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S98CA6MMEC…

In-Line Slip Clutches
pg. **13**-3

S98CA6MMOC…

In-Line Slip Clutches
pg. **13**-3

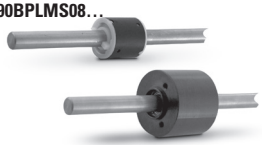
S90APLMP08…

Plastic Bearings Magnetic Particle Slip Clutches pg. **13**-6

S90APLMS08…

Ball Bearings Magnetic Particle Slip Clutches pg. **13**-6

S90BPLMP08…
S90BPLMS08…



Magnetic Particle Slip Clutches with Shaft pg. **13**-7

S9940YMSWC…

Spring-Wrapped Slip Clutches
pg. **13**-9

S9941YMSWC…

Spring-Wrapped Slip Couplings
pg. **13**-11

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Magnetic Clutches and Couplings
pg. **13**-16

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Magnetic Clutches and Couplings
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Magnetic Clutches and Couplings
pg. **13**-18

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pg. **13**-19

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Roller Clutches with Bearing Support
pg. **13**-20

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Roller Clutches with Bearing Support
pg. **13**-21

S90HB1M…

Hysteresis Brakes
pg. **13**-24

S90SB9M…

Power-Off Servo Brakes
pgs. **13**-25 & **13**-26

S90BF9M…

Power-On Flange-Mounted Brakes
pg. **13**-27

Technical Data

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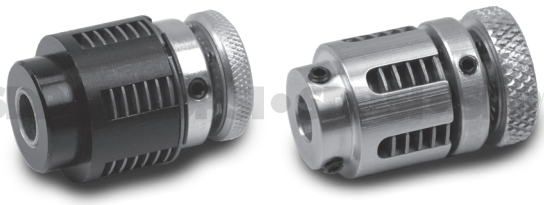
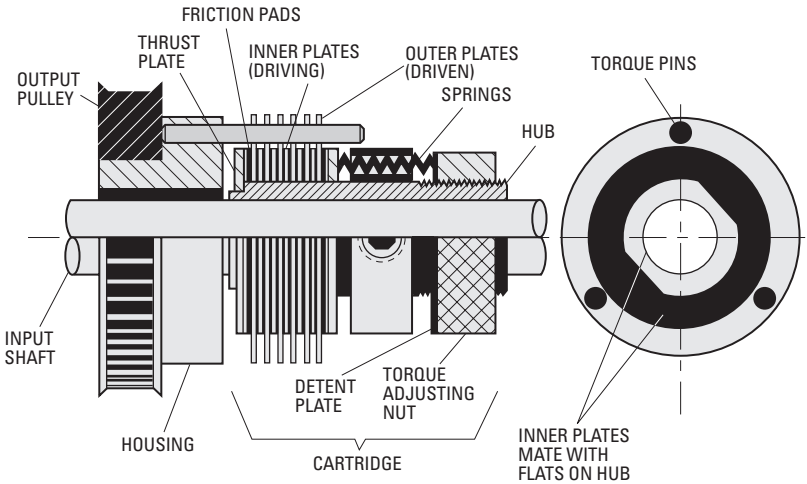


FUNCTION:

Multiplate slip clutches control torque for intermittent, continuous, or overload slip. It will drive in both directions, slip when the torque setting is reached, and resume driving as the load is reduced. These clutches are excellent as continuous or intermittent drag brakes, protection against overloads, for "soft starts," slip at the end of a stroke, as friction hinges, for screwing on container caps, etc.



CONSTRUCTION:

The clutch consists of two assemblies: a cartridge and a housing (see cutaway above). The cartridge is set-screwed or keyed to the input shaft. The housing is either set-screwed or keyed to the output shaft or, as shown, is attached to the output gear or pulley with a bronze bearing to allow relative motion between the input shaft and the output gear/pulley. Torque is transmitted from the flats on the hub to the mating flats on the inner plates, through the friction pads to the outer plates, through the torque pins to the housing and the output gear/pulley. The torque level is controlled by compressing the springs with the adjusting nut. For a fixed torque clutch, a collar is attached to the hub in a fixed position instead of the adjusting nut. In operation, either the input shaft or the housing can be the input member, with the other member being driven.

CAPACITY:

The clutch capacity as noted in the catalog is based on continuous operation at 50 rpm for over 25 million cycles. Torque, rpm, duty cycle and life are interdependent. A reduction of any of these will allow an increase in any other. Running at 25 rpm will allow twice the torque, or running for only 10% of the cycle will allow higher rpm, etc. The limit is based on heat buildup measured in watts:

English Unit Watts = Torque (lbf-in.) x rpm x 0.0118 x % Duty Cycle
Metric Unit Watts = Torque (N • m) x rpm x 0.104 x % Duty Cycle

For typical applications, see examples on page **13**-4.

MULTIPLATE DESIGN

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Metric

0 10

MATERIAL:

Fig. 1 - Housing - Zinc Plated Steel
Plates - Brass
Friction Materials - Proprietary (Nonasbestos)
Fig. 2 - Housing - Aluminum
Plates - Brass
Friction Materials - Proprietary (Nonasbestos)

Fig. 1

FEATURES:

Fully adjustable within rating limits
Low stick / slip ratio
Continuous slip within dissipation limit
Available with bronze bearing in hub end so that gear, pulley, etc. can be mounted on hub "D_1"
Available with other bores as special order

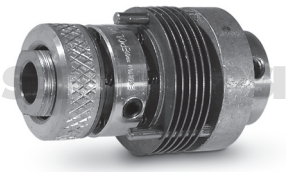

Fig. 2

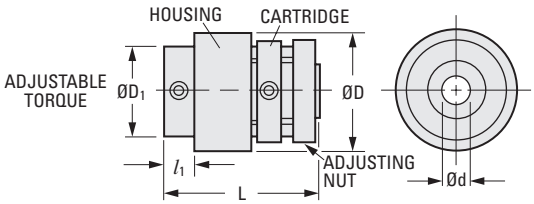

Fig. 1

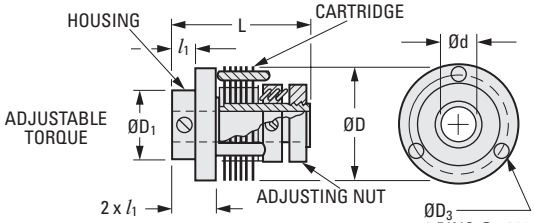

Fig. 2

METRIC COMPONENT

Catalog Number	D Body Dia. ± 0.5	d Bore Std. +0.05 0	d Bore Max. Bore Spec.	L Length ± 0.05	D_1 Hub Dia. ± 0.05	l_1 Hub Length	Bore Depth Hub End	Bore Depth Cart. End	Torque* Range N • cm @ 50 rpm	Dissip.* Power Watts	Friction Surfaces
Fig. 1											
S98CA6MMEC250827	25.4	8	10	26.9	19.3	6.3	7.8	19.1	0.23 to 22.6	1	2
S98CA6MMEC250833				33.3				25.4	1.13 to 113	5.8	8

Catalog Number	D Body Dia. ± 0.5	d Bore Std. +0.05 0	d Bore Max. Bore Spec.	L Length ± 0.05	D_1 Hub Dia. ± 0.05	l_1 Hub Length	Bore Depth Hub End	Bore Depth Cart. End	D_2	D_3	Torque* Range N • cm @ 50 rpm	Dissip.* Power Watts	Friction Surfaces
Fig. 2													
S98CA6MMOC320838	31.8	8	10	38.1	19.3	6.3	12.7	25.4	26.98	2.38	1.13 to 113	6	8
S98CA6MMOC381063	38.1	10	13	63.5	25.7	9.4	19.1	44.5	33.32	3.17	5.65 to 282	14.5	12
S98CA6MMOC511273	50.8	12	16	72.9	35.1	12.7	25.4	47.7	42.47	4.78	9.04 to 564	29	12
S98CA6MMOC701273	69.9				41.4				60.33		11.3 to 847	43	

*See Technical Applications page.

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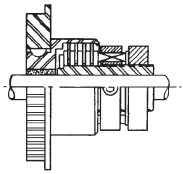
Metric
0 10

UNLIMITED APPLICATIONS:*

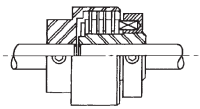
Intermittent motion
Indexing
Phase adjustment
Feeding
Torque limiting
Hinging
Many more

*The ingenuity of engineering has led to applications with labelers, indexing, film transport, instrumentation, business machines, computer peripherals, packaging, mailing, plotters, paper feeds and many more. We supply stock clutches or we work with you to develop units for your specific applications.

