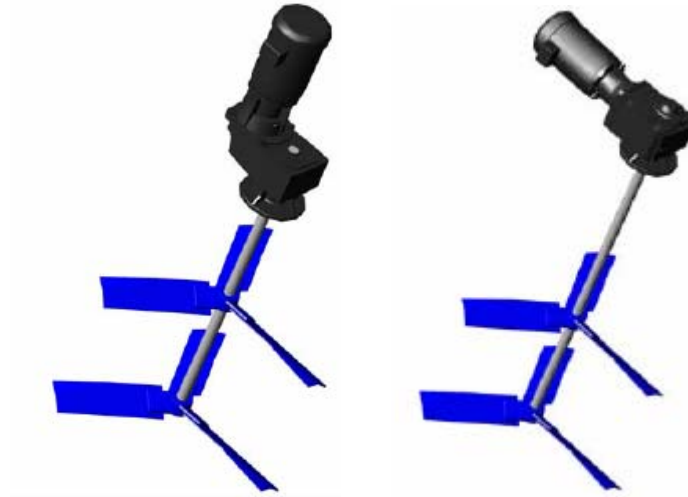


***Fusion Fluid
Equipment_{LLC}***



O&M

**Operation and Maintenance Manual for Fusion
“Flow” series TOP ENTRY open tank mixers
Models FG-M, FR-M, & FW-M**

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Section 1 – Safety

Safety should be one's main priority when working with industrial mixing equipment. There are many potential hazards associated with rotating equipment. The precautions mentioned in this manual are not intended to cover all hazards in a plant or on this equipment. Using safety mechanisms requires the constant attention of anyone in the vicinity of this or any other equipment. Please use common sense and caution. DO NOT attempt to operate this or any equipment if it does not appear safe. In addition, please use all necessary personal safety devices as well as mechanical safety devices when operating and or maintaining this or any equipment.



PLEASE READ BEFORE INSTALLATION / OPERATION



- Read this manual completely before operating the mixer. In addition to this manual, please read manuals for all components. A manual for you motor and gearbox will be available on-line from the manufacture of each component. Nameplates are intentionally left on the units so you can find this information. If you have difficulty locating this information, contact Fusion Fluid Equipment and we will find it for you.
- Installation, operation, and maintenance should only be performed by qualified personnel.
- Check all safety devices prior to starting the equipment. Do not operate the mixer if those devices are not present. Do not operate the mixer if the devices are not functional.
- BEFORE doing any maintenance on the mixer, disconnect all power. Be sure to follow correct lock out – tag out procedure before proceeding.
- DO NOT touch any rotating parts under any circumstances. Keep all guards and safety devices installed.
- Maintain the equipment on a regular basis. Unmaintained equipment can become unsafe.
- Develop a safety checklist to ensure that proper caution is used during operation and maintenance
- Do not modify your equipment without consulting the factory. Modification of the equipment may cause the equipment to become unstable. In addition, it may decrease the performance or mechanical stability.



Caution: There are several pinch points on these mixers



Section 2 - Inspection

Inspection should be done upon receipt of the mixer as well as before installation and during maintenance.

1. Check to make sure that all components were received. Fusion Side Entry mixers may be shipped in multiple packages. Typically your shipment should contain:
 - Mixer drive
 - Gearbox
 - Shaft
 - Impeller hub and blades
2. Check to see if the equipment is damaged. Check the shaft to see if it appears bent. Check the impellers to see if the blades appear abnormally bent. All of the blades should be symmetrical. The equipment should not appear damaged in any way.
3. Inspect the bore in the gearbox if shaft is shipped loose. It should be free of galling or burs. Inspect couplings and hubs to make sure they are free of dings and dents on mating faces. Check the mixer shaft to assure that it is straight and free from galling on mating surfaces. If you proceed to install the mixer shaft with these defects, the shaft may bind or vibrate and cause further damage, which may not be covered under warranty. It may also be unsafe to operate.

