Special-Multifunction Valve SMV 10/12 and SMV 18/20

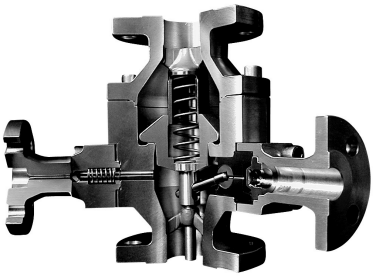

Figure 1 Special-Multifunction Valve SMV 10 / SMV 12

Application

The Special-Multifunction Valve (SMV) is a pump protection device. It automatically protects centrifugal pumps from damage which might occur through partial evaporation of the fluid content during low load operation (see also SSV-types).

Additional the SMV provides an **Automatic Degassing Device** for idle and stopped pumps. The integrated degassing vent at the pressure site of the pump secures a constant filling with the delivery fluid of stopped and reserved pumps.

The SMV type was designed especially for following applications:

- Delivery of industrial liquid gases
- Low temperature services of fluid gas pumps
- Delivery of easily boiling fluids
- Delivery of fluids near the boiling point
- Delivery of liquids with gas-phase
- Pumps with gas-injection for the sealing system

Experiences in Practice

In case of fluid gases in the boiling point, the transformation of fluid into gas occurs by a minor temperature increase in the stopped pump. This gas volume then presses the fluid out of the pump towards the suction pipe. This results in the pump filling up partly or totally with gas. This can be caused by the temperature influence from outside as well as from the after-heat of the pump immediately after disconnection. Depending on the pump type it will become completely dry or filled up with gas in a way, that the impellers cannot build up delivery pressure when the pump is re-started. Thus the pump operates dry and seconds later considerable damages occur, possibly leading to destruction of the pump and environment.

Design and Operation

For the main flow - to the process - the valve has an inlet flange DN_1 and an outlet flange DN_2. The minimum flow is going out through an additional branch DN_3 back to the reservoir. The automatic minimum flow regulation complies with the SSV type.

The automatic degassing of the Multifunction valve SMV takes place through an additional branch DN_4. It is automatically kept in open position, when the pump is not working. Thus a continuous degasification is provided and the pump is always filled completely with delivery fluid.

Immediately after start-up the pump produces the required differential pressure, and the automatic degassing device of the SMV valve shuts the degassing line tightly.

Advantage and Utility

- automatic degassing of idle and stopped pumps
  avoidance of damages to the pump and plant caused by gas filled and dry pump operation;
  keep the pump in “cold state” in low temperature services
- assurance of the required pump minimum continuous safe flow
  no inadmissible temperature increase in the pump;
  avoidance of cavitations in the pump;
  avoidance of pump and plant damages
- integrated non-return valve in the main delivery stream
  avoidance of reverse operation of the pump;
  allows parallel pump operation
- specifically designed throttle system in the bypass (low cavitations)
  reduces pressure and flow rate to minimum flow requirements
  optionally with integrated non-return valve in the bypass (SMV 18, SMV 20)
- favorable NPSH-value of the plant ($NPSH_A$) and the pump ($NPSH_R$)
  lower capacity in operating point because of automatic closure of the minimum flow line
- lower prime mover power requirement
- lower facility costs

Special Features

- modulating bypass control with low wear by the „Rotary-Valve-Design“
- non-return-function in main direction to the process
- multistage reduction of pressure and flow rate in the bypass - low cavitations
- without additional auxiliary energy and measuring technique
- less pressure loss
- mounting position vertical* or horizontal
- all internal parts are made out of stainless steel
- reliable and durable