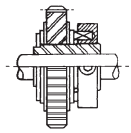
TYPICAL MULTIPLATE SLIP CLUTCH APPLICATIONS:



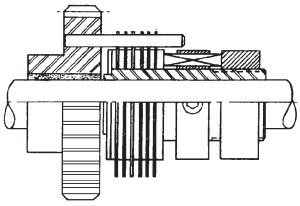
TIMING BELT ON HOUSING
Timing belt drives housing. Torque transmitted through adjustable pressure plates to shaft. Also operates as shaft input to timing belt.



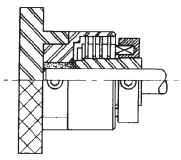
SHAFT-TO-SHAFT CONTROL
Either shaft as input. Fixed torque transmitted through pressure plates. Shafts must be journalized. Also can be adjustable torque.



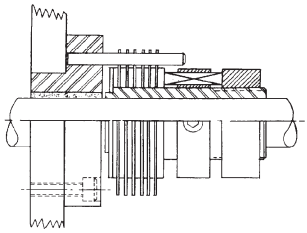
SLIP CARTRIDGE WITH GEAR
Pressure pads transmit torque directly to gear for space saving package.



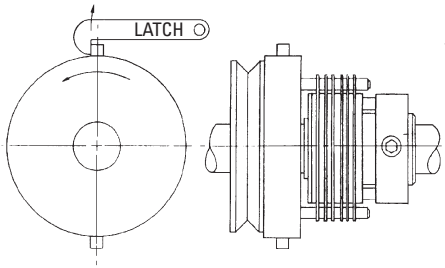
CLUTCH WITH A MODIFIED GEAR
Torque transmitted directly from gear through pins to adjustable pressure plates.



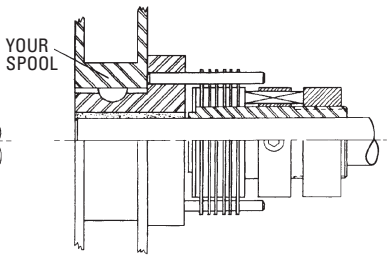
KNOB WITH TORQUE PROTECTION
Knob connected directly to housing. Fixed torque transmitted to shaft. Will slip above preset torque.



BRAKE TO FRAME OF MACHINE
Outer pressure plates held to machine frame. Adjustable braking pressure transmitted to shaft.



"SINGLE" REVOLUTION CLUTCH
Input shaft turns continuously. Output shaft turns when latch is disengaged. Single revolution, partial revolution, or multi-revolutions can be designed.



CONSTANT TORQUE – SUPPLY OR REWIND SPOOL
Slip clutch mounted directly to spool will give constant torque. Mounted directly to constant diameter cylinder will give constant tension. Many variations available to control wire supply system.

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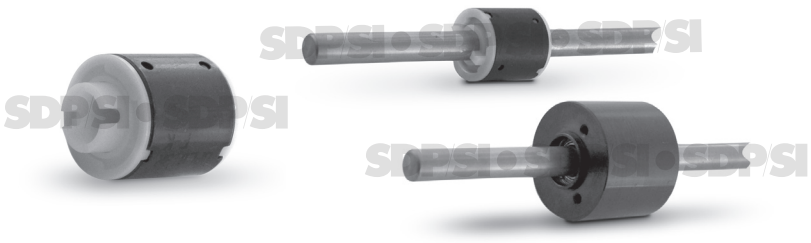

DESIGN:

The magnetic particle slip clutch uses a sealed, steel outer housing and permanent magnets arranged alternately (north and south poles) around a central hub.

The space between the housing and the magnets is filled with a ferromagnetic compound (hysteresis particles). The particles align themselves along the flux pattern between the steel housing and the magnets, creating a magnetic coupling between them. (See Fig. 1)

The torque rating is determined by the number of particles added. The clutches can be manufactured in the range from 2.82 to 39.55 N • cm. Because the coupling is magnetic, torque value remains stable over time, temperature and speed value.

APPLICATIONS:

One of the applications is for paper feeding devices on scanners, copy machines and fax machines. Paper is an abrasive material. Pages often stick together and usually the thickness of the paper is different. The paper feeding device uses a powered roller to "urge" the top sheet off an infeed stack toward the interface between a second pair of rollers just beyond the urging mechanism. On the second pair, one of the rollers is powered; the second is unpowered, spring-loaded against the first and rides on a shaft linked to the chassis through the magnetic particle clutch. With no paper in the feeder mechanism, the clutch slips; when a single page is drawn between rollers, friction between the rollers and the paper remains high enough to maintain slippage and paper passes through the mechanism normally.

If two or more pages are drawn in, the coefficient of friction between the pages is not high enough to drive the unpowered roller. The slip clutch now acts as a drag brake holding back the lower roller. The roller stalls, preventing all but the top page from continuing through the feed device.

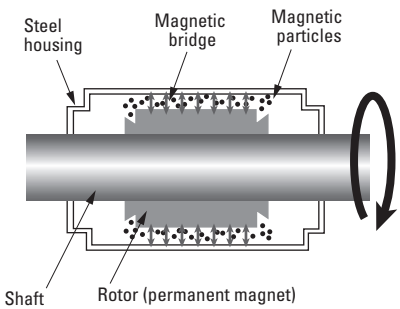

Fig. 1
Reversible Magnetic Particle Slip Clutch

MAGNETIC PARTICLE SLIP CLUTCHES

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ZERO MAINTENANCE
CONSTANT TORQUE LEVELS

Metric
0 10

MATERIAL:

Shell - Steel
End Caps - Plastic

FEATURES:

Requires no power
Uses permanent magnets and magnetic particles
Long operational life
Sealed from contamination

SPECIFICATIONS:

d Tolerances:
Fig. 1: +0.1/0
Fig. 2: +0.022/0
*D_1 Tolerance: 0/-0.033 (h8)

**Optional torques available only by special order.

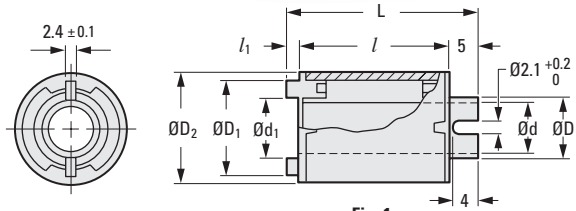

Fig. 1

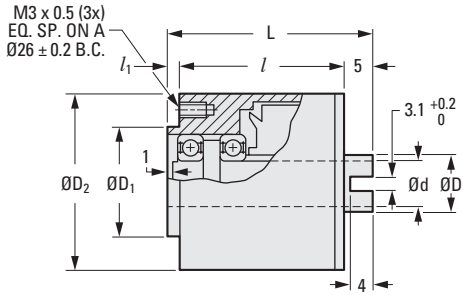

Fig. 2

METRIC COMPONENT

Catalog Number	d Bore	d_1	D Hub Dia.	D_1 Hub Dia.	D_2	l	l_1 End Lgth.	L Total Lgth.	Max. Allowable Speed rpm	Torque ± 10% Nominal Static N•m	Torque ± 10% Nominal Opt. Range** N•m	Weight kg
Fig. 1 Plastic Bearings												
S90APLMP08030028	8	11	11	17	20	20	2.5	27.5	300	0.030	0.019 - 0.040	0.025
S90APLMP08060028										0.060	0.040 - 0.060	
S90APLMP08120035	8	11	11	17	20	27	2.5	34.5	250	0.120	0.060 - 0.120	0.030
Fig. 2 Ball Bearings												
S90APLMS08099037	8	—	10	20*	32	30	2	37	400	0.099	0.070 - 0.099	0.120
S90APLMS08150037										0.150	0.099 - 0.150	
S90APLMS08199044	8	—	10	20*	32	37	2	44	300	0.199	0.150 - 0.199	0.150
S90APLMS08301044										0.301	0.199 - 0.301	

NOTE: When the slip clutch is to be subjected to any radial or axial thrust, use of the ball bearing design is required. Units should be used on horizontal shafts only.

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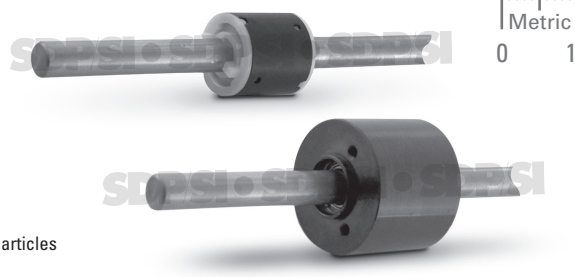
ZERO MAINTENANCE
EASY INSTALLATION
CONSTANT TORQUE LEVELS
INTEGRAL SHAFT

Metric
0 10



› MATERIAL:

Shell - Steel
End Caps - Plastic
Shafts - Steel

› FEATURES:

Requires no power
Uses permanent magnets and magnetic particles
Long operational life
Sealed from contamination

*Optional torques available only by special order.

