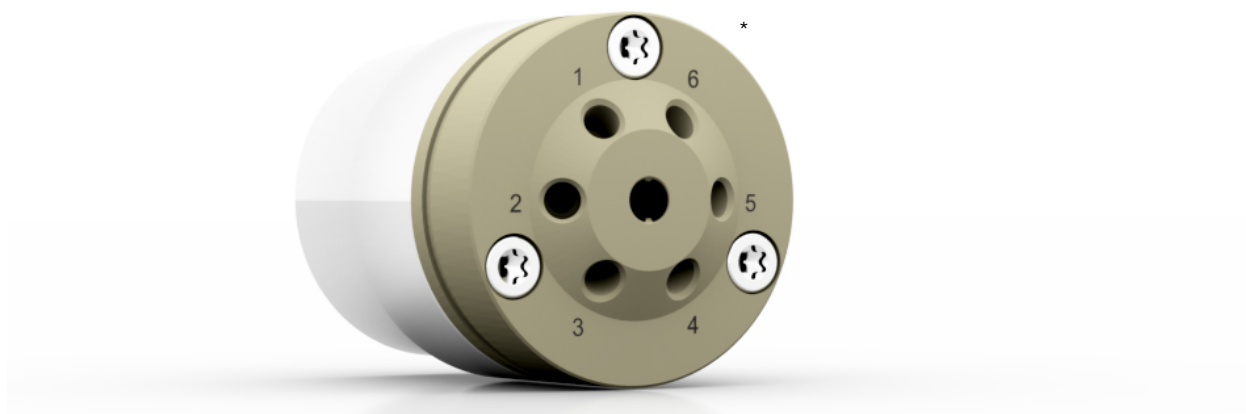


AZURA

AZURA® Valve V 4.1 Supplement



* Exemplary representation

Document no. V6864



Note: For your own safety, read the instructions and follow the warnings and safety information on the device and in the instructions. Keep the instructions for future reference.



Note: In case you require this instruction in another language, please submit your request including the corresponding document number via e-mail or fax to KNAUER.

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1. Product information



Note: Only use the device for applications that fall within the range of the intended use. Otherwise, the protective and safety equipment of the device could fail.

Various types of valves with different operating modes allow the use of these valves for a variety of applications. It is important that valve drive and valve are compatible.

The AZURA® Valve V 4.1 is available in several versions, which differ in valve type, port number, material and capillary connection.

2-position valves are used for injection, column switching, or column back-flushing. Generally, 2-position valves can be operated manually through a lever or electrically through the valve drive. Multiposition valves can only be controlled through a valve drive and are suitable for fractionation or column switching of more than two columns.

2. Mounting the valve onto the valve drive

For this procedure, please see chapter 6.4 in the instructions of the AZURA® Valve Unifier VU 4.1 valve drive (document no. [V6855](#)).

3. Mounting onto AZURA® L devices

Use the mounting bracket A9854-3 to attach the AZURA® Valve Unifier VU 4.1 valve drive on the side panel of an AZURA® L device.

The manual injection valves are delivered in mounted condition and have to be prepared and disassembled for mounting. For the exact procedure, please refer to the supplement of the respective mounting bracket (A9853) for AZURA® L devices (document no. [V6806](#)).

4. Application examples

This chapter describes possible applications for the different valve types. Of course there are also other applications possible which are not listed here.

4.1 6 port 2-position valve

Sample Injection

Functional principle

The sample loop is installed between port 3 and port 6. In position 1, sample is loaded via port 1 into the sample loop. Excess volume exits via port 2.

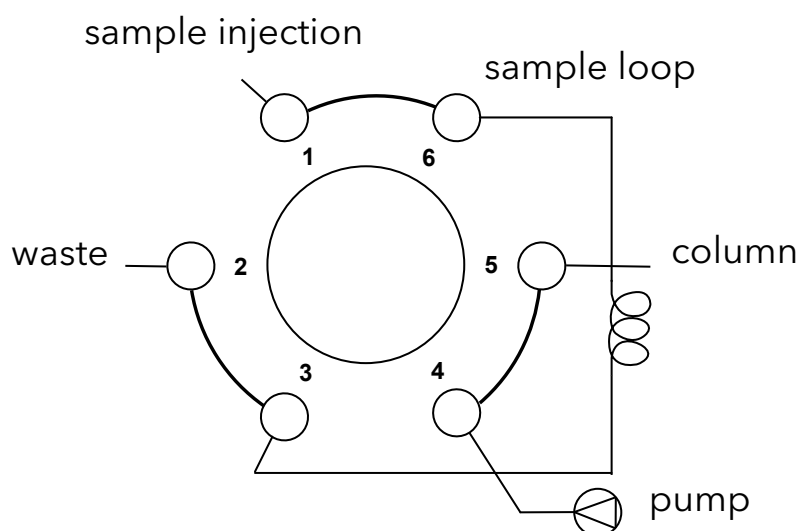


Fig. 1 Position 1, Sample loading

In position 2, the sample is injected via the pump (port 4) from the loop onto the column (port 5).

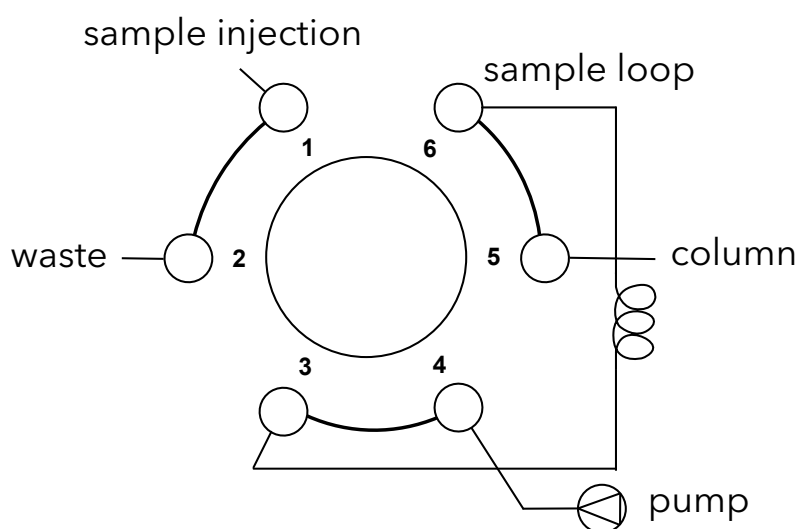


Fig. 2 Position 2, Sample injection

Column selection

NOTICE

Device defect

Damage of the column caused by switching under pressure.