Section 3 – Storage

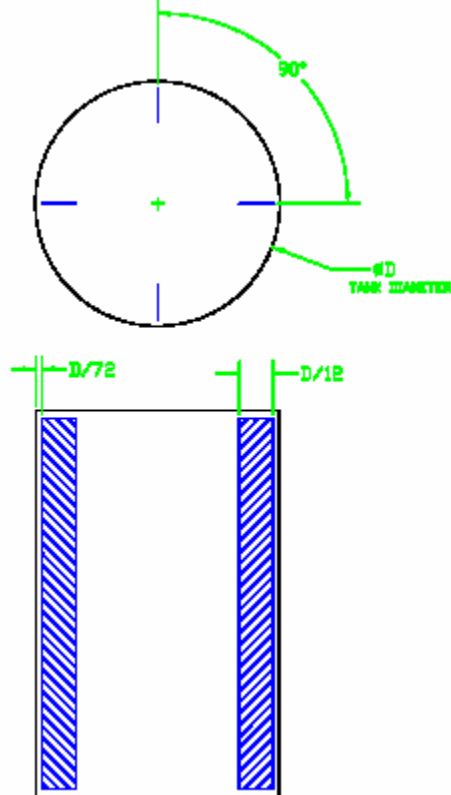
Mixer should be stored into a cool, dry environment. Humid conditions can damage the motor windings, output bearings, and lubrication. All of these factors may deteriorate your mixer. Do not store the mixer near vibrating machinery. For long storage periods, rotate the mixer shaft once a month and change gearbox lubricant before installation.

Section 4 – Installation

Before any actual installation, come up with a plan for mounting location. Mounting the mixer on an angle according to the figure below will result in the best mixing performance. Also, be sure that your tank is strong enough to handle the weight and dynamic loads from the mixer. Please reference the approval drawing for these loads. If you do not have them, contact your Fusion rep to obtain them. Fusion is not responsible for damage done to the tank or injury to persons due to inadequate tank

design. Be sure that the anchor supports for the tie rods are sturdy enough to hold the weight of the mixer. **The flange alone is not enough to support this mixer!** If the mixer is supplied with a support leg, be sure that there is an adequate structural pad underneath that will not settle.

Mounting Guideline For TOP Entry Mixers On Center with Baffles – THE BEST WAY!



MIXER BAFFLE GUIDELINES

1. MOUNT MIXER VERTICAL – ON CENTER
2. BAFFLE WIDTH 1/12 TANK DIAMETER
3. QTY 3 BAFFLES AT 120° OR QTY 4 BAFFLES AT 90° APART
4. FOR OPTIMAL PERFORMANCE, BAFFLES SHOULD BE 1/72 TANK DIAMETER OFF THE SIDE WALL. THIS PROMOTES MINIMAL DEAD ZONES. NOT REQUIRED.

–IT IS UP TO THE TANK MFG TO DECIDE BAFFLE THICKNESS AND ANCHORING OF BAFFLES.

–IF BAFFLES ARE NOT AN OPTION, PLEASE ANGLE MOUNT OR VERTICAL OFFSET MOUNT

Other Mounting Options:

PLEASE BE SURE THAT YOUR MIXER IS DESIGNED FOR THIS CONDITION!

1. Off center – vertical: Mixers can be mounted in a vertical position 1/3 to 1/2 X tank radius off center. Be sure that your custom drawing notes this. Mixers must be specifically designed for this mounting condition. If your mixer was designed to only run on-center with baffles, then mixer failure may occur. Please obtain verification from Fusion that this mounting position is acceptable. In addition, make sure that the impellers have AT LEAST 4” of clearance from the tank side wall during rotation.

2. Angle Offset: Angle offsetting the mixer is another acceptable mounting position to promote proper performance. There are a few steps that MUST be taken to ensure proper performance. As with “vertical offset” mounting, the mixer must be designed to handle the condition. In addition, there are only a few ways to orient the gearbox so that gear lubrication is not compromised. Please call Fusion to get a 3D layout of your application done in order to properly angle mount your mixer.



