rotork®

Keeping the World Flowing

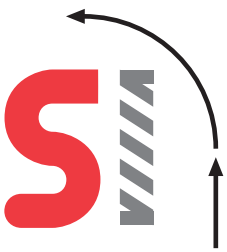
Skilmatic SI-1L

Spring-Return Electric Linear Actuator (1.7 to 11 kN)

Skilmatic SI intelligent actuators offer a unique combination of the renowned features of Rotork actuation, such as the double-sealing system and non-intrusive commissioning capability, with the benefits of control and safety from Skilmatic range.

The **SI-1L** are compact and robust electrically operated failsafe spring-return linear actuators. The actuators are designed for modulating, two-position or ESD applications and are suitable for all styles of control valves with a linear drive shaft.

The **SI-1L** is watertight and dustight to IP67 / NEMA 6 with the option of IP68 and includes the Rotork double-seal system with separated termination and cable gland compartment. The actuators are also available certified explosionproof for hazardous area gas group **IIB** and **IIC** applications.



Features

- Self-contained electrically operated actuator with internal low pressure electro-hydraulic control module
- Spring-return, failsafe or lock in position
- Spring-return speed options – single or dual valve combinations
- Single-phase, three-phase and DC power supply
- Watertight and explosionproof for gas group IIB & IIC
- Double-sealed control module – with separate terminal compartment
- Non-intrusive commissioning and configuration setting tool
- Local LCD dual screen display – for position indication, internal pressure and fault diagnostics
- Local controls – lockable Local/Stop/Remote selector switch with local Open/Closed switch
- Modulating control – 4-20 mA input and output with a resolution < 0.25 %
- Digital control – two position and emergency shutdown options for functional safety instrumented systems
- Output relays for monitoring, fault alarms and Open/Closed limits
- Optional Fieldbus communications
- Built in datalogger – recording events, trends and alarms

Skilmatic SI-1L

Consisting of a self-contained electro-hydraulic control module and linear spring-return cylinder. The actuators combine the simplicity of electrical operation, with the precision of hydraulic control, and reliability of spring-powered failsafe 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 lock in last position on power or signal failure. The actuators are available as spring to extend the actuator drive shaft or spring to retract, with thrusts from 1.76 kN (400 lbf) to 11.88 kN (2,700 lbf) and a stroke up to 65 mm (2½").

The actuators can be programmed with the *Bluetooth*® wireless setting tool to accept an analogue or digital input, with ESD and partial stroking or network cards options. A wide range of functions can also be selected through the setting tool such as zero and span limits, deadband, hysteresis, interrupter timer, ESD options, partial stroke testing and alarms.

