

Description

The tube metering pump series SV is a glandless, oscillating metering pump with hydraulically actuated pump chamber. It consists of pump head and drive mechanism.

□ The pump head

The vertically mounted elastomer tube (28) within the pump head forms a smooth pump chamber passage which is completely surrounded by hydraulic fluid (pumps can be arranged to use a hydraulic fluid other than oil, if oil should be incompatible with the process fluid). The pump head is separate from the crank case, so that in the unlikely event of the failure of the tube, process fluid will not enter the crank case. During the discharge stroke the plunger (19), which is coupled to the piston rod (18), presses the hydraulic fluid through the holes of the tube support (29). As a result the tube deforms and displaces the process fluid through the discharge valve (23). During the suction stroke the tube is hydraulically expanded and returns to its initial position. This creates a vacuum within the pump chamber and effects refilling through the suction valve (33). The pump head is fully protected against both vacuum and overpressure.

Vacuum protection

The hydraulic leakage valve (35) which is fitted within the hydraulic chamber (31) is so constructed that the hydraulic fluid is required to compensate for effective leaks only, which may occur at the plunger bushing (20). Clogged suction line, closed valves, low suction head or high viscosity of the medium cannot damage the pump because the hydraulic chamber can never be overfilled. Due to these features the pump is selfpriming and can accommodate vacuum suction (limited by the vapour pressure of the hydraulic fluid).

Overpressure protection

The pump head is equipped with an internal pressure relief valve (30). An additional relief valve on the discharge side of the pump is therefore not necessary and would also be too expensive since its construction material must be resistant to the process fluid.

□ The drive mechanism

The V-type drive mechanism is a motor driven crank gear with variable eccentricity. The stroke length is adjustable either whilst running or stationary by means of a stroke positioner (12). The adjusted stroke length is indicated on a stroke length indicator (10) with an increment of 0.1 mm. The movable parts of the drive mechanism are manufactured to close tolerances. Sufficient lubrication action is provided by means of a built-in oil pump. Due to the inherent design of the drive mechanism the pump gives excellent metering accuracy (less than 0.1 % under ideal operating conditions) and reproducibility together with long life.

❑ Driver

Pumps are normally equipped with a three-phase electric motor, protection class IP 54. Explosion proof motors are also available. DC-motor, hydraulic motor or other versions of drivers can be provided. The drive can also be via a hydraulic coupling or a variable speed gearbox.

Construction materials

Elastomer tube (28) of Viton, Perbunan or EPDM, valves (23 and 33), tube flanges (25 and 32) and connecting pieces (24 and 34) are in stainless steel. For special application they are also available in Hastelloy alloys, nickel, monel, titanium, tantalum, molybdenum, bronze, ceramics and plastics (PTFE, PVDF, PVC, Polypropylene, Nylon and others).

Range of applications

The tube pump is a universal glandless oscillating metering pump for a wide range of applications.

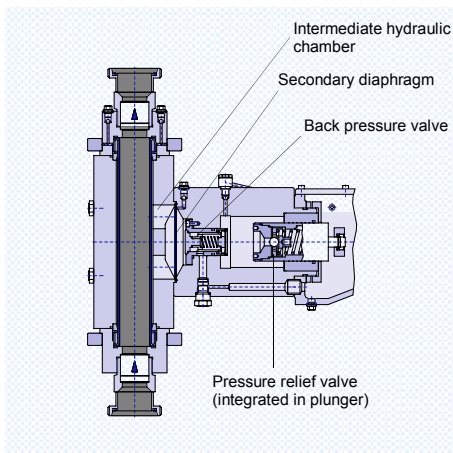
- ❑ The pump protects its surrounding against contamination by leakage because the pump chamber is hermetically sealed. There is no risk to health when operating with dangerous fluids such as poisonous, easily flammable, explosive, corrosive or obnoxious products.

- ❑ The pump protects the product against deteriorating influences of the atmosphere or light (oxydation, polymerisation, crystallisation or microbiological damage). This pump is designed so that the minimum shear forces are transmitted to the pumped products.

Consequently the tube metering pump is particularly suitable for the food and beverage industry (metering of beverage syrup, sugar, solution, pectins, yeasts, food and beverage base products and concentrates, yoghurt, jams etc.).

- ❑ The pump can be easily fitted into CIP circuits without dismantling. There are no inaccessible corners within the pump chamber which are isolated from the cleaning or sterilizing agent. The pump chamber is even suitable for steam sterilization.
- ❑ The pump is highly recommended for use with abrasive liquids and slurries such as suspensions of chalk, kieselgur, zinc, oxide, titanium, oxide, super-saturated sugar solutions etc. Due to the fact that no stuffing box is used, wear and tear problems cannot arise.
- ❑ The pump is suitable for operation with nonlubricating process fluids such as distilled water etc., and thus avoids the need for stuffing box lubrication systems as required by plunger or piston pumps.

