Motor data for IQ DC actuators

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Electric Motor Performance Data for IQD New Generation Actuators - DC Power Supplies

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Introduction
This guide provides IQD motor data for standard class F, 15 minute rated actuators at the following DC supply voltages:

24V 48V 110V

Actuator performance is limited by supply voltage due to current switching limitations. Refer to motor data tables.
The IQD actuator range is generally described in publication E110E. For IQD control and monitoring refer to publication E120E

Glossary
- Rated Torque – Corresponds to 100% torque switch setting
- Locked rotor – motor starting and stalled condition
- Rated Amps – current at 100% torque switch setting
- Average (nominal) load – Corresponds to 33% of rated torque.
- Efficiency – electrical efficiency of the actuator motor.

Design criteria
Motors designed for operation of valve actuators require special consideration. As continuous running is not a requirement with isolating and “inching” or regulating duty valves, motors need only be short duty time rated. Valve load can vary dramatically across stroke and from stroke to stroke as process and valve conditions change. Varying from light running to rated torque with a facility to exceed rated in unseating “sticky” valves, actual motor loading has no constant. To apply traditional motor protection to actuator motors is therefore flawed, leading to spurious tripping or no protection at all. Rotork recognise the special nature of actuator motors and have therefore designed the IQD motor and control package with this unique duty at the forefront.

IQD Motor Design
IQD motors are of a low inertia, permanent magnet design. In its standard form they are class F insulated, rated 15 minutes at average load. The motor torque/speed characteristic has been designed to fulfill the following requirements:
- High locked rotor torque in comparison with that required to operate and seat the valve. Rotork are able to guarantee actuator performance at +/-10% of nominal voltage, however in common with all DC motors of this type, speed will vary with load and voltage.
- Low inertia, high starting torque motor combined with the lost motion drive, allows the motor to reach full speed with maximum available torque before the drive is applied to the valve, ensuring unseating for all except jammed valves.
- Maintenance free for the life of the actuator.

IQD motor protection
The primary protection for the motor is torque switch protection. By measuring the actuator output torque and comparing it to the open and close torque switch setting, the motor will be de-energised when the set torque is reached. This method provides the only comprehensive means of motor *and* valve protection.

IQD motors also incorporate over temperature protection using thermostats that will de-energise the motor if the duty cycle exceeds actuator rating. Testing has shown that using motor mounted thermostats offer better protection than traditional thermal overload relays as they respond directly to motor temperature and therefore are more closely linked to the motor thermal characteristic.

IQD control protection will prevent motor stall in the event of valve jamming *.

*If “torque switch bypass” or “Boost” open torque has been set the actuator will develop torque in excess of rated and can stall in attempting to unseat a jammed valve. If the actuator stalls, jammed valve protection will trip the motor within 4 seconds.

Power supply cable sizing
As a minimum requirement, cables must be sized to ensure volt drop does not exceed 10% of nominal supply voltage at locked rotor current.

Fuse selection
Due to the unique nature of the motor duty and taking in to account the comprehensive control protection of the IQD, sizing of fuses or trip devices should be based on protecting the power cable connected to the actuator. If required, sizing trip devices to disconnect after 5 seconds at locked rotor current may enhance protection. This will reduce the risk of severe motor heating under 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 meet extreme fault conditions such as jammed contactor when standard control protection cannot de-energise the motor. All other operating conditions will be catered for by the standard IQD control protection.

DC power systems
Rotork can supply failsafe charger/battery backup systems for use with IQD and IQT-24V DC range actuators. Please apply.

24VDC

Size	Actuator	Rated Torque		Locked Rotor Current	Rated Torque	Average (Nominal) Load		
	rpm	Nm	Ft lbf	(Cold Motor) Amps	Amps	Amps	KW	Effy. %
IQD10	18	34	25	50.5	19.2	7	0.21	72
	24	34	25	50.5	19.2	7	0.21	72
	36	31	23	50.5	19.2	7	0.21	72
	48	27	20	50.5	19.2	7	0.21	72

48VDC

Size	Actuator	Rated Torque		Locked Rotor Current	Rated Torque	Average (Nominal) Load		
	rpm	Nm	Ft lbf	(Cold Motor) Amps	Amps	Amps	KW	Effy. %
IQD10	18	34	25	24	9.6	3.5	0.21	70
	24	34	25	24	9.6	3.5	0.21	70
	36	31	23	24	9.6	3.5	0.21	70
	48	27	20	24	9.6	3.5	0.21	70
IQD12	18	68	50	48	18	6.4	0.38	75
	24	68	50	48	18	6.4	0.38	75
	36	61	45	48	18	6.4	0.38	75
	48	54	40	48	18	6.4	0.38	75
IQD18	24	108	80	51	29.6	10.5	0.51	79

110VDC

Size	Actuator	Rated Torque		Locked Rotor Current	Rated Torque	Average (Nominal) Load		
	rpm	Nm	Ft lbf	(Cold Motor) Amps	Amps	Amps	KW	Effy. %
IQD10	18	34	25	14	4.6	1.54	0.21	67
	24	34	25	14	4.6	1.54	0.21	67
	36	31	23	14	4.6	1.54	0.21	67
	48	27	20	14	4.6	1.54	0.21	67
IQD12	18	68	50	20	8.2	2.8	0.38	73
	24	68	50	20	8.2	2.8	0.38	73
	36	61	45	20	8.2	2.8	0.38	73
	48	54	40	20	8.2	2.8	0.38	73
IQD18	24	108	80	24	12.8	4.5	0.51	74
IQD20	18	163	120	36	13.9	5	0.6	69
	24	163	120	36	13.9	5	0.6	69
	36	136	100	36	13.9	5	0.6	69
	48	108	80	36	13.9	5	0.6	69
IQD25	18	305	225	68	26	7	1.1	77
	24	305	225	68	26	7	1.1	77
	36	257	190	68	26	7	1.1	77
	48	203	150	68	26	7	1.1	77