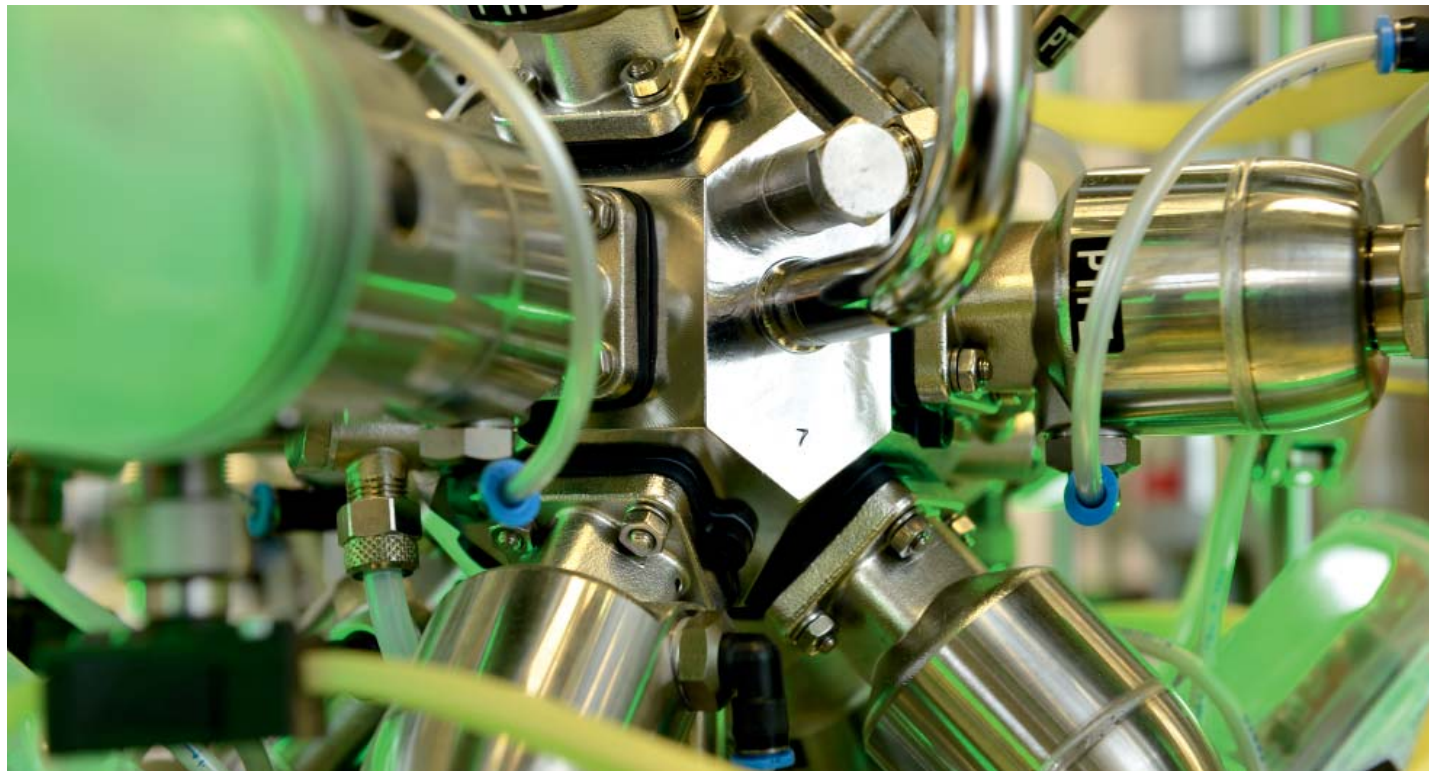


**GEMÜ®**

VALVES, MEASUREMENT AND  
CONTROL SYSTEMS

## ***M600 Multi-Port Valve Blocks in Stainless Steel***





**Leading the world in pharmaceutical and biotechnology industry sterilisation processes**

GEMÜ is one of the leading manufacturers of valves, measurement and control systems for sterile applications in the pharmaceutical and biotechnology industries. This position is based on GEMÜ's comprehensive investments in application-oriented research & development, amounting to more than 5% of the company's turnover. The versatile product range is supplemented with a wide range of advisory services provided by industry specialists and application experts.

**Customized solutions for your project business**

GEMÜ provides the optimal solution from a single source. As a system supplier of isolation, actuator and control technology, we can respond very flexibly to your individual project-specific needs.

Our worldwide sales network provides fast reaction times, customer oriented service and a committed project management team.





# Table of contents

Multi-port valve blocks for sterile applications	4 - 5	M600 05-03.A7	23
Advantages of GEMÜ multi-port valve blocks	6	M600 05-04.C	24
i-bodies	7	M600 06-04.P1	25
Functions of multi-port valve blocks	8 - 9	M600 10-08.T	26
Examples of multi-port valve block designs	10 - 11	Butt weld connections / Surface finish	27 - 29
Multi-port valve block design example	12	Clamp bodies	30
M600 03-01.EL / M600 03-01.ER	13	Materials and certificates	31
M600 03-02.B	14	Certificates and approvals	32
M600 03-02.SL / M600 03-02.SR	15	The original GEMÜ seal system	33 - 34
M600 03-03.N1 / M600 03-03.N3	16	GEMÜ diaphragms	35 - 37
M600 03-03.N2 / M600 03-03.N9	17	Selection of operators	38 - 40
M600 04-02.OC	18	Automation components	41
M600 04-02.U5	19	Special version of multi-port valve block	
M600 04-04.N1 / M600 04-04.N2	20	GEMÜ sampling bottle	42 - 43
M600 04-04.W	21	Specification of multi-port valve blocks	44 - 46
M600 04-05.R	22	GEMÜ manufacturing sites and sales locations worldwide	47

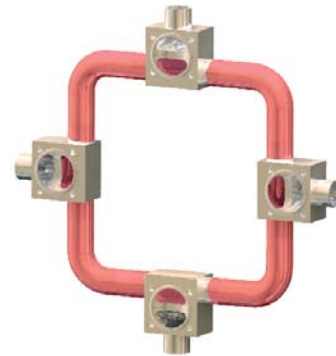
## *Multi-port valve blocks for sterile applications*



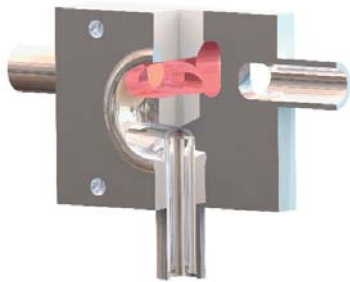
Multi-port valve blocks (M-blocks) made of stainless steel are the most progressive solution for meeting the stringent requirements of the pharmaceutical and food industries. Complex processes using welded fabrications are often still being implemented today, more than 20 years after the market launch of the first M-blocks. The valves, fittings and pipe components used for this require a lot of space, a greater installation and welding effort on site and lead to a correspondingly high validation expense. Not to mention a high hold-up volume and larger deadlegs even when complying with the conventional 6D or 3D rules.

To make processes safer, increase the availability of the plant and reduce the life cycle costs of a plant within the scope of a total cost of ownership concept (TCO), GEMÜ has implemented more than 400 different designs and thousands of customized variants of multi-port valve blocks over the years. We support our customers with ideas and initial drafts at the planning phase. The drafts are then implemented constructively in our 3D CAD system, agreed in close co-operation with the customer and then machined by means of a highly efficient machine park. We machine a large number of M-blocks weighing between 0.1 kg and 500 kg on multi-axis machining centres per year. Every day, our Design Centre turns out new customized block designs.

## Conventional designs



## M-block design



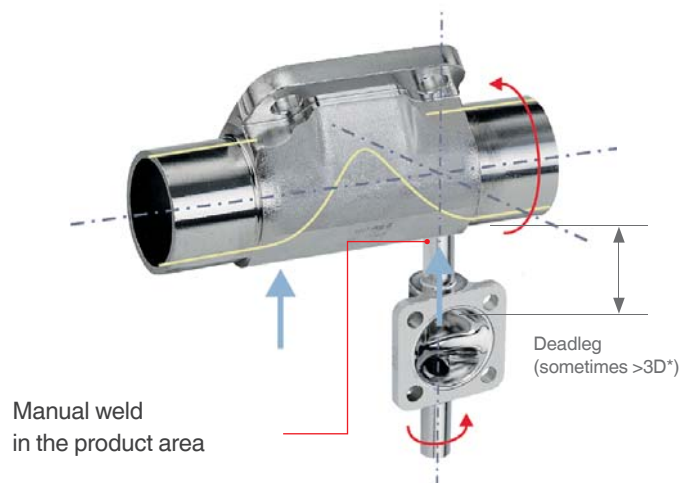
The red coloured line sections mark the hold-up volume.

## Features of stainless steel M blocks

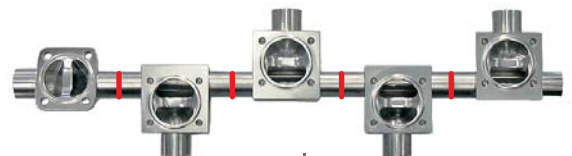
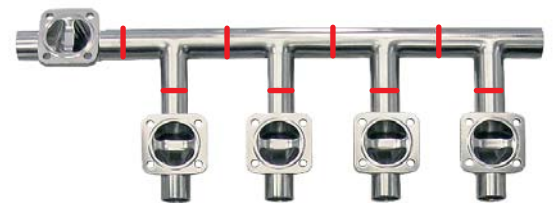
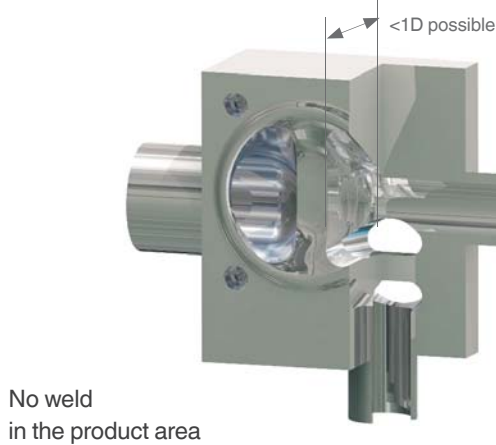
- Individual, customized and very flexible design
- Compact – low space requirements
- Low hold-up volume, smaller wetted area
- Greatly reduced deadlegs
- All blocks are designed for optimized draining and machined from one block of material
- Much greater product reliability
- No internal welds: reduced and simple validation due to fewer fittings, welds and radiographic inspections
- Standard welded ends for orbital welding
- Reduced total cost of ownership
- Operators and diaphragms from the proven GEMÜ modular system can be used

# Advantages of GEMÜ multi-port valve blocks

Classic designs of valves, fittings and pipework components have high space requirements. They also require a correspondingly high installation and welding effort, which results in increased validation costs. Using multi-port valve blocks means that weld seams are no longer necessary in the product area, for example, and that space requirements can be significantly reduced, as shown in the figures below.



