HercuFlex® Gear Coupling
FX Flange Sleeve Sizes 1-7

Figure 1

⚠ WARNING

Failure to observe the following warnings could cause the power transmission product to break and parts to be thrown with sufficient force to cause serious injury or death.

Contact with moving parts and/or rotating shafts poses a risk of serious injury or death. Consult all applicable Federal, State and local laws and regulations covering the safe operation and maintenance of equipment, including, without limitation, the USDOL-OSHA "Lockout / Tag-out" procedure set forth in 29 CFR 1910.147. Installation and service should only be performed by a qualified person.

1.0 Introduction

The following document is intended for Lovejoy customers to aid in the installation of Lovejoy power transmission products. Although the coupling may have been properly specified during the design and selection process before the coupling was ordered, operational conditions could possibly have changed prior to installation. Lovejoy, LLC provides the information and technical support necessary to ensure the appropriate coupling selection was made relative to the product specifications and limitations of Lovejoy's power transmission products. The end user is ultimately responsible for verifying the suitability of the final coupling selection based on the actual service conditions at the time the coupling is installed. Please thoroughly review all the instructions in this document prior to installing this coupling and placing it in operation. Always follow proper safety guidelines and practices during every phase of the installation. This installation document is part of the purchased product. Retain for future reference.

CAUTION

Failure to follow these cautions may result in damage to the coupling and surrounding equipment.

Lovejoy manufactures couplings based on the shaft details provided by the purchaser. Lovejoy will not be responsible for inaccurate or incomplete information supplied by the purchaser. Re-check all shaft dimensions.

It is the responsibility of the purchaser to assure the interface connection (flanges, bolts, keys, hydraulic fits, etc.) between the coupling and connected equipment is capable of handling the anticipated loads.

2.0 Safety

The purchaser of this equipment must assure that the equipment is properly assembled, installed, safeguarded, operated, and maintained. Never operate equipment outside of conditions exceeding manufacturer's specifications. Because of the possible danger to persons or property from accidents which may result from the improper use or unapproved modifications of the product, this product must be installed, maintained, and operated in accordance with the procedures, standards, and engineering specifications specified in the product literature. To assure safe operation, inspect product in accordance with the instructions described in this document. Install proper guards and any suitable safety equipment or procedures as may be necessary, or as may be specified in safety codes. Safety equipment, coupling guards, and shields are not provided by, nor are they the responsibility of Lovejoy, LLC.

3.0 Product Inspection

Prior to installation examine the coupling, components, and all hardware for damage that may have occurred as a result of shipping or handling. Refer to the chart below (Table 1) and the exploded view (Figure 3) to ensure all parts as ordered are present.

Table 1 – Component Quantities

Size	Hubs	Sleeves with O-ring Seal & Pipe Plug	Gaskets	Exposed Bolts & Lock Nuts Per Hub	Shrouded Bolts & Lock Nuts Per Hub[1]
FX 1	2	2	1	6	6
FX 1.5				8	8
FX 2				6	10
FX 2.5				6	10
FX 3				8	12
FX 3.5				8	12
FX 4				8	14
FX 4.5				10	14
FX 5				8	14
FX 5.5				14	16
FX 6				14	-
FX 7				16	-

[1] *Only exposed bolts available for sizes FX6 and FX7*

For maximum protection, store the coupling and all components in the original packaging. Repackage any components and protect them from environmental exposure if extended delays are expected before starting installation. Measure all parts prior to installation to ensure correctness of parts to meet the application requirements, such as the hub bore diameter, shaft diameter, shaft separation, bolt lengths, key sizes, etc. The BSE (shaft separation) or "G" dimension must be measured from the end of one shaft to the end of the other shaft, not to hub faces or pilots (see Table 2). All sleeves, seals, hub

bores, shafts, keys, and keyways must be checked for raised metal, nicks, burrs, dents, gouges, etc.

Note: Although FX-Series gear couplings may be shipped with the hub inside the sleeve, the complete couplings are normally shipped unassembled. The seals are packaged with the sleeve.

Note: Lovejoy manufactures couplings based on the shaft details provided by the purchaser. Lovejoy will not be responsible for inaccurate or incomplete information supplied by the purchaser. It is the responsibility of the purchaser to assure the interface connection (flanges, bolts, keys, and hydraulic fits) between the coupling and connected equipment is capable of handling the anticipated loads.

