rotork®

Keeping the World Flowing
for Future Generations



A Range

Multi-turn and double-sealed
3-phase electric valve actuators



Robust electro-mechanical design with class leading reliability, proven in all environmental conditions worldwide for more than 50 years.

Rotork Group

Rotork is a market-leading global provider of mission-critical flow control and instrumentation solutions for the industrial actuation and flow control markets. These include oil and gas, water and wastewater, power, chemical, process and industrial applications.

Customers rely on us for innovative, high quality and dependable solutions for managing the flow of liquids, gases and powders. We help customers around the world to improve efficiency, reduce emissions, minimise their environmental impact and assure safety.

Our reliability record is second to none. Our products are designed with safety and performance at their core and are put through vigorous testing and certified to international standards. Our products are certified for use in the world's most dangerous and hazardous areas.

Partnering with us provides the following:

- Assured safety and reliability
- Industry leading accuracy and efficiency
- Proven technology that works with all network control systems
- Product range with solutions to suit every application
- Assistance with plant planning, development and maintenance through our local support services
- We have innovative research and development centers throughout the world

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Reliable valve actuation with proven mechanical design and **near-zero maintenance**

- Oil bath lubrication provides extended life and the ability to mount in any orientation
- Wide range of speeds and output torques available
- Valve protection via a combined torque and travel limit switch mechanism
- Clear and straightforward on-product position indication
- Water ingress protection, not reliant on terminal cover or cable gland sealing – double-sealed to IP66/68 3 m for 48 hrs
- Upgraded remote position indication options available
- Safe, motor-independent, handwheel operation available at all times

A Range actuators combine the qualities of a robust electric motor and a well proven mechanical drive of the utmost simplicity. In addition, total environmental sealing and Rotork's positive attitude to quality, result in an actuator of the utmost reliability.

A Range Syncroset actuators are particularly suitable for:

- Situations in which the equipment at the valve location must be minimised and applications where actuators with separate mounted starters could be preferable. For example, where there are high levels of vibration, high ambient temperatures or where accessibility to the motor operated valve is limited after installation.
- Installations where traditional electro-mechanical actuators are preferred for the continuity of house specifications.


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Double-sealing of Electrical Enclosures

Without double-sealing, investment in modern sophisticated controls can be rendered worthless, since moisture and dirt ingress will cause gradual, if not immediate, electrical or mechanical failure.

A Range actuators do not breathe. They are double-sealed, watertight and dust tight to IP68 suitable for submersion to a depth of 3 metres for 48 hours.

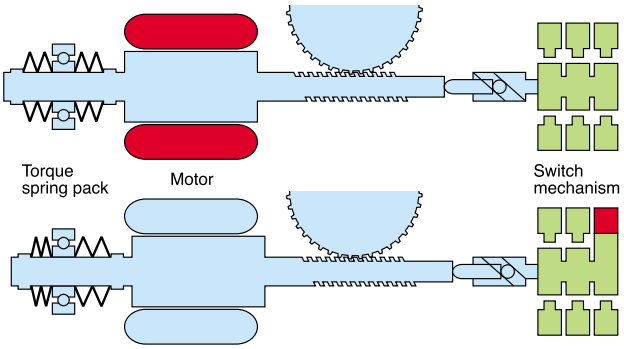
They do not rely upon the care of the site electrician to fully seal the cable gland in order to maintain the integrity of the internal electrical equipment.

Low Inertia / High Torque Motor

Three-phase class F insulated squirrel cage motor of special high torque low inertia design, 15 minute rated with cyclic duration factor of 25% at 33% of actuator output rated torque giving a temperature rise not exceeding the permitted for Class B insulation. Peak torque is rapidly produced from starting and the motor has extremely low overrun when switched off. The winding thermostat provides accurate temperature sensing independent of ambient temperature conditions to optimise the motor's thermal capacity.

Torque Springs

The torque produced by the motor is sensed independently of voltage fluctuations. The pack of disc springs attached to the end of the motor shaft provides some mechanical resistance to the natural tendency of the wormshaft to move laterally when under load.



A mechanical setting is made in the combined torque/travel limit switch mechanism (see below) in order to switch off the motor when a set proportion of torque has been reached.

Seperately Sealed Terminal Compartment

Permits connection using various cabling practices. Internal sealing of the terminal area ensures the integrity of the electrical equipment even during site wiring in wet locations.