Caution: There are several pinch points on the mixers



2. Mount the mixer to the desired location. Be careful, as there are several pinch points in the mounting hardware, couplings, hubs, etc. Once the desired position and mounting angles are achieved, tighten all of the hardware to the torque specifications in the table below. THERE IS ONE EXCEPTION. The socket head cap screw that holds the mixer shaft in the gearbox should not exceed half of the full rated torque. Otherwise, please adhere to the specifications below:

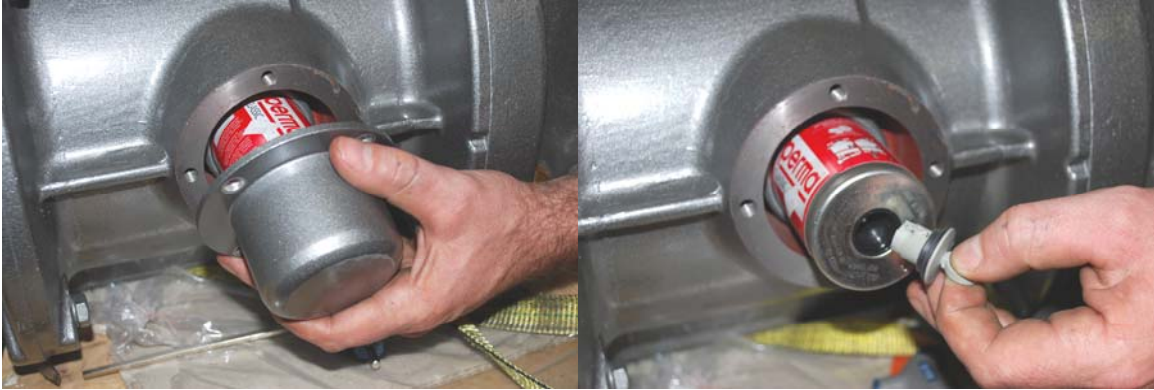
Hardware Size	Grade 2 and 300 series stainless hardware	High strength grades 5 & 8
1/4"	5 ft*lbs	7 ft*lbs
5/16"	9 ft*lbs	14 ft*lbs
3/8"	15 ft*lbs	25 ft*lbs
1/2"	37 ft*lbs	60 ft*lbs
9/16"	53 ft*lbs	88 ft*lbs
5/8"	74 ft*lbs	120 ft*lbs
3/4"	120 ft*lbs	200 ft*lbs
7/8"	190 ft*lbs	302 ft*lbs
1"	282 ft*lbs	466 ft*lbs

3. Mixer shaft installation: To avoid binding in the future and ease of installation, apply process compatible grease or anti-seize compound on the end portion of the mixer shaft, as well as the keyway. Be sure to slide the shaft into the bore slowly and gently. The tolerances are very tight to keep concentricity and limit vibration. If the shaft is forced, it will gall and the mixer will be damaged. Light tapping from a plastic mallet may be required for large diameter shafts to slide the shaft into the hollow bore.

Slide shaft into bore until it stops against the snap ring. The snap ring is there to locate the position of the shaft. Once the shaft is in place, install the cap plate and tighten the supplied socket head cap screw to ~half of the full torque value. See the figure below for more detail:



4. Pre-Lubrication: Make sure that all grease fittings are lubricated on the motor, gearbox, and pedestal. On larger units, the input bearing on the gearbox comes with an automatic lubricator, which needs to be activated before use. See the figures below for more detail:



A. Remove protective cap

B. Activate lubricator per instructions inside

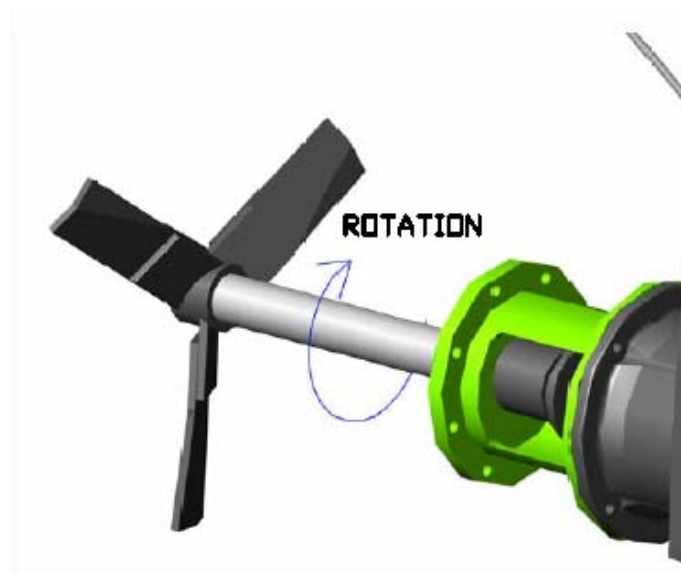
5. Impeller installation: Install the impeller hub on the shaft. If the hub “ears” have a taper on them, the widest part of the ear should face away from the gearbox. Tighten the set screw on the hub to the proper torque value. Install the blades on the hub. The blades should be bolted on the face of the “ears” furthest away from the gearbox. Tighten the hardware to the specified torque values. Please see the picture below for orientation:



6. Electric Components: All wiring of motors, VFD’s, panels, and controls should be done according to local code. If any wiring was provided by Fusion, please have your electrical inspector inspect all connections, conductors, etc. to verify that the installation is acceptable. Unless specifically requested, pre wiring of components may not be UL approved. Call your local inspector!

Electric motors: Motors provided are specific to each application. You will be able to locate the motor model number and MFG on the tag. You can find performance data and operating limitations online. Otherwise, contact Fusion, and we will provide this information to you.

! NOTE: Wire so impeller rotates clockwise when viewed from behind the gearbox **!**



Section 5 – Maintenance

! Warning: Turn off power to the mixer before any maintenance **!**

1. Lubrication is the most important key to prolonging the life of your mixer. Be sure to regularly grease all fittings on the mixer. Gearboxes units come pre-lubricated with ISO VG220 mineral based oil, which is good for temps from 20 deg F to 140 deg F or Mobile SHC630 (-30F to 176F). Periodically remove the vent plug to check for water contamination in the oil. Change the oil if there is water contamination. Below is a list of recommended oils for this unit:

STANDARD OIL – ISO VG220

Ambient Temperature	Formulation
20 to 104°F (-5 to 40°C)	Mineral

TYPICAL OILS

Viscosity ISO NLGI	Formulation	Service Temperature Range	Mobil®	Shell	Castrol	KLÜBER LUBRICATION	bp	Tribol®
VG 460	Conventional Mineral	20°C to +50°C 68F to +122°F	Mobilgear 634	Omala 460	7EP	Klüberoil GEM 1-460	Energol GR-XP 460	Tribol 1100/460
	Synthetic PAO	-30°C to +80°C -22°F to +176°F	Mobil SHC 634	Omala 460 HD	Isolube EP 460	Klübersynth EG 4-460	N/A	Tribol 1510/460
VG 320	Conventional Mineral	0°C to +30°C 32°F to +86°F	Mobilgear 632	Omala 320	6EP	Klüberoil GEM 1-320	Energol GR-XP 320	Tribol 1100/320
	Synthetic PAO	-35°C to +80°C -31°F to +176°F	Mobil SHC 632	Omala 320 HD	Isolube EP 460	Klübersynth EG 4-320	N/A	Tribol 1510/320
VG 220	Conventional Mineral	-5°C to +40°C +20°F to +104°F	Mobilgear 630	Omala 220	5EP	Klüberoil GEM 1-220	Energol GR-XP 220	Tribol 1100/220
	Synthetic PAO	-34°C to +80°C -30°F to +176°F	Mobil SHC 630	Omala 220 HD	Isolube EP 220	Klübersynth EG 4-220	N/A	Tribol 1510/220
VG 150 & VG 100	Conventional Mineral	-15°C to +25°C 5°F to +77°F	Mobilgear 629	Omala 100	4EP	Klüberoil GEM 1-150	Energol GR-XP 100	Tribol 1100/100
	Synthetic PAO	-37°C to +10°C -35°F to +50°F	Mobil SHC 629	Omala 150 HD	Isolube EP 150	Klübersynth EG 4-150	N/A	N/A
VG 68	Conventional Mineral	-15°C to +25°C 5°F to +77°F	Mobilgear 626	Omala 68	2EP	Klüberoil GEM 1-68	Energol GR-XP 68	Tribol 1100/68
	Synthetic PAO	-40°C to +10°C -40°F to +50°F	Mobil SHC 626	N/A	Isolube EP 68	N/A	N/A	N/A
VG 32	Synthetic PAO	-40°C to +10°C -40°F to +50°F	Mobil SHC 624	N/A	N/A	Klüber-Summit HySyn FG-32	N/A	N/A