4.0 Required Tools

- Calipers
- Calibrated Torque Wrench
- Sockets and appropriate open end wrenches
- Alignment Equipment
- Oven or heating device for interference fit hubs

5.0 Coupling and Component Preparation

Prior to installing, thoroughly clean all exposed surfaces of the coupling and components, including hubs, sleeves, spacers, and any sub-assemblies to remove any protective coatings normally applied by Lovejoy at the factory. These coatings are applied as corrosion protection for the coupling surfaces during shipping. All coupling parts, equipment components, shafts, and keyways must be clean and free of any foreign materials prior to attempting assembly or installation. A clean cloth dampened with a nonflammable solvent should suffice for this cleaning.

6.0 Coupling Installation

Note: The gear teeth on FX series flex hubs are NOT centered on the hub. Each hub has a long end and short end. The hub orientation is dependent on the shaft separation G dimension in Table 2. If this hub is mounted in the incorrect orientation, the coupling could become disengaged during operation, or could cause damage to the coupling.

6.1 Prior to installing the hub, install the seal in the sleeve and position the sleeve on the shaft with flange facing the end of the shaft. The sleeve must be positioned back on the shaft far enough to allow room for mounting the hub. Support the sleeve to prevent damage to the sleeve, shaft, or seal, should the sleeve accidentally slip while positioning it on the shaft.

NOTE: The sleeves with the seals in place must be mounted on shafts prior to installing hubs. Hubs and Sleeves must be supported during installation to avoid accidental damage should they slip.

6.2 Lovejoy gear coupling hubs are shipped with an interference fit bore unless otherwise specified. Prior to installing the coupling, measure the shaft diameters and the hub bores to ensure a proper fit. With an interference fit, the hub bore diameter will be smaller than the shaft diameter and each hub will need to be heated prior to mounting on the shaft.

NOTE: The Engineering Data section of the Lovejoy Power Transmission Products Catalog contains the bore and keyway sizes supplied for specific shaft sizes and is available on the Lovejoy website at: www.lovejoy-inc.com.

- Lovejoy machines bores in all Lovejoy gear coupling hubs with 'inch' dimensioned straight bores and keyways to meet the industry accepted ANSI/AGMA 9002-B04 Standards' tolerance for an interference or shrink fit bore unless otherwise specified. Tapered and spline bores typically require special consideration.
- Lovejoy machines bores in all Lovejoy gear coupling hubs with 'metric' dimensioned straight bores and keyways to meet the industry accepted ANSI/AGMA 9112-A04, or ISO 286-2, Standards' tolerance for an interference or shrink fit bore unless otherwise specified. Tapered and spline bores typically require special consideration.
- For all Lovejoy gear coupling hubs with taper bores and taper bores with keyways, Lovejoy manufactures these hubs with bores using tolerances and specifications as supplied by the customer.

6.3 Install the key in the shaft keyway. The key should fit snuggly with no side-to-side movement. The key should be the same length as Length Thru Bore (LTB) dimension of the hub (see Table 2) to maintain dynamic balance and transmit the maximum torque. Measure from the top of the key to the bottom of the shaft, then measure from the top of the keyway in the hub to the bottom of the hub bore diameter. For hubs machined with an interference fit, the hub measurements should be a minimum of .005" (0.13mm) greater than the measurement from the top of the key to the bottom of the shaft.

6.4 Prior to mounting the hub, heat the hub uniformly to a temperature of at least 350° F (177° C), but no greater than 450° F (232° C), using an oil bath, induction heater, or oven.

NOTE: Hubs may discolor when heated. This is normal.

NOTE: Do not spot heat the hub in single areas or distortion of the hub could occur. Do not exceed 450° F (232° C) during the heating process. Excessive heat can soften, or anneal the hub, reducing the strength of the steel thus affecting the performance characteristics of the hub.

NOTE: When heating hubs using oil or oven method, do not rest the hubs on bottom of oil container or on floor of the oven

NOTE: If there is not a minimum of .005" (0.13mm) clearance between the top of the key and the hub keyway, when the hub cools the keyway will rest on the key creating high stresses in the hub that could cause the hub to fail.

6.5 After heating hubs, slide them on the shafts. Mount the hubs on the proper shafts and ensure the face of the hub is even with the end of the shaft. Line up the key with the end of the shaft and face of the hub. Once mounted on the shaft, allow the hubs to cool completely before continuing.

6.6 If either of the hubs was manufactured with a clearance, or slip fit bore, slide these hubs onto the appropriate shafts. Align the long end of the hub flush with the end of the shaft and key. These hubs will be held in place with set screws tightened with a calibrated torque wrench.

