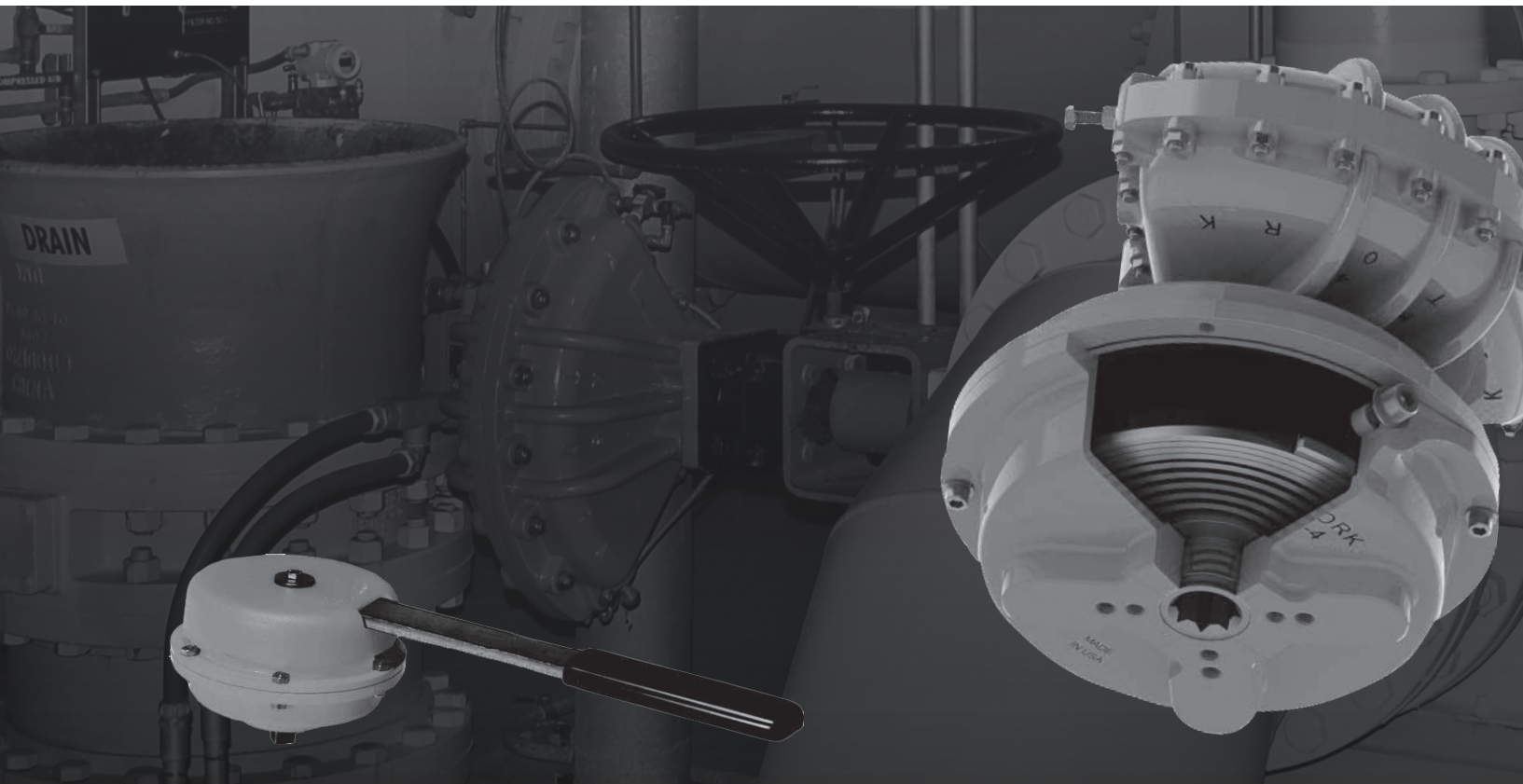


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Keeping the World Flowing
for Future Generations

K-TORK KS-SRH range Installation & maintenance instructions



Spring-return (dead-man) handle

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This manual contains important safety information. Please ensure it is thoroughly read and understood before installing, operating or maintaining the equipment.

Rotork reserves the right to modify, amend and improve this manual without notice.

Rotork is not responsible for damage or injury caused by the failure to observe the instructions contained herein.

