



Features

- Self-contained electrically operated with internal low-pressure electro-hydraulic control module.
- Spring-return for failsafe open, close or lock-in-last position.
- Single-phase, three-phase and 24 VDC power supply options.
- Non-intrusive commissioning and configuration via our hand-held infrared setting tool.
- Local LCD display provides position and internal pressure indication as well as and fault diagnostics.
- Local controls include a lockable Local / Stop / Remote selector and an Open / Close switch.
- Modulating control via 4-20 mA input/output with a resolution < 0.2°.
- Digital control with ESD and partial stroke capabilities.
- Output relays for monitoring, fault alarms and open/close limits.
- Optional fieldbus communications via all common protocols.
- Watertight and explosionproof.
- Double-sealed control module with separate terminal and cable gland compartments.
- Spring-return speeds: single, dual or ESD combination valve options.

“Intelligent” Electro-hydraulic Quarter-turn Valve Actuator

The SI-Q are compact and robust electrically operated failsafe spring-return, quarter-turn actuators for two-position, ESD or modulating applications. They feature the Rotork double-seal system with separate termination and cable gland compartments, are suitable for all types of quarter-turn valves and are supplied with a mounting flange to ISO 5211. The quarter-turn range is divided into two groups: SI-1Q with end torque ranging from 65 to 480 Nm (575 to 4,248 lbf-in), and SI-2Q / SI2.1Q with end torque ranging from 380 to 4,400 Nm (3,360 to 39,000 lbf-in).

SI-2Q actuators are watertight and dusttight to IP67 / NEMA 6 with the option of IP68 and are also available certified explosionproof for hazardous area gas group IIB applications.

Consisting of a self-contained electro-hydraulic control module and scotch yoke spring-return drive, the actuators combine the simplicity of electrical operation with the precision of hydraulic control and the reliability of spring-powered fail-safe action. The spring-return mechanism provides the most reliable means of positioning a valve to the safe condition and can be provided as failsafe close, open, or last position on loss of power or signal failure. They are available with either a clockwise or anticlockwise spring stroke.

For modulating control applications, the control module provides a pulsed hydraulic signal to accurately position the spring-opposed cylinder, resulting in accurate positioning with a resolution better than 0.2°.

The actuators can be configured to accept analogue, digital, or network card input and can be programmed with the Rotork infrared setting tool. A wide range of functions can be set with the tool: zero and span limits, deadband, hysteresis, slow band, and partial stroke position are easily adjusted. Optional internal fieldbus communication boards are available for Rotork Pakscan, DeviceNet, Profibus, Foundation Fieldbus and Modbus digital control systems.

Lockable local controls are provided as standard and, for safety critical applications, the local selection can be overridden –proper actuator configuration required. Electro-mechanical end-of-stroke limit switches are also offered for safety critical applications.

A manual override gearbox is available on all sizes.

SI-2Q Specification

Ordering Information and Model Code

ACTUATOR SELECTION		SI-2-Q110	0	0	2	1	0	0	0	A	A
Table 1	Actuator Size										
Table 2	Failure Mode										
Table 3	Return Speed Options										
Table 4	Supply Voltage										
Table 5	Control Option										
Table 6	Certification										
Table 7	Cable Entries										
Table 8	Hydraulic Fluid / Operating Temperature										
Table 9	Mounting										
Table 10	Accessories										

