

FS – General Purpose Overrunning Clutches Models FS-100, FS-200 & FS-300

Service & Installation Instructions

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Bulletin 2218



 **Formsprag**[®]
Clutch

An **Altra Industrial Motion** Company

Introduction

Formsprag FS-100, FS-200 and FS-300 clutches utilize a full complement of load carrying sprags made of ball bearing steel. They are designed and built primarily for indexing, backstopping and overrunning applications.

Pre-installation Check

Before installing, check:

1. **Shaft to Bore Fit:** A line to line fit to .001 inches loose is recommended. If a press fit is necessary, do not exceed .001 inches tight.
2. **Key and Keyseat:** A hardened key, from 30 to 40 Rockwell "C" Scale, is recommended. Make key as long as inner race for proper support. Use material AISI 1141, 1045 or 4130.

Indexing: Fit key .000/.001 inches tight on width dimension to prevent loosening in indexing service.

Do Not Exceed .001 inches tight.

Backstopping and Overrunning: Install key with push fit. Be sure key seats squarely. **Do not use a driving or force fit.**

3. **Rotation:** Turn the inner race to check for proper direction of rotation. If hand effort does not cause clutch to overrun, tap outer race lightly with plastic or leather hammer while exerting a light torque load in overrunning direction.

To change overrunning direction, return clutch to Formsprag plant.

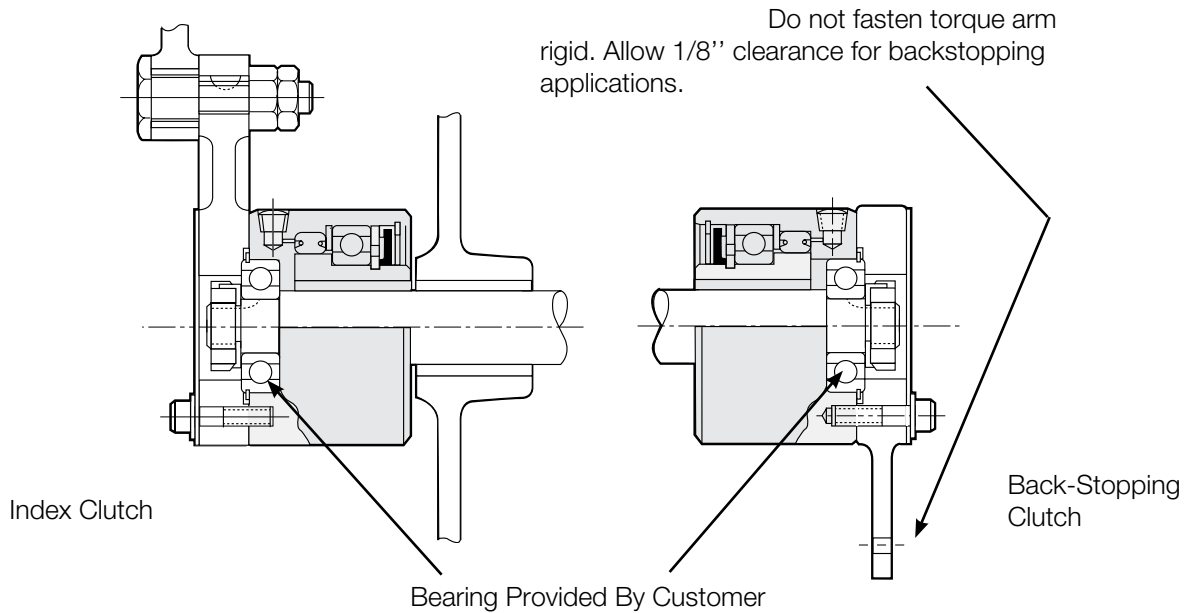
Installation

1. Mount key and clutch on shaft.
2. Apply pressure, if necessary, to end of clutch inner race only.

Note: To simplify mounting, should a fit of .001 inches tight be required (tightest allowable) immerse clutch in hot, clean oil (not to exceed 200°F/93°C) for ten or fifteen minutes before mounting.

3. An internal bearing must be used (**not furnished with clutch**) to support the clutch outer race. See mounting Sketch.
4. All fasteners are recommended to be grade 8 bolts.

