



## Automatic Recirculation Valve

# series SUL



flow actuated  
pump protection unit

### Features:

- Dependable Operation
- Low maintenance
- Easy to install
- Damping of system pulsations
- Suitable for many fluids
- Wide temperature range



**SCHROEDAHL**  
Specialty Valves

## Preamble

Modern process industry often requires centrifugal pumps to operate with fluctuating flows. This is a result of automated control of such processes. Too low flows in centrifugal pumps however may result in overheating and lead to damage or cause unstable operation. It is important that flows through a pump do not get below a certain minimum as stated by the pump manufacturer.

## Automatic recirculation control

During the last decades, SCHROEDAHL has developed a series of valves, which provide automatic bypass at low flow conditions. The bypass opens only when the mainflow is throttled to less than the minimum flow. In these valves, which are basically disc-type non-return valves, the movement of the disc is used to open or close the bypass.

All valves combine four functions in one:

1. The automatic recirculation valve senses the mainflow and positions the disc accordingly.
2. The automatic recirculation valve bypasses the minimum flow to a suction tank (or condensate tank), preventing overheating of the pump.
3. The cascade element in the bypass reduces the high pressure of the main flow to a lower pressure in the suction tank, this combined with a low noise level and minimum wear and tear.
4. The automatic recirculation valve also operates as a checkvalve, preventing a return flow through the pump.

Besides the well-known TD and MRM series, the series SUL valve offer an effective, low cost protection for pumps in the chemical- and petrochemical industries.

## Description

The SUL valve design is a further development of the SCHROEDAHL SU valve, an automatic recirculation valve which is used on board ships since 1960. The valve consists of a valve body (pos. 01 and 02), and a check valve (pos. 07), which is guided at the top by the guide bushing (pos. 04) and the vortex bushing (pos. 10) at the bottom. The check valve is springloaded (pos. 06) and is fitted with a damping device (pos. 14, 15).

This arrangement ensures a stable operation of the valve, even if pulsations do occur in the system.

The automatic bypass section comprises the vortex bushing (pos. 10), in which a bushing/stem assembly (pos. 11/12) follows the movement of the check valve. The bypass capacity (Kv) can be adjusted by changing the adjustment bolts (pos. 13), which is available with dimensions as required to meet the field conditions. Therefore, any minimum flow value between 20% to 80% of the mainflow is possible.

## Features

- Dependable operation - few moving parts
- Easy to install - in a vertical or horizontal position, direct to the pump outlet
- Easy to change flow characteristics (change of 1 part - pos. 13 - only)
- Suitable for a wide range of fluids such as water, oils, hydrocarbons, liquid gases and chemicals. Allowable temperatures from  $-200^{\circ}$  to  $+280^{\circ}$  C

## Sizes

DN 25, 32, 40, 50, 65, 80, 100, 125, 150, 200 (1", 1 1/4", 1 1/2", 2", 2 1/2", 3", 4", 5", 6", 8" and 10").

## Materials

Housing casted in carbon steel or stainless steel, internal always in forged stainless steel.

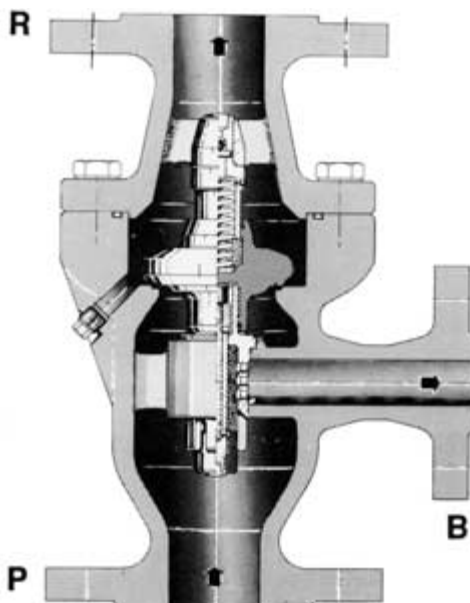
## Connections

Flanges acc. DIN or ANSI in PN 10, 16, 25, 40 and 64 (ANSI 150/300 lbs).

## Sizing and Selection

In order to size and select the valve, the following data are required:

1. Required Mainflow -  $Q_{P-R}$
2. Required minimumflow -  $Q_B$
3. Pump discharge pressure at design flow -  $P_1$
4. Pump discharge pressure at minimum flow -  $P_M$
5. Max. pump pressure (max. design pressure) -  $P_{max}$
6. Backpressure in the bypass piping -  $P_{bypass}$
7. Temperature of the fluid
8. Specific gravity of the fluid
9. Required pressure rating of the valve
10. Horizontal or vertical installation of the valve
11. Is drain connection required?



