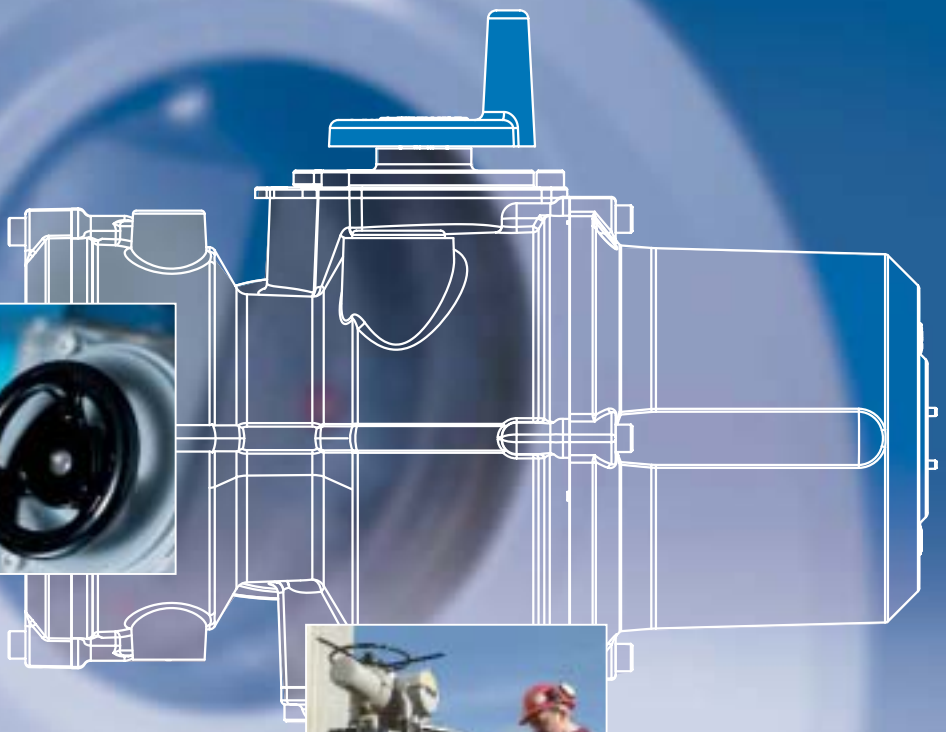
rotork®



Established leaders in Actuation Technology

IQ & IQT Range

electric valve actuators
with intelligent technology

Publication E110E issue 05/03

Rotork Actuation

World leaders in valve control

In the 45 years since the company was founded, Rotork Actuation has become a byword for excellence in the field of valve, sluice gate and damper actuation products for the oil, gas, power, water and waste treatment industries - worldwide.

We owe our success to an uncompromising focus on quality at every stage - and at every level - of Rotork's operations.

From initial site survey, specification and design, through to materials, manufacturing and testing, installation, commissioning and after-sales service we accept nothing but the best.

At the heart of the company is an exceptional workforce - the highly trained, forward-thinking engineers, technicians and support staff who each have a crucial role to play in maintaining Rotork's unrivalled reputation for innovation, reliability and first class customer support.

Rotork. Established leaders in actuation technology.

Contents

Features of the IQ range	**3**
Reliability	**4**
Intelligent actuation	**5**
Protection	**6**
Applications	**7**
Intelligent communication	**8**
Rotork Pakscan system control	**10**
Fieldbus system control	**11**
Construction	**12**
Second stage gearboxes	**14**
Actuator specification	**15**
Performance summary	**16**

rotork®

Rotork Controls Ltd, Bath, UK

Rotork Controls Inc, Rochester, USA

Rotork's IQ intelligent valve actuator range - the best just got better

Rotork's tried and tested range of IQ intelligent electric valve actuators is now further enhanced - retaining legendary features such as Rotork's unique double sealing system and 'non-intrusive' infrared commissioning capability by the addition of the IQT dedicated quarter-turn actuator.

The IQT (IQ quarter-turn) is the result of ongoing commitment to product development at the leading edge of new technology. The Rotork IQ now delivers a complete range of actuators suitable for most quarter and multi-turn applications that require control and indication flexibility, offering end users ever higher standards of performance build quality and overall value.

The IQ continues to offer all the key benefits which have made it a world leader including:

Fit for Life

Whatever the environment, whatever the duty IQ has become a byword for reliability. Design simplicity, double sealing with a watertight enclosure coupled with infra-red set-up and comprehensive protection systems have come together to make IQ the world leader in reliable valve operation. Gain peace of mind and minimise maintenance costs with fit and forget IQ technology.

Simple commissioning

Simple, safe and rapid non-intrusive commissioning with infra-red control. Actuator settings such as torque levels, position limits, control and indication functions can be accessed and adjusted using the "point and shoot" IQ Setting Tool. The supplied, intrinsically safe (IS) tool is unique to Rotork and allows non-intrusive actuator set-up whatever the environment, power on or power off.

Simple troubleshooting

Active valve, control and actuator alarm icons are provided on the easy to read illuminated display.

Access comprehensive, real-time, diagnostic help screens with the IQ Setting Tool for a full picture of local and remote control status, actuator configuration and torque against position profiles. The on-board data logger records operational, alarm and valve torque profile data providing valuable information of plant operating performance and conditions.

IQ offers a range of powerful features unparalleled in valve actuation including:

- Multi and quarter-turn capability
- Three phase, direct current and single phase actuators
- On-board data logger included as standard
- IrDA compatible for local and remote actuator analysis via PC
- Clear, user friendly controls and indication
- Simplified torque and position control for increased reliability
- Rationalised electronics - "system on a chip" technology
- Comprehensive control and indication flexibility

IQ - simply unmatched for reliability

Protection - the key

Vast experience in the application of electric actuators has enabled Rotork to lead the world in actuator ingress protection. Situated in environments ranging from desert to tundra, offshore to underground, where flooding, humidity, extremes of heat and cold, ultra violet and corrosive atmospheres are normal, actuators have to perform unfailingly. Rotork understand that the most important factor in the reliability of an actuator is protection from the environment - in simple terms, the enclosure.

Double sealed for double protection

The IQ enclosure is rated IP68 - 7 metres for 72 hours, NEMA 4/4X/6. It is completely watertight and dusttight and does not "breathe". The Rotork Double Seal system ensures protection of internal components since they are separated from the cable gland and terminal compartment by a watertight terminal block. Protection is maintained during site hook-up when terminal covers are removed and is independent of cable gland sealing.

Non-intrusive - sealed for life

IQ covers need not be removed for site commissioning. All settings and adjustments are made using the supplied infra-red Setting Tool, including speed setting for the IQT. After assembly in the controlled environment of our manufacturing facilities, air exchanges are eliminated - all internal components are completely protected for life. Non-intrusive control selectors mean there are no moving shafts penetrating the control enclosure.

Reliability through simplicity

The IQ combines simplicity of design while extending specification and performance.

Torque measurement

An actuators ability to reliably and accurately determine the force applied in operating a valve is fundamental in providing valve and actuator protection. The IQ range uses tried and tested technology, proven in industry. Accurate, repeatable torque measurement is achieved independent of variations in frequency, voltage and temperature.

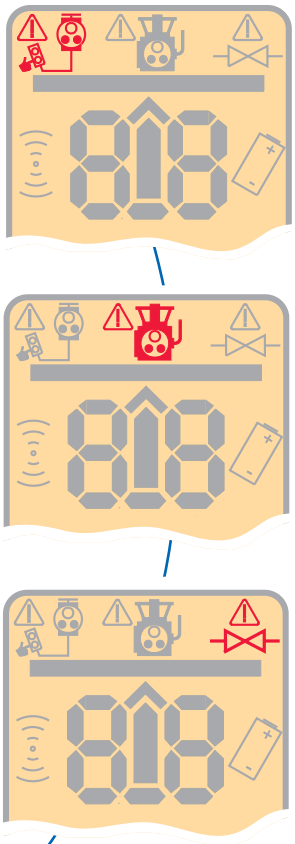
Position measurement

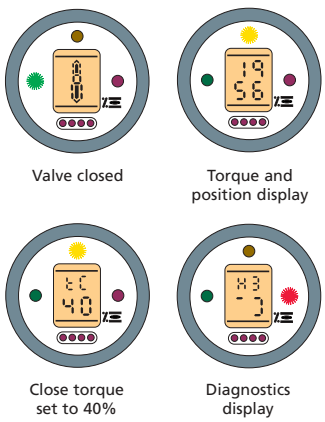
Reliable process control depends on accurate positioning of the valve at end of travel and for fluid control, mid travel. The patented IQ non-contacting position measuring system is the most simple yet devised for actuator control. With only one moving part, the resolver converts output centre column rotation into an electronic signal which is then compared to position limits stored within a safe, non volatile memory.

