WedgeRock RC Series

Worm Gear Actuators

INSTALLATION COMMISSIONING, OPERATION & MAINTENANCE MANUAL

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1.0 Introduction

1.1 Purpose

The purpose of this manual is to provide necessary information for:

- Installation
- Commissioning
- Operation
- Maintenance

Caution:
Failure to observe instructions contained in this manual could result in personal injury and property damage, and may void warranty. Read this manual carefully before installing and using the product. Additional information will be provided on request.

1.2 Audience

This manual is intended for qualified personnel who are tasked to deal with all aspects of the gear actuator.

2.0 Safety

2.1 General Safety Information

The end user or contractor performing commissioning or repairs are responsible for securing work area and implementing protective measures, such as the use of personal protective equipment, lockout-tagout, or barriers. Safety guidelines provided in this document are intended to supplement site/facility work practice and policy.

All activities addressed in this manual must be carried out by suitably qualified personnel having been authorized by the end user and/or contractor. Prior to working on this product, personnel must thoroughly read and understand instructions.

Only WedgeRock approved replacement parts should be used. Modifications or changes to components can invalidate warranty, actuator certifications, and fit for purpose.

2.2 Safety Terminology and Symbols

It is important to read, understand, and follow safety messages and regulations carefully before handling product. Instructions are published to help prevent these hazards:

- Personal accidents and health problems
- Damage to the product
- Product malfunction
- Environmental contamination

All safety messages are flagged with an exclamation symbol and the word Caution, Warning, or Danger.

Hazard Level	Indication
 **Danger:**	A hazardous situation which, if not avoided, will result in death or serious injury.
 **Warning:**	A hazardous situation which, if not avoided, could result in death or serious injury.
 **Caution:**	A hazardous situation which, if not avoided, could result in minor or moderate injury.
Notice:	• A potential situation which, if not avoided, could result in undesirable conditions. • A practice not related to personal injury.

2.3 Environmental Safety

The Work Area

Always keep work area clean.

Waste and Emissions Regulations

Observe safety regulations regarding waste and emissions:

- Appropriately dispose of all waste.
- Clean up spills in accordance with safety and environmental procedures.
- Report all environmental emissions to the appropriate authorities.

WARNING:
If the product has been contaminated in any way, such as from toxic chemicals or nuclear radiation, do NOT send the product to WedgeRock unless it has been properly decontaminated.

2.4 User Safety

Safety Equipment

Use safety equipment according to the company and manufacturers guidance. Recommended personal protective equipment (PPE) in the work area:

- Safety Glasses
- Protective Shoes
- Protective Gloves
- Hard hats when applicable

Precautions before Work

- Make sure of clear path of retreat.
- Make sure product cannot roll or fall over and injure people or damage property.
- Make sure lifting equipment is in serviceable condition.
- Check explosion risk before using electric hand tools.

- Lock and tag out any potentially dangerous energy sources.

Precautions during Work

- Never work alone.
- Always wear protective clothing and hand protection.
- Stay clear of suspended loads.
- Always lift the product by its lifting device.

3.0 Transportation, Handling, Storage, & Packaging

3.1 Inspect the Delivery

Inspect the package

1. Inspect for damaged or missing items upon delivery.
2. Note any damaged or missing items on the receipt and freight bill.
3. File a claim with the shipping company if anything is out of order. If product has been picked up from distributor, make a claim directly to distributor.

Inspect the unit

1. Remove packing materials from product. Dispose of all packing materials in accordance with local regulations.
2. Inspect product to determine if parts have been damaged or are missing.
3. If applicable, unfasten product by removing screws, bolts, or straps. For personal safety, be careful when handling nails and straps.
4. Contact sales representative if anything is out of order

3.2 Transportation Guidelines

WARNING:
Dropping, rolling or tipping units, or applying other shock loads, can cause property damage and personal injury. Ensure unit is properly supported and secure during lifting and handling.

CAUTION:
Risk of injury or equipment damage from use of inadequate lifting devices. Ensure lifting devices (such as chains, straps, forklifts, cranes, etc.) are rated to sufficient capacity.