Local Indicator, Torque And Limit Switches

The combined torque and travel limit switch mechanism allows the same actuator to be specified for any type of valve, eg. either for:

- Travel limitation as in the case of the closed position of a parallel slide valve or
- Torque switch as in closing the gate of a wedge gate valve.

The actuator can therefore be moved from any one valve type to another in a plant provided the torque range is correct. In addition, the torque switch latch prevents the torque switches from interfering with operation during unseating. The end position limits are easily and accurately set to suit a wide range of valve sizes.

Once the actuator stroke has been set to suit a particular valve, no resetting of the mechanism is necessary if the actuator is taken off and replaced on the same valve. Winding the valve fully open and shut will re-position the mechanism.

In addition, two Open and two Close auxiliary switches are provided as standard for remote indication or interlocking purposes.

A mechanical 3 position pointer and dial showing the valve to be fully Open, Shut or in an Intermediate position, repeats the movement of the limit switch striker, enabling start-up personnel to check switch setting without removing the cover. See page 10 for additional indication features.

Thrust Base

All valve thrust is absorbed in the cast iron thrust base which supports the output shaft by means of a thrust bearing. Therefore no thrust is taken up by the gearcase. This has the following advantages:

- Weight saving for the gearcase.
- Even if the gearcase is damaged the valve stem remains secured and unauthorised valve motion leading to system failures will not occur.
- The gearcase can be opened for examination with the valve in service without releasing the valve stem.
- Thrust base bearings are permanently lubricated from the gearcase oil-bath, therefore external greasing sometimes associated with detachable designs is eliminated.
- In a fire, the base, thrust bearing and drive bush will retain the closed or open valves in a secure position and will meet the requirements of API600 relating to temperature.

Manual Operation

When the hand/auto lever is engaged in the manual position, it disengages the electric drive mechanism and enables direct operation of the output shaft by the handwheel. A geared side mounted handwheel is provided as standard on actuator sizes 70A and larger and is available as an optional extra on sizes 14A and larger.

- As the hand/auto clutch is positioned on the low speed output shaft, power operation can be transferred to manual control in order to stop valve motion, if required. Syncroset actuators can be stopped locally in emergencies in this way, if running under remote control.
- Hand operation of the valve is still possible even if the actuator gearing has failed.
- Seating and unseating is assisted with the hammerblow effect feature so that hand operation is as quick and effective as comparable manual valves.
- Motor operation is automatic and instantly restored when the motor is started. The declutch lever is padlockable in Hand to prevent motor drive, or in Auto to prevent handwheel drive.

Drive Bushing

Detachable drive bushing, machinable to suit valve stem, underhung for convenient valve adaptation (see page 9).

Gearcase

Oil-bathed gearcase is sealed for any operating angle to provide maintenance-free reliability and to avoid 'tunnelling' problems associated with grease-filled designs.

Quality Control Seal

Shows actuator has passed full Rotork performance checks.

Standard Alternative Conduit Entries

- 1x M40, 2x M32
- 1x 1.5", 2x 1.25", ASA NPT
- 1x PG29, 2x PG21

Syncroset Control System

The Rotork Syncroset actuator comprises a 3-phase motor, reduction gearbox, torque and limit switch mechanism, valve position indicator and space heater. All integral connections are brought out via individually number identified wires to a terminal compartment with threaded conduit entries. Reversing contactors must be separately procured and installed.



Options

Side Mounting

Large or slow speed valves can be motorised through thrust-taking bevel or spur gear operators on which the electric actuator is mounted. Because of their inherent high efficiency, such gears provide for satisfactory handwheel operation. Refer to PUB030-001 for Rotork IB bevel gear operators and PUB031-001 for Rotork IS spur gear operators.

Quarter-turn Valves

Rotork IW worm gear operators can be offered in combination with A Range actuators to provide increased torque at reduced speeds for the operation of ball, butterfly and plug valves. Refer to PUB028-079.

Floor Mounting

Floorstands with upward and downward stub shafts are available for coupling via customer's shaft and universal joints to remote valves.

Damper Actuation

Single blade and multi-vane dampers can be motorised either by direct connection to the spindle or by lever-arm. Apply to Rotork for details.