Table 1 – Actuator Size

Code		Torque Nm (lbs-in)						Stroke Speed (Seconds)			
Spring-Return Direction		Hydraulic Stroke			Spring-Return			Hydraulic	Spring-Return (See table 3 & note 2)		
Clockwise	Anti-Clockwise	Start	Mid	End	Start	Mid	End		A	B	C
SI-2-Q60	SI-2-QA60	720 (6370)	360 (3185)	500 (4425)	500 (4425)	260 (2300)	380 (3363)	14	14	10	8
SI-2-Q61	SI-2-QA61	620 (5487)	300 (2655)	350 (3095)	630 (5575)	340 (3009)	480 (4248)	14	14	10	8
SI-2-Q70	SI-2-QA70	1650 (14602)	718 (6354)	885 (7832)	1160 (10266)	570 (5044)	800 (7080)	30	30	20	12
SI-2-Q80	SI-2-QA80	3350 (29647)	1450 (12832)	1780 (15753)	2350 (20797)	1150 (10177)	1605 (14204)	55	55	45	25
SI-2-Q110	SI-2-QA110	4383 (38790)	2160 (19116)	2807 (24842)	3820 (33807)	1892 (16744)	2381 (21072)	70	70	58	20
SI-2-Q111	SI-2-QA111	6428 (56888)	3290 (29116)	4544 (40214)	5033 (44542)	2527 (22364)	3255 (28807)	110	110	90	28
SI-2-Q112	SI-2-QA112	5264 (46586)	2447 (21656)	2852 (25240)	6433 (56932)	3301 (29214)	4407 (39002)	110	110	90	28

Table 2 – Failure Mode

Code	Description
0	Fail-safe on loss of power supply (in direction of spring).
1	Fail in position on loss of power supply.

Table 3 – Spring-Return Speed & ESD Options

Code	Description
0	Speed A – Single internal solenoid.
1	Speed B – Dual internal solenoid.
2	Speed C – Single internal & external solenoid (note 4)
3	Speed D – Slow acting internal solenoid, consult sales office.
5	Speed E – Quick acting spring return, consult sales office. (note 6)
6	Speed A – Hardwired single internal solenoid (note 5).
7	Speed C – Hardwired single internal & external solenoid (note 4 & 5).
8	Speed B – Hardwired dual internal solenoids, no partial stroke (note 5).

Table 4 – Supply Voltage

Code	Description
0	1-phase 115 VAC $\pm$ 10% 50/60 Hz.
1	1-phase 230 VAC $\pm$ 10% 50/60 Hz.
2	24 VDC $\pm$ 10%.
3	3-phase 380-480 VAC $\pm$ 10% 50/60 Hz

Table 5 – Control

Code	Description
0	Standard digital control (open/closed/partial stroke).
1	Analogue control 4-20 mA or 0-10 VDC (note 3).
2	Pakscan.
4	Modbus single-channel.
5	Modbus dual-channel.
6	Profibus dual-channel.
7	DeviceNet.
8	Foundation Fieldbus.
9	Profibus single channel.

GENERAL NOTES:

- Select one option from each table except table 10 which has multiple options.
- Stroke speed is typical for all actuators with no load at 20 °C $\pm$ 10%.
- All actuators are available with 4-20 or 20-4 mA output, powered internally by an isolated 24 VDC supply or external customer supply.
- Watertight to IP68 is only available on SI-2Q60 to 80 models and is not available with external solenoid options (table 3 code 2 & 7).
- For hardwired 24 VDC ESD option, on loss of supply voltage actuator will fail in position and on loss of ESD signal will fail safe.
- Spring return stroke speed C can be reduce by 50% on 115 & 230 VAC models. Consult the sales office for details.
- External solenoid option FM & CSA certified available to -20 °C only.



Table 6 – Certification

Code	Description
0	WT: Watertight IP67.
1	ATEX: Hazardous area Gas group IIB (IP67).
2	IEC: Hazardous area Gas group IIB (IP67).
3	FM: Hazardous area Gas group IIB (IP67).
4	CSA: Hazardous area Gas group IIB (IP67).
5	GOST: Hazardous area Gas Group IIB.

Table 7 – Cable Entries

Code	Description
0	M25 x 1.5P
1	M20 x 1.5P
2	1/2" NPT adaptors
3	3/4" NPT adaptors
4	1" NPT adaptors

Table 8 – Hydraulic Fluid/Operating Temperature

Code	Description
0	Mineral fluid -15 to +60 °C.
3	Food grade fluid -10 to +60 °C.
4	Silicone fluid -30 to +60 °C (note 7).
5	Silicone fluid / low temperature seals -40 to +60 °C (note 7).

