

Damcos™ SC Actuators

SC Actuators for Gate Valves

Linear Double-Acting Duplex Piston Actuator



Description

The SC actuator is designed to operate wedge gate valves (lower closing thrust than opening thrust) and open/closing these by means of hydraulic pressure.

Construction and Function

This double-acting cylinder has been constructed to function in a 2-line system.

Opening-/Closing direction is depending upon the choice on which side of the piston the hydraulic pressure is placed.

Into the cylinder a booster piston has been built, which increases the opening power in proportion to the closing thrust.

In the cylinder head an indicator shaft is placed. This shaft turns when the piston moves up and down, by which the true position of the valve is shown. Between valve and cylinder is placed a packing bush, furnished with rubber sealing rings. Between the sealing ring a small hole out to the open has been drilled in order to prevent mixing of the liquids. Damcos has plugged the hole.

Hydraulic Operation

Opening of the Valve

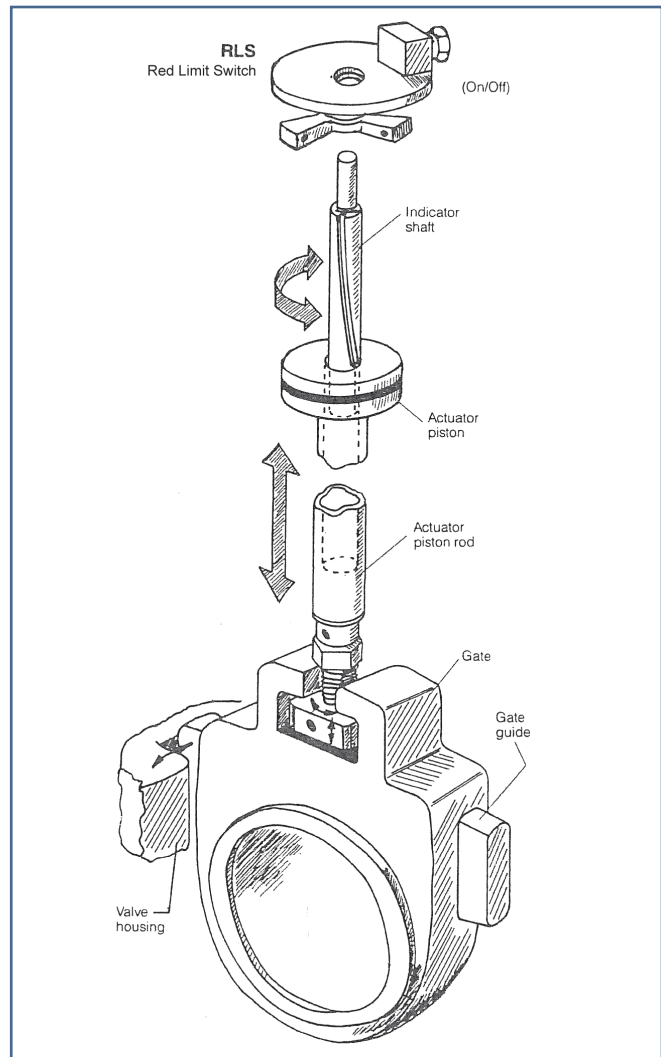
Turn the corresponding pilot valve to position “open”. The hydraulic pressure will then be conducted from pump station/ power unit through the respective pipes to the opening side of the piston. The closing side of the piston is simultaneously connected with the oil tank of the power unit.

The oil pressure lifts the booster piston to stop-face against the main piston, thus pressing the cylinder spindle upwards and the valve opens.

As long as the pilot valve is in position “open” the valve will stay open.

Closing of the valve

The corresponding pilot valve is turned to position “closed” and the oil pressure is then conducted to the closing side of the piston. From the opening side the oil is led to the tank. Hereby the booster and main piston press the cylinder spindle down, making the valve close. By the last movement the booster piston stops smoothly when stop-facing the cylinder, and does not participate in the closing. Consequently the closing thrust is reduced.