Actuator for Low Temperatures

Standard actuators are designed to operate at temperatures down to -30 °C (-22 °F). Special provision is made at extra cost for temperatures of -40 °C (-40 °F) or -60 °C (-76 °F).

High Speed Actuators

Where high output speeds are required, Rotork torque limiting brake can be supplied to prevent excessive valve seat loading.

Performance Summary

3-phase actuators - performance data

	Actuator output speeds							
rpm at 50 Hz rpm at 60 Hz	18 21	24 29	36 43	48 57	72 86	96 115	144[1] 173[1]	192[1] 230[1]
Actuator size	Torque[2] Nm		lbf.ft					
7A	34	34	31	27	27	22	–	–
	25	25	23	20	20	16	–	–
11A	68	68	61	54	54	43	–	–
	50	50	45	40	40	32	–	–
13A	–	108	95	81	–	–	–	–
	–	80	70	60	–	–	–	–
14A	163	163	136	108	108	81	61[1]	–
	120	120	100	80	80	60	45[1]	–
16A	305	305	258	203	203	149	108[1]	–
	225	225	190	150	150	110	80[1]	–
30A	542	542	508	407	407	325	258[1]	–
	400	400	375	300	300	240	190[1]	–
40A	1,017	1,017	847	678	678	542	407[1]	–
	750	750	625	500	500	400	300[1]	–
70A	1,491	1,491	1,288	1,017	1,017	746	644[1]	542[1]
	1,100	1,100	950	750	750	550	475[1]	400[1]
90A	2,034	2,034	1,695	1,356	1,356	1,017	868[1]	732[1]
	1,500	1,500	1,250	1,000	1,000	750	640[1]	540[1]
91AR	–	–	–	–	–	–	1,356[1]	1,356[1]
	–	–	-	–	-	-	1,000[1]	1,000[1]
95AZ	–	2,983	–	–	–	–	–	–
	–	2,200	–	–	–	–	–	–

Notes:

1 Due to the effects of inertia and drive nut wear, speeds are not recommended for direct mounted gate valve applications.

2 Torque rating is maximum torque setting in both directions. Stall torque will be 1.4 to 2.0 times this value depending on speed and voltage.

If maximum torque is required for more than 20% of valve travel, refer to Rotork.

For full electrical motor data, refer to PUB003-003.

Performance Summary

Mechanical data

Actuator size		7A 11A 13A	13AL	14A 16A	30A	40A	70A	90A	91AR	95AZ
Approximate weight[1]	kg	39	39	74	108	134	176	186	213	196
	lbs	86	86	163	238	295	388	410	470	432
Type A couplings - torque and thrust[2]										
Thrust rating	kN	44	33	67	110	220	220	334	–	445
	lbf	10,000	7,500	15,000	25,000	50,000	50,000	75,000	–	100,000
Stem acceptance - Type A1 (maximum)										
Rising	mm	26	38	38	54	64	70	70	–	–
	in	1	1.5	1.5	2.13	2.52	2.76	2.76	–	–
Non-rising	mm	20	32	32	44	51	57	57	–	–
	in	0.79	1.26	1.26	1.73	2	2.24	2.24	–	–
Stem acceptance - Type AZ (maximum)										
Rising	mm	32	–	51	67	73	83	83	–	83
	in	1.26	–	2	2.64	2.87	3.27	3.27	–	3.27
Non-rising	mm	26	–	38	51	57	73	73	–	73
	in	1	–	1.5	2	2.24	2.87	2.87	–	2.87
Type B couplings - torque only										
Stem acceptance										
B1 fixed bore	mm	42	–	60	80	100	100	120	–	–
	in	1.65	–	2.36	3.15	3.94	3.94	4.72	–	–
B3 fixed bore	mm	20	–	30	40	50	50	50	50	–
	in	0.79	–	1.18	1.57	1.97	1.97	1.97	1.97	–
B4 (maximum)	mm	20	–	32	45	50	60	60	60	–
	in	0.79	–	1.26	1.77	1.97	2.36	2.36	2.36	–
Handwheels										
Standard ratio	Standard	1:1	1:1	1:1	1:1	1:1	15:1	15:1	15:1	15:1
Option ratio	Optional	–	–	10:1	15:1	20:1	30:1	45:1	30:1	45:1
Flange size										
Flange	ISO 5210	F10	F10	F14	F16	F25	F25	F30[3]	F25	F30
	MSS SP-102	FA10	FA10[4]	FA14	FA16	FA25	FA25	FA30[3]	FA25	FA30

Notes:

1 Approximate net weights of standard build actuators. Actual weight will be dependent on specification and options fitted.

