TIANJIN FREYA AUTOMATION TECHNOLOGY CO., LTD.

Q SERIES ELECTRIC ACTUATOR

ENGINEERING CREATIVE SOLUTIONS FOR FLUID SYSTEMS

INTRODUCTION

• Q type electric valve actuators are suitable for butterfly valves, ball valves etc, which are required to turn 90°. These actuators are featured by small size, light weight, high efficiency, high reliability, high protection capability, low noise and so on. Both operation at site and remote controlling can be carried out. So they have been applied in petroleum and chemical industries, power plant, water treatment and paper-making industries.

• Freya controls designs, produces and provides high-quality actuators and services related to valve automation.

• With our many years of experience in the field of automation, we have launched the Q series of electric actuators, which are compact, rugged, reliable and can be fully integrated into complex control systems.

• We are always ready to provide you with our Q series actuators and accessories as well as quality services.

FEATURES

• Compact and robust construction, lightweight.
• Wide range of torque variation (From min 50Nm to max 5000Nm).
• Hard anodized aluminum housing inside and outside with external high temperature paint coating for use against severe industrial environment.
• Enclosure uses radial seals & O-rings that provide protection to waterproof IP67 and optional watertight lP68.
• lSO5211 standard.
• Removable drive bushing for easy machining and mounting.
• Self-locking provided by double worm gearing (no brake required).
• It automatically identifies and corrects phases. Automatic phase failure protection protects equipment safety.
• Reliable mechanical torque sensing system providing safe operation in overload condition.
• Large size window and indicator provides better position indication from a distance.
• Number of local position control options to provide easy commissioning and field operation.

PRODUCT FEATURES

Motor

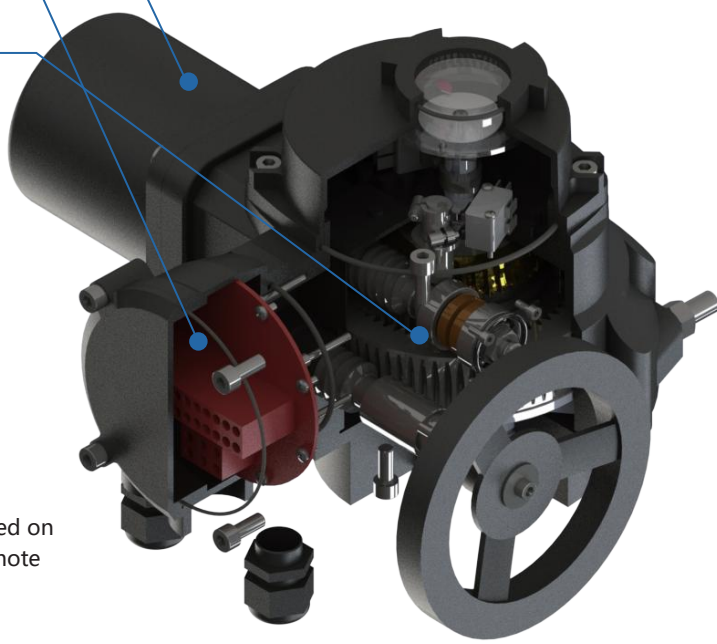
The valve-specific motor that can be disassembled independently has the characteristics of high starting torque and small inertia.

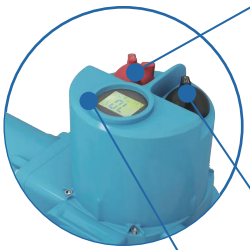
Terminal box

The independent sealed terminal cavity can ensure the sealing integrity of the electrical part of the electric actuator when performing on-site wiring, and at the same time meet the product explosion-proof requirements.

Electric operation

The motor drives the electric worm through a first-stage spur gear pair, and the worm drives the eccentric shaft to rotate through the copper worm gear combined with it. A planetary gear is installed on the eccentric shaft. Because the outer teeth of the fixed ring gear and the manual worm are self-locking structures, the planetary gear cannot make the fixed ring gear rotate. The planetary gear, the inner teeth of the fixed ring gear and the eccentric shaft form a planetary gear train, which transmits the rotation of the eccentric shaft to the output shaft with a reductionratio of about 40:1, thereby driving the valve stem to rotate. This reduction gear structure has self-locking performance, when the motor stops, the valve will be locked in place.





