

3-port valves

electrically actuated



spirax
/sarco

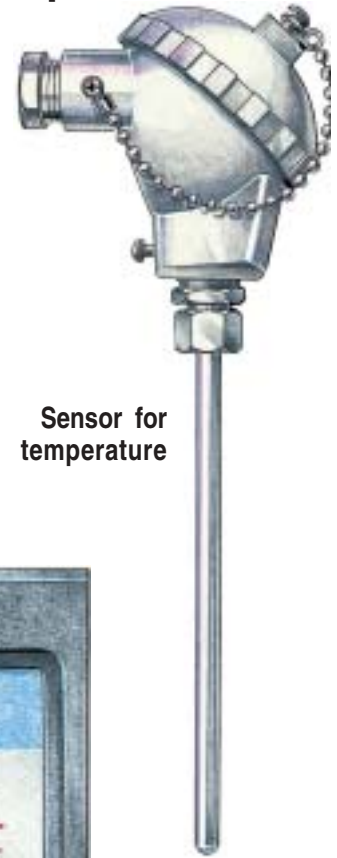
Electrically actuated valves for quality and accuracy in fluid control

The Spirax Sarco range of 3-port QL valves with electric actuators provides a wide choice for the control of water, oils and other industrial fluids used in controlling energy and fluid flows to manufacturing and other processes.

The control valve options cover PN25 up to PN40 pressure ratings with materials in SG iron or cast steel.

Valve body and electric actuator combinations from Spirax Sarco provide reliable and competitive solutions to most fluid control problems.

Control options



Sensor for temperature

User benefits

- Wide range of options provides one source to meet most plant standards.
- Enclosure of electronic components minimises maintenance problems in dirty environments.
- Provision for optional switches and potentiometers for control and management information feedback.
- Plug in positioner for easy conversion and reduced spares stocking cost.
- Long life valve components simplify and reduce maintenance requirements.
- Constant force stem seals for added control, accuracy and reduced valve maintenance.

