

# MAXTORQUE™ LW, BW, and MW Series Worm Gearboxes

Install, Operation, and Maintenance Manual



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## PREFACE

The procedures included in this book are to be performed in conjunction with the requirements and recommendations outlined in API Specifications. Any repairs to the equipment covered by this book should be done by an authorized Cameron service representative. Cameron will not be responsible for loss or expense resulting from any failure of equipment or any damage to any property or death or injury to any person resulting in whole or in part from repairs performed by other than authorized Cameron personnel. Such unauthorized repairs shall also serve to terminate any contractual or other warranty, if any, on the equipment and may also result in equipment no longer meeting applicable requirements.

File copies of this manual are maintained. Revisions and/or additions will be made as deemed necessary by Cameron. The drawings in this book are not drawn to scale, but the dimensions shown are accurate.

This book covers Cameron products.

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## Purpose

This instruction manual covers operation, maintenance, and installation of standard MAXTORQUE gear operators in LW, BW, and MW series. For specific cases, special instructions may be necessary. If unsure, contact Cameron's engineering department.

## Precautions/Warnings

- Cameron recommends using grade 5 or higher bolts.
- Gear operators may present unbalanced loads when lifting.
- Gear and valve assembly should not be lifted by gear operator unless specifically engineered.
- Gear operators with segmented worm gears are designed to over travel +/-5%. If turned beyond this, it is possible to disengage the worm from worm gear. If you are unsure of the units gear style or the gear does become disengaged, please contact Cameron engineering.
- Use of handwheels larger than recommended by the factory, cheater bars, etc. will void the warranty and may cause damage to the operator, valve stem, drive shafts, or other torque transmitting devices as well as being dangerous to the user. Additionally, use of chainwheels on operators that are not recommended for those applications will result in voiding operator warranty.
- MAXTORQUE gear operators can come with a splined driver available to rotate 360 degrees or a solid hub with two or more keys. Contact Cameron's MAXTORQUE engineering team if clarification is required.

## Installation Steps

1. If the gear operator is a partial turn, ensure the valve and operator have the same orientation (open/closed). The gear operator position can be changed by rotating input shaft. Multi-turn gear operators can be cycled to align with valve stem despite initial orientation.
2. Remove indicator cover, taking care to keep the O-ring in its original condition.
3. Cameron recommends application of grease or anti-seize to valve stem before installing gear operator.
4. Align gear operator with valve stem and lower gear operator onto valve flange.
5. Align gear operator and flange mounting holes and loosely install bolts.
6. Align keyway(s) by turning input shaft and install the drive key(s).
7. Tighten bolts incrementally and in crossing pattern to ensure proper seating.
8. See attached Bolt Torque Specifications for final torque values.
9. If the gear operator is partial turn, turn valve to fully open position and adjust gear stop bolts as necessary. Turn valve to fully closed and repeat process. Once completed, screw locking nuts firmly in place. Cycle the gearbox and verify that the gearbox operates freely through its full range of travel in both directions.
10. Reinstall indicator cover. This process is shown on the next page.

### Indicator Cover Installation and Sealing:

1. Place a bead of Loctite® 598 on the bolt circle of the static sealing surface of the indicator cover [14] (or riser [3]). The bead should be no less than 0.25" in diameter.
2. Install the indicator cover. Verify that the orientation of the arrow on the indicator cover matches the orientation of the gear operator/valve assembly (open/closed). Line up the thru holes of the indicator with the threaded holes of the hub and/or riser. Place the indicator down in such a way as to not disturb the sealing bead on the hub [2] (or riser [3]).