PAO = Poly Alpha Olefin

SPECIAL PURPOSE LUBRICANTS

Ambient Temperature	Formulation	Manufacturer	Oil Brand Name
20 to 104°F (-5 to 40°C)	Food Grade Oil - Synthetic	Chevron	FM ISO 220
20 to 104°F (-5 to 40°C)	Food Grade Oil - Synthetic	OilJAX	Magnaplate 85W140-FG
5 to 125°F (-20 to 50°C)	Fluid Grease	Mobil	Mobilux EP023
-30 to 140°F (-35 to 60°C)	Fluid Grease - Synthetic	Mobil	Mobilith SHC 007
-30 to 140°F (-35 to 60°C)	Fluid Grease - Synthetic	Shell	Albida LC

STANDARD BEARING GREASE – NLGI 2EP Lithium

Ambient Temperature	Formulation
-20 to 140°F (-30 to 60°C)	Mineral

OPTIONAL BEARING GREASES

Ambient Temperature	Formulation	Manufacturer	Grease Brand Name
-40 to 230°F (-40 to 110°C)	Synthetic	Shell	Aeroshell 6
-40 to 230°F (-40 to 110°C)	Food Grade - Synthetic	Lubriplate	SFL1

- For harsh, washdown, or wet environments, special attention is required. These units are provided with additional o-rings and lip seals to prevent contamination from entering or leaving the drive. High pressure washing can allow water to enter through the seals. Check for water contamination as described in step 1 and also regularly remove motor drain plugs to remove any water. Water contamination will greatly reduce the life of your mixer.

Section 6 – Warranty and Contact

Warranty:

All equipment or parts covered by this manual are guaranteed free from defective material and workmanship for a period of twelve (12) months from date of shipment, under normal use and service. This warranty does not cover failure of normal wear parts unless the failure of such part has resulted from defective material and workmanship. Fusion Fluid Equipment LLC will repair or replace, at its option, any equipment which has been found to be defective and is within the warranty period, provided that the equipment is shipped, with previous factory authorization, freight prepaid, to Fusion's plant in Whitehall, Michigan, USA. All return shipments are made FOB Fusion's factory. Fusion Fluid Equipment LLC is not responsible for removal, installation, or any other incidental expenses incurred in shipping the equipment to or from Fusion Fluid Equipment LLC. In the case of components purchased by Fusion Fluid Equipment LLC, and incorporated in the equipment, the component manufacturer's guarantee shall apply. NOTE: Any modifications or corrective work done to the equipment which were not specifically authorized in writing by Fusion Fluid Equipment LLC shall void this limited warranty, and Fusion Fluid Equipment LLC shall accept no liability for any of the corrective work or expenditures which were conducted without their prior, written authorization. Fusion Fluid Equipment LLC shall not be held liable for any further cost, expense, or labor to replace equipment or replaceable parts, or indirect or consequential damages.

With the exceptions of the limited warranty set out above, there are no other understandings, agreements, representatives, or warranties implied (including any regarding the merchant-ability or fitness for a particular purpose), not specified herein, respecting this agreement or equipment, hereunder. This contract states the entire obligation of Fusion Fluid Equipment LLC in connection with this transaction.

Contact:

For questions, concerns, or comments, we strongly recommend contacting the sales representative that supplied your equipment. Otherwise you may email us or visit our website. We typically respond same day.

Website:

www.fusionfluid.com

Email:

info@fusionfluid.com

Thank you for choosing Fusion. We look forward to a long standing relationship with you, providing high quality custom equipment!