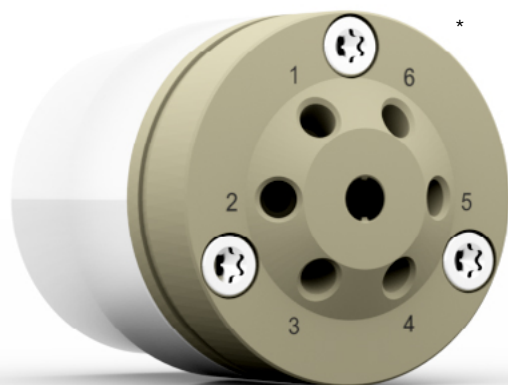


*Azura*

**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.

**Support:** Do you have questions about the installation or the operation of your instrument or software?

**International Support:**

Contact your local KNAUER partner for support:

[www.knauer.net/en/Support/Distributors-worldwide](http://www.knauer.net/en/Support/Distributors-worldwide)

**Support in Germany**

(Austria & Switzerland on case-to-case basis):

Phone: +49 30 809727-111 (workdays 9-17h CET)

Fax: +49 30 8015010

E-mail: [support@knauer.net](mailto:support@knauer.net)

**Publisher:** KNAUER Wissenschaftliche Geräte GmbH

Hegauer Weg 38

14163 Berlin

Germany

Phone: +49 30 809727-0

Fax: +49 30 8015010

Internet: [www.knauer.net](http://www.knauer.net)

E-mail: [info@knauer.net](mailto:info@knauer.net)

**Version information:** Document number: V6864

Version number: 2.11

Release date: January 31, 2024

Translation of the original edition

The information in this document is subject to change without prior notice. For the latest version of the instructions, visit our website: [www.knauer.net/library](http://www.knauer.net/library).



**Copyright:** This document contains confidential information and may not be reproduced without written consent of KNAUER Wissenschaftliche Geräte GmbH.

© KNAUER Wissenschaftliche Geräte GmbH 2024

All rights reserved.

AZURA® is a registered trademark of KNAUER Wissenschaftliche Geräte GmbH.

# Table of contents

<b>1. Product information</b>	<b>1</b>
<b>2. Mounting the valve onto the valve drive</b>	<b>1</b>
<b>3. Mounting onto AZURA® L devices</b>	<b>1</b>
<b>4. Application examples</b>	<b>2</b>
4.1 6 port 2-position valve	2
4.2 8 port valve 2-position valve	4
4.3 Multi-injection valve (AVN96AE)	7
4.4 Multi-injection valve (AVN94CE)	10
<b>5. Installation</b>	<b>13</b>
5.1 Sample loop	13
5.2 Inserting the injection port	14
<b>6. Maintenance</b>	<b>15</b>
6.1 Cleaning and maintaining the valve	15
6.2 Replacing the rotor seal	15
<b>7. Technical data</b>	<b>17</b>
7.1 General	17
7.2 Valves	17
<b>8. Reorders</b>	<b>20</b>
8.1 Devices & accessories	20
8.2 Maintenance kits & spare parts	20



# 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. Multi-position 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

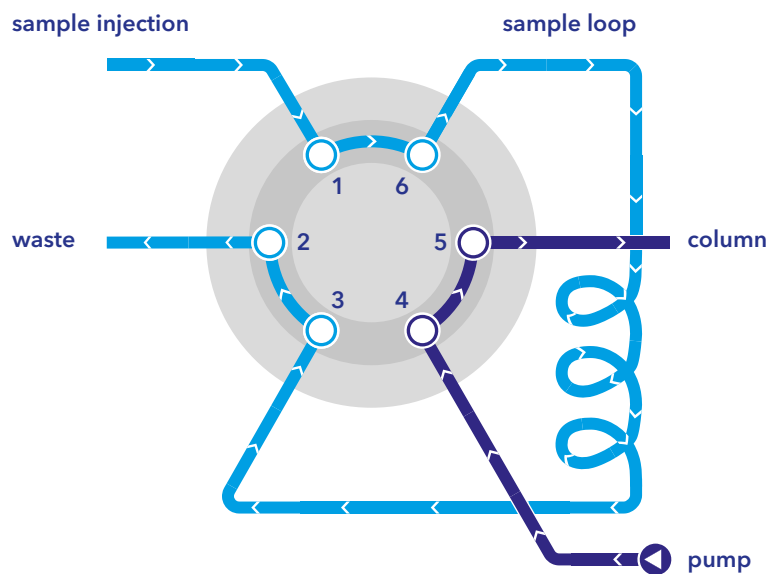
This chapter describes possible applications for the different valve types. Of course there are also other applications possible which are not listed here.