➔ Make sure there is no pressure when switching between the columns so that the columns are not damaged.

Functional principle

This configuration allows to select between two columns without changing capillary connections. In position 1, the flow of the pump (port 6) is directed via column A (port 1 & 2) to the detector (port 3).

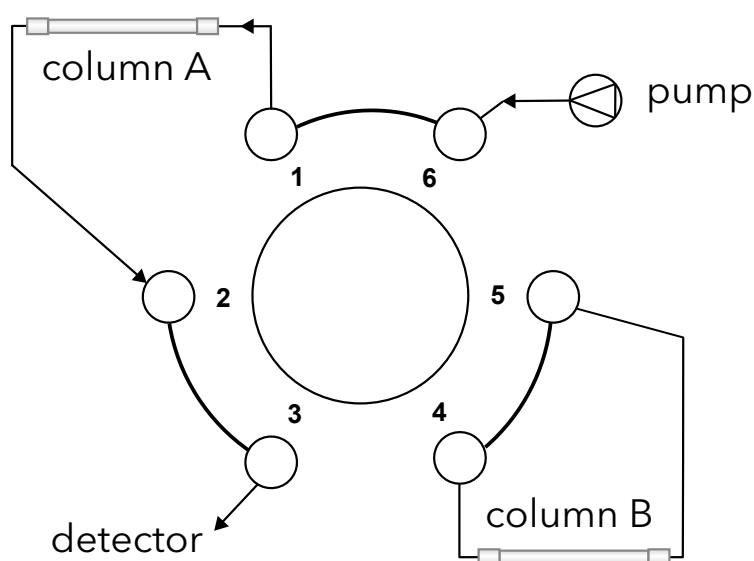


Fig. 3 Column selection - usage of column A

In position 2, the flow is directed via column B (port 5 & 4).

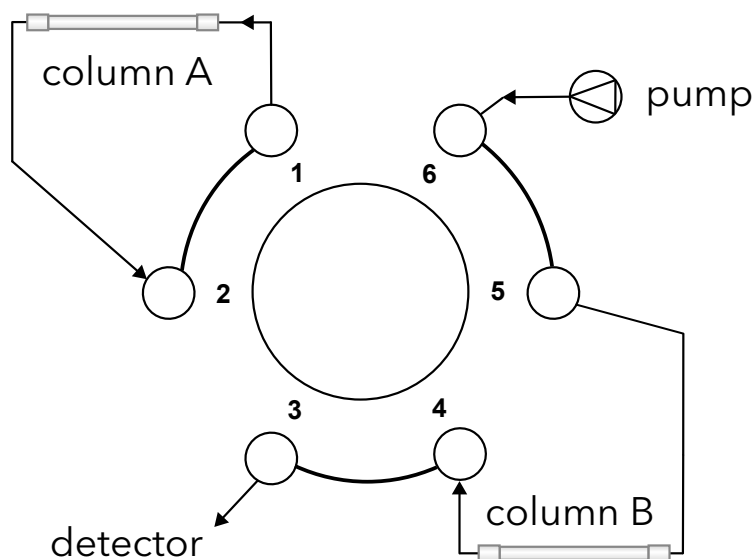


Fig. 4 Column selection - usage of column B

4.2 8 port valve 2-position valve

High-throughput sample loading

Functional principle

This configuration allows high-throughput analysis as sample loading and injection are parallelized. In position 1, the sample is loaded to sample loop B (port 2 & 6), while sample from loop A is injected.

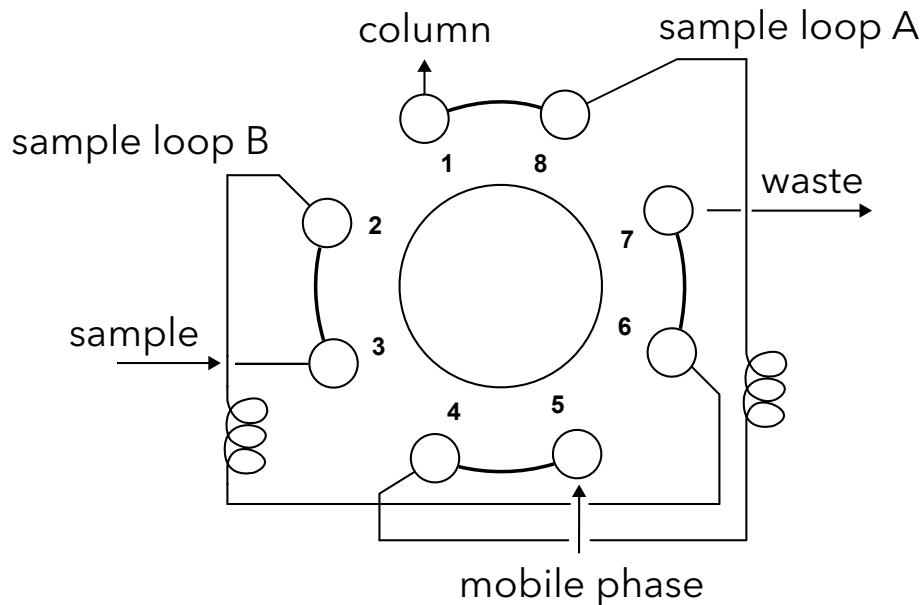


Fig. 5 Sample loading of loop B, sample injection of loop A

In position 2, the sample of sample loop B is injected onto the column. In parallel, sample can be loaded again into loop A (port 4 & 8).