Example of Installation

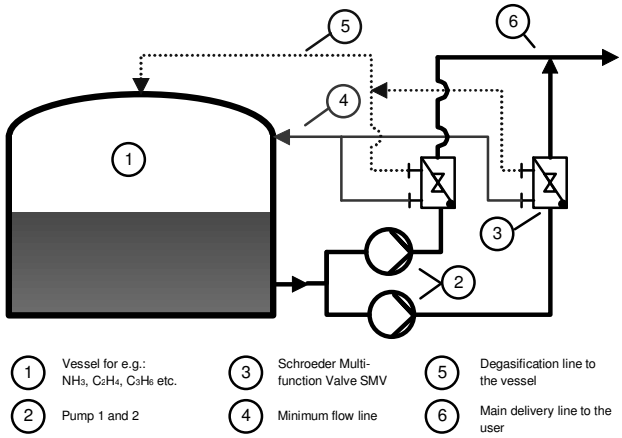

Figure 2 Delivery of easily boiling fluids

Special-Multifunction Valve SMV 10/12 and SMV 18/20

Technical Data SMV 10/12 and SMV 18/20

Medium	
Fluids without solids up to 15% gas phase	
Viscosity	≤ 150 cSt
Temperature	-200 °C up to +300 °C* -330 °F up to +572 °F*
Engineering Specification	
Nominal width DN	
• main direction	25 up to 300 mm; (1“ up to 12“)*
• bypass	15 up to 150 mm (0,5“ up to 6“)*
• automatic degassing	15 or 25 mm (0,5“ or 1“)*
Pressure rate	PN 10 up to PN 320* ANSI 150 up to ANSI 2500 lbs*
Bypass control	modulating with throttle or non-return valve
Material casing parts	1.0460 (A105)* ASME in () 1.0566 (A350-LF2); 1.4301 (A182-F304); 1.4541 (A276-321); 1.4571 (A276-316TI); 1.4404 (A182-F316L); 1.4462 (A182-F51); further materials by request
Material internals	stainless steel*
Connection	Flanges according to DIN / ANSI* Sealing and connection parts are not scope of supply
Mounting position	vertical* or horizontal
Operating Condition	
Pressure difference between inlet (DN_1) and Bypass branch (DN_3)	max. 180 bar (40 bar SMV12/20) max. 2600 psi (580 psi SSV20/12)
Flow rate main direction	5 m³/h up to 2000 m³/h* 22 USgpm up to 8800 USgpm*
Flow rate bypass	up to 630 m³/h* (2775 USgm)* 35%, max. 50% of main flow rate is advised*
Flow velocity	max. 10 m/s (flange)
Pressure loss in the valve (applied to main flow)	0,5 bar (low pressure) up to 1,3 bar (high pressure)

* standard version, more by request

Design

The construction is according to specification AD 2000 and particularly to EN 13445. As per Pressure Equipment Directive 97/23 EC the products are provided with the CE marking and the Declaration of Conformity. Certified according to the Module H1 (Pres-sure Equipment Directive 97/23 EC) all dangerous material classes of category 1 to 4 are covered.

Installation and Connection

The SMV is produced and tested only for the ordered data according the customer data sheet. Following points have to be alluded:

- Mounting direct on the pump discharge branch (advised)
- Pipes have to be connected free of stress, without offset, mismatch or longitudinal shifting
- The pipe system must be cleaned and free of soiling
- Installation has to be in the ordered mounting position
- The degassing pipe has to go upward constantly and without any hollow
- To maintain the valve and to calm down the flow a piece of straight pipe with a length of 1 meter (40”) has to be installed at the bypass branch DN_3 and at the outlet branch DN_2
- The bypass pipe has to be filled with medium anytime
- The supplied installation and operating instructions has to be followed