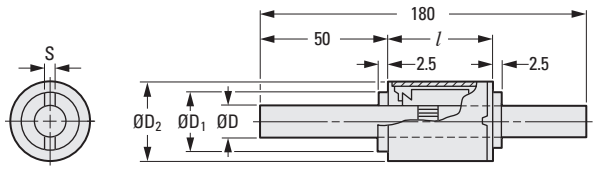


Fig. 1

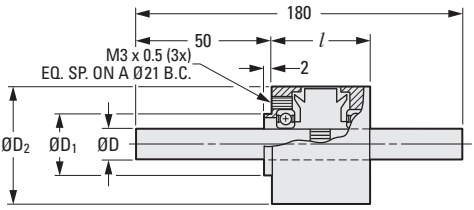


Fig. 2

METRIC COMPONENT

Catalog Number **	D Shaft Dia. 0 -0.03	D1 Hub Dia.	D2	S	l	Max. Allowable Speed rpm	Torque ± 10% Nominal Static N • m	Torque ± 10% Nominal Opt. Range* N • m
Fig. 1 Plastic Bearings								
S90BPLMP08030025	8	15	20	2.4	20	300	0.030	0.019 - 0.040
S90BPLMP08060025							0.060	0.040 - 0.060
S90BPLMP08120032	8	15	20	2.4	27	250	0.120	0.060 - 0.120
S90BPLMP08181039					34	200	0.181	0.120 - 0.181
Fig. 2 Ball Bearings								
S90BPLMS08099028	8	15	32	—	26	400	0.099	0.070 - 0.099
S90BPLMS08150028							0.150	0.099 - 0.150
S90BPLMS08199035	8	15	32	—	33	300	0.199	0.150 - 0.199
S90BPLMS08301035							0.301	0.199 - 0.301
S90BPLMS08398042	8	15	32	—	40	200	0.398	0.301 - 0.398

NOTE: When the slip clutch is to be subjected to any radial or axial thrust, use of the ball bearing design is required. Units should be used on horizontal shafts only.

SPRING-WRAPPED SLIP CLUTCHES

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Metric
0 10

FEATURES:

Long life under continuous slip conditions
Unidirectional or bidirectional operation
Same or different clockwise and counterclockwise torques
Precise and stable limit torque calibration (range: 0.007 to 4.24 N • m)
Same torque at breakaway as at high slip velocities
Mounting provisions for gear, sprocket or pulley
Corrosion-resistant materials

APPLICATIONS:

Tension control of film or tape drives
Transmission overload protection

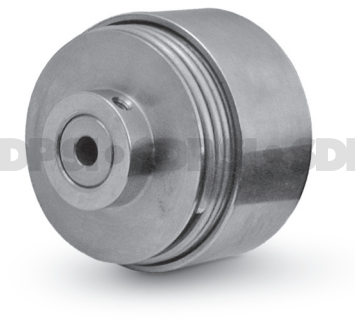
SPECIAL DESIGNS:

The standard line of slip elements provides a wide selection of limit torques, sizes and coupling arrangements. In addition, our engineers will modify designs to meet your specific requirements in such areas as:
Configuration
Driving arrangement
Limit torques from a fraction of a N • cm to many N • m's
Calibration of torque to a tolerance of ± 5%
Different limit torques for the two directions of rotation
Spring windup and limit torque combination. The spring action of the slip element is useful for tensioning of tape and prevention of slack loops.

*Stock units are calibrated with equal clockwise and counterclockwise slip torques corresponding to the tabulated Upper Limit Torques. Other torques are readily available from full, down to 1/8 of the Upper Limit Torque for each model. Torque values are independent of each other for clockwise and counterclockwise rotation, and may be specified the same or different for the two directions.

**All clutches in this series have a pilot diameter "D_3" and three tapped holes "T_1" for mounting a gear, sprocket or pulley on the input hub. Screw penetration into the clutch housing must not exceed the depth specified in column "T_1". Concentricity of pilot diameter "D_3" to bore "d" is 0.025 T.I.R. max.

All slip clutches are designed for long life under continuous slip conditions. The useful life of these elements is a function of the transmitted torque and slip speed.



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Metric

0 10

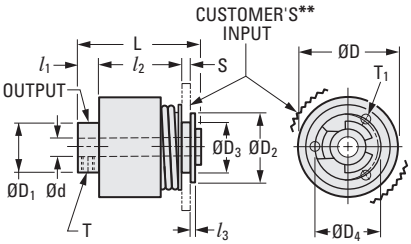

Fig. 1

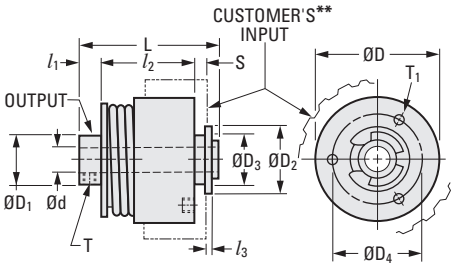

Fig. 2

METRIC COMPONENT

Catalog Number	Fig. No.	d Bore +0.025 0	D	L	l_1	l_2	S	l_3	T Set Screw	D_1 Max.	D_2 Max.	D_3 0 -0.025	D_4	T_1	Upper* Limit Torque N • m	Wt. g
S9940YMSWC16X03	1	3	16	26.7	4.57	18.29	2.03	0.76	M1.6	13	11.43	9.5	12.7	M2X3	0.064 ± 0.007	26
S9940YMSWC16X04		4														
S9940YMSWC25X04		4	25.4	31.5	5.33	21.59	2.41	1.02	M3	22.4	17.27	12.675	16.51		0.141 ± 0.014	68
S9940YMSWC25X06		6														
S9940YMSWC25X08		8														
S9940YMSWC32X06	2	6	31.75	35.3	5.84	23.88	3.3	1.02	M4	25.7	17.27	12.675	23.5	M2X3	0.339 ± 0.035	117
S9940YMSWC32X08		8														
S9940YMSWC38X06	1	6	38.1	35.3	5.84	23.88	3.3	1.02	M4	25.7	17.27	12.675	23.5	M3X4	0.565 ± 0.057	213
S9940YMSWC38X08		8								32						
S9940YMSWC48X06	1	6	47.5	42.4	6.35	30.48	3.3	1.02	M4	32	17.27	12.675	19.2	M3X4	0.847 ± 0.085	355
S9940YMSWC48X08		8								38.4						
S9940YMSWC48X10		10		47.8	7.37	34.04				38.4		12.675	29.72		1.059 ± 0.106	482
S9940YMSWC48X12		12										19.025				
S9940YMSWC57X06	2	6	57.15	47.8	7.37	34.04	3.3	1.02	M4	51.1	18.8	19.025	29.72	M3X4	1.695 ± 0.170	582
S9940YMSWC57X08		8														
S9940YMSWC57X10		10														
S9940YMSWC57X12		12														
S9940YMSWC67X08	1	8	66.55	47.8	8.13	33.27	3.3	1.02	M5	51.1	18.8	19.025	29.72	M4X5	2.540 ± 0.250	794
S9940YMSWC67X10		10														
S9940YMSWC67X12		12														
S9940YMSWC76X16	1	16	76.2	58.4	—	50.17	5.72	1.17	M6 2 @ 120°	76.5	27.94	28.55	37.6	M2X3	3.390 ± 0.340	993
S9940YMSWC76X19		19														
S9940YMSWC76X20		20														

* or ** See Preceding Page

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Metric
0 10

FEATURES:

Long life under continuous slip conditions
Unidirectional or bidirectional operation
Same or different clockwise and counterclockwise torques
Precise and stable limit torque calibration (0.0035 to 1.695 N • m)
Same torque at breakaway as at high slip velocities
Corrosion-resistant materials

APPLICATIONS:

Tension control of film or tape drives
Friction loads for testing components
Transmission overload protection

RECOMMENDED MOUNTING PROCEDURE:

Coupling is slipped over one shaft and applicable screws tightened.
Second shaft is inserted into other end of coupling.
Pull loose end of coupling back about 0.5 mm and tighten applicable screws.

The slip coupling serves as a torque limiter as well as a coupling for two colinear shafts. This coupling is equipped with hubs at both ends for pinning to the two shafts. When the load exceeds the limit torque of a slip coupling, the two shafts rotate relative to each other at the full limit torque. The standard coupling is designed to operate with 3° angular or linear misalignments of up to 0.25 mm between the two shafts. The mounting hole diameters of the slip couplings can differ for the two ends, so that different diameters of "in-line" shafts can be coupled together.

*Stock units are calibrated with equal clockwise and counterclockwise slip torques corresponding to the tabulated Upper Limit Torques. Other torques are readily available from full, down to 1/8 of the Upper Limit Torque for each model. Torque values are independent of each other for clockwise and counterclockwise rotation, and may be specified the same or different for the directions.

