Safety Guide
DOC.SG.HX.1 Rev. 2
March 2024

Hytork XL-Series

Rack and Pinion Pneumatic Actuators

HYTORK™

EMERSON™

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Table of Contents

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Section 1: Safety Instructions

Please read these safety warnings, cautions and instructions carefully before using the product.

These instructions cannot cover every installation and situation. Do not install, operate or maintain this product without being fully trained and qualified in valve, actuator and accessory installation, operation and maintenance.

To avoid personal injury or property damage, it is important to carefully read, understand and follow all of the contents of the associated Installation, Operation and Maintenance Manual, including all safety cautions and warnings. If you have any questions concerning installation, or use of this product, contact your Emerson sales office before proceeding.

1.1 ANSI 534.6 Safety Messages

⚠ WARNING

Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

NOTE:

Indicates information considered important, but not hazard-related.

Section 2: General Information

2.1 General Application

The Hytork™ XL-Series Rack and Pinion actuators are intended for the automation and operation of quarter-turn valves like Butterfly, Ball and Plug valves.

Rack and Pinion actuators can also be used to operate venting louvers or any other quarter-turn applications.

This product was intended for a specific range of service conditions: pressure, ambient temperature, operating media and possibly other specifications. Do not expose the product to service conditions or variables other than those for which the product was intended.

If you are not sure what these conditions or variables are, contact your Emerson sales office for assistance. Provide the product type, size, serial number and all other pertinent information that you have available.

2.2 Inspection and Maintenance Schedules

The Hytork XL-Series Rack and Pinion actuators must be inspected periodically and maintained as needed. Refer to Installation, Operation and Maintenance Manual, MAC050515 EN for more detailed information.

The schedule for inspection can only be determined based on the severity of your service conditions. Your installation might also be subject to inspection schedules set by applicable governmental codes and regulations, industry standards, company standards or plant standards.

In order to avoid increasing dust explosion risk, periodically clean dust deposits from all equipment.

When equipment is installed in a hazardous area location (potentially explosive atmosphere), prevent sparks by proper tool selection and avoiding other types of impact energy.

Proper care must be taken to avoid generation of static electricity on the non-conductive external surfaces of the equipment (e.g., rubbing of surfaces, etc.). The actuator's surface temperature is dependent upon process operating conditions.

2.3 Parts Ordering

When ordering parts for older products, always specify the type, size and serial number of the product and provide all other pertinent information that you can, such as part material, age of the product and general service conditions. If you have reconfigured the product since it was originally purchased, include that information with your request.

⚠ WARNING

Use only genuine replacement parts. Components that are not supplied by Emerson should not be used under any circumstances in any Hytork product. Use of components not supplied by Emerson may void your warranty, might adversely affect the performance of the product and could cause personal injury and property damage.

Section 3: Hytork XL-Series Actuators

These safety instructions are limited to Hytork XL-Series actuators which are operating using air or inert gas. If the application requires use of a flammable or hazardous gas, you must contact your Emerson sales office for assistance.

3.1 Installation

⚠ WARNING

To avoid personal injury and property damage caused by bursting of parts and to avoid parts damage, malfunction of control valve or loss of control of the process caused by excessive pressure, do not exceed the maximum pressures or temperatures for this actuator, as given in the applicable product literature or on the nameplate. Use pressure-limiting or pressure-relieving devices to prevent the actuator pressure from exceeding specified limits. If you cannot determine the limits for this product, contact your Emerson sales office before proceeding.

- To avoid personal injury, always wear protective gloves, clothing and eye wear when performing any installation operation.
- If hoisting the actuator, use a nylon sling to protect the surfaces. Carefully position the sling to prevent damage to the actuator tubing and any accessories. Also, take care to prevent people from being injured in case the hoist or rigging slips. Be sure to use adequately sized hoists and chains or slings to handle the assembly. If an actuator/valve assembly should be lifted, it is strongly recommended to connect the nylon lifting slings in such way that the actuator and valve is supported.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.
- If installing into an existing application, also refer to the WARNING in the Maintenance section.
- Do not connect a pressure vessel to the actuator with unrestricted media.
- Do not exceed the MAXIMUM stated operating pressures.
- Applying pressure directly to the actuator can turn the actuator's shaft/valve stem.
- Applying a control signal to the actuator's solenoid can turn the actuator/valve assembly.