\*D = pipe inside diameter



## ***i-bodies***



The GEMÜ i-body (integrated valve seat) can be seen as an intermediate step to full GEMÜ M-block design machined from a piece of block material. i-bodies are a special construction type of the classical 2/2-way valve bodies. The integrated valve seat of i-bodies is used for example as sampling, steam and condensate valve. The valve bodies have two valve seats and 3 pipe connections. They are manufactured from a forging blank or a piece of block material.

The i-body offers a low cost and good alternative for a number of combinations. It already exhibits two essential features of an M-block. It has a greatly reduced dead volume and no internal weld. The drain or supply spigot is only welded on behind the valve seat.

The major advantages of i-bodies compared to standard sampling or condensate valve bodies are as follows:

- *Reduced weight*
- *Minimal deadleg*
- *No weld in the product area*
- *Compact*
- *Cost effective*
- *Available with spigots or elbows*
- *Draining in vertical installation position possible if adhering to the 3D-rule*

## Functions of multi-port valve blocks



M600 09-04.B for automatic measuring point activation.  
GEMÜ 651 actuator

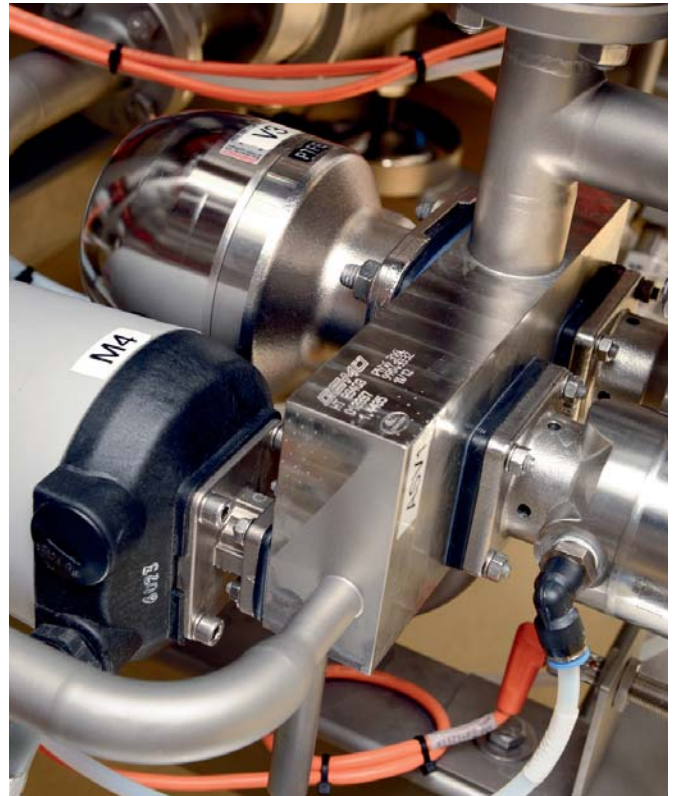
M-blocks can unite a wide variety of different functions in the smallest of spaces thanks to their individual design:

- *Mixing*
- *Dividing*
- *Feeding*
- *Diverting*
- *Discharging*
- *Dosing*
- *Bringing together*

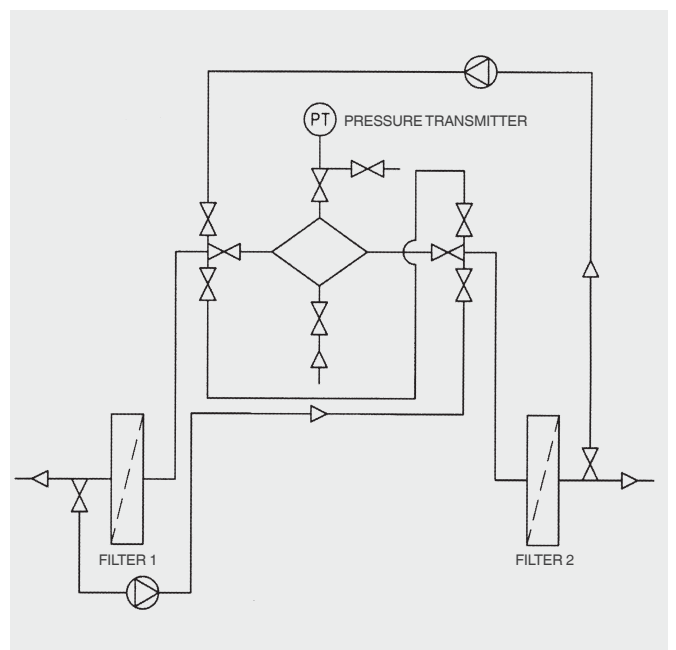
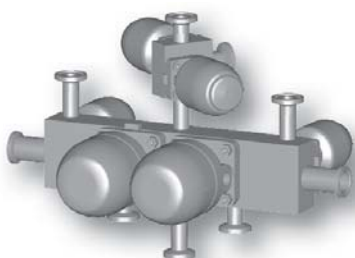
Quite substantial tasks are assigned to these individual functions. These are for example, sampling, sterile steam connection (SIP), connection for cleaning agent (CIP) or guarantee of a minimum flow. In addition to this, there are other functions in the scope of process automation which can be integrated.

In automatic measuring point switching in a plant, four measuring points are connected to one measuring instrument, for example, via one M-block. The measurements are made in a fixed rhythm. The media currents are controlled fully automatically by the M-block, the valve operators of which are connected to a central PLC.

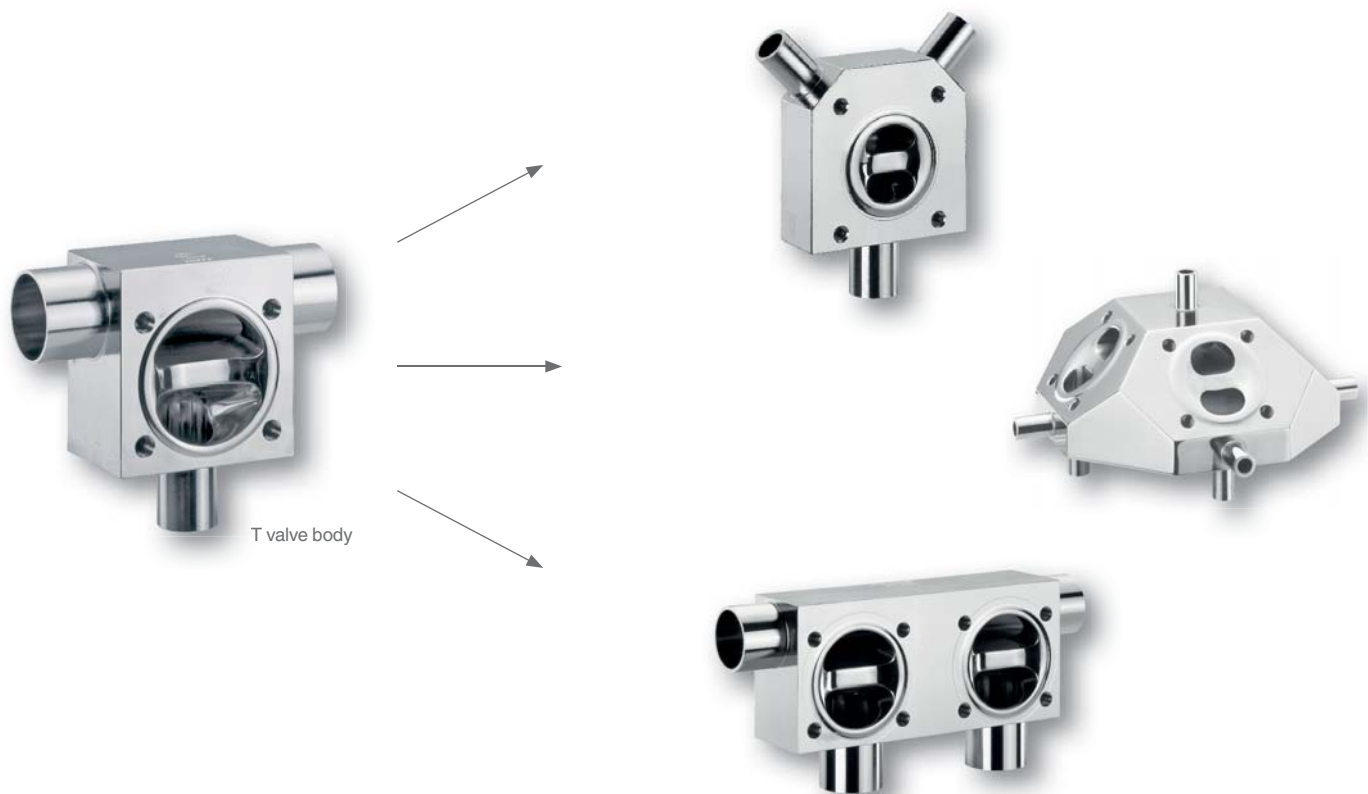




Another function is the automatic switching between two filters. If the set differential pressure in filter 1 is reached, the M-block automatically switches over to filter 2. This also ensures that the rest of the medium is fed through filter 2 again before backwashing filter 1. This means no medium is lost. The filters in the plant used to be flanged manually with the associated high risk of contamination and loss of valuable medium. This automatic switching could only be implemented previously by using welded configurations. Enhanced draining and the low space requirement, however, are factors which promote the use of M-blocks.