IQT speed control

By use of motor control technology proven in the AQ range over 20 years and now integrated with the IQ "actuator on a chip" the output speed of the IQT can be adjusted without affecting the torque output.

IQ - big on intelligence





Actuator display

The IQ incorporates a unique liquid crystal display developed specifically for actuator indication. Large segments allow easy, distance viewing of valve position, torque and diagnostic screens. A unique, diffused LED backlighting system provides high visibility in all light conditions. The LCD display is supplemented with position indication lights, green, yellow and red.

Indication back up

Rotork recognise the need for local and remote position indication at all times, even when the actuator is powered down. The IQ incorporates a battery to maintain and update position indication when the main power is switched off. The battery also supports power off data logging and commissioning.

Set-up

Infra-red set up, adjustment and review using the supplied, intrinsically safe IQ Setting Tool allows users access to the configuration of the actuator using the convenient actuator liquid crystal display.

On screen diagnostic icons

Four dedicated alarm icons are incorporated into the LCD display giving clear indication of valve, control system and actuator alarms.

Help screens

Nine help screens can be accessed with the IQ setting tool allowing real time, grouped analysis of control signal status, valve and actuator status and indication status.

Valve torque indication

Real time viewing of valve torque against valve position can be accessed with the Setting Tool via the IQ LCD. Analysis of valve operating conditions is therefore available as standard.

Conditional control

For applications where a high level of safety integrity is required the IQ can be configured for conditional control. In this mode, operation is conditional on two discrete signals being applied.

Looking at an example of a close valve command, by applying a signal to the remote close input and close interlock input simultaneously the actuator will operate and close the valve. If only one signal is applied, or a signal is lost, the actuator will failsafe by staying put or stopping. When conditional remote control is configured, the interlock inputs are not required for local operation.

Data logging

Every IQ includes an on board data logger. The data logger captures and stores valve, actuator and control signal operation and status data:

- Valve torque profile, open/closed instantaneous and average torque against valve position
- Number of operations
- Valve and actuator position status log
- Operation signal log
- Actuator control status log
- Statistics

Log data is time and date stamped and can be analysed by playing back in “real time” or on an event by event basis.

The data logger is accessed via the IrDA™ interface to compatible devices, see below. Data logger data can be analysed with IQ-Insight PC based software, described in detail on page 8.

IrDA™ communication (IQ-Insight)

IQ supports IrDA™ compatible communication. IQ configuration and data logger files are accessed via the infra-red port non-intrusively. Data exchanges are via IrDA™ with compatible Personal Digital Assistants (PDAs), note books or PCs. IQ-Insight PC software provides the interface with the actuator and its on-board data logger.

Full security, full protection

Syncrophase prevents valve damage through incorrect wiring

Rotork's unique 'Syncrophase' automatic phase rotation correction prevents valve damage through incorrect wiring by ensuring that the IQ three-phase motor is always presented with the correct phase rotation of the power supply.

Single phasing protection

Also developed to control motor overheating, IQ electronics constantly monitor all three phases of the power supply. Should one or more phases be lost the control circuit is prevented from energising the contactors. Local and remote alarm signals of incomplete supply are offered as standard features.

Motor protection when valve jams

Should a valve jam, the IQ motor is prevented from overheating by a logic circuit which trips the contactor when there is no movement within seven seconds of a start signal.

IQT uses a 24 volt DC motor. For single and 3 phase* supplied actuators the motor supply is internally provided via a transformer - rectifier (24 volt DC supplies - rectifier only). IQT will always run in the correct direction irrespective of supply type and connection. On loss of one or more of the utilised phases (or DC supply pole) the IQT actuator will stop.

IQ thermostatic protection

Two thermostats embedded in the motor windings directly sense temperature, tripping the actuator control circuit in the event of overheating.

IQT thermostatic protection

Two thermostats are embedded in the toroid transformer windings providing comprehensive motor power module protection.

Auto self test and diagnosis (ASTD)

Each time the actuator is powered up, its vital operational circuits automatically self test to ensure correct operation. In the unlikely event that a fault is diagnosed the information is automatically presented using the display icons. At the same time, actuator operation can be inhibited to enable site investigation.

Instant reversal protection

An automatic time-delay circuit avoids the shock loads which may cause unnecessary wear to valve stems and gearboxes when an actuator is ordered to reverse direction 'instantaneously'. The circuit also limits current surges through the contactor.

* Actuator utilises 2 phases only - refer to circuit diagram.

Advanced engineering

1 Hand operation

Direct drive handwheel (or geared handwheel on larger sizes and IQT) to provide reliable emergency manual operation in the event of a power supply failure. With padlockable* hand/auto clutch for safe operation even when the motor is running.

Note: power operation always has preference unless hand/auto lever is purposely locked into ‘hand drive’. Lost motion ‘hammerblow’ effect is provided with both direct and independently geared handwheels.

2 Non intrusive setting

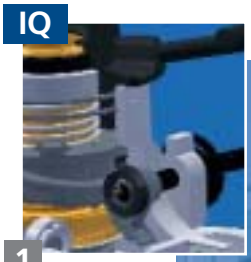
All actuator settings and diagnostics are made through the sealed indication window. It is not necessary to remove electrical covers exposing the integral controls on site.

3 Local controls

Local controls and padlockable* Local/Stop/Remote selector switch operate internal reed switches, avoiding penetrating shafts which would have to be sealed to prevent moisture ingress.

4 Position control

Hall effect magnetic pulse system accurately measures and controls the stroke of the actuator without using gears and switches.



5 Terminal compartment

Separately sealed terminal compartment ensures the integrity of the electrical equipment even when the terminal cover is removed during site wiring.

6 IQ motor and drive

Motor shaft and worm shaft separate to facilitate simple actuator speed change. Low inertia high torque motor. The motor produces peak torque rapidly after starting but with very little overrun when de-energized. The winding thermostat provides accurate temperature sensing independent of ambient temperature conditions to optimize the motor's thermal capacity. The motor drive includes a lost motion 'hammerblow' to assist in unseating tightly shut valves. Single worm and wheel drive running in an oil bath for maximum life with ambient temperature tolerance.

IQT motor

High efficiency compact unit with a proven reliability record in valve actuation applications over 20 years. Integrated speed control allows output speed adjustment over a 4:1 speed range.

7 Thrust base

Cast iron, water sealed bearings. Easily removable drive bushing for machining to suit valve stem for convenient valve adaptation.

*Suitable for 6mm / 1/4 inch padlock

Gearboxes

Multi-turn output - IB and IS Range

For multi turn applications the Bevel (IB) and spur (IS) gear combinations are available, where screwed or keyed stems are used to operate the valve. IQ - IB combinations are available up to 8,135Nm torque and 1,557kN thrust output. IQ - IS combinations are available up to 43,386 Nm torque and 3,342kN thrust output.

Key features:

- Totally enclosed, fully sealed and grease filled for life
- Removable output drive coupling for machining
- Comprehensive gear ratios combined with a selection of auxiliary input spur/bevel gear reducers
- Optional input flanges
- Optional twin pinion units for secondary drive (IB)
- Upward or downward drive option (IS)

Quarter-turn output

For torque output up to 2000Nm IQT provides direct quarter-turn output. For part-turn applications that require torques in excess of 2000Nm or where increased thrust/torque at reduced operating speed is required, Rotork produce a range of gearboxes. With the IW range of gearboxes torque outputs up to 137,000Nm are available.

Key features:

- Totally enclosed, fully sealed and greased filled for life
- Removable output drive coupling for machining, repositionable baseplate facility
- Adjustable mechanical stops (at 0° and 90° +/- 5°)
- Comprehensive gear ratios combined with a selection of auxiliary input spur gear reducers
- Optional input flanges

Modulating and submersible gearbox forms are available. As standard, gearboxes are despatched painted the same colour as the actuator.