⚠ WARNING

Stay away from moving parts to prevent serious injuries. When test cycling the actuator and valve assembly by applying pressure to the A or B port (2 or 4 port), be aware that there are moving parts like pinion top, actuator to valve coupling and the valve blade, ball or plug, etc. Isolate the piping system on which an actuator-valve assembly is installed, when removing this assembly, relieve any media pressure that may be trapped in the valve cavities before removing the actuator for maintenance.

3.2 Operation

⚠ WARNING

When rotating the actuator stem or shaft with loading pressure applied, use caution to keep hands and tools out of the actuator travel path. Personal injury and property damage is possible if something is caught between the actuator stem and other control valve assembly parts.

3.2.1 Operating Media

1. Use clean, dry or lubricated air or inert gas.
2. **Maximum Operating Pressure (MOP)** = 8.3 barg / 120 psig, MOP is the pressure required to produce the maximum rated torque at the break position for all actuators. Pressure should not exceed MOP during valve rotation. MOP should be the maximum pressure regulator setting.

⚠ WARNING

It can be assured that the housing will not rupture or burst when applying 10 bar of pressure but the cycle function cannot be guaranteed as it totally depends on the time span to which actuator is subjected at 10 bar and the frequency at which these pressure peaks occurs. Every time this peak occurs will, for sure, have a significant negative effect on the life expectancy of the actuator.

3. Refer to Table 1 on applications where the spring stroke of spring-return actuators is pneumatically operated.

Table 1. Maximum Pressure on Spring Stroke of Spring-Return Actuators

Spring Set	Maximum Pressure on Spring Stroke of Spring-Return Actuators
S20	6.9 barg / 100 psig
S30	6.2 barg / 90 psig
S40	5.5 barg / 80 psig
S50	4.8 barg / 70 psig
S60	4.1 barg / 60 psig
S70	3.4 barg / 50 psig
S80	2.8 barg / 40 psig
S90	2.1 barg / 30 psig
S1C	1.4 barg / 20 psig

4. Dew point should be at least 10 K below ambient temperature.
5. For subzero applications take appropriate measures.
6. Mentioned pressure levels are “gauge pressures”. Gauge pressure is equal to absolute pressure minus atmospheric pressure.

3.2.2 Operating Temperature Range

1. Using standard seals and grease the operating temperature range is -20 to +80 °C / -4 to +176 °F as indicated on the product label.
2. Other media and temperatures may be used but consult your local Emerson sales office for confirmation as to suitability.

3.3 Maintenance

Before mounting or (dis)assembling the actuator, consult the relevant sections of the installation, operation and maintenance manual for more detailed maintenance information.

⚠ WARNING

Avoid personnel injury or property damage from sudden release of process pressure or uncontrolled movement of parts. Before performing any maintenance operations:

- Always wear protective gloves, clothing and eye wear.
- Disconnect any operating lines providing air pressure, electric power, or a control signal to the actuator. Be sure the actuator cannot suddenly open or close the valve.
- Do not remove the actuator from the valve while the valve is still pressurized.
- Vent any pneumatic pressure from the actuator and relieve any actuator spring pre-compression.
- Use lock-out procedures to be sure that the above measures stay in effect while you work on the equipment.
- Never apply pressure to a partially assembled actuator unless all pressure-retaining parts have been installed properly.
- Check with your process or safety engineer for any additional measures that must be taken to protect against process media.
- Do not remove the pistons from the actuator body by using air pressure when the end caps have been removed.

⚠ CAUTION

Do not turn out the travel stops completely when the actuator is pressurized. When adjusting the travel stops and the actuator is still pressurized, the travel stops can be “shot” away when completely turned out.

⚠ CAUTION

A spring-return actuator mounted on a valve, which is stuck in mid stroke, contains a high spring load which will cause a sudden rotation during disassembly of the actuator versus the valve or valve bracket. This can cause serious injury to personnel or damage to material. Hytork actuators are equipped with the SAFEKEY design that allow in-field removal of the end caps. Refer to Section 9 of Manual MAC050515 EN for instructions to safely remove the spring load using retractor rods, before disassembling the actuator from a valve, which is stuck in mid stroke.

Section 4: Actuator Accessories

The actuator may be equipped with components for control and/or feedback. Check the instructions of these components for installation, operation and maintenance instructions.

Section 5: Safety Instructions for Use in (Potential) Explosive Atmosphere

5.1 Intended Use

The Hytork XL-Series pneumatic actuators are designed to comply with the explosion safety requirements in the Ex-standards EN IEC 60079-0:2018, EN ISO 80079-36, EN ISO 80079-37:2016 and EN 1127-1:2019. These standards contain the requirements for non-electrical equipment in potentially explosive atmospheres.

