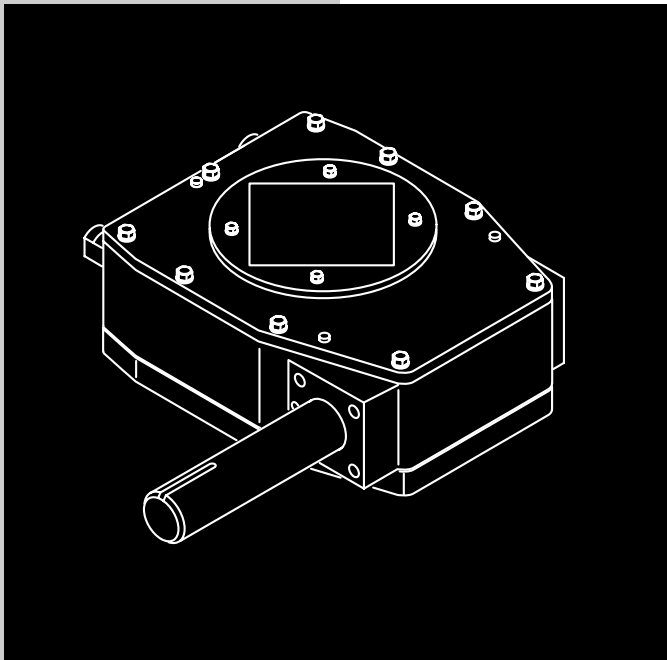


WTR Series

Installation & Maintenance for WTR-3 through WTR-575

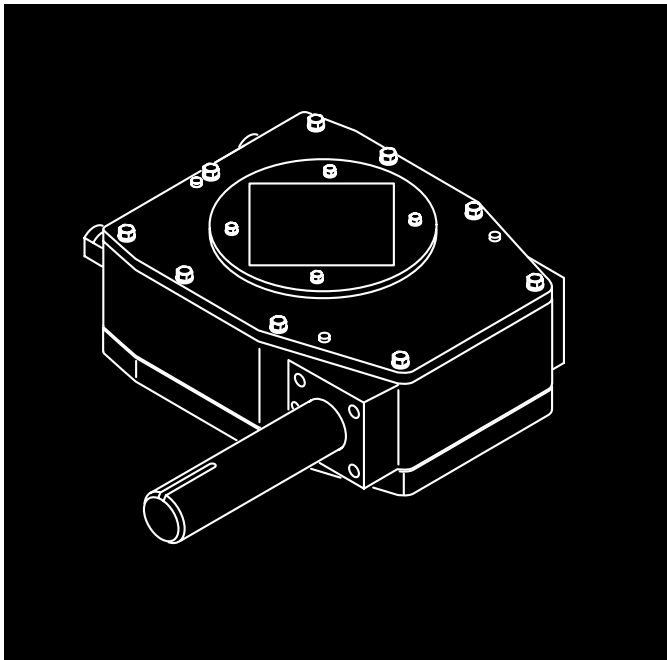
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October 2002



Limitorque

WTR Series

Installation & Maintenance for
WTR-3 through WTR-575



Limitorque

**WTR Series Installation & Maintenance Manual
for WTR-3 through WTR-575**

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1 Introduction

1.1 Purpose

This Installation and Maintenance Manual explains how to install and maintain the WTR actuator. Information on installation, disassembly, lubrication, and spare parts is provided.

1.2 User Safety

Safety notices in this manual detail precautions the user must take to reduce the risk of personal injury and damage to the equipment. The user must read and be familiar with these instructions before attempting installation, operation, or maintenance. Failure to observe these precautions could result in serious bodily injury, damage to the equipment, void of the warranty, or operational difficulty.

Safety notices are presented in this manual in three forms:

▲ WARNING: Refers to personal safety. Alerts the user to potential danger. Failure to follow warning notices could result in personal injury or death.

CAUTION: Directs the user's attention to general precautions that, if not followed, could result in personal injury and/or equipment damage.

NOTE: Highlights information critical to the user's understanding of the actuator's installation and operation.

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2 Product Capabilities and Features

Designed to operate 90° applications WTR series worm gear actuators are designed to operate valves or other applications that require 90° operation such as butterfly, ball, and plug valves.

Can be hand-operated with a handwheel or 2" nut, or electrically operated with an added motorized actuator.

Designed for use in Commercial service and AWWA C504-87 and 540-93 standards The Commercial service series uses a ductile iron worm gear with a hardened steel worm. The AWWA service series uses an alloy bronze worm gear and hardened steel worm.

The WTR has flexibility built into its design

Removable Splined Adapter to accommodate simple installation The actuator has a drop-in splined adapter to allow easy incremental adjustments when aligning the valve stem keyway and the actuator positions.

Removable/Interchangeable Mounting Base for easy input shaft position and mounting base changes for Units WTR-3 through 150 The handwheel/input shaft assembly position is changed by unbolting the housing cover and baseplate from the WTR main housing, inverting the housing 180°, and bolting the cover and the baseplate back to the WTR main housing.

▲ WARNING: Always isolate valve before reversing assembly position.

The WTR accommodates other components such as spur gear attachments and electric actuators. For WTR-3 through 150, combinations of these components can be added without removing the input shaft assembly.

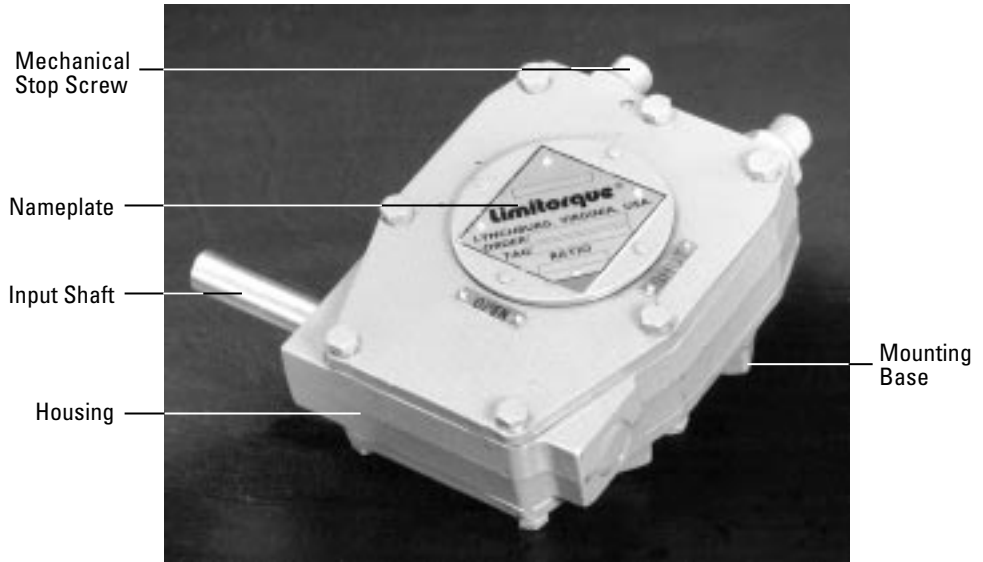
O-ring sealed and permanently lubricated for reduced maintenance.

2.1 Initial Inspection and Storage Instructions

▲ WARNING: Read this Installation and Maintenance Manual carefully and completely before attempting to store the actuator. If an electric actuator is attached to the WTR manual actuator, be aware of the electrical hazards.