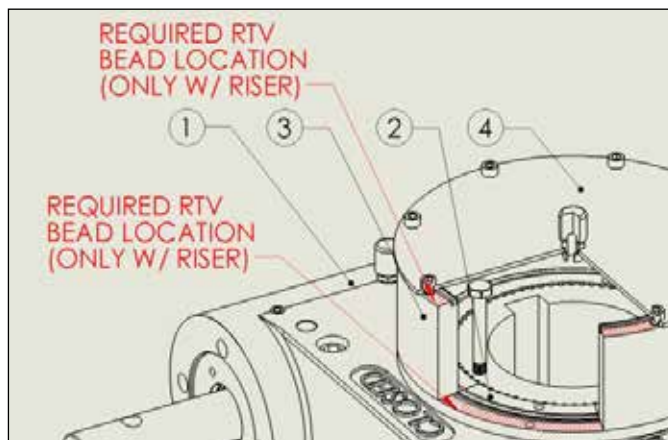


Figure 1: Static riser/indicator cover configuration (typically buried service application).

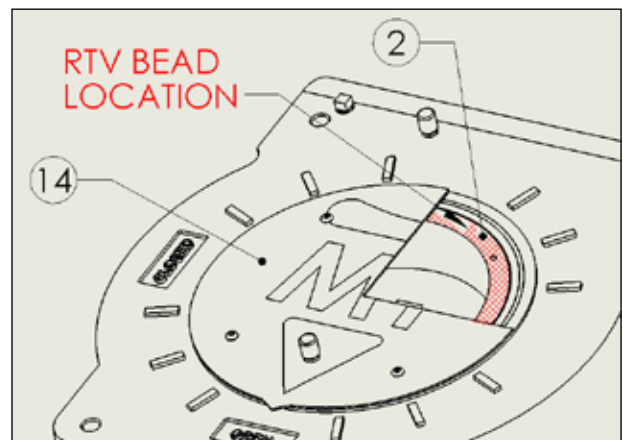


Figure 2: Standard indicator cover orientation, no riser.

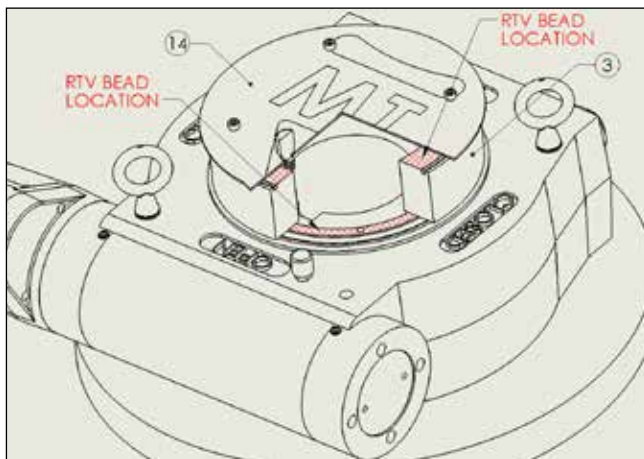


Figure 3: Dynamic riser/indicator cover configuration.

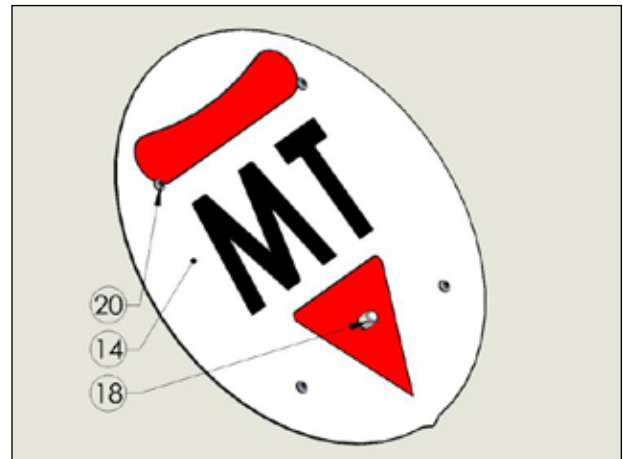


Figure 4: Standard MAXTORQUE indicator cover.

### Note:

- If removal of indicator cover is not required for valve installation, the re-application of Loctite is not necessary.
- Figures 1, 2, and 3 show different indicator configurations.
- Contact Cameron Engineering if clarification is required.