The actuators comply with the constructional safety type "c" requirements. The actuators are designed for gas group IIB or IIC and dust group IIIC applications and are applicable in temperature classes T6 to T2 depending on model. The Equipment Protection Level is Gb for gas and Db for dust, so the actuators can be used in Ex classified hazardous zones 1/21 and 2/22.

5.2 ATEX Marking

Complete ATEX Marking:

CE Ex II 2 G Ex h IIB or IIC TX Gb
II 2 G Ex h IIIC TX Db

For surface temperature "TX", refer to Table 3 in Maximum Temperatures Section.

Ambient Temperature Ranges (T_{amb}):

Standard Temperature:	-20 to +100 °C / -4 to +212 °F
Low Temperature:	-40 to +100 °C / -40 to +212 °F
High Temperature:	-20 to +120 °C / -4 to +248 °F
Tunnel Application:	-20 to +250 °C / -4 to +482 °F for 2 hours

5.3 Safety Instructions

1. Before the installation, please carefully read the service instructions. Emerson is not responsible for damages caused by operations not complying with the instructions contained in such manuals.
2. All the operations shall be done by a trained and qualified operator. All maintenance operations must be performed in accordance with the instructions detailed in the maintenance manual.
3. The assembly cannot be installed and used in classified areas as zone 0 to 20, mines (group I).
4. The equipment shall be installed in a place where the risk of lightning is covered by the relevant industrial code of practice.
5. Assembly, disassembly and maintenance, is only allowed at the actuator, when, at the time of the activity, there are no explosive mixtures.
6. During maintenance operations, the user must take all appropriate measures to prevent risks related to the toxicity of substances, using appropriate protective equipment (e.g., gloves, goggles, face mask), according to the extent provided the technical and organizational point of use and the recommendations provided in the specifications of the used substances.
7. All the mechanical components do not have ignition sources during the normal working process. The user shall check periodically the vibration presences and/or abnormal noises and it must stop the unit immediately, check the causes and contact the manufacturer.
8. Actuators do not have an inherent ignition source due to electrostatic discharge, but explosion hazards may be present due to the discharge of static electricity from other valve assembly components.
    i. To avoid personal injury or property damage, make sure that the valve is grounded to the pipeline before placing the valve assembly into service.
    ii. Use and maintain alternate shaft-to-valve body bonding, such as a shaft-to-body bonding strap assembly.

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

iv. A warning is present into the label: "Potential Electrostatic Charging Hazard".

9. When equipment is installed in a hazardous area location (potentially explosive atmosphere), prevent sparks by proper tool selection and avoiding other types of impact energy.
10. It is under end user responsibility to avoid the explosive mixture inside the actuator. We suggest utilizing a solenoid with a "breather" function on spring-return actuators when used in potentially explosive atmospheres.
11. To avoid increasing dust explosion risk, periodically clean dust deposits from all equipment.
12. Proper care must be taken to avoid generation of static electricity on the non-conductive external surfaces of the equipment (e.g., rubbing of surfaces, etc.).
13. The paint protection must not exceed 200 µm if the actuator is used in a group IIC atmosphere. For group IIA or IIB atmospheres, the paint protection must not exceed a thickness of 2 mm / 0.08 in.
14. For single acting actuators, it is necessary using safe air and to convey by a piping inlet/exhaust of the cylinder outside of the Ex-zone (Safe Area).
15. After maintenance operations, perform a few actuator operations to check that its movement is regular and that there is no air/oil leakage through the seals/gaskets.
16. It is under end user responsibility to make sure the electrical equipment installed on the actuators have a separated ATEX evaluation and they are designed according to the ATEX Directive and they are suitable for the installation zone, group of gas, temperature class, maximum surface temperature, EPL and range of temperature.

17. The plastic position indicator can cause an ignition due to electrostatic discharge. Therefore, the plastic position indicators are only approved for use in certain potentially explosive (Ex) gas group areas, without additional warning on the equipment of Electrostatic hazard. Each indicator is shipped with an "Electrostatic Hazard Warning Sticker" which must be applied to the equipment according to below schedule.

Table 2.

Actuator Sizes	Ex Gas Group		
	IIA	IIB	IIC
Small indicator (actuator sizes up to size XL 681)	OK to use without warning sticker	OK to use without warning sticker	Apply the Electrostatic Hazard Warning sticker
Larger indicator (actuator sizes XL 1127 up to XL 4581)	Apply the Electrostatic Hazard Warning sticker	Apply the Electrostatic Hazard Warning sticker	Apply the Electrostatic Hazard Warning sticker

18. It is forbidden to use this equipment in a different way, if it is not included in the instruction manual. Emerson is not responsible for damages caused by an improper and/or dangerous use.

