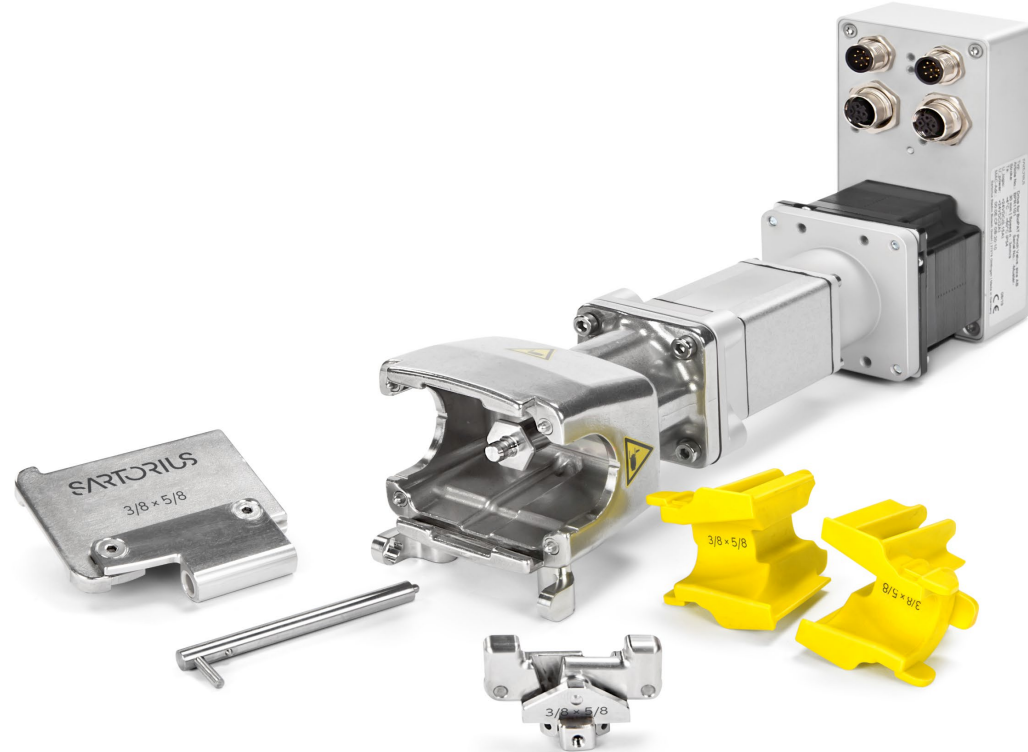


Simplifying Progress

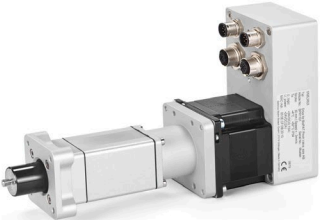


BioPAT[®] Pinch Valve

Customer Presentation

SARTORIUS

BioPAT® Pinch Valve Family



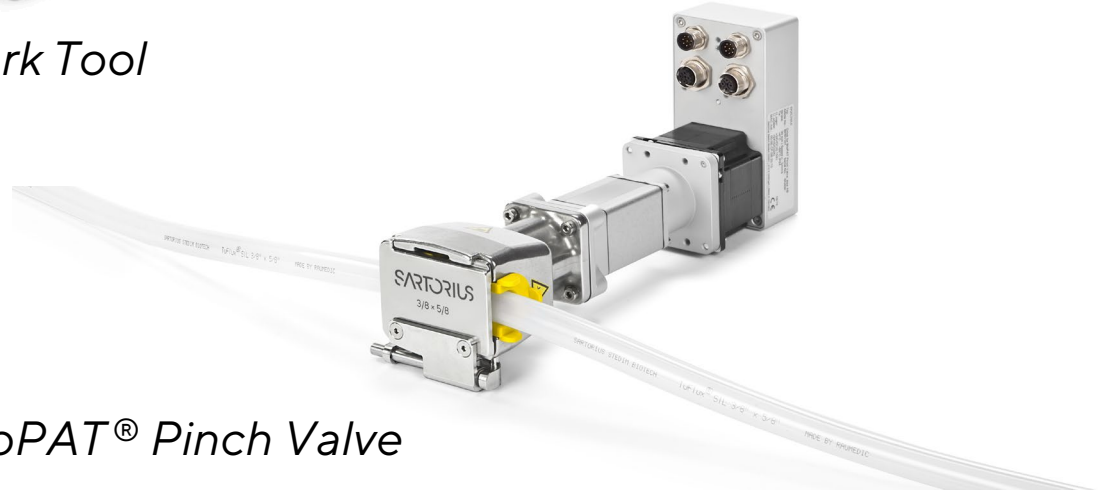
Drive



Valve Body, Spindle, Lid, Gripper and Tube Holder



Fork Tool



BioPAT® Pinch Valve

Working Principle

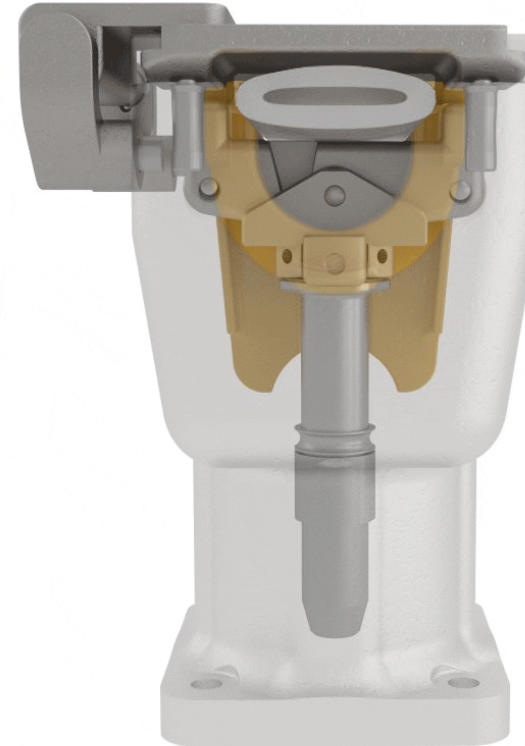
- When tubing is correctly installed in BioPAT® Pinch Valve and lid is close, degree of 'openness' can be controlled by moving the gripper and the spindle
- To open the tube: drive pulls shaft and gripper deeper into the body, while gripper is slightly closing to bring tube back to original form



Definition	Description
Fully Close	Defined during the initialization of the valve as the maximum distance the motor can travel without installed tubing.
Closing point-secure (CPS)	Position at which the tubing is fully close. Dependent on tubing type and size. Pre-configured in the control unit software.
Opening point (OP)	Position at which the tubing is open enough to achieve X% of the flow rate. Dependent on tubing type and size. Pre-configured in the control unit software.
Fully open	Defined during the initialization of the valve as the minimum distance the motor can travel without installed tubing.

Working Principle: Re-opening Mechanism