Typical Mounting Arrangements



Use metric bearings with external snap rings as shown in the following table:

Model	Bore in Clutch For Ball Bearing Outside Diameter (inches)	Mounting Holes			Recommended Ball Bearing
		No. of holes	Size (in.)	B.C. (in.)	
FS-100	1.1811/1.1816	4 holes	1/4-28NF	1-7/8 dia.	200
FS-200	2.0471/2.0475	4 holes	5/16-24NF	2-3/4 dia.	205 or 304
FS-300	2.8345/2.8349	6 holes	3/8-24NF	3-3/4 dia.	207 or 306

- If the clutch is oil lubricated use a suitable sealant, such as RTV around the bore and keyseat of the inner race on the side of the clutch that is opposite to the side that has the customer supplied bearing.

- Flush with mineral spirits and relubricate before use if clutch has been out of service or in storage for six months or more. For optimum performance use recommended oils.

Lubrication

Clutches are oil dipped at the factory **but must be filled to proper level before operation**, See Oil Lubrication. Clutches can be furnished as grease lubricated if so specified on order. Letters (-GR) after part number on clutch designates grease lubrication.

Oil Lubrication

Select type of oil from the oil lubrication chart, base clutch selection on ambient temperature and application data.

Oil Lubrication Maintenance

- Check the oil level monthly.

In INDEXING applications, check the oil level monthly, or every 160 hours of operation, whichever occurs first. If the clutch is indexing in excess of 150 strokes a minute, oiling may be required at shorter intervals.
- Add oil, if necessary, to maintain a proper fluid level.

Overrunning, Backstopping – 1/2 full
Indexing – completely full
- Flush the clutch every six months with mineral spirits. **Do not use carbon tetrachloride.**

Important: Under severe operation conditions, such as heavy dust or twenty-four hours per day operation, flushing may be required at shorter intervals.

Flushing will remove waxes and gums formed by vaporization of the oil and assure continued efficiency of operation. See “Flushing Procedure” section.

⚠ CAUTION Do not use lubricants containing slippery additives, or those having extreme pressure or anti-wear characteristics such as any EP/AW type lubricants. For additional Lube information, see Brochure P-1053.

⚠ WARNING The use of lubricants in clutch assemblies, other than those shown, can result in improper sprag engagement. Improper sprag engagement may cause personal injury or property damage.

Formsprag Clutch is not responsible for any changes made by the manufacturers in their lubricants.

The use of any lubricants, other than those listed in this bulletin, will automatically void any warranty.

Important: Do not mix the above oils, they are not compatible. When switching from one brand to another, drain old oil and flush clutch with mineral spirits. **Do not use carbon tetrachloride before adding new oil.**

Oil Lubrication Chart

Application	Temperature Range	Recommended Lubricant
Indexing (Fill clutch completely full of oil).	+20°F to +150°F (-7°C to +65°C) (Maximum permissible ambient temp. or 150 strokes per minute or less)	Mobil DTE Light Oil Any Automatic Transmission Fluid (high grade only) Chevron Regal R&O Oil 68 Shell Turbo Oil T 68 Gulf Harmony 68 Mobil Teresstic 68 Mobil SHC-624
	-10°F to +20°F (-23°C to -7°C) (Maximum permissible ambient temp. or 150 strokes per minute or more)	Chevron GST Oil 46 Mobil SHC-624 Any Automatic Transmission Fluid (high grade only)
	-10°F or below (-23°C)	Consult Formsprag
Back-Stopping and Over-Running (Clutch should be one-half full of oil)	+20°F to +150°F (-7°C to +65°C) (Maximum permissible ambient temp.)	Standard Chevron GST Oil 68 Mobil DTE Heavy Medium Mobil SHC-626 Any Automatic Transmission Fluid (high grade only) Chevron Regal R&O Oil 68 Shell Turbo Oil 68 Gulf Harmony Oil 68 Mobil Teresstic Oil 68 Sunoco Sunvis 968
	-10°F to +150°F (-23°C to -7°C) (Maximum permissible ambient temp.)	Any Automatic Transmission Fluid (high grade only) Chevron Regal R&O Oil 46 Mobil SHC-626
	-40°F to +150°F (-40°C to +65°C) (Maximum permissible ambient temp.)	Mobil Jet Oil 2 Shell Turbine Oil 500 Military Oils MIL-L-7808 or MIL-L-23699 MIL-PRF-83282 MIL-PRF-87257

Oil Lubrication – Filling Procedure

Two oil holes for 100 & 200 & three oil holes for 300 are located in clutch outer race. 1/8" – 27 socket pipe plugs are installed in holes.

Indexing Applications: Rotate clutch so one oil port is at top of clutch. Remove plug and add oil until full. (Bottom plug is for flushing only.)

Backstopping or Overrunning Applications: Add oil until full and then rotate clutch until open oil port is at a position which is horizontal with the center line of the clutch (3 o'clock or 9 o'clock position) to permit the excess oil to run out, leave the clutch one-half full of oil.