Emergency Operation

In order to be able to operate a gate valve with an SC-cylinder in an emergency situation it is necessary for the SC-cylinder to be pressureless, e.g. by means of either a double pilot controlled non-return valve or a check valve. The emergency operation takes place by means of a hand pump.

Opening/Closing of Valve by Hand Pump

The hoses of the hand pump are connected by means of quick connections to the respective joints of the cylinder. The change over valve is to be placed in the position required, open/closed, and it is necessary to pump until the valve reaches the proper position. Hereafter the change over valve is placed in position neutral, locking the oil on both sides of the piston, and the valve is kept in position.

Consideration when choosing a Damcos SC Actuator

When choosing a Damcos SC actuator to operate a gate valve there are 3 variables to be considered:

1. type, i.e. diameter of the actuator
2. closing-stroke thrust reduction ratio
3. stroke

Please refer to the “SC Actuator Categories” table on next page when choosing an actuator.

Actuator type (Diameter)

The naming of the actuator type starts with the letters SC, that stands for a linear double-acting, duplex piston actuator and ends with a number. The last digit of the number is the model designation whilst the remaining digits represent the actuator inside cylinder diameter in mm.

For example an SC630 is a model “0” and has an inside cylinder diameter of 63 mm (2.5”).

The actuator type is chosen according to the required opening thrust of the gate valve in question.

The Thrust table below shows the opening thrusts for all SC types at 105, 125 and 135 bar working pressure. Choose the smallest type that produces sufficient thrust at the available working pressure. (The thrust is directly proportional to the applied pressure).

Closing Stroke Thrust Reduction

A smaller closing thrust than opening thrust is an actuator feature that is obtained through the duplex piston design. It is a necessity when operating valves with conical gates, but it is also an important feature for parallel gate (sluice-) valves as it prevents seizing in case of trapping of foreign bodies.

The normal reduction ratio is for closing thrust: opening thrust = 1:1.8 which is equivalent to a closing thrust reduction of 44%. The actuator piston set that produces this reduction is designated /1 .

Some of the SC actuator types (see table) are available with a reduction ratio (1:1.5) - that is a reduction of 33%. This actuator piston set is designated /2 .

For example an SC 630/1 is a “63 mm”, model “0” actuator with a 44% closing thrust reduction.

Stroke

When choosing an SC actuator the exact Nominal Lift (L_N) of the valve must be known.

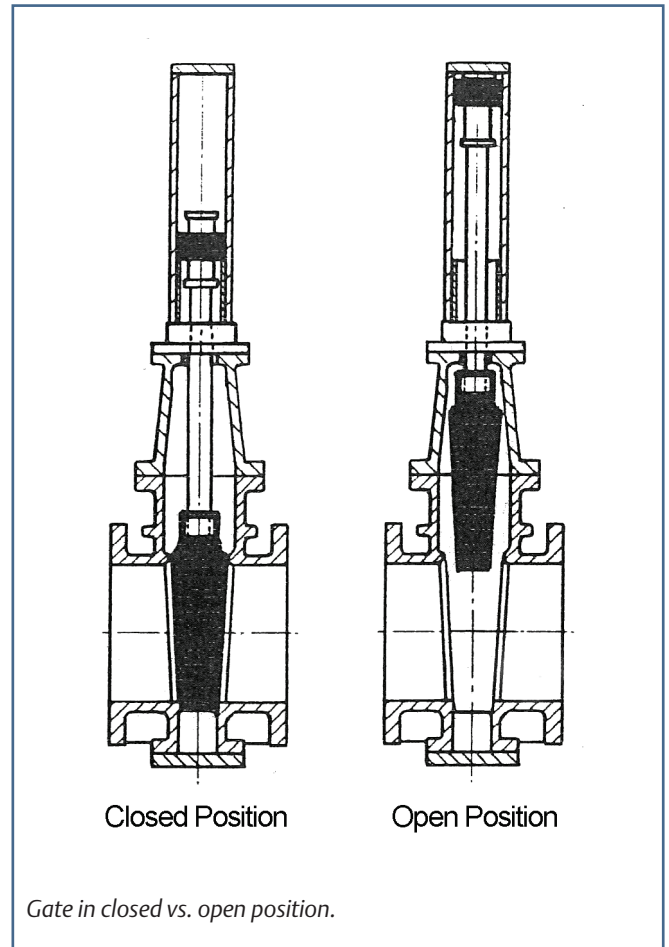
The Nominal Lift should be understood as the distance between the gate when it is in closed (new seats) position and when it is in the fully open position (without the gate hitting the valve upper housing!)