## Examples of multi-port valve block designs

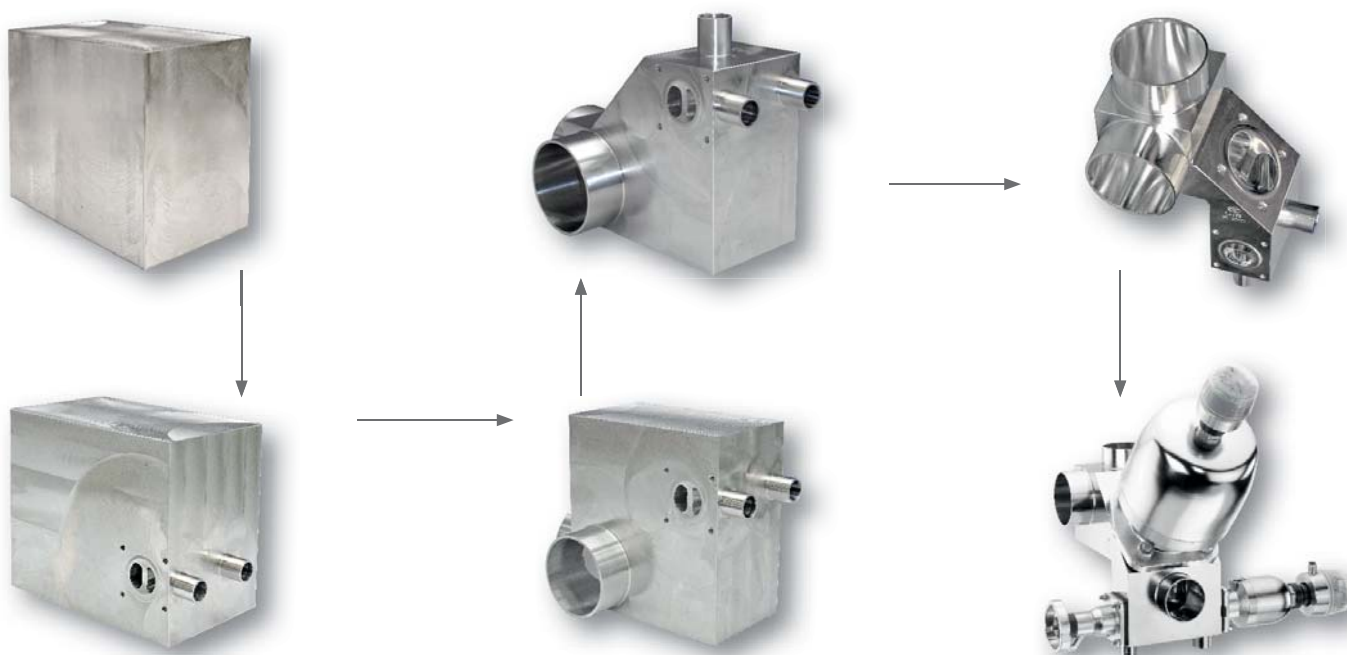
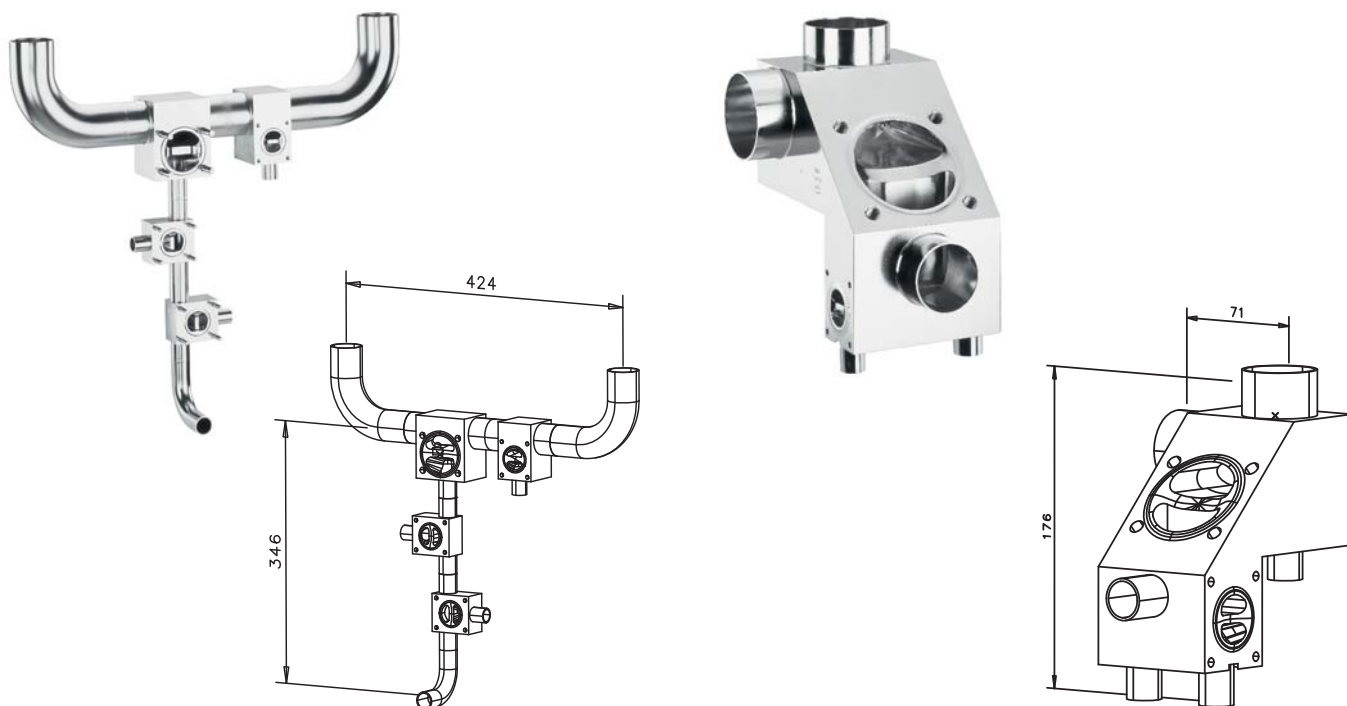


A number of points need to be considered in the design and manufacture of M-blocks. First of all, there is the application and process safety for the plant in which the block is to be installed. This requires an exact specification, which includes the function of the block, the number and dimensions of the pipe connections and the number and size of the individual valve seats. Our engineers turn these and further specifications into your special solution.

Simple designs include valve banks for media distribution.



A more complex version is represented by the following WFI loop valve. There the functions removal, condensate outlet, pure steam supply and sampling are integrated in a compact block.



## Multi-port valve block design example

In order to be able to identify the blocks clearly later, a code has been generated at GEMÜ which makes communication easier.

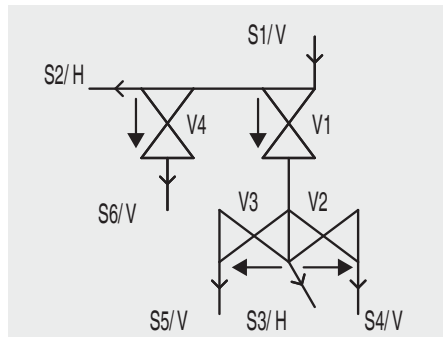
### M600 06-04.P1

M600 stands for a multi-port valve without operators

"06" indicates the number of pipe connections

The numbers at the end of the code indicate the design and variant details

"04" indicates the number of valve seats



Example: M600 06-04:P1

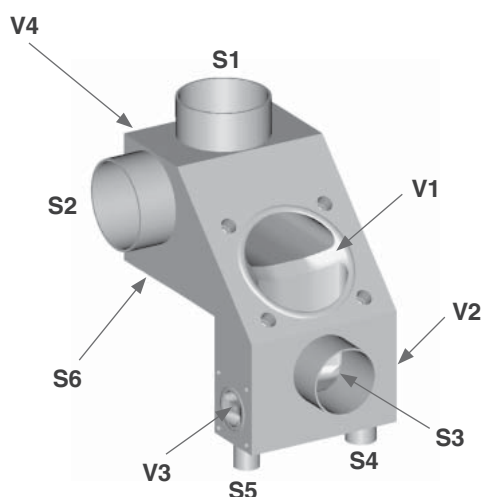
### M600 06-04.P1

Using your specification, first a diagrammatic view of the valve block to be designed is created, whereby your details are, of course, treated strictly confidentially.

The flow directions specified in the diagram are examples and are implemented according to customer requirements.

→ Flow direction

→ Draining direction



This schematic design then results in CAD based three-dimensional construction drawings.

We will produce the block individually for you after you have released it.



## M600 03-01.EL / M600 03-01.ER

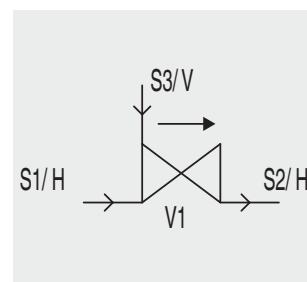
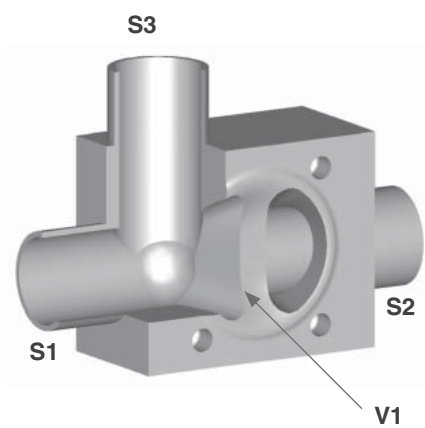
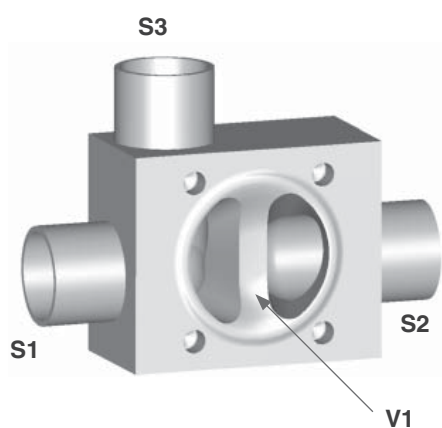
### Sterile valve block made of stainless steel block material

Dependent on the variant selected (ER or EL) the M-block can be used for example as a branch, sampling valve or insulation between two media rings.