Selection of control mode

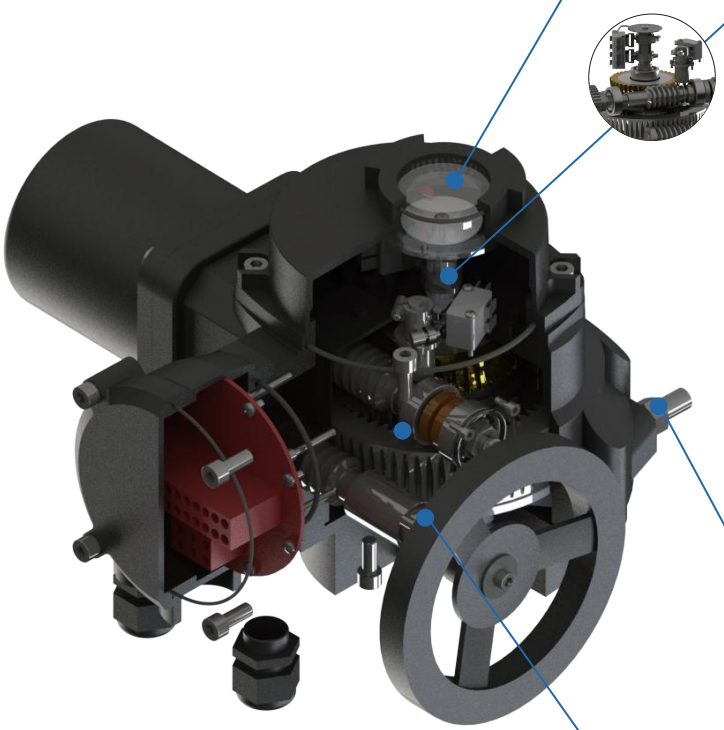
The selective switch "Remote"-"Stop"-"Local" installed on the local operating device can be used to set up remote operation (remote control) or local operation (local control) or stop mode.

Local electric operation

The operating switch “Open” - “Close” installed on the local operating device can be used to open or close actuator locally.

LCD interface

The LCD interface can display text information, graphical elements and actuator characteristics.



Observation window

The large-diameter observation window can clearly observe the real-time position of the valve.

Stroke control, torque control and opening indicating mechanism

Stroke control
The basic type adopts a cam mechanism, the cam shaft is synchronized with the output shaft and two micro switches are respectively set in the opening and closing directions.The upper end of the cam shaft is equipped with a dial to indicate the valve position.
Torque control
The electric worm is equipped with a butterfly spring group, the axial movement of the electric worm is proportional to the output torque of the output shaft, and the movement of the worm is converted into the rotation of the torque shaft through the rack and pinion structure. A cam is installed on the torque shaft, and a microswitch is provided correspondingly in the direction of opening and closing.

Mechanical limit

There is an adjustable limit screw in each direction of opening and closing. A special sealing gasket is installed on the limit screw to ensure good sealing performance of this part.

Manual operation

When the handwheel is turned, the manual worm drives the outer gear of the fixed ring gear to rotate, and the inner gear of the fixed ring gear and the planetary gear form a fixed-axis gear train to drive the output shaft to rotate. Therefore the manual and electric operation conversion of the actuators is completed through the role conversion of the static ring gear. There is no clutch, and there is no need to switch the handle to achieve fully automatic switching.

STANDARD SPECIFICATION

Protection grade	Standard IP65/IP67 Special IP68
Power supply	Three-phase AC380V---460V 50/60Hz Single-phase: AC110V-AC220V DC24V AC24V 50/60Hz
Duty cycle(on-off)	Short 10 minutes (special order 30 minutes)
Duty cycle(modulating)	Short 10 minutes (special order 30 minutes)
Motor	Squirrel cage induction motor
Limit switches	2 each for open and close (SPDT 250VAC/16A rating)
Torque switches	1 each for open and close (SPDT 250VAC/16A rating)
Jam protection	Build-in overheat protection
Travel angle	90°
Position indicator	Continuous mechanical indicator with arrow
Self locking	Provided by double worm gearing (no brake)
Mechanical stopper	1 each for each travel end (open and close), external & adjustable
Ambient temperature	Standard: -20～+60℃ Optional: -40～+80℃
Ambient humidity	90%RH max (Non-condensing)
External coating	High temperature paint
Explosion-proof grade	ExdbIIBT4Gb (IECEx/ATEx)
Functions	LCD Chinese / English display window and local operation function Self phase sequence identifying and phase disconnection protection Infrared setting and control Fault self-diagnosis technology Modbus, Profidbus DP, Hart
Signal	A: Remote passive dry contact, signal short pulse (Inching). B: Remote passive dry contact, signal long pulse (hold). C: Active DC24V signal. D: Active AC220V signal. E: Remote DC4-20mA signal.
Feedback signal	A: Open, close, stop signals (passive dry contact). B: Fault signal (passive dry contact). C: Valve position signal (DC4-20mA, DC1-5V, DC0-10V) D: Remote control signal (passive dry contact)