- *Re-opening mechanism: purposely designed feature in the BioPAT® Pinch Valve gripper*
- *promote the re-shaping of the tube cross-section after long periods being closed*
- *To open tubing: levers on the gripper push walls of the tubing inwards, while spindle and gripper move away from the lid*



*Working principle
schematic of the
BioPAT® Pinch Valve*

Sizes Overview

The BioPAT® Pinch Valve has been qualified for use with the following tube types and sizes:

BioPAT® Pinch Valve size	Tubing Size ID x OD	TuFlux® SIL ¹	Dow Corning® Pharma 50 ²	Sani-Tech® STHT®-R ³	C-Flex® 374 ³
A	1/8" x 1/4"	•	•	-	•
	1/4" x 3/8"	•	•	-	•
	1/4" x 7/16"	•	•	-	•
B	3/8" x 5/8"	•	•	•	•
	1/2" x 3/4"	•	•	-	•
	1/2" x 7/8"	-	-	•	-
C	3/4" x 1"	•	•	-	•
	3/4" x 1 1/8"	•	•	•	-
	1" x 1 3/8"	-	-	•	-

ID: inner diameter; OD: outer diameter

¹ Tuflux® is a registered Trademark of Sartorius Stedim Biotech GmbH

² Dow Corning® is a registered Trademark of Dow Corporate

³ Sani-Tech® und C-Flex® is a registered Trademark of Saint-Gobain Performance Plastics Corporation

Ranges Overview

The operation of the BioPAT® Pinch Valve with the different tubing types and sizes was qualified up to the following operating pressure in the tubing:

Tubing ID	1/8"	1/4"	3/8"	1/2"	3/4"	1"
Raumedic TuFlux® SIL ¹	0.2 bar				1.0 bar	
Dow Corning®Ph arma 50 ²	1.5 bar			1.0 bar		
Sani-Tech® STHT®-R ³			5.0 bar	3.0 bar		
C-Flex® 374 ³	1.0 bar					