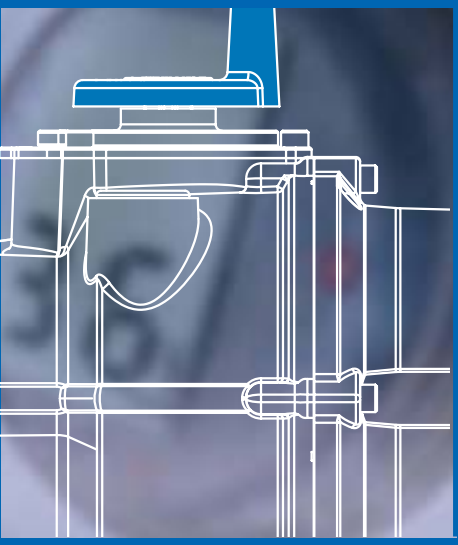
Gearbox summary: Quarter-turn 90˚

Torque: Nm *lbs ft*	**2,000** *1,476*	**137,000** *107,000*
Actuator type:	**IQT**	**IQ + IW** Worm Gearbox

Gearbox summary: Multi-turn

Torque: Nm *lbs ft* **Thrust: kN** *Lbs*	**3,000** *2,200* **44** *10,000*	**8,135** *6,000* **350** *1,557*	**43,386** *32,000* **3,342** *750,000*
Actuator type:	**IQ**	**IQ + IB** Bevel Gearbox	**IQ + IS** Spur Gearbox

Actuator specification - contents



The following pages contain details on performance and specification for the Rotork IQ range of actuators. Please use the contents table below to help access the information you require.

1	**Performance summary**	**p16**
2	**Actuator Drive Couplings**	**p20**
3	**Introduction**	**p23**
4	**Mechanical**	**p23**
4.1	Enclosure	p23
4.2	Valve/actuator interface	p24
4.3	Handwheel	p24
4.4	Lubricant	p25
4.5	Finish	p25
5	**Electrical**	**p25**
5.1	Power supplies	p25
5.2	Control	p25
5.3	Indication, monitoring and data logging	p27
5.4	Fieldbus system control	p28
5.5	Protection	p28
5.6	Actuator set-up	p28
6	**Actuator Components**	**p29**
6.1	Motor	p29
6.2	Power module	p29
6.3	Control module	p29
6.4	Torque and position control	p29
6.5	Conduit entries, terminals and wiring	p29
7	**Design Specification**	**p30**
7.1	Design life	p30
7.2	Frequency of operation	p30
7.3	Operating temperature	p30
7.4	Vibration	p30
7.5	Safety integrity	p30
7.6	Noise	p30

IQ 3 phase performance summary

Performance data

	Actuator output speeds							
rpm at 50 Hz	**18**	**24**	**36**	**48**	**72**	**96**	**144**	**192**
rpm at 60 Hz	**21**	**29**	**43**	**57**	**86**	**115**	**173**	**230**
Actuator size	**Torque** Nm**							
IQ10	34	34	34	34	34	34		
	25	25	25	25	25	25		
IQ12	81	81	81	68	48	41		
	60	60	60	50	35	30		
IQ18	108	108						
	80	80						
IQ20	203	203	203	203	176	142	102*	
	150	150	150	150	130	105	75*	
IQ25	400	400	298	244	244	230	149*	
	295	295	220	180	180	170	110*	
IQ35	610	610	542	474	474	366	257*	
	450	450	400	350	350	270	190*	
IQ40	1020	1020	845	680	680	542	406*	
	750	750	625	500	500	400	300*	
IQ70	1490	1490	1290	1020	1020	745	645*	542*
	1100	1100	950	750	750	550	475*	400*
IQ90	2030	2030	1700	1355	1355	1020	865*	730*
	1500	1500	1250	1000	1000	750	640*	540*
IQ91							1355*	1355*
							1000*	1000*
IQ95		3000						
		2200						

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

** 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.

IQ single phase - performance data

	Actuator output speeds							
rpm at 50 Hz	**18**	**24**	**36**	**48**	**72**	**96**	**144**	
rpm at 60 Hz	**21**	**29**	**43**	**57**	**86**	**115**	**173**	
Actuator size	**Torque**** **Nm** / **Ft lbf**							
IQS12	65	60	45	40	30	25		
	48	44	33	30	22	18		
IQS20	165	130	130	125	100	80	60	
	122	96	96	92	74	59	44	
IQS35*	380	325	350	320	230	190	135	
	280	240	258	236	170	140	100	

IQ DC - performance data

	Actuator output speeds							
rpm	**18**	**24**	**36**	**48**				
Actuator size	**Torque**** **Nm** / **Ft lbf**							
IQD10	34	34	31	27				
	25	25	23	20				
IQD12	68	68	61	54				
	50	50	45	40				
IQD18		108						
		80						
IQD20	163	163	136	108				
	120	120	100	80				
IQD25	305	305	257	203				
	225	225	190	150				

DC supply voltage	**24V**	**48V**	**110V**
IQD10	✔	✔	✔
IQD12	✘	✔	✔
IQD18	✘	✔	✔
IQD20	✘	✔	✔
IQD25	✘	✘	✔

* **IQS35 not available at 115v.** Actuator output speed 144/173 rpm is not recommended for direct mounted gate valve applications.

** 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.

IQ performance summary

Mechanical data

Actuator size IQ IQS IQD ▷		10 12 18	20 25	35	40	70	90	91	95
Flange size	ISO 5210	F10	F14	F16	F25	F25	F30*	F25	F30
	MSS SP - 102	FA10	FA14	FA16	FA25	FA25	FA30*	FA25	FA30
Approximate weight**	kg	27	46	69	190	190	200	200	200
	lbs	60	101	152	418	418	440	440	440
Group 'A' couplings (thrust)									
Thrust rating	kN	44	100	150	220	220	334	N/A	445
	lbf	10,000	22,480	33,750	50,000	50,000	75,000	N/A	100,000
Stem acceptance diameter									
Type 'A' (maximum)									
Rising	mm	32	38	54	64	70	70	N/A	N/A
	ins	1 1/4	1 1/2	2 1/8	2 1/2	2 3/4	2 3/4	N/A	N/A
Non-rising	mm	26	32	45	51	57	57	N/A	N/A
	ins	1	1 1/4	1 3/4	2	2 1/4	2 1/4	N/A	N/A
Type 'Z' (maximum)									
Rising	mm		51	67	73	83	83	N/A	83
	ins		2	2 5/8	2 7/8	3 1/4	3 1/4	N/A	3 1/4
Non-rising	mm		38	51	57	73	73	N/A	73
	ins		1 1/2	2	2 1/4	2 7/8	2 7/8	N/A	2 7/8
Z3	mm	32	51	67	N/A	N/A	N/A	N/A	N/A
	ins	1 1/4	2	2 5/8	N/A	N/A	N/A	N/A	N/A
Group 'B' couplings (non-thrust)									
Bore diameter									
Type 'B1' (fixed bore)	mm	42	60	80	100	100	120	100	N/A
Type 'B3' (fixed bore)	mm	20†	30†	40†	50	50	50	50	N/A
Type 'B4' (maximum)	mm	20†	30†	44†	50	60	60	60	N/A
	ins	3/4	1 1/4	1 3/4	2	2 1/4	2 1/4	2 1/4	N/A
Handwheel ratio	Standard	Direct	Direct	Direct	Direct	15:1	15:1	15:1	15:1
	Optional	12:1	13.5:1	22.5:1	15:1 or 30:1	30:1	45:1	30:1	45:1

* IQ90 with B3 and B4 couplings have flange size F25.
** Weight will be dependent on optional equipment fitted.
† For actuator sizes IQ10 to IQ35 when required to drive shafts or stems having any axial movement, a type 'A' coupling must be used.