OPTIONS AVAILABLE

Mechnical

Symbol	Description	Remark
EX	Explosion proof (Ex d II B T4)	Approved by ATEX
WT	Watertight (IP67), temporary submersible	
ALS	Auxiliary limit switches	
ATS	Auxiliary torque switches	
EXT	Extended travel angle	
SV	Variation in torque and operating speed	Please consult before ordering

Remote monitoring and control

PK	Potentiometer kit (output signal: 0 – 1 KΩ) High resolution potentiometer and precisely machined gearing are directly engaged with drive shaft to feedback Continuous position of valve
CT	Current transmitter (output signal: 4-20mA)
Signal Confguration	Remote position controller (input and output signal) Input: 4-20mA, 0-10VDC, 2-10VDC, 1-5VDC, 0-5VDC Output: 4-20mA Option: 0-10VDC, 2-10VDC, 1-5VDC, 0-5VDC Auto-calibration Reverse operating direction

MODEL COMPILATION METHOD

FRY – □ – □ □ □ – □ □

- Shell: W for standard type, B for explosion-proof type.
- Power supply: 1 for AC380V 50Hz, 2 for AC220V 50Hz. 3 for special power supply voltage (please contact us if you have special requirements).
- It represents actuator output torque (digit x 10)
- Electric actuator type
- FRY series electric actuator

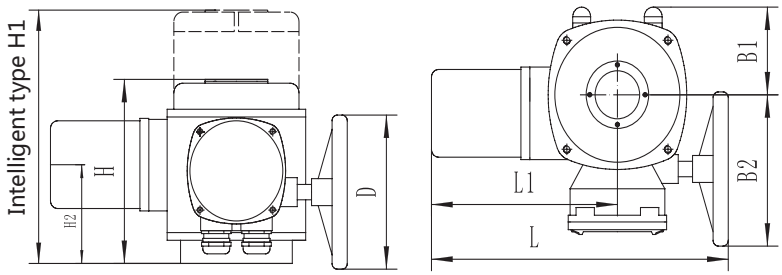
TECHNICAL PARAMETERS

Model	Torque (N·m)	Max. stem diameter (mm)	Manual ratio	Output speed (r/min)	AC380V		AC220V		Reference weight (KG)	
					Power (KW)	Current (A)	Power (KW)	Current (A)	Direct mounted	Foot-plate mounted
FRY-Q-005	50	19	60:1	0.5	0.045	0.35	0.06	0.7	8.5	16
FRY-Q-010	100	19	60:1	0.5	0.06	0.5	0.09	1.0	9	17
FRY-Q-015	100	28	90:1	0.5	0.06	0.5	0.09	1.0	17	25
FRY-Q-020	200	28	90:1	0.5	0.09	0.7	0.12	1.5	17	25
FRY-Q-030	300	28	90:1	0.5	0.12	0.8	0.15	2.0	17	25
FRY-Q-040	400	28	90:1	0.5	0.15	0.9	0.18	2.5	18	26
FRY-Q-060	600	38	87:1	0.5	0.18	1.0	0.25	3.0	25	41
FRY-Q-090	900	38	87:1	0.5	0.25	1.5	0.37	4.0	26	50
FRY-Q-120	1200	38	87:1	0.5	0.25	1.5	0.37	4.0	27	51
FRY-Q-180	1800	38	87:1	0.5	0.37	2.0	0.55	5.0	28	67
FRY-Q-300	3000	55	348:1	0.5	0.37	2.0	0.55	5.0	39	77
FRY-Q-400	4000	55	348:1	0.5	0.55	3.0	0.75	7.0	40	78
FRY-Q-500	5000	55	348:1	0.5	0.55	3.0	0.75	7.0	41	82

Note : 1. Under the rated voltage, the ratio of the jam current to the rated current of the motor is 7, and the tolerance is +20% of the guaranteed value

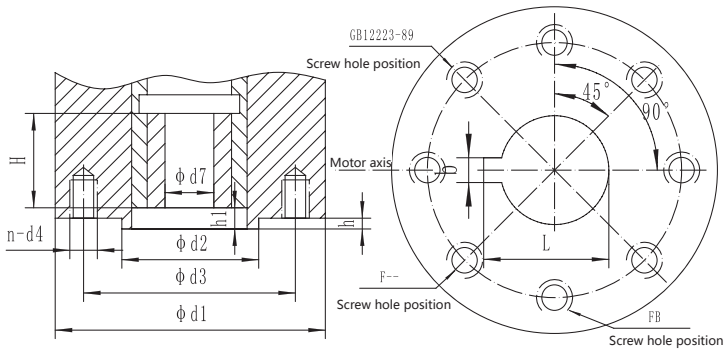
2. If there are special requirements, the company can provide other speeds: 0.25/1/2/3/4 (r/min), etc.

