WedgeRock RS(DR) Series

Spring Return Actuators

INSTALLATION COMMISSIONING, OPERATION & MAINTENANCE MANUAL

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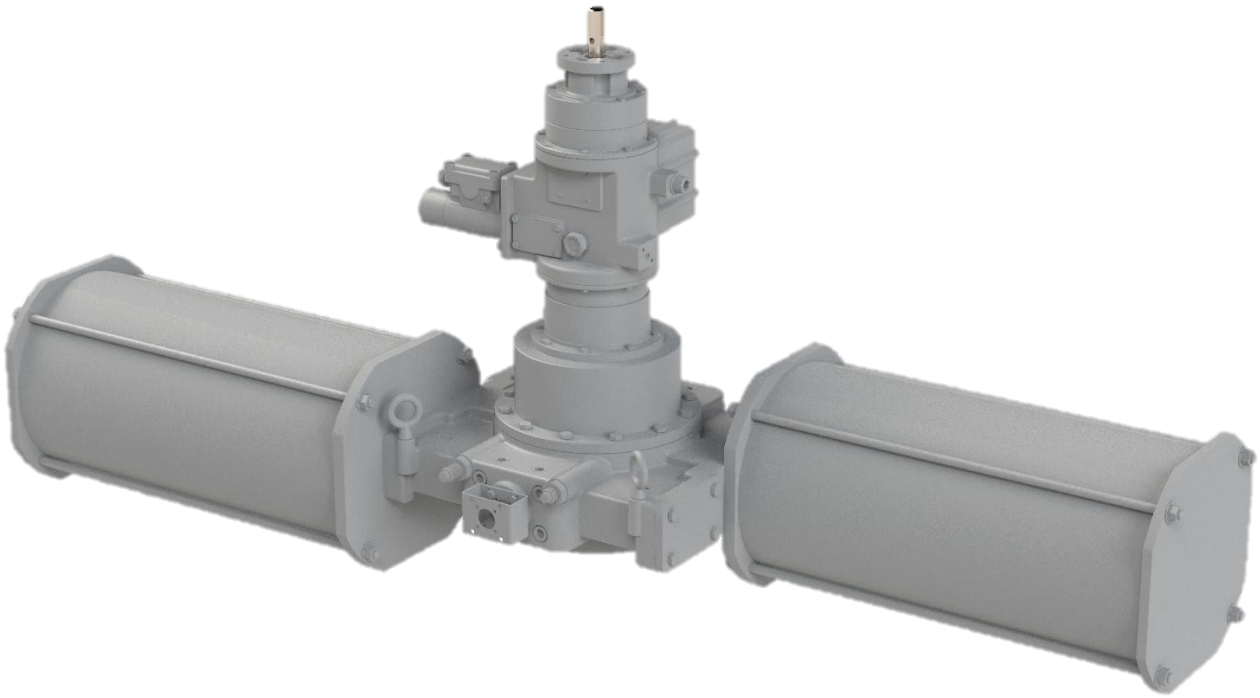

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1.0 Introduction

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, 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 trained and experienced in all aspects of the RS(DR) 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 Functional Safety Information

For functional safety and SIL rated applications, please refer to the RS safety manual, 700160.

2.3 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 likely 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.

2.4 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.

2.5 User Safety

Safety Equipment

Use safety equipment according to the company and manufacturers guidance.
Minimum 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.
- Disconnect electrical power from electric actuator if used to prevent unintended movement.
- Remove signal to solenoid and ensure the RS(DR) actuator is in the fail-safe position.

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.

DANGER:
Do not disassemble the actuator if it is malfunctioning. There is a possibility of releasing potential energy. Contact WedgeRock for further instructions.

3.0 Transportation, Handling, Lifting, Storage, & Packaging

3.1 Inspect the Delivery after Transport

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 Lifting and Handling

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 follow 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 RS actuators are intended for use in lifting RS actuator assembly only.
- Lifting points are not designed to lift both the RS actuator and valves or other objects that may be attached.
- 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.

Rigging the RS

Threaded holes are located on the ends of the spring can. Install swivel lifting eyes for use. Use a choker hitch around the main body and another sling to a hoist ring on the spring can. Adjust strap length as required. See figure 1.

Figure 1 - Example of a Proper Lifting Method, RS

Rigging the RSDR

The RSDR comes with lifting eyes. See figure 2. Use of all four lifting eyes is required when lifting to avoid an unstable lift.

Figure 2 - Example of a Proper Lifting Method, RSDR

3.3 Storage guidelines

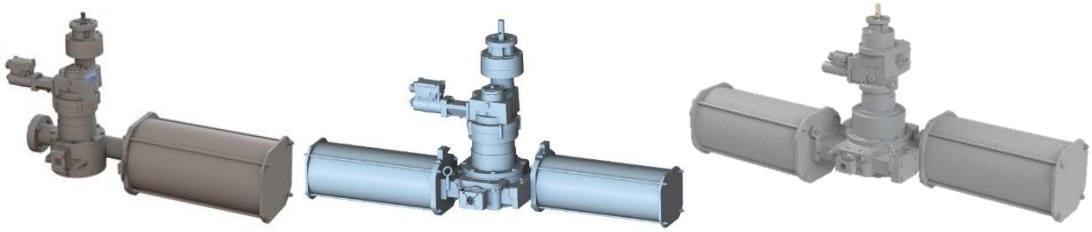
Storage requirements are dependent on storage duration. The normal packaging is designed only to protect the unit during shipping.