## Valve Code

Size	Pressure	Configuration
05 = DN25      1"	1 = PN10	V = vertical installation
06 = DN32      1 1/4"	2 = PN16	H = horizontal installation
07 = DN40      1 1/2"	3 = PN25 - ANSI 150 lbs	CS = carbon steel body
08 = DN50      2"	4 = PN40	SS = stainless steel body
09 = DN65      2 1/2"	5 = PN64 - ANSI 300 lbs	D = with drainhole
10 = DN80      3"		F = DIN-flanges
11 = DN100     4"		U = ANSI-flanges
12 = DN125     5"		
13 = DN150     6"		
15 = DN200     8"		
16 = DN250     10"		

### Sizing

- Determine size of the valve with Table 2.  
The pressure loss of the valve is calculated as follows:

$$\left( \frac{\text{actual mainflow } Q}{\text{max. mainflow } Q_n} \right)^2 \times \text{s. g.} \times 0.4 + 0.25 \text{ bar}$$

- Calculate the pressure difference at minimum flow:  
 $\Delta p = p_M - p_{\text{bypass}} \leq (\text{max. } 40 \text{ bar or } 600 \text{ psi})$
- Calculate the required bypass Kv or Cv

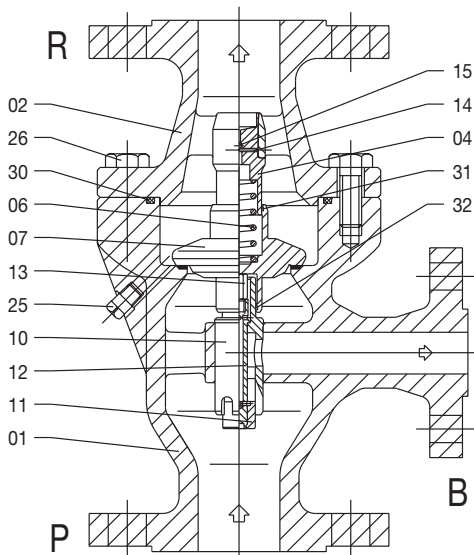
$$K_v = Q \text{ (m}^3\text{/hr)} \times \sqrt{\frac{\text{s. g.}}{\Delta p \text{ (bar)}}$$

$$\text{or } C_v = Q \text{ (US gpm)} \times \sqrt{\frac{\text{s. g.}}{\Delta p \text{ (psi)}}$$

- Check if Kv (Cv) required = Kv (Cv) available according table 2 (if not, select next larger valve).
- Determine the required pressure rating, vertical or horizontal installation, and the flanges required.

### Example:

SUL 083UV-CS is an automatic recirculation valve type SUL with 2" main flanges, ANSI 150 lbs, vertical installation, housing material of carbon steel.



### Installation Instructions

The valve should be installed as close to the pump as possible; preferably on the pump outlet and in a vertical or horizontal position. The distance between valve inlet and pump outlet should not exceed 1.5 m (5 ft) to prevent low pressure pulsations caused by the elasticity of the fluid.

Ensure that the drainhole (if provided) is at the bottom of the valve in case of horizontal installation.

### Maintenance

Maintenance and installation instructions are available upon request.

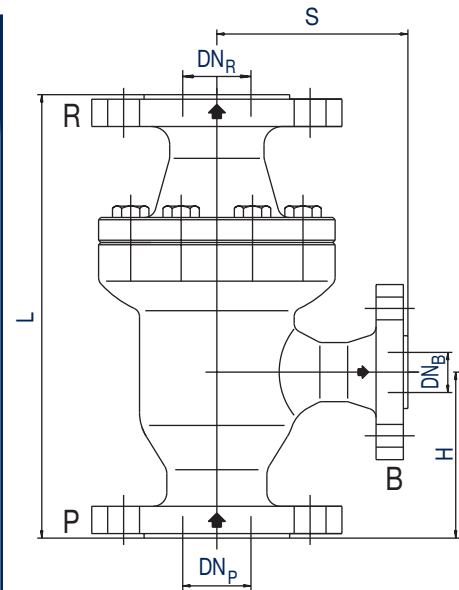
Correct operation of the valve is to be checked with the usual operational test of the pump.