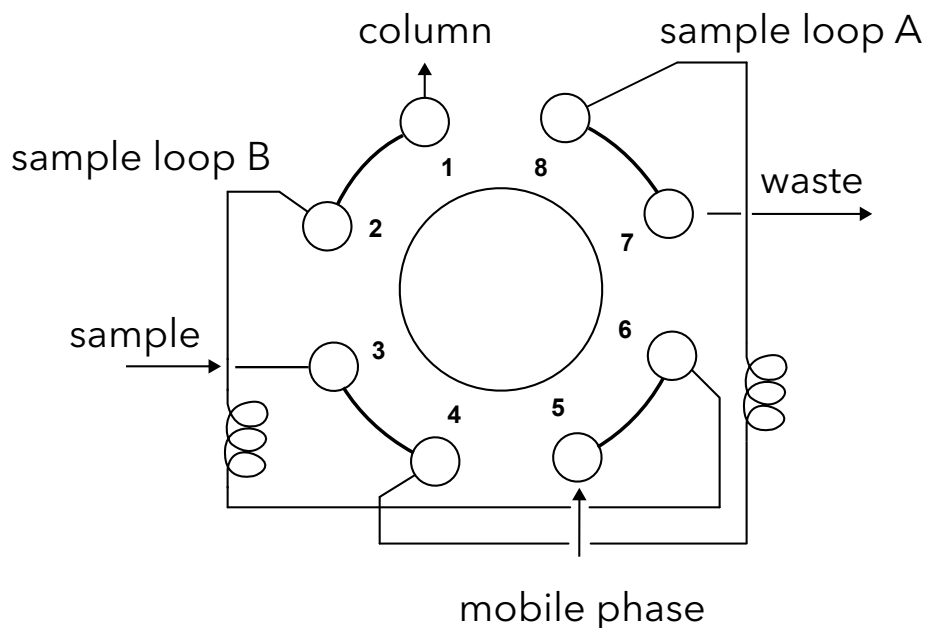


Fig. 6 Sample injection of loop B, sample loading of loop A

Sample injection and column backflushing

Functional principle

This configuration allows to reduce analysis time for sample with late-eluting compounds, which are not relevant for sample analysis. In position 1, the sample is injected onto the column.

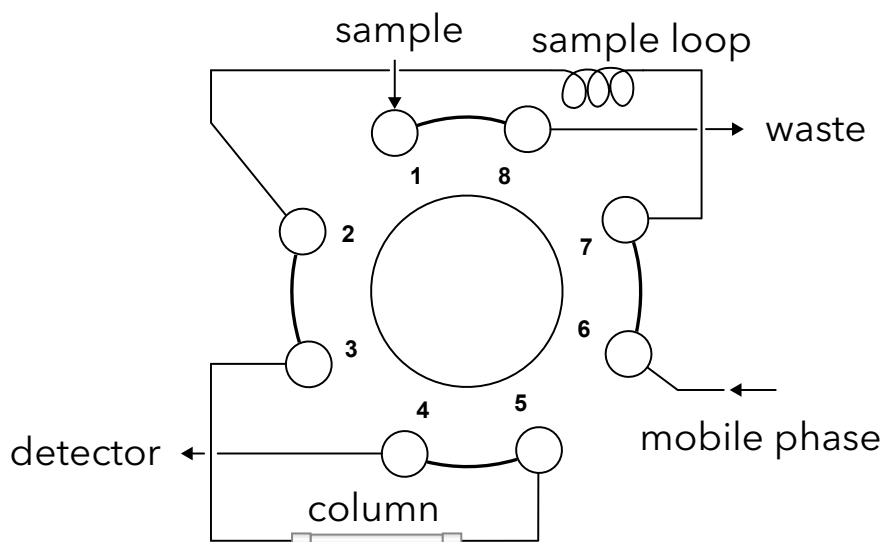


Fig. 7 Sample injection

After relevant compounds were separated and detected, the valve is switched to position 2. Undesired, strongly retarded compounds are back-flushed and removed to prepare the column for the next separation. Also, in this position the sample loop is loaded.

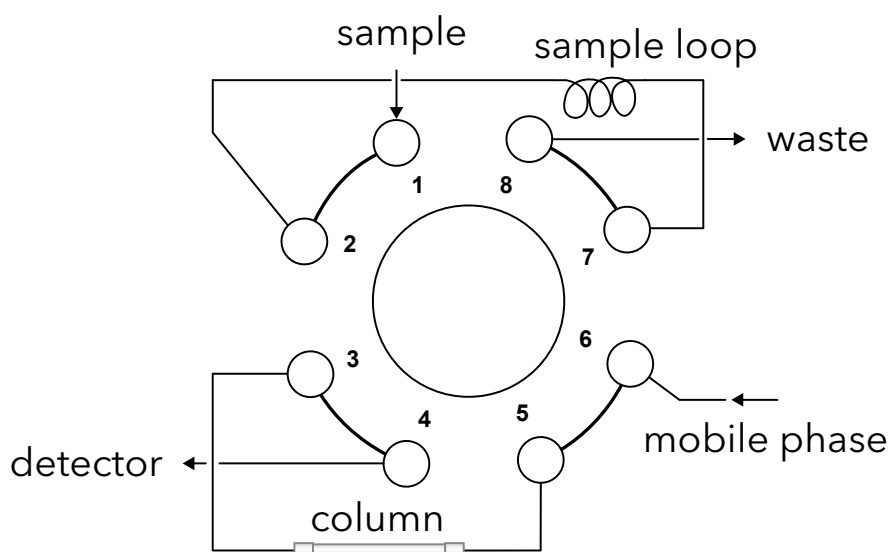


Fig. 8 Backflushing of the column

Column switching

Functional principle

Two 6 port or two 8 port multiposition valves are required for a column switching. It is then possible to operate 5 columns and a bypass, or alternatively 7 columns and a bypass. Example for 6 port multiposition valve:

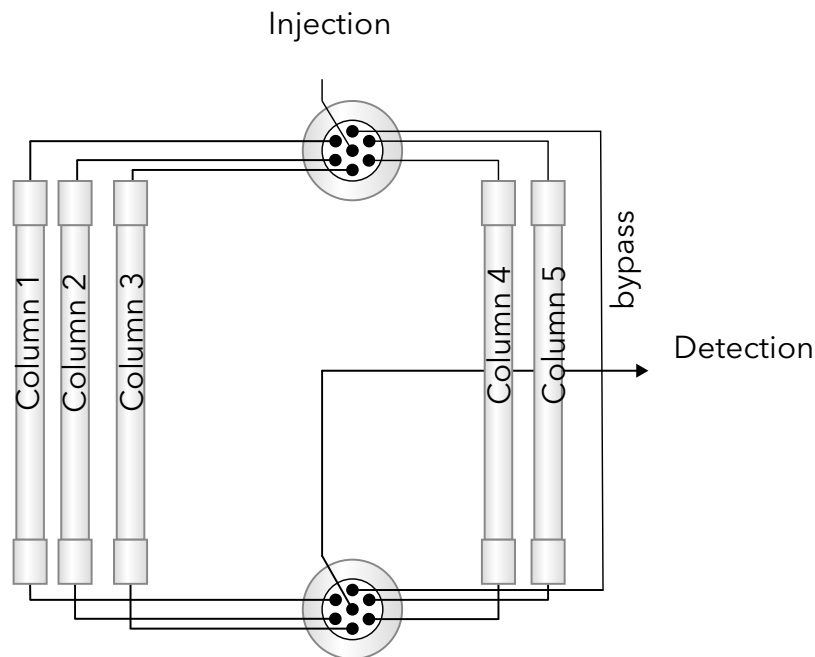
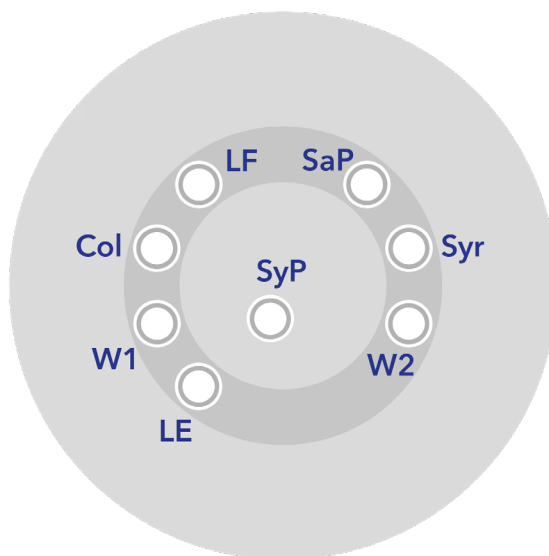


Fig. 9 Column switching

4.3 Multi-injection valve (AVN96AE)

Figure



Legend

- LF:** Port to connect a loop.
Used to fill the loop.
- Col:** Outlet to column
- W1:** Outlet to waste 1
- LE:** Port to connect a loop.
Used to empty the loop.
- W2:** Outlet to waste 2
- Syr:** Syringe inlet
- SaP:** Sample pump inlet
- SyP:** System pump inlet

Fig. 10 Multi-injection valve scheme

Functional principle**Manual load & column equilibration (Position 1):**

The sample loop is manually filled via a syringe and the column is equilibrated via the system pump.

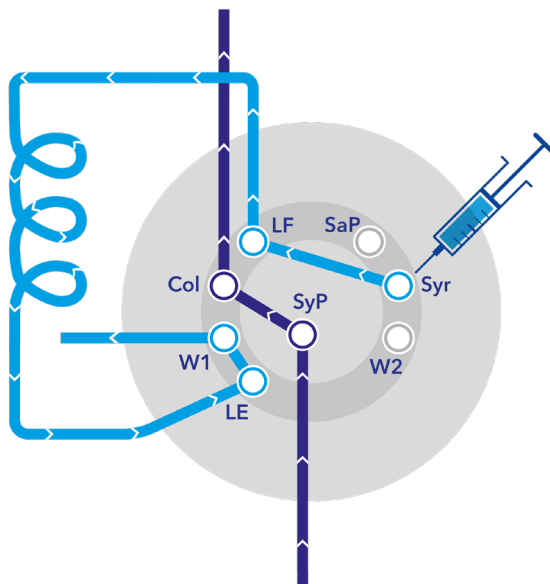


Fig. 11 Position 1

Sample injection (Position 2):

The flow of the system pump is directed through the loop and sample is injected onto the column. Additionally, the flow of the sample pump is directed to waste 2.

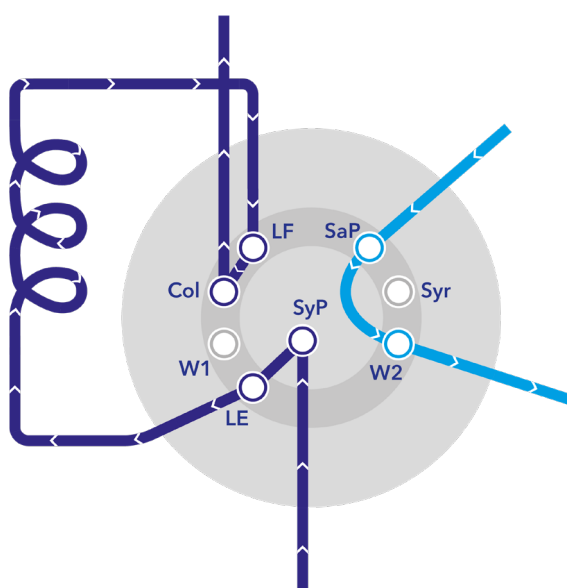


Fig. 12 Position 2

Direct injection (Position 3):

Sample is loaded directly onto the column via the sample pump. Additionally, the flow of the system pump is directed to waste 1.

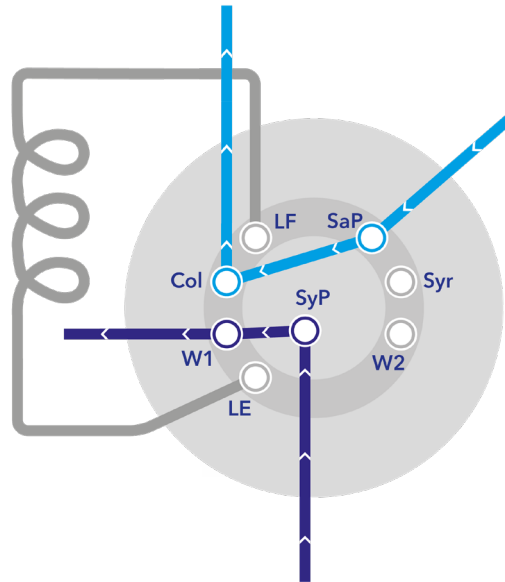


Fig. 13 Position 3

Automatic load & column equilibration (Position 4):

The sample loop is automatically filled via the sample pump and the column is equilibrated via the system pump.