1. Introduction

Rotork designs, manufactures, and tests its products to meet many national and international standards. For these products to operate within their normal specifications, they must be properly installed and maintained.

The following instructions must be followed and integrated with your safety program when installing and using Rotork products:

- Read and save all instructions prior to installing, operating and servicing this product
- If you don't understand any of the instructions, contact Rotork for clarification
- Follow all warnings, cautions and instructions marked on, and supplied with, the product
- Inform and educate personnel in the proper installation, operation and maintenance of the product
- Install equipment as specified in Rotork installation instructions and per applicable local and national codes. Connect all products to the proper electrical sources
- To ensure proper performance, use qualified personnel to install, operate, update and maintain the unit
- When replacement parts are required, ensure that the qualified service technician uses replacement parts specified by Rotork. Substitutions may result in fire, electrical shock, other hazards, or improper equipment operation
- Keep all product protective covers in place (except when installing, or when maintenance is being performed by qualified personnel), to prevent electrical shock, personal injury or actuator damage
- Operation of actuator in an inappropriate fashion may cause harm or damage to unit or other equipment surroundings

This manual covers maintenance aspects and instructions specific to the K-TORK range of actuators. General information on Rotork actuators are described in the user manual, delivered separately.

In this manual, warning indications are represented by icons, according to ISO 7010 Safety Signs.



Generic danger



Hand crush/pinch point



Electrocution



Explosive material

Customer service

For technical assistance, please contact Rotork customer service:

E-mail: rfs.international@rotork.com

Rotork, Via Padre Jacques Hamel, 138B, Porcari, Lucca, 55016, IT. Tel: +39 0583-222-1

Rotork plc, Brassmill Lane, Bath, UK. Tel +44 (0)1225 733200

Preservation

This manual is considered an integral part of the actuator and must be kept along with it until the actuator is decommissioned.

This manual and all the attached documentation are to be preserved, kept in a suitable and accessible place and available at all times to the maintenance operators for consultation.

This manual shall always accompany the actuator, even when the actuator is moved to another plant.

Should the manual be lost or damaged, please contact Rotork to get a copy, providing the manual document number for reference or download a copy from www.rotork.com.

2. Standards and regulations

Actuators destined for European member states and for the United Kingdom have been designed, built and tested according to the quality control system, in compliance with the EN ISO 9001:2015 and with the following regulations/directive and standards:

- 2006/42/EC: Machinery Directive (MD)
- S.I. 2008 No. 1597: The Supply of Machinery (Safety) Regulations 2008
- 2014/34/EU: Directive for safety equipment and systems to be used in potentially explosive atmospheres (ATEX)
- S.I. 2016 No. 1107: The Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016
- BS EN ISO 12100: Machinery Safety Directive
- BS EN 1127-1: Explosive atmospheres - Explosion prevention and protection - Basic concepts and methodology
- BS EN ISO 80079-36: Non Electrical equipment for explosive atmospheres - Basic methods and requirements
- BS EN ISO 80079-37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection construction safety "c", control of ignition "b", liquid immersion "k"
- BS EN ISO 7010: Safety Signals

3. General information

This manual is produced to enable a competent user to install, operate and maintain the Rotork K-TORK manual actuator KT-XX-SRH.

The mechanical installation must be carried out as outlined in this manual and in accordance with any relevant national standard codes of practice.

Maintenance and operation must be carried out in accordance with the National Legislation and Statutory Provisions relating to the safe use of this equipment, applicable to the site of installation.

Any inspection or repair in a hazardous area must not be undertaken unless it conforms to National Legislation and Statutory Provisions relating to the specific hazardous area.

Only Rotork approved replacement parts should be used. Under no circumstances should any modification or alteration be carried out on the equipment, as this could invalidate the conditions under which its certification was granted.

Only trained and experienced operators can install, maintain and repair Rotork actuators. Work undertaken must be carried out in accordance with instructions in this manual. The user and those persons working on this equipment must be familiar with their responsibilities under any statutory provisions relating to the health and safety of their workplace.

Operators must always wear appropriate Personal Protective Equipment (PPE) in line with the existing plant regulations.

Appropriate usage

Rotork K-TORK range actuators have been specifically developed to automate quarter-turn valves, such as ball valves, butterfly valves or plug valves installed on pipelines for oil & gas transport and distribution.