IQT quarter-turn performance summary

Performance and mechanical data

Actuator	IQT125			IQT250		IQT500	IQT1000		IQT2000
Torque									
Max Nm	125			250		500	1000		2000
Min Nm	50			100		200	400		800
Max Ft lbs	92			185		369	738		1476
Min Ft lbs	37			74		148	295		590
Operating time									
90˚ Min	5			8		15	30		30
90˚ Max	20			30		60	120		120
Flange									
ISO 5211	F05*	F07*	F10	F07*	F10	F10	F12	F14*	F14
MSS SP-101	FA05*	FA07*	FA10	FA07*	FA10	FA10	FA12	FA14*	FA14
Weight									
Kg	22			22		22	37		37
lbs	49			49		49	82		82
Couplings** **Spindle acceptance**									
Bore & key max mm	22	28	42	28	42	42	50	60	60
Bore & key max ins	0.87	1.1	1.65	1.1	1.65	1.65	1.97	2.36	2.36
Square AF max mm	14	19	32	19	32	32	28	41	41
Square AF max ins	0.56	0.75	0.88	0.75	0.88	0.88	1.12	1.62	1.62
Handwheel									
Turns for 90˚	80			80		80	80		80
Angular adjustment									
(nominal) degrees	80 - 100			80 - 100		80 - 100	80 - 100		80 - 100

IQ 24V DC (17-37 Volts) Performance

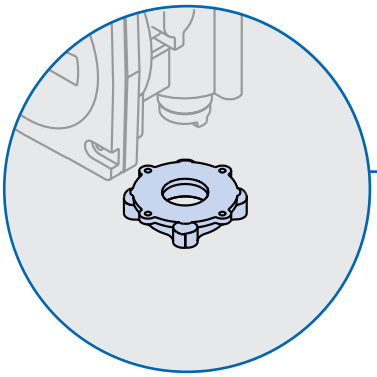
Torque outputs for 24V DC are the same as above, however speed varies with load.

* Optional flanges F05, FA05, F07 and FA07 use a base adapter plate. Required base type must be specified.

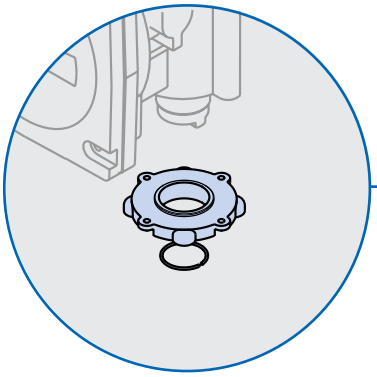
** Couplings are supplied blank for machining by valve maker.

2 Actuator drive couplings

The IQ range features two actuator base designs - a removable base for the IQ10, 12, 18, 20, 25 and 35 sizes and an integral base for IQ40, 70, 90, 91 and 95. Both arrangements are available with flanges and couplings which comply with either ISO 5210 or MSS SP-102.



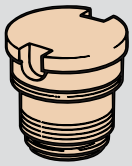
Removable thrust base



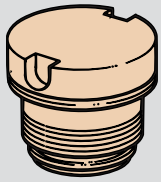
Removable non-thrust base

Actuators IQ10 IQ12 IQ18 IQ20 IQ25 IQ35

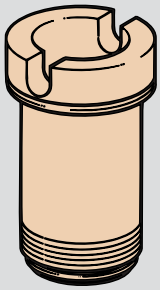
Thrust



Type A
for sizes IQ10 to 35

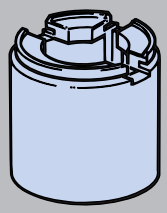


Type Z
for sizes IQ20 to 35
increased stem
acceptance

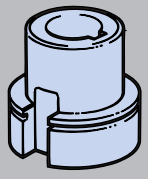


Type Z3
for sizes IQ10 to 35
increased stem
acceptance
and reach

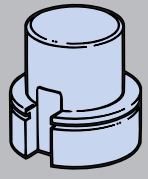
Non-Thrust



Type B1
for sizes IQ10 to 35
large fixed bore
with ISO standard
bore and keyway



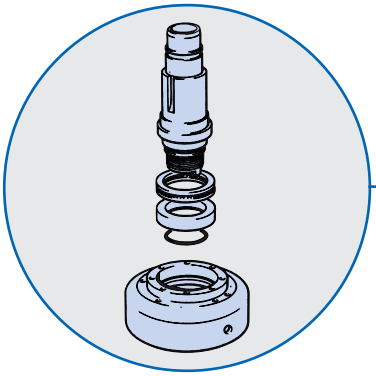
Type B3
for sizes IQ10 to 35
fixed bore with
ISO standard bore
and keyway



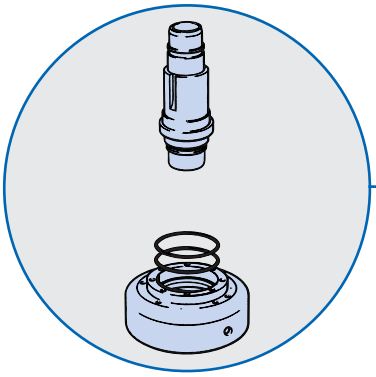
Type B4
for sizes IQ10 to 35
blank drive bush
for machining
by customer

Thrust bearings

Both type 'A' and 'Z' couplings feature an associated thrust bearing. In the case of the removable thrust base this is fully sealed and lubricated for life; in the integral base design this is lubricated by the actuator gearcase oil bath. Both integral and removable thrust bases are designed to retain all developed thrust reaction forces without any load appearing on the actuator gearcase.



Standard centre column with thrust bearing

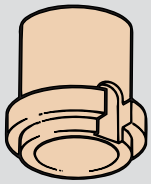


Non-thrust centre column

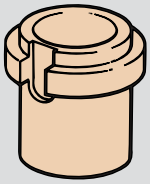
Actuators IQ40 IQ70 IQ90 IQ91 IQ95

Thrust

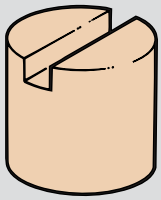
Position 1



Position 2

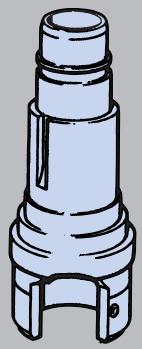


Type A
for sizes IQ40, 70 and 90

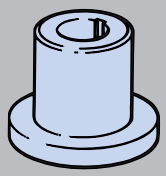


Type Z3
for sizes IQ40, 70, 90 and 95 increased stem acceptance and reach

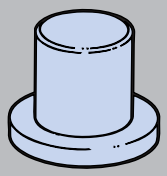
Non-Thrust



Type B1
for sizes IQ40, 70 and 90 large fixed bore with ISO standard bore and keyway



Type B3
for sizes IQ40, 70, 90 and 91 fixed bore with ISO standard bore and keyway



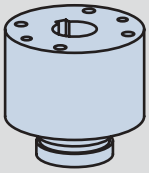
Type B4
for sizes IQ40, 70, 90 and 91 blank drive bush for machining by customer

IQT actuator drive couplings

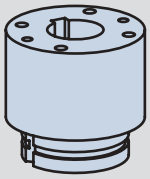
Drive couplings*

The easily removable drive bush is supplied blank for machining to suit valve stem for convenient valve adaption. The IQT base design and drive couplings comply with either ISO 5211 or MSS SP-101.

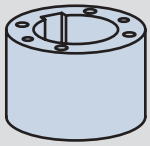
Actuators IQT125 IQT250 IQT500



F05/FA05
for size IQT125

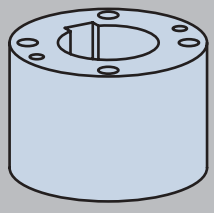


F07/FA07
for sizes IQT125/250

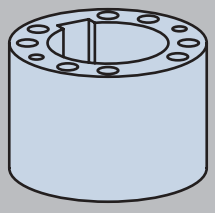


F10/FA10
for sizes IQT125/250/500

Actuators IQT1000 IQT2000



F12/FA12
for size IQT1000



F14/FA14
for size IQT2000

*bore and key is for illustrative purposes only. Drive bushes are supplied blank as standard.

3 Introduction

IQ actuators are self contained units for local and remote electrical operation of valves. Comprising an electric motor, reduction gearing, reversing starter with local controls, turns and torque limitation with electronic logic controls and monitoring facilities, all housed in a double-sealed watertight enclosure to IP68 7 metres-72 hours, NEMA 4, 4X and 6.

All torque and turns settings and configuration of the indication contacts are effected using the non-intrusive, hand held infra-red, IQ Setting Tool, which is included with each order.