Part- No.	Description
01	Body
02	Bonnet
04	Guide bushing
06	Spring
07	Disc
10	Vortex bushing
11	Control bushing
12	Stem
13	Adjustment bolt
14	Pin
15	Ball
25	Drain screw
26*	Hex. screw
30*	O-ring
31	Guiding ring
32	Guiding ring

Recommended spare parts.

**Table 1 - Dimensions**

Valve size DN <sub>p</sub> (DN <sub>R</sub> )	Dimensions mm (in)			Bypass (DN <sub>M</sub> )	Weight kg (lb)	
	S	H	L		PN10/16 150 lbs	PN25/40/64 300 lbs
25 (1")	115 (4 1/2")	102 (4")	267 (10 1/2")	15 (10 1/2")	12 (28)	18 (39)
32 (1 1/4")	115 (4 1/2")	102 (4")	267 (10 1/2")	20 (3/4")	14 (32)	20 (43)
40 (1 1/2")	115 (4 1/2")	102 (4")	267 (10 1/2")	20 (3/4")	14 (32)	20 (43)
50 (2")	130 (5 1/8")	108 (4 1/4")	305 (12")	25 (1")	22 (48)	26 (59)
65 (2 1/2")	165 (6 1/2")	136 (5 3/8")	406 (16")	40 (1 1/2")	46 (101)	51 (112)
80 (3")	165 (6 1/2")	136 (5 3/8")	406 (16")	40 (1 1/2")	46 (101)	51 (112)
100 (4")	209 (8 1/4")	159 (6 1/4")	495 (19 1/2")	50 (2")	105 (231)	118 (260)
125 (5")	267 (10 1/2")	228 (9")	679 (26 3/4")	80 (3")	220 (484)	240 (528)
150 (6")	267 (10 1/2")	228 (9")	679 (26 3/4")	80 (3")	220 (484)	240 (528)
200 (8")	356 (14")	305 (12")	902 (35 1/2")	100 (4")	524 (1155)	549 (1210)
250 (10")	356 (14")	305 (12")	902 (35 1/2")	100 (4")	530 (1168)	560 (1234)


**Table 2 - Sizing and Selection**

Valve size	mm inches	25 1	32 1 1/4	40 1 1/2	50 2	65 2 1/2	80 3	100 4	125 5	150 6	200 8	250 10
Max. main flow	m3/hr	12	30	30	50	100	100	200	400	400	750	750
	GPM us	52	135	135	220	440	440	800	1760	1760	3300	3300
	GPM imp.	44	110	110	183	366	366	732	1464	1464	2745	2745
Max. bypass flow	Kv	2	4	4	6	16	16	30	60	60	100	100
	Cv	2,3	4,6	4,6	6,9	18,5	18,5	34,7	69,3	69,3	116	116
	m3/hr	6	8	8	18	42	42	65	180	180	280	280
	GPM us	26	35	35	80	185	185	280	790	790	1230	1230
	GPM imp.	22	29	29	65	153	153	237	657	657	1022	1022
bypass size	mm inches	15 1/2	20 3/4	20 3/4	25 1	40 1 1/2	40 1 1/2	50 2	80 3	80 3	100 4	100 4

Subject to changes

 Besuchen Sie unsere Homepage • Bezoek onze website • Visit our homepage • [www.schroedahl.com](http://www.schroedahl.com)

**Schroedahl-Arapp**  
**Spezial-Armaturen GmbH & Co. KG**  
 Schönenbacher Str. 4  
 D-51580 Reichshof-Mittelagger (Germany)  
 Tel.: +49 (0) 2265/9927-0  
 Fax: +49 (0) 2265/9927-27  
 Fax: +49 (0) 2265/9927-47 (Vertrieb/Sales)  
 E-Mail: [info@schroedahl.de](mailto:info@schroedahl.de)

**Schroedahl International B. V.**  
 P.O. Box 537  
 NL 4600 AM Bergen op Zoom  
 The Netherlands  
 Tel.: +31 (0) 164/255040  
 Fax: +31 (0) 164/259885  
 E-Mail: [si@schroedahl.com](mailto:si@schroedahl.com)

**U. S. Sales Organisation:**  
**Schroedahl International Corp.**  
 2400 Augusta Dr., Suite 285  
 Houston, Texas, TX 77057  
 USA  
 Tel.: +1 (0) 713/975-8351  
 Fax: +1 (0) 713/780-0421  
 E-Mail: [sic@schroedahl.com](mailto:sic@schroedahl.com)