2.2 Product Identification

Figure 2.1 – WTR gearbox



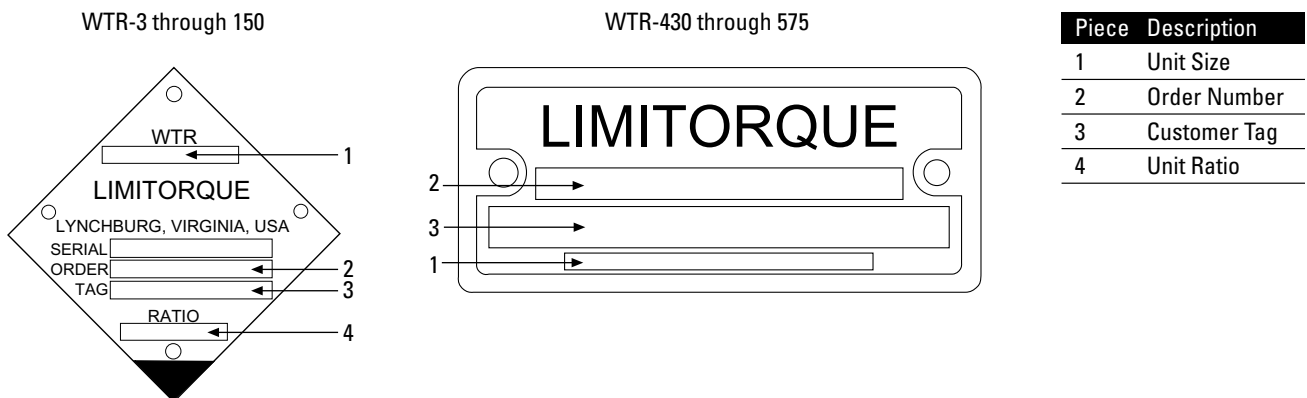
2.3 Inspection and Recording

Upon receipt of the actuator, inspect the condition of the equipment and record nameplate information as follows:

1. Carefully remove actuator from shipping carton or skid. Thoroughly examine the equipment for any physical damage that may have occurred during shipment. If damaged, immediately report the damage to the transport company.
2. A nameplate is attached to each actuator with the following information:
 - Unit Size
 - Limitorque Order Number
 - Customer Tagging
 - Unit Ratio (includes WTR SGA if attached to unit - does not include motorized actuator ratios)

Record this information for future reference, i.e., ordering parts, obtaining further information.

Figure 2.2 – WTR nameplates



2.4 Storage Procedure

NOTE: The following is our recommended storage procedure to retain maximum product integrity during storage. Failure to comply with recommended procedure will void the warranty.

Storage (less than 1 year)

Store actuators on wooden skids to protect the machined mounting flange. Place the wooden skids containing the actuators in a clean, dry, protected warehouse. If the actuators must be stored outside, they must be covered in polyethylene protection with silica gel crystals to absorb moisture. If an electric actuator is attached to the WTR actuator, refer to the storage procedures in its respective manual for appropriate storage procedures. Rotate input shafts every three months to mix the lubricant.

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3 Unit Weights

The approximate weights of the WTR actuators, with and without Spur Gear Attachments (SGA), are provided below.

Table 3.1 – Unit weights

Commercial Unit Size/SGA	AWWA Unit Size/SGA	Lbs	Kg
WTRC-3	N/A	14	7
WTRC-5	N/A	14	7
WTRC-10	WTRA-12	34	15
WTRC-15	WTRA-21	59	27
WTRC-15/S1.7	WTRA-21/S1.7	75	34
WTRC-28	WTRA-36	78	35
WTRC-28/S3.0	WTRA-36/S3.0	108	49
WTRC-40	WTRA-48	126	57
WTRC-40/S3.7	WTRA-48/S3.7	157	71
WTRC-60	WTRA-72	194	88
WTRC-60/S4.6	WTRA-72/S4.6	224	102
WTRC-150	WTRA-130	290	132
WTRC-150/S8.25	WTRA-130/S8.25	360	163
WTRC-430	WTRA-430	340	154
WTRC-450	WTRA-450	413	187
WTRC-500	WTRA-500	518	235
WTRC-575	WTRA-575	1262	572

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4

Installation Instructions

4.1 Safety Precautions

- ▲ **WARNING:** Read this Installation and Maintenance Manual carefully and completely before attempting to install, operate, or troubleshoot the Limitorque WTR actuator. Be aware of electrical hazards if an electric actuator is attached to the WTR manual actuator. Be aware of high-pressure hazards associated with the attached valve or other actuated device when installing or performing maintenance on your WTR actuator.
 - ▲ **WARNING:** Do not overtorque the WTR actuator or operate the actuator with devices other than installed operating equipment such as the handwheel, chainwheel, 2" AWWA nut or other factory-installed equipment. Using force beyond the ratings of the unit and/or using additive force devices such as cheater bars, wheel wrenches, pipe wrenches or other devices on the actuator handwheel may cause serious personal injury and/or damage to the actuator or valve.
 - ▲ **WARNING:** Do not overtorque the WTR actuator when using a Power-Take-Off Drive (PTO) to operate the 2" AWWA nut. Using force beyond the ratings of the unit may cause serious personal injury and/or damage to the actuator or valve.
 - ▲ **WARNING:** Potential HIGH-PRESSURE vessel - Before installing the WTR on a valve that is in service, ensure that the valve or other actuated device is isolated from operation and the associated pipeline is not under pressure.
 - ▲ **WARNING:** Do not attempt to remove the WTR from a valve on a pressurized line. The WTR has self-locking gears that will stabilize the valve until pressure on the line is under control or removed.
-

4.2 Safety Practices

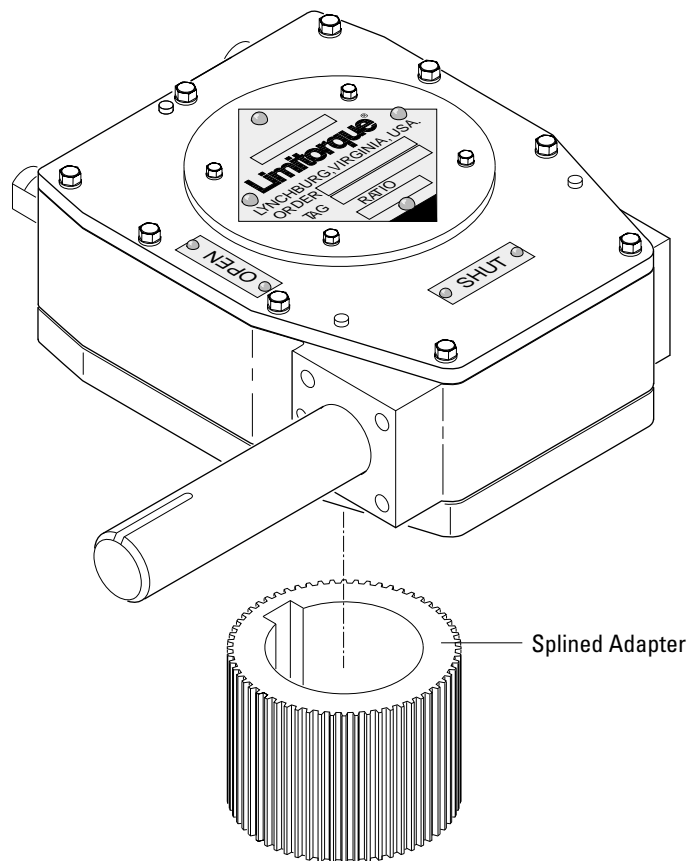
The following check points should be performed to maintain safe operation of the WTR actuator:

- Set up a periodic operating schedule on infrequently used valves.
- Verify that the pointer cap has been replaced after the gear operator is installed.
- Verify that the "end-of-travel" stop screws are correctly adjusted.
- Verify that the limit and/or torque switches on any electric actuator fitted to the WTR are correctly and appropriately adjusted.