This series of slip couplings is designed for long life under continuous slip conditions. The useful life of these elements is a function of the transmitted torque and slip speed.

COVERED BY U.S. PATENTS AND PATENTS PENDING

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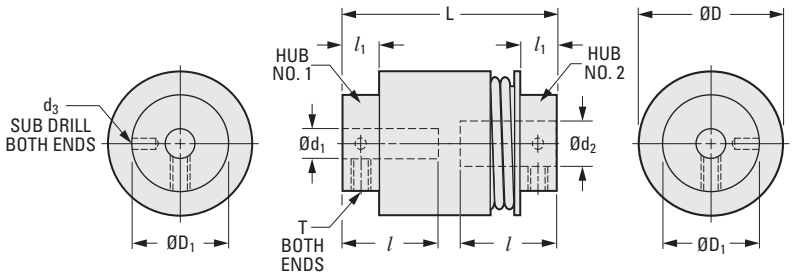
Metric



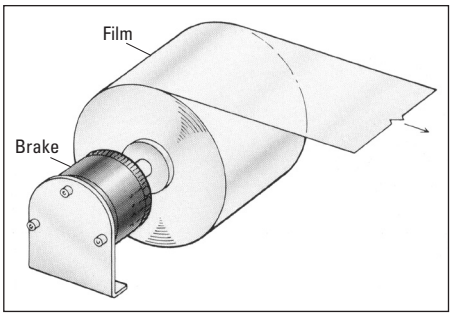
METRIC COMPONENT

Catalog Number	d_1 Bore +0.025 0	d_2 Bore +0.025 0	D ±0.5	L ±0.8	D_1 Max.	l	l_1 ±0.5	T Set Screw	d_3 Sub Drill	Upper Limit Torque* N • m	Weight g
S9941YMSWC12X33	3	3	12.7	22.6	12.7	10.9	4.32	M2	.74	0.035 ± 0.005	17
S9941YMSWC12X34	3	4									
S9941YMSWC12X44	4	4									
S9941YMSWC19X44	4	4	19.05	28.2	16	12.7	4.83	M3	1.02	0.085 ± 0.008	34
S9941YMSWC19X46	4	6									
S9941YMSWC19X66	6	6									
S9941YMSWC25X44	4	4	25.4	32	19.3	14	4.83	M3	1.02	0.141 ± 0.014	74
S9941YMSWC25X46	4	6									
S9941YMSWC25X66	6	6									
S9941YMSWC31X66	6	6	31.75	36.3	25.7	15.75	6.35	M4	1.4	0.339 ± 0.035	108
S9941YMSWC31X6A	6	10									
S9941YMSWC31XAA	10	10									
S9941YMSWC38X88	8	8	38.1	40.4	32	18.54	6.35	M4	1.4	0.622 ± 0.063	184
S9941YMSWC38XAA	10	10									
S9941YMSWC47XAA	10	10	47.5	46.74	38.4	21.6	7.11	M4	1.4	0.847 ± 0.085	312
S9941YMSWC47XAC	10	12									
S9941YMSWC47XCC	12	12									
S9941YMSWC57XAA	10	10	57.15	57.15	51.1	25.4	9.65	M5	2.36	1.695 ± 0.170	624
S9941YMSWC57XAC	10	12									
S9941YMSWC57XCC	12	12									
S9941YMSWC57XCG	12	16									
S9941YMSWC57XGG	16	16									

*See Preceding Page.

UNWIND TENSION CONTROL

Brake mounted on shaft of unwind spool or bobbin.



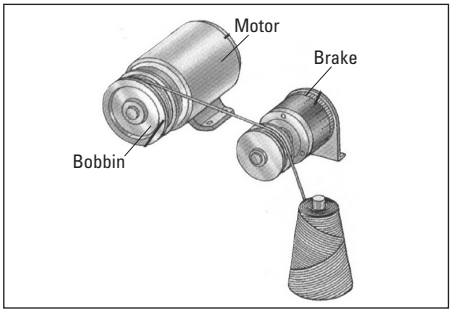
Film Unwind - Tension provided by hysteresis units.

Information required: (Example)
Full diameter = 150 mm
Empty core diameter = 75 mm
Average tension = 5 N
Velocity (meters per min.) = 50 m/min.

How to size:
Avg. radius = [Full roll dia. + Empty dia.] / 4
= (150 +75) / 4 = 56.25 mm = 0.056 m
Avg. torque (N • m) = avg. tension (N) x avg. radius (m)
= 5 x 0.056 = 0.28 N • m

1. Select Catalog Number **S90MCCMMTL0806** based on 0.28 N • m
2. Check Operating Curve
   The Max. rpm occurs at the min. radius
   Max. rpm = Velocity / (Empty dia. x π)
   = (50 m/min.) / [(0.075 m) x π]
   = 212 rpm
   0.28 N • m at 212 rpm is okay.

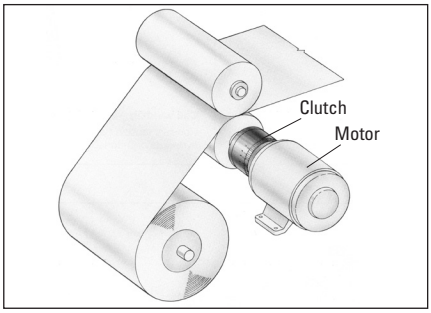
NIP ROLL OR PULLEY TENSION CONTROL



Coil Winding - Constant tension provided by hysteresis unit.

Information required: (Example)
Pulley diameter or nip roll = 76 mm
Tension = 10 N
Velocity = 100 m/min.

How to size:
Torque (N • m) = Tension x Radius
= 10 N x [(0.076 m) / 2] = 0.38 N • m



Film Tensioning - Constant tensioning supplied by hysteresis unit.

1. Select Catalog Number **S90MCCMMTL0806** based on 0.38 N • m
2. Check Operating Curve
   Max. rpm = (100 m/min.) / (0.076 m x π) = 419 rpm
   419 rpm is too high for continuous duty on the **S90MCCMMTL0806** unit.
3. Select Catalog Number **S90MCCMMTL1612**

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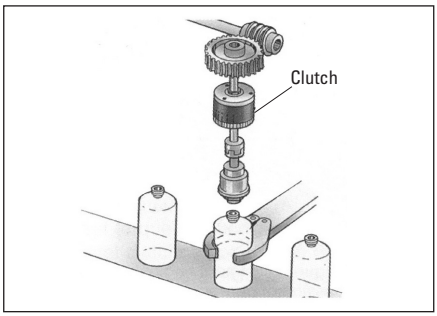
Metric

0 10

CYCLING

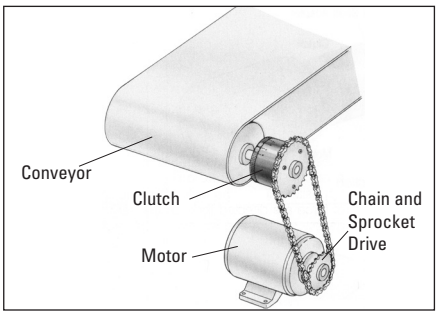


Bottle Capping - Constant torque provided by a hysteresis clutch.

Information required: (Example)
Slip rpm = 350 rpm
Torque = 1 N • m
Duty cycle (% slip time of total cycle time) = 25%

How to size:
1. Select Catalog Number **S90MCCMMTL1612** based on 1 N • m
2. Check Operating Curve
   350 rpm is high, but as the duty cycle is only 25%, the Catalog Number **S90MCCMMTL1612** is okay.

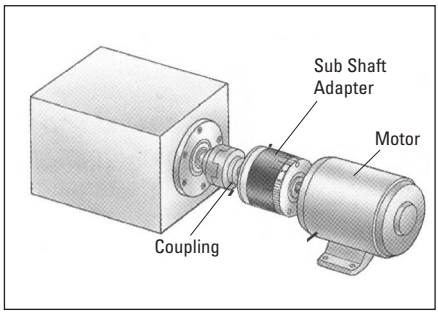
OVERLOAD PROTECTION TORQUE LIMITING SOFT START (Motor Horsepower Method)



Torque Limiting - Hysteresis clutch provides overload protection.

Information required: (Example)
Motor HP = 0.07 kw (1/10 HP)
Motor rpm = 900 rpm

How to size:
Torque (N • m) = (Motor HP x 9550) / Motor rpm
= [0.07 kw x 9550] / 900 = 0.74 N • m



Material Handling - Hysteresis clutch can provide overload protection and soft start.

1. Select Catalog Number **S90MCCMMTL1628** based on 0.74 N • m
2. Check Operating Curve
   0.75 N • m is at the upper limit of safe continuous operation, but is okay.