### GEMÜ M600 03-01.EL

#### Installation position:

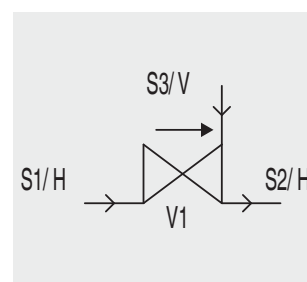
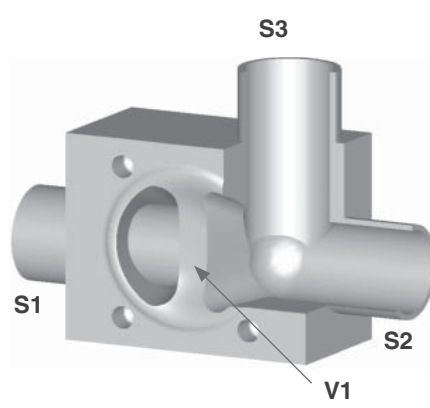
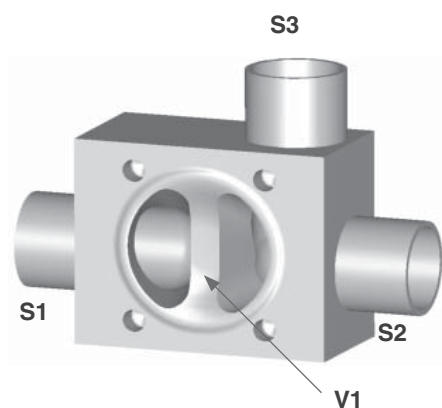
Spigot S3 arranged vertically upwards on the left.



### GEMÜ M600 03-01.ER

#### Installation position:

Spigot S3 arranged vertically upwards on the right.



H = horizontal, V = vertical

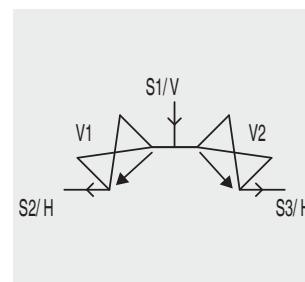
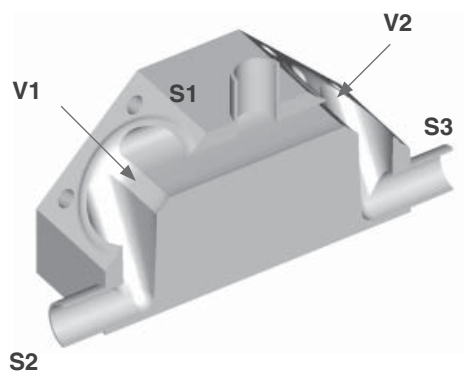
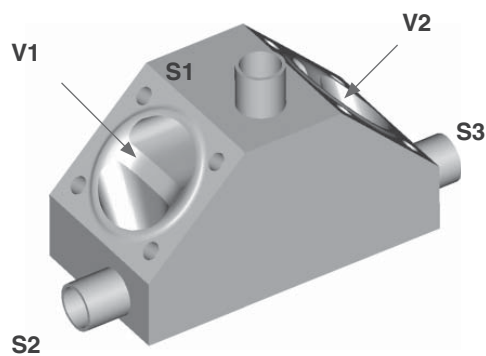
## M600 03-02.B

### Sterile valve block made of stainless steel block material

This configuration is used for example for distributing or mixing.

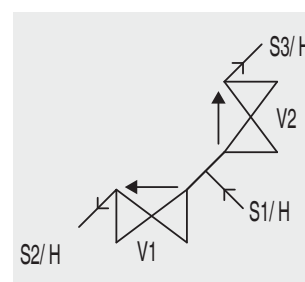
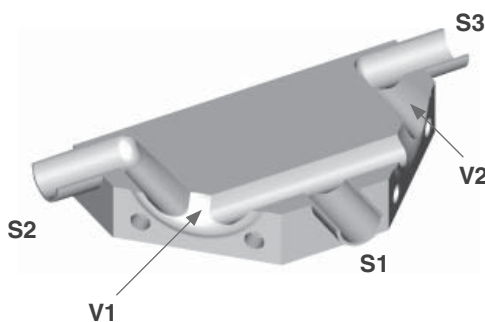
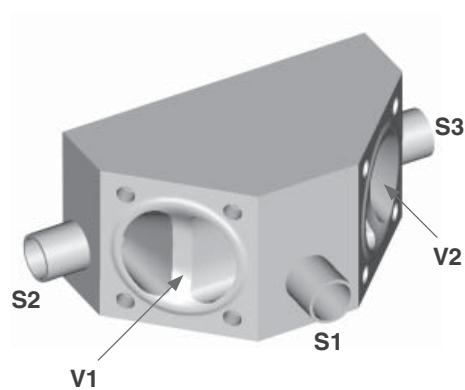
#### Installation position:

Spigot S1 aligned vertically upwards or downwards.



#### Alternative installation position:

All spigots aligned horizontally.



H = horizontal, V = vertical

# M600 03-02.SL / M600 03-02.SR

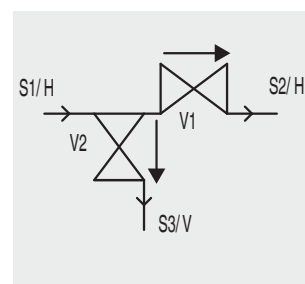
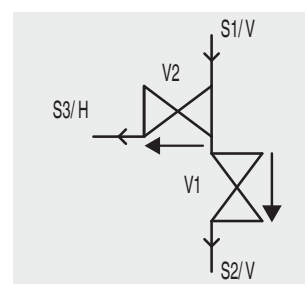
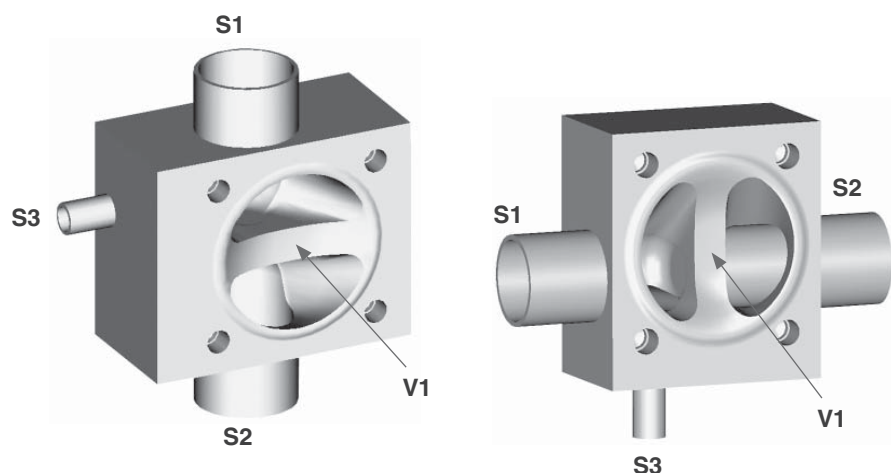
## Sterile valve block made of stainless steel block material

This configuration is used for example as a condensate drain or sampling valve.

### GEMÜ M600 03-02.SL

#### Installation position:

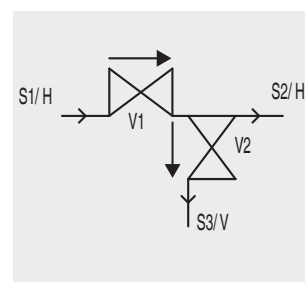
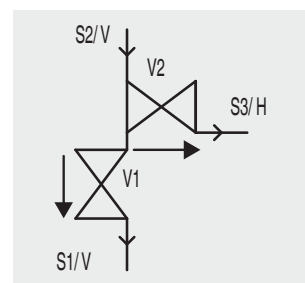
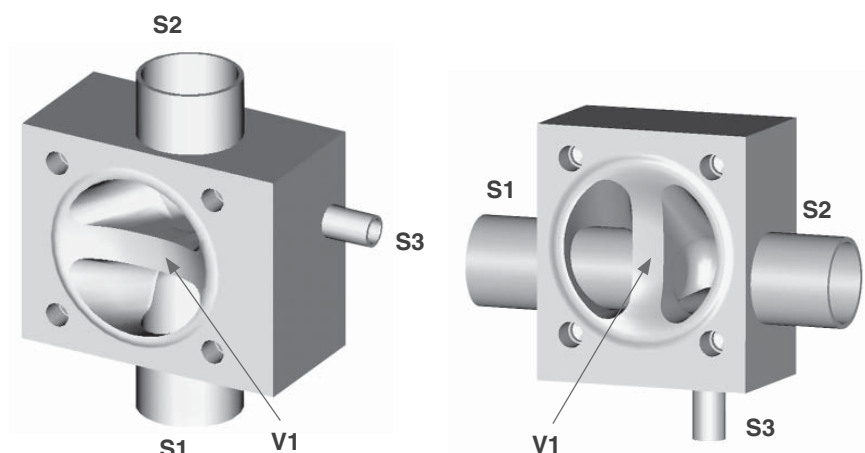
Spigot S3 arranged horizontally to the left or vertically downwards, on the left.



### GEMÜ M600 03-02.SR

#### Installation position:

Spigot S3 arranged horizontally to the right or vertically downwards, on the right.



H = horizontal, V = vertical

## M600 03-03.N1 / M600 03-03.N3

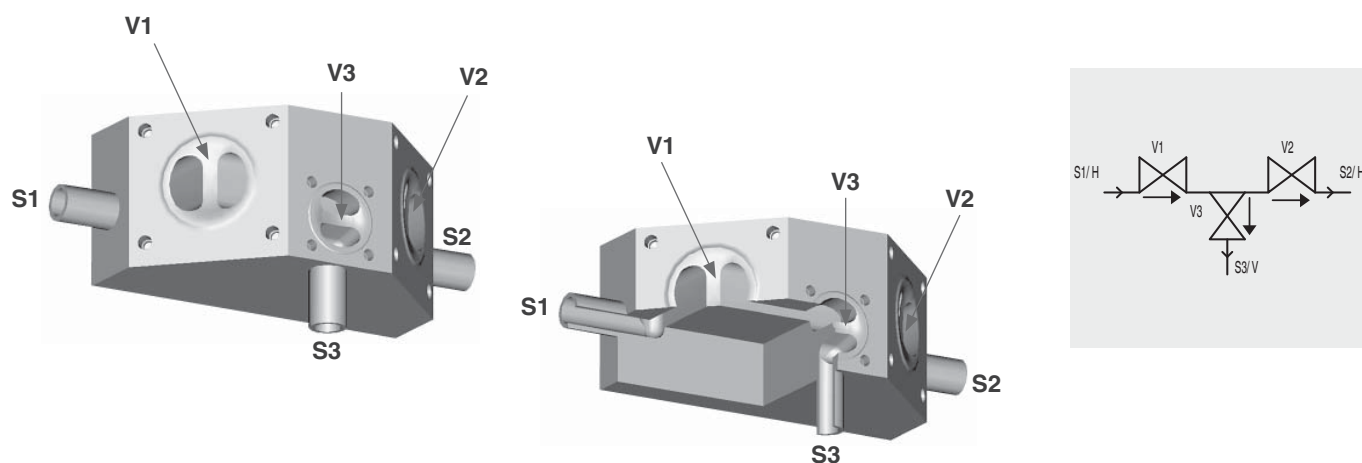
**Sterile valve block made of stainless steel block material.**

This configuration is used, for example, as a block-and-bleed valve.