4.3 Prepare Actuator

1. Remove the Splined Adapter from the bottom of the actuator. (See **Figure 4.1** below.)
NOTE: The valve manufacturer is responsible for assuring that the Splined Adapter is retained within the WTR actuator. Retaining the Splined Adapter is accomplished by ensuring the Valve/Actuator Mounting Flange is sized to retain the Splined Adapter or by using the Setscrew that is threaded through the Splined Adapter. Setscrews are provided only if the Splined Adapter has been bored and keyed at the factory.
NOTE: A Splined Adapter is equivalent to a two-piece drive sleeve.

Figure 4.1 – WTR Splined Adapter removal



2. If the Splined Adapter has been bored and keyed by Limitorque, verify dimensions to ensure proper compatibility with the valve stem.

NOTE: If Splined Adapter is not factory-machined, the customer assumes responsibility for securing the adapter to the valve stem so it will not disengage from the shaft.

3. If the Splined Adapter has not been bored and keyed by Limitorque, it is provided solid or with a minimum pilot bore. Custom bore and key to the maximum permissible sizes as listed in **Table 4.1**.

Table 4.1 – Splined Adapter custom bore and keyway sizes

Commercial Unit size	AWWA Unit size	Key size in max bore				Key size in max bore					
		Max bore (in)		Rect. key	Sq. key	Max bore (mm)		Metric key			
WTRC-3	N/A	1.25		1/4 x 3/16	0.250	28		8 x 7			
WTRC-5	N/A	1.50		3/8 x 1/4	5/16	38		10 x 8			
WTRC-10	WTRA-12	2.25		1/2 x 3/8	3/8	58		16 x 10			
WTRC-15	WTRA-21	2.75		3/4 x 1/2	5/8	70		20 x 12			
WTRC-28	WTRA-36	3.25		7/8 x 5/8	3/4	82		22 x 14			
WTRC-40	WTRA-48	3.75		7/8 x 5/8	3/4	96		28 x 16			
WTRC-60	WTRA-72	4.00		1 x 3/4	7/8	102		28 x 16			
WTRC-150	WTRA-130	5.00		1-1/4 x 7/8	1	127		32 x 18			
Drive sleeve		1 pc	2 pc	1 pc	2 pc	1 pc	2 pc	1 pc	2 pc		
WTRC-430	WTRA-430	5.50	4.438	1.25 x 0.875	1 x 0.75	1.25	1.0	140	N/A	36 x 20	N/A
WTRC-450	WTRA-450	6.00	4.50	1.5 x 1	1.00 x 0.75	1.50	1.0	152	N/A	40 x 22	N/A
WTRC-500	WTRA-500	7.00	5.938	1.75 x 1.50	1.50 x 1.00	1.75	1.25	178	N/A	45 x 25	N/A
WTRC-575	WTRA-575	8.00	6.50	2.00 x 1.50	1.50 x 1.00	1.75	1.5	203	N/A	50 x 28	N/A

4.4 Installing WTR-3 through 150

CAUTION: If your actuator is already mounted to a valve from the manufacturer, verify that the actuator is mounted according to the following instructions. Failure to follow the installation procedures could result in personal injury or improper operation and could damage the equipment.

Install actuator as follows:

NOTE: Piece numbers correspond to piece numbers listed in **Figure 6.1**.

1. Place valve in MID-TRAVEL position.
2. Install the Splined Adapter (piece #24) on the valve shaft and insert the Key to secure the Splined Adapter. If the Splined Adapter has been factory-machined, insert and tighten the Setscrew into the Splined Adapter tapped hole to secure it to the valve stem.
3. Remove Pointer Cap (piece #5) to view the Worm Gear (Drive Sleeve - piece #4) and the Splined Adapter while mounting onto the valve flange and setting Mechanical Stop Screws (piece #13) and Jam Nut (piece #14).
4. Adjust the WTR Worm Gear to approximate MID-TRAVEL position. **Figure 4.2** shows gear in closed position.
5. Align and mount the WTR on the installed Splined Adapter. Once the unit is properly aligned on the valve Mounting Flange, secure the unit with the required number of mounting bolts. High strength (minimum SAE-Grade 5) hex head or socket head cap screws with lockwashers are recommended. The quantity and thread size of the actuator mounting taps are listed in **Table 4.2**.

Table 4.2 – WTR mounting base tap sizes (3 through 150)

Commercial Unit size/SGA	AWWA Unit size/SGA	Tap size and quantity		Standard Flange	
		MSS	ISO	MSS	ISO
WTRC-3	N/A	N/A	(4) M8-1.25 x 12 deep 70.00 B.C.	N/A	F07
WTRC-5	N/A	(4) 3/8-16 x .56 deep 4.000 B.C.	(4) M10-1.50 x 15 deep 102.00 B.C.	FA10	F10
WTRC-10	WTRA-12	(4) 1/2-13 x .750 deep 4.950 B.C.	(4) M12-1.75 x 18 deep 125.00 B.C.	FA12	F12
WTRC-15	WTRA-21	(4) 5/8-11 x .9 deep 5.500 B.C.	(4) M16-2 x 25 deep 140.00 B.C.	FA14	F14
WTRC-15/S1.7	WTRA-21/S1.7				
WTRC-28	WTRA-36	(4) 3/4-10 x 1.12 deep 6.500 B.C.	(4) M20-2.5 x 30 deep 165.00 B.C.	FA16	F16
WTRC-28/S3.0	WTRA-36/S3.0				
WTRC-40	WTRA-48	(8) 5/8-11 x .9 deep 7.500 B.C.	(4) M20-2.5 x 24 deep 165.00 B.C.	FA19	F16
WTRC-40/S3.7	WTRA-48/S3.7				
WTRC-60	WTRA-72	(8) 5/8-11 x .9 deep 10.00 B.C.	(8) M16-2 x 24 deep 254.00 B.C.	FA25	F25
WTRC-60/S4.6	WTRA-72/S4.6				
WTRC-150	WTRA-130	(8) 3/4-10 x 1.1 deep 11.750 B.C.	(8) M20-2.5 x 32 deep 298.00 B.C.	FA30	F30
WTRC-150/S8.3	WTRA-130/S8.3				

4.5 Installing WTR-430 through 575

CAUTION: If the actuator is already mounted to a valve from the manufacturer, verify that the actuator is mounted according to the following instructions. Failure to follow the installation procedures could result in personal injury or improper operation and could damage the equipment.

4.5.1 Two-Piece Drive Sleeve

Install actuator as follows:

NOTE: Piece numbers correspond to piece numbers listed in **Figure 6.2**.