2 Valve stems or shafting should be adequately supported to prevent radial loads being imposed on the actuator drive bushings.

3 90A with Type B3 and B4 couplings have flange size F25/FA25.

4 13AL has FA10 base dimensions except that spigot diameter is 2.76".

Specification Summary

	Publication number for more detailed information
Main drive unit[1]	
3-phase electric actuator with double-sealed watertight enclosure IEC IP68 (submersion in water to a depth of 3m for 48hrs. Other national enclosure standards also complied with, ie. UL50E and CSA C22.2 No 94.2, BS5410 specifications) complete with segregated terminal area to IEC. Declutchable lockable emergency handwheel. Class F insulated 15 min. rated, low/high torque motor with thermostat protection. Combined torque/limit switches for open and closed position and 2 each auxiliary limit switches for remote lamp indication or interlocks. 3 position local indicator.	–
Additional valve status indication facilities[2]	
Potentiometer for remote continuous indication	4/1
Add-on-Pak 1 unit comprising potentiometer for continuous remote indication and 6 additional limit switches adjustable in banks of 3 to any valve position. Continuous local indicator.	4/1
Blinker switch for valve motion indicator.	4/1
Current Position Transmitter (CPT) for any range between 0 and 50mA	4/1

Notes:
1 Basic specification
2 Standard 'adder' options

Standard paint finish A Range - all sizes

Preparation

1. Iron castings are fettled to present a smooth surface after which they are dipped, before machining, in a synthetic red oxide primer to seal all surfaces.
2. Aluminium castings are treated, after machining, by dipping in Gardobond® X4707. This process gives all surfaces high corrosion resistance combined with excellent paint bonding properties.
3. Assembled actuators are then suitably masked and passed on a conveyor through an aqueous de-greasing plant operating at +70 °C to the spraying stage.

Paint application

Preheated paint is applied as follows:

Undercoat

Manufacturer: Cromadex
Type: Anti-corrosive primer
Ref no: '395 Primer'
Min Film Thickness: 50.80 microns / 2.00 mills
Application: Air assisted airless electrostatic system

Top coat

Manufacturer: Cromadex
Type: Fast air drying alkyd
Ref no: '222 Top coat'
Colour: RAL7011 Dark Grey - gloss
Min Film Thickness: 25.4 microns / 1.00 mills
Application: Air assisted airless electrostatic system
Total Dry Film Thickness: 76.2 microns / 3 mills
Total Drying Time: 12 hours

Actuators finished with our standard preparations developed for exposed locations involving salt spray, high humidity and a wide band of ambient temperatures -40 °C +70 °C. The finish has successfully withstood 1000 hour salt mist testing in accordance with ISO9227:2017

Temperature

Standard for ambients of -30 to +70 °C (-22 to +158 °F).
For lower or higher ambient temperatures please apply.

Design Life

For isolating duty torque ratings of actuators are based on a minimum maintenance free life of 10,000 valve operations or Open/Close cycles assuming rated seating torque at stroke and ⅓ rated torque during operation. For modulating duty ratings please apply.

Life Tests

These are based on 10,000 valve operating cycles at average of ⅓ seating torque. the actuator is also stalled against solid obstruction 50 times to prove durability.

Frequency of Operation

Standard A Range actuators are suitable for up to a maximum of 60 starts per hour.

Vibration

Standard A Range actuators should not be used on applications where they are likely to be subjected to levels of vibration exceeding the following:

Plant induced vibration – 0.5 g over frequency range of 10-200 Hz.

Seismic – in frequency range of 0.2 - 33 Hz, 1.0 g if it is to operate during and after the event, or 5.0 g if it is only required to maintain structural integrity.

Where excessive plant induced vibration is anticipated, mounting the actuator remote from the valve and driving through extension shafting incorporating vibration absorbing couplings, may provide a satisfactory solution.

Main Alternative Enclosures

Enclosure Type **X*** rating available in accordance with UL 50E and CSA C22.2 No. 94.2.

*X - Type 4 and Type 6.

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