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

While there are different iterations of the RS(DR), they all perform the same basic function. The RS or RS-G1 is a single spring can assembly with a hydraulic damper. This is a legacy product and no longer manufactured. The RSDR is a dual spring can assembly and available in two configurations referred to as RSDR-G1 and RSDR-G2. The difference between the two is the way they regulate the fail-safe direction time to operate. The G1 uses an adjustable hydraulic damper, the G2 uses a centrifugal clutch damper.



RS-G1 RSDR-G1 RSDR-G2

Figure 3 - RS(DR) TYPES

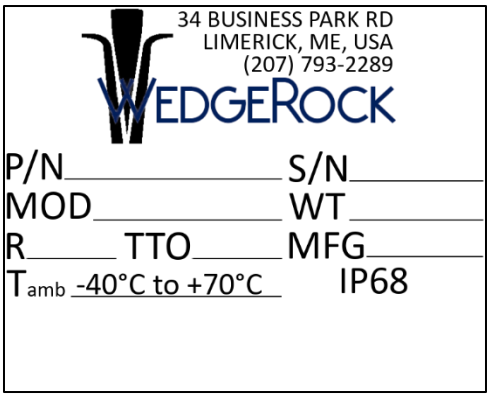
RS(DR) actuators are designed for efficient reliable operation. These are typically used for operating quarter turn valves. The RS(DR) can be assembled in a “fail close” or “fail open” configuration. Operation can be by a user with a handwheel or by using a standard electric actuator.

A rack and helical spring acts on an output pinion gear coupled to a valve stem in the fail position. A helical spring housed in a spring can operates the valve to the fail-safe position when a braking mechanism is released. When a solenoid is energized, a plunger rod is retracted, and the locking mechanism is engaged allowing the RS(DR) actuator to be operated. When the solenoid is de-energized, a plunger rod extends and releases the locking mechanism, forcing the RS(DR) actuator to move to the fail-safe position. Stop bolts are provided to allow for travel adjustment. Direct indication to the valve stem is provided and can be fitted with a position indicator as an option to provide a position signal to the electric actuator. A damper is used to adjust operation time when the actuator is moving in the fail-safe position. Other accessories or options can be provided as required.

4.2 Nameplate information

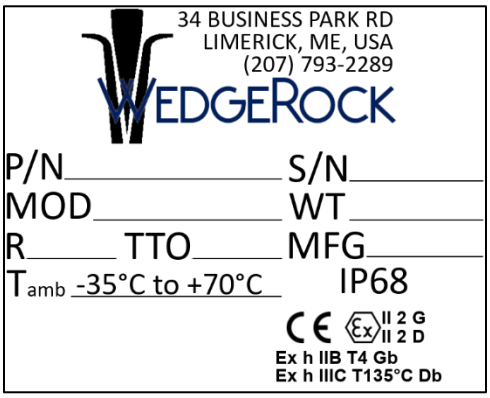
Every gear actuator has a nameplate that provides information including:

- P/N: Part/Drawing number
- S/N: Serial/job number
- MOD: Frame Size – Spring Size – Fail Direction: I.E. RSDR9-100-CW
- 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



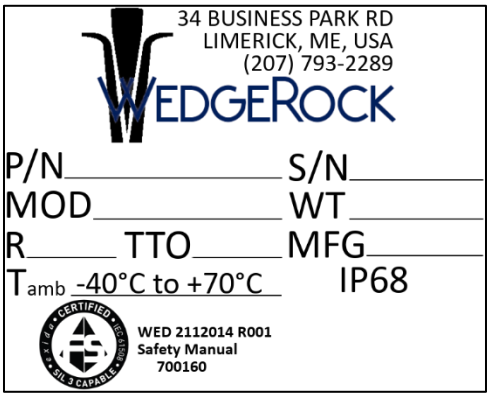
4.2.1 Nameplate for ATEX Applications

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



4.2.2 Nameplate for SIL Applications

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



4.3 Environmental Limits

The RS(DR) is capable of the following standard temperature rating:

RS(DR) STD Temperature Limits		
Tamb	Low Temp Rating	High Temp Rating
Std	-40˚F(-40˚C)	160˚F(70˚C)
Extended	-60˚F(-51˚C)	240˚F(115˚C)

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

Other commercial bolt on options may have different temperature and ingress protection ratings including the solenoid, electric actuator, and indicator. The

overall temperature rating should be constrained by the device with the most restrictive limits.

When using an electric solenoid, the following options are available:

Solenoid	Ex Class	Low Temp Rating	High Temp Rating	IP Rating	Voltage
41 01E06K00	II 2G Ex eb IIC T4 Gb	-4˚F(-20˚C)	104˚F(40˚C)	IP54	24VDC
E-G060-907GMC MB	II 2G Ex eb mb IIC T4 Gb II 2D Ex tb IIIC T130˚C Db	-22˚F(-30˚C)	140˚F(60˚C)	IP65	24VDC
E-G060-909GMC MB	II 2G Ex eb mb IIC T4 Gb II 2D Ex tb IIIC T130˚C Db	-22˚F(-30˚C)	140˚F(60˚C)	IP65	230VAC

Other solenoid options available on request.

