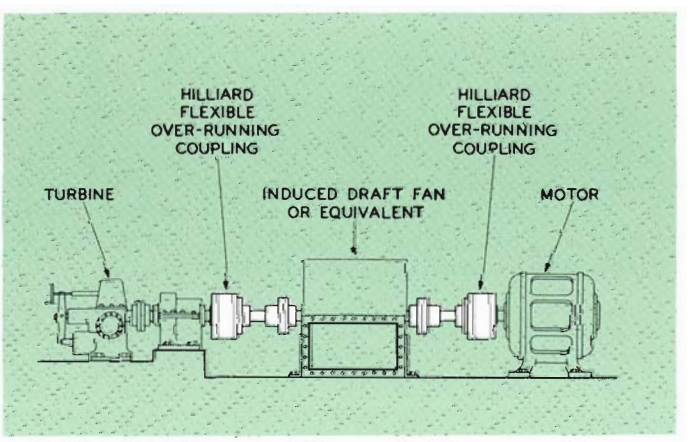


COUPLING-TYPE 96



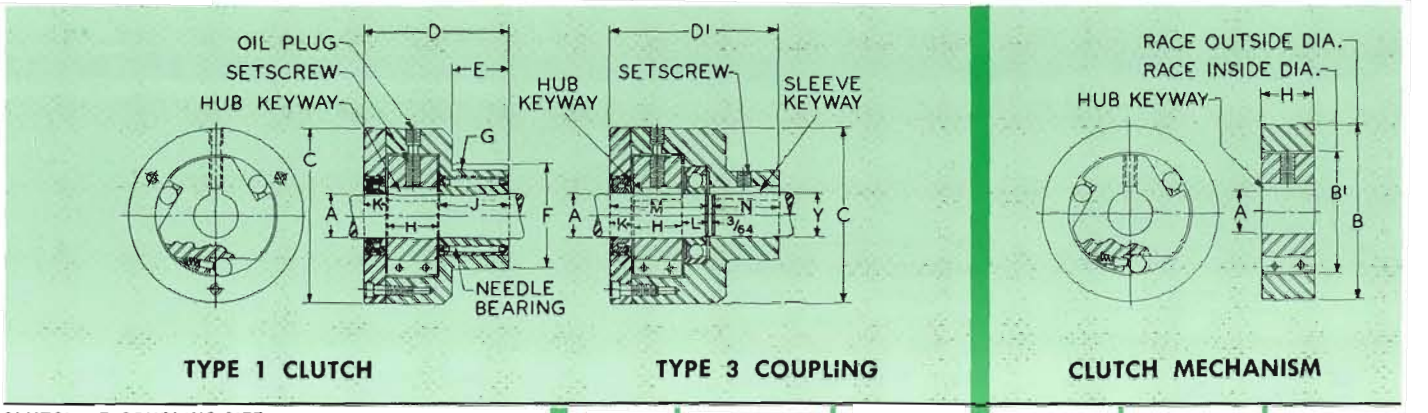
Construction the same as Type 95 except the outer coupling is designed to permit extra end float to accommodate extreme axial expansion as well as misalignment. Permissible end float ⅜" or more depending on size of coupling.

See page 10 for ratings and dimensions.



HILLIARD FRACTIONAL HORSEPOWER OVER-RUNNING CLUTCH AND COUPLING

(Coupling Recommended for Application Only Where Exact Shaft Alignment Can Be Maintained)



TYPE 1 CLUTCH **TYPE 3 COUPLING** **CLUTCH MECHANISM**

CLUTCH OR COUPLING SIZE OR MECHANISM NUMBER →		1	1½	1¾	1-0-1	1½-0-1	1¾-0-1
NORMAL RATING: H.P. Per 100 R.P.M.		1/20	1/10	1/5	1/20	1/10	1/5
Inch Pounds Torque		31.5	63.0	126.0	31.5	63.0	126.0
MAXIMUM OVER-RUNNING, R.P.M.: With Sleeve Rotating — Shaft at Rest:	R.P.M.	3600	3600	3600	3600	3600	3600
With Shaft Rotating — Sleeve at Rest:	R.P.M.	1750	1750	1750	1750	1750	1750
DIMENSIONS		USE ONLY CERTIFIED PRINTS FOR INSTALLATION					
Shaft Diameter	A-Y	.3750 .3745	.5000 .4995	.6250 .6245	.3750 .3745	.5000 .4995	.6250 .6245
Hub and Sleeve Keyway		•⅛ x 1/16	⅛ x 1/16	3/16 x 3/32	⅛ x 1/16	⅛ x 1/16	3/16 x 3/32
Race Outside Diameter (Mechanism Only)	B	—	—	—	1.813 1.812	2.063 2.062	2.501 2.500
Race Inside Diameter (Mechanism Only)	B_1	—	—	—	1.125 1.124	1.375 1.374	1.750 1.749
Outside Diameter	C	1 13/16	2 1/16	2½	—	—	—
Overall Length (Type 1 Clutch)	D	1 29/64	1 45/64	2 5/64	—	—	—
Overall Length (Type 3 Coupling)	D_1	1 9/16	2	2 1/16	—	—	—
Sleeve Length	E	9/16	9/16	13/16	—	—	—
Sleeve Diameter (Type 1 Clutch)	F	1.126 1.125	1.376 1.375	1.501 1.500	—	—	—
Sleeve Keyway (Type 1 Clutch)	G	3/16 x 3/32	3/16 x 3/32	3/16 x 3/32	—	—	—
Hub Bore Length	H	⅜	⅝	¾	⅜	⅝	¾
Bearing Length (Type 1 Clutch)	J	¾	¾	1	—	—	—
Cover Thickness	K	¼	5/16	5/16	—	—	—
Shaft Pilot Length (Type 3 Coupling)	L	.289	.320	.351	—	—	—
Hub Shaft Length (Type 3 Coupling)	M	59/64	1 13/64	1 27/64	—	—	—
Sleeve Shaft Length (Type 3 Coupling)	N	19/32	1 1/16	1 1/32	—	—	—
Shipping Weight	(Lbs.)	1	1½	2½	—	—	—

● Hub Keyway Only. No Sleeve Keyway in Size 1 Type 3.