ADVANTAGES:

No electricity
No breakaway torque
Constant torque independent of shaft (rotor) speed
No contacting or wearing parts
No friction elements – same smooth torque year after year
No magnetic particles to leak or contaminate end product
Operable in some of the most difficult environments
Brake (with shaft) and clutch (with hollow shaft) available
Custom designs available

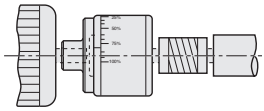


Fig. 1

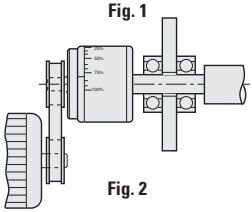


Fig. 2

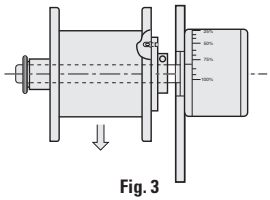


Fig. 3

APPLICATIONS:

Fig. 1 As a Coupling
This is for load protection or torque limiting. The coupling style unit is directly connected to a motor and turns at the same speed as the motor until the torque is reached. At this point it will slip and still generate the maximum torque.

Fig. 2 As a Clutch
The unit is connected to a motor by a timing belt or gear. The housing is driven and the shaft is the output end.

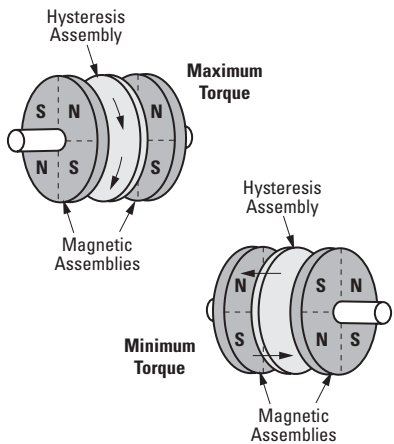
Fig. 3 As a Payout Brake
Brake is stationary and the reel or material is fitted to the output shaft. The tension on the material will vary with the diameter.

HOW THEY OPERATE:

For Maximum Torque
All important internal clearances are ground to tolerances of less than .001 in. (0.025 mm). Magnet assemblies surround hysteresis assembly. When like poles face each other, they produce maximum magnetic saturation of the hysteresis disc, forcing lines of flux to travel circumferentially through the hysteresis disc.

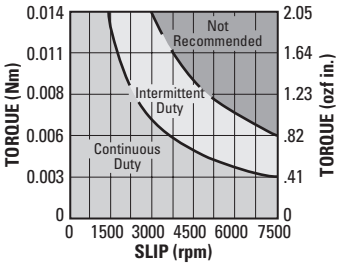
For Minimum Torque
When opposite poles face each other they produce minimum saturation of the hysteresis disc. The lines of flux travel through the hysteresis disc.

Combinations of adjustment angles between the two extremes give infinite adjustability. Because there are no contacting surfaces, the setting can be maintained indefinitely.

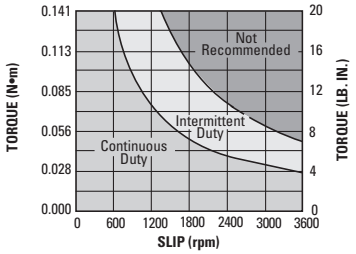


› HOW TO USE THE CURVES:

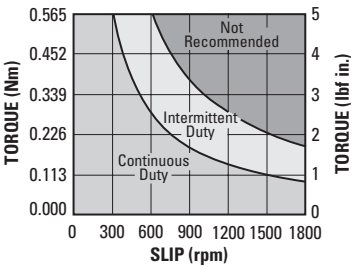
Find the slip rpm on the X-axis and the torque on the Y-axis. Notice the areas that represent safe, continuous duty; intermittent duty, such as five minutes on, five minutes off; and the area which is not recommended. Operating above that line for any period of time will cause overheating and possible damage to the unit.



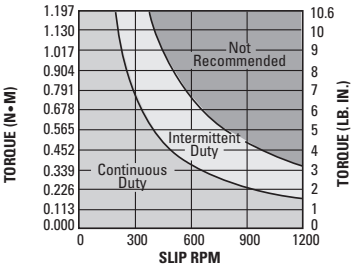
S90MCCM513...



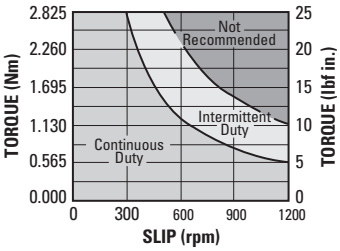
S90MCC-MTL25001
S90MCCMMTL0601



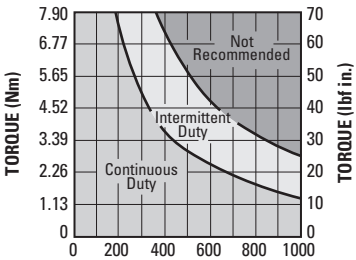
S90MCC-MTL37505
S90MCCMMTL0806



S90MCC-MTL37510
S90MCC-MTL50010
S90MCC-MTL62510
S90MCCMMTL1612



S90MCC-MTL50025
S90MCC-MTL62525
S90MCCMMTL1628



S90MCCMM806...

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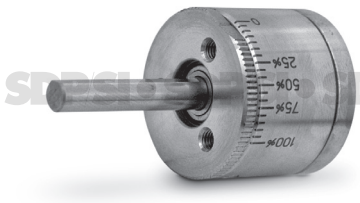
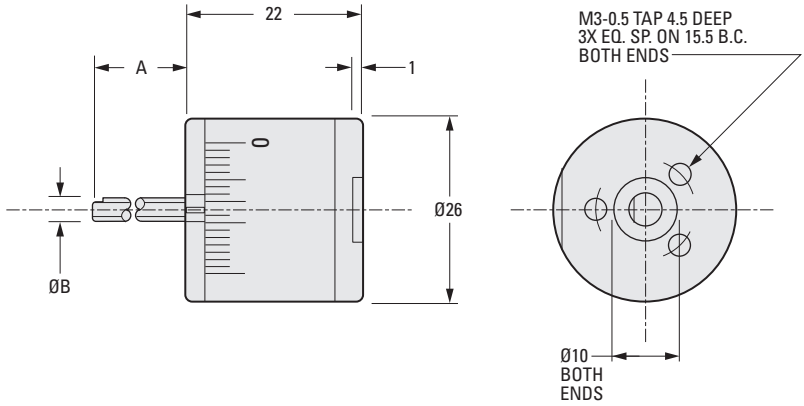
0.0003...0.014 N • m TORQUE RANGE
NONELECTRIC
NO WEARING PARTS
NO FRICTION

Metric
0 10

› **MATERIAL:**
Housing and Shaft - Stainless Steel





The projections shown are per ISO convention.

METRIC COMPONENT

Catalog Number	B Shaft 0 -0.03	A Shaft Length	Torque Range N•m	Weight kg
S90MCCM5130213	5	13	0.0003...0.002	0.071
S90MCCM5130225		25		
S90MCCM5130713	5	13	0.001... 0.007	0.071
S90MCCM5130725		25		
S90MCCM5131413	5	13	0.001... 0.014	0.071
S90MCCM5131425		25		

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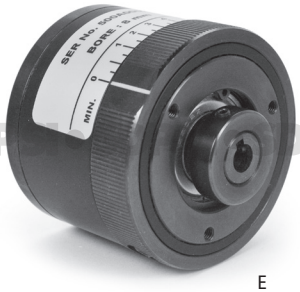
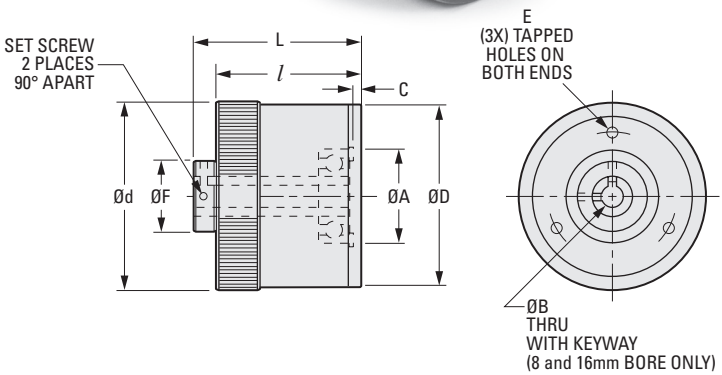
0.007...2.83 N • m TORQUE RANGE
NONELECTRIC
NO WEARING PARTS
NO FRICTION
HOLLOW BORE

Metric
0 10

› **MATERIAL:**
Housing - Aluminum, Black Anodized Finish
Dial - Steel, Black Oxide Finish





The projections shown are per ISO convention.