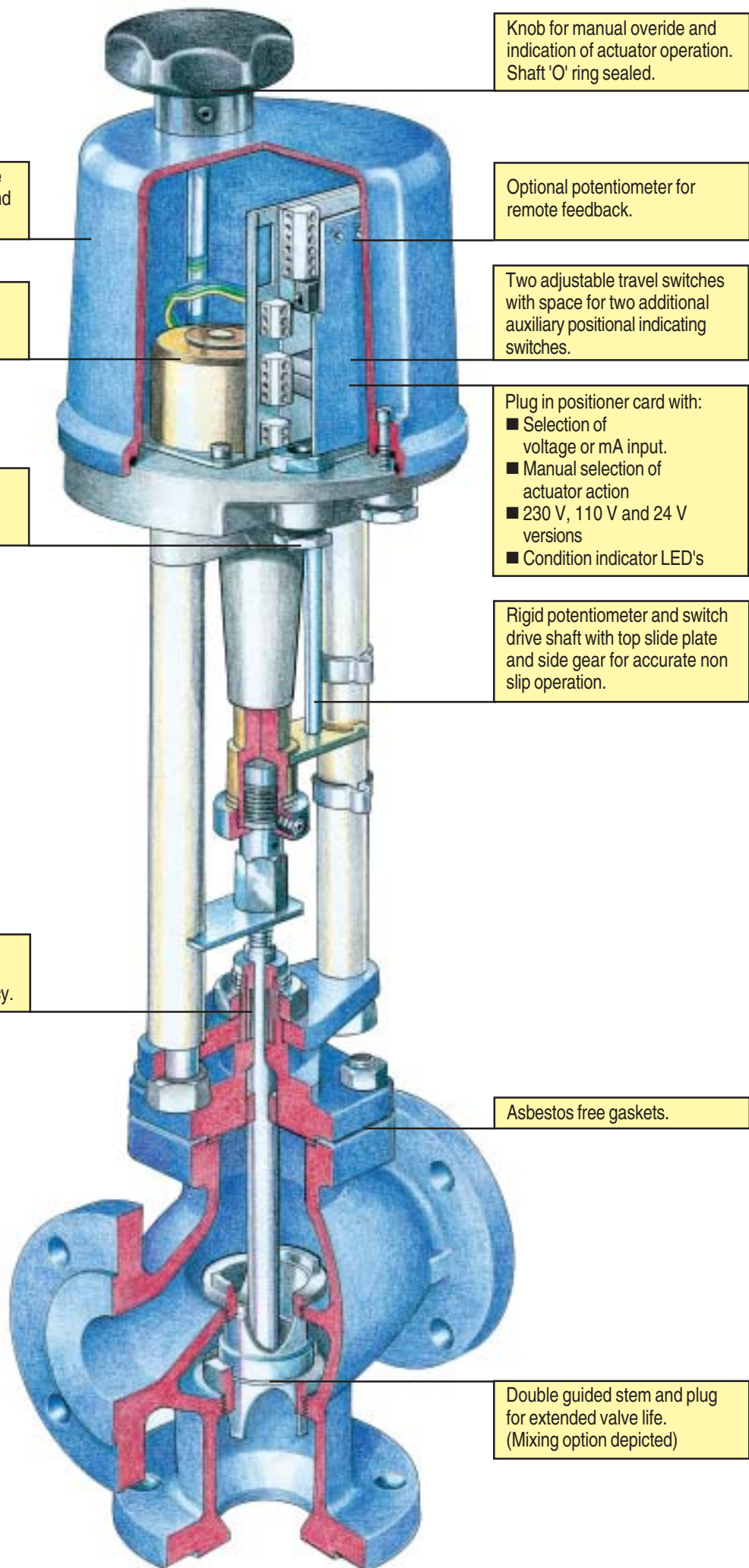


Electronic controllers:-
For pressure, temperature and flow control in processes which need a high level of control intelligence.

Valve options

Operation	Model	Size DN	Material	Connections	Max. differential pressure	Max. operating temperature
Mixing	QL73	15 -100	SG iron	Flanged BS 4504 PN25	25 bar	250°C
	QL43	15 -100	Cast steel	Flanged BS 4504 PN40	40 bar	250°C
Diverting	QL73D	15 -100	SG iron	Flanged BS 4504 PN25	25 bar	250°C
	QL43D	15 -100	Cast steel	Flanged BS 4504 PN40	40 bar	250°C

Note: See operating range charts on page 7



Knob for manual override and indication of actuator operation. Shaft 'O' ring sealed.

Polycarbonate IP65 enclosure with bottom sealing 'O' ring and captive screws.

Optional potentiometer for remote feedback.

Option of anti-condensate heater for humid or cold environments (not shown).

Two adjustable travel switches with space for two additional auxiliary positional indicating switches.

Alternative power and control cable entries with PG13 or PG16 tapings.

Plug in positioner card with:
■ Selection of voltage or mA input.
■ Manual selection of actuator action
■ 230 V, 110 V and 24 V versions
■ Condition indicator LED's

Rigid potentiometer and switch drive shaft with top slide plate and side gear for accurate non slip operation.

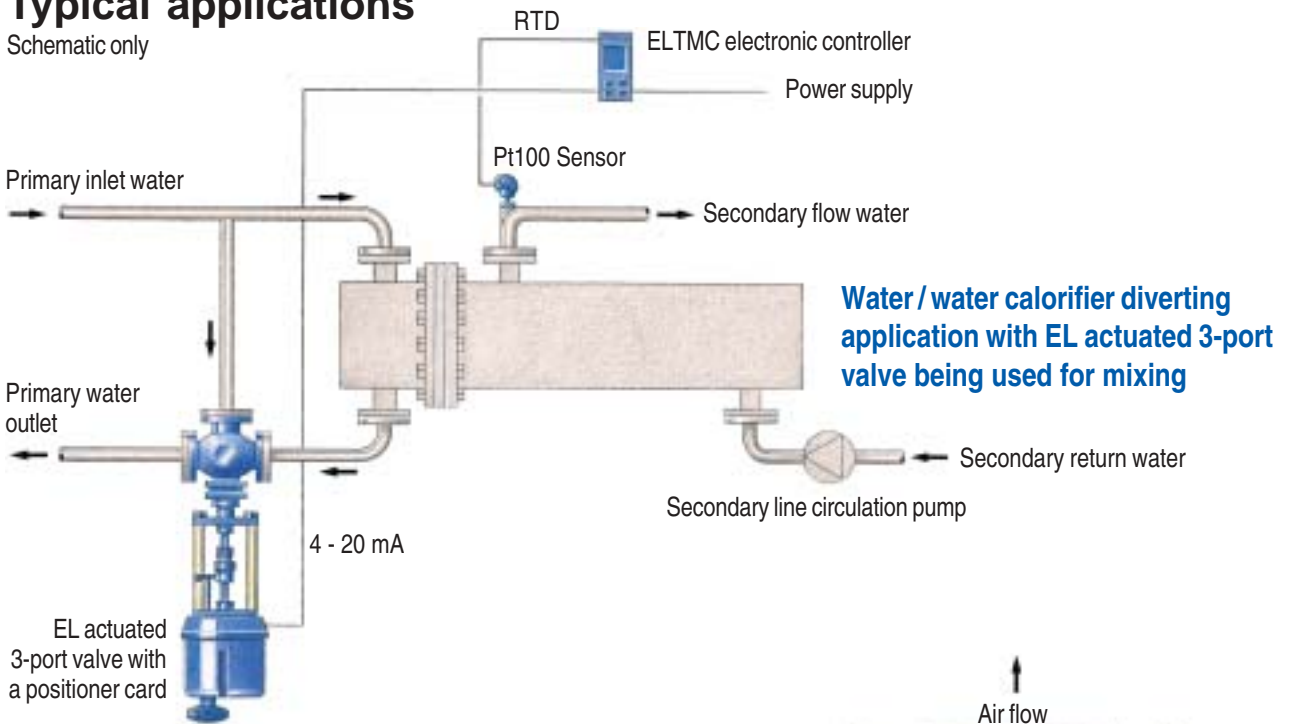
Self adjusting chevron valve stem seals giving long life and low friction for control accuracy.