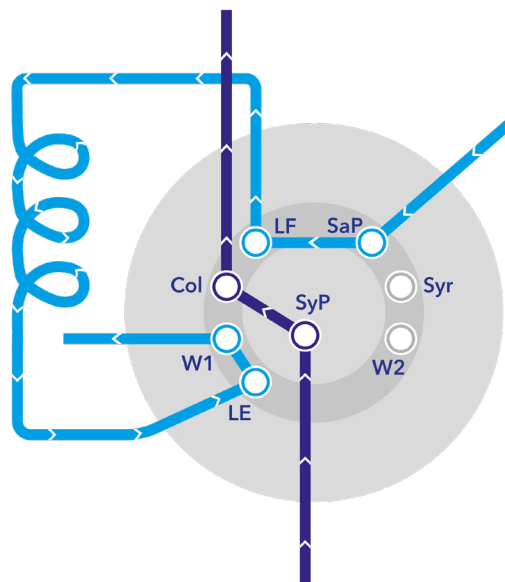


Fig. 14 Position 4

4.4 Multi-injection valve (AVN94CE)

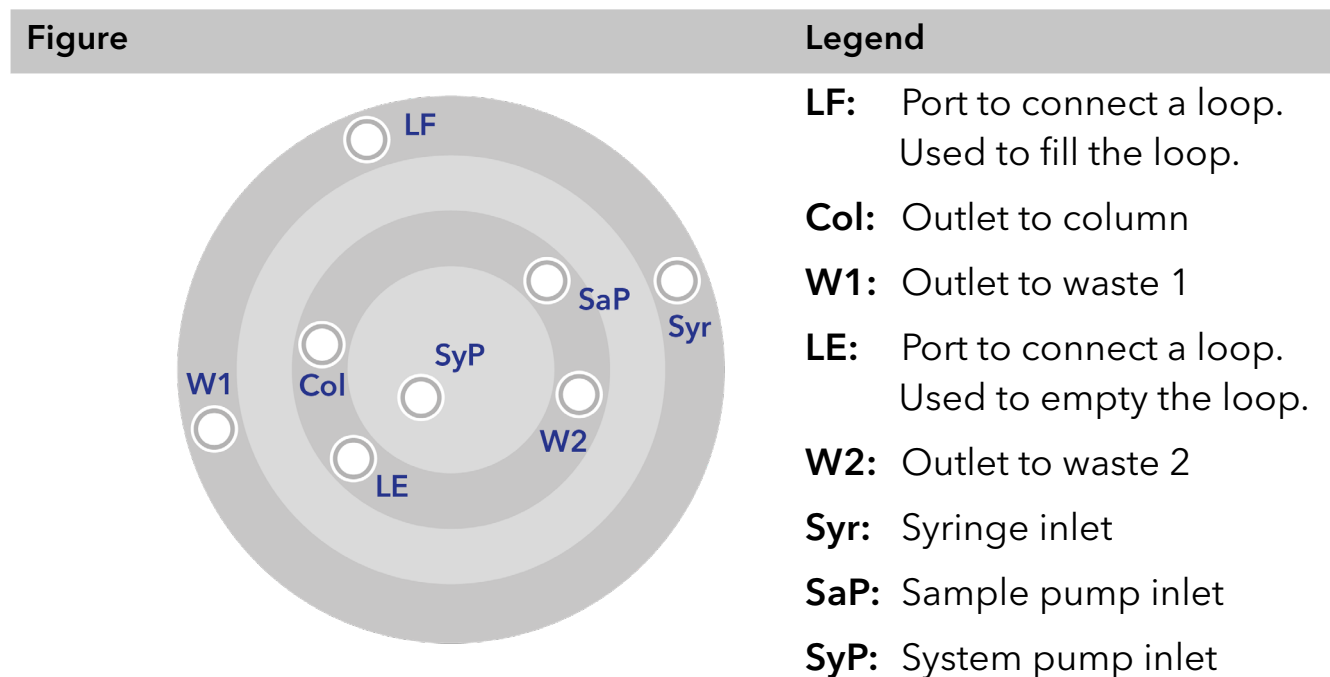


Fig. 15 Multi-injection valve scheme

Manual load & column equilibration (Position 1):

The sample loop is manually filled via a syringe and the column is equilibrated via the system pump.

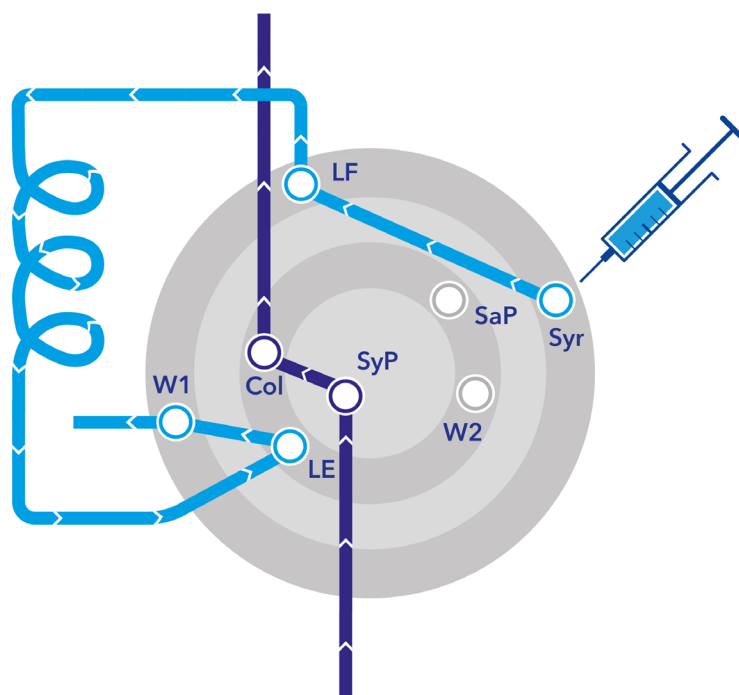


Fig. 16 Position 1

Functional principle**Sample injection (Position 2):**

The flow of the system pump is directed through the loop and sample is injected onto the column. Additionally, the flow of the sample pump is directed to waste 2.