### GEMÜ M600 03-03.N1

**Installation position:**

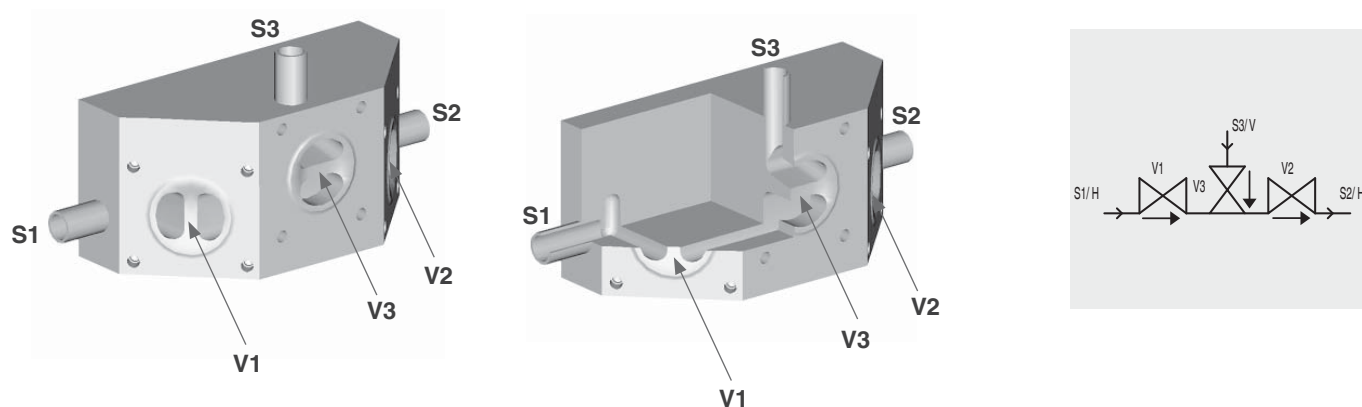
Spigot S3, centred and arranged vertically downwards. Suitable for wall mounting. Manual operators possible.



### GEMÜ M600 03-03.N3

**Installation position:**

Spigot S3, centred and arranged vertically upwards. Suitable for wall mounting. Manual operators possible.



H = horizontal, V = vertical



## M600 03-03.N2 / M600 03-03.N9

**Sterile valve block made of stainless steel block material.**

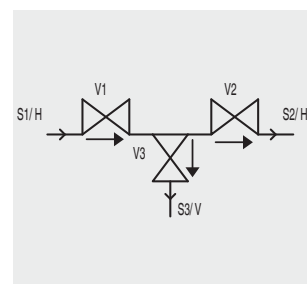
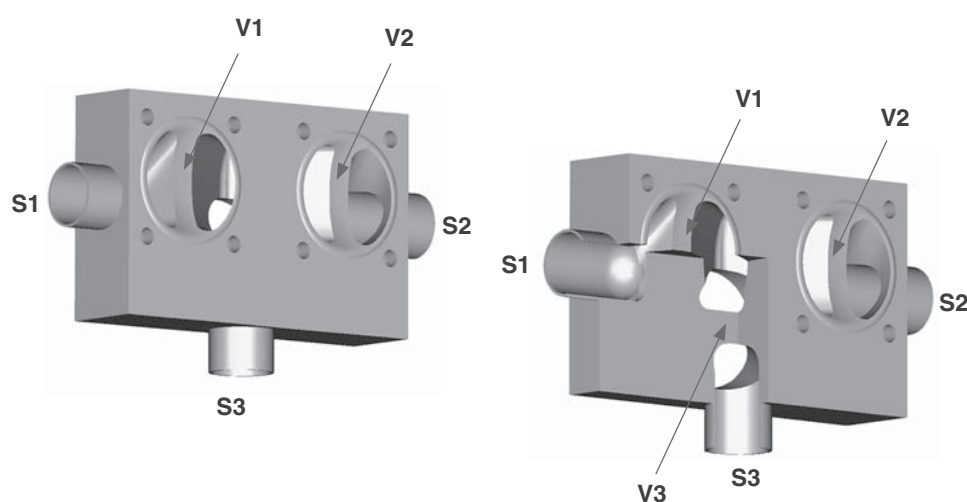
This configuration is used, for example, as a block-and-bleed valve.

### GEMÜ M600 03-03.N2

#### Installation position:

Spigot S3, centred and arranged vertically downwards. Optimized for GEMÜ 650 actuators.

This enables very compact construction.

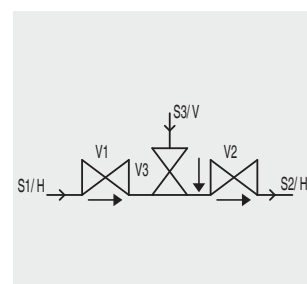
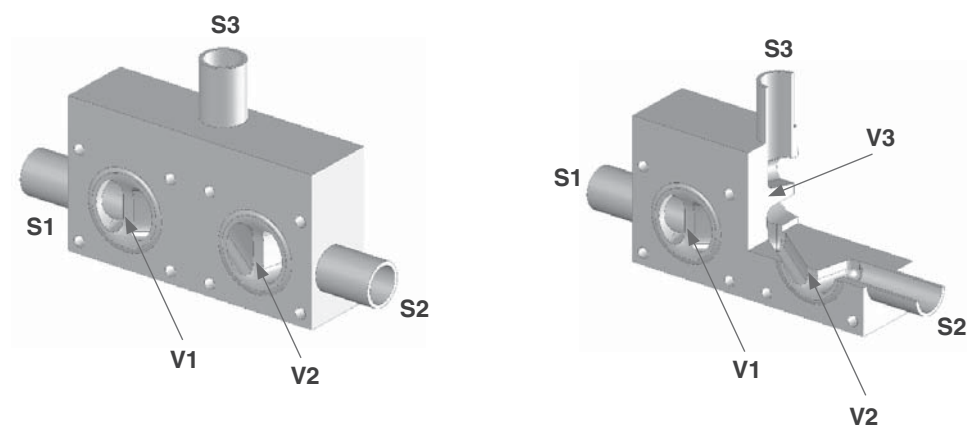


### GEMÜ M600 03-03.N9

#### Installation position:

Spigot S3, centred and arranged vertically upwards. Optimized for GEMÜ 650 actuators.

This enables very compact construction.



H = horizontal, V = vertical

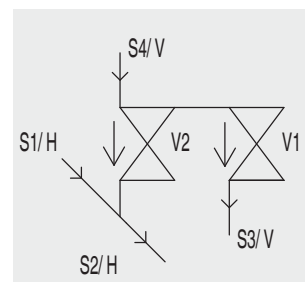
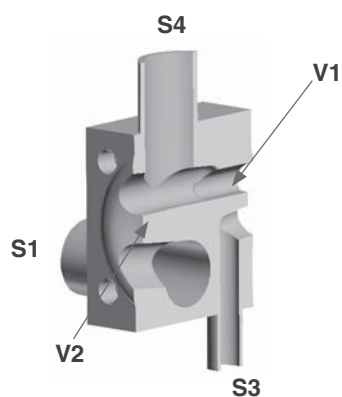
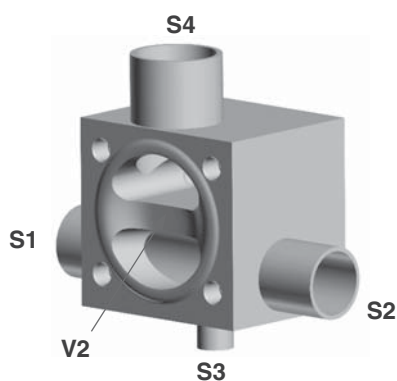
## M600 04-02.OC

### Sterile valve block made of stainless steel block material.

This configuration is used for applications including mixing, distributing or sampling.

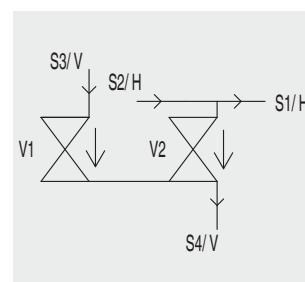
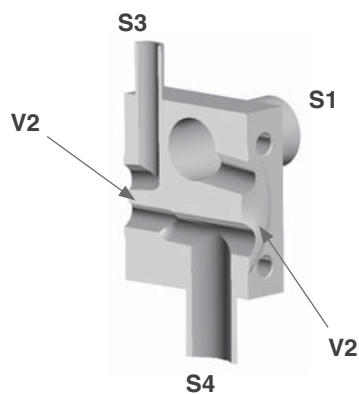
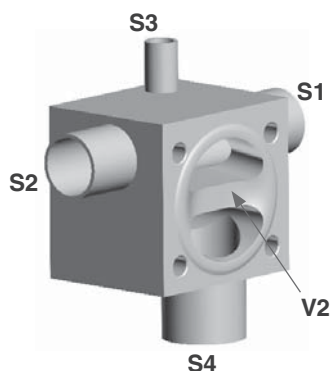
#### Installation position:

Main pipe arranged horizontally. Spigot S3 pointing downwards, spigot S4 upwards. Spigots S3 is used for condensate drain or as a sampling point.



#### Alternative installation position:

Main pipe arranged horizontally. Spigot S4 pointing downwards, spigot S3 upwards. Spigot S3 is used for CIP/SIP connection.