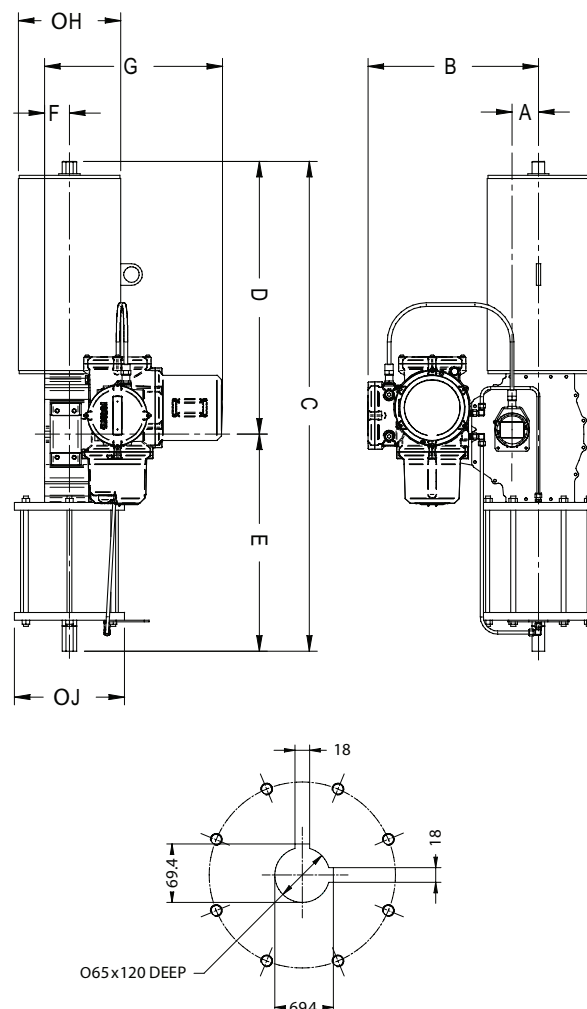
Table 9 – Mounting

Code	Description
A	Vertical stem above valve.
B	Vertical stem below valve.
C1	Valve stem & pipeline horizontal.
C2	Valve stem horizontal, pipeline vertical.
D	Vertical stem above valve with valve mounting kit.
E	Vertical stem below valve with valve mounting kit.
F1	Valve stem & pipeline horizontal with valve mounting kit.
F2	Valve stem horizontal, pipeline vertical with valve mounting kit.

Table 10 – Accessories

Code	Description
A	None.
B	Manual override hydraulic hand pump.
C	Manual override (gearbox standard IP65).
D	WT - Watertight IP68 (7m for 72 hours).
F	Two additional volt-free SPDT limit switches (four total).
G	Hardware ESD configuration (failsafe actuators only).
H	All cable entries plugged.
J	Viton seals.

SI-2-Q110 to Q112 Dimension & Mounting Details



DIMENSIONS (mm)	ACTUATOR CODE		
	Q110	Q111	Q112
A	85	85	85
B	440	440	440
B*	524	524	524
C	1580	1615	1715
D	880	895	995
E	700	720	720
F	80	80	80
G	569	569	569
H	325	325	410
J	355	415	415
ØV	254	254	254
W	M16 x 15	M16 x 15	M16 x 15
Weight (kg)	335	365	465

NOTE: For 3-phase units use "B*" instead of "B".



Certification

ATEX- II 2G EEx de* IIB T4 (T_{amb} -40 to +60 °C)

EN60079-0, EN60079-1, EN60079-7, EN13463-1.

IEC Ex - Ex de* IIB T4 (T_{amb} -40 to +60 °C)

IEC60079 – 0:2004, 60079 -1:
2003 & 60079 -7:2001.

FM - Class I, Zone1 AEx de* IIB T4 (Ta -40 to +60 °C)

CSA – Ex de* IIB T4, - 40 °C ≤ Ta ≤ 60 °C

Product Class 2258 02 (approval apply to the power module – Full actuator assembly will be subject to CSA inspection). * 'e' increased safety available on single phase & DC supply voltage only.

Note: Certification temperatures are not operating temperatures.