⚠ Improper use can damage the equipment or cause dangerous situations for health and safety. Rotork declines any responsibility for damage to people and/or objects resulting from the use of the equipment for applications different from those described in the present manual.

⚠ Hazardous area usage: Only use devices approved for hazardous area use. These devices will have an EX type label fixed to them. Before installation and operation in a potentially explosive atmosphere, read and follow the information and instructions on the EX label and any additional EX instructions in the documentation received with the device.

4. Health and safety

Before installing the equipment, verify it is suitable for the intended application. If unsure consult Rotork.

4.1 Residual risks

Residual risks resulting from equipment risk evaluation performed by Rotork.

4.2 Thermal risks

Risk Hot/cold surface during normal operation (RES_01).
Preventive measures Operators should wear protective gloves.

4.3 Noise

Risk Noise >85 dB during operation (RES_05).
Preventive measures Operators should wear ear protections. Operators should not stand near the equipment during operation.

4.4 Health risks

Risk Pressurised fluid ejection during normal operation (RES_02).
Preventive measures All fittings must be properly sealed. All fixing clamps must be correctly tightened and sealed.
Risk Risk of intoxication (according to the type of medium utilised) (RES_06).
Preventive measures Operators must use PPE and any other equipment (breathing apparatus) based on the type of supply medium.

4.5 Mechanical risks

Risk Uncontrolled movement (remote operation) (RES_03). (This risk is applicable only for actuators provided with control panel).
Preventive measures Assure that the actuator can not be operated remotely. Prior to starting, remove pneumatic supply, vent all pressure vessels, and remove electrical power.
Risk Presence of moving parts (centre body, valve adapter) (RES_04)
Preventive measures Do not perform start-up or test the actuator if the cylinder tube is removed.

Risk Loss of stability with possible parts projection (RES_08).
Preventive measures Do not disassemble the actuator in case of malfunctioning. Follow instructions in the present manual and contact Rotork.
Preventive measures Foresee periodic maintenance procedure to verify tightening.
Risk Presence of potential energy (RES_10) during dismantling.
Preventive measures Do not disassemble the actuator during dismantling. Follow instructions in the present manual and contact Rotork.

5. Labels and nameplates

The actuator body is cast-embossed with the manufacturer's name and the model number. For actuators delivered within the European Union, the CE mark the product conformity with the essential applicable health and safety requirements of the European Directives.

The supplementary plates are applied externally on the centre body cover and displays the following data:

- Name and address of the manufacturer
- Month/year of manufacture
- IP protection class
- ATEX protection
- CE conformity marking
- Name of technical file deposited with a Notified Body.

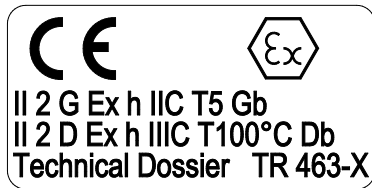


Figure 1: CE ATEX nameplate

Contents of the standard nameplate:

- Name and address of the manufacturer
- Model type
- Serial number
- Month/year of manufacture
- Maximum/minimum operating pressure (NA)
- Maximum/minimum operative temperature (°C)
- IP protection class

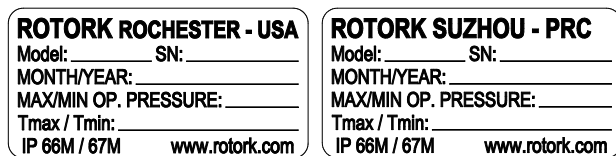


Figure 2: KT-XX-SRH standard nameplate for units made in USA and China

EX type of protection: constructional safety "c".

T5 temperature class is provided even if actuator has no internal heat source. The maximum actuator temperature is near the environmental or exercise fluid temperature, whichever is the greater. The normal operating temperature range is -20 to +80 °C (-22 to +176 °F). The temperature range is specified within the project-specific technical documentation. Special applications out of the normal range are available upon request.

EX plate does not indicate the maximum environmental and/or exercise fluid temperature; this information is reported within the project specific technical documentation.

Please check if the data stamped on the plate coincide with those specified on the Confirmation of Order, Test Certificates and the Delivery Note.