1. Place valve in MID-TRAVEL position.
2. Place WTR in MID-TRAVEL position. **Pointer Cap** (piece #7) should be halfway between open and close position.
3. Install the **Splined Adapter** (piece #32) on the valve shaft and insert the Key to secure the **Splined Adapter**. If the **Splined Adapter** has been factory-machined, insert and tighten the **Setscrew** into the **Splined Adapter** tapped hole to secure it to the valve stem.
4. Remove **Pointer Cap** (piece #7) to view the **Worm Gear** (Drive Sleeve - piece #5) and the **Splined Adapter** while mounting onto the valve flange and setting **Mechanical Stop Screws** (piece #22) and **Nut** (piece #24).
5. Align and mount the WTR on the installed **Splined Adapter**. Once the unit is properly aligned on the valve **Mounting Flange**, secure the unit with the required number of mounting bolts. High strength (minimum SAE-Grade 5) hex head or socket head cap screws with lockwashers are recommended. The quantity and thread size of the actuator mounting taps are listed in **Table 4.3**.

4.5.2 One-Piece Drive Sleeve

Install as follows:

NOTE: Piece numbers correspond to piece numbers listed in **Figure 6.2**.

1. Place valve in closed position.
2. Remove the **Pointer Cap** (piece #7) from the actuator.
3. Turn operator input shaft until gear unit is in fully closed position (verify correct rotation).
4. Mount the WTR on the valve **Mounting Flange**, locating the valve **Shaft Key** in the keyway of the operator drive sleeve.
5. Bolt the WTR securely to the **Mounting Flange**. The quantity and thread size of the actuator mounting taps are listed in **Table 4.3**.

Table 4.3 – WTR mounting base tap sizes (430 through 575)

Commercial Unit size/SGA	AWWA Unit size/SGA	Tap size and quantity		Standard Flange	
		MSS	ISO	MSS	ISO
WTRC-430	WTRA-430	(8) 1 - 8 x 1.3 deep, 14.02 B.C.	(8) M30 - 3.5 x 34 deep, 356.00 B.C.	FA35	F35
WTRA-450	WTRA-450	(8) 1 - 8 x 1.8 deep, 14.02 B.C.	(8) M30 - 3.5 x 34 deep, 356.00 B.C.	FA35	F35
WTRA-500	WTRA-500	(8) 1.25 - 7 x 1.97 deep, 16.00 B.C.	(8) M36 - 4 x 50 deep, 406.00 B.C.	FA40	F40
WTRC-575	WTRA-575	(12) 1.25 - 7 x 2.05 deep, 19.02 B.C.	(8) M36 - 4 x 52 deep, 483.00 B.C.	FA48	F48

4.6 Setting the Mechanical Stops on the WTR

- If the WTR is shipped already *installed* on the valve, the Mechanical Stops should be set.
 - If the WTR is *not installed* on the valve, the Mechanical Stops must be set after mounting.
- The following instructions for setting the Mechanical Stops are based on the typical orientation (Position B) for most actuator applications: turn handwheel Clockwise to CLOSE and Counterclockwise to OPEN.

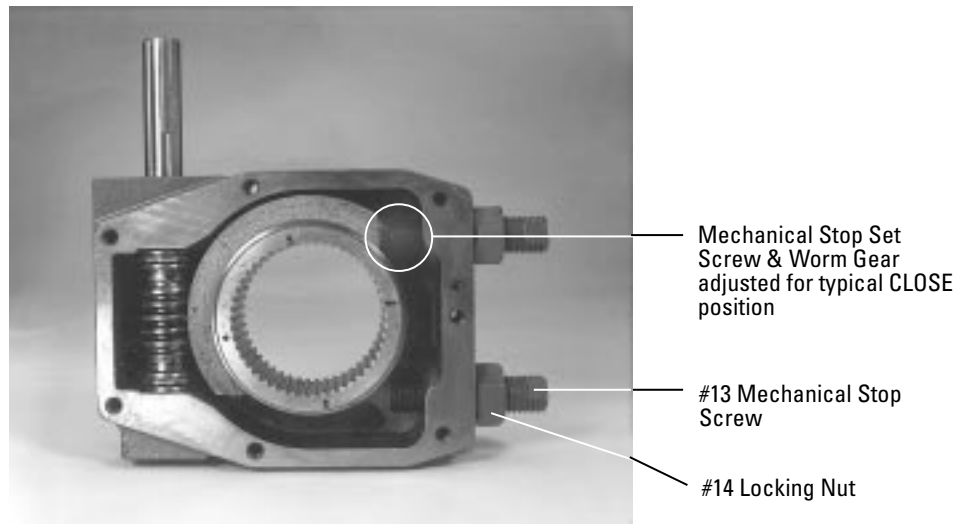
Set or reset the stops as follows:

NOTE: Piece numbers correspond to piece numbers listed on **Figure 6.1** or **6.2**.

1. Set CLOSE Mechanical Stop Screw (piece #13/#22): loosen the Locking Nut (piece #14/#23) and back off the Mechanical Stop Screw (piece #13/#22) to allow the valve to travel to the fully CLOSED position.
2. Using the Handwheel, turn the valve to the CLOSE position. The valve *must be* fully seated before setting the CLOSE mechanical stop.
NOTE: If the actuator is motor-operated, engage the Declutch Lever to put the electric actuator in the manual mode. Use the electric actuator Handwheel for manual operation.
3. Rotate the Mechanical Stop Screw (piece #13/#22) in the clockwise direction until contact is made with the Drive Sleeve (piece #4/#5).

CAUTION: When using an electric actuator, do not allow mechanical stops to be used to torque against. Use the limit switch.

Figure 4.2 – Worm gear quadrant adjusted to contact with mechanical stops to set mechanical stop screw position



4. Re-tighten Locking Nut (piece #14/#23) to secure the Mechanical Stop Screw.

Set OPEN Mechanical Stop:

1. Setscrew (piece #13/#22): loosen the Locking Nut (piece #14/#22, 23); back off the Mechanical Stop Setscrew (piece #13/#22) to allow the valve to travel to the fully OPEN position.
2. Using the Handwheel, turn the valve to the OPEN position. The valve must be fully seated in the OPEN position before setting the OPEN mechanical stop.
NOTE: If the actuator is motor-operated, engage the Declutch Lever to put the electric actuator in the manual mode. Use the electric actuator Handwheel for manual operation.
3. Rotate the Mechanical Stop Setscrew (piece #13/#22) in the clockwise direction until contact is made with the Worm Gear Quadrant.
4. Retighten Locking Nut (piece #14/#23) to secure the Mechanical Stop Screw.

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5 Maintenance

5.1 Lubrication

The WTR series actuators have a totally sealed gear case, factory-lubricated with grease. No seal can remain absolutely tight at all times. Therefore, it is not unusual to find a very small amount of weeping around shaft seals—especially during long periods of idleness such as storage. Using grease minimizes this condition as much as possible. If a small amount is weeping at start-up, remove it with a clean cloth. Once the equipment is operating on a regular basis, the weeping should stop.

5.1.1 Lubrication Inspection

Inspect Limitorque WTR actuators for correct lubrication prior to operating—particularly following a long storage period.

Under normal usage and environmental conditions, adding or replacing the grease should not be necessary. Limitorque suggests that during an overhaul program, the actuators should be checked for leakage.

Each application has its own effect on the actuator and the frequency of these inspections should be based on the application and the operating experience.