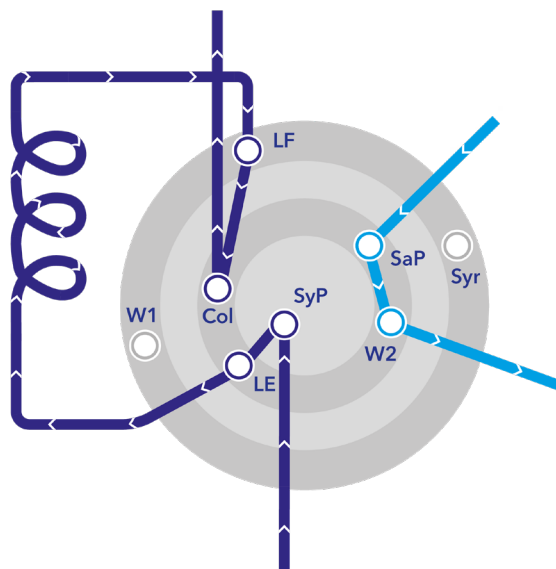


Fig. 17 Position 2

Direct injection (Position 3):

Sample is loaded directly onto the column via the sample pump. Additionally, the flow of the system pump is directed to waste 1.

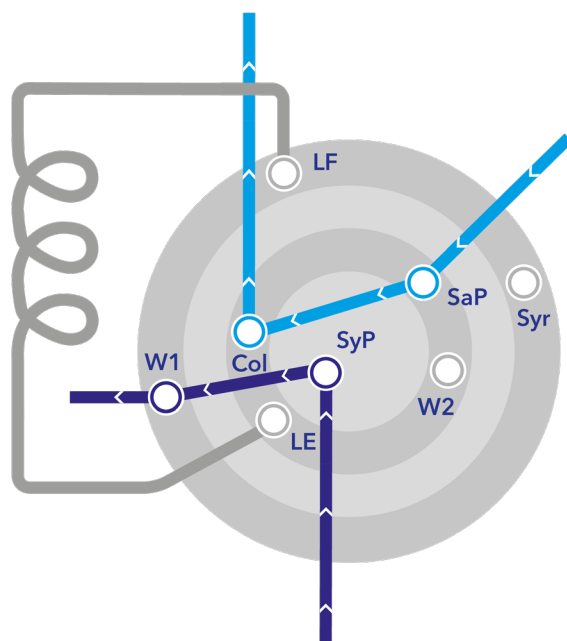


Fig. 18 Position 3

Functional principle

Automatic load & column equilibration (Position 4):

The sample loop is automatically filled via the sample pump and the column is equilibrated via the system pump.

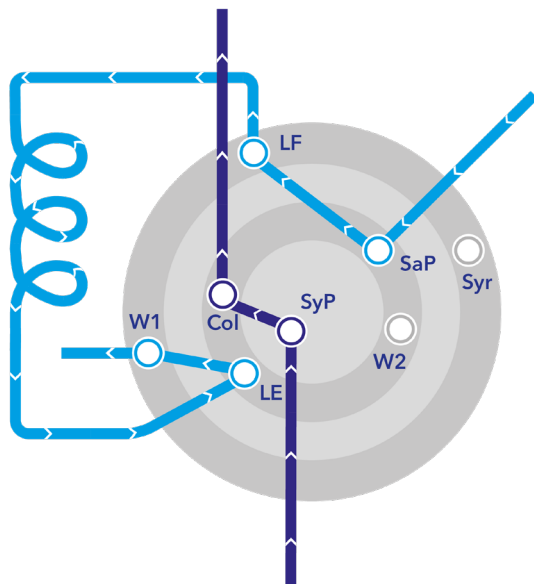


Fig. 19 Position 4



Note: If no sample pump is used, close the SaP port with a blind plug.

5. Installation

5.1 Sample loop

To ensure the full functionality, follow the steps below:

- Use the appropriate sample loop diameter.
- Keep the connections as short as possible.
- Check the pressure resistance of the screw fittings.

NOTICE

Component defect

Damage to components due to excessive tightening possible.

Observe the torque of the screw connection.

→ Use 5 Nm torque for stainless steel fittings.

→ Use 1 Nm torque for PEEK fittings.

Tools: Torque wrench

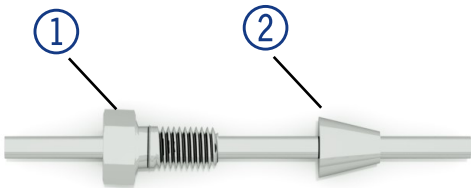
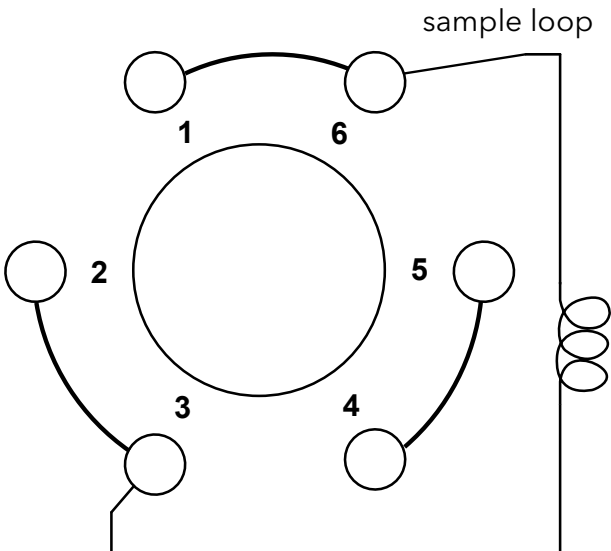
Process	Figure
1. Insert one end of the sample loop into the screw fitting ①. 2. Attach the ferrule ②. 3. Repeat the first steps on the other end of the sample loop.	
4. Fasten the first screw fitting by screwing it into port 3. Afterwards unscrew again. 5. Fasten the second screw fitting in port 6 and unscrew again. 6. Screw the sample loop evenly and simultaneously into port 3 and port 6.	

Fig. 20 Screw fitting and ferrule

Fig. 21 Installed sample loop

5.2 Inserting the injection port

NOTICE

Component defect

Valve damage when using pointed injection syringes.

→ Use only injection syringes with luer lock and flat-ground cannula.



Note: The DYNASEAL fitting is screwed together hand-tight. The DYNASEAL fitting sits adequately tight when you feel a resistance at pulling the needle.

Process

Figure

1. Insert the needle seal ① into the fitting ②.
2. Put the ferrule ③ onto the needle seal.
3. Insert the needle of the syringe into the needle seal.
4. Insert the needle seal including the needle into the port and hand tighten the assembly.