H = horizontal, V = vertical

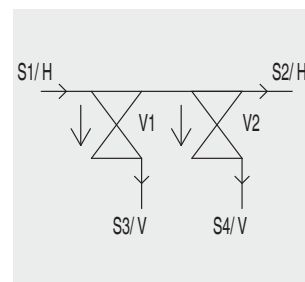
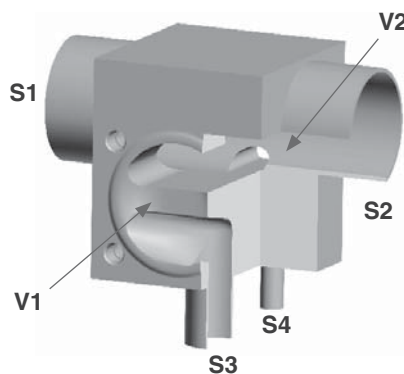
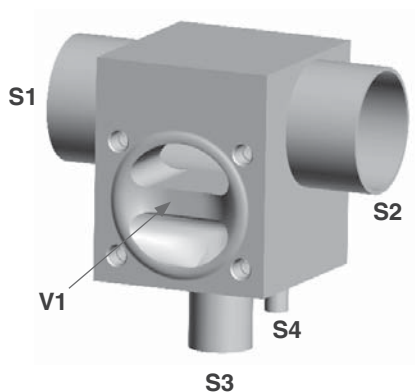
## M600 04-02.U5

**Sterile valve block made of stainless steel block material.**

This configuration is used for example for distributing, mixing or sampling.

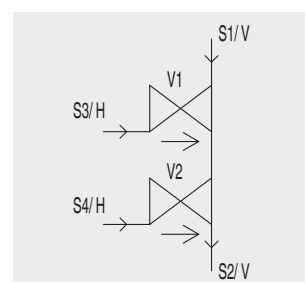
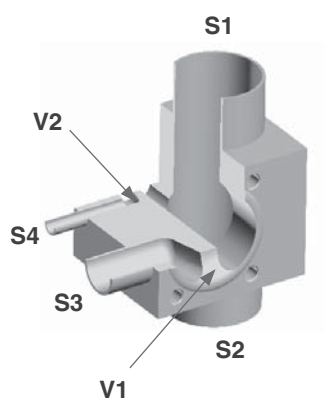
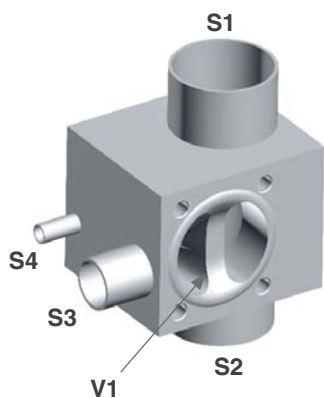
### Installation position:

Main pipe arranged horizontally. Spigots S3 and S4 as extraction and sampling option from the ring main.



### Alternative installation position:

Main pipe arranged vertically. Spigots S3 and S4 for the purpose of optimum draining offset to the side of the valve seat.



H = horizontal, V = vertical

# M600 04-04.N1 / M600 04-04.N2

## Sterile valve block made of stainless steel block material

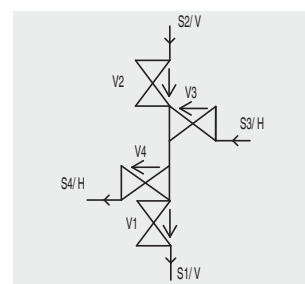
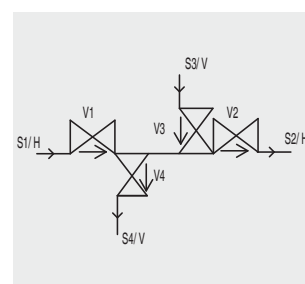
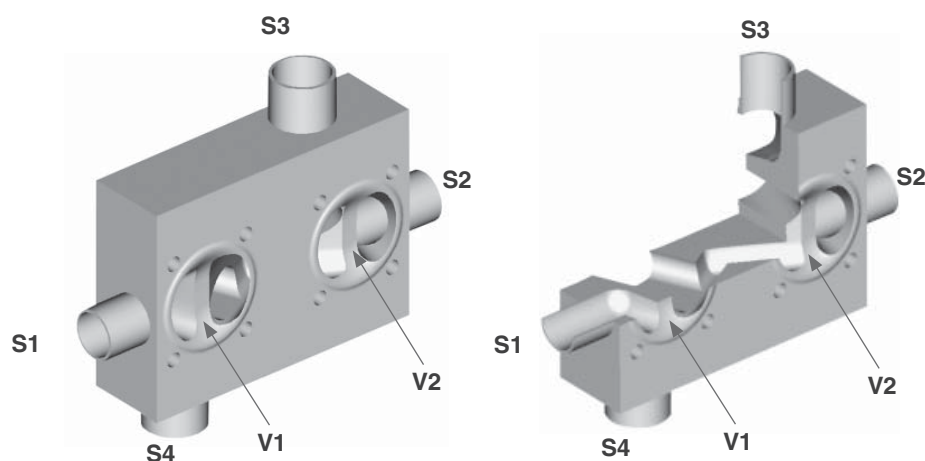
This configuration is used, for example, as a block-and-bleed valve.

### GEMÜ M600 04-04.N1

#### Installation position:

Spigots S1 and S2 arranged horizontally, S3 and S4 vertically.

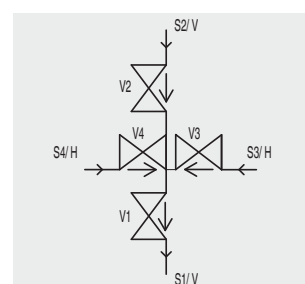
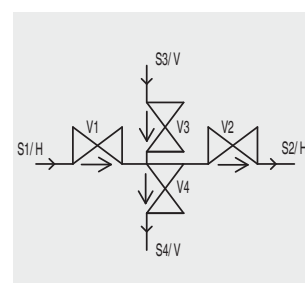
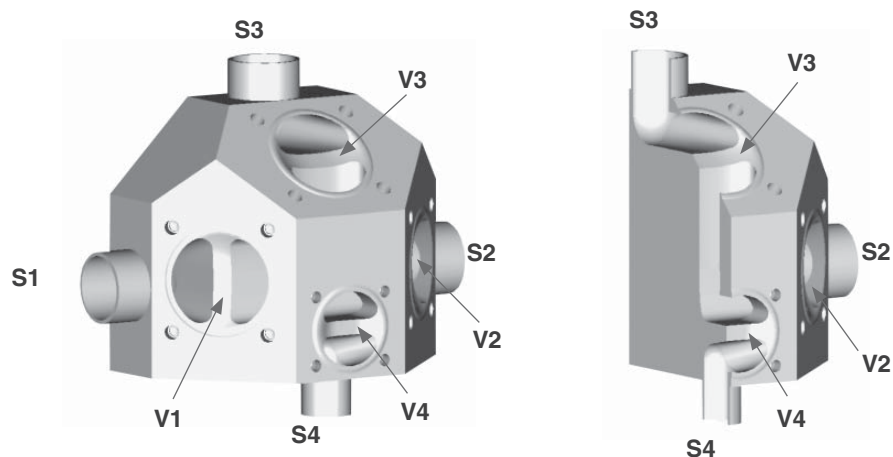
Optimized for GEMÜ 650 actuators. This enables very compact construction.



### GEMÜ M600 04-04.N2

#### Installation position:

Spigots S1 and S2 arranged horizontally, S3 and S4 vertically. Suitable for wall mounting. Manual operators possible.



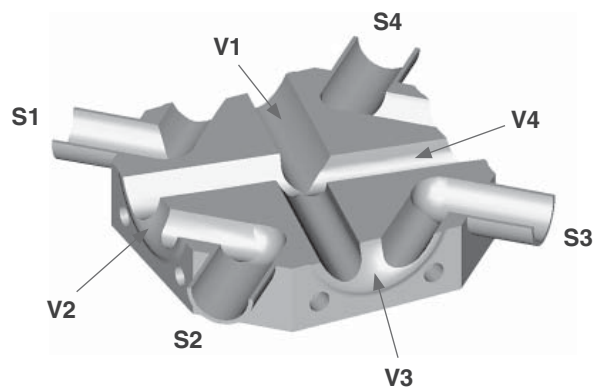
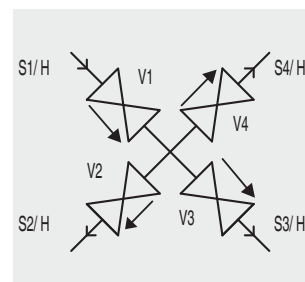
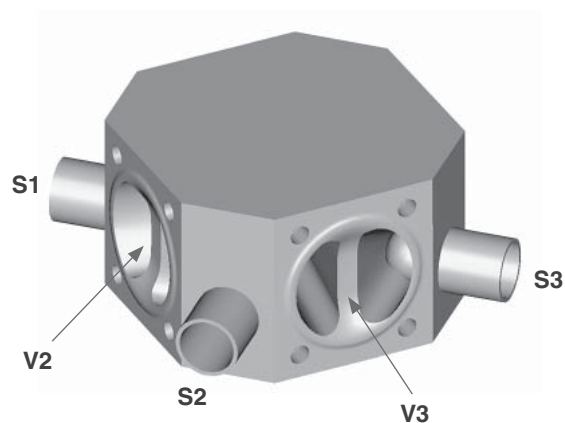
H = horizontal, V = vertical



## M600 04-04.W

**Sterile valve block made of stainless steel block material,**  
This configuration is used for example for distributing or mixing.

**Installation position:**  
All spigots aligned horizontally.



H = horizontal, V = vertical

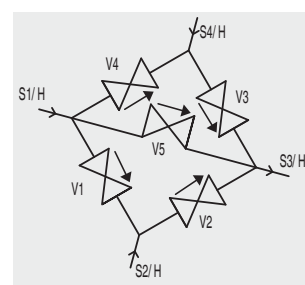
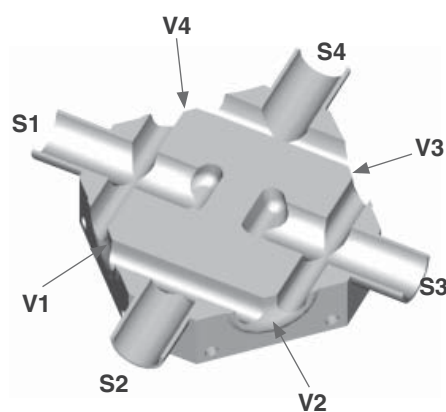
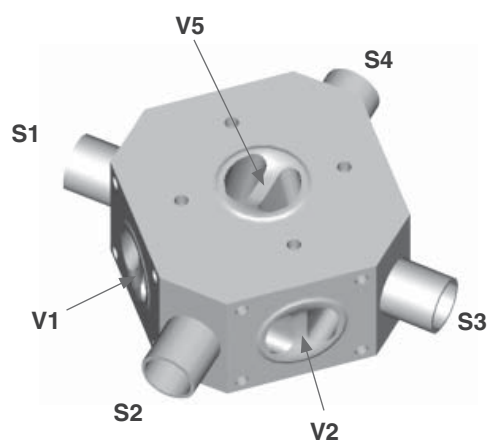
## M600 04-05.R

**Sterile valve block made of stainless steel block material.**

This configuration is used, for example, as a chromatography block, for conducting, diverting and switching.