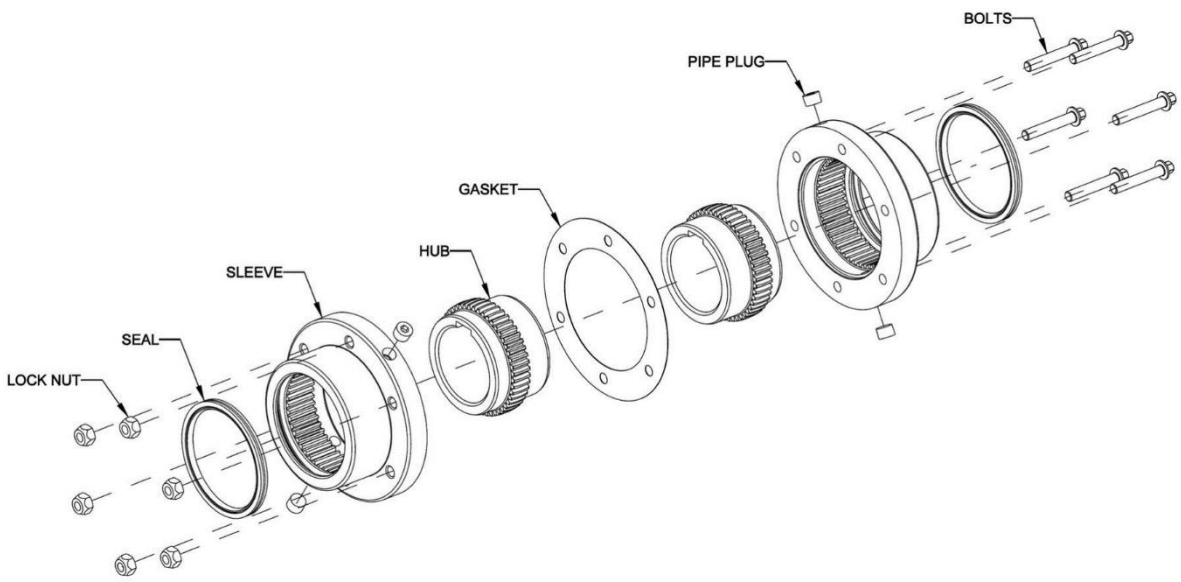
7.0 Coupling Alignment

7.1 Although the shafts may be accurately aligned at installation, they will require realignment after the coupling hubs have been mounted. Loosen the equipment and foundation mounting bolts to position the equipment in approximate alignment using the specified hub separation (see Table 2). Allowable angular and parallel misalignment values are shown in Table 3 (see Figure 2). Methods for performing an industry accepted coupling alignment using dial indicators will be covered in the next two steps.

NOTE: Optical alignment methods, such as a laser, may also be used. Ensure alignment measurements do not exceed the values shown in Table 3.

7.2 Angular Alignment –Attach a dial indicator base to one of the hubs and position the indicator needle against the face of the other hub. Ensure the needle is placed on a clean smooth surface as close to the outside diameter of the hub face as possible. Rotate the hub 360º and record indicator readings at four locations, 90º apart. Adjust the equipment until all four readings are identical. The difference between the maximum and minimum measurements must not exceed the Maximum Installation Limits found in Table-3. Relocate the indicator to the opposite hub and repeat this procedure.

Figure 3



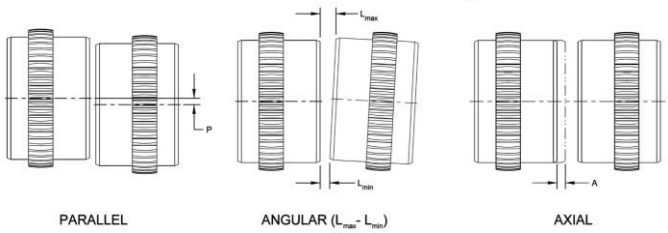


Figure 2

7.3 Parallel Offset Alignment –Attach the dial indicator base to one of the hubs and set the dial indicator needle in contact with the outside diameter of the opposite hub. Rotate the hub 360º and record indicator readings at four locations, 90º apart. Adjust the equipment until all four readings are identical. The difference between the maximum and minimum measurements must not exceed the Maximum Installation Limits found in Table-3. Relocate the indicator to the opposite hub and repeat this procedure.