### 4.1 6 port 2-position valve

#### Sample Injection

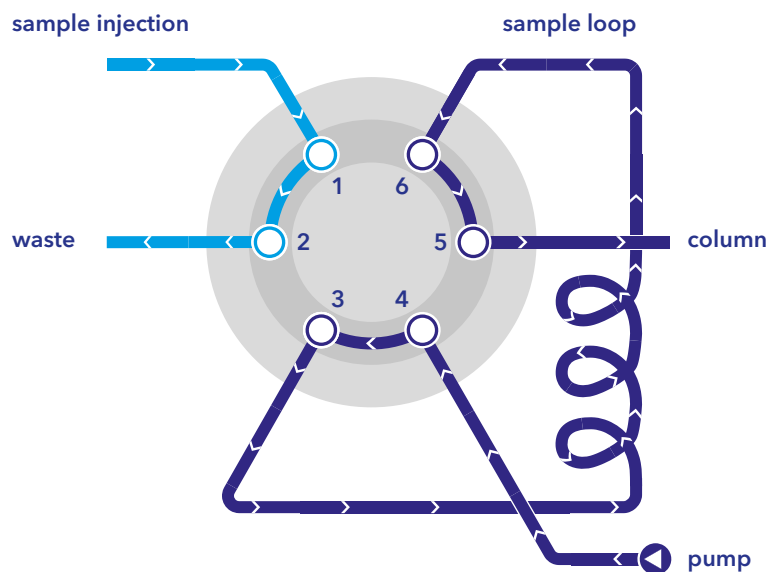
##### Functional principle

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

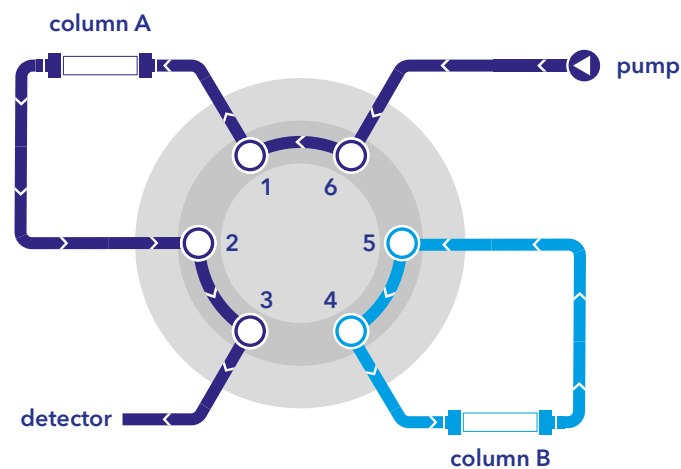
#### Device defect

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.

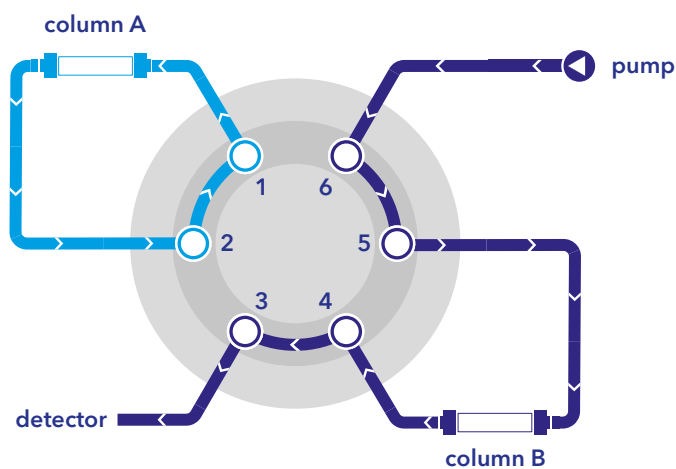
### Functional principle

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).



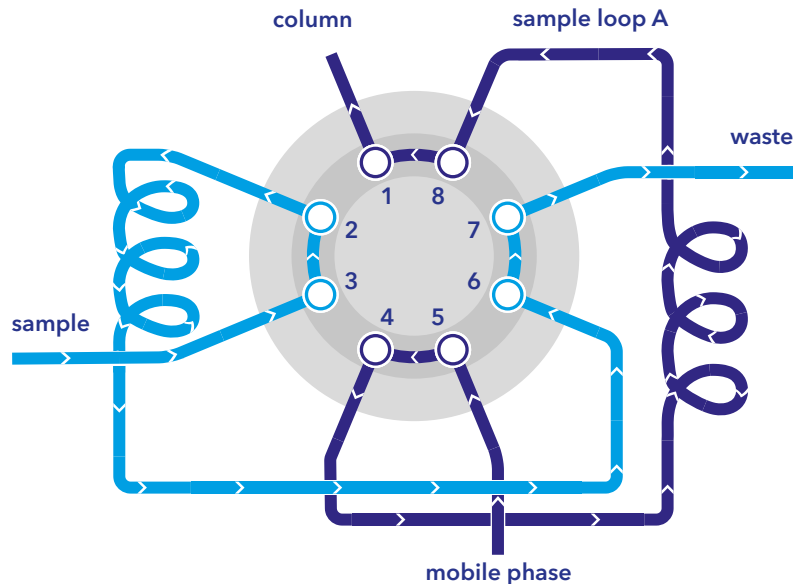
**Fig. 4** Column selection - usage of column B

