

# rotork®

Keeping the World Flowing  
for Future Generations

## IQD and IQDL Range



Electrical data – DC actuators

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Rotork is the global market leader in valve automation and flow control. Our products and services are helping organisations around the world to improve efficiency, assure safety and protect the environment.

We strive always for technical excellence, innovation and the highest quality standards in everything we do. As a result, our people and products remain at the forefront of flow control technology.

Uncompromising reliability is a feature of our entire product range, from our flagship electric actuator range through to our pneumatic, hydraulic and electro-hydraulic actuators, as well as instruments, gear boxes and valve accessories.

Rotork is committed to providing first class support to each client throughout the whole life of their plant, from initial site surveys to installation, maintenance, audits and repair. From our network of national and international offices, our engineers work around the clock to maintain our position of trust.

**Rotork. Keeping the World Flowing for Future Generations.**

# Introduction

This guide is provided to assist in the sizing of actuator power supply cables, circuit protection devices and calculation of electrical diversity. The data provided is averaged from actuators of the same size, speed and voltage as recorded from production test data. As such it is not exact electrical data for individual actuators, however is sufficient for the above sizing calculations.

Test certificates for individual actuators provide unit specific loadings for the starting/stall and rated torque levels and are available when requested.

The data included is for standard duty, DC supplies at the following common voltages only:

DC
24 V
48 V
110 V

To quickly access the data for your voltage, click the value in the table above.

## Important notes

- 'Test data not available' – insufficient test data available.
- 'Not available at this voltage' – this particular build cannot be produced due to excess current draw.

## Glossary

- **Rated torque** – the catalogued torque output of the actuator at full load. Represents a torque switch setting of 100%
- **Starting / stall** – the value during the initial start of output movement or under motor stall conditions. IQ standard protection prevents stall by limiting torque to approximately 150% of rated torque when the breakout torque feature is enabled. Stall is also limited to a maximum of 5 seconds.
- **Rated torque current** – the average current drawn when the actuator is producing the rated catalogue torque.
- **Average (nominal) torque** – corresponds to approximately one third of the rated catalogued torque. This value has been confirmed after decades of valve automation and provides a representative average for load across typical valve strokes.
- **Average (nominal) current** – the current at average nominal torque (one third rated torque).

## Design philosophy

Actuators designed for valve automation have bespoke characteristics. Unlike conventional motors, actuators are only short time duty rated. As continuous running is not a requirement with 'isolating', 'inching' and 'regulating' duty valves, actuators are rated for a standard 15 minute nominal operating time with a cyclic duration factor of 25% (S2 / S3), or Class A & B as per EN15714-2 Industrial Valves - Actuators (Part 2: Electric actuators for industrial valves - Basic requirements).

Actuator loading is not constant, it can vary from light running through to full rated and even higher when unseating 'sticky' valves. Applying traditional motor protection is flawed and can lead to spurious tripping or no protection at all.

Rotork recognises the bespoke nature of actuator design and have therefore incorporated comprehensive protection in the motor and control package.

## Motor design

Motors are designed specifically for IQD actuators and have the following features:

- Low inertia rotors
- Permanent magnet construction
- Induction windings
- TENV – Totally Enclosed Non-Ventilated
- Class F insulation
- Class B temperature rise
- Dual embedded thermostat (132 °C)
- Sealed / lubricated for life bearings
- Integral to the actuator

IQD motors meet the requirements of EN15714-2 (electric actuators) and comply with IEC60034 and NEMA MG1 where applicable. The motor torque / speed characteristic has been selected to fulfil the following requirements:

High Stall Torque in comparison with that required to operate and seat the valve. This is essential in maintaining the rated torque at reduced voltage conditions

Inclusive lost motion drive (hammerblow), allows the motor to reach full speed with maximum available torque before the drive is applied to the valve. This ensures good un-seating of all valve types unless fully jammed.

# Introduction

## Motor control protection

The primary protection device is the torque switch. By direct physical measurement of the actuator output torque versus the torque switch setting, effective motor and more importantly valve protection is achieved.

The IQD motor is also protected by two thermostats embedded in the motor providing over temperature protection if the duty exceeds the actuator rating.

Additionally, STALL protection is included in the standard control protection package.

Using torque as the primary means of protection along with thermostat and the control protection eliminates the requirement for traditional motor protection methods and their inherent weaknesses when applied to short time duty, variable load actuators.

## Power supply cable sizing

When sizing cables, it is important to use the STARTING/STALL figure in this document to make sure the voltage drop is limited to a maximum 15% of nominal voltage under full starting conditions.