The RS(DR) has been tested for an ingress protection rating of IP68.

4.3.1 ATEX Environmental Limits

The temperature limits of the RS(DR) for ATEX applications are as follows:

RS(DR) 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**			

For ATEX applications, if using an electric solenoid, it is not considered part of the assembly and it is a bolt on accessory with its own ratings.

4.3.2 SIL Environmental Limits

The RS(DR) has been tested to function within the temperature range -40˚F(-40˚C) to 160˚F (70˚C) for SIL applications.

5.0 Installation

DANGER:
Spring return actuator must be in its fail-safe position when installing to avoid accidental release of spring. If used, electric spring release solenoid should be disconnected from power supply. If used, pressure pilot spring release mechanism should be disconnected from any source of pressure. Failure to do so can cause unexpected movement resulting in personal injury or death and damage to equipment.

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.

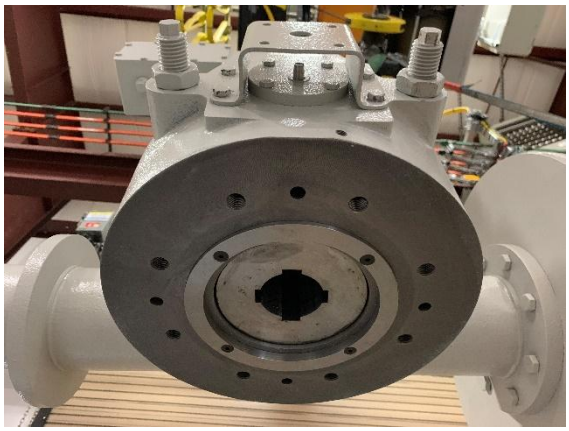


Figure 4 - Baseplate

5.2 Installation of Spring Return Actuator on to Valve

1. Verify both the operator and valve are in the fail-safe position.
2. Apply light oil or anti-seize to the valve stem before installing gear operator.
3. Install key into valve stem keyway.
4. Align valve stem with gear operator and slide onto valve flange. Reference **3.2** for lifting instructions.
5. Align gear operator and valve flange mounting holes.
6. Install mounting bolts and tighten incrementally in a crossing pattern.
7. Tighten bolts to the correct torque based on the size and material installed by the end user.

5.3 Installation of Electric Actuator on RS(DR) Operator

If the spring return actuator is designed and configured for motorized service, an electric actuator specified on the general arrangement drawing may be used to operate. Refer to the electric actuator IOM to install.

Figure 5 - Electric Actuator Mounting

5.4 Installation of Position Indication

A position indicator can be used to provide valve position to the control room when installed on provided bracket and indication shaft. Refer to the position indicator IOM to install.

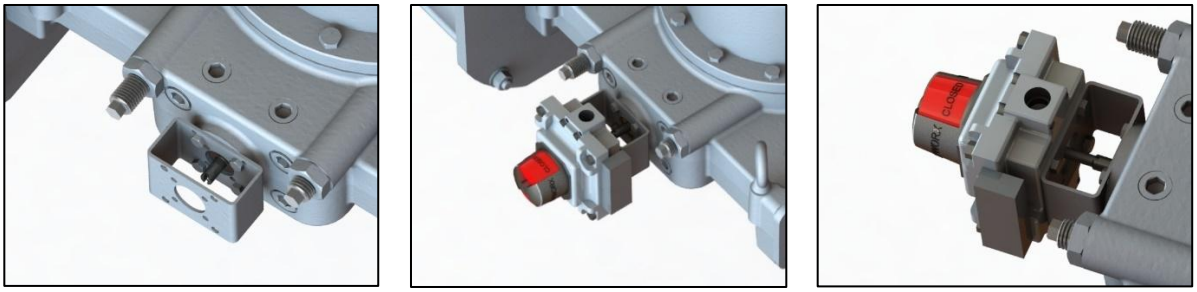


Figure 6 - Indicator Bracket & Shaft

5.5 Powering Electric Solenoid

Solenoid is installed at the factory but must be provided power by the end user as specified per project. Cable must be installed per local code and properly sealed entering enclosure. Solenoid design may vary depending on project requirements. Reference project specific wiring diagram.