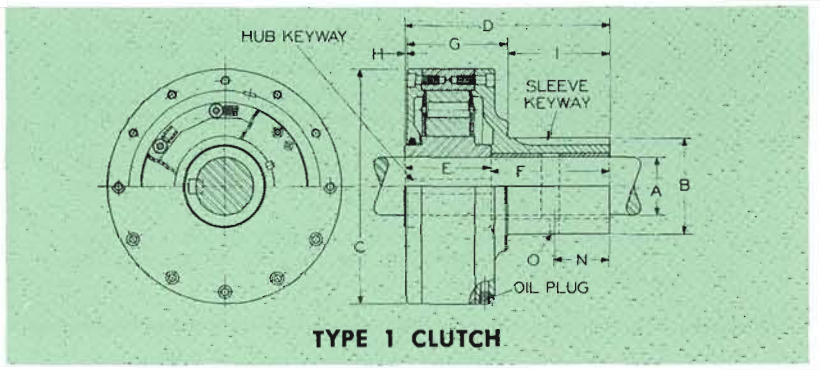
The fractional horsepower units are available only with the dimensions shown and no variation is possible except on special quantity orders.

These clutches and couplings have operating characteristics the same as the larger standard series and are used in a similar manner for light duty service. See Page 12 for approximate free-wheeling drag torque after run-in.

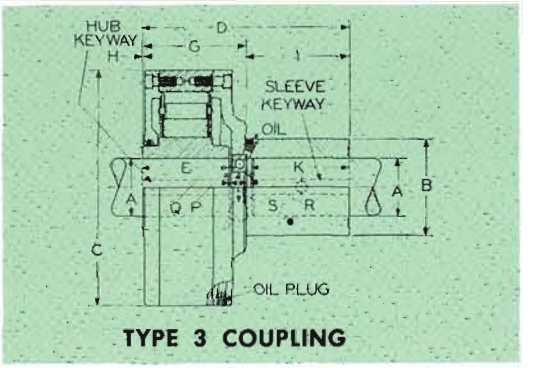
The housing furnished by the customer must be .001 to .002 press fit on the race outside diameter "B". The housing should be designed with a counterbore for the clutch race .015 to .020 deeper than the width of the race to provide running clearance for the cam. Endwise movement of the rollers must be restricted on both sides but with running clearance by suitable construction of the housing. The mechanism must not be used like a roller bearing to support the housing.

TYPE 1 OVER-RUNNING CLUTCH | TYPE 3 OVER-RUNNING COUPLING

(Coupling Recommended for Application Only Where Exact Shaft Alignment Can Be Maintained)



TYPE 1 CLUTCH



TYPE 3 COUPLING

CLUTCH OR COUPLING SIZE →		2*	3*	4*	6	7	8	10	12▲	14▲	16▲	18▲	20▲
NORMAL RATING: H.P. Per 100 R.P.M.		.35	.97	1.2	3.5	8.1	10.6	22.7	41.6	88.0	96.0	171.0	197.0
Foot Pounds Torque		18	51	63	184	427	557	1192	2185	4620	5042	8981	10347
Double Capacity Size →		—	—	D4*	D6	D7	D8	D10	D12	D14	D16	D18	D20
Double Capacity Rating: H.P. Per 100 R.P.M.		—	—	2.4	7.0	16.2	21.2	45.4	83.2	176.0	192.0	342.0	394.0
Foot Pounds Torque		—	—	126	368	854	1114	2384	4370	9240	10084	17962	20694
MAXIMUM OVER-RUNNING R.P.M.: With Sleeve Rotating—Shaft at Rest:													
Type 1 Clutch	Single and Double Capacity	1400	1200	1000	700	600	500	400	300	250	210	180	150
Type 3 Coupling	Single Capacity	5000	4000	3600	2400	2100	1800	1200	900	800	700	600	500
	Double Capacity	—	—	3600	2400	2100	1800	1200	900	400	400	250	250
With Shaft Rotating—Sleeve at Rest:													
Type 1 Clutch	Single Capacity	1400	1200	1000	550	375	325	275	180	140	130	100	90
	Double Capacity	—	—	750	410	280	240	200	—	100	95	75	65
Type 3 Coupling	Single Capacity	1750	1200	1000	550	375	325	275	180	140	130	100	90
	Double Capacity	—	—	750	410	280	240	200	150	100	95	75	65

DIMENSIONS (Single and Double Capacity Units) — USE ONLY CERTIFIED PRINTS FOR INSTALLATION

Maximum Bore (Stock Size)**	A	¾ +.0000 −.0005	15/16 +.0000 −.0005	1 3/16● +.0000 −.0005	1 11/16 +.000 −.001	1 15/16 +.000 −.001	2 7/16 +.000 −.001	3 7/16 +.000 −.001	3 15/16 +.0000 −.0015	4 15/16 +.0000 −.0015	5 15/16 +.0000 −.0015	6 15/16 +.0000 −.0015	7 15/16 +.0000 −.0015
Stock Hub and Sleeve Keyways		3/16 x 3/32	1/4 x 1/8	5/16 x 5/32	7/16 x 7/32	1/2 x 1/4	5/8 x 5/16	7/8 x 7/16	1 x 1/2	1 1/4 x 5/8	1 1/2 x 3/4	1 1/2 x 3/4	1 1/2 x 3/4
Sleeve Diameter	B	1 3/8 +.001 −.000	1 3/4 +.001 −.000	2 3/16 +.001 −.000	3 +.001 −.000	3 1/2 +.001 −.000	4 +.001 −.000	5 1/2 +.001 −.000	6 1/2 +.0015 −.0000	7 1/2 +.0015 −.0000	9 +.0015 −.0000	10 +.0015 −.0000	12 +.0015 −.0000
Outside Diameter	C	2 15/16	3 7/8	4 7/8	7	8 1/2	9 7/8	13	15	17 1/2	19 1/2	22	25
Overall Length	D	3 3/32	4 1/2	4 13/16	6 1/4	7 13/16	8 5/8	11 1/2	13 3/8	15	15 5/16	16 5/8	16 7/8
Hub Bore Length	E	1 9/16	2 3/8	2 3/8	3	3 5/8	3 5/8	4 1/2	5 3/4	6 3/4	6 7/8	8 1/4	8 3/8
Sleeve Bore Length	F	1 21/32	2 1/8	2 7/16	3 1/4	4 3/16	5	7	8 1/8	8 1/4	8 5/16	8 3/8	8 1/2
Body Width	G	1 13/16	2 11/16	2 3/4	3 7/16	4 1/4	4 1/4	5 1/4	6 1/2	7 5/8	7 13/16	9 1/4	9 1/2
Hub Projection	H	1/32	1/16	1/16	1/16	1/16	1/16	1/16	1/8	1/8	1/8	1/8	1/8
Sleeve Length	I	1 3/8	1 3/4	2	2 3/4	3 1/2	4 5/16	6 3/16	7 1/4	7 1/4	7 1/4	7 1/4	7 1/4
Sleeve Shaft Length	K	1 1/4	1 5/8	1 1/8	2 9/16	3 3/8	4 1/8	5 15/16	7	7	6 7/8	6 11/16	6 1/8
Oil Hole Position	N	1 1/16	7/8	1	1 3/8	1 3/4	2 1/8	3 1/16	3 5/8	3 5/8	3 5/8	3 5/8	3 5/8
Oil Hole Size	O	1/8	3/16	3/16	3/16	3/16	3/16	1/4	1/4	1/4	3/8	3/8	3/8
Shaft Shoulder Width	P	1/32	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16	1/16
Shaft Pilot Length	Q	5/16	3/8	7/16	9/16	21/32	1 1/16	2 7/32	7/8	1 1/32	1 3/16	1 7/16	2 1/8
Clearance	R	1/16	1/16	1/16	1/16	3/32	1/8	5/32	3/16	5/32	3/16	3/16	3/16
Shaft Pilot Diameter	S	.3150 .3145	.3937 .3930	.5905 .5900	.7875 .7870	1.1810 1.1805	1.3780 1.3775	2.1655 2.1650	2.3620 2.3615	3.1496 3.1490	3.5433 3.5425	4.1339 4.1332	3.5433 3.5425
Quantity of Oil Required (Ounces)		1/3	¾	1 1/2	3	5	7	10	20	30	35	50	65
Approx. Shipping Weight (Lbs.)		4	8	12	35	60	80	200	325	450	600	900	1250