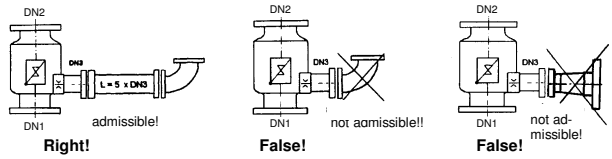

Figure 3 Mounting with straight pipe piece

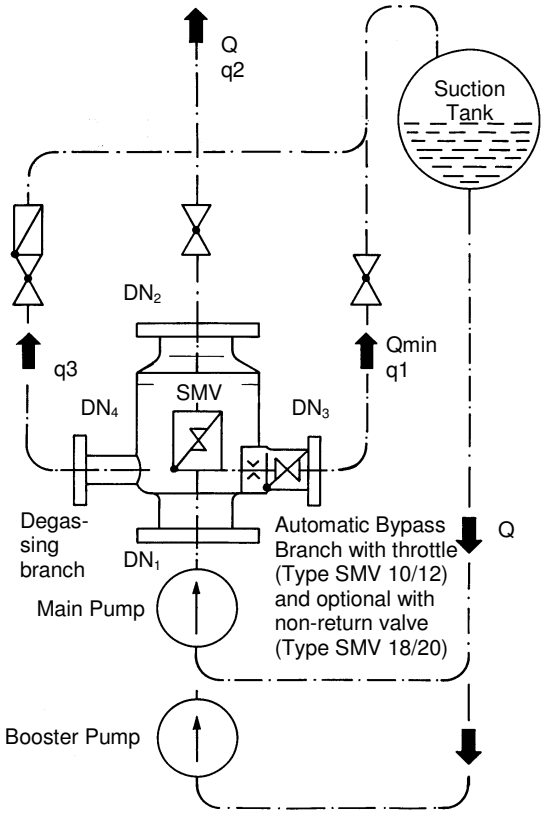

Figure 4 Bypass Return with automatic degassing device

Special-Multifunction Valve SMV 10/12 and SMV 18/20

Note of Application

The operator of these fittings is responsible for suitability, proper use and corrosion resistance of the used materials with regard to the used fluid. It must be ensured that the materials selected for the fitting parts in contact with the medium are suitable for the used process media. The fitting may only be used for the application specified in the operating instructions and the data sheets. Provide a touch guard for surface temperatures of < -10 °C or > +50 °C. This touch guard must be designed in a way that the max. allowable ambient temperature on the unit is not exceeded. Before replacing the valve, check that the unit is free of hazardous media and pressures.

Designation of the Valves

The designation of the valve specifies the type, nominal width and pressure rate, the flange sizes and the mounting position.

Example:

S M V 1 0 - 5 0 / 1 6 0 - 5 0 / 5 0 / 1 5 / 1 5 - 1
S M V 1 0 - 2 " ANSI900 - 2 / 2 / 0,5 / 0,5 - 1

Valve type	
with throttles in bypass	10
with throttles in bypass	12
with non-return valve in the bypass	18
with non-return valve in the bypass	20
Valve size	
DN 50 mm	50
DN 2" (ANSI)	2"
Pressure rate	
160 bar	160
900 lbs. (ANSI)	ANSI900
Flange sizes	
inlet DN_1 50 mm	50
inlet DN_1 2" (ANSI)	2
outlet DN_2 50 mm	50
outlet DN_2 2" (ANSI)	2
bypass DN_3 15 mm	15
bypass DN_3 0,5" (ANSI)	0,5
degassing branch DN_4 15 mm	15
degassing branch DN_4 0,5" (ANSI)	0,5
mounting (applied to main flow)	
vertical	1
horizontal	2

SMV 12, SMV 20

The type SMV 12 resp. SMV 20 corresponds technical with the SMV 10 resp. SMV 18 and will be supplied with a larger bypass. This is required for larger bypass flows up to 40 bar differential pressure. The choice will be done factory-made.

Marking of the Valve

The Special-Multifunction Valve has the following name plate with all relevant valve data.