## Fuse / protection selection

Due to the unique nature of the actuator duty and taking into account the comprehensive control protection of the IQD, sizing of fuses or trip devices should be based on protecting the supply cable under fault conditions.

If required, protection may be enhanced by sizing trip devices to disconnect somewhere between 5 and 10 seconds at starting/stall current. This will reduce the risk of severe motor and supply cable heating under extended stall conditions while preventing spurious trips under normal operation. It should be noted that sizing trip devices in this manner may not be possible while meeting other criteria and is purely designed to protect against extreme fault conditions such as a jammed contactor when the standard control protection cannot de-energise the motor. All other operating conditions are fully protected by the standard built-in IQD control protection.

## Motor options

Extended duty cycles are available with a higher thermostat and Class H insulation for non-hazardous area applications.

## Solar mode

For applications where the actuator is powered from a power supply of limited capacity such as solar power charged direct current UPS, power conservation is of prime importance.

The IQD includes a solar mode feature to minimise power consumption when not operating, reducing the current drawn by the actuator control to **10 mA** (maximum). Applying a remote "Open", "Close" or "ESD" control signal or a discreet "wake up" signal causes the actuator to power up its control circuits and after a delay of up to 10 seconds, respond to the remote control signal. Between three and six seconds after the control signal is removed, the actuator returns to the low current "solar" state.

As part of this routine, the actuator fed 24 VDC remote circuit supply is disabled when in solar sleep mode to save power. A discreet externally fed "wake up" signal or externally powered control signal must therefore be used to wake the actuator. Availability of the remote 24 VDC circuit supply is configurable.

Three modes of control are available:

- Standard – sleep function disabled, 24 VDC remote circuit supply available at all times.
- "Solar" – sleep function enabled, 24 VDC remote circuit supply **disabled**\* when asleep.
- "Solar Plus" – sleep function enabled, 24 VDC remote circuit supply **enabled** when asleep.

Refer to the actuator wiring diagram for solar mode configuration details.

Unless otherwise specified, the actuator will be configured in the "solar" mode of control. Remote control signals must therefore be a minimum of 10 second duration. The 2-wire remote control form is not available. For Fieldbus system control please apply to Rotork.

In local control and when "awake", the actuator will draw approximately **100 mA** (with 24 VDC power supply) from the supply in the quiescent state.

## Electrical consumption data

[Click here to return to the voltage table on p3.](#)

IQD	Mechanical Data			Electrical Data			
	Speed rpm	Rated Torque		Starting / Stall A	Rated Torque Current A	Motor Average Load	
24 VDC		Nm	lbf.ft			A	kW
10	18	34	25	50.5	19.2	7	0.21
	24	34	25	50.5	19.2	7	0.21
	36	31	23	50.5	19.2	7	0.21
	48	27	20	50.5	19.2	7	0.21

IQD	Mechanical Data			Electrical Data			
	Speed rpm	Rated Torque		Starting / Stall A	Rated Torque Current A	Motor Average Load	
48 VDC		Nm	lbf.ft			A	kW
12	18	68	50	22.4	7.5	5.1	0.2
	24	68	50	22.4	7.5	5.1	0.2
	36	61	45	22.4	7.5	5.1	0.2
	48	54	40	22.4	7.5	5.1	0.2
18	24	108	80	51	29.6	10.5	0.51

IQD	Mechanical Data			Electrical Data			
	Speed rpm	Rated Torque		Starting / Stall A	Rated Torque Current A	Motor Average Load	
110 VDC		Nm	lbf.ft			A	kW
12	18	68	50	10.9	4.7	2.3	0.2
	24	68	50	10.9	4.7	2.3	0.2
	36	61	45	10.9	4.7	2.3	0.2
	48	54	40	10.9	4.7	2.3	0.2
18	24	108	80	24	12.8	4.5	0.51
19	18	163	120	19	6.3	4.9	0.34
	24	163	120	19	6.3	4.9	0.34
	36	136	100	19	6.3	4.9	0.34
	48	108	80	19	6.3	4.9	0.34
20	18	163	120	19	6.3	4.9	0.34
	24	163	120	19	6.3	4.9	0.34
	36	136	100	19	6.3	4.9	0.34
	48	108	80	19	6.3	4.9	0.34
25	18	305	225	31.9	10.2	7	0.61
	24	305	225	31.9	10.2	7	0.61
	36	257	190	31.9	10.2	7	0.61
	48	203	150	31.9	10.2	7	0.61

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