## 4.2 8 port valve 2-position valve

### High-throughput sample loading

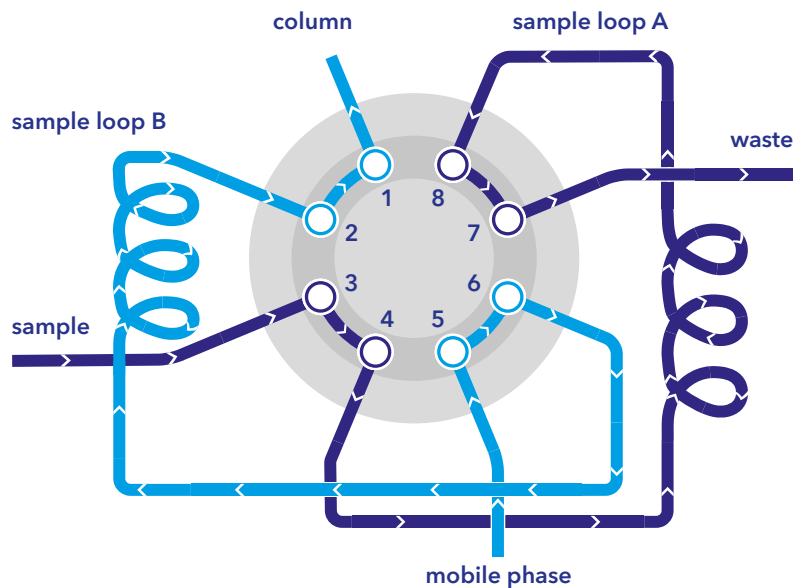
#### Functional principle

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).



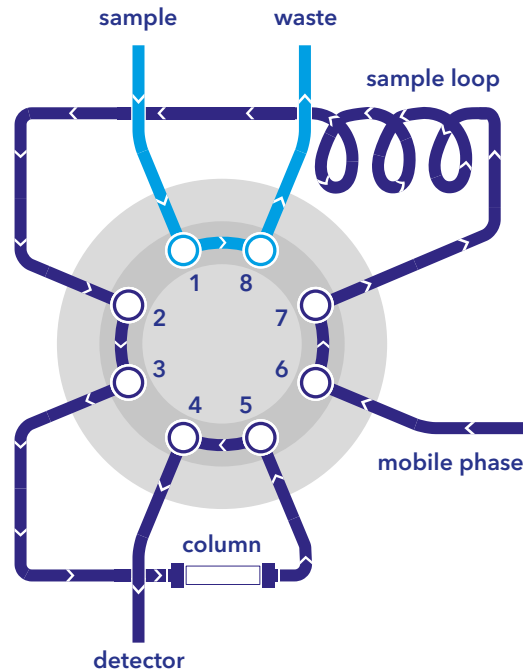
**Fig. 6** Sample injection of loop B, sample loading of loop A



## Sample injection and column backflushing

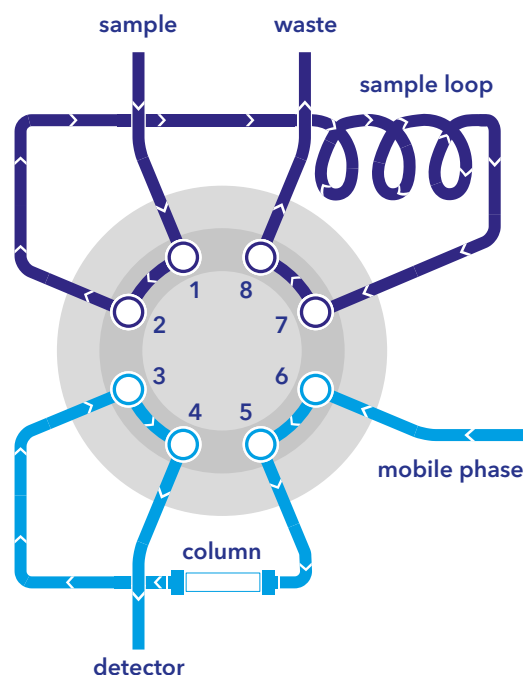
### Functional principle

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 backflushed and removed to prepare the column for the next separation. Also, in this position the sample loop is loaded.