Pump head variations and modifications



Pump head with intermediate chamber designed for pre-pressurized suction conditions and vapour sterilization

The standard version can be sterilized up to 110 °C. The construction shown on the left is suitable for temperatures up to 140 °C. During the sterilization period the hydraulic system of the pump will be discharged by means of a back pressure valve. Pump heads with intermediate chamber are also recommended for highly pressurized suction conditions where this pressure could act upon the pump chamber during the stand still period.

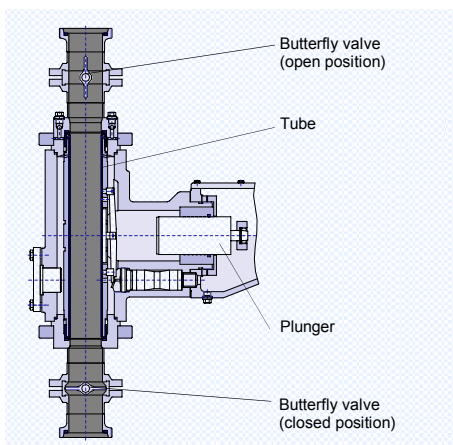
Pump head with externally linked suction and discharge valves and other valve modifications

The tube pump heads are supplied as standard with single ball valves (cone valves for larger sized models). For special applications modified valve assemblies are available. For high metering accuracy and small capacities double or multiple valve assemblies are recommended.

Valves can also be supplied spring-loaded with stellite coated valve seats or elastomer coated seats.

For slurries, viscous products and for metering applications with negative pressure difference between discharge and suction we recommend mechanically linked valves having an external source of actuation.

The figure opposite shows externally linked butterfly valves for metering of high viscous fluids. The valves are operated by a cam gear mechanism which is coupled to the shaft of the drive mechanism. These are particularly suitable for metering liquids with whole fruit pieces. Special constructions have been developed for cream, latex and similar sensitive products.



Tube failure monitoring

On special request tube pump heads can be equipped with a tube failure monitoring system. Generally conductivity probes are used. According to the nature of the liquid to be pumped and the hydraulic fluid, other probe types may be installed (e.g. based on photo-electric principle).

Standard pump heads (without intermediate chamber) can be monitored by a liquid level probe in the reservoir.

Heating-/Cooling jackets - automatic bleeding

❑ Heating-/Cooling jacket

In some cases it is necessary to heat the process fluid in order to make or keep it pumpable (high viscous material, glucose, plastics, inverted sugar solution, honey, grease, etc.). Also a specific processes could require high or low temperature. In these cases a heating or cooling jacket is recommended (partially or totally jacketed including valves connecting pieces and hydraulic chamber).

Sufficient heating in many cases can be achieved by means of a thermostatically controlled electric cartridge.

❑ Automatic bleeding device

Pump heads can be equipped with an automatic bleeding device which ensures continuous bleeding of the hydraulic chamber (viscous products or difficult suction conditions could effect evaporation of hydraulic fluid). The automatic bleeding device is equipped with a fixed capillary allowing effective air bleeding with a minimum of volumetric efficiency losses.

Multiple pump assemblies

Multiple pump assemblies with common driver can be supplied. Each head is separately adjustable and controllable. If necessary, common stroke control equipment can be fitted to multiple pumps.

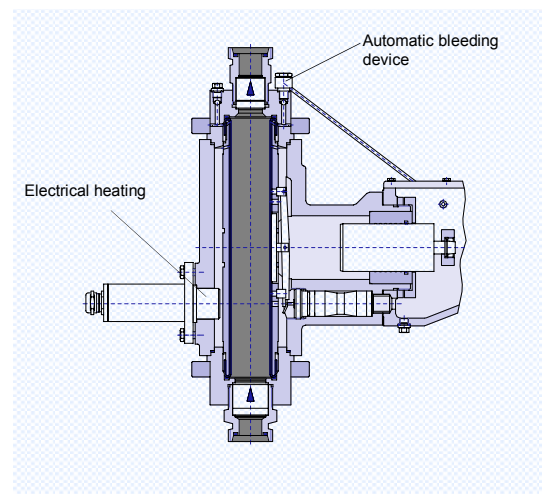
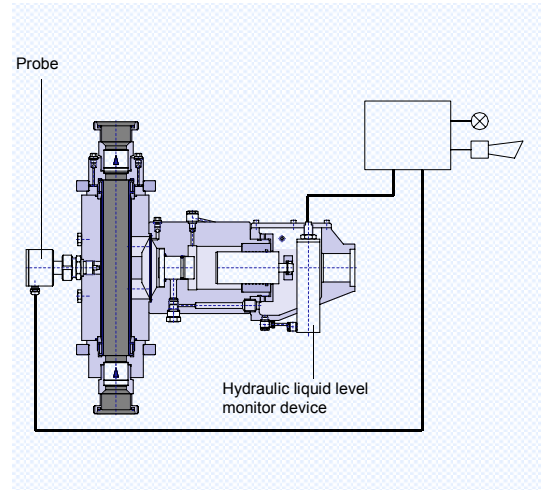
The standard types are equipped with threads or flanges according to DIN, ASA (ANSI) or BSS.