7.4 Tighten all equipment mounting and foundation bolts; then repeat steps 7.2 and 7.3 to ensure the coupling hubs are still in proper alignment. Ensure the hub separation has not changed and matches the specified value for the coupling as purchased (see Table-2).

8.0 Coupling Assembly

8.1 Per instructions earlier in this document (see section 6.1), the sleeves should already be mounted on the shafts with the seals in place prior to mounting the hubs.

8.2 Apply an ample amount of qualified coupling rated grease around the gear teeth on one hub and the gear teeth inside the mating sleeve. Specifications for coupling grease can be found in the Technical Data Section of the Installation Instructions page on the Resources tab on the Lovejoy web site www.lovejoy-inc.com. The gear teeth in the sleeve mesh with the gear teeth on the hub. Carefully slide the sleeve over the hub until the hub protrudes through the seal. The teeth and seal should support the weight of the sleeve at this time. Repeat this process for the opposite hub and sleeve.

NOTE: Maintain support for the sleeve to protect the seal and ensure the sleeve does not impact against the hub causing possible damage.

8.3 Prior to sliding the sleeves together, remove the flange gasket from the accessory kit and position the gasket between the two flanges then slide two or more of the bolts from the accessory kit through the top bolt holes in the sleeves and gasket to hold the gasket in place.

NOTE: Use care not to crimp or damage the gasket.

8.4 Slide the two flanges together with the gasket between them. Insert the remaining bolts from the accessory kit. The grease fitting holes should be located 180º apart. Hand tighten the lock nuts on each bolt.

8.5 Partially tighten each of the nuts in a star, or crisscross, pattern, using care to ensure the gasket is not being crimped or damaged.

8.6 Use a calibrated torque wrench to tighten the bolts and nuts following a star, or crisscross pattern to 50%, then 75%, then the full torque value specified in Table-3.

8.7 On one coupling sleeve, remove two of the pipe plugs in holes that are 180° apart. Insert a grease fitting (supplied by customer) in one of the grease fitting ports and leave the second hole unplugged. Rotate the coupling until the grease fittings are horizontal. Use only coupling grease and inject the grease through the fitting until the recommended amount specified in Table-3 has been loaded into the coupling. Repeat this process for the opposite hub and sleeve.

8.8 Replace both pipe plugs before continuing.

8.10 Remove any tooling and material away from the coupling and equipment. Install the coupling guard per OSHA requirements and remove the Lockout / Tagout kit from the power supply. The equipment can then be started up and tested. The coupling and equipment should run smoothly. If vibration is detected it could indicate there is an issue with alignment or other problems possibly related to the motor, coupling, or driven equipment. Resolve these issues prior to placing this coupling into operation.

9.0 Maintenance

9.1 Inspect the coupling after running a few hours or less to ensure there are no issues with alignment, heat, or other concerns that could be detrimental to further operation.

9.2 After one month of operation, disassemble coupling and inspect for abnormal wear, problems with grease, and possible issues with equipment alignment.

9.3 Inspect on an annual basis to ensure the coupling is performing as designed and the grease is not breaking down. Whenever the coupling is disassembled for inspection, replace the old grease with a qualified coupling rated grease.

NOTE: During maintenance the coupling is being lubricated without disassembly or removing bolts, insert a grease fitting in one of the grease fitting ports and leave the second hole unplugged. Rotate the coupling until the grease fittings are horizontal. Inject grease through the fitting until clean grease oozes out of the other port. Replace the grease plugs in both fitting holes prior to placing the coupling back in service.