Flushing Procedure

1. Rotate clutch outer race to locate one oil port at lowest point of outer race.
2. Remove lowest plug and drain clutch of oil. Remove top plug to vent for better drainage.
3. Install bottom drain plug and fill clutch completely full with mineral spirits. Install filling plug.
4. Rotate clutch slowly for several minutes to break up and dissolve oily residue which may have formed. Indexing clutches may be operated from five to ten minutes to do this.
5. Remove lower plug and drain all mineral spirits from the clutch assembly. Remove top plug for venting and better drainage.
6. Relubricate clutch according to **Oil Lubrication Filling Procedure.**

Grease Lubrication

Use greases selected from the following table:

Lubriplate Low Temp Grease (Fiske Bros.)
 Fiske Bros. Aero Lubriplate
 Shell Alvania No. 1
 Aeroshell No. 7
 Aeroshell No. 16

Note: Grease lubricated FS-100 thru FS-300 are packed at the factory with Fiske Brothers Lubriplate Low-Temp grease.

Important: Do not mix the above greases, they are not compatible. When switching from one brand to another, pump a sufficient amount of grease into the clutch to insure that all the previous grease has been purged out.

- Grease lubrication may be used if:
 - The clutch is inaccessible for frequent maintenance.
- Use no other grease unless a specific recommendation has been made by Formsprag.
- Grease lubricated clutches should not be operated at ambient temperatures below +20°F/-7°C.
- If operation at temperatures below +20°F/-7°C is required, consult Formsprag for special lubricant recommendations.

Conditions do not permit the type of maintenance required for oil lubricated clutches.

The clutch is mounted on a vertical shaft.

The clutch must be operated continuously.

The clutch is operated in the presence of severe abrasive dust.

- Do not attempt to substitute grease lubrication in a standard oil lubricated clutch. The use of grease lubrication in a clutch intended for oil could cause a malfunction.
- Formsprag can convert in-service clutches from oil to grease lubrication. Changes to internal construction are usually required. Consult Formsprag Service Department, and give the complete model number.
- Modified or special order clutches, designated by a "CL" number following the model number, may be lubricated with greases for specific applications. For information regarding these products, contact Formsprag giving both the model and "CL" numbers.

Grease Lubrication Maintenance

Application	Add Grease	Add Grease Under Rugged Conditions*
Overrunning	Every 3 months	Once a month
Backstopping	Every 3 months	Once a month
Indexing	Once a month	Every 2 weeks

*24 hours per day or operation in severe abrasive dust conditions may require more frequent lubrication.

Use recommended greases only.

Grease lubrication Procedure

1. Select one grease fitting on the clutch for regreasing and wipe clean.
2. Remove one adjacent fitting.
3. Pump fresh grease into the clutch until clean grease runs out the open hole.
4. Reinstall the fitting, tightening securely.
5. Continue to pump grease into the clutch until clean grease flows out around the seals.

Clutch Rebuilding Service

Disassembly and repair of Formsprag clutches in the field is not recommended.

Formsprag clutches are precision devices manufactured under careful controls to meet exacting standards. When reconditioning is required, clutches should be returned to Formsprag Clutch directly, through your local Distributor, or through the Original Equipment Manufacturer.

These instructions cannot cover all details or variations in equipment and applications nor provide for every possible contingency which may be met in installation, operation or maintenance. Should further information be needed, contract Formsprag.

For additional technical and dimensional information on FS clutches refer to Formsprag Overrunning Clutch Catalog P-956 or website www.formsprag.com.

Rotating Equipment

Rotating equipment is potentially dangerous and should be properly guarded. The user should check for all applicable safety codes in his area and provide a suitable guard.

Warranty

Formsprag LLC warrants that it will repair or replace (whichever in its sole discretion it deems advisable) any product it manufactured and sold which proves to be defective in material or workmanship within a period of one (1) year from date of original purchase for consumer, commercial or industrial use. This warranty extends only to the original purchaser and is not transferable or assignable without Formsprag LLC's prior consent.

This warranty covers normal use and does not cover damage or defect which results from alterations, accident, neglect, disassembly or improper installation, operation or maintenance.

Formsprag LLC's obligation under this warranty is limited to the repair or replacement of the defective product. In no event shall Formsprag LLC be liable for consequential, indirect or incidental damages of any kind incurred by reason of manufacture, sale or use of any defective product. Formsprag LLC neither assumes nor authorizes any other person to give any other warranty or to assume any other obligation or liability on its behalf.

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