## Operation

After successful installation of MAXTORQUE gear operator, operation is very straightforward; rotating input shaft results in valve operation. The input vs. output rotation, as well as the mechanical advantage, turns to close, and output rating can be found on the submittal drawing.

## Maintenance

MAXTORQUE gear operators do not require periodic maintenance. They are, for most applications, lubricated for life, with all components designed to have a life equal to or exceeding wear life of gearing.

- Storage: MAXTORQUE gear operators should be kept dry and free of debris to help ensure ideal performance. If high humidity areas are unavoidable, steps should be taken to reduce amount of moisture the units will be exposed to. If gearboxes are being stored for long period of time, rust inhibitor should be applied to gearbox mounting surfaces.
- Spare parts: If spare parts are needed, please contact Cameron's MAXTORQUE customer service.

## Appendix A

### Bolt Torque Specifications

Grade 5			Class 8.8		
Imperial Size (Hex)	Torque		Metric Size (Hex)	Torque	
	N•m	lb-ft		N•m	lb-ft
1/4"	13	10	M5	6	4
5/16"	25	19	M6	10	7
3/8"	44	33	M7	17	12
7/16"	73	54	M8	25	18
1/2"	105	78	M10	50	36
9/16"	154	114	M12	88	64
5/8"	208	154	M16	218	160
3/4"	348	257	M18	301	222
7/8"	517	382	M20	426	314
1"	795	587	M24	736	542
1-1/4"	1498	1105	M30	1463	1079
1-1/2"	2406	1775	M36	2557	1885

### Bolt Torque Factors

Lubricant or Plating	Torque Changes
Oil	Reduce torque 15% to 25%
Dry film (Teflon or moly based)	Reduce torque 50%
Dry wax (Cetly alcohol)	Reduce Torque 50%
Chrome plating	No change
Cadmium plating	Reduce torque 25%

## Appendix B – Thread Locking, Sealing, and Gasketing



- LOCTITE® 2760 (OR EQUIVALENT) – For use on all metal fasteners where regular removal for maintenance is not required. For use on critical torque carrying components, i.e., bolt on worm gears.



- LOCTITE® 243 (OR EQUIVALENT) – A general purpose, medium strength Threadlocker. For use on general bolting, i.e., housings, baseplates, etc. **Do not mix with grease or oil.**



- LOCTITE® SUPERFLEX RTV (OR EQUIVALENT) – For use to seal surfaces. Used on surfaces needing sealing where an O-ring isn't available or for additional sealing in addition to an O-ring i.e., subsea.



- LOCTITE® 598 (OR EQUIVALENT) – For use to seal static surfaces. Used on sealing under indicator covers and also to affix the nameplates.



- LOCTITE® Nickel Anti-Seize (OR EQUIVALENT ANTI-SEIZE)- Protects metal parts from rust, corrosion, galling, and seizing. Used on a stainless hardware to prevent seizing fasteners.



- TEFLON TAPE (OR EQUIVALENT)- Seals tapered threads. Provides suitable sealing on straight threads requiring adjustment. Used on tapered threads i.e., pipe plugs and stop bolts.

### **Appendix C – Lubricants**

**Note:**

- Other lubricants may be used depending on customer specification.

**CITGO® LITHOPLEX™ CM1 OR EQUALIVENT (TEMPERATURE RANGE: -15° F to 400° F)** – Used for general assembly.

**LUBRIPLATE™ (TEMPERATURE RANGE: -60° F to 300° F)** – Used for cold weather applications. This should only be used if specifically called for.

**AEROSHELL™ 33MS (TEMPERATURE RANGE: -100° F to 250° F)** – Used for extreme cold temperature applications. This should only be used if specifically called for.

### **Appendix D – O-rings and Lipseals**

**BUNA NITRILE** – Used for general assembly.

**LOW TEMP. BUNA** – Used for low temperature applications.

**VITON®** – Used for high temperature applications.





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**HSE Policy Statement**

At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.