The following specification covers standard features and available optional features. Options selected must be specified with enquiry.

Below:
Pocket IQ-Insight software tool used to download 'data logger' file.

4 Mechanical

4.1 Enclosure and ambient temperatures

All IQ actuator hazardous and non-hazardous area enclosures are built to a watertight standard. Through the use of non-intrusive commissioning and site adjustment using the supplied infra-red IQ Setting Tool, the hermetic, factory-sealed enclosure protects internal components for life as covers never need removing. The terminal compartment is sealed from other areas by the Rotork double seal, maintaining watertight integrity even during site connection.

Actuators are available with the following enclosure types for which the ambient working temperature ranges are stated. Where option temperatures are indicated, changes to some actuator components are required and therefore the temperature requirement must be specified. Hazardous area approvals for other country standards are available, please apply to Rotork.

The IQ range is built in accordance with the following standards:

WT: Standard watertight,
IEC 60529 (1989-11),
IP68 7 metres/72 hours,
NEMA 4, 4X and 6.
Temperature -30°C to +70°C
(-22°F to +158°F).
*Option -40°C to +70°C
(-40°F to +158°F).
*Option -50°C to +40°C
(-58°F to +104°F).

European - Hazardous Area

EExd IIB T4. ATEX (94/9/EC) II 2GD:
CENELEC Norm EN50014 and EN50018.
Temperature -20°C to +70°C
(-4°F to +158°F).
*Option -30°C to +70°C
(-22°F to +158°F).
*Option -40°C to +70°C
(-40°F to +158°F).
*Option -50°C to +40°C
(-58°F to +104°F).

EExd IIC T4. ATEX (94/9/EC) II 2GD: CENELEC Norm EN50014 and EN50018.
Temperature -20°C to +70°C
(-4°F to +158°F).

Standard specification

EExde IIB T4. ATEX (94/9/EC) II 2GD:
CENELEC Norm EN50014, EN50018 and EN50019.
Temperature -20°C to +70°C (-4°F to +158°F).
*Option -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

EExde IIC T4. ATEX (94/9/EC) II 2GD:
CENELEC Norm EN50014, EN50018 and EN50019.
Temperature -20°C to +70°C (-4°F to +158°F).

International - Hazardous Area

IEC. Exd IIB T4:
IEC60079-0 and IEC60079-1 for Exd IIB T4.
Temperature -20°C to +60°C (-4°F to +140°F).

IEC. Exd IIC T4:
IEC60079-0 and IEC60079-1 for Exd IIC T4.
Temperature -20°C to 60°C (-4°F to +140°F).

USA - Hazardous Area

FM. Class 1, Division 1, Groups C, D, E, F, G hazardous areas:
Factory Mutual - Explosionproof to NEC Article 500.
Temperature -30°C to +60°C (-22°F to +140°F).
*Option -40°C to + 60°C (-40°F to +40°F).
*Option -50°C to +40°C (-58°F to +104°F).
*Alternative for Group B hazardous area. Temperatures as for Groups C and D.

Canada - Hazardous Area

CSA EP. Class 1, Division 1, Groups C and D hazardous areas:
Canadian Standard Association - Explosionproof.
Temperature -30°C to +70°C (-22°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).
*Alternative for Group B hazardous area. Temperatures as for Groups C and D.

International - Non Hazardous

WT: Standard watertight, BS EN 60529 :1992, IP68, 7 metres/72 hrs.
Temperature -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

US - Non Hazardous

NEMA 4, 4X and 6:
Temperature -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

Canada - Non Hazardous

CSA WT: Canadian Standard Association -Watertight. Wiring and components complying with CSA Enclosure 4 and 4X:
Temperature -30°C to +70°C (-22°F to +158°F).
*Option -40°C to +70°C (-40°F to +158°F).
*Option -50°C to +40°C (-58°F to +104°F).

Rotork can supply actuators to national standards not listed above. For details please contact Rotork.

4.2 Valve/actuator interface

The range of IQ actuators is available with mounting base and output drive couplings conforming to international standard ISO 5210 or USA standard MSS SP-102. IQT actuators are available with mounting base and output drive couplings conforming to ISO 5211 or US standard MSS SP-101. Applications for which the various types of couplings have been designed are outlined on pages 20-22

4.3 Handwheel

Handwheels are provided to allow manual operation of the valve during electrical power interruption.

IQ10 - IQ40 Direct acting top mounted handwheel. Option: side mounted geared handwheels.

IQ70 - IQ95 Side mounted geared handwheel. Option: alternative gear ratios.

IQT all sizes. Side mounted geared handwheel.

During electric operation of the actuator the handwheel is mechanically disengaged from the drive. To engage handwheel operation, the hand/auto selection lever is depressed and released after which handwheel operation remains selected. When electrical operation takes place, the actuator will automatically return to motor drive without lever or handwheel kickback.

The hand/auto selection lever incorporates a facility for locking in the hand or auto positions using a 6mm diameter hasp padlock (not supplied by Rotork), preventing engagement of motor drive (locked in hand) or engagement of handwheel drive (locked in auto). Emergency disengagement of motor drive can be selected by depressing and holding the lever during electric operation.

4.4 Lubrication

IQ and IQT actuators are factory filled for life with premium quality gear oil specified as SAE 80/90 EP for IQ and Dextron 2 for IQT. Oil lubrication out-performs grease over the IQ temperature range -30°C to +70°C, with none of the problems associated with grease such as separation and tunneling. Rotork have used this same grade of lubricating oil for 40 years.

Lubrication options

Food grade lubricant

IQ and IQT actuators may be supplied with the gearcase filled with Hydra Lube GB Heavy food grade lubricant. This lubricant is a synthetic non-aromatic hydrocarbon mixture with PTFE and other additives. It does not contain chlorinated solvents. Grease used in assembly and thrust bearings is Hydra Lube WIG Medium-NLGI-123.

Extreme temperature service

Where actuator service requires operation outside of -30°C to +70°C alternative lubricants are available, please apply to Rotork.

4.5 Finish

All IQT and IQ actuators up to size IQ35 are finished in polyester powder coating, colour silver grey. Actuators size IQ40 and above are finished in air-dried urethane reinforced synthetic alkyd resin colour, silver grey. For full specification of paint finish see publication E151E.

Finish options

Colour: Other colours may be specified, please apply to Rotork.

Offshore: 2 pack epoxy coatings are available for extreme environmental conditions, please apply to Rotork.

5 Electrical

5.1 Power supplies

IQ and IQT actuators are suitable for operation with the following three phase, three wire power supplies:

50Hz
200, 220, 240, 380, 400, 415, 440, 480, 500, 550, 660 and 690 volts

60Hz
200, 208, 220, 230, 240, 380, 400, 440, 460, 480, 575, 590, 600, 660 and 690 volts

The required nominal operating voltage must be specified at time of order.

Actuator performance is guaranteed with a voltage tolerance +/-10% and frequency tolerance +/-5Hz. Actuators are capable of starting and running up to speed with a maximum 15% volt drop.

Uninterruptable power supplies

Standard actuators can be operated on UPS systems providing the above specified tolerances are not exceeded and waveforms, harmonics, spikes etc. adhere to recognised supply standards such as EN50160. For more information refer to publication E130E.

Power supply options

IQS and IQT single phase

Available for standard single-phase voltages:
50Hz: 110, 115, 120, 220, 230 and 240 volts
60Hz: 100, 110, 115, 120, 208, 220, 230 and 240 volts

IQD and IQT DC

Available for the following DC supplies:
IQD: 24, 48 and 110 volts
IQT: 24 volts

Non-standard voltages
Actuators can be supplied to operate on power supply voltages other than those quoted above. Please apply to Rotork.

Non standard tolerances

Where voltage and/or frequency variations may be experienced outside those quoted above, or where operation under large volt drop conditions may be required please apply to Rotork.

5.2 Control

Local control

Non-intrusive selectors are provided on the actuator electrical control cover, one for Local/Stop/Remote selection, pad-lockable in each position, and the other for Open/Close control. Controls may be rotated to suit actuator orientation.

Local control may be selected to operate using the supplied IQ Setting Tool. The Setting Tool incorporates dedicated open, stop and close buttons and will operate over a nominal distance of 0.75 metres from the display window.