5.1.2 Factory Lubricant

The WTR-3 through 150 series operator gear case is factory-lubricated with EP-00 calcium complex base grease, suitable for temperatures from -20F (-29C) to +250F (+121C).

The WTR-430 through 575 series operator gear case is factory-lubricated with EP-2 calcium complex base grease, suitable for temperatures from 0F (-18C) to +150F (+66C).

Table 5.2 – Lubricant Quantities

Amount of Lubricant	Unit		with SGA	
	Lbs	Kg	Lbs	Kg
WTR-3	.75	.3	.5	.25
WTR-5	.75	.3	.5	.25
WTR-10/12	1.1	.5	.5	.25
WTR-15/21	1.3	.6	.5	.25
WTR-28/36	1.5	.7	.5	.25
WTR-40/48	1.7	.8	.5	.25
WTR-60/72	2.2	1	.5	.25
WTR-130/150	4	1.8	.5	.25
WTR-430	7.0	3.2	8.0	3.6
WTR-450	9.5	4.3	11.0	5.0
WTR-500	10.0	4.5	12.5	5.6
WTR-575	11.0	5.0	13.0	5.9

5.2 Minimum Lubricant Qualities Required

The standard lubricants used by Limitorque have been proven to be extremely reliable over years of service. Limitorque does not recommend a particular lubricant substitute for the standard lubricants; however, Limitorque does require the following lubricant qualities as a minimum.

The lubricant must

- Contain an “EP” additive.
- Be suitable for the temperature range intended.
- Be water and heat resistant and non-separating.
- Not create more than 8% swell in Buna N or Viton.
- Not contain any grit, abrasive, or fillers.
- Be slump-resistant; prefer NLGI-0 grade.
- Not be corrosive to steel gears, ball, or roller bearings.
- Have a dropping point above 316°F for temperature ranges of -20°F to +150°F (-28°C to 65°C).

5.3 Disassemble and Reassemble

▲ WARNING: Possible Hazardous Voltage. If WTR is mounted on an electric actuator, turn power OFF before disassembling the WTR to prevent accidental start-up while disassembling.

▲ WARNING: Potential High Pressure Vessel. Before removing or disassembling your actuator, ensure that the valve or other actuated device is isolated and is not under pressure.

5.3.1 Disassemble WTR-3 through 150

Piece numbers refer to the Illustrated Parts Breakdown of **Figure 6.1**.

Remove the Drive Sleeve

1. Remove Hex Head Cap Screws (piece #19) and Spring Washers (piece #20); lift Pointer Cap (piece #5) from Drive Sleeve (piece #4).
2. Remove Hex Head Cap Screws (piece #15) and Spring Washers (piece #16) from the WTR Housing Cover (piece #3) and Housing Base (piece #2); remove the Housing Cover.
3. Back the Stop Screws (piece #13) and Jam Nut (piece #14) out of the WTR to provide extra space for removing the Drive Sleeve (piece #4).
4. Slide the WTR Housing Assembly away from the Drive Sleeve (piece #4); once disengaged from the Worm Shaft Assembly, lift the Drive Sleeve out of the WTR Housing Base (piece #2).

Remove the Worm Shaft Assembly

5. Tap the two Spiral Pins (piece #8) out of the Worm (piece #7) and slide the Input Shaft (piece #6) out of the actuator.
6. Remove the loose Worm Shaft Assembly parts: O-ring (piece #21), Thrust Bearings (piece #9) and Shim Washers (piece #28).

5.3.2 Reassemble WTR-3 through 150

Perform Steps 1 through 6 listed above in the *reverse* order to reassemble the WTR.

5.3.3 Disassemble SGA for WTR-15 through 150

Piece numbers refer to the Illustrated Parts Breakdown of **Figure 6.1**.

The WTR Spur Gear Attachments are modular and can be assembled directly to the WTR housing without special modifications. To disassemble the SGA:

1. Remove Key (piece #15) for Input Pinion (piece #3).
2. Remove Mounting Adapter (piece #19) if supplied by removing Hex Head Cap Screws (piece #21) and Lockwashers (piece #20).
3. Remove Hex Head Cap Screws (piece #11) and Lockwashers (piece #12) and slide Housing Cover (piece #2) off the Input Shaft (piece #3).
4. Remove the Input Shaft (piece #3), Idler Gear (piece #5), and Output Spur Gear (piece #4).
5. Remove Socket Head Cap Screws (piece #13) and Lockwasher (piece #14) and slide Spur Gear Housing (piece #1) off the WTR's input shaft.
6. Remove Spur Gear Attachment Register (piece #17).

5.3.4 Reassemble SGA for WTR-15 through 150

Perform Steps 1 through 6 listed above in the *reverse* order to reassemble the WTR.

5.3.5 Disassemble WTR-430 through 575

5.3.5.1 Disassemble SGA

Piece numbers refer to **Figure 6.2**.

1. Remove the Key (piece #11) from the Input Pinion (piece #23).
 2. Remove the Housing Cover (piece #21) by removing the Cap Screws (piece #15).
 3. Remove the Input Pinion (piece #23) and the Output Gear (piece #22).
 4. Remove the small Housing (piece #20) by removing the Cap Screws (piece #30).
 5. Remove the Key (piece #24) from the Pinion Gear (piece #5).
- If not Double Reduction SGA, go to Step No. 8.
6. Remove the Key (piece #11) from the Input Gear (piece #5).
 7. Remove the End Cover (piece #17) by removing the Cap Screws (piece #16).
 8. On the WTR-575 only, remove the Packer (piece #8).
 9. Remove the top Cover (piece #2) by removing the Cap Screws (piece #16).
 10. Remove the Input Gear (piece #5) including the Bearings (piece #6) and the Shim (piece #19).
 11. Remove the Gear Sub-Assembly (piece #18) and the final Output Gear (piece #4).
 12. Remove the main SGA Housing (piece #1).

5.3.5.2 Disassemble WTR

Piece numbers refer to **Figure 6.2**.

If the units are for use in buried service applications:

- The Pointer Cap (piece #7) is replaced with a non-rotating sealed cap.
- The input shaft will be sealed with extra O-rings, a bronze sealing ring and a soil pipe support.

1. Remove Pointer Cap (piece #7), Housing Cover (piece #2), and Motor Adapters (if supplied).

NOTE: Three jack screw holes are provided in the housing cover to aid in removal.

2. Remove End Caps (piece #8 and #8A).
3. Withdraw Wormshaft assembly (piece #3) complete with Thrust Bearings (piece #10) and Shims (piece #16).

NOTE: Note the number and position of any shims that are present. Gasket compound must be used on all metal/metal faces.

4. Remove Drive Sleeve (piece #5) from Housing (piece #1).

5.3.6 Reassemble WTR-430 through 575

1. Perform Steps 1 through 4 listed in Disassemble WTR in the *reverse* order to reassemble the WTR.

2. Reassemble the SGA by reversing the order of the disassembly steps shown above.

NOTE: Note the number and position of any shims that are present. Gasket compound must be used on all metal/metal faces.