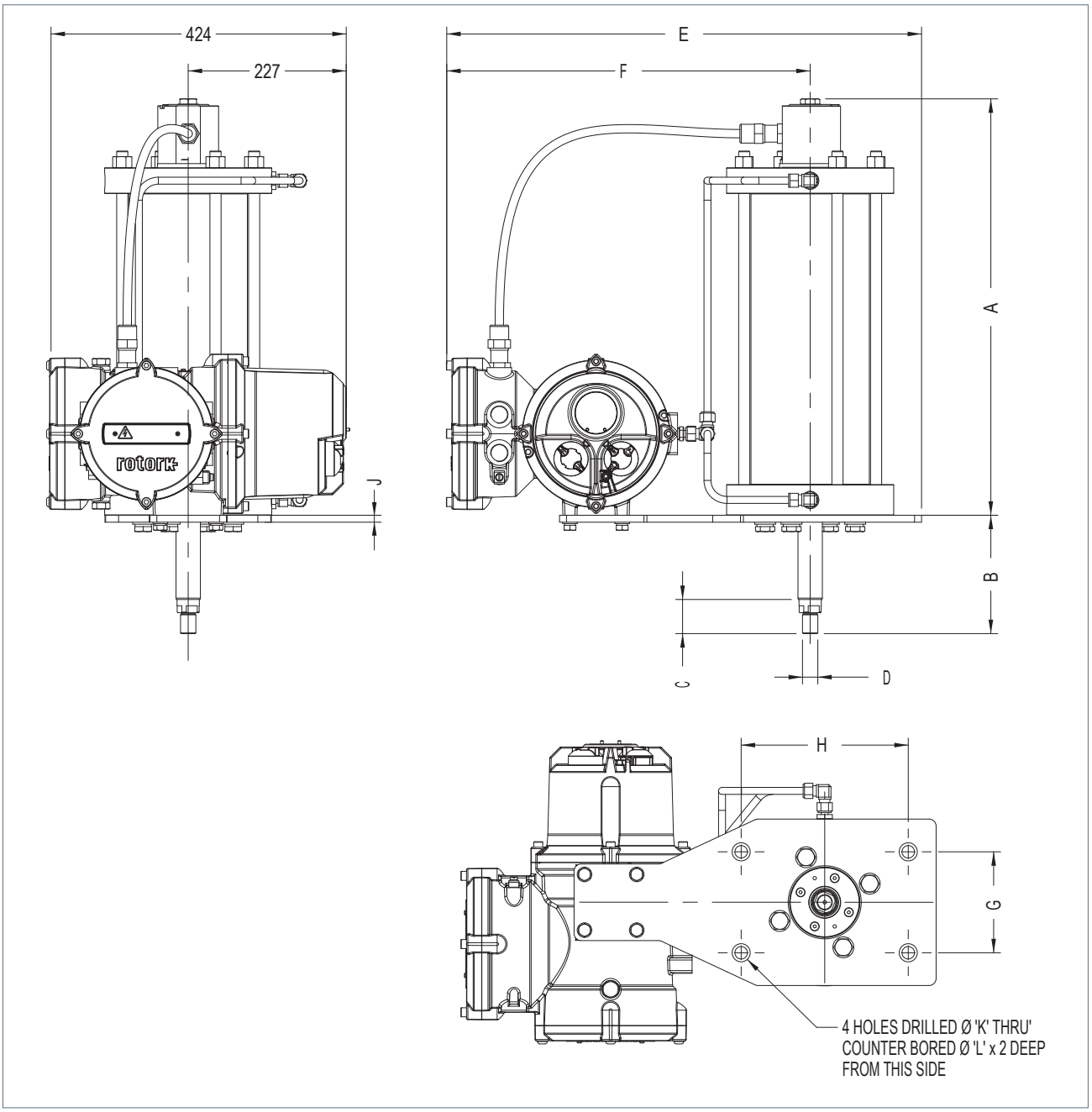
The actuator is provided with a built in datalogger to record the configuration settings and the last 1,024 events with 32 bits of status for each event. The data can be downloaded via the Rotork Bluetooth® Setting Tool *Pro*.

Optional internal fieldbus communication boards are also available for the Rotork *Pakscan*™, DeviceNet®, Profibus®, Foundation Fieldbus® and Modbus® digital control systems.

Specifically designed for modulating control applications, the control module provides a pulsed hydraulic signal to accurately position the spring-opposed cylinder. Resulting in accurately positioning a valve with a resolution better than 0.25 %.

Operating from a standard single-phase, three-phase or 24 VDC supply the actuators are also ideal for on/off duties where failsafe action is required. Lockable Local controls are provided as standard. Electro-mechanical ends of stroke limit switches are offered as an option for safety critical applications. Manual override hand pump is also available on all sizes.

SI-1L Dimensions and Mounting Details



CODE	A	B	C	D	E	F	E*	F*	G	H	J	K	L	Weight (kg)
SI-1-L80/40	438	145	30	M20x1.5P	567	644	644	457	76	170	10	18	26	~68
SI-1-L100/40	474	145	30	M20x1.5P	594	679	679	483	100	190	10	18	26	~73
SI-1-L125/65	581	170	30	M20x1.5P	629	706	706	489	120	240	10	18	26	~98
SI-1-L160/65	598	170	30	M22x1.5P	667	744	744	507	145	240	15	18	26	~128
SI-1-L200/65	628	170	30	M22x1.5P	722	799	799	537	178	290	15	22	36	~180

Note:
Weights are approximate and for actuators with 1-Phase power units.
For 3-Phase actuators use E* instead of E, and use F* instead of F.
Mounting dimensions are for reference only, consult factory for detailed valve mounting adaptions.

All dimensions in mm.

Ordering Code

Ordering Code Example **SI-1-L80/40 - 0 0 2 - 0 0 - 0 0 - A A**

Failure Mode
0 = Failsafe on loss of power supply (in direction of spring) (note 7)
1 = Fail in Position on loss of power supply (note 8)

Spring-return Speed & ESD Options
0 = Speed A – Single internal solenoid (note 7)
1 = Speed B – Dual internal solenoid (note 7 & 9)
2 = Speed C – Single internal & external solenoid (note 5 & 7)
3 = Speed D – Slow acting internal solenoid – Consult Factory
6 = Speed A – Hardwired single internal solenoid (note 8)
7 = Speed C – Hardwired single internal & external solenoid (note 5 & 8)