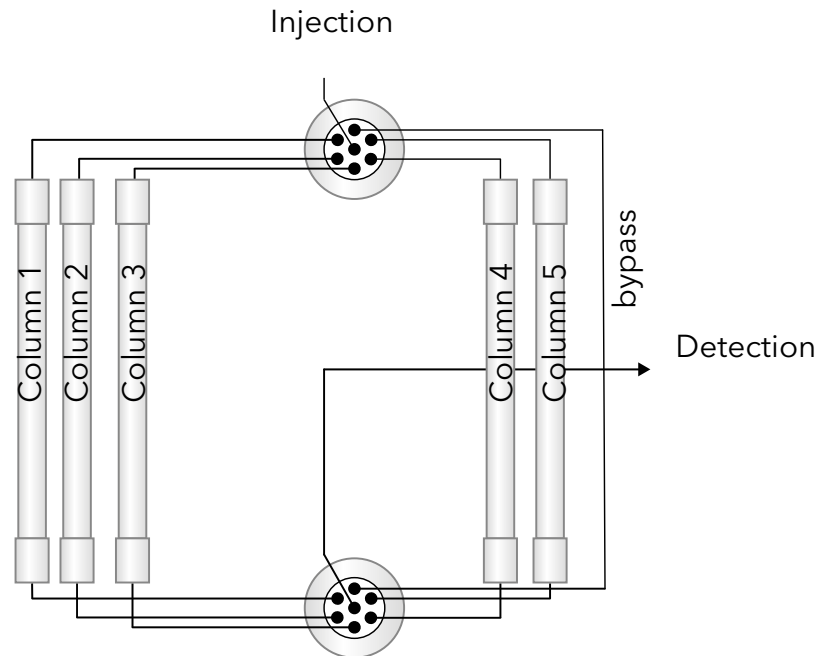


**Fig. 8** Backflushing of the column

## Column switching

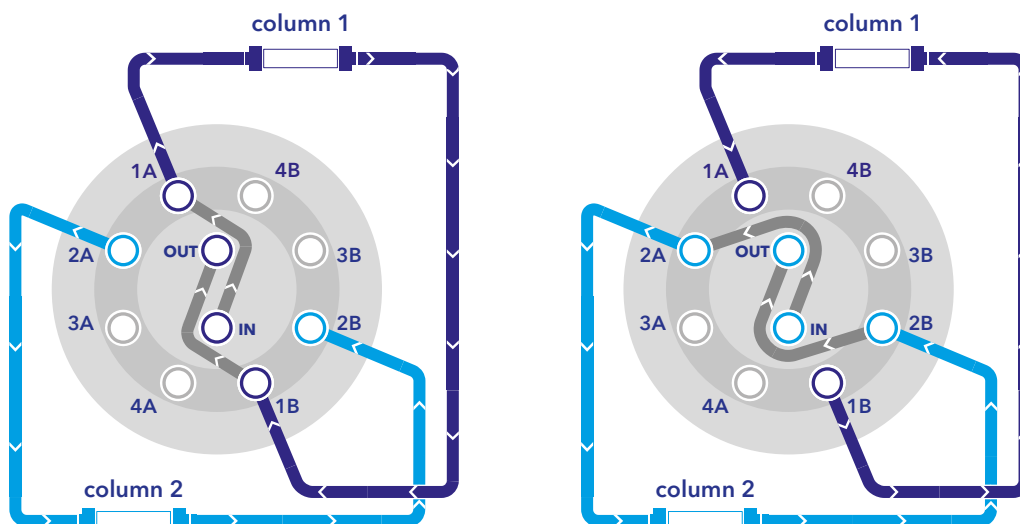
### Functional principle

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

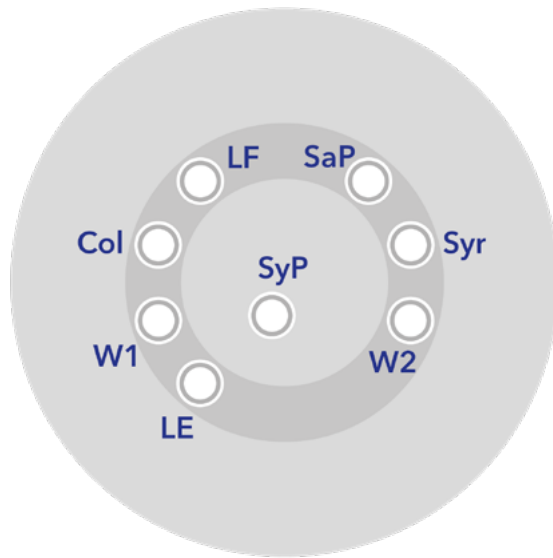
Additionally, a column switching valve can be used for a column switching of up to 4 columns with only one VU 4.1.



**Fig. 10** Valve position 1A with 2 columns (left) and valve position 2A with 2 columns (right)

## 4.3 Multi-injection valve (AVN96AE)

### Figure



### Legend

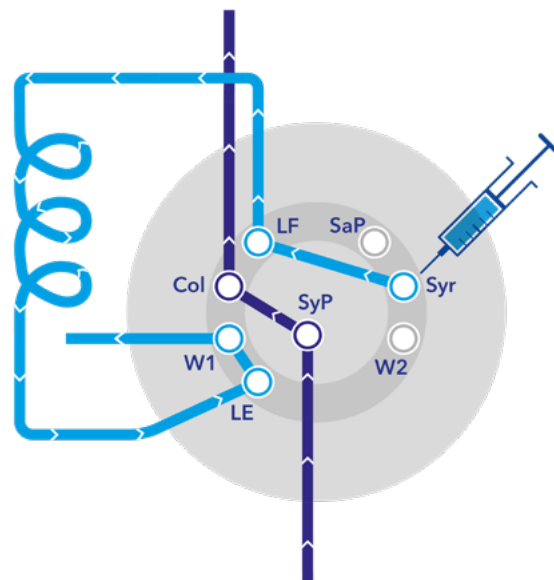
- LF:** Port to connect a loop. Used to fill the loop.
- Col:** Outlet to column
- W1:** Outlet to waste 1
- LE:** Port to connect a loop. Used to empty the loop.
- W2:** Outlet to waste 2
- Syr:** Syringe inlet
- SaP:** Sample pump inlet
- SyP:** System pump inlet