Asbestos free gaskets.

Double guided stem and plug for extended valve life. (Mixing option depicted)

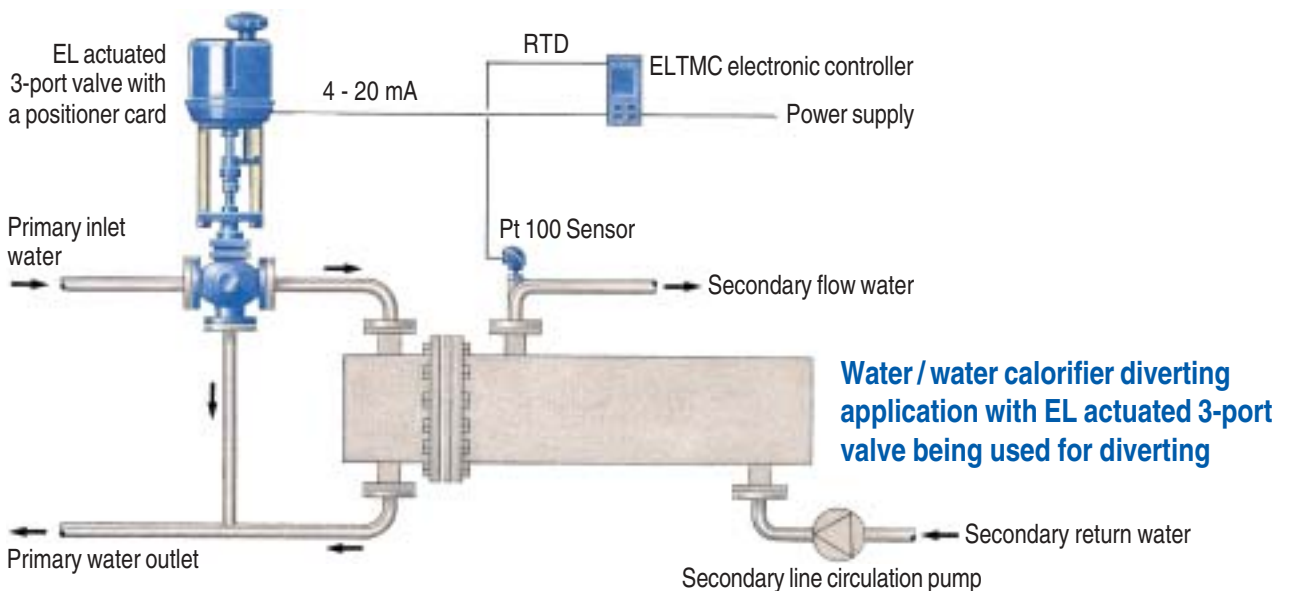
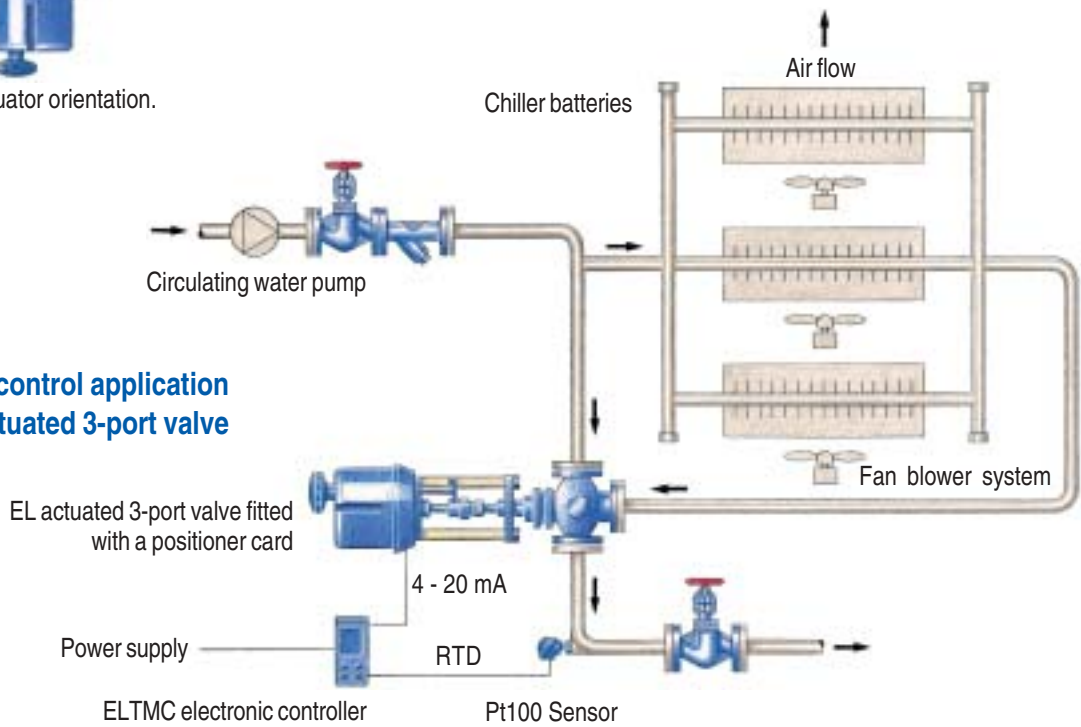
Typical applications