Standard specification

Local control option

Vandal resistant

Selectors removed, indication window with removable cover, control of local, stop and remote selection and local open and closed control is via the supplied IQ Setting Tool.

Remote control

There are six control inputs for remote control:

Open, closed, stop/maintain.

Emergency shut down (ESD).

Open interlock and closed interlock.

Control can be connected for maintained or push to run, (inching) control.ESD signals must be derived from a stayput contact. For more information refer to publication E120E.
Control inputs are opto-isolated interfaces with a surge immunity of 2kV. Control is positive switching negative earth, internally fed from the actuator 24V DC customer supply or from external supplies within the ranges 20-60V AC or DC or 60-120V AC.

ESD can be configured off, active high or active low, to close or open the valve, with or without automatic motor thermostat bypass*. ESD will override any local or remote signals that may be active. If required ESD can be configured to override local stop, interlocks or the optional interrupter timer. The ESD input operates from a separate common allowing isolation between the ESD control system and operational control systems.

*Bypassing the motor thermostat will invalidate hazardous area certification.

Remote control can be configured so that the open signal and open interlock (or closed signal and closed interlock) can be combined to form a remote open (or closed) signal that can detect single faults. When configured, interlocks will not be active during local control. For more information refer to publication E120E.

Remote control options

Negative switching

For remote control systems where the negative pole of the remote control circuit supply is switched.

External control circuit supplies

For control with supplies in the range 60 - 125V DC and 230V AC an alternative control circuit option is available.

Analogue Proportional Control

The Rotork Folomatic proportional controller enables the actuator to automatically position a valve in proportion to an analogue current, voltage or potentiometric signal. Signal ranges: 0-5, 0-10, 0-20 or 4-20mA. 0-5, 0-10 or 0-20V.

Positioning can take place over the whole valve stroke or if required, a set portion of stroke. By incorporating a remote manual/remote auto control selector in the control scheme, proportional control can be over-ridden allowing standard remote control operation to take place when manual intervention is required (see above). The Folomatic can be configured to failsafe stayput, open or closed on loss of analogue signal.

Hydraulic shock/surge protection IQ

Where the operating time of the valve must be increased to prevent hydraulic shock or water hammer, or to prevent surges, the Rotork Interrupter Timer option can be included. Pulsed operation with independently adjustable on and off time periods in the range 1-99 seconds can be selected to operate over any portion of the closing or opening valve stroke, effectively reducing valve speed. On/Off time period range may be extended when configuration is carried out with the IQ-Insight PC tool. The interrupter timer is active for both local and remote control.

Hydraulic shock/surge protection IQT

The IQT actuator allows the output speed to be adjusted with the Setting Tool. Refer to performance summary, page 19. Speed control over 4:1 ratio is available and settable non intrusively. The IQT also includes the Interrupter Timer option (as above) for extended operating times.

5.3 Indication, monitoring and data logging

Local

A back-lit liquid crystal display gives digital indication from fully open to fully closed in 1% increments. Three LED's coloured red, green and yellow for indication of open, close and intermediate positions respectively are also provided. The display includes four icons for rapid diagnosis of valve alarm, actuator alarm, control system alarm and actuator battery status.

With the supplied IQ Setting Tool, actuator torque plus position can be displayed allowing the valve torque against position to be monitored in real time. Help screen diagnosis is available for monitoring valve, actuator and control system status. The local display can be rotated to suit actuator orientation. LED colours can be reversed. Please specify with order.

Remote

Four latching volt free contacts, S1, S2, S3 and S4 are provided each independently configurable using the supplied IQ Setting Tool to signal one of the following:

Valve Position
fully open, fully closed or intermediate positions (0-99% open).

Status
Valve opening, closing, moving (continuous or pulsing signal), Local stop selected, local selected, remote selected, open or close interlock active, ESD active.

Valve Alarms
Motor tripped on torque in mid travel, motor tripped on torque going open, going closed, pre-set torque exceeded, valve jammed, actuator being operated by handwheel.

Actuator alarms
Lost phase, customer 24V DC (120V AC) supply lost, battery low, internal failure detected, thermostat tripped.

Each contact can be configured to either 'normally open' or 'normally closed' and rated at 5mA to 5A, 120V AC, 30V DC.

Monitor relay

An independent relay with a volt-free changeover contact for monitoring actuator electrical availability.

Contact rating 5mA to 5A, 120V AC, 30V DC. The relay can be configured to de-energise under any one, or combination, of the following conditions:

Loss of one or more of the power supply phases.

Loss of control circuit supply.

Local control selected.

Local stop selected.

Motor thermostat tripped.

Data logger

The on board data logger allows infra-red, IrDA((Infra-Red Data Association) standard, download of historical actuator/valve performance data to PC or via an IrDA compatible PDA.

For hazardous areas the intrinsically safe Rotork Communicator tool is available. Rotork IQ-Insight PC software allows data logger information of operational events and statistics all time and date stamped plus valve torque/position profiles, both last operation and historical trends, all to be analyzed. For more information please refer to publication E111E.

Indication options

Remote analogue position indication: The Current Position Transmitter (CPT) provides a contact-less internally fed 4-20mA analogue signal proportional to valve position, selectable for minimum signal corresponding to fully closed or fully open position with automatic zero and span setting. An externally powered version of the CPT is also available.

Remote analogue torque indication

The Current Torque Transmitter (CTT) provides an internally fed 4-20mA analogue signal proportional to actuator output torque 0-100%rated.

Extra indication contacts*

The extra indication contacts module provides an additional four change-over contacts, S5, S6, S7 and S8. Each contact is latching, volt free and rated at 5mA to 5A, 120V AC, 30V DC. The extra indication contact functions are independently configurable in the same way as the standard contacts using the supplied IQ Setting Tool. The extra indication contact functions available are shown below:

- Valve position:
  Fully open, fully closed or intermediate positions (0-99% open)

Standard specification

- Status:
  Valve opening, closing, moving (continuous or pulsing signal), local stop selected, local selected, remote selected, open or close interlock active, ESD active
- Valve alarms:
  Motor tripped on torque in mid travel, motor tripped on torque going open, going closed, pre-set torque exceeded, valve jammed, actuator being operated by handwheel
- Actuator alarms:
  Lost phase, customer 24V DC (120V AC) supply lost, battery low, internal failure detected, thermostat tripped

*not available with IQD.

5.4 Fieldbus system control

Pakscan

An internally mounted Pakscan field unit for remote control and status indication over a fault tolerant two-wire serial link. Loop distances of up to 20 km without repeaters and host communications using Modbus protocol. System variables programmable over the infra-red data link. For more information please refer to publication SOOOE.

Modbus

Modbus modules suitable for single or dual communication highways may be included in the IQ and IQT actuator to provide fieldbus communication of all the actuator control functions and feedback data. The fieldbus information is carried on an RS485 data highway and the communications protocol used is Modbus RTU. System variables such as unit address and data baud rate are programmed over the infra-red data link. For more information please refer to Rotork.

Profibus

A Profibus DP interface module is available to allow the actuator to be integrated into a Profibus network. Full compatibility with EN 50170 is provided and the Profibus network allows full actuator control and feedback of data to the host. For more information please refer to publication S113E.

Foundation Fieldbus

An IEC 61158-2 compliant Foundation interface module allows the actuator to be connected to a Foundation network. The device has link scheduler capability as well as digital and analogue function block capability. Foundation Fieldbus actuators can communicate directly between themselves without the need of a host supervisory system. For more information please refer to Rotork.

DeviceNet

The ODVA certified DeviceNet interface module, with full status data feedback and actuator digital and analogue control, connects directly to the popular DeviceNet data highway. Data feedback includes both torque and high accuracy position information while the inbuilt positioner allows for full modulating control. Up to 63 IQ actuators can be connected on a single DeviceNet highway. For further information refer to publication S116E.

5.5 Protection

The IQ control system incorporates the following valve, actuator and control protection:

Obstructed valve (torque trip) protection.

Lost phase protection plus automatic phase rotation correction by Syncrophase.

Jammed valve protection.

Motor thermostat protection.

Internal fault protection - ASTD (automatic self test & diagnosis).

Actuator control circuit supply protection.

Instantaneous reversal protection.