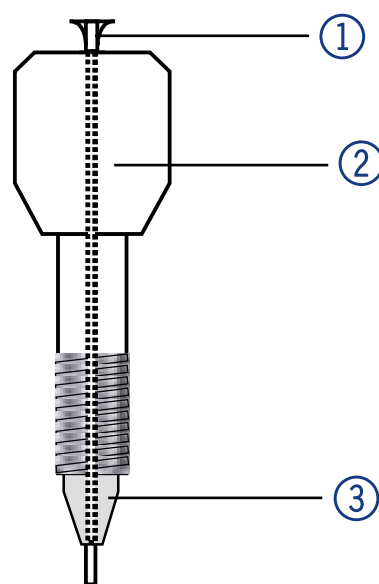


Fig. 22 Syringe port

Result

The AZURA® Valve V 4.1 is prepared for the injection of sample solutions in the sample loop via a glass syringe with luer lock.

6. Maintenance

6.1 Cleaning and maintaining the valve

All smooth surfaces of the valve can be cleaned with a mild, commercially available cleaning solution, or with isopropanol.

6.2 Replacing the rotor seal



Note: Replace the rotor seal in the following cases:

- If the pressure is not kept stable
- If leakage occurs at the valve
- If the rotor seal has been used more than 50 000 times (Check the entry „Cycles“ in „VALVE GLP“ menu of the valve drive when the valve is mounted.)

Prerequisites: Valve has been removed from valve drive.

Tools: Torx screwdriver, T20

Process	Figure
1. Loosen the 3 screws ① alternately at the front of the valve. Ensure to loosen the screws each time only by half a turn to allow an even release of pressure. 2. Lift the stator ② from the valve body and rest it on its outer surface to avoid damage of the sealing surface. 3. Gently remove the rotor seal ③ from the rotor. 4. Check the rotor seal for damages or dirt and replace or clean if necessary. 5. Check the sealing face of the stator for damages or dirt. 6. Replace the rotor seal with a new one. Ensure that the groove(s) point away from the valve body and towards the stator.	

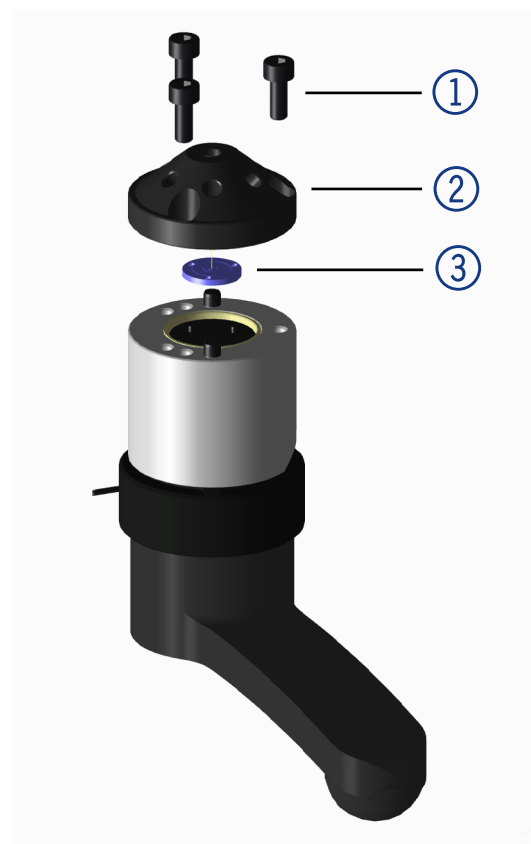


Fig. 23 Replacing the rotor seal

Process**Figure**

7. To re-assemble the valve proceed in reverse order. A sealing is ensured when there is no gap between stator and valve body. Do not overtighten the screws.
8. If the valve is operated with a VU 4.1 valve drive, also update the information on the RFID tag of the valve (see Instruction of AZURA Valve Unifier VU 4.1, [V6855](#)).

7. Technical data

7.1 General

Ambient conditions	Temperature: 4 - 40 °C; 39.2 - 104 °F; Air humidity: below 90 %
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7.2 Valves

Manual valves

Art. no.	Ports	Stator material	Rotor material	Max. pressure	Bore size	Connection
AVG24CE	6	PEEK	PEEK	240 bar	0.75 mm	1/16", UNF 10-32 coned
AVK25AE	6	SST DLC*	PEEK	300 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVJ23AF	6	SST DLC*	POM	100 bar	0.75 mm	1/16", UNF 10-32 coned
AVJ26AE	6	SST DLC*	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVI28AC	6	SST DLC*	Vespel®	1200 bar	0.3 mm	1/16", UNF 10-32 coned
AVL23CE	6	PEEK	PEEK	100 bar	2 mm	1/8", UNF 1/4-28 coned
AVJ36AE	8	SST DLC*	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVI38AC	8	SST DLC*	Vespel®	1200 bar	0.3 mm	1/16", UNF 10-32 coned

2-position valves



Note: To operate these valves the valve drive VU 4.1 (AWA01XA) is required.

Art. no.	Ports	Stator material	Rotor material	Max. pressure	Bore size	Connection
AVD23AF	6	SST DLC*	POM	100 bar	0.75 mm	1/16", UNF 10-32 coned
AVD24CE	6	PEEK	PEEK	240 bar	0.75 mm	1/16", UNF 10-32 coned
AVE25AE	6	SST DLC*	PEEK	300 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVE25AI ¹	6	SST DLC*	PEEK	300 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVD26AE	6	SST DLC*	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVC28AC	6	SST DLC*	Vespel®	1200 bar	0.3 mm	1/16", UNF 10-32 coned
AVF23CE	6	PEEK	PEEK	100 bar	2 mm	1/8", UNF 1/4-28 coned
AVF32CE	8	PEEK	PEEK	500 bar	2 mm	1/8", UNF 1/4-28 coned
AVD36AE	8	SST DLC*	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVC38AC	8	SST DLC*	Vespel®	1200 bar	0.3 mm	1/16", UNF 10-32 coned

* SST DLC = Stainless steel, coated with diamond-like carbon

¹ The rotor seal of this 6 port 2-position valve has two channels instead of three as in a usual injection valves. The port connection is 1-6 and 3-4 (position 1) or 1-2 and 4-5 (position 2), respectively.