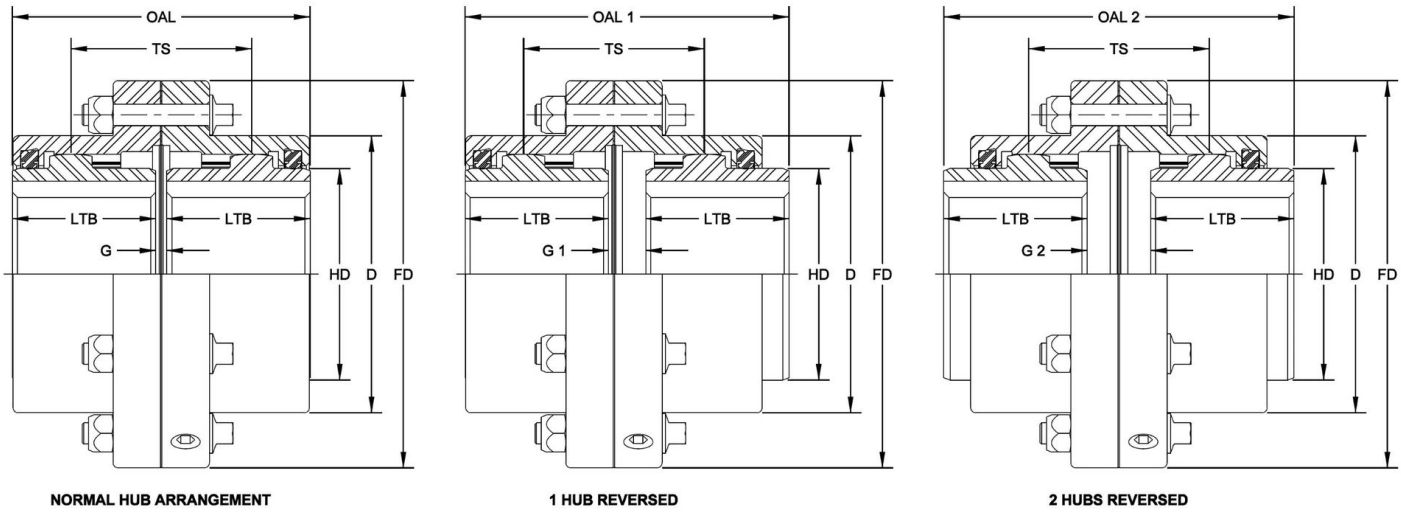


Table 2 - Dimensional Data: Inches (Millimeters)

Size	FX 1	FX 1.5	FX 2	FX 2.5	FX 3	FX 3.5	FX 4	FX 4.5	FX 5	FX 5.5	FX 6	FX 7
OAL	3.51 (89.2)	4.01 (101.9)	5.01 (127.3)	6.25 (158.8)	7.37 (187.2)	8.63 (219.2)	9.75 (247.7)	10.93 (277.6)	12.37 (314.2)	14.13 (358.9)	15.13 (384.3)	17.76 (451.1)
OAL 1	3.82 (97.0)	4.25 (108.0)	5.69 (144.5)	7.03 (178.6)	8.04 (204.2)	9.20 (233.7)	10.44 (265.2)	11.99 (304.5)	13.72 (348.5)	15.35 (389.9)	16.54 (420.1)	19.07 (484.4)
OAL 2	4.13 (104.9)	4.49 (114.0)	6.37 (161.8)	7.81 (198.4)	8.71 (221.2)	9.77 (248.2)	11.13 (282.7)	13.05 (331.5)	15.07 (382.8)	16.57 (420.9)	17.95 (455.9)	20.38 (517.7)
FD	4.56 (115.8)	6.00 (152.4)	7.00 (177.8)	8.38 (212.9)	9.44 (239.8)	11.00 (279.4)	12.50 (317.5)	13.63 (346.2)	15.31 (388.9)	16.75 (425.5)	18.00 (457.2)	20.75 (527.1)
D	3.26 (82.8)	4.11 (104.4)	5.10 (129.5)	6.17 (156.7)	7.17 (182.1)	8.35 (212.1)	9.83 (249.7)	10.81 (274.6)	12.13 (308.1)	13.13 (333.5)	14.38 (365.3)	16.69 (423.9)
HD	2.49 (63.2)	3.29 (83.6)	4.21 (106.9)	4.97 (126.2)	5.88 (149.4)	6.87 (174.5)	8.10 (205.7)	9.09 (230.9)	10.24 (260.1)	11.28 (286.5)	12.29 (312.2)	14.30 (363.2)
G	0.13 (3.3)	0.13 (3.3)	0.13 (3.3)	0.19 (4.8)	0.19 (4.8)	0.25 (6.4)	0.25 (6.4)	0.31 (7.9)	0.31 (7.9)	0.31 (7.9)	0.31 (7.9)	0.38 (9.7)
G 1	0.44 (11.2)	0.37 (9.4)	0.81 (20.6)	0.97 (24.6)	0.86 (21.8)	0.82 (20.8)	0.94 (23.9)	1.37 (34.8)	1.66 (42.2)	1.53 (38.9)	1.72 (43.7)	1.69 (42.9)
G 2	0.75 (19.1)	0.61 (15.5)	1.49 (37.8)	1.75 (44.5)	1.53 (38.9)	1.39 (35.3)	1.63 (41.4)	2.43 (61.7)	3.01 (76.5)	2.75 (69.9)	3.13 (79.5)	3.00 (76.2)
LTB	1.69 (42.9)	1.94 (49.3)	2.44 (62.0)	3.03 (77.0)	3.59 (91.2)	4.19 (106.4)	4.75 (120.7)	5.31 (134.9)	6.03 (153.2)	6.91 (175.5)	7.41 (188.2)	8.69 (220.7)
TS	2.13 (54.1)	2.31 (58.7)	3.25 (82.6)	4.00 (101.6)	4.45 (113.0)	5.01 (127.3)	5.69 (144.5)	6.68 (169.7)	7.69 (195.3)	8.44 (214.4)	9.13 (231.9)	10.38 (263.7)