**Fig. 11** 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.

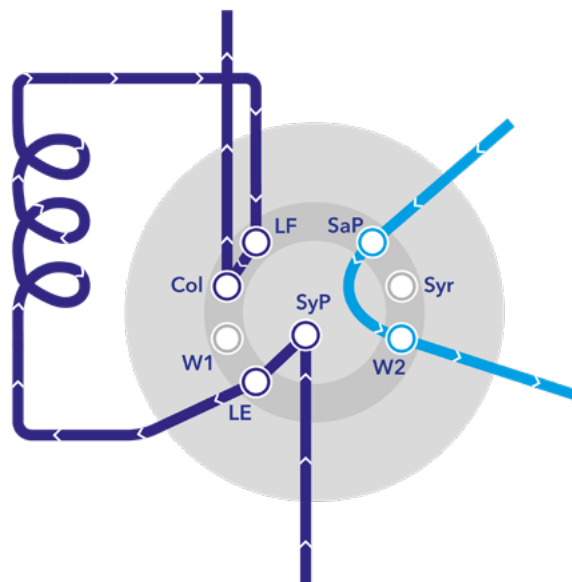


**Fig. 12** Position 1

## Functional principle

### Sample injection (Position 2):

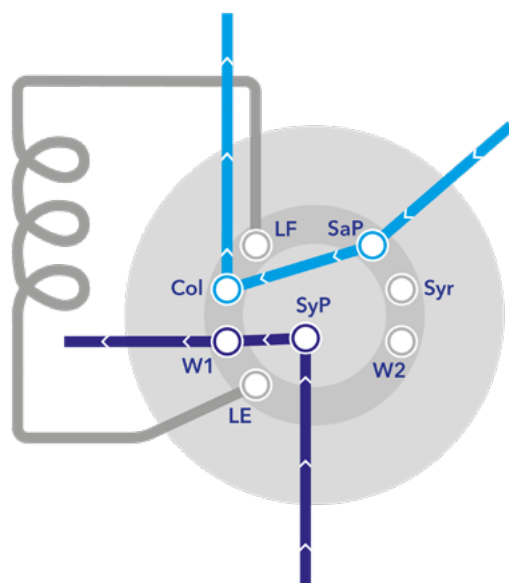
The flow of the system pump is directed through the loop and sample is injected onto the column. Additionally, the flow of the sample pump is directed to waste 2.



**Fig. 13** 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.

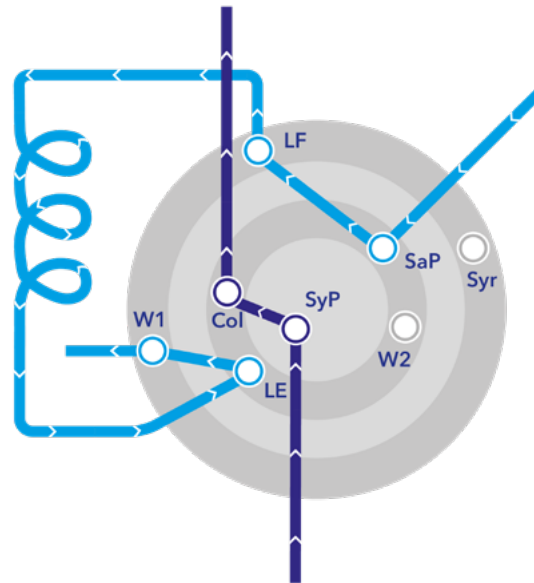


**Fig. 14** Position 3

## Functional principle

### Automatic load & column equilibration (Position 4):

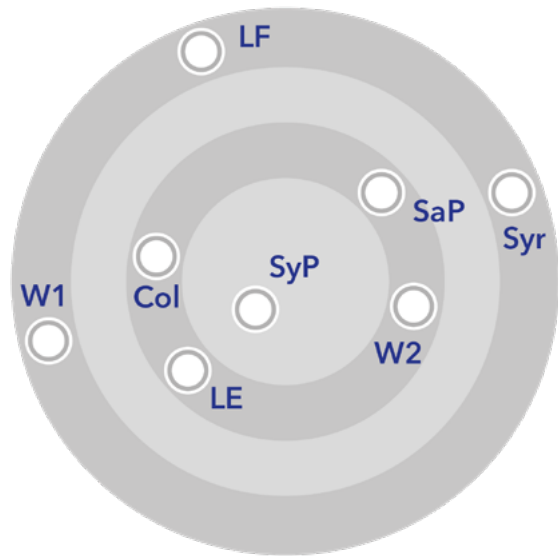
The sample loop is automatically filled via the sample pump and the column is equilibrated via the system pump.