ID: inner diameter

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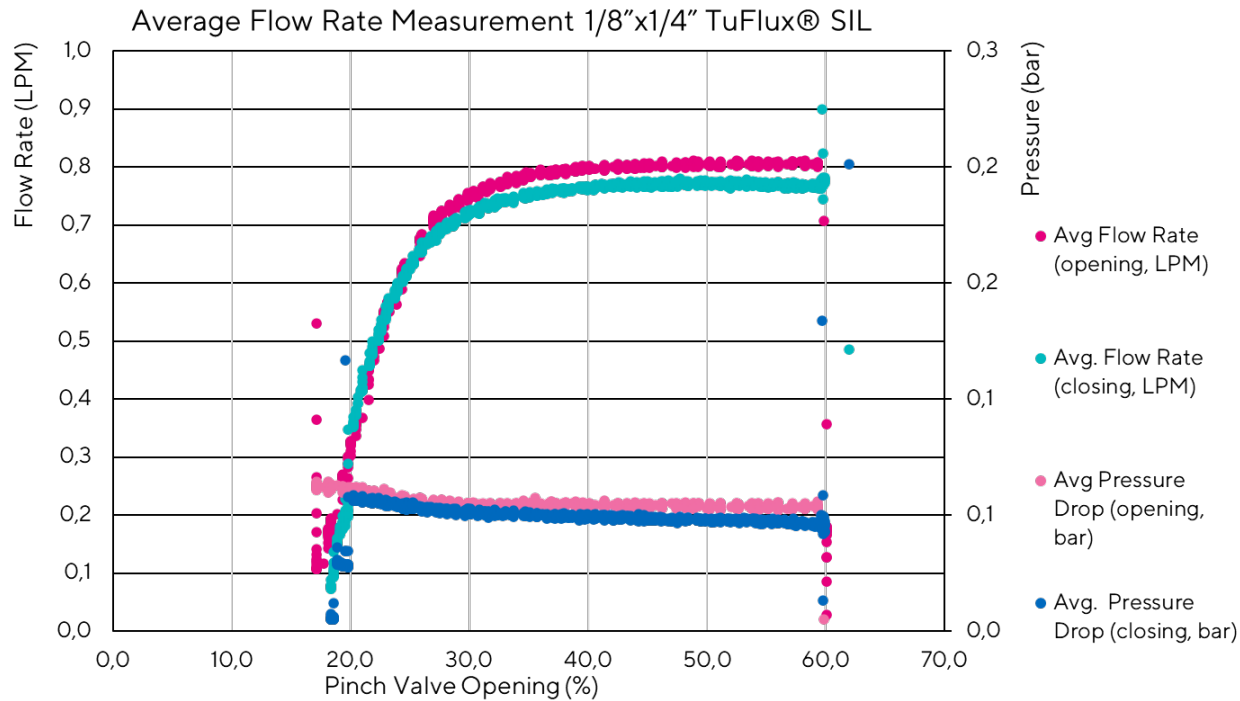
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Technical Characteristics of Valve and Drive

- *BioPAT® Pinch Valve is controlled by an electrical drive*
- *The step motor allows high accuracy and robustness of the positioning of the valve*
- *The electrical drive is available in two sizes: small (used with sizes A & B) and big (used with size C)*
- *Can be integrated into the Sartorius single-use upstream and downstream bioprocessing systems, through Profinet® interface*
- *Digital interface allows a more comprehensive integration, control and flexibility of the BioPAT® Pinch Valve, and better monitoring of maintenance status of motor itself*

Flow Curves



- Each tubing type and size has a characteristic curve that relates position of the BioPAT® Pinch Valve to the flow rate allowed by the valve
- Figure 1 shows the characteristic flow curve for Tuflux®Sil, with a BioPAT® Pinch Valve size B, with the corresponding installation-set size
- Figure 1 also shown the absolute pressure generated by the valve, at each position of the BioPAT® Pinch Valve.
- Characteristic flow curves for all tube types and sizes are available on-demand. To obtain this information, please contact our sales office.

Open and Closing Points

The table below summarizes the opening points and closing points-secure for all tube types and sizes currently qualified for the BioPAT® Pinch Valve.