The Nominal Lift is usually between 105% and 130% of the nominal diameter (DN) of the valve. The actuator must be chosen so that its Nominal Stroke corresponds to the Nominal Lift of the valve. In the table the Nominal Strokes of the SC actuators are divided into three categories; Short (S), Medium (M) and Long (L).

When the Nominal Stroke of the valve is known, find out in which actuator stroke category this figure belongs and state the category letter as well as the exact Nominal Stroke. If the actuator is an SC 630/1 and the required Nominal Stroke is 245 mm, the actuator should be designated SC 630/1-M245, because 245 mm lies within the Medium range from 213 - 378 mm.

Note!

The total stroke of the actuator is larger than the nominal stroke in order to compensate for seat wear in valves with conical gates!



Gate in closed vs. open position.

SC Actuator Categories								
Actuator type	Opening thrust (kN)			Closing thrust		Nominal stroke (mm)		
	105 Bar	125 Bar	135 Bar	44% Reduction	33% Reduction	S Short	M Medium	L Long
SC 400	9	10	11	/1	/2	52 - 118	118 - 278	278 - 428
SC 500	15	18	19	/1	/2	67 - 168	168 - 328	328 - 538
SC 630	25	29	32	/1	/2	67 - 213	213 - 378	378 - 648
SC 700	30	35	38	/1		127 - 218	218 - 428	428 - 748
SC 800	42	50	54	/1	/2	202 - 268	268 - 423	423 - 743
SC 1000	68	81	88	/1		252 - 318	318 - 528	528 - 738
SC 1300	117	140	151	/1		302 - 428	428 - 638	638 - 848
SC 1600	174	207	224	/1		352 - 528	528 - 738	738 - 948