Multiposition valves



Note: To operate these valves the valve drive VU 4.1 (AWA01XA) is required.

Art. no.	Ports	Stator material	Rotor material	Max. pressure	Bore size	Connection
AVS23AF	6	SST DLC*	POM	100 bar	0.75 mm	1/16", UNF 10-32 coned
AVT25AE	6	SST DLC*	PEEK	300 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVS26AE	6	SST DLC*	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVR28AC	6	SST DLC*	Vespel®	1200 bar	0.3 mm	1/16", UNF 10-32 coned
AVU32CE	8	PEEK	PEEK	50 bar	2 mm	1/8", UNF 1/4-28 flat-bottom
AVT34AE	8	SST DLC*	PEEK	200 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVT34AH ¹	8	SST DLC*	PEEK	200 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVN94CE**	8	PEEK	PEEK	240 bar	0.75 mm	1/16", UNF 10-32 coned
AVN96AE**	8	SST DLC*	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVS34CE	8	PEEK	PEEK	240 bar	0.75 mm	1/16", UNF 10-32 coned
AVS35AE	8	SST DLC*	PEEK	300 bar	0.75 mm	1/16", UNF 10-32 coned
AVS35AH ¹	8	SST DLC*	PEEK	300 bar	0.75 mm	1/16", UNF 10-32 coned
AVS36AE	8	SST DLC*	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVR38AC	8	SST DLC*	Vespel®	1200 bar	0.3 mm	1/16", UNF 10-32 coned
AVT53AE	12	SST DLC*	PEEK	100 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVT53CE	12	PEEK	PEEK	100 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVS62CE	16	PEEK	PEEK	50 bar	0.75 mm	1/16", UNF 10-32 coned
AVS63CE	16	PEEK	PEEK	150 bar	1.5 mm	1/16", UNF 10-32 coned
AVQ63AF	16	PEEK	POM	100 bar	0.75 mm	1/16", UNF 10-32 coned
AVQ66AE	16	SST DLC*	PEEK	500 bar	0.6 mm	1/16", UNF 10-32 coned

* SST DLC = Stainless steel, coated with diamond-like carbon

** Multi-injection valve

¹ Break-free version of standard multi-position valve, which prevents pressure peaks during switching.

8. Reorders

8.1 Devices & accessories

Article	Art. no.
Reed contact	G0365
Magnetic core	M0527
Injection port, SST, 1/16"	A0328
Injection port, PEEK, 1/16"	A03281
Mounting bracket AZURA® L for valve drive VU 4.1	A9854-3
Mounting bracket AZURA® L for manual injection valves	A9853
AZURA® Valve Unifier VU 4.1 valve drive	AWA01XA

8.2 Valves

Valve Art. no.	Description	Rotor seal Art. no.	Stator Art. no.
AVC28AC	6 Port 2-position valve, 1200 bar	A0611.2	A205118
AVC38AC	8 Port 2-position valve, 1200 bar	A0611.3	A205120
AVD23AF	6 Port 2-position valve, 100 bar	A205107	A205140
AVD24CE	6 Port 2-position valve, 240 bar, bioinert	A205101	A205102
AVD26AE	6 Port 2-position valve, 500 bar	A205145	A205140
AVD36AE	8 Port 2-position valve, 500 bar	A205144	A205142
AVE25AI	6 Port 2-position valve, 300 bar	A205162	A205146
AVE25AE	6 Port 2-position valve, 300 bar	A205147	A205146
AVF23CE	6 Port 2-position valve, 100 bar, bioinert	A205157	A205156
AVF32CE	6 Port 2-position valve, 50 bar, bioinert	A205111	A205130
AVG24CE	Manual 6 Port 2-position valve, 240 bar, bioinert	A205101	A205102
AVI28AC	Manual 6 Port 2-position valve, 1200 bar	A0611.2	A205118
AVI38AC	Manual 8 Port 2-position valve, 1200 bar	A0611.3	A205120
AVJ23AF	Manual 6 Port 2-position valve, 100 bar	A205165	A205140
AVJ26AE	Manual 6 Port 2-position valve, 500 bar	A205145	A205140
AVJ36AE	Manual 8 Port 2-position valve, 500 bar	A205144	A205142
AVK25AE	Manual 6 Port 2-position valve, 300 bar	A205147	A205146
AVL23CE	Manual 6 Port 2-position valve, 100 bar, bioinert	A205157	A205156
AVN94CE	8 Port multi-injection valve, 240 bar, bioinert	A205131	A205132

Valve Art. no.	Description	Rotor seal Art. no.	Stator Art. no.
AVN96AE	8 Port multi-injection valve, 500 bar	A205160	A205161
AVQ63AF	16 Port multiposition valve, 100 bar	A205113	A205152
AVQ66AE	16 Port multiposition valve, 500 bar	A205151	A205152
AVR28AC	6 Port multiposition valve, 1200 bar	A0880.2	A205118
AVR38AC	8 Port multiposition valve, 1200 bar	A0880.4	A205120
AVS23AF	6 Port multiposition valve, 100 bar	A205109	A205140
AVS26AE	6 Port multiposition valve, 500 bar	A205139	A205140
AVS34CE	8 Port multiposition valve, 240 bar, bioinert	A205103	A205104
AVS35AE	8 Port multiposition valve, 300 bar	A205103	A205142
AVS36AE	8 Port multiposition valve, 500 bar	A205103	A205142
AVS35AH	8 Port multiposition valve, 300 bar	A205115	A205142
AVS62CE	16 Port multiposition valve, 50 bar, bioinert	A250105	A205106
AVT25AE	6 Port multiposition valve, 300 bar	A205148	A205146
AVT34AE	8 Port multiposition valve, 200 bar	A205149	A205150
AVT34AH	8 Port multiposition valve, 200 bar	A205163	A205150
AVT53AE	12 Port multiposition valve, 100 bar	A205155	A205154
AVT53CE	12 Port multiposition valve, 100 bar	A205155	A205164
AVU32CE	8 Port multiposition valve, 50 bar, bioinert	A205129	A205130
AVU32GE	8 Port multiposition valve, 50 bar, flat bottom	A205129	A205153
AVT34AE	8 Port multiposition valve, 200 bar	A205149	A205150

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