Supply Voltage
0 = Single-phase 115 VAC ± 10% 50/60 Hz
1 = Single-phase 230 VAC ± 10% 50/60 Hz
2 = 24 VDC ± 10%
3 = Three phase 380-480 VAC ± 10% 50/60 Hz

Control
0 = Standard Digital control (Open / Closed / partial stroke)
1 = Analogue control 4-20 mA or 0-10 VDC (note 4 & 6)
2 = *Pakscan* (note 6)
3 = *Pakscan* – analogue input (note 6)
4 = Modbus single channel (note 6)
5 = Modbus dual channel (note 6)
6 = Profibus dual channel (note 6)
7 = DeviceNet (note 6)
8 = Foundation Fieldbus (note 6)
9 = Profibus single channel (note 6)

Certifications
0 = WT – Watertight IP67
1 = ATEX – European – Hazardous area Gas group IIB (IP67)
1C = ATEX – European – Hazardous area Gas group IIC (IP67) (note 11)
2 = IEC – International – Hazardous area Gas group IIB (IP67)
2C = IEC – International – Hazardous area Gas group IIC (IP67) (note 11)
3 = FM – US – Hazardous area Gas group IIB (IP67) (note 10)
3C = FM – US – Hazardous area Gas group IIC (IP67) (note 10 & 11)
4 = CSA – Canada – Hazardous area Gas group IIB (IP67) (note 10)
4C = CSA – Canada – Hazardous area Gas group IIC (IP67) (note 10 & 11)
5 = EAC – Russia TR TS Hazardous area Gas Group IIB
5C = EAC – Russia TR TS Hazardous area Gas Group IIC -20 to +60 (IP67) (note 11)
6 = INMETRO – Brazil – apply factory
6C = INMETRO – Brazil – apply factory

Cable Entries
0 = M25 x 1.5P
1 = M20 x 1.5P adaptors
2 = ½" NPT adaptors
3 = ¾" NPT adaptors
4 = 1" NPT adaptors

Hydraulic Fluid/Operating Temperature

0 =	Mineral fluid	–10 to +60 °C (note 2)
3 =	Food grade fluid	–10 to +60 °C (note 2)
4 =	Silicone fluid	–30 to +60 °C (note 10 & 11)
5 =	Silicone fluid / Low temperature seals	–35 to +60 °C (note 10 & 11)

Mounting
A = Vertical stem above valve
B = Vertical stem below-valve
C = Valve stem horizontal
D = Vertical stem above valve with valve mounting kit
E = Valve stem vertical below valve with valve mounting kit
F = Valve stem horizontal with valve mounting kit

Accessories
A = None
B = Manual override (Handpump)
D = WT – Watertight IP68 7m for 72 hours (note 5)
E = Mechanical indication switches (2 off)
G = Hardware ESD configuration (Failsafe actuators only) (note 7)
H = All cable entries plugged
J = Viton seals
K = Paint colour change to standard specification
L1 = Coastal Paint & Exd IIC applications (2 pack Epoxy 150 to 200 microns)
L2 = Offshore Paint, watertight & Exd IIB applications (2 pack Epoxy to 250 to 350 microns)
N = Flow control valve – to adjust the stroke speed in the spring direction
O = Optional Low power external solenoid valve option for 'Spring-Return Speed & ESD Options' code 2 or 7 – consult sales office
T = Remote mounted EH power module (Max distance 5m from actuator drive)

Ordering Code

Notes:

1 Select one option from each section except 'Accessories' which is multiple options.

2 Stroke speed is typical for all actuators with no load at 20 °C. Speed can vary ±10% (or 1 second, whichever is greater) at 20 °C. Stroke speeds with mineral and food grade fluid are affected by subzero temperatures and can change by up to 50%. If this is not acceptable select silicone fluid.

3 The column shows the maximimum available stroke, shorter ones are also possible on request with a corresponding change of thrust value.

4 All actuators are available with 4-20 or 20-4 mA output, powered internally by an isolated 24 VDC supply or external customer supply. Speed 'A' resolution <0.2%, Speed 'B' resolution <0.5%, Speed 'C 'resolution 1%.

5 All actuators are watertight to IP67, the option of IP68 is available except external solenoid option. (Spring-Return Speed and ESD Options – code 2 & 7).

6 Analogue control, local controls, partial stroking and communication circuits are not part of the Functional Safety circuit.

7 Functional safety applications (SIL) – Failsafe on loss of power supply select spring speed and ESD options. (Failure Mode code 0). Select Spring-Return Speed and ESD Options – code 0, 1, 2 or 3 and Accessories – code G.

8 Functional safety application (SIL) – Fail in last position on loss of power supply (Failure Mode code 1). Select Spring-Return Speed and ESD Options – code 6 or 7. The actuator will failsafe on loss of 24 VDC ESD input signal.