⚠ It is not allowed to remove or modify the nameplate(s). The nameplate must be kept legible at all times: it must be regularly cleaned. In case the nameplate is damaged and illegible, a duplicate is to be requested.

6. Operating limits

Operating temperature

K-TORK actuators are built with two seal options, referred to as high and low temperature builds, suitable for the following operating temperature ranges:

High Temperature (HT): -20 to +149 °C (0 to +300 °F)

Low Temperature (LT): -40 to +70 °C (-40 to +160 °F)

Both build options are suitable for standard operating temperature ranges, -20 to +70 °C (0 to +160 °F).

A specific build option is only required for low and high temperatures where the operating conditions are outside this range.

Please contact Rotork for further details, and to confirm operating temperature range at required design point.

7. Handling and lifting

7.1 Handling

The actuator is supplied packed on pallets suitable for normal handling.

Handle the actuator with care to avoid damaging the actuator assembly.

Never stack pallets.

⚠ Only trained and experienced personnel should handle/lift the actuator.

7.2 Actuator lifting

Since KS-XX-SRH models have a weight less than 20 kg, the actuators could be easily moved by one person.

8. Storage

Every Rotork actuator has been fully tested before leaving the factory to give years of trouble free operation, provided that it is correctly commissioned, installed and sealed.

To keep actuators in a good condition until they are installed, Rotork recommends the following measures during storage:

- The actuators are supplied on wooden pallets. They must remain on the pallets until they are installed, in order to prevent damage to the valve coupling flange

 **Never put the actuator directly on the ground.**

- It is recommended to store the actuators indoors in a dry place, (e.g. under a roofing) or outdoors, providing appropriate protection against direct effects of weathering, covering the actuators with appropriate polyethylene sheets
- Check the actuator condition every 6 months and verify the above protection measures remain in place

9. Long-term storage


If long term storage is necessary, further operations must be carried out to maintain the actuator in a good working condition, namely:

- The actuator must be stroked every 12-months
 - Cycle the actuator (i.e. two complete strokes - one open, one closed) at least five times
- In case of storage for over 12 months prior to installation, it is recommended to operate the actuator to verify correct operation

10. Installation on valve and earthing


Before proceeding, read and understand the Health and Safety information.

NOTE: The valve must be properly secured prior to performing the following operations according to instructions provided by the valve's manufacturer.

 **Prior to performing any operations check the operating drawings and TAG numbers.**

Consult Rotork for any additional information.

10.1 Preliminary actions


 **Verify the EX classification of the actuator is compatible with the plant zoning. Refer to actuator nameplate. The end user shall guarantee the valve earthing and the equal voltage potential between the valve and the actuator.**

The assembling of the actuator onto the valve can be performed by using an adapter and a coupling joint between the actuator and the valve. The bracket utilised to interface the actuator and valve (damper, or other quarter-turn device) must be designed with close tolerance that permits near perfect concentric alignment between the centre axes of the actuator shaft and driven shaft of the device being automated.

K-TORK range actuators can be mounted on valves in almost any desired position.

Important: To function properly, certain accessory and control components e.g. filter drains, pneumatic reservoirs; require proper orientation with respect to gravity. Contact Rotork if in doubt.

- Ensure that all fasteners are adequately tightened to avoid loosening during normal operation, take into account the vibrations induced by the dynamics of the pipeline
- Allow clearance for handle rotation

 **Improper adaptation of the bracket and coupling to the actuator can cause unnecessary friction and premature failure. Misalignment can certainly lead to poor performance and inaccurate control.**


10.2 Instructions

Avoid all end loading to the actuator shaft. End loading will force the spring upwards and will damage the actuator. This event commonly occurs when proper clearance is not provided for the coupling to float between the actuator shaft and the driven device. When bolting the assembly together, if it is necessary to force the two components together with the coupling fitted between the shafts, chances are you have an end-loading problem.

The assembly position of the actuator must be in accordance with the actuator design, plant requirements and the valve model.