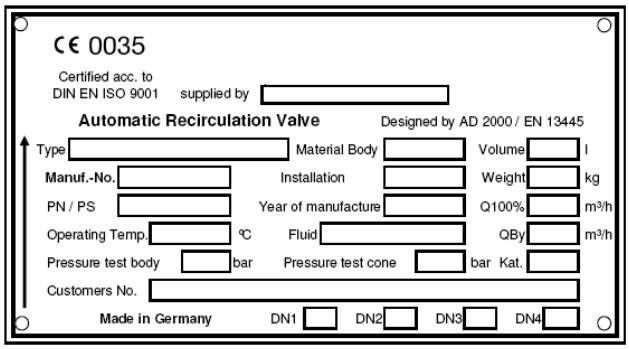

Figure 5 Name plate mounted to the fitting

Accessories

The **hand operating branch** with multiport-throttle is fitted at the casing below the cone seat and serves to pass off the minimum flow via a hand-operated valve combination. We recommend the branch for protection of the internal bypass parts at extreme operating conditions, e.g. at high differential pressures and frequent operation in the range of bypass flow as well as for filling and start-up of the plant.

Start-Up-Trim (SUT) substitutes the bypass valve head during cleaning and start-up of plants and therefore spares the sophisticated regulating parts (optional, permanently open bypass outlet). Also usable instead of the hand operating branch.

Warm-up branch, pressure gauge branch, draining branch etc. can be provided, if required.

The **pressure device SPD** avoids cavitations and flashing in piping. The function corresponds to a variable throttle which adjusts oneself to the flow rate.

The **damping valve SRV** will be applied to absorb pressure shocks during recurrent on/off operation e.g. for descaling facilities at steel mills. The SRV has to be mounted direct to the AR-Valve.

Parts List SMV 10/12 with Throttles

Part-#	Designation	Materials
1	Lower body	according to operating conditions and valid standards
2	Upper body	
3	Cone	
4	Cone guide	
10	Bypass branch	
15	Throttle	
26	Degassing Branch	
27	Degassing Valve	
60	Bypass Valve Head, compelte	
78.1	O-Ring	
78.2	O-Ring	
78.3	O-Ring	
78.4	O-Ring	
78.5	O-Ring	
91.1	Socket screw	
91.2	Socket screw	
95.1	Coil spring	
95.4	Coil spring	

Wear and Spare Parts SMV 10/12

Bypass Valve Head	
Bypass Valve Head, complete	Part-# 60
Throttle in the Bypass Branch	
Throttle	Part-# 15
O-Ring	Part-# 78.2
Single Spare Parts	
Degassing Valve	Part-# 27
O-Ring	Part-# 78.1
O-Ring	Part-# 78.2
O-Ring	Part-# 78.3
O-Ring	Part-# 78.4
O-Ring	Part-# 78.5
Coil spring	Part-# 95.1
Coil spring	Part-# 95.4