DIMENSIONS



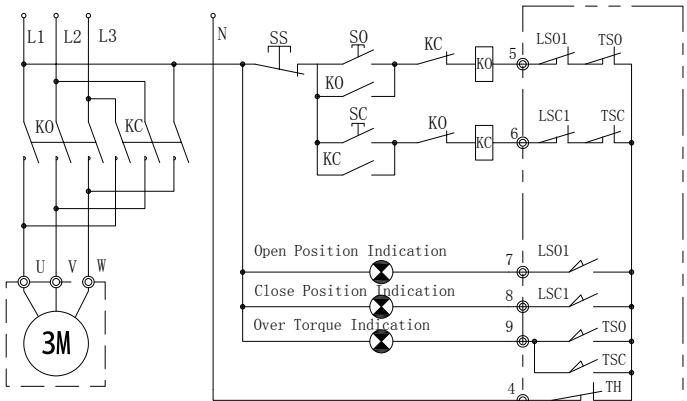
Model	B1	B2	H	H1	H2	L	L1	D
FRY-Q-005/015	68	114	156	270	73	250	157	140
FRY-Q-020/040	91	157	191	273	103	332	208	160
FRY-Q-060/180	143	203	227	309	126	424	232	250
FRY-Q-300/800	143	203	291	373	190	424	232	250

CONNECTION DIMENSIONS

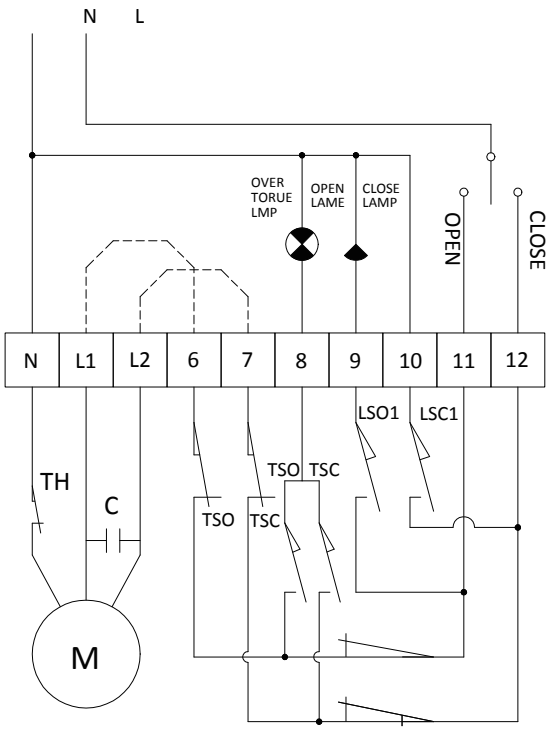


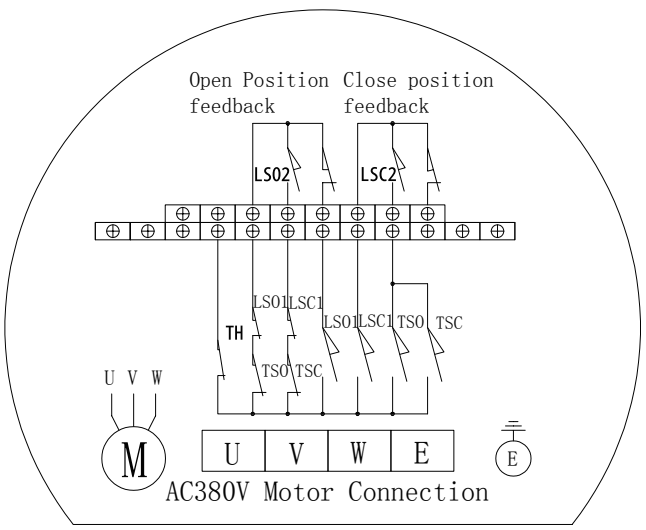
Model	Flange model		d1	d2	d3	n-d4	D7		H	h	h1
							Reserved	Max.			
FRY-Q-005		FB1	77		57	4-M6	12.7	12.7	35		
FRY-Q-010		FB1	77		57	4-M6	15.9	15.9	35		
	F05		65	35	50	4-M6	8	18	35	3	2
FRY-Q-015		FB2	92		70	4-M8	19	19	42		
FRY-Q-020	F07		90	55	70	4-M8	12	28	42	3	2
FRY-Q-030		FB3	115		89	4-M12	22.2	22.2	42		
FRY-Q-040	F10		125	70	102	4-M10	12	28	42	3	2
FRY-Q-060		FB3	115		89	4-M12	28.6	28.6	50		
	F10		125	70	102	4-M10	15	38	50	3	2
FRY-Q-120		FB4	140		108	4-M12	31.7	31.7	50		
	F12		150	85	125	4-M12	15	38	50	3	2
FRY-Q-120		FB5	197		159	4-M16	33.3	33.3	60		
FRY-Q-180	F14		175	100	140	4-M16	20	38	60	3	3
FRY-Q-180		FB5	197		159	4-M16	41.3	41.3	90		
FRY-Q-300 FRY-Q-500	F16		210	130	165	4-M20	20	60	90	3	3