● Available with 1" Bore, ¼ x ⅛ Hub Keyway and 5/16 x 5/32 Sleeve Keyway (Type I) at no extra charge.

* Variation in construction for Sizes No. 2, 3 and 4 illustrated on Page 11.

** Bronze Bushings are bored for running fit on the normal shaft diameter. Bores and keyways smaller than stock sizes shown, furnished at extra charge.

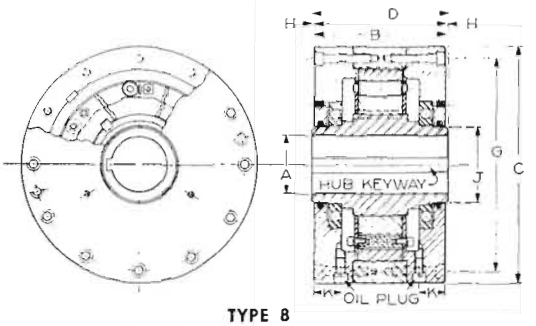
▲ Consult factory for the most current information on clutch sizes 12 through 20.

Double roller construction can be furnished for all sizes except Nos. 2 and 3 with no change in dimensions.

Letter "D" before size designates Double Capacity Size.

See Page 12 for approximate free-wheeling drag torque after run-in.

TYPE 8 OVER-RUNNING CLUTCH



TYPE 8

The Type 8 clutch is designed for mounting a gear, sprocket pulley or sheave on the housing and the major diameter is machined to close tolerance. If preferred a plate type sprocket or gear can be attached on one face of the clutch.

A keyway will be cut to your specifications in the housing ring or one cover drilled and tapped and a pilot shoulder formed, if required, at nominal extra charge.

Other special variations are possible such as combining the auxiliary part with the central housing ring in an integral piece. The cost depends on the actual specifications.

Always mount the clutch on the driving shaft unless used as a ratchet or in slow speed operation. See Page 12 for approximate free-wheeling drag torque.

CLUTCH SIZE →	2	4	H4*	6	7	8	10	12▲	14▲	16▲	18▲	20▲
NORMAL RATING:												
H.P. Per 100 R.P.M.	.35	1.2	1.2	3.5	8.1	10.6	22.7	41.6	88.0	96.0	171.0	197.0
Foot Pounds Torque	18	63	63	184	427	557	1192	2185	4620	5042	8981	10347
Double Capacity Size →	—	**D4**	—	**D6**	**D7**	**D8**	**D10**	**D12**	**D14**	**D16**	**D18**	**D20**
Double Capacity Rating:												
H.P. Per 100 R.P.M.	—	2.4	—	7.0	16.2	21.2	45.4	83.2	176.0	192.0	342.0	394.0
Foot Pounds Torque	—	126	—	368	854	1114	2384	4370	9240	10084	17962	20694
MAXIMUM OVER-RUNNING R.P.M.:												
With Housing Rotating—Shaft at Rest:												
Single Capacity	5000	3600	3600	2400	2100	1800	1500	1200	900	700	600	500
Double Capacity	—	3600	—	2400	2100	1800	1500	1200	900	400	250	250
With Shaft Rotating—Housing At Rest:												
Single Capacity	1750	1000	2000	550	375	325	275	180	140	130	100	90
Double Capacity	—	750	—	410	280	240	200	150	100	95	75	65

DIMENSIONS (Single and Double Capacity Units) USE ONLY CERTIFIED PRINTS FOR INSTALLATION