BioPAT® Pinch Valve size	Tubing Size ID x OD	TuFlux® SIL ¹		Dow Corning® Pharma 50 ²		Sani-Tech® STHT®-R ³		C-Flex® 374 ³	
		OP	CPS	OP	CPS	OP	CPS	OP	CPS
A	1/8" x 1/4"	39	17,3	46,2	18,2	-	-	40,9	16,9
	1/4" x 3/8"	46,5	17,8	42,2	18,3	-	-	47,6	18,2
	1/4" x 7/16"	51,7	21,4	48,8	23,1	-	-	52,8	21
B	3/8" x 5/8"	39,8	7,1	35,4	8,1	45,0	13,1	35,8	9,1
	1/2" x 3/4"	51,4	5,3	44,3	7,6	-	-	32,7	8,4
	1/2" x 7/8"	-	-	-	-	71,0	18,9	-	-
C	3/4" x 1"	45,0	8,4	54,0	8,7	-	-	50,0	9
	3/4" x 11/8"	46,0	10,3	50,0	10,1	51,0	8,3	-	-
	1" x 1 3/8"	40,0	12,4	-	-	51,0	11,8	-	-

ID: inner diameter; OD: outer diameter; OP: opening point; CPS: closing point-secure

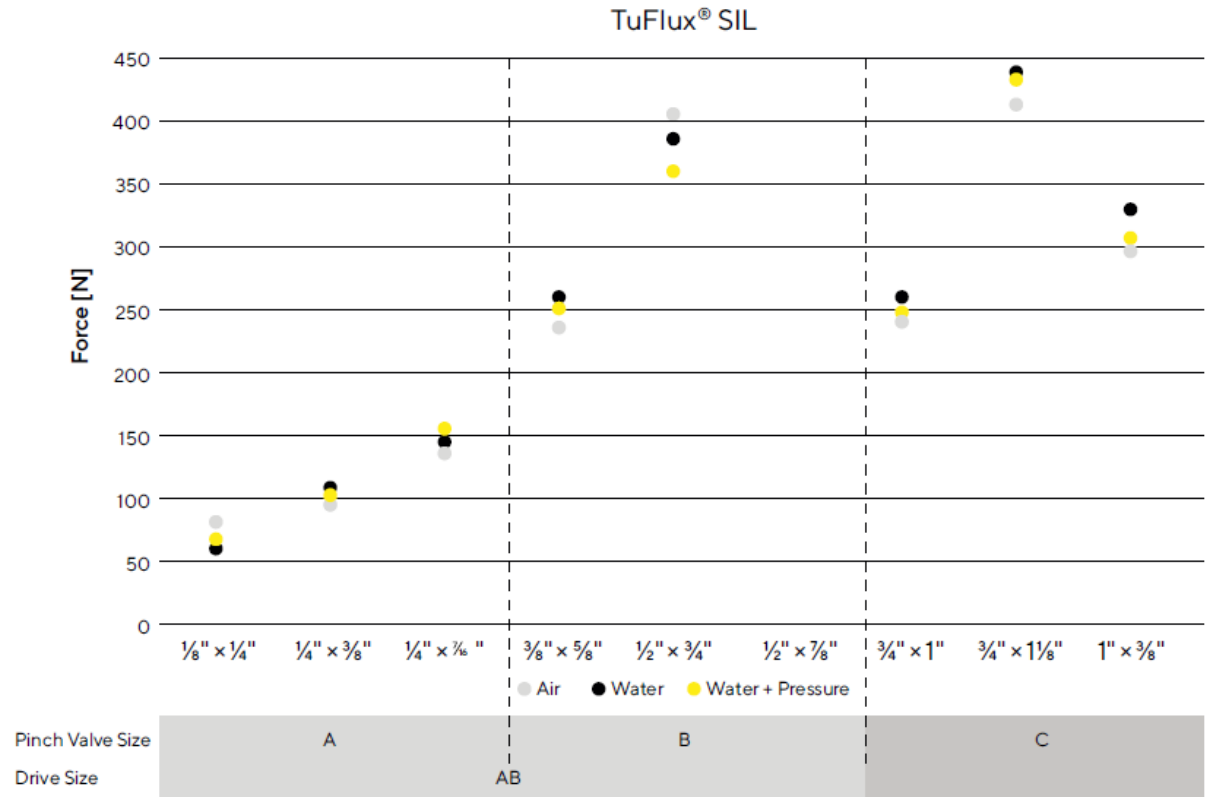
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Influence of Process Parameters: Closing Speed and Forces

- The force required to control the degree of opening of the BioPAT® Pinch Valve is dependent on:
tube type, tube size and operating pressure in the tubing
- Characteristic force curves for all qualified tube types are available on-demand, please contact our sales office
- The force required to pinch the tubing then has an impact on the maximum speed at which the electrical drive can operate



Maintenance

Life Time

The different components of the BioPAT® Pinch Valve have been qualified for different lifetimes depending on their functions.