Schematic only



Note: Not valid actuator orientation.

Cooling water control application using an EL actuated 3-port valve for mixing



Valve sizing and selection for water

Note: For other liquids, the specific gravity (zg) must be taken into account.

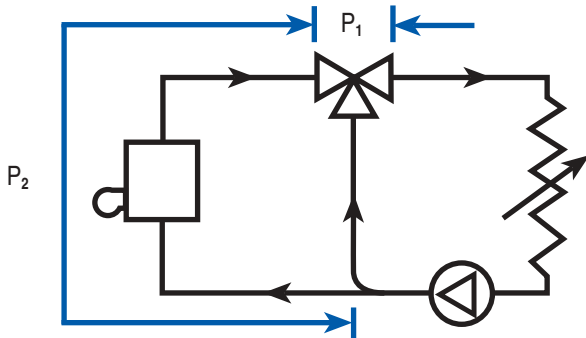
Valve authority

The ratio of pressure drop across the valve when fully open to that across the complete circuit is termed the 'valve authority' (N) and is expressed as:-

$$N = \frac{P_1}{P_1 + P_2}$$

Where:-
 N = Valve authority
 P₁ = Pressure drop across fully open valve
 P₂ = Pressure drop across remainder of circuit

The following diagrams illustrate P₁ and P₂ more fully. Valve authority is a means of selecting a valve size on a water system with due regard to economic viability and good control. When selecting a valve size, the valve authority should be between 0.2 and 0.5 (and preferably 0.5). This will ensure that each small valve movement will influence some authority over the flow whilst not excessively increasing pumping power costs. Valve authority will always relate to the circuit which has a varying flowrate.



Valve authority - Three-port mixing valve

How to use the chart

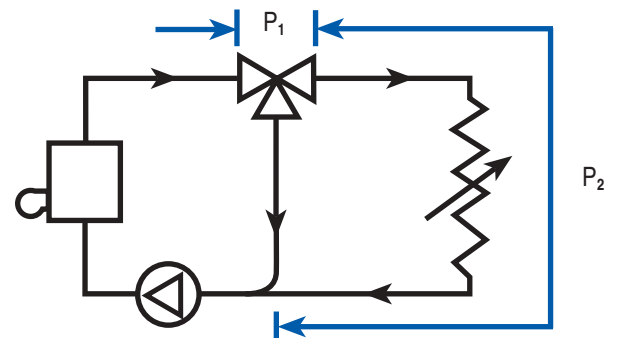
The sizing chart below can be used to determine the K_V value of the required control valve for most water applications by plotting:-

- Inlet water pressure
- Valve pressure drop
- Water flow

Where the K_V value is already known, the chart can be used to determine valve pressure drop for any given flowrate. Having selected the valve K_V move to actuator and valve selection on pages 6 and 7.