In order to assemble the actuator onto the valve, proceed as follows:

- Verify the coupling dimensions of the valve flange and stem; they must meet the actuator coupling dimensions
- Clean the valve and actuator coupling flanges, removing anything that might prevent electrical connection and adherence to the actuator flange interface: grease and paint residuals, if present, must be completely removed from threaded holes
- Apply non-seize material to the valve stem to facilitate assembly
- Lift the actuator according instructions reported in Section 6
- If possible, place the valve stem in a vertical position to facilitate assembling - in this case the actuator must be lifted while the coupling flange is kept in the horizontal position
- If the assembly is done using an adapter and a coupling joint, assemble the coupling joint onto the valve stem before proceeding with the assembly of the actuator
- Lower the actuator onto the valve so that the valve stem (or the coupling joint) slips in the actuator without exerting any force and only with the weight of the actuator
- Installation must be performed by qualified personnel

 **Hands must be kept away from the valve-actuator coupling area.**

10. Installation on valve and earthing

- Clean and degrease the coupling bolts, stud bolts, nuts and the threads on actuator coupling flange
- Fix the actuator to the valve by means of threaded connections (bolts, stud bolts and nuts)
- Tighten the bolts or the nuts of the connecting stud bolts to the right torque, in accordance with the size and material characteristics of the bolts installed by the customer. See *Table 1: Recommended tightening torques*

⚠ The actuator must be supported until it is fully coupled with the valve stem and until the fixing bolts are correctly tightened.

After the actuator has been assembled on the valve, check for possible damage to the paintwork and repair if necessary, according to the Rotork paint specification. Ensure that the coupling will slightly float up and down on the actuator and driven shafts. This check will guarantee concentricity between the actuator shaft and driven device.

Table 1: Recommended tightening torques

Actuator Size	Bolt Size		Torque	
	Imperial*	Metric**	Imperial	Metric
K05	¼-20	M6	91 in-lbs	10 Nm
K1	5/16-18	M8	188 in-lbs	24 Nm
K2	3/8-16	M10	28 ft-lbs	48 Nm
K3	½-13	M12	68 ft-lbs	84 Nm

*Grade 5

** Class 10.9

⚠ Attention: End user should verify the electrical correctness of coupling, performing a standard continuity test between actuator and valve.

11. Actuator removal from the valve

The end-user is in charge of removing the actuator from the valve.

⚠ The actuator is to be removed exclusively by competent and qualified staff, wearing/using appropriate personal protection devices.

Ensure sufficient free space is available for the disassembly of the actuator from the valve.

⚠ Do not remove the actuator from the valve in the event the valve is blocked in the intermediate position (the valve stem must be in such a position so as not to rotate during the disassembly of the actuator). Contact Rotork.

In order to disassemble the actuator from the valve, proceed as follows:

- Unscrew the bolts or the nuts from the stud bolts fixing the actuator to the valve
- Lift and remove the actuator from the valve

12. Operation

12.1 Actuator description

The KS-XX-SRH series actuators are manual, single-acting spring-return actuators specifically designed to provide efficiency and reliability in heavy duty services.

The KS-XX-SRH series actuators allow to manually operate valve and maintain the position when unattended thanks to the fail-safe spring action.

These actuators can be assembled in a 'spring to open' or in a 'spring to close' version. Spring may be removed from housing and flipped to reverse fail direction for flexibility, reducing stock requirements.

Actuator design characteristics are shown on the data plate attached to the actuator itself.



1 Spring housing

Non-breathing spring is protected externally from environmental corrosion and internally from supply air and atmospheric air contaminants. It is totally enclosed and O-ring sealed. Internally there is housed the spring that may be removed from housing and flipped to reverse fail direction for flexibility, reducing stock requirements. Spring includes steel safety band (patent-pending) around spring perimeter, allowing safe removal from housing.

2 Actuator handle

Simple metallic bar with a sleeve.

3 Dead man handle cover

4 Dual Output Drive

Spring housing standard with ISO 5211 'star pattern' female drive and ISO mount flange coupled with matching actuator bolt circle. Optional male drive insert to match actuator drive shaft.

12. Operation

12.2 Actuator operating description

Please refer to the operating diagram supplied for the specific actuator.

⚠ The actuator has to be actuated with the operator standing in a stable position.

To operate the KS-XX-SRH actuator proceed as follows:

1. Rotate the handle slowly, acting against the spring action with an adequate grip and be sure that nothing obstructs the path of the handle in case of an accidental release.

⚠ Never release the handle during the operation as it may cause harm to surrounding personnel and could damage the actuator.