5.4 Maximum Temperatures

⚠ WARNING

The actuator's surface temperature is dependent upon process operating conditions. Personal injury or property damage, caused by fire or explosion, can result if the actuator's surface temperature exceeds the acceptable temperature for the hazardous area classification. To avoid an increase of instrumentation and/or accessory surface temperature due to process operating conditions, ensure adequate ventilation, shielding or insulation of these actuator components installed in a potentially hazardous or explosive atmosphere.

Table 3. Temperature Range for (Potential) Explosive Areas

Temperature			Valid for Actuator Model
Ambient Range	ATEX Class	TX (ATEX Surface Temperature)	
-20 to +75 °C	T6	T85 °C / 185 °F	Standard temperature models
-20 to +80 °C	T5	T90 °C / 194 °F	
-20 to +80 °C	T1 to T4	T90 °C / 194 °F	
-20 to +75 °C	T6	T85 °C / 185 °F	High temperature models
-20 to +90 °C	T5	T100 °C / 212 °F	
-20 to +120 °C	T1 to T4	T130 °C / 266 °F	
-40 to +75 °C	T6	T85 °C / 185 °F	Low temperature models
-40 to +80 °C	T5	T90 °C / 194 °F	
-40 to +80 °C	T1 to T4	T90 °C / 194 °F	
-20 to +250 °C for 2 hours	T2	T260 °C / 500 °F	Tunnel application models

Notes:

1. The actual maximum surface temperature depends not on the equipment itself, but mainly on operating conditions e.g., the temperature of the supply media.
2. The specified values are valid with condition: Maximum cycle frequency of the actuator is 1 Hz at a maximum of 50 cycles per hour and at maximum load.

Appendix A: EU Declaration of Conformity

Legal representative entity for the European Union:
Emerson S.R.L., Company No. J12/88/2006, Emerson 4 street,
Parcul Industrial Tetarom II, Cluj-Napoca 400638, Romania
Regulatory Compliance Shared Services Department
Email: europeproductcompliance@emerson.com
Phone: +40 374 132 035

ROC no 9010
Rev. 1

We hereby declare, that the products specified below meet the basic health and safety requirements of the below mentioned European Directives.

Product Description:
- Hytork™ XL-Series Pneumatic actuator
- Double-acting and spring-return actuators
- Sizes: XL26, XL71, XL131, XL186, XL221, XL281, XL426, XL681, XL1127, XL1372, XL2586 and XL4581

Product Variations:
- Product variations of the below mentioned types are still covered by the listed directive and are CE marked.

Serial Number:
- Each actuator has an identifiable serial number.

Manufacturer:
- Emerson Process Management
  Valve Automation (M) Sdn. Bhd.
  Lot 13112, Mukim Labu,
  Kawasan Perindustrian Nilai,
  71807 Nilai, Negeri Sembilan
  Malaysia

EU Declaration of Conformity

Issued in accordance with:

Pressure Equipment Directive (PED) 2014/68/EU

- For Gas Group 2 (see DOC.SG.HX.1, Section 3.2.1, Operating Media), Hytork XL-Series pneumatic actuators are excluded from the requirements of the Pressure Equipment Directive 2014/68/EU based on Article 1, Section 2(f) of the directive.
- For Gas Group 1 pressure media, first consult engineering to check compatibility of pressure media with the actuator.
- The below listed limited range of Hytork XL-Series actuator sizes are rated "Sound-Engineering-Practice" or Module A (Internal Production Control) and are available on request for use with Gas Group 1 media.
  - Double-acting and spring-return actuators
  - Sizes: XL26, XL71, XL131, XL186, XL221, XL281, XL426, XL681, XL1127 and XL1372

EU Declaration of Conformity

Issued in accordance with:

ATEX Directive 2014/34/EU

ATEX Marking:
- Ⓔx II 2G Ex h IIC TX Gb
  Ⓔx II 2D Ex h IIIC TX Db
- For maximum temperature limits and classifications, see Safety Guide: DOC.SG.HX.1, Section 5, Safety Instructions for Use in (Potential) Explosive Atmosphere.