9 For applications requiring redundant solenoid valves, (Spring-Return Speed and ESD Options – code 1), please refer to single solenoid speed 'A' for critical safety speed on functional safety systems.

10 External solenoid option FM & CSA certified, available to a minimum -20 °C.

11 Explosionproof actuators for gas group IIC, available only for temperature -20 to +65 °C.

Performance Data

CODE	Stroke Max. (see note 3)	Thrust kN (lbf)				Nominal Stroke Speed (mm/seconds)			
Spring to Extend		Hydraulic Stroke (Open)		Spring Stroke (Close)		Hydraulic Stroke Speed	Spring-Return Speed (See note 2 and 9)		
		Start	Finish	Start	Finish		Speed A	Speed B	Speed C
SI-1-L80/40	40 mm	2.08 (469.4)	1.12 (251.78)	2.69 (606.84)	1.82 (410.05)	3.95	8.8	14	40
SI-1-L100/40	40 mm	3.55 (799.19)	1.99 (448.94)	4.33 (974.99)	2.92 (658.01)	2.39	4	6	20
SI-1-L125/65	65 mm	5.99 (1348.4)	3.6 (809.53)	6.68 (1502.17)	4.51 (1014.78)	1.48	4.38	6	21
SI-1-L160/65	65 mm	9.69 (2178.62)	5.61 (1262.75)	11.37 (2556.75)	7.68 (1727.88)	0.89	2.44	5	13
SI-1-L200/65	65 mm	15.44 (3472.62)	8.97 (2017.88)	18.05 (4058.92)	12.2 (2742.67)	0.56	1.7	3.5	8

CODE	Stroke Max. (see note 3)	Thrust kN (lbf)				Nominal Stroke Speed (mm/seconds)			
Spring to Retract		Hydraulic Stroke (Close)		Spring Stroke (Open)		Hydraulic Stroke Speed	Spring-Return Speed (See note 2 and 9)		
		Start	Finish	Start	Finish		Speed A	Speed B	Speed C
SI-1LA80/40	40 mm	3.05 (685.89)	2.08 (468.27)	2.43 (547.63)	1.56 (350.7)	3.95	8.8	14	40
SI-1LA100/40	40 mm	4.69 (1055.92)	3.13 (705.67)	3.91 (879.22)	2.5 (562.24)	2.39	4	6	20
SI-1LA125/65	65 mm	7.14 (1606.03)	4.74 (1067.39)	6.25 (1405.5)	4.08 (918.12)	1.48	4.38	6	21
SI-1LA160/65	65 mm	11.81 (2655.89)	7.74 (1740.02)	10.27 (2310.81)	6.59 (1482.16)	0.89	2.44	5	13
SI-1LA200/65	65 mm	18.3 (4114.67)	11.83 (2659.94)	16.29 (3663.93)	10.44 (2347.68)	0.56	1.7	3.5	8

Note:
Standard stroke lengths include an additional 5 mm to pre-compress the internal spring.
Add C for no pre-compressions of the internal spring i.e. SI-1L80/40C.
Stroke Speed in mm/sec for full stroke e.g. SL-1-L80/40 has a stroke of 40 mm (1½") = 10 seconds in the hydraulic direction.

Specification

Certification

ATEX – II 2G Ex db mb eb* IIB T4 Gb (Tamb -35 to +65°C)
ATEX – II 2G Ex db mb eb* IIC T4 Gb (Tamb -20 to +65°C)
EN 60079-0, EN 60079-1, EN 60079-7, EN 60079-18, EN 13463-1

IEC Ex – Ex db mb eb* IIB Gb T4 (Tamb -35 to +65°C)
IEX Ex – Ex db mb eb* IIC Gb T4 (Tamb -20 to +65°C)
IEC 60079-0, IEC 60079-1, IEC 60079-7, IEC 60079-18

FM - Class I, Zone 1 AEx dme* IIB T4 (Ta -35 to +65 °C)
FM - Class I, Zone 1 AEx dme* IIC T4 (Ta -20 to +65 °C)
Class 3600, ANSI/ISA-12.00.01, ANSI/ISA-12.22.01,
ANSI/ISA-12.16.01 ANSI/ISA-12.23.01,
Class 3810 & ANSI/NEMA-250

CSA – Ex db mb eb* IIB T4, -35 °C ≤ Ta ≤ 65 °C
CSA – Ex db mb eb* IIC T4, -20 °C ≤ Ta ≤ 65 °C
Product Class 2258 02 (approval apply to the power module – Full actuator assembly will be subject to CSA inspection)

TRTS EAC – Ex dme* IIB T4 (Tamb -35 to +65 °C)
TRTS EAC – Ex dme* IIC T4 (Tamb -20 to +65 °C)
EN60079-0, EN60079-1, EN60079-7, EN60079-18

*'e' or 'eb' increased safety available on single-phase and DC supply voltage only.