6 Parts Breakdown

Figure 6.1 (1 of 2) – WTR with SGA parts breakdown (3 through 150)

Piece	Description	Quantity
1	WTR Housing	1
2	WTR Housing Base	1
3	WTR Housing Cover	1
4	Drive Sleeve	1
5	Pointer Cap	1
6	Input Shaft	1
7	Worm	1
8	Spiral Pin	2
9	Thrust Bearing	2
10	Bushing	2
11	Key	1
12	Core Plug	1
13	Mechanical Stop Screw	2
14	Jam Nut	2
15	Hex Head Cap Screw	A/R
16	Spring Washer	A/R
18	Housing Gasket	2
19	Hex Head Cap Screw	4
20	Spring Washer	4
21	O-Ring	2
22	Pointer Gasket	1
23	Dowel Pin	5
24	Splined Adapter	1
25	O-Ring	2
26	Stop Pin (with bronze worm only)	2
28	Shim Washer	2
29	Label Kit	1
30	Nameplate	1
31	Drive Screw	4

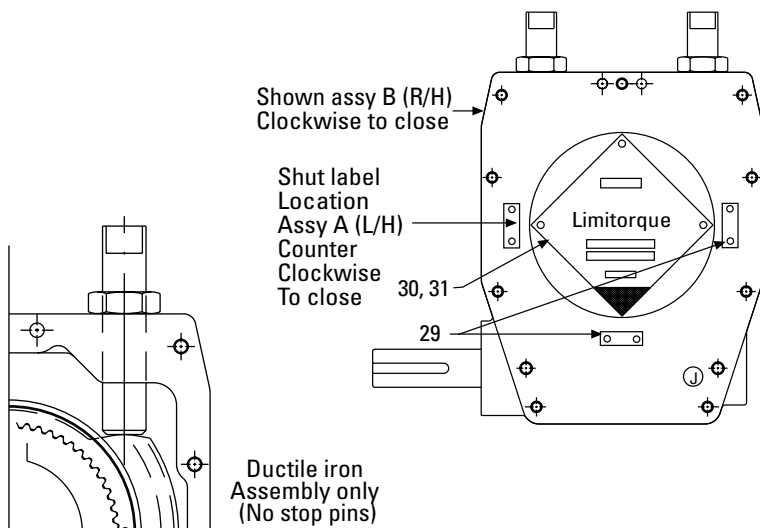
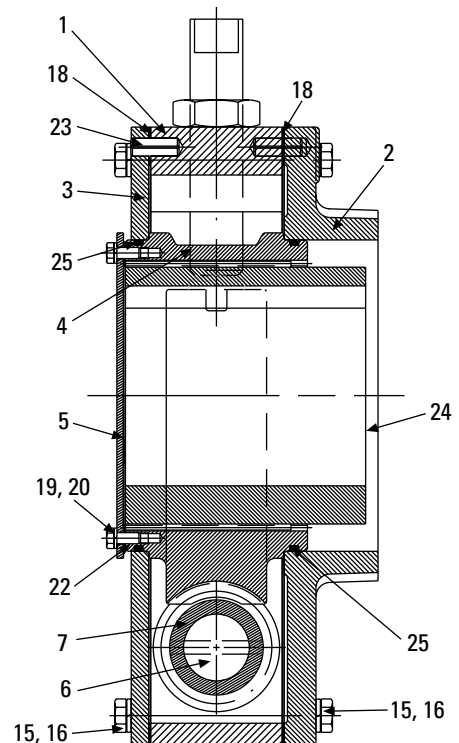
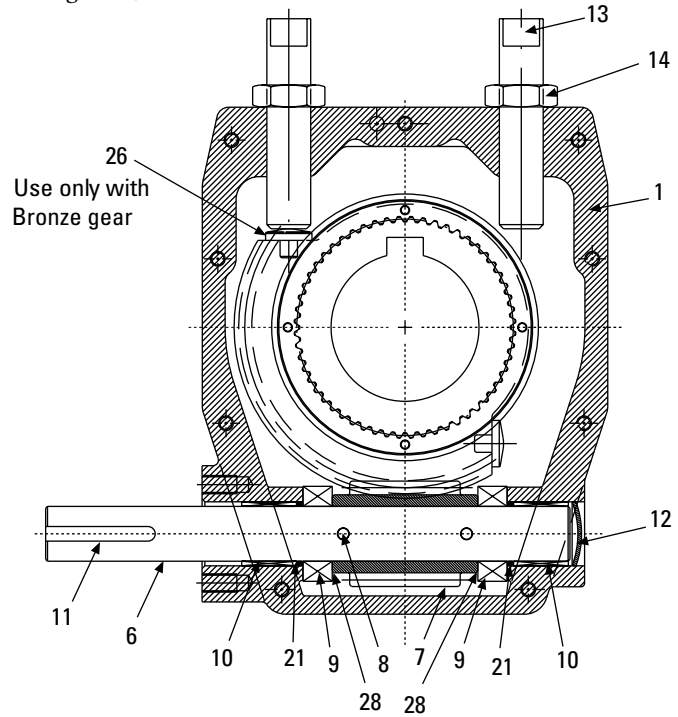


Figure 6.1 (2 of 2) – WTR with SGA parts breakdown (3 through 150)

Piece	Quantity	Description
1	1	Spur Gear Housing
2	1	Housing Cover
3	1	Input Shaft & Pinion
4	1	Output Spur Gear
5	1	Idler Gear
6	2	Idler Bushing
7	1	Cover Gasket
8	1	Housing Gasket
9	2	Bushing
10	1	O-Ring
11	6	Hex Head Cap Screw
12	6	Lockwasher
13	4	Socket Head Cap Screw
14	4	Lockwasher
15	1	Key
16	1	Dowel Pin
17	1	Register
18	3	Welsh Plug
19	1	Mounting Adapter
20	4	Lockwasher
21	4	Hex Head Cap Screw
22	4	Hex Head Cap Screw
23	4	Lockwasher
24	1	Bushing