Applicable Standards:
- EN IEC 60079-0:2018
  EN ISO 80079-36:2016
  EN ISO 80079-37:2016
  EN 1127-1:2019

VCCAQ-15691-EN

Declaration of Incorporation of Partly Completed Machinery

Issued in accordance with:

Machinery Directive 2006/42/EC, Appendix IIb

Essential requirements applied and complied with:
- 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4, 1.3.7, 1.5.2, 1.5.3, 1.5.4, 1.5.7, 1.6.1, 1.7.1, 1.7.3 and 1.7.4.
- Technical documentation is drafted in compliance with Appendix VII, Section B.
- Before the actuator is put into operation, the machine into or onto which the actuator will be installed, must comply with the stipulations of the machinery directive.
- The relevant information concerning the machine or part will be available in the event of a motivated request from national authorities.

Applicable Standards:
- EN ISO 12100:2010

Signed: BShirolikar
Name: Bharat Shirolikar
Position: Director, Global Product Engineering
Date: 2023-10-01
Place: Houston TX, U.S.A.

Appendix B: UKCA Declaration of Conformity

EMERSON

VCCAQ-17151-EN
Rev. 1

HYTORK

Legal representative entity for the GB Market:
Emerson Process Management Limited, Company No. 00671801,
Meridian East, Leicester LE19 1UX, United Kingdom
Regulatory Compliance Department
Email: ukproductcompliance@emerson.com
Phone: +44 11 6282 23 64

This declaration of conformity is issued under the sole responsibility of the manufacturer. The products specified below meet the basic health and safety requirements of the below mentioned UK legislations.

Product Description:
- Hytork™ XL-Series Pneumatic actuator
- Double-acting and spring-return actuators
- Sizes: XL26, XL71, XL131, XL186, XL221, XL281, XL426, XL681, XL1127, XL1372, XL2586 and XL4581

Product Variations:
- Product variations of the above mentioned types are still covered by the listed regulations and are UKCA marked.

Serial Number:
- Each actuator has an identifiable serial number.

Manufacturer:
- Emerson Process Management Valve Automation (M) Sdn. Bhd. Lot 13112, Mukim Labu, Kawasan Perindustrian Nilai, 71807 Nilai, Negeri Sembilan Malaysia

UK Declaration of Conformity

Issued in accordance with the:

UK Regulation 2016 – UK SI 2016 No. 1105

- For Gas Group 2, (see Safety Guide, DOC.SG.HX.1, Section 3.2.1, Operating Media). Hytork-XL Series pneumatic actuators are excluded from the requirements of the Pressure Equipment (Safety) Regulations 2016, UK Statutory Instrument 2016 No. 1105, as amended by the Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019, UK Statutory Instrument 2019 No. 696 based on SCHEDULE 1, Paragraph 1(f) of the regulation.
- For Gas Group 1 pressure media, first consult engineering to check compatibility of pressure media with the actuator.
- The below listed limited range of Hytork-XL Series actuator sizes are rated "Sound-Engineering-Practice" or Module A (Internal Production Control) and are available on request for use with Gas Group 1 media.
  - Double-acting and spring-return actuators
  - Sizes: XL26, XL71, XL131, XL186, XL221, XL281, XL426, XL681, XL1127 and XL1372

UK Declaration of Conformity

Issued in accordance with the:

UK Regulation 2016 – UK SI 2016 No. 1107

Marking of the Product:
- Ⓔx II 2G Ex h IIC TX Gb
  Ⓔx II 2D Ex h IIIC TX Db
- For maximum temperature limits and classifications, see Safety Guide: DOC.SG.HX.1, Section 5, Safety Instructions for Use in (Potential) Explosive Atmosphere.

Applicable Standards:
- BS EN IEC 60079-0:2018 BS EN ISO 80079-36:2016 BS EN ISO 80079-37:2016 BS EN 1127-1:2019

Declaration of Incorporation of Partly Completed Machinery

Issued in accordance with the:

UK Regulation 2008 – UK SI 2008 No. 1597 SCHEDULE 2, Annex II(B)

Essential requirements applied and complied with:
- 1.1.2, 1.1.3, 1.1.5, 1.3.2, 1.3.4, 1.3.7, 1.5.2, 1.5.3, 1.5.4, 1.5.7, 1.6.1, 1.7.1, 1.7.3 and 1.7.4.
- Technical documentation is drafted in compliance with Annex VII, Section B of the Regulation.
- Before the actuator is put into operation, the machine into or onto which the actuator will be installed, must comply with the stipulations of the machinery directive.
- The relevant information concerning the machine or part will be available in the event of a motivated request from national authorities.

Applicable Standards:
- BS EN ISO 12100:2010

Signed: BShirolikar
Name: Bharat Shirolikar
Position: Director, Global Product Engineering
Date: 2023-11-01
Place: Houston TX, U.S.A.

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