Control signal fault protection (configurable).

5.6 Actuator set-up

All actuator settings may be configured using the supplied IQ Setting Tool over the infra-red interface without the removal of any covers. Setup can take place with main power on or power off, during which power is provided by the actuator battery. Each IQ actuator includes a comprehensive installation and maintenance manual providing information on site commissioning and adjustment. An actuator wiring diagram is also included. As an option Rotork IQ-Insight software for PC allows configuration of actuator settings. For Bus control system options, tools are available allowing configuration testing over the serial interface as well as by Setting Tool or IQ-Insight software for PC.

6 Actuator components

6.1 Motor

IQ 3 phase

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 that permitted for Class B insulation at standard nominal voltage. Actuator rated up to 60 starts per hour at a rate not exceeding 600 starts per hour. Burnout protection by embedded thermostat, with facility for bypassing under emergency shutdown control. For details of motor performance and use of uninterruptable power supplies please refer to publication E130E.

Motor options

Modulating

When a higher number of starts per hour are required (up to 1200 starts per hour) IQM/IQTM and IQTFM have been specifically designed for these duties. For further details please refer to IQM/IQTM publication E410E.

IQS Single Phase

Capacitor start/run squirrel cage induction motor. IQDC: Permanent magnet, low inertia design.

IQD Direct Current

Permanent magnet, DC motor incorporating thermostatic protection.

IQT

24V DC permanent magnet, low inertia motor. The IQT motor has a proven 20 year record in valve actuators.

6.2 Power module

IQ

The power module incorporates a mechanically and electronically interlocked reversing contactor starter*. The control supply transformer, fed from two phases of the incoming power supply, provides internal control circuit supplies and an isolated, nominal 24V DC customer supply rated at 5W for actuator fed remote control circuits. The Rotork Syncrophase circuit incorporates phase rotation correction and lost phase protection.

Option - Control circuit supply

Nominal 110V AC supply, rated at 20VA (not available with IQD).

*Single Phase and IQM modulating units utilise a solid state motor starter.

IQT

The IQT power module consists of a torroid power transformer with a fast acting micro controller based, intelligent switch mode motor drive. Customer remote control supply is an isolated 24V DC rated at 5W or an optional nominal 110V AC supply rated at 20VA.

6.3 Control module

IQ and IQT

Incorporating a single integrated circuit, hard-wired logic control for the actuator together with infra-red (IrDA) interface for external non-intrusive settings and interrogation by IQ-Insight configuration and data logger viewer PC tool. On board data logger records operational data, valve torque/position profiles and statistical information, all time and date stamped.

6.4 Torque and position control

IQ

Position and torque are adjustable as follows:

Position setting range:
2.5 to 100,000 turns, with a maximum angular resolution to 7.5° of actuator output center column.

IQT

Torque setting:
40% to 100% rated torque. Torque sensing is derived from drive current sensing and digital filtering.

Position setting range:
Limits are factory set to 90° stop bolt positions (nominal). Limit setting range: 10° to 1800°. Maximum angular resolution to 0.1°.

The IQT actuator speed range can be configured with the IQ Setting Tool.

Output torque for the IQ, is obtained via the direct measurement of wormshaft thrust reaction under load and is independent of voltage, frequency and temperature fluctuations.

For the IQT the output torque is measured using the motor current. Torque off during unseating or during starting/reversing in mid travel against high inertia loads can be inhibited. The jammed valve protection circuit de-energizes the motor if no movement occurs after a few seconds from receipt of a signal to open or close.

When power to the actuator is isolated, all settings are retained in an EEPROM. In the event of manual operation of the valve during isolation or loss of the power supply a battery provides power to the internal position-monitoring transmitter to update the valve position data in the EEPROM. The battery also drives the LCD display, without backlighting, and the four latching contacts S1-S4 while the power to the actuator is not available. Based on a typical application the minimum battery life is 5 years. Infra-red setting is also available with main power off.

6.5 Conduit entries, terminals and wiring

IQ actuators

Three threaded conduit entries are provided tapped: 1 x 1½ and 2 x 1" ASA NPT.

Unless otherwise specified, actuator will be dispatched with adapters: 1 x M40 and 2 x M25 metric to BS3643, "Ex" certified or as an alternative, 1 x PG29 and 2 x PG16.

It is the responsibility of the installer to ensure the appropriate cable/conduit adapters and blanking plugs are fitted, in order to maintain hazardous area certification and ingress protection levels. Certified adapters and blanking plugs are available as optional extras.

If specified with order, a fourth conduit entry can be provided tapped 1" ASA NPT with adapter to M25 or as an alternative PG16.

IQT actuators

Standard cable entries 2 off M25. Additional 2 off M25 entries available as option. Adaptors for M20, NPT 1", 1¼", 1½" option.

Separately sealed compartment containing segregated metric thread M5 power and M4 control terminals. Terminal screws and washers are supplied with the actuator. The terminal box cover carries a terminal identification code card. An Installation and Maintenance manual (E170E2) and wiring diagram are enclosed with each actuator.

Jig built harnesses of individually numbered stranded conductors, tropical grade PVC insulated, connect internal components to the sealed terminal block. All internal control connections to the printed circuit boards are via plugs and sockets.

7 Design specification

7.1 Design life

For isolating duty, torque ratings of IQ actuators are based on a minimum maintenance free life of 10,000 open/close/open cycles with rated seating torque at stroke end and an average of 1/3 rated seating torque during stroke. For modulating duty during stroke please refer to IQM Range, publication E410E.

Life tests

Standard IQ life test is based on 10,000 open/close/open cycles (500,000 output turns) with maximum seating torque at stroke end and an average of 1/3 max. seating torque during stroke. Actuators are stalled against a solid object 25 times to prove durability.

Standard IQT life test is based on 25,000 open/close/open cycles at 75% rated torque rising to 100% at each end of travel.

7.2 Frequency of operation

IQ actuators are suitable for valve duty up to 60 starts per hour.

IQM/IQTM Modulating service: up to 1200 starts per hour.

IQ Single Phase: up to 60 starts per hour.

IQDC: up to 60 starts per hour.

7.3 Operating temperature

Actuators are suitable for operation for ambient temperatures in the range -30°C to +70°C. Please note - Hazardous Area certification defines the temperature operating range to maintain certification. Refer to 4.1.

For temperatures outside this range please apply to Rotork.

7.4 Vibration

Standard IQ and IQT Range actuators are suitable for applications where vibration severity does not exceed the following:

Plant induced: Where the cumulative level of all vibration within the frequency range of 10 to 1000Hz is less than 1g rms.

Shock: 5g peak acceleration.

Seismic: Frequency range 1 to 50Hz, 2g acceleration if it is to operate during and after the event. 5g 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 via extension shafting incorporating vibration absorbing couplings may provide a satisfactory solution.

7.5 Safety integrity

Electromagnetic compatibility directive (EMC)

Actuators conform to the requirements of the European Economic Community EMC Directive 89/336/EEC as amended by 92/31/EEC. Contact Rotork for a copy of our Declaration of Conformity.

Low voltage directive (LV)

Actuators conform to the requirements of the European Economic Community Low Voltage Directive 73/23/EEC amended by 93/68/EEC by the application of EN 60204-1 1993. Contact Rotork for a copy of our Declaration of Conformity.