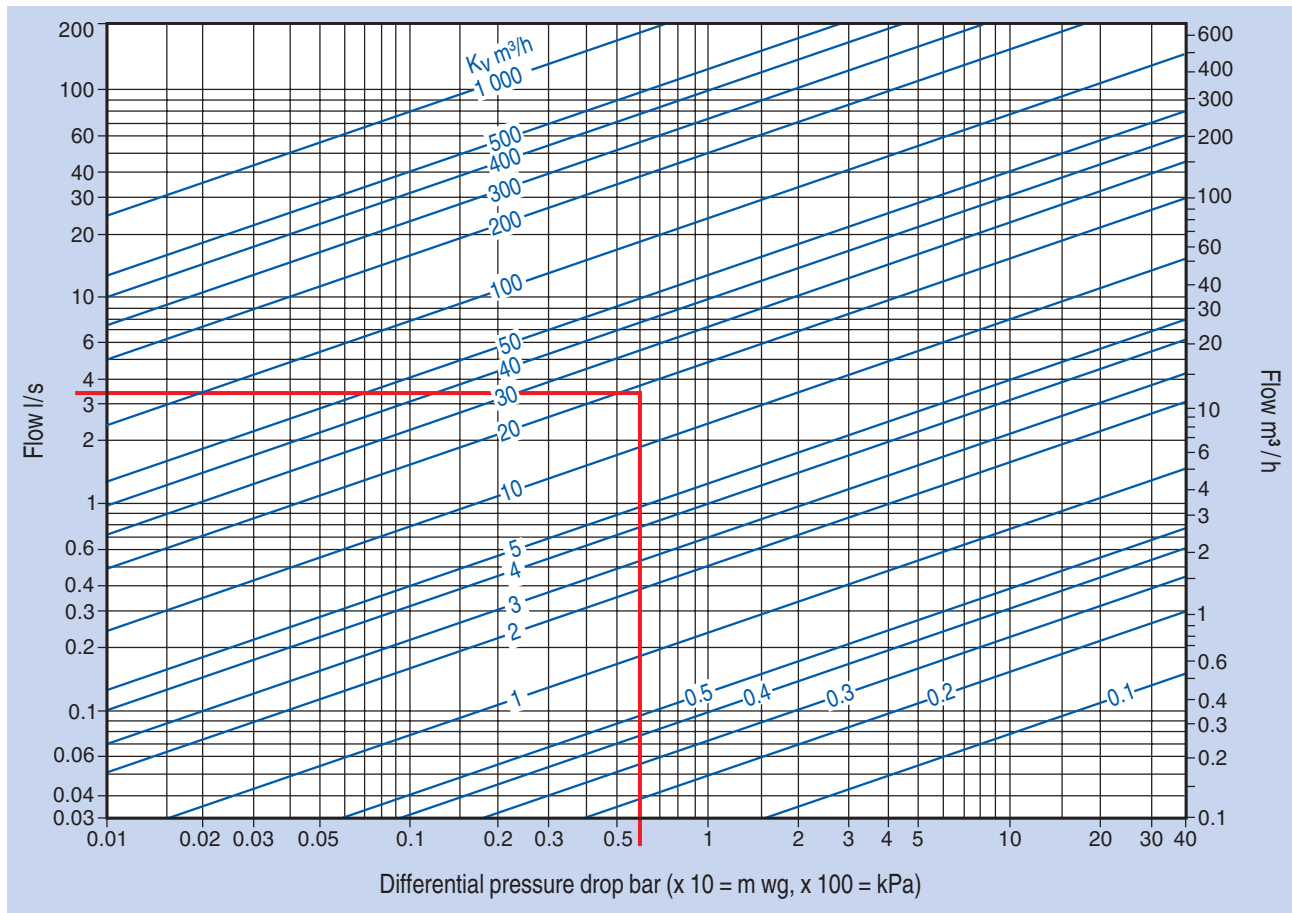
K_V selection example

Heat exchanger has a MTHW demand of = 3.6 l/s
 Full load pressure drop Δp = 0.6 bar (established from valve authority)
 Go to selection chart below
 Draw horizontal line from 3.6 l/s. Run a vertical line from 0.6 bar until it crosses 3.6 l/s line. K_V is given at this crossing point. i.e. K_V = 17
 For valve size and actuator selection turn to pages 6 and 7.
 Q = K_V √ Δp Q = Water flow m³/h Δp = Pressure drop bar



Valve authority - Three-port diverting valve

Water sizing chart



Actuator selection

Actuator selection example

Having selected the K_V value, the valve and actuator size can be determined from the selection chart below, starting in the K_{VS} value row and moving horizontally until the next highest value to the selected K_V is seen. By moving vertically upwards the valve size is determined and vertically downwards until the closed valve maximum differential pressure is found. Moving horizontally left will indicate most suitable actuator for any given voltage.