WARNING

- Risk of serious personal injury or equipment damage. Proper lifting practices are critical to safe transport of heavy equipment. Ensure practices used are in compliance with all applicable regulations and standards.
- Safe lifting points are specifically identified in manual and general arrangement drawing. It is critical to lift equipment only at designated points. Integral lifting eyes or eye bolts on gear actuators are intended for use in lifting gear actuator assembly only.
- Lifting and handling heavy equipment poses a crush hazard. Use caution during lifting and handling and wear appropriate Personal Protective Equipment (PPE, such as steel-toed shoes, gloves, etc.) at all times. Seek assistance if necessary.

Figure 1: - Example of a Proper Lifting Method

3.3 Storage guidelines

Storage requirements are dependent on storage duration. The normal packaging is designed only to protect the unit during shipping.

Length of time in storage	Storage requirements
Upon receipt/short-term (less than six months)	• Store in a covered and dry location. • Store the unit free from dirt. • Store on a pallet or up off the ground.
Long-term (more than six months)	• In addition to the short term requirements, apply rust inhibitor to uncoated faces such as the baseplate and motor adapter if any. Inspect every six months and reapply if needed.

4.0 Product description

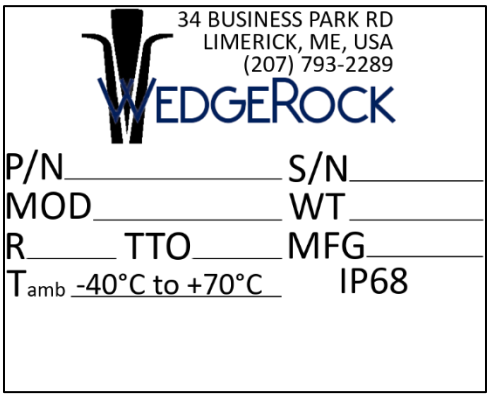
4.1 General description

The RC series gear actuator is an industrial worm gear with optional gear reduction. These are used for operating a variety of applications including valves, dampers, gates, etc. The gearbox can be operated manually or with an electric actuator.

4.2 Nameplate information

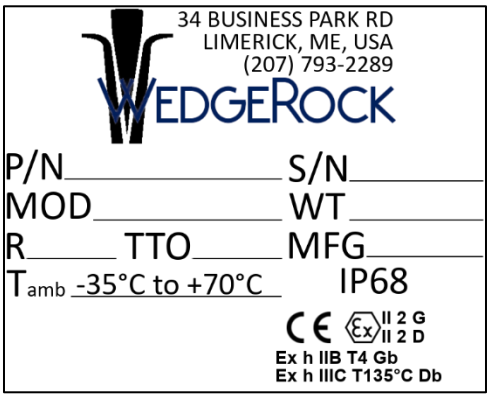
Every gear actuator has a nameplate that provides information including:

- P/N: Part/Drawing number
- S/N: Serial/job number
- MOD: Frame Size: I.E. RC24
- WT: Assembly Weight (Pounds unless stated otherwise)
- R: Total gear ratio
- TTO: Turns to operate
- MFG: Manufacturing Date (Month/Year)
- Tamb: Ambient temperature rating
- IP68: Ingress protection rating



4.2.1 Nameplate for ATEX Applications

If product is sold as ATEX, the following is the default serial tag:



4.3 Environmental Limits

The RC is capable of the following standard temperature rating:

RC STD Temperature Limits		
Tamb	Low Temp Rating	High Temp Rating
High	-10˚F(-23˚C)	400˚F(204˚C)
Std	-40˚F(-40˚C)	212˚F(100˚C)
Low	-60˚F(-51˚C)	240˚F(115˚C)

Review expected regional temperatures to ensure the product will function properly.

The RC has been tested for an ingress protection rating of IP68.

4.3.1 ATEX Environmental Limits

The temperature limits of the RC for ATEX applications are as follows:

RC ATEX Temperature Limits			
Temp Class	Tamb	Low Temp Rating	High Temp Rating
T3	Std	-40˚F(-40˚C)	240˚F(115˚C)
T3	Low	-60˚F(-51˚C)	240˚F(115˚C)
T4*	**Std**	**-31˚F(-35˚C)**	**160˚F(70˚C)**
T4	Low	-60˚F(-51˚C)	160˚F(70˚C)
***Standard ATEX Rating**			

5.0 Installation

WARNING:
Ensure shaft being driven by gear actuator is not able to rotate while installing gear operator. If installing in the field, valves should be shut with pipeline flow stopped, dampers and gates should be locked or placed in a position that won't allow movement. Failure to do so can cause unexpected movement resulting in personal injury and damage to equipment.