WIRING DIAGRAM



LSC1 Close Limit Switch
TSC Close Limit Switch
TSO Open Torque Switch
LSO1 Open Torque Switch





INSTALLATION, DISASSEMBLY AND PRECAUTIONS

1) There is no principle requirement for the installation form of this electric device, but the recommended installation form is that the motor is in a horizontal state and the electrical box cover is in a horizontal or vertical upward state, which is conducive to lubrication, debugging, maintenance and manual operation;
2) During installation, the space required for maintenance and inspection personnel to disassemble each component should be ensured;
3) The bolts connected to the valve shall not be lower than grade 8.8;
4) When disassembly is required, the manual handwheel should be rotated several times first, with the valve slightly open;
5) During installation, disassembly and commissioning, the sealing surface, seals and explosion-proof surface of explosion-proof electrical equipment must not be damaged, and anti-rust oil should be applied to the explosion-proof surface. The electrical cover should be tightly closed to prevent rain or moisture from entering;
6) The window must not collide with the hard objects.
7) This electric device is a short-time working cycle and the continuous working time shall not exceed the nameplate calibration time;
8) When the valve is not used frequently, it should be inspected, maintained and operated regularly. It is recommended to run it at least once a month and the running time shall not exceed 10 minutes. .

FAULTS AND SOLUTIONS

No.	Faults	Reasons	Solutions
1	Motor does not start.	1. Power cord disconnected. 2. Control circuit failure. 3. The stroke or torque control mechanism fails.	1. Check the power cord. 2. Eliminate line faults. 3. Eliminate stroke or torque control mecha-nism faults.
2	The direction of rotation of the output shaft does not comply with the regulations.	The phase sequence of the power supply is reversed.	Swap any two power cords.
3	Motor overheating.	1. Continuous working time is too long. 2. Single phase line is disconected.	1. Stop running and let the motor cool down. 2. Check the power cord.
4	The motor stops during operation.	1. The valve is faulty. 2. The electric actuator is overloaded, and the torque control mechanism operates.	1. Check the valve. 2. Increase the set torque.
5	After the valve is in position, the motor keeps turning or the light is not on.	1. The stroke or torque control mechanism is faulty. 2. Improper adjustment of stroke control mechanism.	1. Check stroke or torque control mecha-nism. 2 Readjust stroke control mechanism.
6	No remote valve position signal.	1. The potentiometer gear set screw is loose. 2. Remote potentiometer failure.	1. Tighten the potentiometer gear set screw. 2. Check and replace the potentiometer.

ELECTRIC VALVE ACTUATOR Q SERIES ORDERING INFORMATION

Electric Actuator

Series	
XX	
Q	Eletric

Actuator size	
XX	
005	5
010	10
015	15
020	20
030	30
040	40
060	60
090	90
120	120
180	180
300	300
400	400
500	500

Power	
XX	
024	24
048	48
220	220
380	380
460	460

Voltage	
XX	
VAC	AC
VDC	DC

Phase	
X	
1	Single Phase
3	Three Phase

Name	
X	
EX	Exp. Proof
WT	IP67

Electric Actuator Ordering Examples
Example Part #: Q-05-220VAC (Standard)
Example Part #: Q-05-380VAC-EX (Explosion Proof)
Example Part #: Q-05-460VAC-3 (460 volt 3 phase unit)

Standard Product

Special Order Product

TIANJIN FREYA AUTOMATION TECHNOLOGY CO., LTD.

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