- *Tubing: 300 pinches at the same position on the tubing without position adjustment, without losing performance.*
- *Installation Set: 1.45 km use-distance or 25.000 cycles*
- *BioPAT® Pinch Valve Body: 7.25 km use-distance or 125.000 cycles*
- *Electrical Drive: 14.5 km use-distance or 2000 operating hours*

Forktool for BioPAT® Pinch Valve

- *To assist with changing the gripper of a BioPAT® Pinch Valve e.g. while changing the installation set*
- *Suitable for every size of the gripper*



Fork Tool



Securing the Fork Tool between the middle and index fingers, press the button on the fork tool and remove the gripper from the housing.



Press both lateral clamps to release Fork Tool.

Order Information – Electrical Drives and Pinch Valve Bodies

<i>Article Number</i>	<i>Description</i>
<i>BPR1101</i>	<i>Drive for BioPAT® Pinch Valve, Size A&B</i>
<i>BPR1102</i>	<i>Drive for BioPAT® Pinch Valve, Size C</i>
<i>BPR1006</i>	<i>BioPAT® Pinch Valve 1/4 x 7/16"</i>
<i>BPR1007</i>	<i>BioPAT® Pinch Valve 1/4 x 3/8"</i>
<i>BPR1008</i>	<i>BioPAT® Pinch Valve 1/8 x 1/4"</i>
<i>BPR1003</i>	<i>BioPAT® Pinch Valve 1/2 x 7/8"</i>
<i>BPR1004</i>	<i>BioPAT® Pinch Valve 1/2 x 3/4"</i>
<i>BPR1005</i>	<i>BioPAT® Pinch Valve 3/8 x 5/8"</i>
<i>BPR1000</i>	<i>BioPAT® Pinch Valve 1 x 1 3/8"</i>
<i>BPR1001</i>	<i>BioPAT® Pinch Valve 3/4 x 1 1/8"</i>
<i>BPR1002</i>	<i>BioPAT® Pinch Valve 3/4 x 1"</i>

Order Information - Insert Sets and Accessories

<i>Article Number</i>	<i>Description</i>
<i>BPR1015</i>	<i>BioPAT® Pinch Valve Installation Set 1/4 x 7/16"</i>
<i>BPR1016</i>	<i>BioPAT® Pinch Valve Installation Set 1/4 x 3/8"</i>
<i>BPR1017</i>	<i>BioPAT® Pinch Valve Installation Set 1/8 x 1/4"</i>
<i>BPR1012</i>	<i>BioPAT® Pinch Valve Installation Set 1/2 x 7/8"</i>
<i>BPR1013</i>	<i>BioPAT® Pinch Valve Installation Set 1/2 x 3/4"</i>
<i>BPR1014</i>	<i>BioPAT® Pinch Valve Installation Set 3/8 x 5/8"</i>
<i>BPR1009</i>	<i>BioPAT® Pinch Valve Installation Set 1 x 13/8"</i>
<i>BPR1010</i>	<i>BioPAT® Pinch Valve Installation Set 3/4 x 11/8"</i>
<i>BPR1011</i>	<i>BioPAT® Pinch Valve Installation Set 3/4 x 1"</i>
<i>BPR1103</i>	<i>Fork Tool for BioPAT® Pinch Valve</i>

FAQs

What happens in the case of a power shut down?

- *The electrical drive keeps the positions in which it was at the time of the power shut down.*

Is there a high risk of heat transfer from valve to products?

- *Very low risk.*
- *Drive's material is aluminium for good heat exchange and cooling of the motor.*
- *Small contact area between tubing and drive metal (gripper and lid), the tube holders (TPE plastic) are poor heat conductors.*

FAQ

Is there a high risk of particle generation in tubing (product contacting)?

- *When tubes are subject to pinching they undergo deformation which tends to release particles.*
- *Tests was performed.*
- *Result: Risk of particle generation can not be excluded but it is very low.*

Thank you.

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