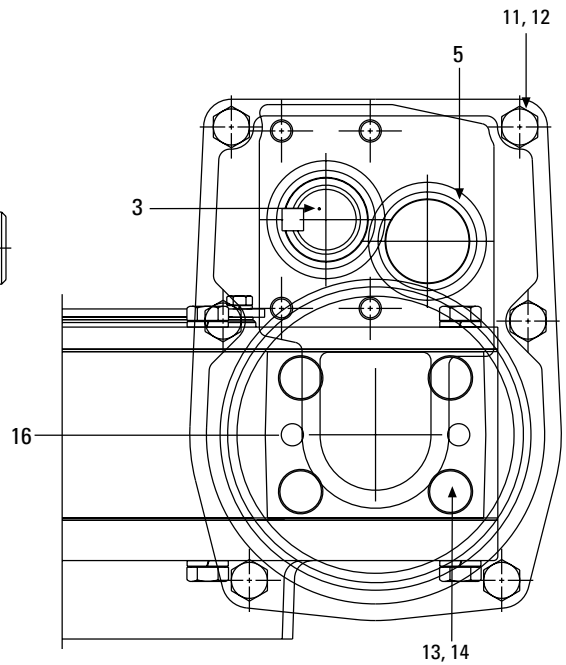
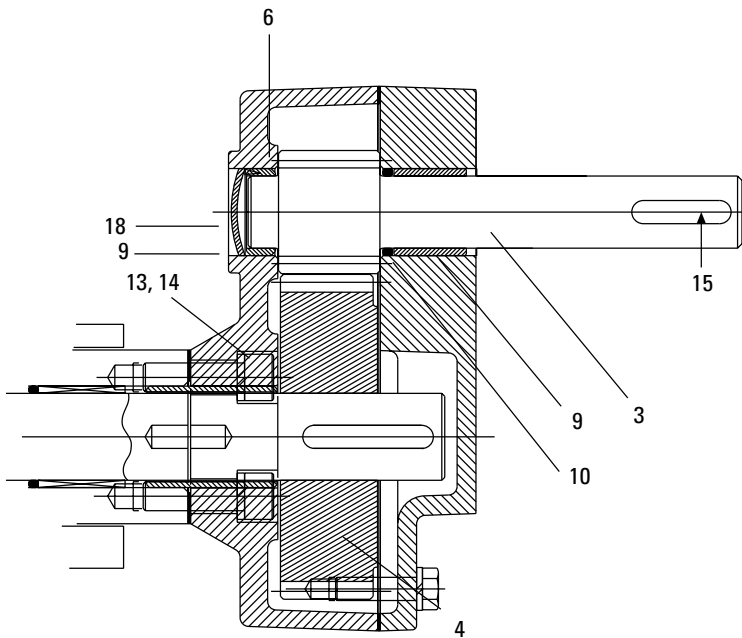
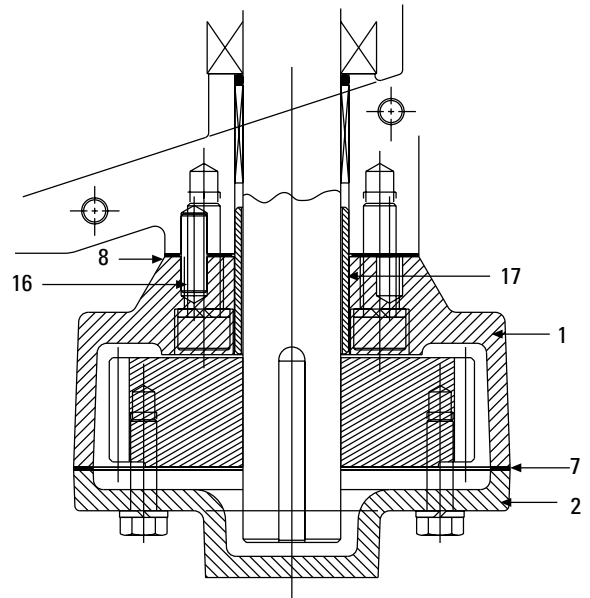
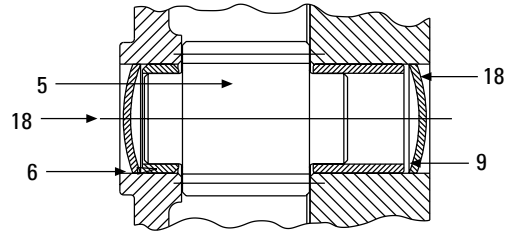


Figure 6.2 (1 of 2) – WTR with SGA parts breakdown (430 through 575)

Piece	Quantity	Description	Piece	Quantity	Description
1	1	Housing	21	1	Key
2	1	Housing Cover	22	2	Stop Screw
3	1	Wormshaft	23***	2	Hex Nut
5	1	Drive Sleeve	23A**	2	Pad
7	1	Pointer Cap	24***	2	Seal Washer
8	1	Closed Endcap	25	A/R	Cap Screw
8A	1	Open Endcap	26	A/R	Lockwasher
10	2	Thrust Bearing	27	4	Cap Screw
11	1	O-Ring	28	4	Lockwasher
12	2	O-Ring	29**	2	Setscrew
13	2	Bushing	29B**	2	Plug**
16	A/R	Shims	30	8	Cap Screw
18*	1	Blanking Plate	31	8	Lockwasher
20	1	Nameplate	32****	1	Splined Adapter