METRIC COMPONENT

Catalog Number	B Bore +0.025 0	L Length	*l*	D	d	A	C	Torque Range N • m
S90MCCMMTL0601	6	42	36	47.5	49.5	22	2	0.007...0.14
S90MCCMMTL0806	8	62	54	69	70	35		0.02 ...0.56
S90MCCMMTL1612	16	64	56	82	84	47	2	0.06 ...1.2
S90MCCMMTL1628		79	68	116	119	62		0.11 ...2.83

Catalog Number (Ref.)	F Hub Dia.	Set Screw	E			Keyway	Weight kg
			Thread	Depth	Bolt Circle		
S90MCCMMTL0601	19	M4	M4 -0.7	8	32	–	0.33
S90MCCMMTL0806	27		M4	10	48	3	1.04
S90MCCMMTL1612	37	M5	M5	10	60.33	5	1.62
S90MCCMMTL1628	35		M5 -0.8	12	76.2		4.07

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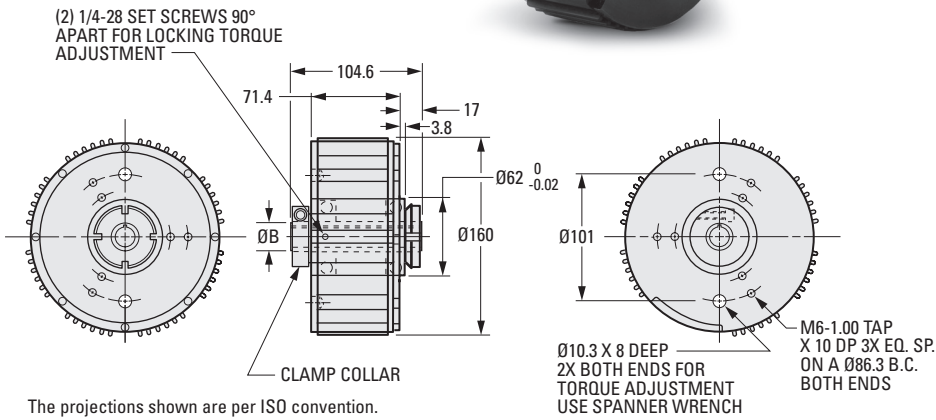
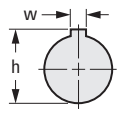
0.33...7.9 N • m TORQUE RANGE
NONELECTRIC
NO WEARING PARTS
NO FRICTION
HOLLOW BORE

Metric
0 10

› **MATERIAL:**
Housing - Aluminum, Black Anodized Finish
Dial - Steel, Black Oxide Finish



The projections shown are per ISO convention.



Keyway Dimensions		
Bore	**16**	**19**
w +0.05/0	5	6
h +0.25/0	18.3	21.8

METRIC COMPONENT

Catalog Number	B Bore +0.025 0	Torque Range N • m	Weight kg
S90MCCM80616	16	0.33...7.9	6.45
S90MCCM80619	19		

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FOR 4 mm TO 35 mm HARDENED SHAFTS
UNIDIRECTIONAL DRIVE

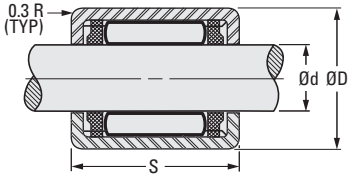
Metric
0 10

MATERIAL:
Roller Cup - Case-Hardened Steel
Needle Bearing - 52100 Hardened Chrome Steel
Springs - Stainless Steel
Cage - Nylon 66 (or Equivalent)

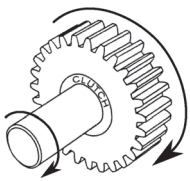
FEATURES:
Ideal for indexing, backstopping or overrunning operations.
Free rolling one way, drives in opposite direction.
Lightweight, low profile.
High indexing frequency, up to 4CPS.
Operating temperature, grease +10°C to +70°C.
Minimum backlash.

SHAFT REQUIREMENTS:
Shaft surface hardness must be HRC 58 min.

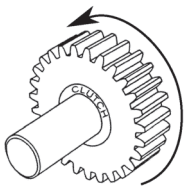
HOUSING RECOMMENDATION:
Recommended tolerances for housing bore according to N7 for steel, R7 for aluminum.



What It Does…
Transmits torque load in one direction. Overruns freely in opposite direction. Either shaft or housing can be driving member.

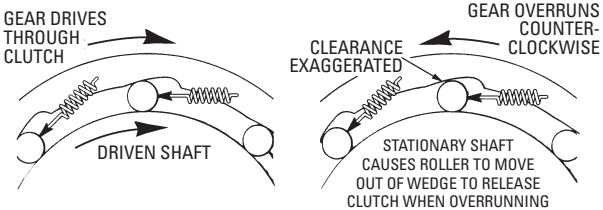


GEAR DRIVES
SHAFT CLOCKWISE



GEAR OVERRUNS
SHAFT COUNTERCLOCKWISE

How It Works…
Rollers wedge between shaft and outer race. Positive wedging forces prevent slipping. Springs position rollers for instantaneous lockup.



METRIC COMPONENT

Catalog Number	d Shaft Dia. h6	D Dia.	S Face Width 0 -0.2	Max. Torque N • m	Rotating Overrun Speed Max. rpm	
					Shaft	Housing
S99NH3MURC0406	4	8	6	0.34	34000	8000
S99NH3MURC0612	6	10	12	1.76	23000	13000
S99NH3MURC0812	8	12		3.15	17000	12000
S99NH3MURC1012	10	14		5.3	14000	11000
S99NH3MURC1216	12	18	16	12.2	11000	8000
S99NH3MURC1416	14	20		17.3	9500	8000
S99NH3MURC1616	16	22		20.5	8500	7500
S99NH3MURC1816	18	24		24.1	7500	7500
S99NH3MURC2016	20	26		28.5	7000	6500
S99NH3MURC2520	25	32	20	66	5500	5500
S99NH3MURC3020	30	37		90	4500	4500
S99NH3MURC3520	35	42		121	3900	3900

SDP/SI

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SINTERED BEARING SUPPORT
UNIDIRECTIONAL DRIVE

Metric
0 10

› MATERIAL:

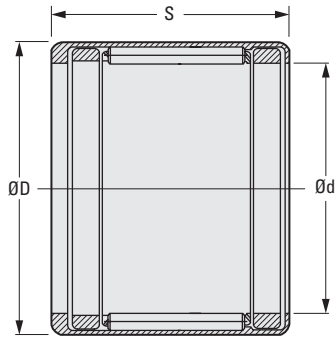
Roller Cup - Case-Hardened Steel
Needle Bearing - 52100 Hardened Chrome Steel
Springs - Stainless Steel
Cage - Plastic
Bearing Support - Sintered Bronze Bearings

› SHAFT REQUIREMENTS:

Shaft surface hardness must be HRC 58 min.

› HOUSING RECOMMENDATION:

Recommended tolerances for housing bore are N6 for steel, R6 for aluminum. Tolerances for housing bore of N7 for steel and R7 for aluminum can be used if only 50% of the torque is used.



METRIC COMPONENT

Catalog Number	d Shaft Dia. h6	D Dia.	S Face Width 0 -0.2	Torque Limit N • m	Max. Speed Limit rpm		Max. Load Limit N	Max. Load Speed Limit N/min.
					Shaft	Housing		
*Δ S99NH4MURC0408	4	8	8	0.34	34000	8000	80	16000
* S99NH4MURC0615	6	10	15	1.76	23000	13000	110	18000

Continued on the next page

* During operation of the above items:
F max. = Load Speed Limit (N/min.)
F_R = Load Limit (N)
n = Speed Limit (housing or shaft) (rpm)
F_R • n = F max.
Δ Equipped with plastic springs.

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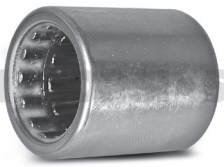
NEEDLE BEARING SUPPORT
UNIDIRECTIONAL DRIVE

Metric
0 10



MATERIAL:

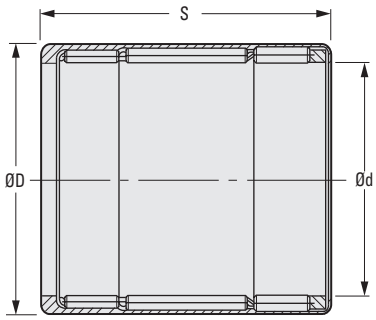
Roller Cup - Case-Hardened Steel
Needle Bearing - 52100 Hardened Chrome Steel
Springs - Stainless Steel
Cage - Plastic
Bearing Support - Needle Bearings

SHAFT REQUIREMENTS:

Shaft surface hardness must be HRC 58 min.