Example of solenoid Enclosure:

[Terminal Block]

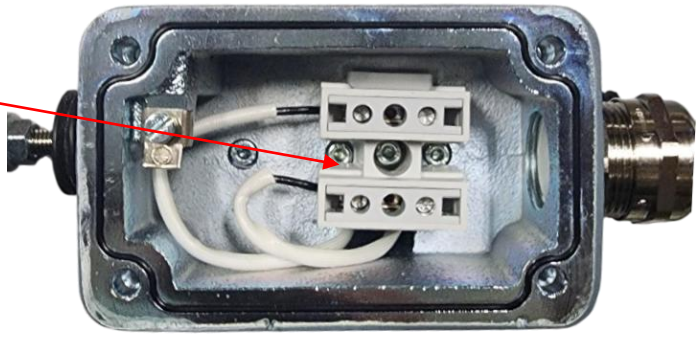


Figure 7 - Solenoid Enclosure

5.6 Adjusting Fail-Safe Stroke Time with Damper

5.6.1 Adjusting Fail-Safe Stroke Time on G1 type RS(DR) Hydraulic Damper

Stroke time is adjusted with a flow control valve. Valve location is identified on the General Arrangement drawing. Full clockwise on the setting screw is the fastest speed. As the screw is turned counterclockwise, the fail operation time increases. If two dampers are used, both dampers must be adjusted the same.

WARNING:
RS(DR) should be cycled after final setting to verify stroke time when going to fail-safe position. Damper adjustment valve may be closed not allowing full operation.

5.6.2 Adjusting Fail-Safe Stroke Time on G2 type RSDR Centrifugal Clutch Damper

Stroke time is adjusted by changing damper gear ratio or centrifugal clutch engagement speed. Fail stroke time is set within a range at the factory per customer order. If a change in stroke time is required, consult with factory for proper ratio or clutch change.

6.0 Removal

WARNING:
Ensure the device being operated is secure and the shaft being driven by the RS(DR) actuator will not rotate uncontrollably after removal. Do not remove the actuator if the valve is blocked and not in the fail-safe position. Failure to conduct a comprehensive risk assessment of gear removal can lead to personal injury and damage to equipment.

6.1 Removal of Spring Return Actuator from Valve

To disassemble the RS(DR) actuator from the valve

1. Disconnect power supply.
2. Remove signal and control lines to solenoid and other accessories.
3. Verify RS(DR) actuator is in the fail-safe position.
4. Attach lifting slings as shown in section **3.2**
5. Remove mounting bolts.
6. Remove gear actuator from valve.

6.2 Removal of Electric Actuator from RS(DR) Operator

WARNING:
In some configurations, the electric actuator may be relied on for it's self-locking features to keep the input shaft from spinning uncontrollably. It is good practice to verify that the RS(DR) actuator is completely in it's fail-safe position with all potential energy removed before removing the electric actuator. Failure to do so may cause the electric actuator to rotate out of control once bolts are removed.

To disassemble the electric actuator from the RS(DR) actuator

1. Slowly loosen bolts holding the electric actuator to the motor flange.
2. With the bolts loosened, verify the actuator housing is free to rotate on the flange and is not under any amount of built up torque.
3. Refer to the electric actuator IOM for further removal instructions.

7.0 Commissioning

7.1 Position Stops

The open and shut stops prevent the actuator 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 Bolt Sealing

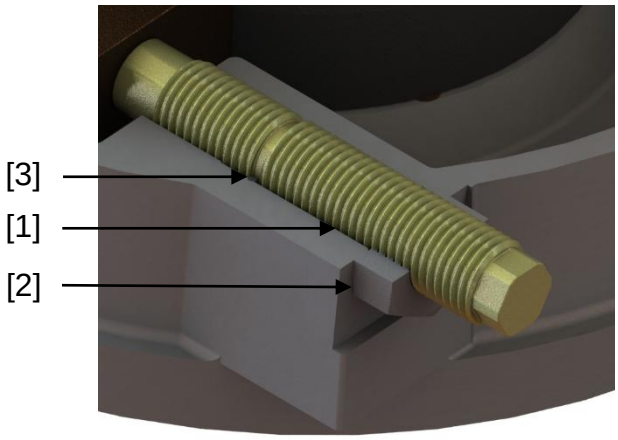


Figure 8 - Standard Stop Configuration

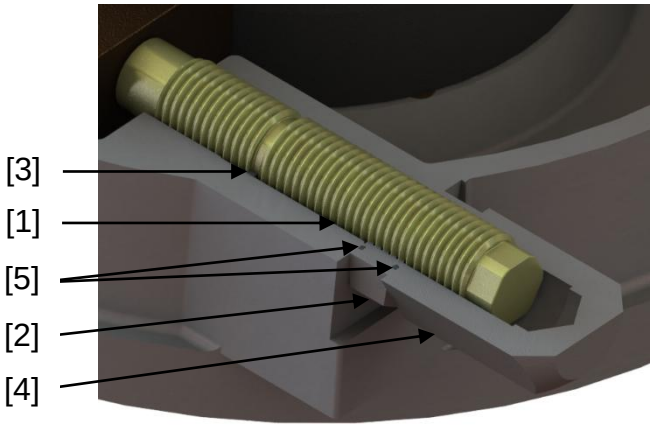


Figure 9 - Sealed Stop Configuration

In the standard configuration, [1] stop bolts include an [3] O-ring that seals against the stop bolt bore in the housing. This arrangement allows the [1] stop bolt to remain sealed from ingress while being adjusted. See Figure 8 - Standard Stop Configuration.