**Valve $K_V = 17$ Electrical supply = 230 Vac
Maximum differential pressure = 0.6 bar**

Entering the chart at the K_{VS} row, the next highest value to the selected K_V is 17 which has a valve size of DN32. Moving vertically downwards the differential pressure nearest the required value is 20 bar, and by moving horizontally left the correct actuator is the EL5511 for a 230 V supply voltage. Final selection = DN32 QL valve with EL5511 actuator.

Note: Where a positioner is required a suffix 'P' should be added to the actuator reference i.e. EL5511P.

Differential pressures for QL valves and EL5500 series actuators

EL5500 series actuators

EL5500P series when positioner is required	EL5500 series	Actuator voltage ac/50 Hz	Actuator speed mm/s
EL5511P	EL5511	230	0.5
EL5512P	EL5512	110	0.5
EL5513P	EL5513	24	0.5
EL5521P	EL5521	230	0.5
EL5522P	EL5522	110	0.5
EL5523P	EL5523	24	0.5
EL5531P	EL5531	230	0.5
EL5532P	EL5532	110	0.5
EL5533P	EL5533	24	0.5
EL5541P	EL5541	230	0.6
EL5542P	EL5542	110	0.6
EL5543P	EL5543	24	0.6

QL valves

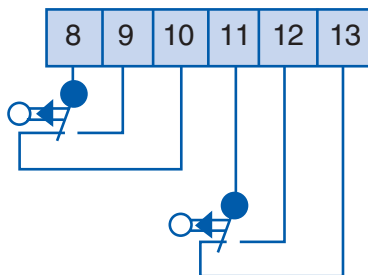
Size DN						Size DN		
15	20	25	32	40	50	65	80	100
20 mm stroke						30 mm stroke		
K _{VS} value						K _{VS} value		
4	6	10	17	25	35	62	100	130
Maximum valve differential pressure (ΔP) bar								
40	40	30	20	12	7	4	2.5	1.2
40	40	30	20	12	7	4	2.5	1.2
40	40	30	20	12	7	4	2.5	1.2
-	-	40	40	29	18	10.7	7	4
-	-	40	40	29	18	10.7	7	4
-	-	40	40	29	18	10.7	7	4
-	-	-	-	40	33	20	13	7
-	-	-	-	40	33	20	13	7
-	-	-	-	40	33	20	13	7
-	-	-	-	40	40	31	21	11.7
-	-	-	-	40	40	31	21	11.7
-	-	-	-	40	40	31	21	11.7

For technical data on valve and actuators go to technical information on page 7.

Actuator accessories

EL5851 auxiliary positional switches

Provision for two additional auxiliary positional switches with 5 amp 230 Vac rating, complete with cams, mounting kit, wiring and terminals.



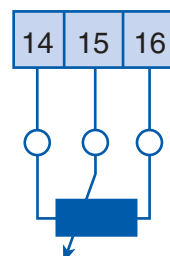
Positioner card

Plug-in positioner card including feedback potentiometer.

Model

- EL5861 230 Vac
- EL5862 110 Vac
- EL5863 24 Vac (except actuator EL5533)

Input signal option of 4-20 mA or 2-10 V

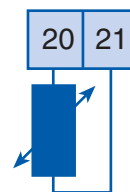


Anti-condensation heater

Complete with mounting kit, wiring terminals and automatic switch.

Model

- EL5854 230 Vac
- EL5855 110 Vac
- EL5856 24 Vac



EL5852 auxiliary feedback potentiometer

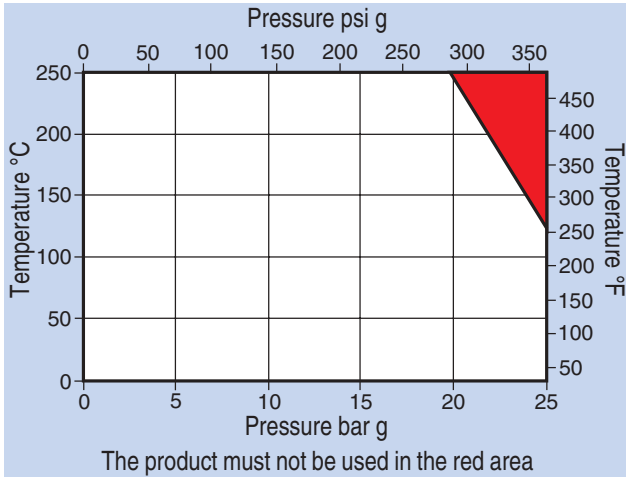
Provision for a 1000 ohm potentiometer complete with mounting kit, pinion and terminals. Cannot be fitted to actuators having positioner cards.