With reservation to changes

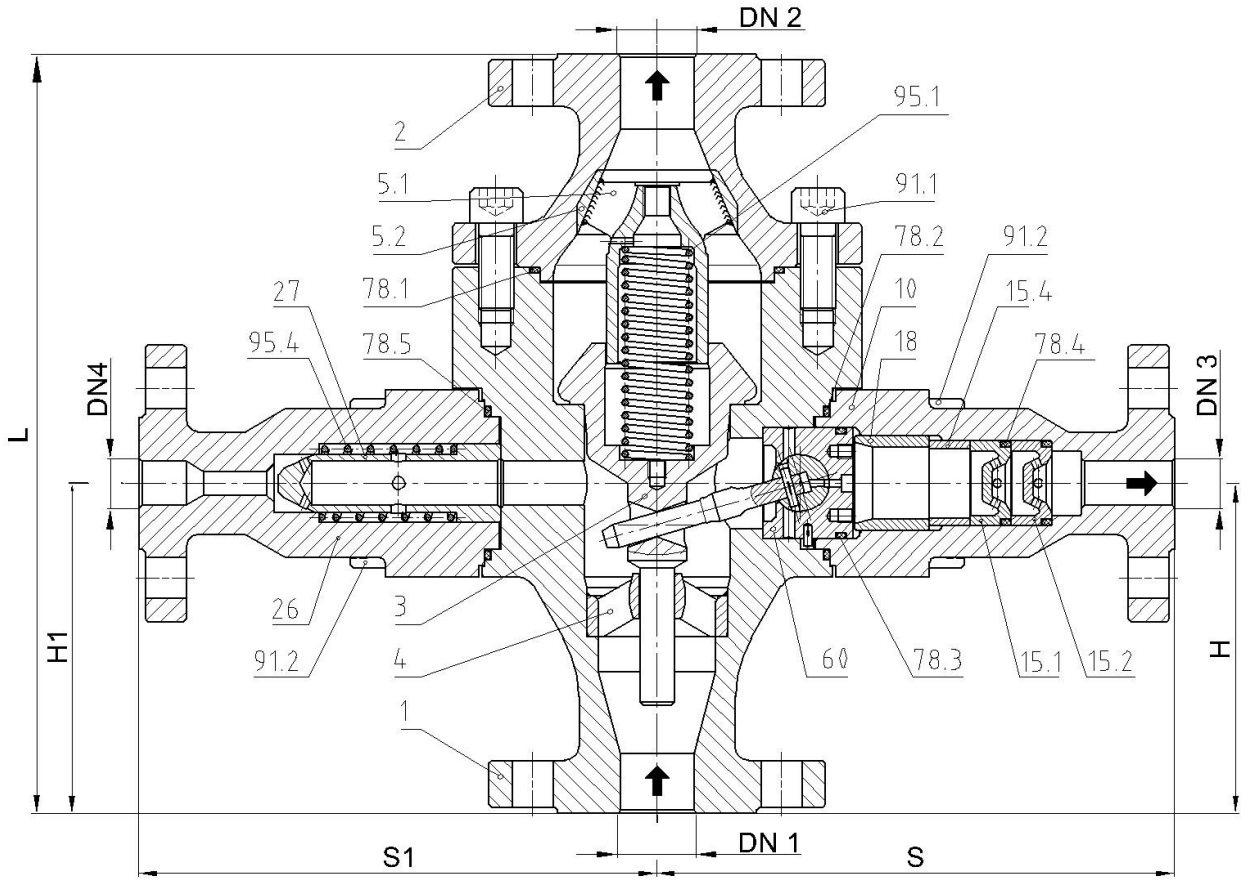

Figure 6 SMV 10/12 with multistage pressure and flow reduction in the bypass

Parts List SMV 18/20 with Non-Return Valve in the Bypass

Part-#	Designation	Materials
1	Lower body	
2	Upper body	
3	Cone	
4	Cone guide	
10	Bypass Branch	
16	Throttle	
17	Valve	
26	Degassing Branch	
27	Degassing Valve	according to operating conditions and valid standards
60	Bypass Valve Head, compelte	
78.1	O-Ring	
78.2	O-Ring	
78.3	O-Ring	
78.4	O-Ring	
78.5	O-Ring	
91.1	Socket screw	
91.2	Socket screw	
95.1	Coil spring	
95.3	Coil spring	
95.4	Coil spring	

Wear and Spare Parts SMV 18/20

Bypass Valve Head	
Bypass Valve Head, complete	Part-# 60
Non-Return Vale, complete	
Throttle	Part-# 16
Valve	Part-# 17
O-Ring	Part-# 78.4
Coil spring	Part-# 95.3
Single Spare Parts	
Degassing Valve	Part-# 27
O-Ring	Part-# 78.1
O-Ring	Part-# 78.2
O-Ring	Part-# 78.3
O-Ring	Part-# 78.4
O-Ring	Part-# 78.5
Coil spring	Part-# 95.1
Coil spring	Part-# 95.4