* Only on WTR-430 *** Not on WTR-575
 ** Only on WTR-575 **** Not Shown

WTR-575
Stop Arrangement

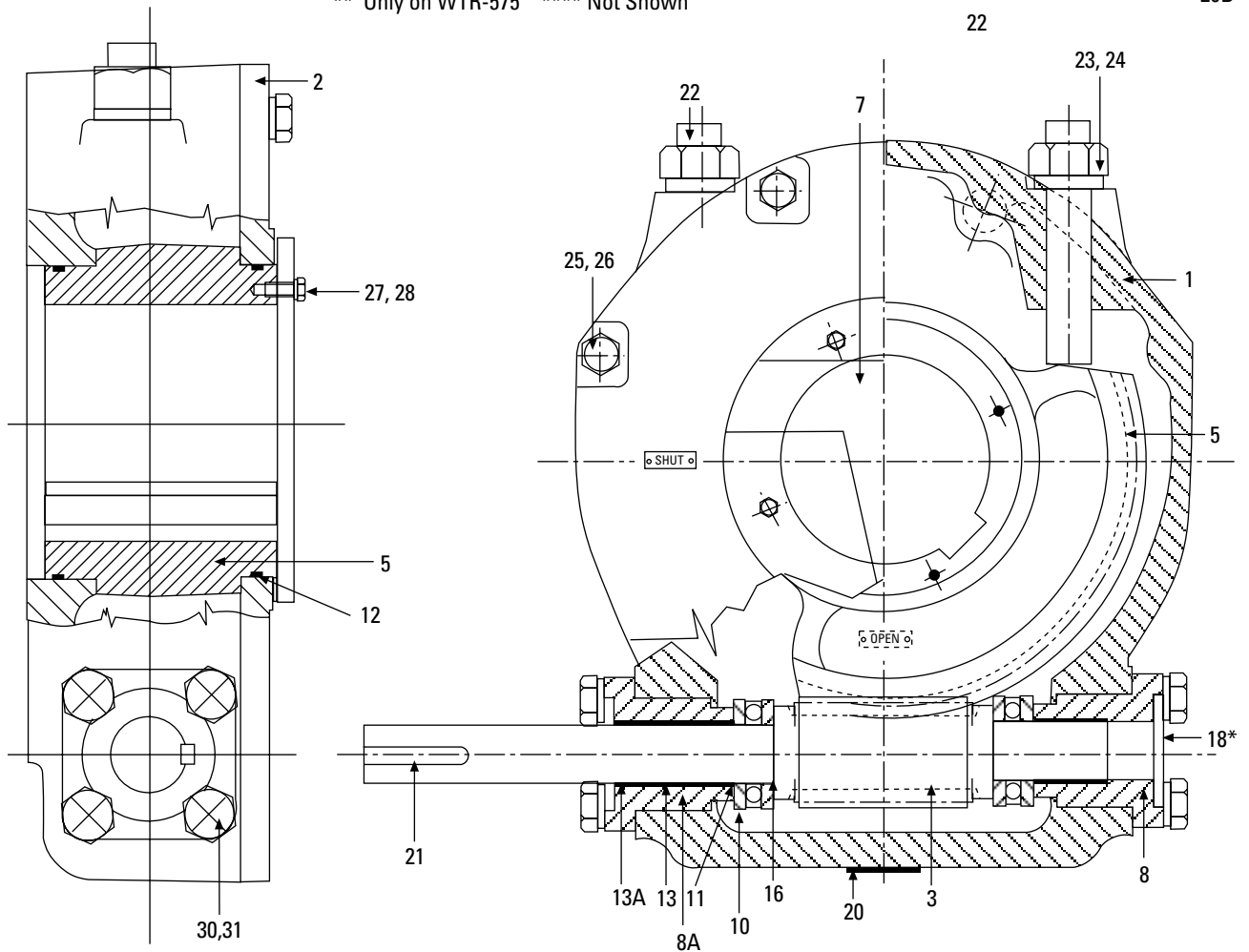
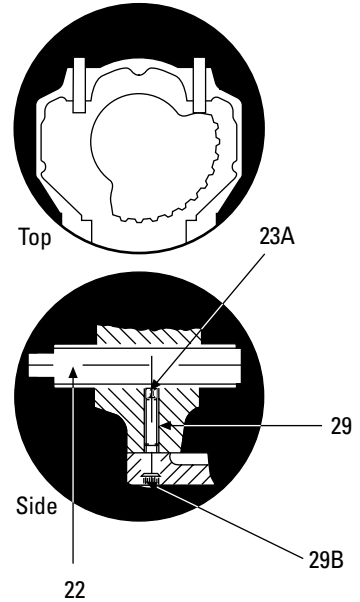
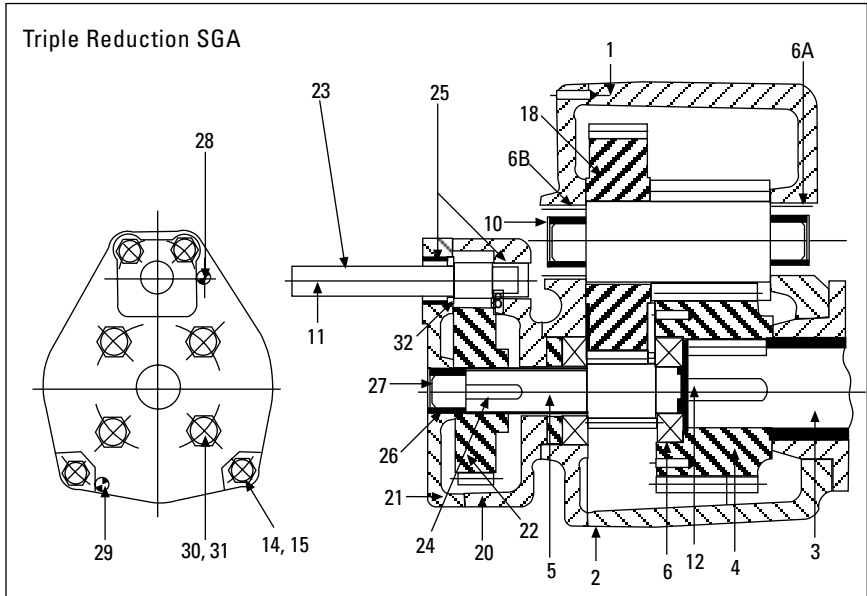
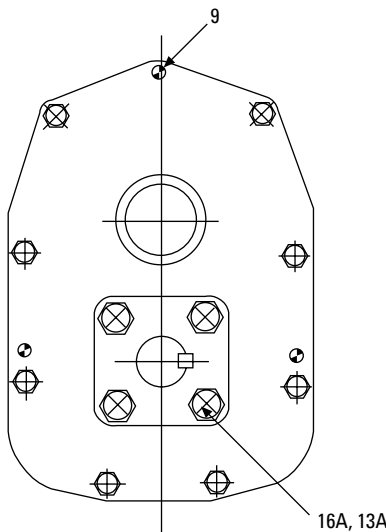
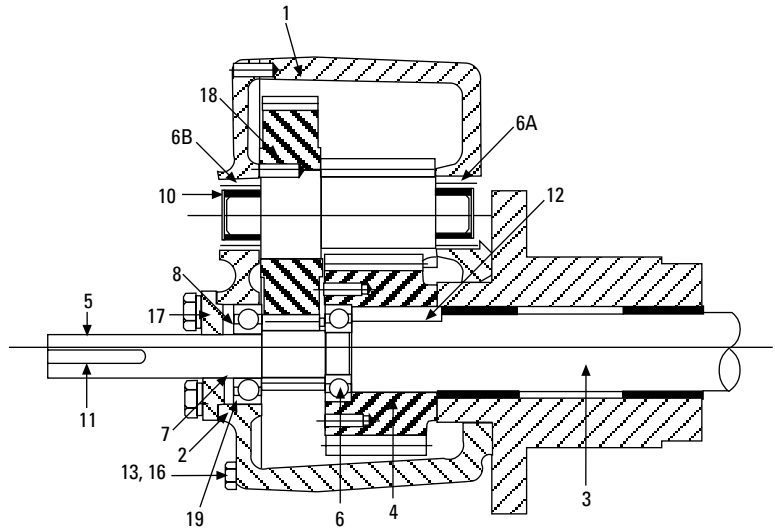
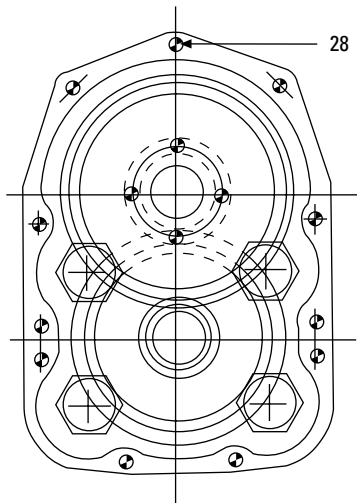


Figure 6.2 (2 of 2) – WTR with SGA parts breakdown (430 through 575)

Piece	Quantity	Description	Piece	Quantity	Description	Piece	Quantity	Description
1	1	Housing	12	A/R	Key	22	1	Output Gear
2	1	Cover	13	A/R	Lockwasher	23	1	Input Pinion
3	1	Wormshaft	13A	4	Lockwasher	24	1	Key
4	1	Output Gear	14	4	Lockwasher	25	2	Bushing
5	1	Input Gear	15	4	Cap Screw	26	1	Bushing
6	2	Bearing	16	A/R	Cap Screw	27	1	Plug
6A	1	Bushing	16A	4	Cap Screw	28	1	Roll Pin
6B	1	Bushing	17	1	End Cover	29	1	Dowel Pin
7*	1	O-Ring	18	1	Intermediate Gear Sub-Assy	30	4	Cap Screw
8	1	Packer	19	A/R	Shim	31	4	Lockwasher
9	A/R	Dowel Pin	20	1	Housing	32	1	Oil Seal
10	2	Core Plug	21	1	Housing Cover			
11	1	Key						

* WTR-575 Only

Double Reduction SGA



7 How to Order Parts

To order parts or obtain further information for your Limitorque WTR actuators, contact your local Limitorque distributor, sales office, or:

Limitorque Corporation
5114 Woodall Road
P.O. Box 11318
Lynchburg, VA 24506-1318
Attn: Parts Department

Phone (804) 528-4400
Fax (804) 845-9736
<http://www.limitorque.com>

All inquiries or orders must be accompanied by the following information:

1. Unit size
2. Limitorque order number
3. Limitorque serial number

NOTE: Limitorque WTR actuators, under normal operating conditions, are virtually maintenance-free. No recommended spare parts are suggested by Limitorque.

Limitorque

Australian Distributor for Limitorque

Acrodyne Pty Ltd
14/11 Havelock Road
Bayswater, Victoria 3153
Australia
Phone 03-8727-7800
Fax 03-9729-8699