Technical information

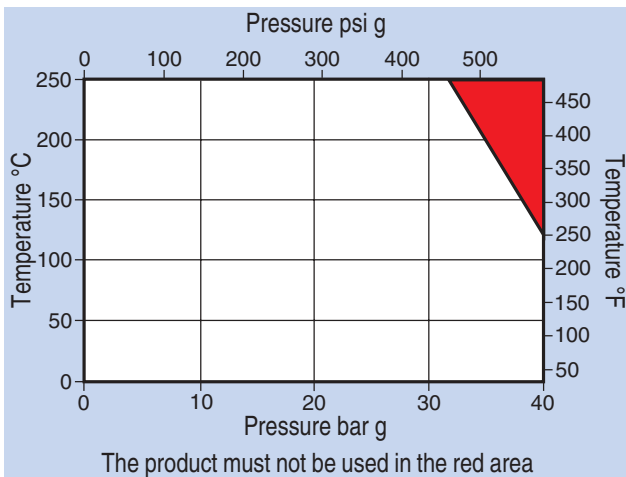
Technical data valves

Plug design	Parabolic vee port	
Maximum leakage	<0.01 % of K _v	
Flow characteristic	Linear	
Rangeability	30:1	
Travel	DN15 to 50	20 mm
	DN65 to 100	30 mm

Operating range QL73



Operating range QL43



Materials for all valves

Valve plug	Stainless steel	BS 970 431 S29
Valve seat	Stainless steel	BS 970 431 S29
Valve stem	Stainless steel	BS 970 431 S29
Gland rings	PTFE chevrons	25 % Carbon / graphite
Bonnet gasket	Reinforced exfoliated graphite	

QL73 Range

Body	SG iron	DIN 1693 GGG 40.3
Bonnet	SG iron	DIN 1693 GGG 40.3

QL43 Range

Body	Cast steel	DIN 17245 GS C25
Bonnet	Forged steel	DIN 16 Mn Cr5

Maximum valve differential pressures

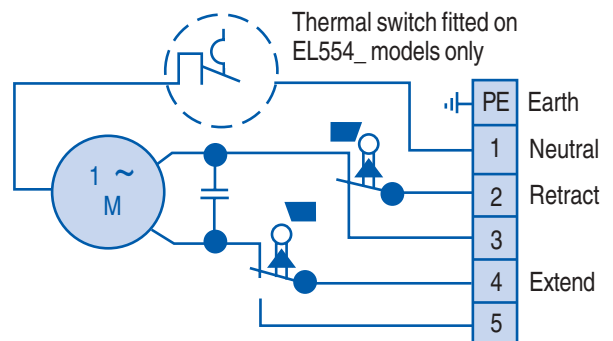
QL73	25 bar
QL43	40 bar

Technical data actuators

Types	EL5511	EL5521	EL5531	EL5541
	EL5512	EL5522	EL5532	EL5542
	EL5513	EL5523	EL5533	EL5543
Voltage	230 Vac ± 20 % / 110 V / 24 V			
Frequency	50 / 60 Hz			
Power consumption	10.9 W	21 W	49 W	78 W
IP rating	IP65			
Running speed mm / s	0.5		0.6	
Ambient temperature limits	-20°C to +60°C -20°C to +50°C for P models			
Motor type	Synchronous capacitor reversing		Non synch.	
Manual override	Handwheel			
Transfer switching	5 amp inductive 230 Vac 50 Hz			
Conduit entries	2 x PG13	2 x PG13 1 x PG9	3 x PG16	
Positioner power consumption	5 VA			
Positioner input impedance	4 - 20 mA = 150 ohm 2 - 20 V = 50 ohm			
Valve adaptors for DN15 - DN50 valves	EL5811	EL5821	EL5831	EL5841
Valve adaptors for DN65 - DN100 valves	EL5812	EL5822	EL5832	EL5842

Installations and wiring

The actuator should preferably be mounted above the valve, but in any case should not be mounted below it. Ensure the actuator is coupled to the valve before power is applied and wiring meets local regulations.