5.1 Pre-Installation

Wipe baseplate underside (mounting surface) and mating flange completely.

5.2 Installation of Gear Operator on to Valve

1. Cycle gear actuator to match the valve position (Open / Shut).
2. Apply light oil or anti-seize to the valve stem before installing gear operator.
3. Install key into valve stem keyway.
4. Align gear operator with valve stem and slide onto valve flange.
5. Align gear operator and valve flange mounting holes by turning gear actuator input shaft.
6. Install mounting screws and tighten incrementally in a crossing pattern.
7. See bolt & screw torque specification chart for torque values.

5.3 Installation of Electric Actuator on Valve Operator

If the gear actuator is designed and configured for motorized service, an electric actuator may be used to operate. Refer to the electric actuator IOM to Install. A motorizable gear actuator can be assembled with a motor adapter flange. Consult WedgeRock to confirm maximum allowable input speed and cycle rating.

6.0 Removal

WARNING:
Ensure the device being operated by the gear is secure and the shaft being driven by the gear actuator will not rotate uncontrollably after removal. Failure to conduct a comprehensive risk assessment of gear removal can lead to personal injury and damage to equipment.

1. Remove mounting screws.
2. Remove gear actuator from valve.

7.0 Commissioning

7.1 Position Stops

The open and shut stops prevent the gear operator from rotating past the open and shut positions of the valve. Each stop allows for ±5˚ of rotation from nominal for a travel range of 80˚ to 100˚.

Stop Screw Sealing

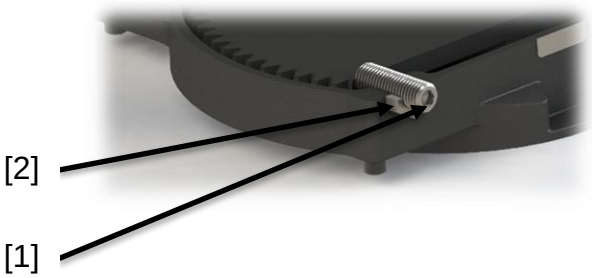


Figure 2 - Standard Stop Configuration

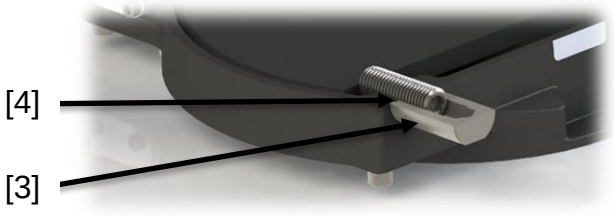


Figure 3 - Sealed Stop Configuration

In all configurations, [1] stop screws include [2] jam nuts. See Figure 2 - Standard Stop Configuration.

[1] Stop screws are supplied standard as zinc plated steel. When not suited to the application, or when sealing is needed, the [2] jam nut is replaced by a [3] stop screw cover, completely sealing the stop screw from outside elements with an [4] O-ring. See Figure 3 - Sealed Stop Configuration.

Adjusting the "Shut" Position Stop

1. Remove [3] stop screw cover or loosen [2] jam nut (as equipped).
2. Turn hand wheel so valve is in the shut position. The [1] stop screw may have to be adjusted to allow valve to move to correct position.
3. Adjust the shut position stop screw until it comes into contact with stop lug inside gear operator.
4. If [3] stop bolt cover is included, verify [4] O-rings are correctly installed in respective grooves.
5. Tighten [2] jam nut or [3] stop screw cover to lock [1] stop screw in place.

Adjusting the "Open" Position Stop

1. Remove [3] stop screw cover or loosen [2] jam nut (as equipped).
2. Turn hand wheel so valve is in the open position. The [1] stop screw may have to be adjusted to allow valve to move to correct position.
3. Adjust the open position stop screw until it comes in contact with stop lug inside gear operator.
4. If [3] stop bolt cover is included, verify [4] O-rings are correctly installed in respective grooves.
5. Tighten [2] jam nut or [3] stop screw cover to lock [1] stop screw in place.