On special request pumps can be delivered with connections to suit the customers requirements. If required connections can be constructed so that valves are removable without dismantling the pipework (cross-head design).

Metering pump accessories

(please ask for special documentation)

- ⇒ Pulsation dampers
- ⇒ Relief valves, back pressure valves and non-return valves
- ⇒ Flow meters
- ⇒ Vessels and fittings
- ⇒ Static and dynamic mixers
- ⇒ Jets and injection nozzles
- ⇒ Low level switches and conductivity probes
- ⇒ Monitoring systems



Required data for enquires:

- ⇒ **Process fluid**
Type, concentration, specific gravity, viscosity, vapour pressure, size and percentage of solids.
- ⇒ **Operating conditions**
Temperature, suction head, discharge head (max./min.), static head and quantity.
- ⇒ **Driver**
Type, voltage, current, phase, frequency, protection.
- ⇒ **Connections**
Type, rating and facing

Pump data

Series	Pump type	Theoretic capacity ¹⁾ (l/h)	Operating pressure (bar)	Tube size	Plunger diameter (mm)	Stroke volume (cm ³)	Piping size ²⁾ (mm) (Zoll)		Valve size	Relief valve size	Gear box data	
SV 055 (120 strokes/minute)	SV 055.3/28	141	40	20	28	19,7	15	1/2	70	028	Stroke length:	32 mm
	SV 055.3/35	221	31	20	35	30,8	15	1/2	70	028	max. power:	0,58 kW
	SV 055.3/45	366	18	30	45	50,9	25	1	180	045	Piston load:	300 kp
	SV 055.3/56	567	12	30	56	78,8	25	1	180	045	Gear ratio:	i = 11,5
	SV 055.3/70	886	7,5	45	70	123,1	40	1 1/2	280	110		
SV 150 (120 strokes/minute)	SV 150.5/22	136	40	20	22	19	15	1/2	70	028	Stroke length:	50 mm
	SV 150.5/28	221	40	20	28	30,8	15	1/2	70	028	max. power:	1,06 kW
	SV 150.5/35	346	38	30	35	48,1	25	1	180	045	Piston load:	370 kp
	SV 150.5/45	575	23	30	45	79,5	25	1	180	045	Gear ratio:	i = 11,5
	SV 150.5/56	886	15	45	56	123,2	40	1 1/2	280	110		
	SV 150.5/70	1385	9,5	45	70	192,4	40	1 1/2	450	110		
	SV 150.5/90	2289	5,5	65	90	318	50	2	700	280		
SV 150.5/110	3420	3,5	65	110	475	65	2 1/2	1100	280			
SV 410 (115 strokes/minute)	SV 410.8/28	340	40	30	28	49,3	25	1	180	045	Stroke length:	80 mm
	SV 410.8/35	530	40	30	35	76,9	25	1	180	045	max. power:	4,28 kW
	SV 410.8/45	877	40	45	45	127,2	40	1 1/2	280	110	Piston load:	1050 kp
	SV 410.8/56	1359	40	45	56	197	40	1 1/2	450	110	Gear ratio:	i = 12,67
	SV 410.8/70	2124	27	65	70	307,9	50	2	700	280		
	SV 410.8/90	3511	16	65	90	508,9	65	2 1/2	1100	280		
	SV 410.8/110	5245	11	100	110	760,3	80	3	1800	700		
SV 410.8/140	8497	6	100	140	1232	100	4	2800	700			
SV 1350 (108 strokes/minute)	SV 1350.12/45	1288	40	45	45	198,8	40	1 1/2	450	110	Stroke length:	125 mm
	SV 1350.12/56	1995	40	65	56	307,9	50	2	700	280	max. power:	7,58 kW
	SV 1350.12/70	3117	31	65	70	481,1	65	2 1/2	1100	280	Piston load:	1200 kp
	SV 1350.12/90	5152	18	100	90	795,2	80	3	1800	700	Gear ratio:	i = 13,33
	SV 1350.12/110	7697	12	100	110	1188	100	4	2800	700		

¹⁾ Capacity data refer to standard stroke frequency. Pumps operating with externally linked valves and pumps for viscous products are run at reduced speed.

²⁾ Standard piping size. High viscous products require increased piping diameter (especially suction). Specify connection type (flange, thread etc.) at enquiry!



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