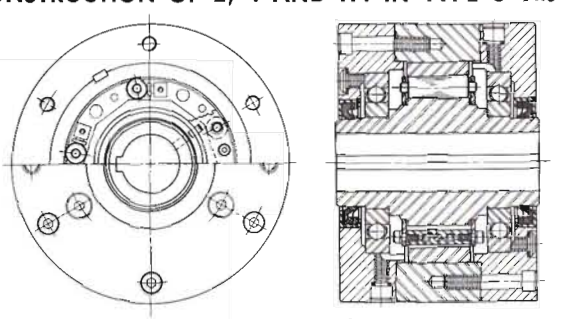
Maximum Bore (Stock Size) +.0000 −.0005	A	3/4	1 3/16 ●	1 3/16 ●	1 11/16	1 15/16	2 7/16	3 7/16	3 15/16	4 15/16	5 15/16	6 15/16	7 15/16
Stock Keyway		3/16 x 3/32	5/16 x 1/8	5/16 x 1/8	7/16 x 3/32	1/2 x 1/4	5/8 x 1/4	7/8 x 5/16	1 x 3/8	1 1/4 x 3/8	1 1/2 x 1/2	1 1/2 x 1/2	1 1/2 x 1/2
Body Width	B	2 11/16	3 1/2	3 1/2	4 5/16	5 1/8	5 1/2	6 7/8	8 5/8	10 3/8	11 3/8	13	13 7/8
Outside Diameter	C	2 15/16 +.000 −.002	4 1/8 +.000 −.002	4 1/8 +.000 −.002	7 +.000 −.002	8 1/2 +.000 −.002	9 1/8 +.000 −.002	13 +.000 −.002	15 +.000 −.003	17 1/2 +.000 −.003	19 1/2 +.000 −.003	22 +.000 −.004	25 +.000 −.004
Overall Length	D	2 3/4	3 5/8	3 5/8	4 7/16	5 1/4	5 3/4	7 1/8	8 7/8	10 5/8	11 5/8	13 3/8	14 3/8
Bolt Circle	G	2 1/2	4 3/16	4 3/16	5 15/16	7 5/8	8 3/8	11 1/2	13 3/8	15 7/8	17 1/2	19 7/8	22 3/4
Number and Size of Bolts		6 *6-32	6 1/4-28	6 1/4-28	12 1/4-28	12 3/8-24	12 3/8-24	12 1/2-20	16 1/2-20	16 1/2-20	16 5/8-18	16 5/8-18	16 5/8-18
Hub Projection	H	1/32	1/16	1/16	1/16	1/16	1/8	1/8	1/8	1/8	1/8	3/16	1/4
Hub Diameter	J	1 1/8	1 5/8	1 5/8	2 3/8	2 3/4	3 1/8	4 5/16	5 1/8	6 1/4	7 1/2	8 11/16	9 1/2
Oil Hole Position	K	1/2	3/4	3/4	27/32	1 1/16	1 1/8	1 3/8	2	2 1/4	2 7/8	3 1/16	3 3/8
Quantity of Oil Required	(Ounces)	1/3	1 1/2	1 1/2	3	6	7	12	24	43	50	65	95
Approx. Shipping Weight	(Lbs.)	5	18	18	45	70	110	250	400	570	800	1200	1700

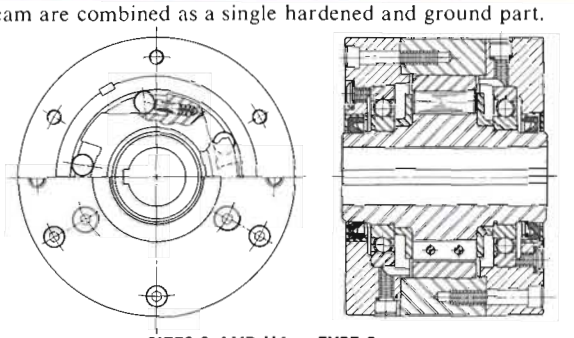
● Available with 1" Bore, 1/4 x 1/8 Keyway, at no extra charge.

* The H4 clutch has special construction to permit higher than normal operating speed especially when the inner member must over-run, and it will stand more severe service in ratchet applications. The H4 clutch is available only with single roller assembly. The rollers are not attached to the cage plates in clutch H4 and must be retained with a wire or band if the mechanism is pulled out of the housing. Letter "D" before size designates Double Capacity Size.

▲ Consult factory for the most current information on clutch sizes 12 through 20.

CONSTRUCTION OF 2, 4 AND H4 IN TYPE 8 The hub and cam are combined as a single hardened and ground part.


SIZE 4 — TYPE 8


SIZES 2 AND H4 — TYPE 8

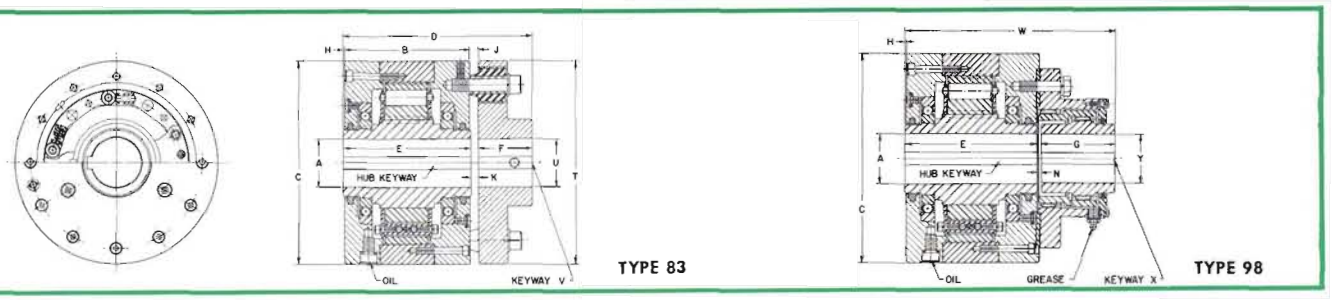
HILLIARD FLEXIBLE OVER-RUNNING COUPLINGS

STANDARD—TYPE 83 FOR NORMAL APPLICATION ——————————— **MAXIMUM MISALIGNMENT—½° ANGULAR, .003" PARALLEL**

SPECIAL—TYPE 98 FOR HEAVY DUTY OR SPECIAL USE ——————————— **MAXIMUM MISALIGNMENT—1° ANGULAR, .005" PARALLEL**

For best performance, shafts should be aligned as perfectly as possible regardless of the flexible element. Normally the hub shaft should drive the coupling shaft. See Page 12 for approximate free-wheeling drag torque.

Coupling Type 98 will permit some axial movement of the shafts but Type 83 will not. The capacity for axial expansion can be provided in Type 83 at nominal extra charge if specified on the order.