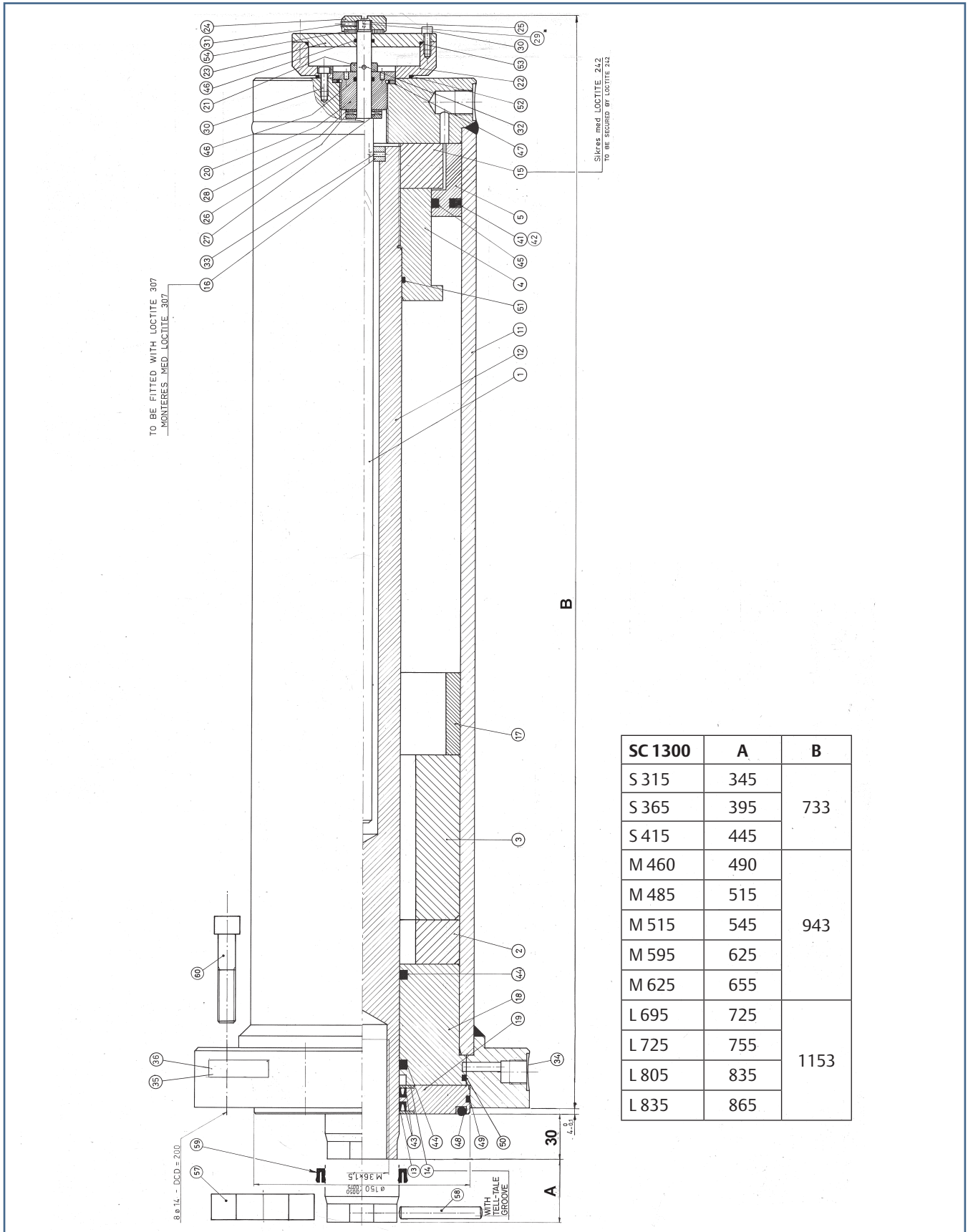
/1) Closing/Opening thrust ratio 1:1.8 (closing thrust reduced 44%)

/2) Closing/Opening thrust ratio 1:1.5 (closing thrust reduced 33%)

Actuator type	Approx. weight (kg)			Displacement per 100 mm stroke (l)		Length of SC Actuator (mm) excluding intermediate flange		
	S Short	M Medium	L Long	Opening	Closing	S Short	M Medium	L Long
SC 400	9	10	11	0.09	0.13	320	480	630
SC 500	13	15	17	0.15	0.20	370	530	740
SC 630	18	20	23	0.24	0.32	420	585	855
SC 700	22	24	30	0.29	0.39	445	655	975
SC 800	32	37	40	0.41	0.50	515	670	999
SC 1000	47	54	62	0.66	0.79	585	795	1005
SC 1300	82	92	102	1.13	1.33	735	945	1155
SC 1600	123	137	151	1.69	2.01	865	1075	1285

Technical Data	
Housing/Cylinder/Flange	Steel
Indicator spindle	Acid proof steel
Indicator housing	Brass (CuZn ₃₉ Pb ₃)
Position indicator or top cover	Brass (CuZn ₃₉ Pb ₃)
Bushing between actuator and valve cover	Brass (CuZn ₃₉ Pb ₃)
Spindle	Acid proof steel
Sealings	NBR and PTFE

Dimensions



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