HOUSING RECOMMENDATIONS:

Recommended tolerances for housing bore are N6 for steel, R6 for aluminum. Tolerances for housing bore of N7 for steel and R7 for aluminum can be used if only 50% of the torque is used.



METRIC COMPONENT

Catalog Number	d Shaft Dia. h6	D Dia.	S Face Width 0 -0.2	Max. Torque N • m	Rotating Overrun Speed Max. rpm		Load Ratings N	
					Shaft	Housing	Dynamic	Static
S99NH4MURC0822	8	12	22	3.15	17000	12000	3500	4100
S99NH4MURC1022	10	14		5.3	14000	11000	3750	4650
S99NH4MURC1226	12	18	26	12.2	11000	8000	5800	6700
S99NH4MURC1426	14	20		17.3	9500	8000	6300	7800
S99NH4MURC1626	16	22		20.5	8500	7500	6900	9000
S99NH4MURC1826	18	24		24.1	7500	7500	7400	10200
S99NH4MURC2026	20	26		28.5	7000	6500	7900	11400
S99NH4MURC2530	25	32	30	66	5500	5500	9800	14000
S99NH4MURC3030	30	37		90	4500	4500	10800	16900
S99NH4MURC3530	35	42		121	3900	3900	11400	18800

Continued from the previous page

› FEATURES:

Torque proportional to input current.
Torque virtually independent of slip speed.
Smooth stable, noise-free operation.
Long-life no-wearing components.
Maintenance-free.
Infinitely adjustable.

› APPLICATIONS:

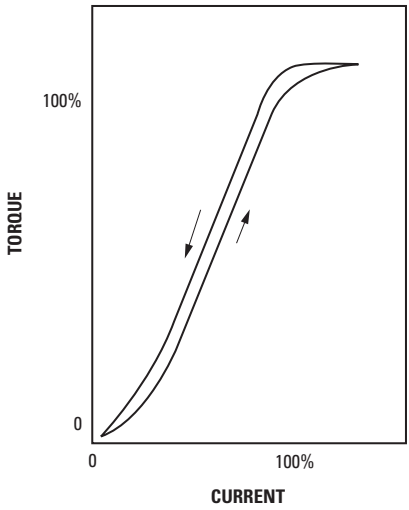
Tensioning of wire, cable, films, paper, etc.
Positioning of fuel flow controls, film processors
Braking for motors and dereeling
Load simulation for motor testing, fuse testing, etc.

› OPTIONS:

Nonstandard coil voltages
Special mounting configurations
Modified shafts

Hysteresis clutches provide an efficient, smooth, electrically controllable link between a motor and a load. While presenting integral ball bearing supported input and output shafts, the clutch features a field (electromagnet) assembly that is prevented from rotating by fixing to a bulkhead. When the coil is energized, the input and output shafts are coupled by magnetic fluxes, thus driving the load. The torque transmitted is proportional to the current supplied to the device.

› TORQUE AS A FUNCTION OF INPUT CURRENT:



When a field setting is approached from zero current, it will produce less torque than if approached from prior current because of residual magnetism. Accurate and repeatable torque outputs are delivered when the setting is approached from the same direction.

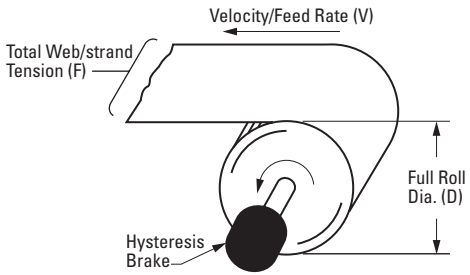
APPLICATION EXAMPLE:

To select a brake to tension a 7-inch (178 mm) diameter pay-off reel in a system requiring total (web or strand) tension of 2 lbf (8.9 N) and a process speed of 600 FPM.

BRAKE TORQUE (T) = Force (F) X Radius (D/2)
T = 2 lbf (8.9 N) X 3.5 in. (88.9 mm) = **7 lbf in. (791 Nmm)**
or T = 32 ozf X 3.5 in. (88.9 mm) = 112 ozf in.

SLIP SPEED (rpm) = linear velocity (V) (in./min.) / circumference (in.)
or linear velocity (V) (mm/min.) /circumference (mm)
rpm = 600 ft./min. X 12 / (π X 7 in.) or (183 m/min. X 1000) / (π X 178 mm)
rpm = **327**

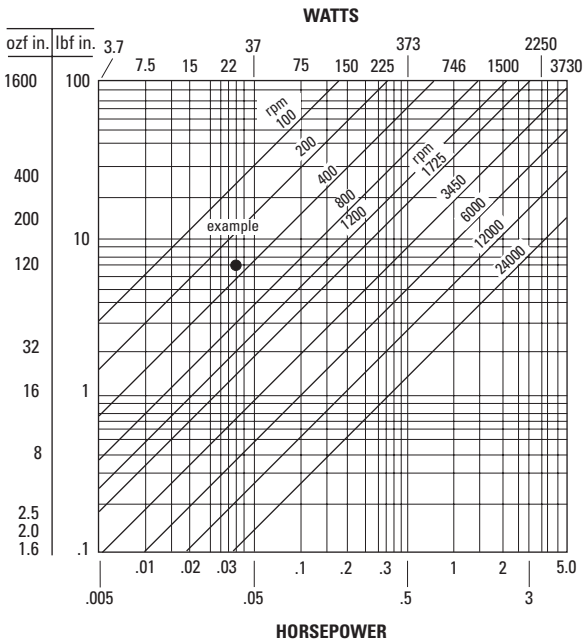
ENERGY DISSIPATION (W) = Energy Dissipation requirement is calculated using basic horsepower formula X 746 watts/hp
W = (T (lbf in.) X rpm / 63025) X 746 or (T (Nmm) X rpm / 7145221) X 746
W = (7 lbf in. X 327 rpm / 63025) X 746 = **27 watts** or (**791 Nmm X 327 rpm** / 7145221) X 746 = **27 watts**



Quick Check: The curves to the left can be used as a quick check to verify the kinetic power calculation. Simply locate the required torque on the vertical axis, move horizontally until you intersect the appropriate speed line, and then read vertically (up or down) to obtain the resulting watts or horsepower.

Selection: From the data on the following pages it can be seen that an **S90HYB-120024** Hysteresis Brake which has a rated torque of 120 ozf in. (847 Nmm), a maximum speed capability of 12000 rpm, and an energy dissipation capability of 75 watts continuous, would be the proper selection for this application.

Note: In a clutch application, slip speed is the difference in rotational speed between the input and output members of the clutch assembly. In the above example, tensioning was being accomplished with a clutch inserted between a take-up reel and a motor driving at 500 rpm. The actual slip used to compute the energy dissipation requirements would be 500 rpm (clutch input speed) - 327 rpm (clutch output speed = 173 rpm). This difference in speed would obviously impact the result for energy dissipation.



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Metric

0 10

COIL DATA:

Voltage: 24VDC

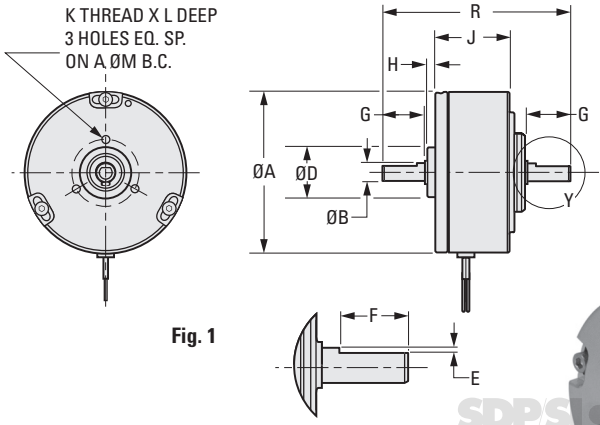

Fig. 1

DETAIL Y

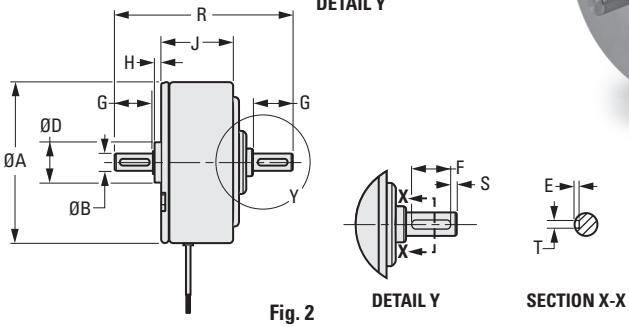

Fig. 2

DETAIL Y

SECTION X-X

The projections shown are per ISO convention.