[1] Stop bolts are supplied standard as zinc plated steel. When not suited to the application, a [4] stop bolt cover configuration, completely seals the stop bolt from outside elements. See Figure 9 - Sealed Stop Configuration

Before adjusting stopbolts, the solenoid should be energized to allow for operation of the RS(DR) actuator. The valve can be cycled to set the stops using the handwheel in manual applications, and electric actuator or handwheel override in motorized applications.

Adjusting the "Shut" Position Stop

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

Adjusting the "Open" Position Stop

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

Note:
If there is not enough travel in one direction, the splined driver may need to be adjusted over one tooth. Refer to 7.3.

7.2 Pressure Relief Vent (PRV)

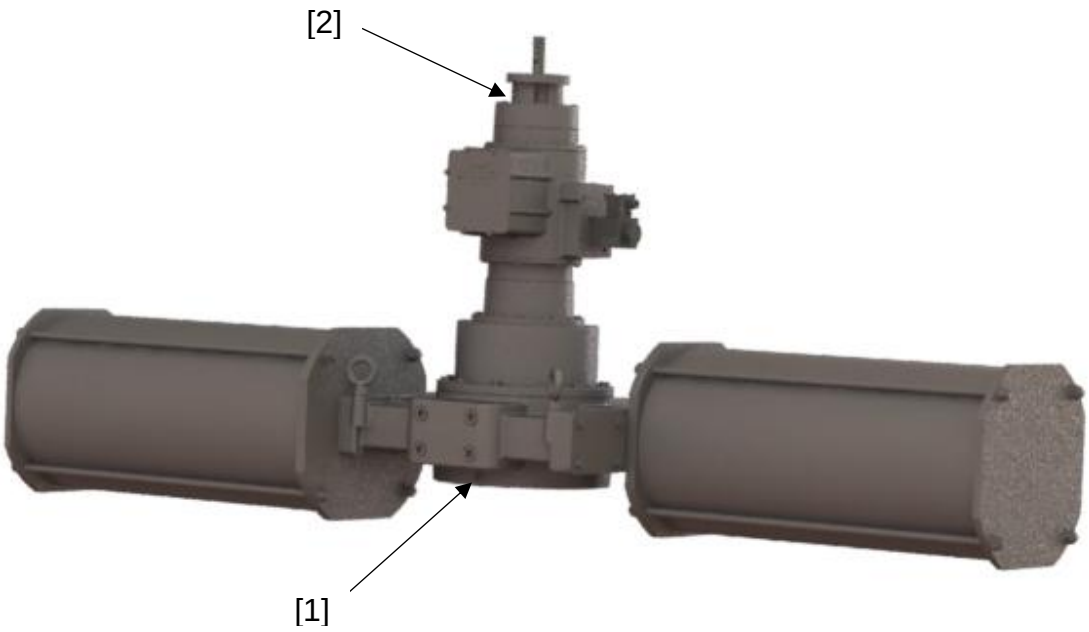


Figure 10 - Pressure Relief Vents

Pressure Relief for Stem Area [1]

Pressure relief is typically provided for stem area to avoid any buildup of pressure due to valve stem leakage per API 6D.

Pressure Relief for Gear Actuator Housing [2]

Pressure relief not typically provided for gear actuator housing. Used to avoid buildup of pressure due to temperature fluctuation (thermal expansion).

7.3 Adjustment of Removable Spline Driver (If Required)

The removable spline driver is pre-set at the factory to align properly with the actuator and valve. In most cases, field adjustment is not necessary. However, if

repositioning is required for any reason (e.g., realignment after disassembly or field modifications), the following steps should be followed.

1. Removal of Spline Driver

- Ensure the actuator is in a safe condition for maintenance.
- Remove the retaining ring Highlighted in **Figure 12 - Retaining Ring** using a flat screwdriver.
- Carefully pull the spline driver out of the drive hub. **Figure 11 - Driver Removal**

2. Repositioning the Spline Driver

- Rotate the spline driver to the desired position.
- Align the splines on the driver with those in the drive hub.
- Insert the spline driver fully into the drive hub.

3. Reassembly

- Reinstall the retaining ring, ensuring it is fully seated in its groove.
- Verify the spline driver is properly secured and does not move freely.
- Cycle the actuator manually or electrically to confirm proper operation.

4. End Stop Adjustment (If Required)

- If the spline driver has been repositioned, the **open and shut position stops** may need to be adjusted.
- Follow the **Section 7.1 Position Stops** procedure to ensure the actuator stops at the correct positions.
- Verify that the stop bolts are properly set and locked to prevent over-travel.

Verification

- Confirm that the actuator cycles properly and the valve reaches the correct open and closed positions.
- If necessary, fine-tune alignment by repeating the process.