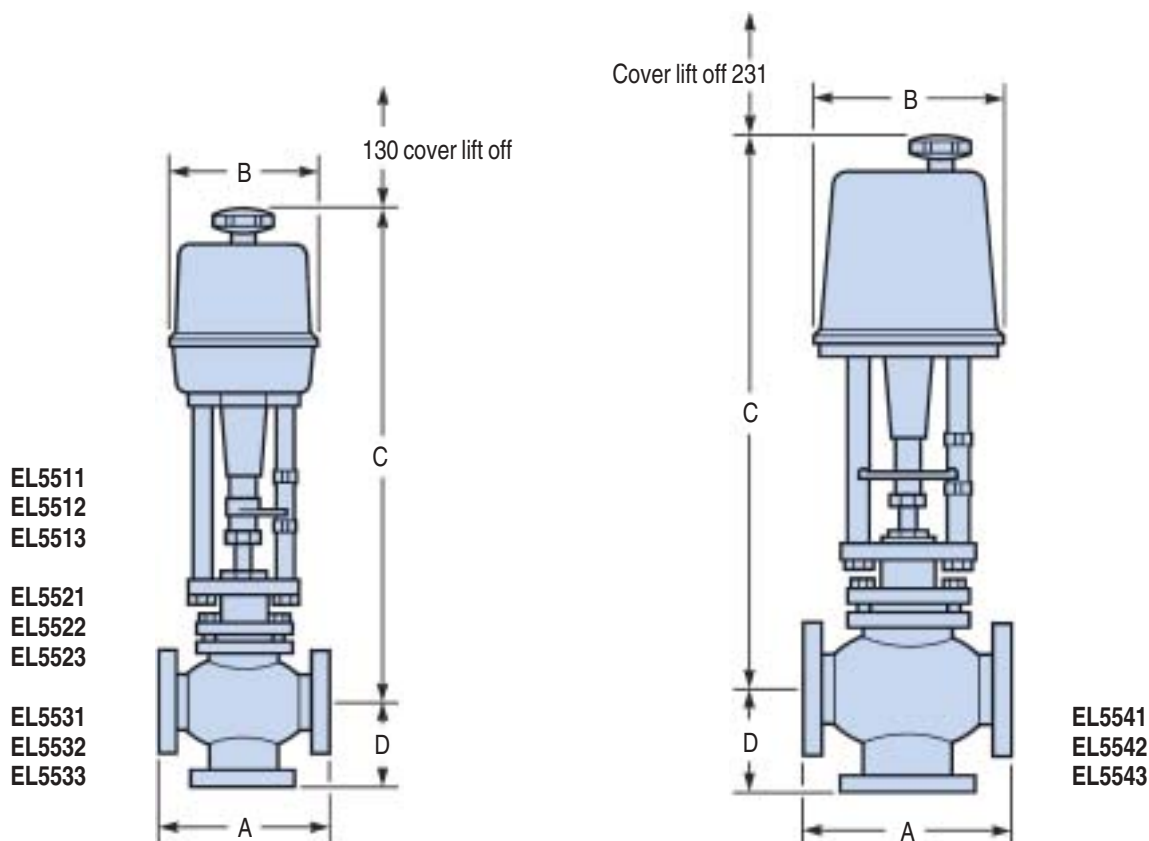


Typical specification

The electrical control valves shall comprise a Spirax Sarco QL43 cast steel 3-port valve with double guided stem, sprung Chevron stem seals, stainless steel internals and flanged to BS 4504 PN40. The valve construction shall be asbestos free. The actuator shall be Spirax Sarco, driven by a synchronous motor with overload protection with facilities for a plug in 2 - 10 V or 4 - 20 mA positioner.

The actuator shall have IP65 encapsulation, fitted with a permanent override knob and be mounted on the valve body by "NAMUR" pillars.

Technical information (Dimensions approximate in mm)



QL73 and QL43 3-port valves

	Size	DN15	DN20	DN25	DN32	DN40	DN50	DN65	DN80	DN100
Flanged valve	A	130	150	160	180	200	230	290	310	350
	D	90	95	100	105	115	125	145	155	175

EL5511 / 5512 / 5513 series actuator

B	176	176	176	176	176	176	176	176	176	176
C	590	590	585	609	622	628	630	635	650	650
Total weight	8.1 kg	8.7 kg	11.5 kg	13.7 kg	14.7 kg	17 kg	24 kg	29.8 kg	40.9 kg	40.9 kg

EL5521 / 5522 / 5523 series actuator

B	-	-	176	176	176	176	176	176	176	176
C	-	-	585	609	622	628	630	635	650	650
Total weight	-	-	12 kg	14.2 kg	15.2 kg	17.5 kg	24.5 kg	30.3 kg	41.4 kg	41.4 kg

EL5531 / 5532 / 5533 series actuator

B	-	-	-	-	176	176	176	176	176	176
C	-	-	-	-	657	663	665	670	685	685
Total weight	-	-	-	-	17.2 kg	19.5 kg	26.5 kg	32.3 kg	43.4 kg	43.4 kg

EL5541 / 5542 / 5543 series actuator

B	-	-	-	-	225	225	225	225	225	225
C	-	-	-	-	721	727	729	734	750	750
Total weight	-	-	-	-	20.2 kg	22.5 kg	29.5 kg	35.3 kg	46.4 kg	46.4 kg

Some of the products shown may not be available in certain markets.

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