rotork®

Keeping the World Flowing

IQS and IQSL Range

Electrical Data
Single-Phase Power Supplies

Contents

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.

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 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, single-phase supplies at the following common voltages only:

50 Hz	60 Hz
110 - 120	110 - 120
220 - 240	220 - 240

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 torque switch bypass 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 IQS actuators and have the following features:

- Low inertia rotors
- Squirrel cage 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

IQS motors meet the requirements of EN15714-2 (electric actuators) and comply with IEC60034 and NEMA MG1 where applicable. The motor is designed to reach full speed within 3 cycles of the mains frequency (approximately 60 ms for 50 Hz and 50 ms for 60 Hz). 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

Pull out torque available at speed (50-70% of synchronous), which combined with the 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 verses the torque switch setting, effective motor and more importantly valve protection is achieved.

The IQS motor is also protected by two thermostats embedded in the motor winding 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 volt 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 IQS, 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 IQS control protection.

Frequency Converters and UPS

Frequency converters for variable speed drives are not normally recommended as a suitable supply for IQS actuators. Where UPS systems are required for back-up operation, the power supply should have negligible harmonic distortion and should output a true sine wave. In general terms actuators are designed to operate on power supplied conforming to recognised international standards such as EN 50160:2010. Please apply to Rotork with specific UPS supply characteristics if different from above.

Motor Options

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

Electrical Consumption Data

Click here to return to the voltage table on p3.

IQS	Mechanical Data				Electrical Data					
110 - 120 V 50 Hz	Speed	Poles	Rated Torque		Starting / Stall		Rated Torque Current	Average (nominal) Torque		
	rpm	qty	Nm	lbf.ft	A	Cos Ø	A	A	Cos Ø	kW
12	18	4	65	48	15	0.98	5.5	4.3	0.8	0.4
	24	4	60	44	15	0.98	5.5	4.3	0.8	0.4
	36	4	45	33	15	0.98	5.5	4.3	0.8	0.4
	48	4	40	30	15	0.98	5.5	4.3	0.8	0.4
	72	4	30	22	15	0.98	5.5	4.3	0.8	0.4
	96	4	25	18	15	0.98	5.5	4.3	0.8	0.4
20	18	4	165	122	41	0.95	14	10	0.6	0.72
	24	4	130	96	41	0.95	14	10	0.6	0.72
	36	4	130	96	41	0.95	14	10	0.6	0.72
	48	4	125	92	41	0.95	14	10	0.6	0.72
	72	4	100	74	41	0.95	14	10	0.6	0.72
	96	4	80	59	41	0.95	14	10	0.6	0.72
	144	4	60	44	41	0.95	14	10	0.6	0.72

IQS	Mechanical Data				Electrical Data					
220 - 240 V 50 Hz	Speed	Poles	Rated Torque		Starting / Stall		Rated Torque Current	Average (nominal) Torque		
	rpm	qty	Nm	lbf.ft	A	Cos Ø	A	A	Cos Ø	kW
12	18	4	65	48	7.5	0.97	3	2.2	0.8	0.4
	24	4	60	44	7.5	0.97	3	2.2	0.8	0.42
	36	4	45	33	7.5	0.97	3	2.2	0.8	0.42
	48	4	40	30	7.5	0.97	3	2.2	0.8	0.35
	72	4	30	22	7.5	0.97	3	2.2	0.8	0.35
	96	4	25	18	7.5	0.97	3	2.2	0.8	0.35
20	18	4	165	122	22	0.95	7.2	5.2	0.6	0.72
	24	4	130	96	22	0.95	7.2	5.2	0.6	0.72
	36	4	130	96	22	0.95	7.2	5.2	0.6	0.72
	48	4	125	92	22	0.95	7.2	5.2	0.6	0.72
	72	4	100	74	22	0.95	7.2	5.2	0.6	0.72
	96	4	80	59	22	0.95	7.2	5.2	0.6	0.72
	144	4	60	44	22	0.95	7.2	5.2	0.6	0.72
35	18	4	450	332	34	0.93	9.5	5.3	0.91	1.1
	24	4	400	295	34	0.93	9.5	5.3	0.91	1.1
	36	2	350	258	64	0.9	15.5	7	0.81	1.3
	48	2	320	236	64	0.9	15.5	7	0.81	1.3
	72	2	230	170	64	0.9	15.5	7	0.81	1.3
	96	2	190	140	64	0.9	15.5	7	0.81	1.3
	144	2	135	100	64	0.9	15.5	7	0.81	1.3

Electrical Consumption Data

Click here to return to the voltage table on p3.

IQS	Mechanical Data				Electrical Data					
110 - 120 V 60 Hz	Speed	Poles	Rated Torque		Starting / Stall		Rated Torque Current	Average (nominal) Torque		
	rpm	qty	Nm	lbf.ft	A	Cos Ø	A	A	Cos Ø	kW
12	21	4	65	48	14	0.98	7	2.5	0.91	0.26
	29	4	60	44	14	0.98	7	2.5	0.91	0.26
	43	4	45	33	14	0.98	7	2.5	0.91	0.26
	57	4	40	30	14	0.98	7	2.5	0.91	0.26
	86	4	30	22	14	0.98	7	2.5	0.91	0.26
	115	4	25	18	14	0.98	7	2.5	0.91	0.26
20	21	4	165	122	41	0.95	14	10	0.6	0.72
	29	4	130	96	41	0.95	14	10	0.6	0.72
	43	4	130	96	41	0.95	14	10	0.6	0.72
	57	4	125	92	41	0.95	14	10	0.6	0.72
	86	4	100	74	41	0.95	14	10	0.6	0.72
	115	4	80	59	41	0.95	14	10	0.6	0.72
	172	4	60	44	41	0.95	14	10	0.6	0.72

IQS	Mechanical Data				Electrical Data					
220 - 240 V 60 Hz	Speed	Poles	Rated Torque		Starting / Stall		Rated Torque Current	Average (nominal) Torque		
	rpm	qty	Nm	lbf.ft	A	Cos Ø	A	A	Cos Ø	kW
12	21	4	65	48	7.4	0.97	3.4	1.6	0.92	0.34
	29	4	60	44	7.4	0.97	3.4	1.6	0.92	0.34
	43	4	45	33	7.4	0.97	3.4	1.6	0.92	0.34
	57	4	40	30	7.4	0.97	3.4	1.6	0.92	0.34
	86	4	30	22	7.4	0.97	3.4	1.6	0.92	0.34
	115	4	25	18	7.4	0.97	3.4	1.6	0.92	0.34
20	21	4	165	122	22	0.95	7.2	5.2	0.6	0.72
	29	4	130	96	22	0.95	7.2	5.2	0.6	0.72
	43	4	130	96	22	0.95	7.2	5.2	0.6	0.72
	57	4	125	92	22	0.95	7.2	5.2	0.6	0.72
	86	4	100	74	22	0.95	7.2	5.2	0.6	0.72
	115	4	80	59	22	0.95	7.2	5.2	0.6	0.72
	172	4	60	44	22	0.95	7.2	5.2	0.6	0.72
35	21	4	450	332	30	0.9	12	7.5	0.71	1.2
	29	4	400	295	30	0.9	12	7.5	0.71	1.2
	43	2	350	258	56	0.85	19	8	0.83	1.5
	57	2	320	236	56	0.85	19	8	0.83	1.5
	86	2	230	170	56	0.85	19	8	0.83	1.5
	115	2	190	140	56	0.85	19	8	0.83	1.5
	172	2	135	100	56	0.85	19	8	0.83	1.5

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