**Fig. 15** Position 4

## 4.4 Multi-injection valve (AVN94CE)

### Figure



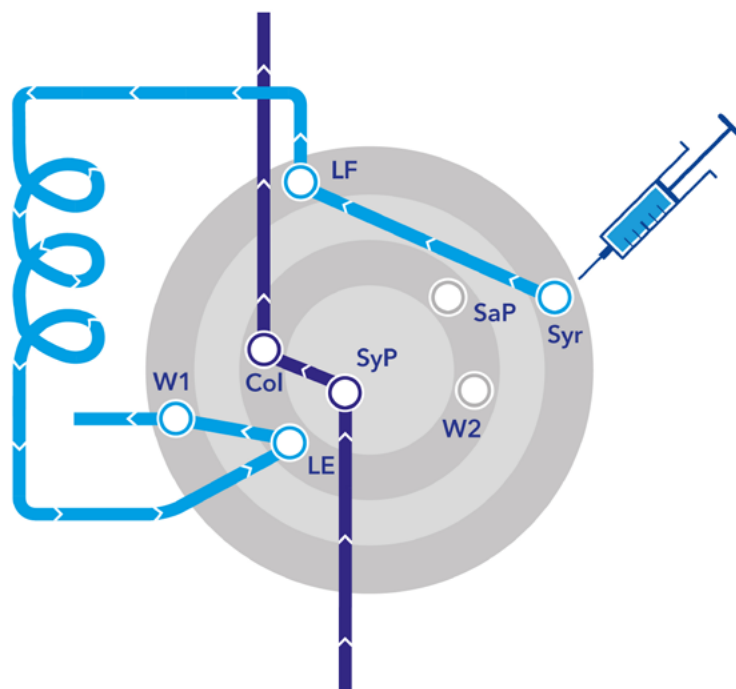
### Legend

- 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. 16** 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.

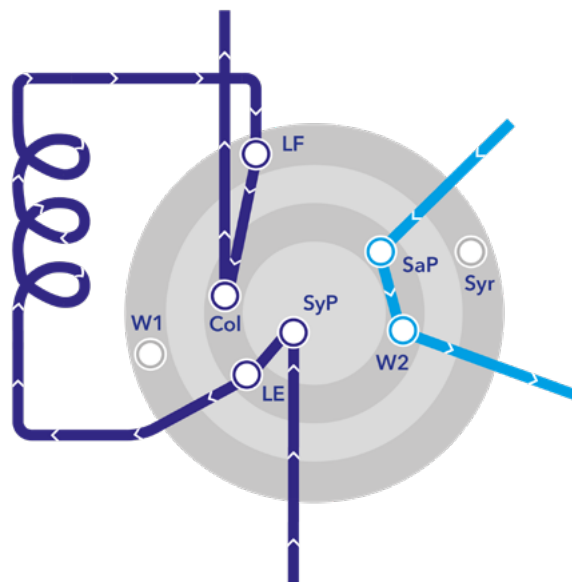


**Fig. 17** Position 1

## Functional principle

### Sample injection (Position 2):

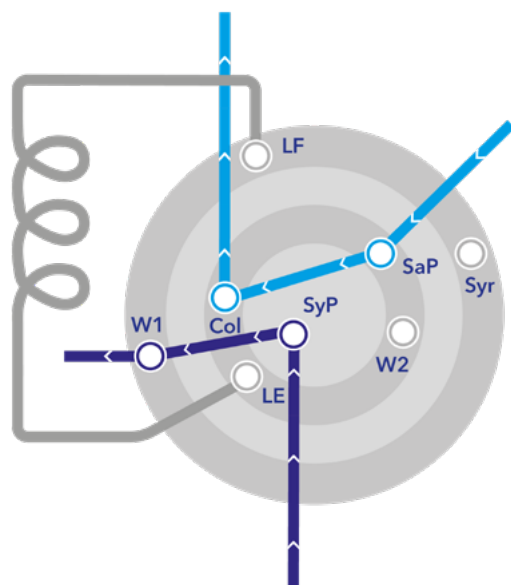
The flow of the system pump is directed through the loop and sample is injected onto the column. Additionally, the flow of the sample pump is directed to waste 2.



**Fig. 18** 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. 19** 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.

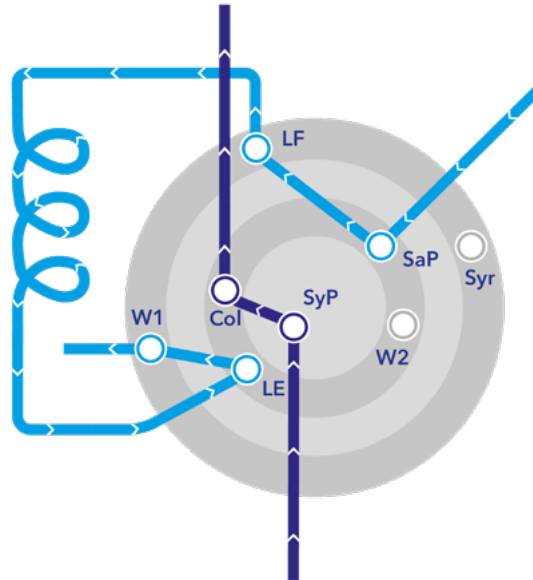


Fig. 20 Position 4



**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.

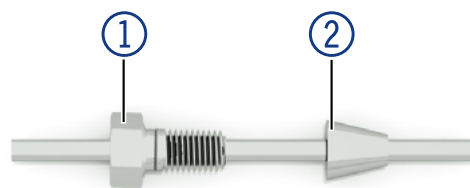
- Use 5 Nm torque for stainless steel fittings.
- Use 1 Nm torque for PEEK fittings.