METRIC COMPONENT

Catalog Number	Fig. No.	Min. Static Torque @ rated VDC N • m	Drag Torque @ 1000 rpm N • m	Power Rating 5 min. Watts	Power Rating Continuous Watts	Max. rpm **	Input Inertia kg • cm²	A Dia.	B Dia. h6	E	F
*S90HB1M032S03	1	0.024	3.53×10^{-4}	20	5	20000	0.0043	31.8	3	—	—
S90HB1M046S05	1	0.095	7.06×10^{-3}	45	12	20000	0.0435	45.7	5	0.7	9.5
S90HB1M050S05		0.15	7.77×10^{-4}	50			0.0458	50			
S90HB1M092S10	1	1.2	5.42×10^{-3}	300	75	12000	1	92	10	1.1	16
S90HB1M113S12	2	2.1	7.77×10^{-3}	450	110	10000	3.45	112.5	12	2.5	20
S90HB1M226S25		14.5	.0918	1200	350	6000	62.5	226	25	4	25

Catalog Number (Ref.)	D Dia. h6	S	T	G	H	J	K	L	M Dia.	R	Weight kg
*S90HB1M032S03	10	—	—	8	2	18.6	M2.5-0.45	4.3	19	42	0.103
S90HB1M046S05	14			12.1	2.4	20.7		5		53	0.24
S90HB1M050S05	14	—	—	13	1.7	23.5	M3-0.5	6.1	21	56	0.32
S90HB1M092S10	22			21Δ	2.5	39	M4-0.7	8.9	38	100	1.85
S90HB1M113S12	28	3.5	4	27	4	50.8	M5-0.8	9.9	45	123	3.5
S90HB1M226S25	52	12.5	8	50	6	76.2	M6-1	12	100	213	24.5

*S90HB1M032S03 does not have a flat, but all other dimensions apply.

** Balancing may be required for certain applications

Δ Right side shaft is 25mm.

SIMPLE INSTALLATION
ECONOMICAL COST
ENERGY EFFICIENT

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Metric
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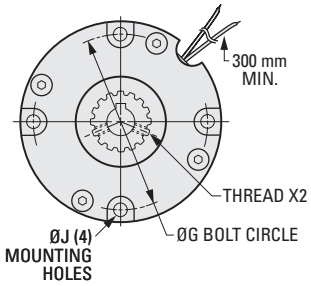
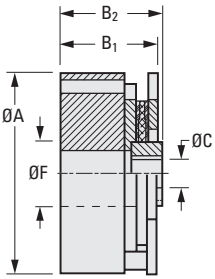
COIL DATA:

Voltage: 24V DC





The projections shown are per ISO convention.

Keyway Dimensions					
Bore	**6**	**8**	**10**	**12**	**16**
Width	2	3	3	4	5
Height	7	9.4	11.4	13.8	18.3

METRIC COMPONENT

Catalog Number	Static Torque N•m	Max. Watts	C Bore	F Case Inside Dia.	A Dia.	G	J	B_1 OAL Short Hub	B_2 OAL Long Hub
S90SB9M15A06S	0.56	7	6	13.5	38.1	33.3	3.2	26.9	—
S90SB9M15A06L								—	30
S90SB9M15A08S			8					26.9	—
S90SB9M15A08L								—	30
S90SB9M15A10S			10					26.9	—
S90SB9M15A10L								—	30
S90SB9M17A06S	1.13	10	6	14.7	45.5	41.7	2.4	30.2	—
S90SB9M17A06L								—	33.5
S90SB9M17A10S			10					30.2	—
S90SB9M17A10L								—	33.5
S90SB9M17A12S			12					30.2	—
S90SB9M17A12L								—	33.5
S90SB9M19A06S	2.03	12	6	10.9	50.8	45	3.7	30.2	—
S90SB9M19A06L								—	35
S90SB9M19A10S			10					30.2	—
S90SB9M19A10L								—	35
S90SB9M23A08S	3.95	13	8	20	60	52.1	4.5	35.6	—
S90SB9M23A08L								—	41.9
S90SB9M23A10S			10					35.6	—
S90SB9M23A10L								—	41.9
S90SB9M23A12S			12					35.6	—
S90SB9M23A12L								—	41.9
S90SB9M23A16S			16					35.6	—
S90SB9M23A16L								—	41.9

Catalog Number (Series Ref.)	Thread	Nom. Resistance Ohms	Armature		Rotor Inertia kgf • m • sec²	Energy Dissipation N•m/min	Weight kg
			Engagement msec	Disengagement msec			
S90SB9M15A...	M2	96	20	10	0.5×10^{-7}	678	0.1
S90SB9M17A...	M3	64	20	10	0.21×10^{-6}	949	0.3
S90SB9M19A...		54	35		0.27×10^{-6}	1220	
S90SB9M23A...	M3	46.5	70	20	0.20×10^{-6}	1627	0.5

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ENERGY EFFICIENT

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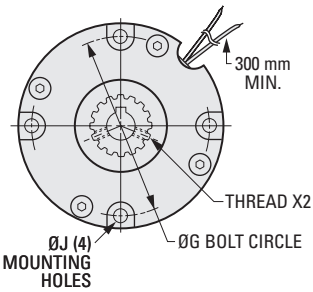
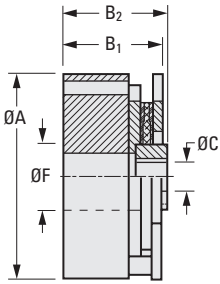
Metric
0 10

› COIL DATA:

Voltage: 24V DC





The projections shown are per ISO convention.

Keyway Dimensions			
Bore	**10**	**12**	**16**
Width	3	4	5
Height	11.4	13.8	18.3

METRIC COMPONENT

Catalog Number	Static Torque N•m	Max. Watts	C Bore	F Case Inside Dia.	A Dia.	G	J	B_1 OAL Short Hub	B_2 OAL Long Hub
S90SB9M26A10S	4.52	19	10	16	72.9	63.5	4.5	31	—
S90SB9M26A10L								—	36.8
S90SB9M26A12S			12					31	—
S90SB9M26A12L								—	36.8
S90SB9M28A10S	9.04	20	10	30	77	70	4.5	31	—
S90SB9M28A10L								—	36.8
S90SB9M28A12S			12					31	—
S90SB9M28A12L								—	36.8
S90SB9M28A16S			16					31	—
S90SB9M28A16L								—	36.8

Catalog Number (Series Ref.)	Thread	Nom. Resistance Ohms	Armature		Rotor Inertia kgf • m • sec²	Energy Dissipation N • m/min	Weight kg
			Engagement msec	Disengagement msec			
S90SB9M26A...	M4	33	80	20	0.13×10^{-5}	1898	0.5
S90SB9M28A...	M4	36	50	40	0.12×10^{-6}	2440	0.8

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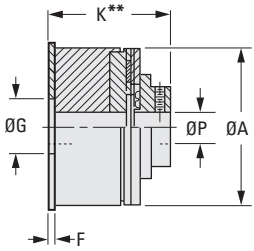
ANTI-BACKLASH WHEN ENERGIZED
ZERO DRAG WHEN DE-ENERGIZED

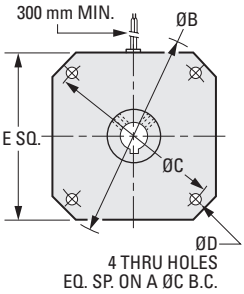
Metric
0 10

COIL DATA:

Voltage: 24V DC

Other voltages available on special order.





The projections shown are per ISO convention.

Keyway Dimensions				
Bore	**6**	**8**	**10**	**12**
Width	2	3	3	4
Height	7	9.4	11.4	13.8

METRIC COMPONENT

Catalog Number	Static* Torque N • m	Max. Wattage	Armature Inertia kgf • m • sec²	Energy Dissipation N • m/min.	Armature		P Bore
					Engagement msec	Disengagement msec	
S90BF9M11A06	0.565	5	0.39×10^{-6}	237.3	5	18	6
S90BF9M11A08							8
S90BF9M22A08	4.519	8.5	0.38×10^{-5}	1898.4	12	32	8
S90BF9M22A10							10
S90BF9M26A10	9.039	9.5	0.93×10^{-5}	3525.6	15	35	10
S90BF9M26A12							12

Catalog Number (Ref.)	A	B	C	D	E	F	G	Length**		T Set Screws	Weight kg
								K	Air Gap		
S90BF9M11A06	31.8	38.05	33.32	3.2	29.7	1.3	13.34	29	0.1/0.22	M3	0.1
S90BF9M11A08											
S90BF9M22A08	57.4	72.97	63.5	4.2	59.2	1.6	22.23	44.2	0.15/0.33	M4	0.4
S90BF9M22A10											
S90BF9M26A10	66.7	88.87	79.38	4.8	66.8	1.6	26.97	46.8	0.15/0.33	M5	0.5
S90BF9M26A12											

*Typical torque after burnishing; units shipped burnished.
**Length equals K including the working gap at installation.