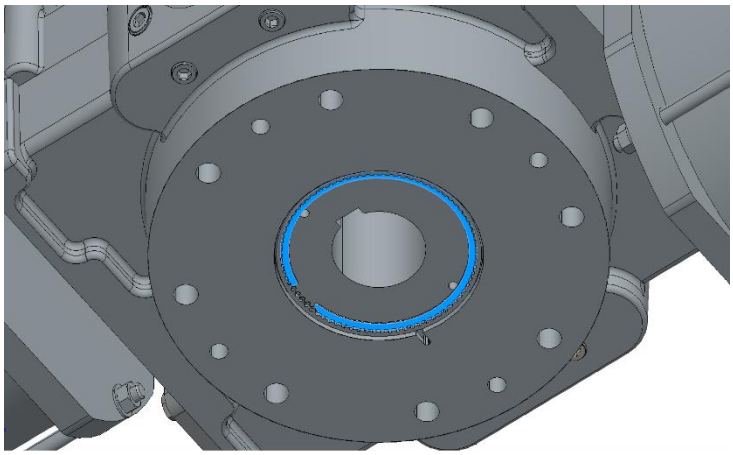


Figure 12 - Retaining Ring

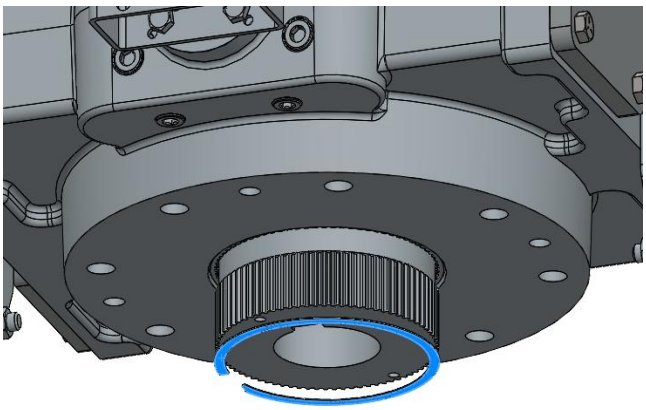


Figure 11 - Driver Removal

7.4 Electric Actuator

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

CAUTION:
Before running RS actuator against 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 or valve.

7.5 Indicator

If an Indicator is installed, refer to the indicator IOM for commissioning.

8.0 Operation

The RS(DR) actuator is operated (In the non-failsafe direction) by rotating the input shaft to compress the spring, either clockwise or counterclockwise depending on the specified fail direction, which results in rotation of the output hub. Refer to the general arrangement drawing for the corresponding output rotation associated with a given input rotation.

When moving to the fail-safe position, the input shaft shall not be used. The RS(DR) actuator must instead be allowed to travel to the fail-safe position under spring force (by removing power from the solenoid if used). Driving the input shaft to the fail-safe position may adversely affect the service life of the clutching mechanism.

When a fail-safe operation is initiated, it is recommended that the RS(DR) be allowed to travel fully to the fail-safe position. Stopping the RS(DR) at an intermediate position is not advised.

8.1 Manual Operation

To operate gear manually, a hand wheel, chain wheel, or drive nut may be provided. Ensure input torque does not exceed gear actuator rating provided by WedgeRock.

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.

In manual applications, the handwheel may be configured to only turn in the direction required to compress the spring. To operate to the fail-safe position, the wrap spring locking mechanism must be released allowing the spring to operate the valve.

8.2 Manual Override Operation

When using an electric actuator equipped with a manual override handwheel, the override should be used only to compress the spring. When moving to the fail-safe position, the input shaft must not be driven. Instead, the RS(DR) actuator must be allowed to travel to the fail-safe position under spring force (for example, by removing power from the solenoid, if used). Driving the input shaft to the fail-safe position may negatively affect the service life of the clutching mechanism.

If the manual override handwheel has been used, it may be beneficial to recalibrate the electric actuator stop positions relative to the RS(DR) and valve stops. This can be accomplished by removing power from the solenoid so the valve moves to the fail-safe position. Then operate the electric actuator to the full non-fail-safe position and back to the fail-safe position. Once this cycle is complete, the electric actuator and RS(DR) positions should be properly aligned. Power may then be reapplied to the solenoid, and normal operation resumed.

8.3 Motorized Operation

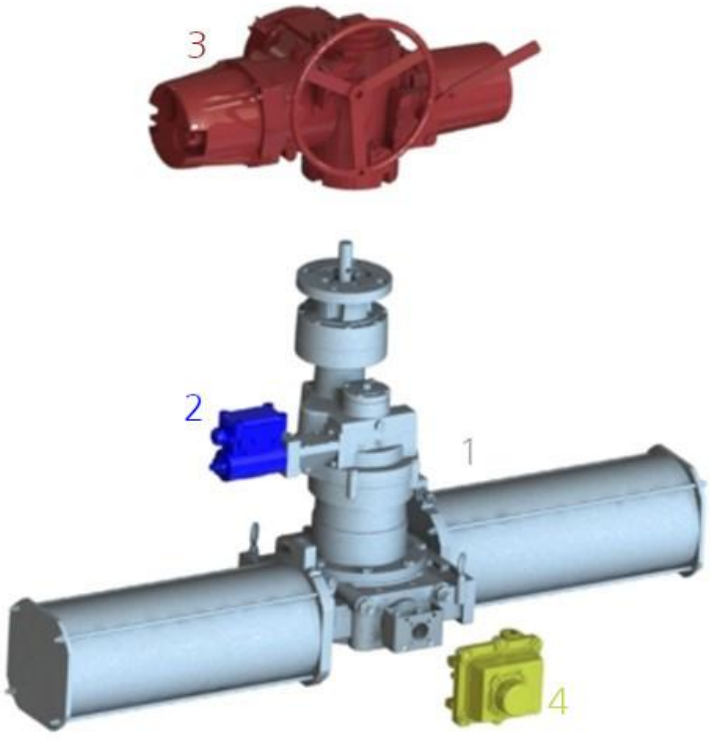
Components of a motorized WedgeRock RS(DR) Fail-Safe Package

Fail Safe Operator[1]: WedgeRock RS(DR) mechanical spring-return quarter-turn gear operator. Configured per application.