**Tools:** Torque wrench

#### Process

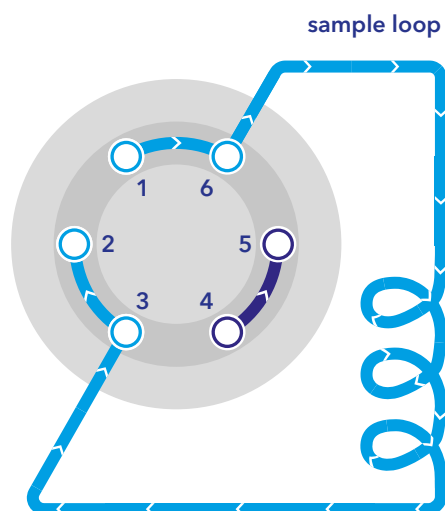
1. Insert one end of the sample loop into the screw fitting ①.
2. Attach the ferrule ②.
3. Repeat the first steps on the other end of the sample loop.

#### Figure



**Fig. 21** Screw fitting and ferrule

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. 22** 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.

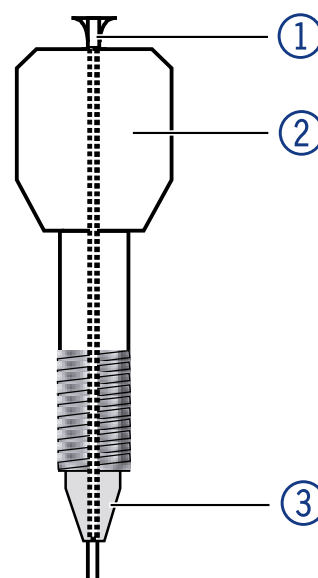


**Note:** The DYNASEAL fitting is screwed together hand-tight. The DYNASEAL fitting sits adequately tight when you feel a resistance at pulling the needle.

### Process

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.

### Figure



**Fig. 23** 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.)

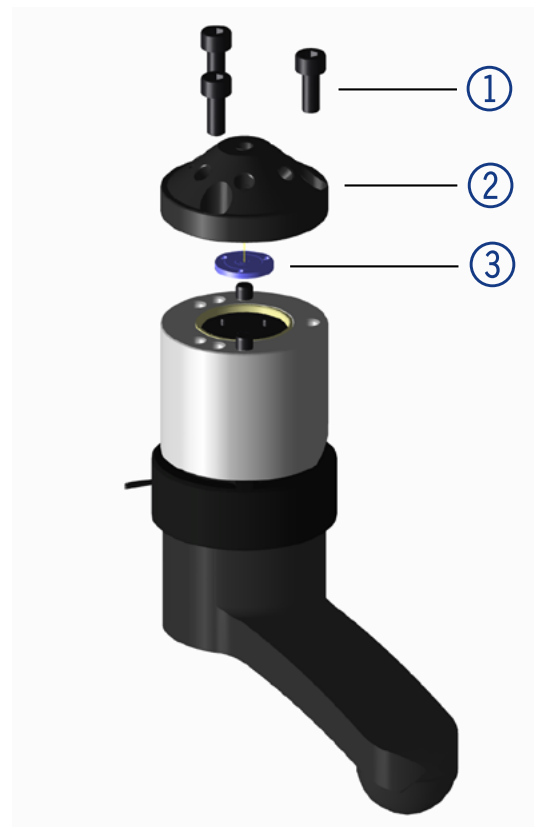
**Prerequisites:** Valve has been removed from valve drive.

**Tools:** Torx screwdriver, T20

#### Process

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.

#### Figure



**Fig. 24** 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 %

### 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 <sup>1</sup>	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
AVD26AH <sup>2</sup>	6	SST DLC	PEEK	500 bar	0.75 mm	1/16", UNF 10-32 coned
AVC28AC	6	SST DLC*	Vespel®	1 200 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®	1 200 bar	0.3 mm	1/16", UNF 10-32 coned
AVC48AC	10	SST DLC	Vespel®	1 200 bar	0.3 mm	1/16", UNF 10-32 coned

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

<sup>1</sup> 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.

<sup>2</sup> Break-free version of the standard 2-position valve, which prevents pressure peaks during switching. We do not recommend to use it as an injection valve.