TYPE 83 TYPE 98

COUPLING SIZE →	2	4	H4	6	7	8	10	12▲	14▲	16▲	18▲	20▲
NORMAL RATING: H.P. Per 100 R.P.M.	.35	1.2	1.2	3.5	8.1	10.6	22.7	41.6	88.0	96.0	171.0	197.0
Foot Pounds Torque	18	63	63	184	427	557	1192	2185	4620	5042	8981	10347
Double Capacity Size →	—	**D4**	—	**D6**	**D7**	**D8**	**D10**	**D12**	**D14**	**D16**	**D18**	**D20**
Double Capacity Rating: H.P. Per 100 R.P.M.	—	2.4	—	7.0	16.2	21.2	45.4	83.2	176.0	192.0	342.0	394.0
Foot Pounds Torque	—	126	—	368	854	1114	2384	4370	9240	10084	17962	20694
MAXIMUM OVER-RUNNING R.P.M.: With Housing Rotating—Shaft At Rest: Type 83 & 98 Single Capacity	5000	3600	3600	2400	2100	1800	1500	1200	900	700	600	500
Double Capacity	—	3600	—	2400	2100	1800	1500	1200	900	400	250	250
With Shaft Rotating—Housing At Rest: Type 83 & 98 Single Capacity	1750	1000	2000	550	375	325	275	180	140	130	100	90
Double Capacity	—	750	—	410	280	240	200	150	100	95	75	65

DIMENSIONS (Single and Double Capacity Units) — USE ONLY CERTIFIED PRINTS FOR INSTALLATION

Maximum Hub Bore (Stock Size) +.0000—.0005	A	¾	1 3/16 ●	1 3/16 ●	1 11/16	1 15/16	2 7/16	3 7/16	3 15/16	4 15/16	5 15/16	6 15/16	7 15/16
Stock Hub Keyway		3/16 x 3/32	5/16 x 1/8	5/16 x 1/8	7/16 x 7/32	½ x ¼	⅝ x ¼	⅞ x 5/16	1 x ⅜	1¼ x ⅜	1½ x ½	1½ x ½	1½ x ½
Maximum Coupling Bore (Stock Size) +.000 —.001	U	1	1 1/16	1 1/16	1 15/16	2 3/16	2 15/16	3 15/16	4 3/4 +.0000 .0015	5 3/16 +.0000 —.0015	6 15/16 +.0000 —.0015	6 15/16 +.0000 —.0015	7 15/16 +.0000 —.0015
Stock Coupling Keyway	V	¼ x ⅛	⅜ x 3/16	⅜ x 3/16	½ x ¼	9/16 x 9/32	¾ x ⅜	1 x ½	1¼ x ⅝	1¼ x ⅝	1½ x ¾	1½ x ¾	1½ x ¾
Maximum Coupling Bore +.000 —.001	Y	—	—	—	1¾	2¼	3	3½	4 +.0000 —.0015	4½ +.0000 —.0015	5⅞ +.0000 —.0015	6½ +.0000 —.0015	7 +.0000 —.0015
Maximum Coupling Keyway	X	—	—	—	⅜ x ⅛	½ x 3/16	¾ x 3/16	⅞ x ¼	1 x 5/16	1 x ⅜	1½ x 7/16	1½ x ½	1¾ x ½
Body Width	B	2 11/16	3½	3½	4 5/16	5⅛	5½	6⅞	8⅝	10⅜	11⅜	13	13⅞
Clutch Diameter	C	2 15/16	4⅞	4⅞	7	8½	9⅞	13	15	17½	19½	22	25
Overall Length	D	4 9/32	5⅝	5⅝	6 9/16	7⅞	8 13/16	11 9/16	13 15/16	16⅞	19⅜	21 9/16	22½
Hub Length	E	2¾	3⅜	3⅜	4 1/16	5¼	5¾	7⅛	8⅛	10⅝	11⅝	13⅜	14⅜
Coupling Bore Length	F	1 5/16	1¾	1¾	1⅞	2⅜	2⅞	4¼	4⅜	6	7½	8	8
Coupling Bore Length	G	—	—	—	2 15/32	3	3¾	4 7/16	4 27/32	5 11/32	6⅝	7 5/16	7⅞
Hub Projection	H	1/32	1/16	1/16	1/16	1/16	⅛	⅛	⅛	⅛	⅛	3/16	¼
Clearance	J	¼	5/16	5/16	5/16	5/16	5/16	5/16	5/16	⅜	⅜	⅜	⅜
Shaft Gap	K	7/32	¼	¼	¼	¼	3/16	3/16	3/16	¼	¼	3/16	⅛
Shaft Gap	N	—	—	—	5/32	5/32	5/32	5/32	5/32	7/32	7/32	5/16	5/16
Coupling Diameter	T	3¾	5½	5½	7	8½	9⅞	13	15	17½	19½	22	25
Overall Length	W	—	—	—	7 1/16	8 13/32	9 21/32	11 23/32	13⅞	16 3/16	18 15/32	21	22 9/16
Oil Required in Clutch (Ounces)		1/3	1½	1½	3	6	7	12	24	40	47	55	75
Grease Req'd. in Type 98 Coupling (Ounces)		—	—	—	2	4	5	10	12	18	38	40	60
Approx. Shipping Weight (Lbs.)		9	23	23	60	100	150	300	475	700	1000	1450	2000

● Available with 1" Hub Bore, ¼ x ⅛ Keyway at no extra charge.
Double roller construction can be furnished for all sizes except Nos. 2 and H4 with no change in dimensions.

Letter "D" before size designates Double Capacity Size.

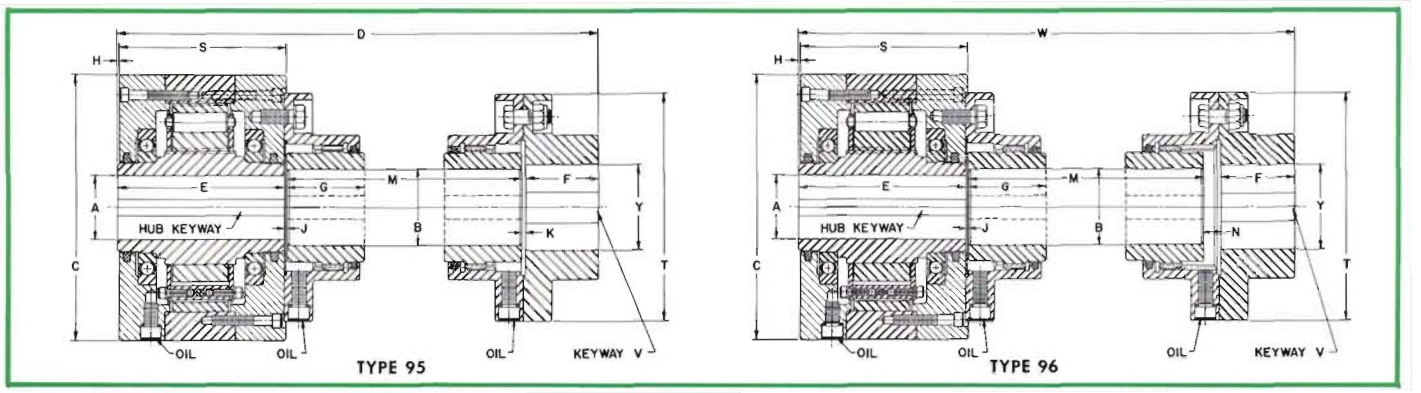
▲ Consult factory for the most current information on clutch sizes 12 through 20.