Setting Tool: ATEX, EEx ia IIC T4 (intrinsically safe)

FM, INT SAFE Class I, Div 1 Groups A, B, C, D.
CSA, Ex ia, INT SAFE, Class I, Div 1 Groups A, B, C, D.
INMETRO, BR-Ex ia IIC T4 (intrinsically safe)
Supplied only with INMETRO approved actuators..

Safety

Integrity: Designed to SIL 3.

Enclosure: Watertight to IP67 / NEMA 6, double-sealed protection with separate cable gland and termination compartment. Optional to IP68 (7 meters / 72 hours). Consult factory for alternative depths / pressures. SI-2Q110 to Q112 & ESD option is only available to IP67.

Materials

Control

Module: Aluminium.

Piping: 316 Stainless steel (hard piped).

Paint Finish: 2-pack epoxy silver grey (150microns thick).

Actuator – Q60 TO 80.

Actuator

Housing: Anodised aluminium.

Piston: Aluminium.

Driving

Shaft: Zinc plated steel.

Actuator – Q110 TO 112.

Actuator

Housing: Carbon steel.

Drive

Shaft: Carbon steel.

Mechanical

Operating

Temperature: See table 8.

Torque/

Speed: See table 1.

Stroke: 0°± 2.5% to 90° ± 2.5%.

Weight: See dimensional detail (page 2 & 3).

Failure Mode: Fail safe in the direction of the spring or fail in last position.

Action: Spring-return clockwise or anti-clockwise.

Hydraulic

Fluid: See table 8.

Max. Working

Pressure: 12 bar (175 psi).

Manual

Override: Optional gearbox (on SI-2Q60 to Q80) or hydraulic hand pump (on SI-2Q60 to Q112).

Internal

Pressure

Transmitter: Displayed as a percentage of maximum working pressure.

Mounting: Valve stem vertical or horizontals (see table 9).

Electrical

Electrical

Supply: 1-phase 115 or 230 VAC, 3-phase 380 to 480 VAC or 24 VDC.

Supply

Tolerance: Supply voltage ± 10 %, Frequency 50/60 Hz ± 5 %.

Power

Consumption: Power direction: 1-phase 320 VA, 3-phase 240 VA, 24 VDC 225 VA maximum.

Motor

Protection: Thermal cutouts, insulation class F.

Cable

Entries: Power module has a minimum of two spare entries (see table 7) plus two plugged M20 cable entries. See drawing SMW-SI-010 for options. Switchbox spare entry will be plugged ATEX = M20, FM/ CSA = ½"NPT.

Position

Feedback: 1 kΩ Conductive plastic.

Electrical *continued*

Remote

Digital

Inputs: Open, close, maintain, ESD and partial stroke. 20 to 60 VAC/DC standard or 60 to 120 VAC optional. Consult factory for other voltages. 5 mA minimum duration 300 ms. DC inputs must be +ve switched.

Limit

Switches: Two adjustable electro-mechanical SPDT volt-free switches. Rating 5 A minimum at 230 VAC (see table 10).

Non-Intrusive

Setting: Sealed control module with infrared setting from the Rotork Setting Tool. All values are held within EEPROM to maintain settings within the memory on power failure, the actuator does not use a battery back up.

Display: LCD display for viewing of valve position, internal pressure and diagnostics screens. LED's are provided to indicate limits and intermediate state in the remote mode.

Control

Control

Options: Remote digital (open, close, maintain), emergency shutdown and partial stroking. or analogue modulating - input 4-20 mA or 0-10 VDC.

Resolution: <0.2% of full scale.

Repeatability: <0.2%.

Duty Rating: 90%.

Output: 4-20 or 20-4 mA, powered internally by an isolated 24 VDC supply or external customer supply.

Function

Settings: Deadband and hysteresis adjustable 0-99%, partial stroke adjustable 0-99%, interrupt timer and ESD action.

Interrupt

Timer: To slow the rate of travel. Pulse ON and OFF duration selectable from 100 ms to 99 sec. Timer does not operate with loss of power.

Local

Controls: Lockable Local/Stop/Remote selector switch and local Open/Closed switch.