## Multi-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
AVT84AH	2	SST DLC*	PEEK	200 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVS85AH	2	SST DLC*	PEEK	300 bar	0.75 mm	1/16", UNF 10-32 coned
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®	1 200 bar	0.3 mm	1/16", UNF 10-32 coned
AVU32GE	8	PEEK	PEEK	50 bar	2 mm	1/8", UNF 1/4-28 flat-bottom
AVU32CE	8	PEEK	PEEK	50 bar	2 mm	1/8", UNF 1/4-28 coned
AVT34AE	8	SST DLC*	PEEK	200 bar	1.5 mm	1/8", UNF 1/4-28 coned
AVT34AH <sup>1</sup>	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
AVS34CH <sup>1</sup>	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 <sup>1</sup>	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®	1 200 bar	0.3 mm	1/16", UNF 10-32 coned
AVM48AC	10	SST DLC*	Vespel®	1 200 bar	0.2 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

<sup>1</sup> 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 Maintenance kits & spare parts

Valve Art. no.	Description	Rotor seal Art. no.	Stator Art. no.
AVT84AH	2 Port multi-position valve, 200 bar	ARV42	A205150
AVS85AH	2 Port multi-position valve, 300 bar	ARV57	A205142
AVF32CE	6 Port 2-position valve, 50 bar, bioinert	ARV52	A205130
AVD23AF	6 Port 2-position valve, 100 bar	ARV48	A205140
AVF23CE	6 Port 2-position valve, 100 bar, bioinert	ARV50	A205156
AVD24CE	6 Port 2-position valve, 240 bar, bioinert	ARV35	A205102
AVE25AE	6 Port 2-position valve, 300 bar	ARV49	A205146
AVE25AI	6 Port 2-position valve, 300 bar	ARV51	A205146
AVD26AE	6 Port 2-position valve, 500 bar	ARV33	A205140
AVD26AH <sup>1</sup>	6 Port 2-position valve, 500 bar	ARV58	A205140
AVC28AC	6 Port 2-position valve, 1 200 bar	ARV36	A205118
AVS23AF	6 Port multi-position valve, 100 bar	ARV53	A205140
AVT25AE	6 Port multi-position valve, 300 bar	ARV54	A205146
AVS26AE	6 Port multi-position valve, 500 bar	ARV46	A205140
AVR28AC	6 Port multi-position valve, 1 200 bar	ARV38	A205118
AVD36AE	8 Port 2-position valve, 500 bar	ARV34	A205142
AVC38AC	8 Port 2-position valve, 1 200 bar	ARV31	A205120
AVU32CE	8 Port multi-position valve, 50 bar, bioinert	ARV41	A205130
AVU32GE	8 Port multi-position valve, 50 bar, flat bottom	ARV41	A205153



Valve Art. no.	Description	Rotor seal Art. no.	Stator Art. no.
AVT34AH	8 Port multi-position valve, 200 bar	ARV42	A205150
AVT34AE	8 Port multi-position valve, 200 bar	ARV45	A205150
AVT34AE	8 Port multi-position valve, 200 bar	ARV45	A205150
AVS34CE	8 Port multi-position valve, 240 bar, bioinert	ARV32	A205104
AVS34CH <sup>1</sup>	8 Port multi-position valve, 240 bar, bioinert	ARV57	A205104
AVS35AE	8 Port multi-position valve, 300 bar	ARV32	A205142
AVS35AH	8 Port multi-position valve, 300 bar	ARV57	A205142
AVS36AE	8 Port multi-position valve, 500 bar	ARV32	A205142
AVR38AC	8 Port multi-position valve, 1 200 bar	ARV39	A205120
AVN94CE	8 Port multi-injection valve, 240 bar, bioinert	ARV40	A205132
AVN96AE	8 Port multi-injection valve, 500 bar	ARV55	A205161
AVC48AC	10 Port 2-position valve, 1 200 bar	ARV59	A205168
AVT53AE	12 Port multi-position valve, 100 bar	ARV47	A205154
AVT53CE	12 Port multi-position valve, 100 bar	ARV47	A205164
AVS62CE	16 Port multi-position valve, 50 bar, bioinert	ARV44	A205106
AVQ63AF	16 Port multi-position valve, 100 bar	ARV56	A205152
AVS63CE	16 Port multi-position valve, 150 bar	ARV44	A205106
AVQ66AE	16 Port multi-position valve, 500 bar	ARV43	A205152
AVJ23AF	Manual 6 Port 2-position valve, 100 bar	ARV48	A205140
AVL23CE	Manual 6 Port 2-position valve, 100 bar, bioinert	ARV50	A205156
AVG24CE	Manual 6 Port 2-position valve, 240 bar, bioinert	ARV35	A205102
AVK25AE	Manual 6 Port 2-position valve, 300 bar	ARV49	A205146
AVJ26AE	Manual 6 Port 2-position valve, 500 bar	ARV33	A205140
AVI28AC	Manual 6 Port 2-position valve, 1 200 bar	ARV36	A205118
AVJ36AE	Manual 8 Port 2-position valve, 500 bar	ARV34	A205142
AVI38AC	Manual 8 Port 2-position valve, 1 200 bar	ARV31	A205120
AVM48AC	High-pressure colum selection valve for 4 columns and bypass	ARV60	A205169

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

Science with Passion



Latest KNAUER instructions online:  
[www.knauer.net/library](http://www.knauer.net/library)

**KNAUER**  
Wissenschaftliche Geräte GmbH  
Hegauer Weg 37-38  
14163 Berlin

Phone: +49 30 809727-0  
Fax: +49 30 8015010  
E-mail: [info@knauer.net](mailto:info@knauer.net)  
Internet: [www.knauer.net](http://www.knauer.net)