Machinery directive

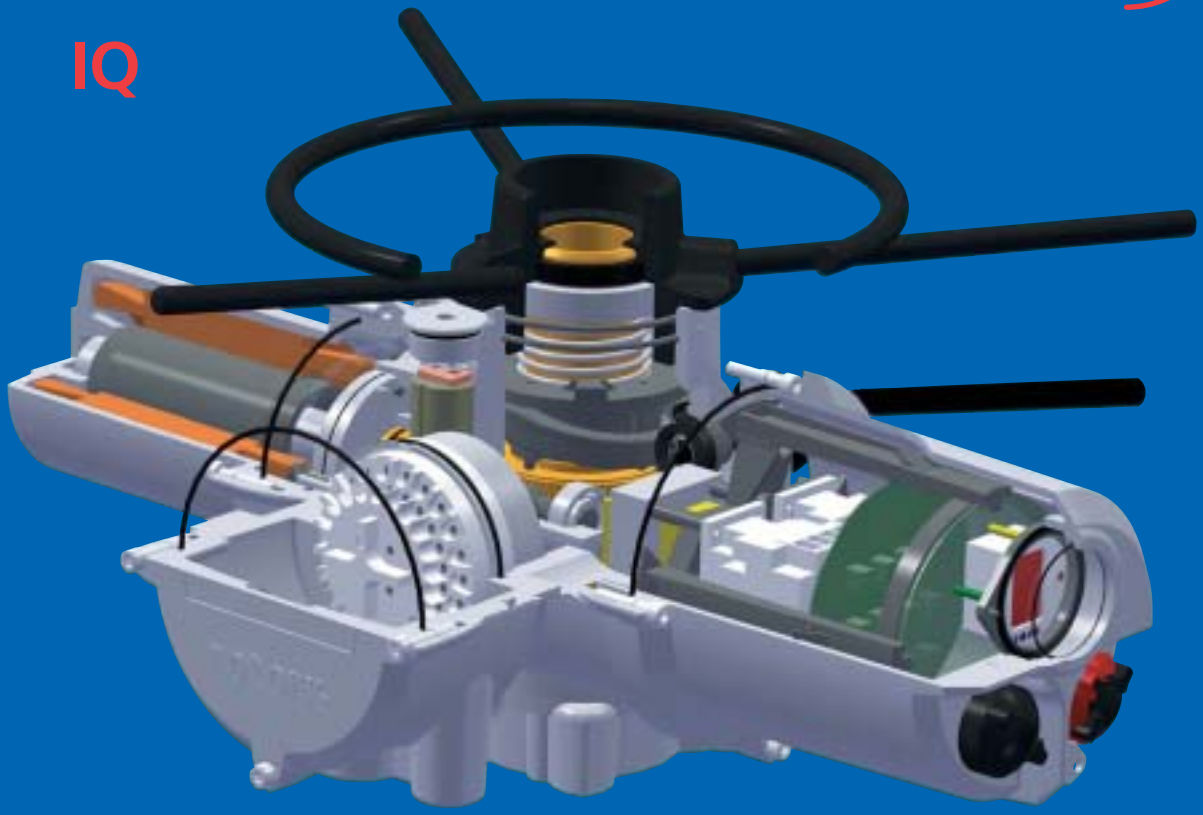
Actuators follow the provision of the Machinery Directive (89/392/EEC) as amended by 91/368/EEC and 93/44/EEC.

The IQ must not be put into service until the equipment into which it is being incorporated has been declared to be in conformity with the provisions of the European Community Machinery Directive (89/392/EEC) 91/368/EEC and 93/44/EEC. Contact Rotork for a copy of our Declaration of Incorporation.

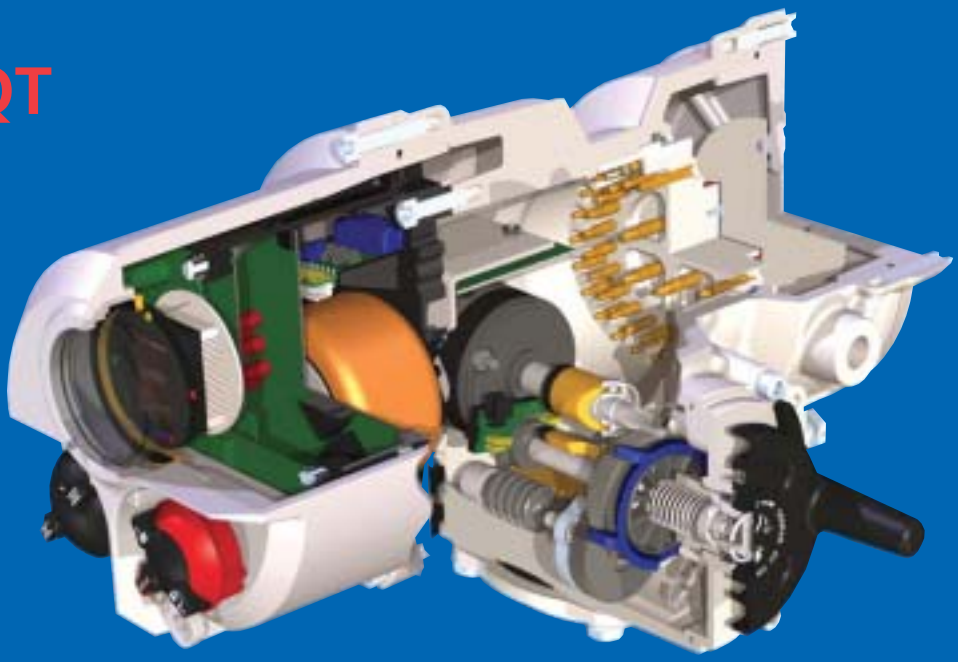
7.6 Noise

Independent tests have shown that at 1m generated noise did not exceed 61db(A).

IQ



IQT



rotork®

UK head office
Rotork Controls Limited
tel: +44 (0)1225 733200
fax: +44 (0) 1225 333467
mail@rotork.co.uk

USA head office
Rotork Controls Inc
tel: +1 585 328 1550
fax: +1 585 328 5848
info@rotork.com

Rotork Controls Ltd, Bath, UK

ISO 9001

Rotork Controls Inc, Rochester, USA

Australia
tel: +61 353 381566
fax: +61 353 381570
mail@rotork.com.au

Canada
tel: +1 403 5699455
fax: +1 403 5699414
info@rotork.ca

China (Shanghai)
tel: +86 21 64785015
fax: +86 21 64785035
crouse.shen@rotork.com.cn

China (Beijing)
tel: +86 10 64974142
fax: +86 10 64994591
simon.yang@rotork.com.cn

France
tel: +33 1 43 111550
fax: +33 1 48 354254
mail@rotork.fr

Germany
tel: +49 2103 95876
fax: +49 2103 54090
info@rotork.de

Hong Kong
tel: +852 25202390
fax: +852 2 5289746
eric.li@rotork.com.cn

India
tel: +91 44 6254219
fax: +91 44 6257108
rotork@rotork.co.in

Indonesia
tel: +62 21 580 6764
fax: +62 21 581 2757
rotork@indosat.net.id

Italy (Electrics)
tel: +39 0245 703300
fax: +39 0245 703301
rotork.italia@rotork.it

Italy (Fluid System)
tel: +39 0583 94811
fax: +39 0583 403482
fluid@fluidsystem.it

Japan
tel: +81 3 5632 2941
fax: +81 3 5632 2942
mail@rotork.co.jp

Korea (South)
tel: +82 31 2650962
fax: +82 31 2651369
ykkim@rotork.co.kr

Malaysia
tel: +60 3 7880 9198
fax: +60 3 7880 9189
rotork@rotork.com.my

Netherlands
tel: +31 10 4146911
fax: +31 10 4144750
sales@rotork.nl

Russia
tel: +7 0952292463
fax: +7 503 2349125
rotork.russia@mtu-net.ru

Saudi Arabia
tel: +966 3 833 1661
fax: +966 3 833 9369
pknair@alhugayet.com

Singapore
tel: +65 645 71233
fax: +65 645 76011
philip.seah@rotork.com.sg

South Africa
tel: +27 11 4539741
fax: +27 11 4539894
howard.mutters@rotork.co.za

Spain
tel: +34 94 6766011
fax: +34 94 6766018
rotork@rotork.es

Thailand
tel: +66 2 2727165
fax: +66 2 2727167
mail@rotork.co.th

U.K. (Electrics)
tel: +44 1225 733 200
fax: +44 1225 333 467
mail@rotork.co.uk

U.K. (Fluid System)
tel: +44 113 2057 223
fax: +44 113 2363 310
mark.thomas@fluidsystem.co.uk

USA
tel: +1 585 3281550
fax: +1 585 328 5848
info@rotork.com

Venezuela
tel: +58 212 2855232
fax: +58 212 2858050
rotorkvz@cantv.net

A full listing of our worldwide sales and service network is available on our website at **www.rotork.com**

As part of a process of on-going product development, Rotork reserves the right to amend and change specifications without prior notice. Published data may be subject to change. For the very latest version release, visit our website at www.rotork.com

The name Rotork is a registered trademark. Rotork recognizes all registered trademarks.
Published and produced in the UK by Rotork Controls Limited.