Table 3 – Installation Data Inches (Millimeters) Unless Specified

	Size	FX 1	FX 1.5	FX 2	FX 2.5	FX 3	FX 3.5	FX 4	FX 4.5	FX 5	FX 5.5	FX 6	FX 7
Maximum Installation Limits[1]	Parallel (P)	0.005 (0.13)	0.005 (0.13)	0.007 (0.18)	0.009 (0.23)	0.010 (0.25)	0.011 (0.28)	0.012 (0.30)	0.015 (0.38)	0.017 (0.43)	0.018 (0.46)	0.020 (0.51)	0.023 (0.58)
	Angular (L_{max}–L_{min})	0.005 (0.13)	0.007 (0.18)	0.009 (0.23)	0.011 (0.28)	0.013 (0.33)	0.015 (0.38)	0.018 (0.46)	0.020 (0.51)	0.022 (0.56)	0.025 (0.64)	0.027 (0.69)	0.031 (0.79)
	Axial (A)	± 0.028 (± 0.71)	± 0.030 (± 0.76)	± 0.043 (± 1.09)	± 0.053 (± 1.35)	± 0.058 (± 1.47)	± 0.065 (± 1.65)	± 0.075 (± 1.91)	± 0.088 (± 2.24)	± 0.100 (± 2.54)	± 0.110 (± 2.79)	± 0.060 (± 1.52)	± 0.068 (± 1.73)
Maximum Operating Limits[2]	Parallel (P)	0.056 (1.42)	0.060 (1.52)	0.085 (2.16)	0.105 (2.67)	0.117 (2.97)	0.131 (3.33)	0.149 (3.78)	0.175 (4.45)	0.201 (5.11)	0.221 (5.61)	0.239 (6.07)	0.272 (6.91)
	Angular (L_{max}–L_{min})	0.065 (1.65)	0.086 (2.18)	0.110 (2.79)	0.130 (3.30)	0.154 (3.91)	0.180 (4.57)	0.212 (5.38)	0.238 (6.05)	0.268 (6.81)	0.295 (7.49)	0.322 (8.18)	0.374 (9.50)
	Axial (A)	± 0.028 (± 0.71)	± 0.030 (± 0.76)	± 0.043 (± 1.09)	± 0.053 (± 1.35)	± 0.058 (± 1.47)	± 0.065 (± 1.65)	± 0.075 (± 1.91)	± 0.088 (± 2.24)	± 0.100 (± 2.54)	± 0.110 (± 2.79)	± 0.060 (± 1.52)	± 0.068 (± 1.73)
Grease Capacity	Weight oz (g)	1.4 (40)	2.0 (57)	3.4 (96)	6.8 (193)	10.1 (286)	13.5 (383)	21.6 (612)	36.5 (1,035)	43.2 (1,225)	63.5 (1,800)	70.2 (1,990)	104.0 (2,948)
	Volume oz (mL)	1.6 (47)	2.4 (71)	4.0 (118)	8.0 (237)	12.0 (355)	16.0 (473)	25.6 (757)	43.2 (1,278)	51.2 (1,514)	75.2 (2,224)	83.2 (2,461)	123.2 (3,643)
Tightening Torque[3]	Exposed ft-lb (Nm)	10 14	30 41	75 102	150 203	150 203	220 298	220 298	220 298	250 339	250 339	250 339	400 542
	Shrouded ft-lb (Nm)	10 14	30 41	30 41	75 102	75 102	150 203	150 203	150 203	220 298	220 298	-	-

[1] The maximum installation limits are based on 1/8° per gear mesh

[2] The maximum operating limits are based on 1-1/2° per gear mesh

[3] Only exposed bolts available for sizes FX6 and FX7