Certification temperatures are not operating temperatures; see operating temperature, page 4.

Rotork Bluetooth® Setting Tool *Pro*:
Ex ia IIC T4 (intrinsically safe)
FM, INT SAFE Class I, II DIV1 Group A B C D
CSA, EEia, Class I, II Div 1 Group A B C D

Enclosure:
Watertight to IP67 / NEMA 6, double-sealed protection with separate cable gland and termination compartment. Optional Watertight models to IP68, Std 7 meters/72 hours, for alternative depths / pressures consult factory. External ESD solenoid option is only available to IP67.

Materials

Control Module:	Aluminium
Actuator Body:	Steel
Actuator Springs:	Steel
Piping:	316 Stainless Steel (hard piped)
Paint Finish:	Standard Grey, powder coated electrical compartments with two pack epoxy hydraulic compartment and actuator drive, minimum 90 microns (see page 4 for additional paint options)

Mechanical

Operating Temperature:	See page 4
Thrust / Speed:	See page 5
Stroke:	Up to 64 mm (2.5”) consult factory for options
Weight:	See dimensional detail (page 3)
Failure Mode:	Failsafe in the direction of the spring or Fail in last position
Action:	Actuator shaft extends on spring return or actuator shaft retracts on spring return
Hydraulic Fluid:	See page 4
Maximum Working Pressure:	12 bar (175 psi)
Manual Override:	Optional hydraulic handpump
Internal Pressure Transmitter:	Displayed as a percentage of maximum working pressure
Mounting:	Valve stem vertical or horizontals (see page 4)

Specification

Electrical

Power Supply: Single-phase 115 or 230 VAC, Three-phase 380 to 480 VAC or 24 VDC

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

Power Consumption: Available upon request

Pump Coil Protection: Thermal cutouts and thermal fuse

Cable Entries: Power module has a minimum of four spare entries See page 4
See Drg No SMW-SI-010 for options

Position Feedback: EX - Linear position transducer - non-contact, magnetostrictive.
WT - linear potentiometer

Remote Digital Inputs: Open, Close, maintain, ESD and Partial Stroke - Std 20 to 60 VAC/VDC or 60 to 120 VAC optional. Other voltages consult factory. 5 mA minimum duration 300 ms. (DC inputs must be +ve switched)

Optional Limit Switches: Optional two electro-mechanical SPDT volt free switches. Rating 5A minimum at 230 VAC (See page 4)

Non-Intrusive Setting: Sealed control module with infrared / Bluetooth setting from the Rotork Bluetooth® Setting Tool *Pro*. All values are held within EEPROM to maintain settings within the memory on power failure. Datalogger configurations and recorders can be downloaded via the Rotork Bluetooth® Setting Tool *Pro*

Display: Rotork LCD dual display with 32 character text to allow viewing of the 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: Control options, Deadband and Hysteresis adjustable 0–99%, Partial stroking adjustable 0–99%, interrupt timer and ESD action

Interrupt Timer: To slow the rate of closing and / or opening over 0–99% of stroke, with the time pulse ON and OFF duration selectable from 100 ms to 99 sec. Timer does not operate with loss on power

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

Alarm and Limit Relays:

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

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

Three Independent Alarm and Status Relay: Can be configured to customer specific alarms and status indication

Fieldbus Communication Options (internally mounted):

Pakscan: Rotork fieldbus system for remote control and status indication over a fault tolerant two-wire serial link. Loop distance up to 20 km. (See PUB059-048)

Modbus: Single and dual communication highways RS485. Modbus protocol RTU (See PUB091-001)

Profibus DP: Fully compatibility with EN 50170 (See PUB088-001)

Foundation Fieldbus: An IEC61158-2 compliant Foundation interface module allows connection to a foundation network. (See PUB089-001)

DeviceNet: ODVA certified DeviceNet interface, with full status data feedback, digital and analogue control (See PUB090-001)

For modulating applications consult factory regarding resolution on all fieldbus cards

Rotork reserves the right to change the specifications without notice.

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A full listing of the Rotork sales and service network is available on our website.

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rotork®

Electric Actuators and Control Systems
Fluid Power Actuators and Control Systems
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Precision Control and Indication
Projects, Services and Retrofit

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