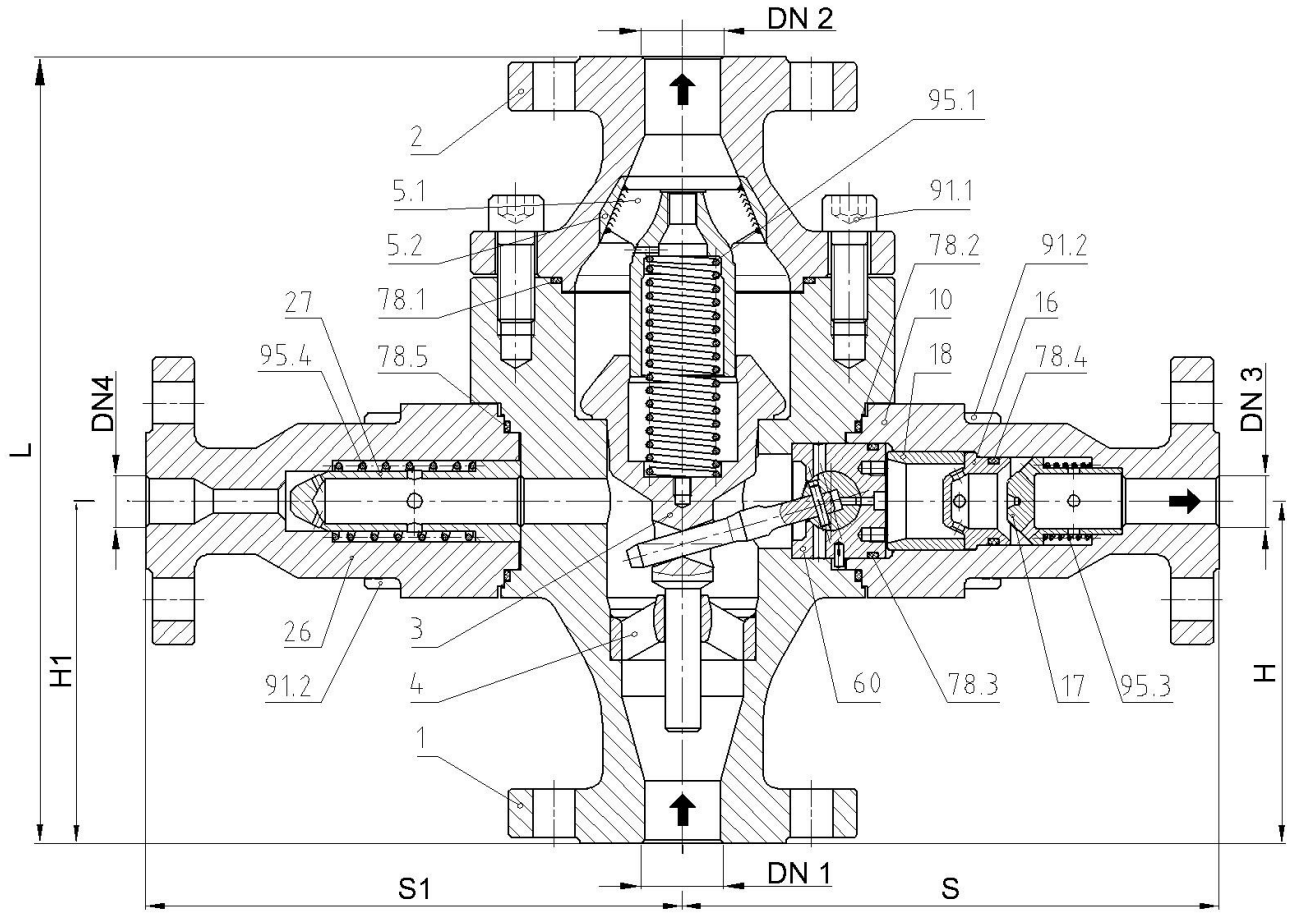

Figure 7 SSV 18/20 with integrated non-return valve and multistage pressure and flow reduction in the bypass