Linear Solenoid[2]: Factory installed by WedgeRock. Voltage configured per application. Typically, 24VDC or 230VAC.

Electric Actuator[3]: Standard electric actuator supplied by 3rd Party per end user specification. Used to operate fail safe operator and valve. Actuator is required to be multi-turn. It should be sized to operate both the valve and compress the springs in the RSDR.

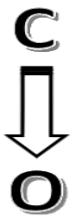
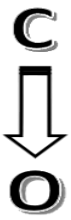
Limit Switch[4]: Mounted on RS(DR), mechanically driven by valve shaft. Supplied by 3rd party per end user specification. Used to tell user actual valve position and RSDR position. When valve goes to fail-safe position, electric actuator is decoupled from drivetrain, losing actual valve and RSDR position. Typically, a single pole double throw type switch.



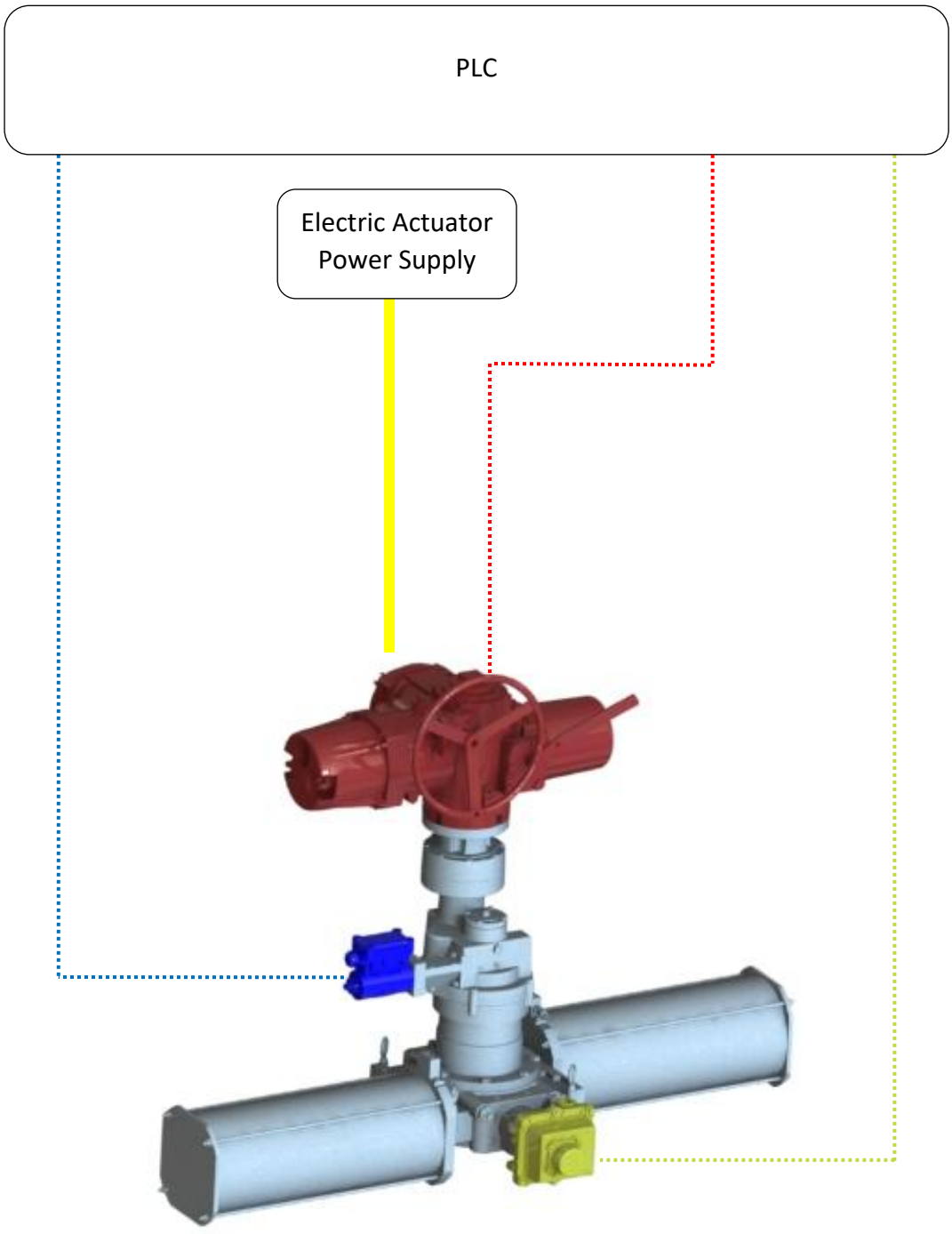
Event (FAIL-CLOSED, CW)	Solenoid	Electric Actuator	Valve	Limit Switch
<u>Closed Position, Ready to Operate</u> Valve is in its fail-safe position. • Solenoid energized, clutch engaged, ready to operate. • Electric Actuator fully closed, powered. • Valve closed. • Limit Switch at full closed		 C		C
<u>Opening Phase</u> When valve is desired to be moved into the open position. • Solenoid is energized. • Electric actuator receives signal to travel to open position. • Valve traveling to open. • Limit switch traveling to open.		 SIGNAL O ⇨ I C ⇩ O		C ⇩ O
<u>Open Position</u> In the open position, valve will remain open as long as solenoid remains energized. Even if power is lost to the electric actuator, if the signal to the solenoid is unaffected, the valve will remain open. • Solenoid remains energized. • Electric actuator at full open. • RS(DR) holds valve in open position. • Limit switch at full open.		 or  O		O