Alarm and

Limit Relays: Volt-free normally open or normally closed contacts rated 5 mA to 5 A 120/230 VDC, 30 VDC.

Alarm Monitor relay: De-energised on loss of mains power; hardware, local controls or position sensor fault; or EEPROM error. Optional signal inverted to de-energise monitor relay for low power applications.

Alarm Fault Relay: Energised on position, pressure sensor fault, over pressure mid-travel (torque) under pressure, stalled, incorrect direction, loss of control signal and hydraulic control module fault. Also on unsuccessful partial stroke and alarm monitor faults described above.

Limit Relays: Two latching relays to indicate when the actuator is at the open or closed limit set within the software.

Fieldbus

Communication

Options: Internally mounted.

Pakscan: Rotork fieldbus system for remote control and status indication over a fault tolerant two-wire serial link.

Modbus: Single and dual communication highways. RS485 Modbus protocol RTU.

Profibus DP: Fully compatibility with EN 50170.

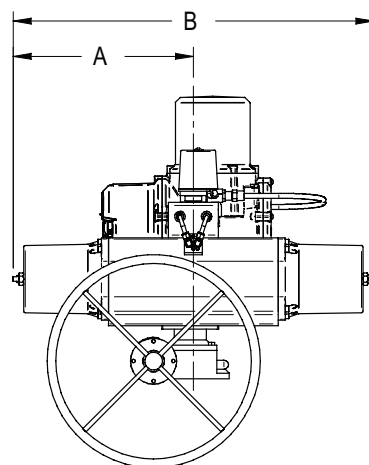
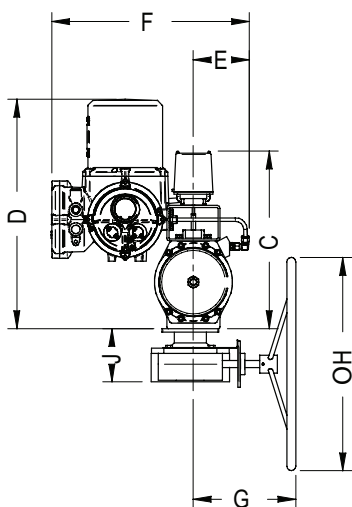
Foundation Fieldbus: An IEC 61158-2 compliant interface module allows connection to a Foundation network.

DeviceNet: ODVA certified DeviceNet interface with full status data feedback, digital and analogue control.

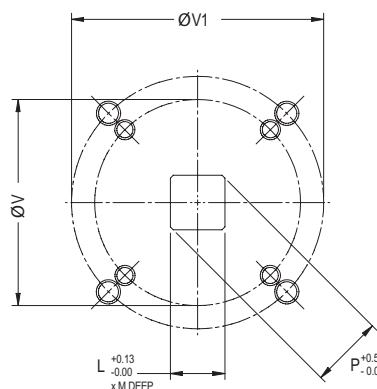
Consult RFS regarding resolution on all fieldbus cards for for modulating applications.

Rotork reserves the right to change specifications without notice.

SI-2-Q60 to Q80 Dimension & Mounting Details



DIMENSIONS (mm)	ACTUATOR CODE		
	Q60 / Q61	Q70	Q80
A	285	510	510
B	570	655	1020
C	346	436	436
D	557	647	647
E	126	157	157
F	525	556	556
F*	609	640	640
G	257	297	415
H	600	600	600
J	131	149	175
L	27	36	46
M	37	64	64
P	37	49	49
ØV	102	140	125
ØV1	125	N/A	165
W	M10 x 17	M16 x 25	M12 x 25
W1	M12 x 21	N/A	M20 x 32
Weight (kg)	62	98	127



Flange & Square Drive Details to ISO 5211

NOTES:

For 3-phase units use "F*" instead of "F".

Q70 also has the following hole pattern for mounting purposes:
170 x 110 mm, 4 x M16 x 25 deep.

Q80 also has the following hole pattern for mounting purposes:
234.7 x 97.2 mm, 4 x M16 x 2 deep.

Manual override gearboxes are optional.