2. Do not release, maintain a firm grip on the handle until the manual stroke has been completed.

12.3 Setting the actuator angular stroke

Warning: Certain valves incorporate their own stops. For such valves it is recommended that the actuator stop bolt positions coincide with the valve stop position.

This manual actuator has no adjustable stop.

12.4 Start-up

During the start-up of the actuator, it is necessary to check if:

- the painted parts have not been damaged during transport, assembling or storage operations. On the contrary, after having removed rust, repair the damaged parts following the applicable painting specifications, please contact Rotork
- actuator and all of its parts work as expected


12.5 Speed adjustment


This manual actuator doesn't allow any speed adjustment.

13. Dismantling and disposal

K-TORK actuators are designed and built to provide a long operative life.

At the end of their operative life, they will have to be removed from the valve and subsequently disposed of.

 The spring cartridge module contains potential energy due to compressed elastic elements. The spring cartridge have to be returned to the manufacturer's plant, upon agreement with Rotork.

 Collect the grease and the oil during dismantling to avoid disposal of pollutants in the environment; the discarded material is to be disposed in accordance with the local environmental laws and regulations.

- Actuators are built in modules and this facilitates dismantling
- Dismount the actuator and separate the various sections and components according to the type of material
- Dispose of the pieces of steel, cast iron and aluminium alloys as metal scraps
- Dispose of the rubber, PVC, resins etc. separately, in accordance with the existing national and regional regulations
- Electrical components are to be separately disposed on specialised disposal sites
- Actuators manufactured after 1993 do not contain asbestos or its by-products

14. Rotork sales and service

If your Rotork actuator has been correctly installed and sealed, it will give years of trouble-free service. Should you require technical assistance or spares, Rotork guarantees one of the highest levels of service in the flow control industry. Contact your local Rotork representative or the factory directly at the address on the nameplate, quoting the actuator type and serial number.

Some actuators have a special spare parts list. Refer to the project-specific documentation for further details.

15. Troubleshooting

Troubleshooting		
FAILURE	POSSIBLE CAUSES	CORRECTIVE MEASURES
Erratic movement	- Fault in actuator operation.	- Replace the actuator.
Incorrect valve position	- Fault of pipeline valve.	- Consult the valve manufacturer's documentation.
Insufficient valve rotation	- Fault of pipeline valve.	- Consult the valve manufacturer's documentation.
	- Fault in actuator operation.	- Replace the actuator.

LOSS OF POWER	POSSIBLE CAUSES	CORRECTIVE MEASURES
	- High valve torque or sizing.	- Consult the valve manufacturer's documentation.
	-Failure of the spring cartridge:	- Replace the actuator.

For other problems please contact Rotork.

16. Maintenance

This actuator does not contain repairable components by the user, if found to be faulty it must be replaced with a new unit or returned to Rotork for repair, if applicable.

16.1 Periodic inspections

K-TORK actuators are designed to work for long periods of time under severe conditions. A preventive approach to maintenance helps to avoid costly down time and can reduce the cost of ownership.

Rotork can provide actuator maintenance contracts tailored to meet each individual customer's requirement.

Rotork will repair or replace without charge, any K-TORK actuator it finds to be defective within three (3) years or two (2) million strokes, whichever occurs first, after the date of shipment from Seller. See whole guarantee for further details.

Perform checks specified in the following periodic maintenance schedule, in accordance with the plant maintenance procedures, and in compliance with the local rules and regulations.

Periodic maintenance schedule			
Maintenance work	Month	Year	Work
Visually check the external components of the actuator as well as the control group (if applicable) for physical damage and repair or replace as required. Verify the integrity of welding if applicable. In case of anomalies detection, please contact Rotork.	6	-	-
Remove built-up dust and dirt from all actuator surfaces.	-	1	-
Inspect actuator paint work for damage to ensure continued corrosion protection. Touch-up as required in accordance with the applicable paint specifications, please contact Rotork.	-	1	-
Verify operation. The actuator should be cycled several times.	-	1	-
Check the threaded connections (bolts, studs and nuts) connecting the actuator to the valve. If necessary tighten the bolts or the nuts of the connecting studs to the correct torque, in accordance with the size and the characteristics of the fastener material installed by the Customer.	-	1	-

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A full listing of our worldwide sales and service network is available on our website.

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