Event (FAIL-CLOSED, CW)	Solenoid	Electric Actuator	Valve	Limit Switch
<u>Closing on loss of signal</u> When signal is lost to solenoid, the clutch mechanism in the RS(DR) releases allowing for the valve to move to its closed position. When this happens, the electric actuator is mechanically decoupled from the drive train. • Solenoid de-energized, clutch disengaged. • Electric actuator may or may not be powered depending on application configuration and remains in the open position. • Valve travels closed. • Limit switch travels to full closed.		 or  O		O ⇩ C
<u>Resetting Electric Actuator Position</u> After valve has moved to the closed position when signal is lost to the solenoid, the electric actuator must be operated to realign its position to the valve. In a fail-close RS(DR), the actuator input shaft **only** drives the valve when operating towards the open position. When the valve is in the closed position, and the input shaft is turning towards the closed position, it is **disengaged** from the drive train of the RSDR and the valve. Once the electric actuator is run to its full closed position, the valve is able to be operated again. • Solenoid de-energized, clutch disengaged. • Electric Actuator powered, operated to full closed. • Valve closed. • Limit Switch at full closed		 SIGNAL O ⇨ I O ⇩ C		C

Event (FAIL-OPEN, CCW)	Solenoid	Electric Actuator	Valve	Limit Switch
<u>Open Position, Ready to Operate</u> Valve is in its fail-safe position. • Solenoid energized, clutch engaged, ready to operate. • Electric Actuator fully open, powered. • Valve open. • Limit Switch at full open.		 O		O
<u>Closing Phase</u> When valve is desired to be moved into the closed position. • Solenoid is energized. • Electric actuator receives signal to travel to closed position. • Valve traveling to closed. • Limit switch traveling to closed.		 SIGNAL O ⇨ I O ⇩ C		O ⇩ C
<u>Closed Position</u> In the closed position, valve will remain closed as long as solenoid remains energized. Even if power is lost to the electric actuator, if the signal to the solenoid is unaffected, the valve will remain closed. • Solenoid remains energized. • Electric actuator at full closed. • RS(DR) holds valve in closed position. • Limit switch at full closed.		 or  C		C

Event (FAIL-OPEN, CCW)	Solenoid	Electric Actuator	Valve	Limit Switch
<u>Opening on loss of signal</u> When signal is lost to solenoid, the clutch mechanism in the RS(DR) releases allowing for the valve to move to its open position. When this happens, the electric actuator is mechanically decoupled from the drive train. • Solenoid de-energized, clutch disengaged. • Electric actuator may or may not be powered depending on application configuration and remains in the closed position. • Valve travels open. • Limit switch travels to full open.		 or  C		
<u>Resetting Electric Actuator Position</u> After valve has moved to the open position when signal is lost to the solenoid, the electric actuator must be operated to realign its position to the valve. In a fail-open RS(DR), the input shaft **only** drives the valve when operating towards the closed position. When the valve is in the open position, and the input shaft is turning towards the open position, it is **disengaged** from the drive train of the RSDR and the valve. Once the electric actuator is run to its full open position, the valve is able to be operated again. • Solenoid de-energized, clutch disengaged. • Electric Actuator powered, operated to full open. • Valve open. • Limit Switch at full open		 SIGNAL O ⇨ I 		O

RS(DR) General Wiring Layout



9.0 Maintenance

9.1 Lubrication

The RS(DR) actuator is lubricated for service life at the factory. Added or replacement lubrication should not be necessary. In the event lubrication is needed, the following can be used:

Standard Grease	Mystik JT-6 Low Temp
Low Temp Grease	Lubriplate Mag-1
Oil for Damper & Clutch	Mobil Univis HVI 13

9.2 Spare Parts

In typical applications, spare parts are not required for the service life of the RS(DR) actuator; however, 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.

9.4 Decommissioning

When decommissioning, following removal instructions. The main spring must be fully decompressed to avoid accidental release of potential energy. Contact WedgeRock for proper removal instructions.

10.0 ATEX Safety Instructions

These safety instructions refer to the installation, use and maintenance of the RS(DR) 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.

Damper cover on RSDR-G2 model should not be removed when hot in an explosive environment per the label.

CAUTION:
WARNING – DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT

11.0 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