7.2 Pressure Relief Vent (PRV)

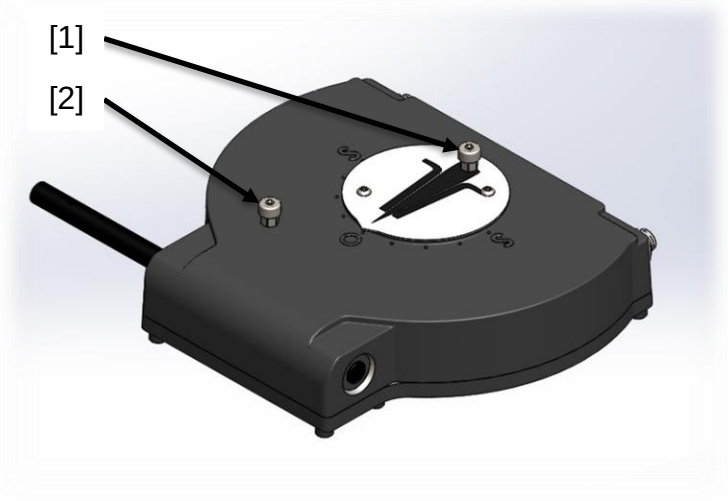


Figure 4 - Pressure Relief Vents

Pressure Relief for Stem Area [1]

Pressure relief is an optional feature provided for stem area to avoid any buildup of pressure due to valve stem leakage for API 6D valves.

Pressure Relief for Gear Actuator Housing [2]

Pressure relief is an optional feature provided for gear actuator housing to avoid buildup of pressure due to temperature fluctuation (thermal expansion).

Adjusting PRV Location

If specified when ordered, the PRV will be provided in the highest NPT port determined by installation orientation. If the final position is not known when the gear is ordered, the PRV will be installed as indicated on the general arrangement drawing. If the PRV is below the grease line, it will allow lubricant to weep periodically as pressure builds and is released. **Please contact WedgeRock to modify PRV location for guidance.**

7.3 Electric Actuator

If an electric actuator is installed, refer to the electric actuator IOM for commissioning.

CAUTION:
Before running gear actuator to the end stops with electric actuator, verify the electric actuator output rotation is correct and torque limits have been set. Failure to do so may result in damage to gear actuator.

8.0 Operation

The gear actuator is operated by rotating the input shaft clockwise or counterclockwise which results in the output hub rotating. Refer to the general arrangement drawing for output rotation direction with a given input rotation. Limit worm shaft input speed to less than 100 RPM and ensure input torque does not exceed gear actuator rating provided by WedgeRock.

8.1 Manual Operation

To operate gear manually, a hand wheel, chain wheel, or drive nut may be provided.

CAUTION:
Do not replace the factory hand wheel with a different size without consulting the factory. Do not install chain wheels if not installed from the factory. Do not use cheater bars or drive the gear in any way it was not intended as this will void the warranty and may cause damage to the gear actuator, valve stem, drive shafts, or other torque transmitting devices as well as being dangerous to the user.

8.2 Motorized Operation

An electric actuator may be used to operate gear actuator. Refer to electric actuator IOM to operate.

9.0 Maintenance

9.1 Lubrication

The gear actuator is lubricated for life at the factory. Added or replacement lubrication will not be necessary throughout its rated life.
. In the event lubrication is needed, the following can be used:

Standard Grease	Mystik JT-6 Low Temp
Low Temp Grease	Lubriplate Mag-1
High Temp Grease	Navi-Guard ClingTuf Hi temp Red 2

9.2 Spare Parts

In general, spare parts are not required for the life of the gear actuator. If spare parts are required, contact your WedgeRock sales representative or go to https://wedgerock.com/contact/ for information.

9.3 Service

WedgeRock has service personnel available to install, maintain, and repair all WedgeRock products. For more information, contact your WedgeRock sales representative or go to https://wedgerock.com/contact/ for information.

10.0 ATEX Safety Instructions

These safety instructions refer to the installation, use and maintenance of the RC for use in potentially explosive areas with the presence of gases, vapours, and dusts.

CAUTION:

These instructions must be observed in addition to the warnings in the equipment instruction manuals.

Any installation, maintenance, operation, and inspection procedures shall be carried out by qualified and trained personnel who understand and comply with local regulations and the operating instructions of the equipment. well as being dangerous to the user.

Before use in a classified area or after a new classification of the area, the user must check the suitability of the equipment for the area and the substances present.

CAUTION:

The equipment cannot be installed and used in hazardous area:

- zone 0 (flammable gases and vapours);
- zone 20 (combustible dusts);
- mines (group I).

The equipment must be installed and maintained in accordance with installation and maintenance standards for environments classified against the risk of explosion (i.e. EN 60079-14, EN 60079-17, or other local standards and regulations).