HILLIARD FLEXIBLE OVER-RUNNING COUPLINGS

TYPE 95—FOR MAXIMUM SHAFT MISALIGNMENT★
TYPE 96—FOR MAXIMUM SHAFT MISALIGNMENT AND END FLOAT★★

Recommended for all types of installations requiring ability of coupling to accommodate maximum possible shaft misalignment and/or end float. Particularly adapted to induced draft fan drives.

Normally the hub shaft should drive the coupling shaft. See Page 12 for approximate free-wheeling drag torque.



COUPLING SIZE →	4	H4	6	7	8	10	12▲	14▲	16▲	18▲	20▲
NORMAL RATING: H.P. Per 100 R.P.M.	1.2	1.2	3.5	8.1	10.6	22.7	41.6	88.0	96.0	171.0	197.0
Foot Pounds Torque	63	63	184	427	557	1192	2185	4620	5042	8981	10347
Double Capacity Size →	**D4**	—	**D6**	**D7**	**D8**	**D10**	**D12**	**D14**	**D16**	**D18**	**D20**
Double Capacity Rating: H.P. Per 100 R.P.M.	2.4	—	7.0	16.2	21.2	45.4	83.2	176.0	192.0	342.0	394.0
Foot Pounds Torque	126	—	368	854	1114	2384	4370	9240	10084	17962	20694
MAXIMUM OVER-RUNNING R.P.M.: With Housing Rotating—Shaft at Rest: Type 95 & 96 Single Capacity	3600	3600	2400	2100	1800	1500	1200	900	700	600	500
Double Capacity	3600	—	2400	2100	1800	1500	1200	900	400	250	250
With Shaft Rotating—Housing at Rest: Type 95 & 96 Single Capacity	1000	2000	550	375	325	275	180	140	130	100	90
Double Capacity	750	—	410	280	240	200	150	100	95	75	65
DIMENSIONS (Single and Double Capacity Units)	USE ONLY CERTIFIED PRINTS FOR INSTALLATION										
Maximum Misalignment ★ (Inches)	.030	.030	.036	.039	.039	.050	.052	.066	.072	.075	.090
Maximum Hub Bore (Stock Size) +.0000 —.0005 A	1 3/16 ●	1 3/16 ●	1 1/16	1 15/16	2 1/16	3 1/16	3 15/16	4 15/16	5 15/16	6 15/16	7 15/16
Stock Hub Keyway	5/16 x 1/8	5/16 x 1/8	7/16 x 3/32	1/2 x 1/4	5/8 x 1/4	7/8 x 5/16	1 x 3/8	1 1/4 x 3/8	1 1/2 x 1/2	1 1/2 x 1/2	1 1/2 x 1/2
Maximum Coupling Bore +.000 —.001 Y	1 3/4	1 3/4	2 1/2	3	3	4 1/4	4 7/8 +.0000 .0015	6 1/2 +.0000 —.0015	7 1/4 +.0000 .0015	8 +.0000 .0015	8 3/4 +.0000 —.0015
Maximum Coupling Keyway V	3/8 x 3/16	3/8 x 3/16	5/8 x 5/16	3/4 x 3/8	3/4 x 3/8	1 x 1/2	1 1/4 x 5/8	1 1/2 x 3/4	1 1/2 x 3/4	1 1/2 x 3/4	1 1/2 x 3/4
Maximum Shaft Diameter (Stock Size) B	1 5/16	1 5/16	1 15/16	2 1/16	2 1/16	3 1/16	3 15/16	4 15/16	5 15/16	6 1/16	6 15/16
Clutch Diameter C	4 1/8	4 7/8	7	8 1/2	9 1/8	13	15	17 1/2	19 1/2	22	25
Overall Length D	10 21/32	10 21/32	12 21/32	14 31/32	15 15/32	21 9/16	25 1/4	31 1/8	35 5/8	41	47 13/16
Hub Length E	3 5/8	3 5/8	4 1/16	5 1/4	5 3/4	7 1/8	8 1/8	10 3/8	11 5/8	13 3/8	14 3/8
Coupling Bore Length F	1 11/32	1 11/32	1 29/32	2 9/32	2 9/32	3 13/32	3 15/16	5	5 3/4	6 1/8	8 1/16
Coupling Bore Length G	1 1/2	1 1/2	2 1/16	2 1/16	2 1/16	3 19/32	4 3/16	5 3/8	6 1/8	6 5/8	8 1/16
Hub Projection H	1/16	1/16	1/16	1/16	1/8	1/8	1/8	1/8	1/8	3/16	1/4
Clearance J	1/16	1/16	1/16	1/16	1/16	3/32	3/16	3/16	3/16	3/16	1/4
Shaft Gap K	1/8	1/8	1/8	1/8	1/8	3/16	1/4	5/16	5/16	5/16	1/2
Shaft Length (Stock Size) M	5 1/2	5 1/2	6 1/4	7 1/4	7 1/4	10 1/2	12	15	17 3/4	21	24
Shaft Gap★★ N	3/8	3/8	1/2	5/8	3/4	3/4	7/8	1	1 1/8	1 1/4	1
Body Width S	3 9/16	3 9/16	4 3/8	5 3/16	5 5/8	7	8 3/4	10 1/2	11 1/2	13 3/16	14 1/8
Coupling Diameter T	4 9/16	4 9/16	6	7	7	9 7/16	11	13 5/8	15 5/16	16 9/16	19 3/8
Overall Length W	10 29/32	10 29/32	13 5/32	15 15/32	16 3/32	21 7/8	25 7/8	31 13/16	36 7/16	41 15/16	48 5/16
Oil Required In Clutch (Ounces)	1 1/2	1 1/2	3	6	7	12	24	40	47	55	75
Oil Required In Coupling (Each End) (Ounces)	3/4	3/4	1	1-1/3	1-1/3	4	6	12	16	20	32
Approx. Shipping Weight (Lbs.)	37	37	83	135	175	400	600	1000	1400	2000	3200

● Available with 1" Hub Bore, 1/4 x 1/8 Keyway at no extra charge.
Double roller construction can be furnished in all sizes except No. H4 with no change in dimensions.