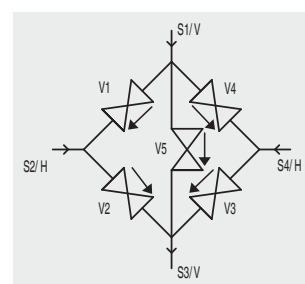
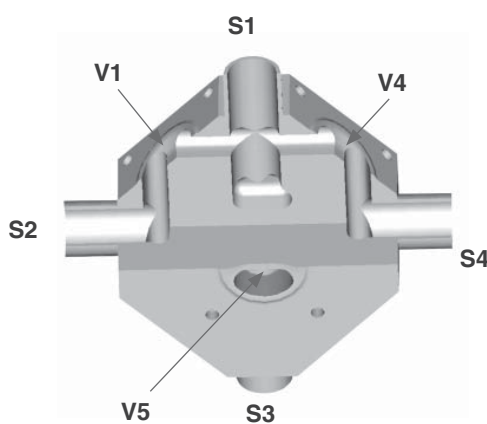
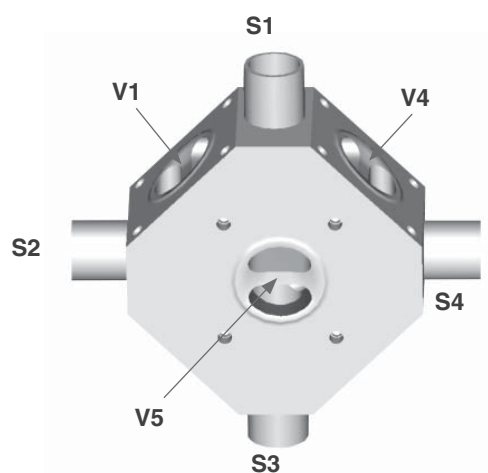
### Installation position:

All spigots aligned horizontally.



### Alternative installation position:

Spigots S1 and S3 aligned vertically, spigots S2 and S4 horizontally.



H = horizontal, V = vertical

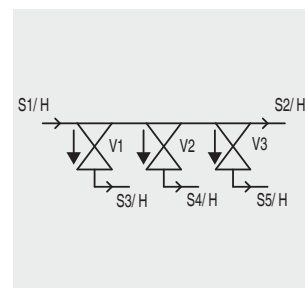
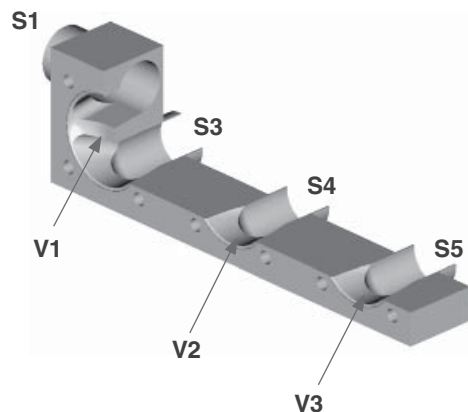
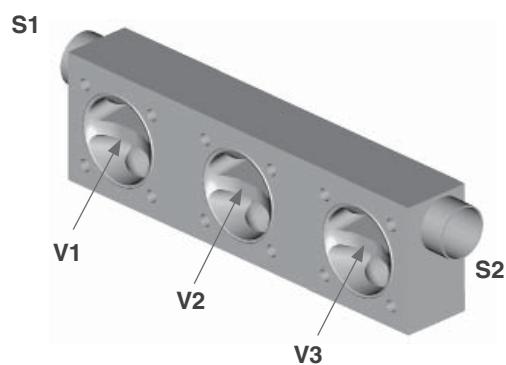
## M600 05-03.A7

**Sterile valve block made of stainless steel block material.**

Application, for example, for distributing and mixing.

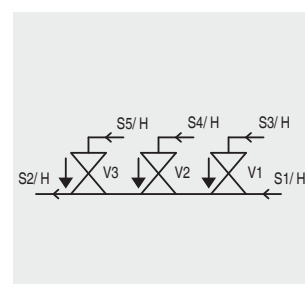
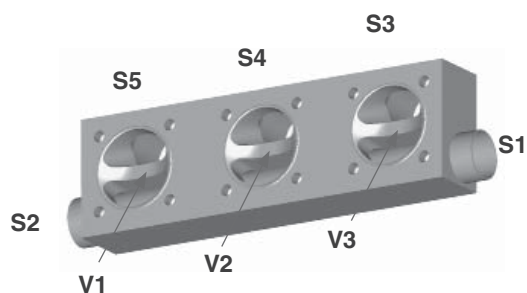
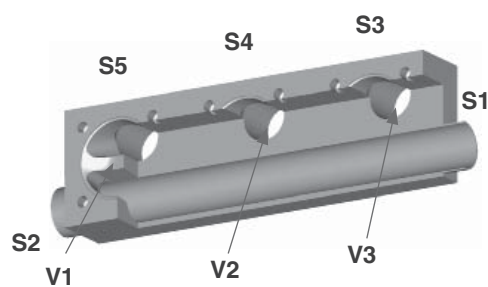
### Installation position:

Main pipe at top



### Alternative installation position:

Main pipe at bottom



H = horizontal, V = vertical

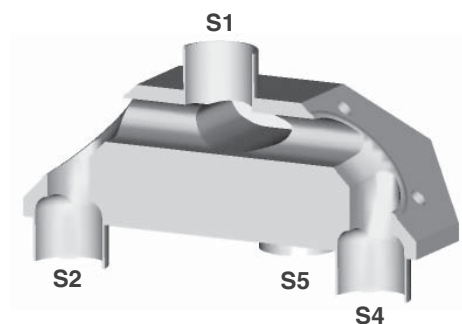
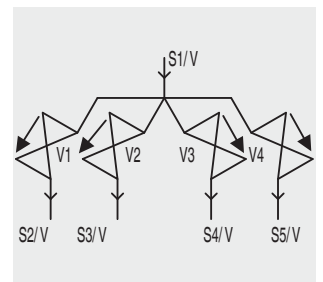
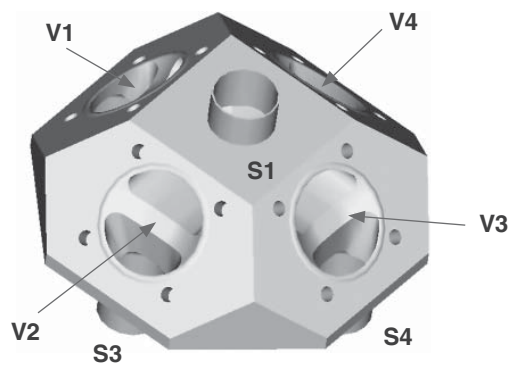
## M600 05-04.C

**Sterile valve block made of stainless steel block material.**

M600 05-04.C can be used for applications including distributing or mixing.

**Installation position:**

Spigot S1 aligned vertically upwards or downwards.



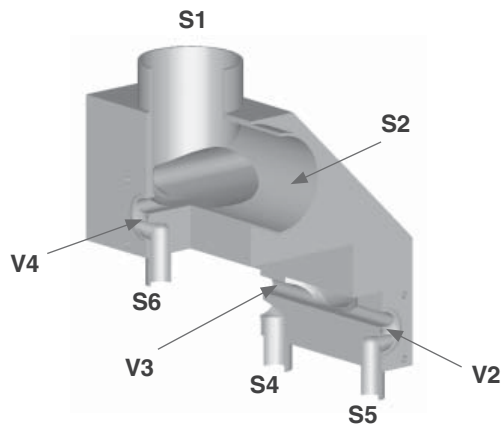
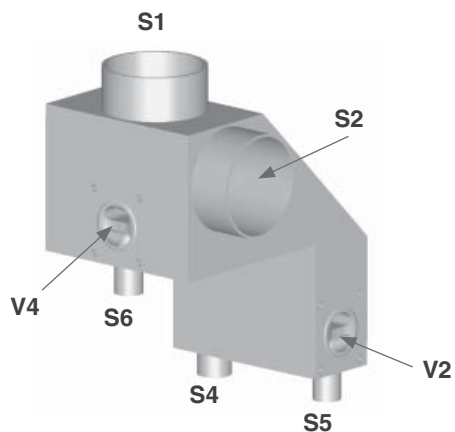
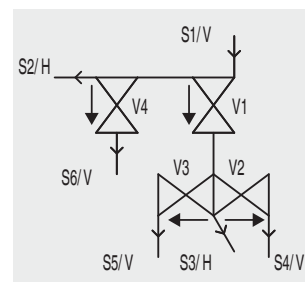
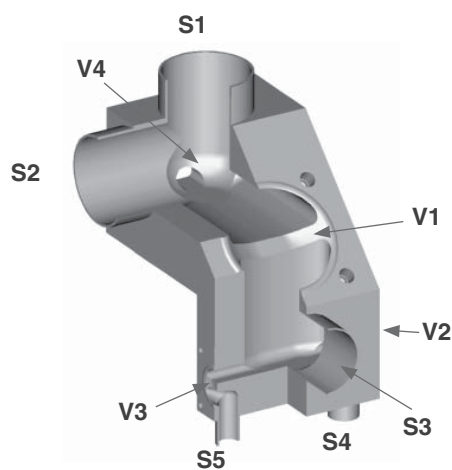
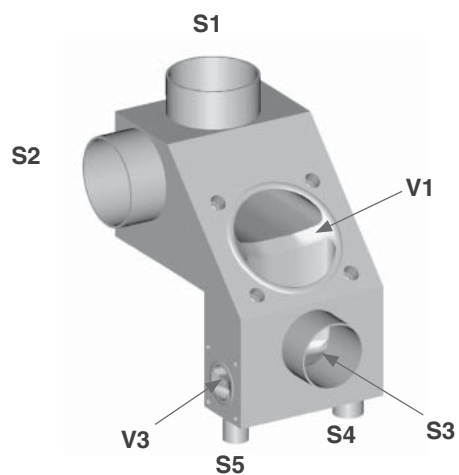
H = horizontal, V = vertical



## M600 06-04.P1

### Sterile valve block made of stainless steel block material.

Multi-function block with several integrated applications: point of use WFI, sampling, condensate drain, filling into larger vessels, draining, sterile steam supply for SIP.