Electric actuator shall be installed by End User according to the instruction manual. Electric actuator shall have a separate ATEX Ex certification suitable for installation zone, group of gas and dust, temperature class and max surface temperature, range of ambient temperature.

In case of coating, the following rules shall be followed by End User:

The equipment is suitable for IIC gas group when:

- A conductive primer coat is applied.
- The thickness of the top coating if not conductive is < 0,2 mm

The User shall take all appropriate measures to avoid the risks associated with the formation and/or presence of static charge during use, such as effective ground connections, clean with a damp cloth or antistatic, etc..

To avoid the dangers associated with the formation of electrostatic charges, the piping connecting the process and/or other machines must be made with metallic materials or antistatic and guaranteed electrical continuity between all metal parts and the rest of the installation.

CAUTION:
The equipment must be earthed through an anti-loosening and anti-rotation device. The user must regularly check the effectiveness of the earth connection.

CAUTION:
Depending on the type of use and the substances, the End User shall periodically check the equipment for cleanliness, wear and correct operation.

The User shall avoid the allowance of ingress of solid materials inside the equipment, in order to avoid ignition sparks.

The user shall provide regular checks to limit dust deposits, it is necessary to have a regular cleaning procedure and remove dust deposits using suitable equipment for the hazardous area: compressed air nozzles shall be avoided.

CAUTION:
The user shall avoid dust deposits.

The equipment must be used in a place protected from the risk of lightning, in accordance with the regulations in force at the installation site.

CAUTION:
The equipment shall not be used in presence of:

- flames and hot gases

- radio frequency (RF) electromagnetic waves from 10^4 Hz to $3x10^{11}$ Hz
- electromagnetic waves from $3x10^{11}$ Hz to $3x10^{15}$ Hz
- ionizing radiation
- ultrasonics
- adiabatic compression
- exothermic reactions.

The user shall perform a periodic visual inspection for leaks from the equipment and carry out maintenance according to the specific use and maintenance manuals.

CAUTION:

Approx. every 2 years visually inspect the equipment for grease leakage. For oil lubrication type equipment visually inspect for oil leakage approximately every year.

For severe applications or if equipment operation is infrequent, perform maintenance checks at shorter intervals.

The user should periodically check the equipment and ensure its proper function.

The user is solely responsible for the correct use and maintenance of the equipment; all operations must be carried out by trained and qualified personnel.

Unauthorised replacement or replacement with non-original components will invalidate the safety of the equipment. All spare parts must be replaced with components equivalent to the original.

CAUTION:

Different or additional uses to those specified in the User and Maintenance Manual are not permitted.

WedgeRock is not responsible for damage caused by improper use and/or dangerous use.

11.0 Bolts / Screw Torque Chart

Torque Chart [Grade 5]				
Diameter & TPI	Torque			
	Dry [K=0.20]		Lubricated [K=0.15]	
	[Ft-Lbs]	[Nm]	[Ft-Lbs]	[Nm]
1/4-20	8.0	10.8	6.3	8.5
5/16-18	17	23	13	18
3/8-16	30	41	23	31
7/16-14	50	68	35	47
1/2-13	75	102	55	75
9/16-12	110	149	80	108
5/8-11	150	203	110	149
3/4-10	260	353	200	271
7/8-9	430	583	320	434
1-8	640	868	480	651
1-1/8-7	790	1071	600	813
1-1/4-7	1,120	1519	840	1139
1-3/8-6	1,470	1993	1,100	1491
1-1/2-6	1,960	2657	1,460	1979

Torque Chart [Class 8.8]				
Diameter & Pitch	Torque			
	Dry [K=0.20]		Lubricated [K=0.15]	
	[Ft-Lbs]	[Nm]	[Ft-Lbs]	[Nm]
M6X1.00	7.7	10.5	5.8	7.9
M8X1.25	19	26	14	19
M10X1.50	37	51	28	38
M12X1.75	65	88	49	66
M14X2.00	103	140	77	105
M16X2.00	162	219	121	164
M18X2.50	229	311	172	233
M20X2.50	325	441	244	331
M22X2.50	443	600	332	450
M24X3.00	562	762	422	572
M27X3.00	822	1115	617	837
M30X3.50	1117	1515	838	1136
M33X3.50	1520	2061	1140	1546
M36X4.00	1952	2647	1464	1985