Letter "D" before size designates Double Capacity Size.

▲ Consult factory for the most current information on clutch sizes 12 through 20.

THE HILLIARD OVER-RUNNING CLUTCH MECHANISM

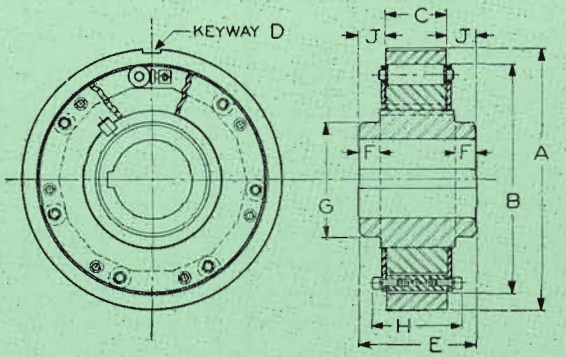


Illustration applies to Size 6 and larger. See bottom of page for construction of Sizes 2, 3, and 4. Can be supplied without the outer race.

THE HILLIARD OVER-RUNNING CLUTCH PARTIAL MECHANISM

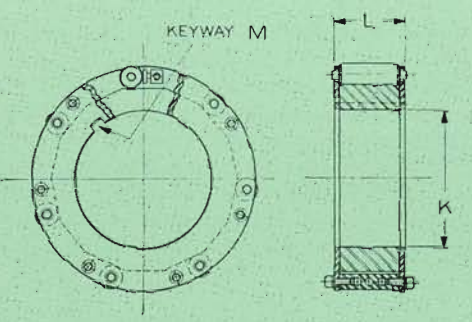


Illustration applies to Size 6 and larger. Not available in smaller sizes. Can be supplied with the outer race included.

NOTE: Power ratings, hub bores and keyways, are the same as Type 1 Clutch on Page 7.

MECHANISM SIZE →		2†	3†	4	6	7	8	10	12▲	14▲	16▲	18▲	20▲
DIMENSIONS (Single and Double Capacity Units)		USE ONLY CERTIFIED PRINTS FOR INSTALLATION											
Race Outside Diameter +.001 —.000	A*	2.250	2.875	3.500	5.500	6.750	8.000	10.000	11.750	14.253	15.500	17.755	20.505
Race Inside Diameter +.001 —.000	B	2.000	2.500	3.000	5.000	6.000	7.000	8.750	10.750	13.250	14.500	16.500	19.000
Race Width +.005 —.000	C	.750	1.125	1.125	1.500	1.875	1.875	2.500	3.000	4.000	4.000	5.000	5.000
Race Keyway	D	—	1/8 x 1/32	1/4 x 1/16	3/8 x 1/16	3/8 x 1/16	1/2 x 1/16	1/2 x 1/16	1/2 x 1/16	1/2 x 1/16	1/2 x 1/16	3/4 x 1/8	3/4 x 1/8
Hub Length	E	1 9/16	2 3/8	2 3/8	3	3 5/8	3 3/8	4 1/2	5 3/4	6 3/4	6 7/8	8 1/4	8 3/8
Hub Projection	F	5/16	1/2	1/2	9/16	1 1/16	1 1/16	3/4	1 1/16	1 1/16	1 1/8	1 1/4	1 5/16
Hub Projection Diameter	G	1 1/8	1 3/8	1 3/4	2 1/2	2 7/8	3 1/2	5	5 3/4	8	8 1/2	10	12 1/4
Width Over Screws	H	1 5/32	1 19/32	1 19/32	2 3/16	2 5/8	2 25/32	3 1/2	4 3/8	5 3/8	5 3/8	6 9/16	6 9/16
Race Location	J	13/32	5/8	5/8	3/4	1/8	1/8	1	1 3/8	1 3/8	1 7/16	1 5/8	1 11/16
Cam Bore Sizes 6-10: +.0000 —.0005 Sizes 12 Up: +.000 —.001	K**	—	—	—	3.000	3.500	4.1895	5.938	7.000	9.750	9.875	11.500	14.000
Width Over Plates	L	—	—	—	1 25/32	2 5/32	2 5/32	2 29/32	3 1/32	4 1/32	4 1/32	5 21/32	5 21/32
Cam Keyway	M	—	—	—	1/4 x 1/8	5/16 x 5/32	5/16 x 5/32	1/2 x 1/8	1/2 x 1/8	1/2 x 3/16	1/2 x 1/4	3/4 x 1/4	3/4 x 1/4

• Housing bore should be a press fit on the Race Outside Diameter "A." Consult the Hilliard Corporation for the proper fits.

▲ Consult factory for the most current information on clutch sizes 12 through 20.

•• Shaft or hub should be .0005 to .001 press fit for the Cam Bore "K."

† Sizes 2 and 3 not available in double roller construction.

All mechanisms are available with double rolls (twice normal capacity) except sizes 2, 3 and H4. When the outer race is furnished by the customer it must be hardened to Rockwell "C" 58 to 60 and ground to size. The race must be supported independent of the roller mechanism and mounted concentric with the shaft. The rollers do not act as a roller bearing.

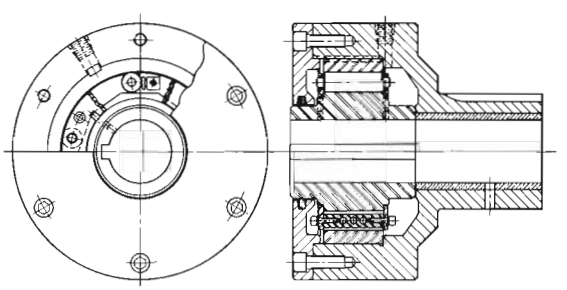
Letter "D" before size designates Double Capacity Size.

CONSTRUCTION OF TYPES 1 AND 3 CLUTCH AND COUPLING IN SMALL SIZES

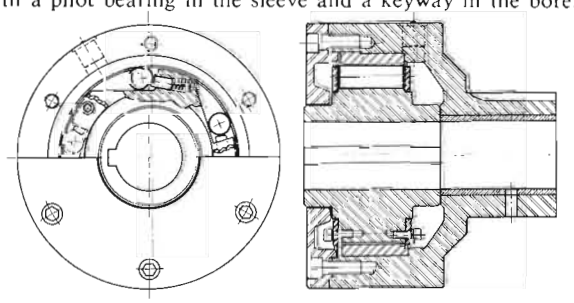
Sizes 1 through 4 have a single piece combined housing and sleeve—the hub and cam are also combined as a single hardened and ground part.

The inner member of Size 4 has no loose parts and can be removed as a unit. In Size 3 and smaller, the rollers are not attached to the cage plates and must be retained with a wire or rubber band around the pack when the mechanism is withdrawn.

The Type 1 Clutch is illustrated. Type 3 is the same but with a pilot bearing in the sleeve and a keyway in the bore.



SIZE 4



SIZES 2 AND 3

FREE-WHEELING RESISTANCE AND SPEED LIMITATIONS

The resistance or over-running drag torque is influenced to some extent by the speed. In the Drag Torque table the foot pound ratings are calculated for the maximum recommended freewheeling speeds. The figures are approximate and intended as a guide only, since several factors influence the resistance in each individual assembly. The drag torque may vary according to the fit of bearings and seals or the combination of machining tolerances and the operating conditions as well as the lubrication. The exact resistance can be determined only by testing the clutch under regular service conditions.

The maximum over-running speeds listed for the various clutches apply to "ideal" installations. The maximum values are possible only when proper lubrication is maintained and when there is no unusual load imposed on the clutch bearings. Shaft alignment in couplings also must be maintained especially when high speed is encountered.

It is always preferable to install an over-running clutch on the driving shaft so that during freewheeling periods the "outer housing member" will rotate. Although the maximum over-running speeds for "shaft rotating" are listed, the installation should be avoided unless circumstances prevent any other method of operation.

The maximum permissible "ratcheting" speed is determined by the load involved and will be calculated by Hilliard engineers for each individual installation after the application is described.

APPROXIMATE DRAG TORQUE AFTER RUN-IN (FT. LBS.)

Clutch or Coupling Size	OUTER MEMBER ROTATING—SHAFT AT REST				SHAFT ROTATING—OUTER MEMBER AT REST			
	TYPE 1		TYPES 3,8,83,95,96,98		TYPE 1		TYPES 3,8,83,95,96,98	
	Single Roll Torque	Double Roll Torque	Single Roll Torque	Double Roll Torque	Single Roll Torque	Double Roll Torque	Single Roll Torque	Double Roll Torque
1	.01	—	.01	—	.02	—	.02	
1½	.01	—	.01	—	.03	—	.03	
1¾	.02	—	.02	—	.08	—	.08	
2	.02	—	.03	—	.04	—	.05	—
3	.10	—	.15	—	.15	—	.20	—
4	.13	.17	.20	.24	.18	.23	.25	.30
H4	.13	—	.20	—	.35	—	.42	—
6	.60	.80	.9	1.1	.76	.99	1.5	1.7
7	1.2	1.6	1.8	2.2	1.4	1.8	2.1	2.5
8	1.5	2.0	2.2	2.7	1.8	2.3	2.5	3.0
10	2.7	3.6	4.0	4.9	3.3	4.2	4.6	5.5
12	9.6	12.8	14	17	11	13.5	15	18
14	15.0	20.0	22	27	17	22	24	29
16	18	24	27	33	20	26	29	35
18	40	53	60	73	42	56	63	76
20	46	60	69	83	49	63	72	86

SELECTING AND ORDERING THE CORRECT UNIT

EXAMPLE:

An over-running coupling is to be used to connect a standby geared type steam turbine and the fan on one side. Its purpose is to prevent the turbine from rotating when the primary electric motor on the other side drives the fan at 1160 RPM. The turbine is rated 40 HP at 1160 RPM and shaft size is 1⅞" diameter. The fan shaft is 2⅛" diameter. Only slight axial movement of the fan shaft is expected. Rotation is clockwise looking from the turbine toward the fan. Alignment can be maintained within 1° angular and .005" parallel.

SELECTION

1. Calculate the Horsepower per 100 RPM or the torque to be transmitted.

$$\text{HP/100 RPM} = \frac{\text{Driving HP} \times 100}{\text{Operating RPM}} = \frac{40 \times 100}{1160} = 3.45 \text{ HP}$$

$$\text{Torque} = \frac{\text{Driving HP} \times 5252}{\text{Operating RPM}} = \frac{40 \times 5252}{1160} = 181 \text{ Ft. Lbs.}$$

2. Determine type of coupling required from illustrations on Pages 4 and 5. Page 5 shows Type 98 or Type 95 coupling will suit alignment conditions and the end float but Type 95 is preferred for fan drives.

3. In Rating Section select size of coupling having nearest higher horsepower or torque rating.

   Size 6, Type 95 coupling rated 3.5 HP/100 RPM and 184 ft. lbs. torque agrees with the load conditions.

4. Determine if shaft sizes can be accommodated in selected unit. Dimension tables indicate 1⅞" turbine shaft is too large for Size 6 hub (Dimension A). Size 7 coupling is needed for shaft sizes involved.

5. Check the maximum over-running speed of the coupling selected and note the estimated freewheeling resistance in the table. The 1160 RPM over-running speed is less than the 2100 RPM maximum limit for Size 7, Type 95. The resistance or drag of approximately 1.8 ft. lbs. should not be objectionable so Size 7, Type 95 is the correct choice provided overall dimensions are acceptable.

INFORMATION REQUIRED WHEN ORDERING

1. Size or Model Number.
2. Type Number.
3. Bore and keyway sizes (specify which is driver and driven bore).
4. Direction of drive rotation.
5. Load to be transmitted. (Horsepower or Torque)
6. Operating RPM and Over-running RPM. For ratchet applications, indicate the number of strokes per minute and the length of stroke.
7. Quantity.

THE HILLIARD CORPORATION RESERVES THE RIGHT TO CHANGE SPECIFICATIONS AND DIMENSIONS AT ANY TIME. PLEASE CONTACT THE FACTORY FOR THE MOST CURRENT INFORMATION.

Hilliard
MOTION CONTROL DIVISION

The Hilliard Corporation
100 West Fourth Street
Elmira, New York, USA 14902-1504
Phone: 607-733-7121
Fax: 607-732-8979
http://www.hilliardcorp.com