H = horizontal, V = vertical

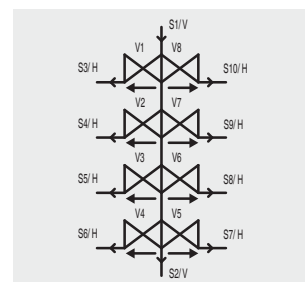
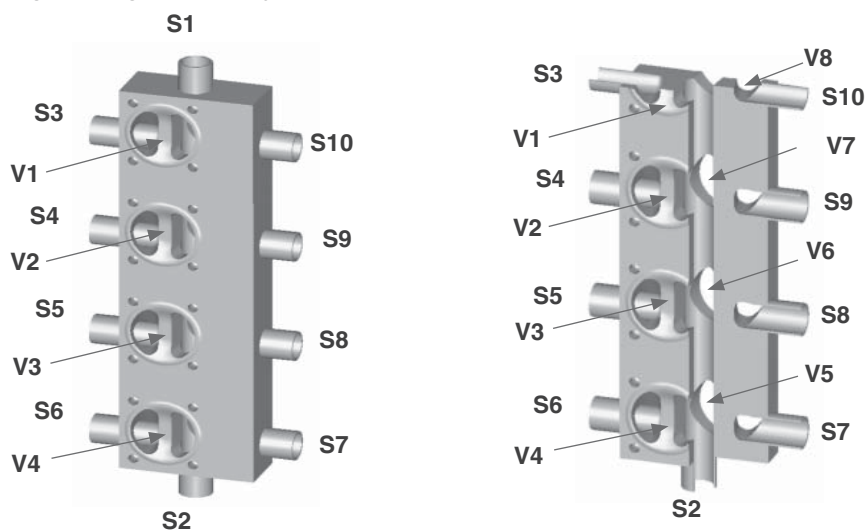
# M600 10-08.T

**Sterile valve block made of stainless steel block material.**

This configuration is used, for example, as a T-valve array for branching and filling.

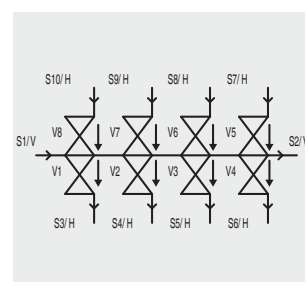
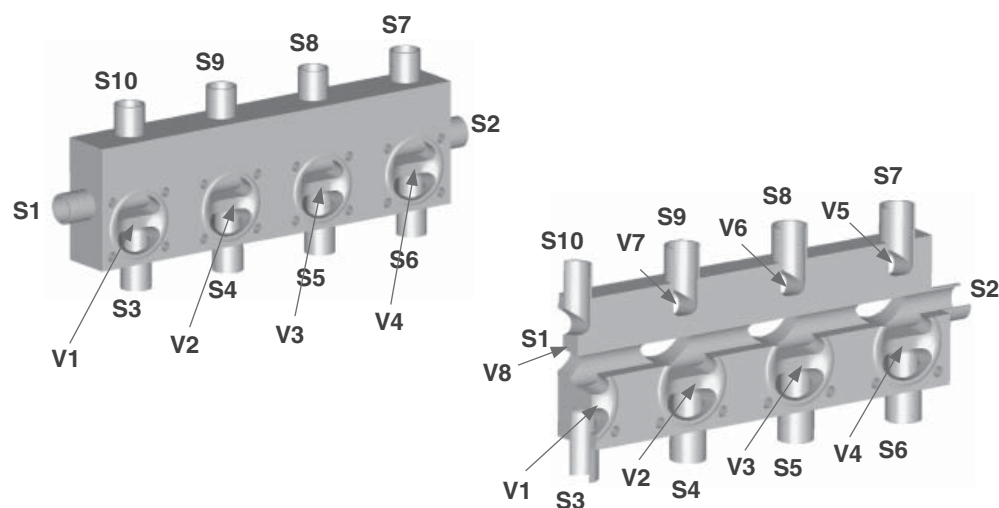
## Installation position:

Spigot S1 aligned vertically upwards.



## Alternative installation position:

Spigots S3 to S10 aligned vertically.



H = horizontal, V = vertical

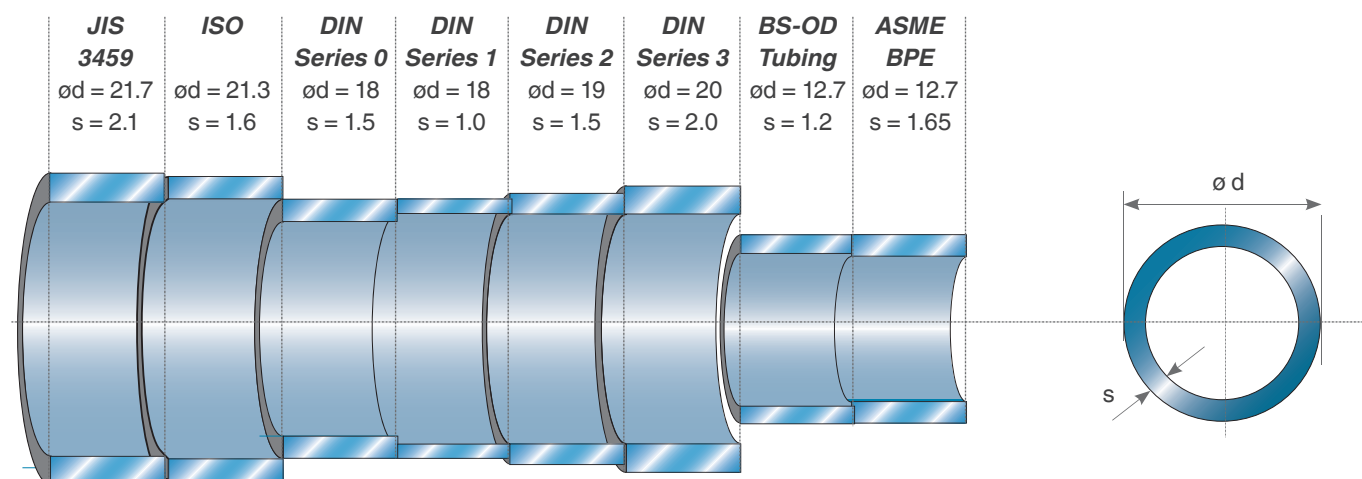
## Butt weld connections / Surface finish

Modern, ergonomically shaped workstations and trained polishing staff give us the ability to provide high quality surface finishes. Depending on the required application, surface finishes from Ra 0.8 µm down to 0.25 µm can be achieved by polishing, electro polishing or a special process, we call “elysieren“.

Mechanical hand polishing is carried out at our works to ensure our high quality standard.

In principle, special connections requested by customers can be provided on GEMÜ multi-port valve blocks and it is also possible to have different connections on one body.

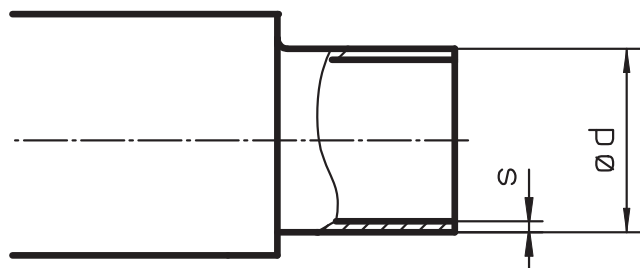
### The difference between tube specifications (Example DN 15)



Valve body surface finish, internal contour		
	Block material - Codes 41, 43	Code
Ra ≤ 0.8 µm, mechanically polished internal, blasted external	X	1502
Ra ≤ 0.8 µm, electropolished internal/external	X	1503
Ra ≤ 0.6 µm, mechanically polished internal, blasted external	X	1507
Ra ≤ 0.6 µm, electropolished internal/external	X	1508
Ra ≤ 0.4 µm, mechanically polished internal, blasted external	X	1536
Ra ≤ 0.4 µm, electropolished internal/external	X	1537
Ra ≤ 0.25 µm, mechanically polished internal, blasted external	X	1527
Ra ≤ 0.25 µm, electropolished internal/external	X	1516

Ra acc. to DIN 4768; at defined reference points. Surface finish data refers to media wetted surfaces.

## Butt weld connections



Dimensions in mm			DIN		DIN 11850						DIN 11866				EN ISO 1127	
			Series 0 Code 0		Series 1 Code 16		Series 2 Code 17		Series 3 Code 18		Series A Code 1A		Series B Code 1B		Code 60	
MG	DN	NPS	ød	s	ød	s	ød	s	ød	s	ød	s	ød	s	ød	s
8	4	-	6	1.0	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	8	1.0	-	-	-	-	-	-	8	1.0	10.2	1.6	10.2	1.6
	8	¼"	10	1.0	-	-	-	-	-	-	10	1.0	13.5	1.6	13.5	1.6
	10	⅜"	-	-	12	1.0	13	1.5	14	2.0	13	1.5	-	-	-	-
	15	½"	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	10	⅜"	-	-	12	1.0	13	1.5	14	2.0	13	1.5	17.2	1.6	17.2	1.6
	15	½"	18	1.5	18	1.0	19	1.5	20	2.0	19	1.5	21.3	1.6	21.3	1.6
	20	¾"	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	15	½"	18	1.5	18	1.0	19	1.5	20	2.0	19	1.5	21.3	1.6	21.3	1.6
	20	¾"	22	1.5	22	1.0	23	1.5	24	2.0	23	1.5	26.9	1.6	26.9	1.6
	25	1"	28	1.5	28	1.0	29	1.5	30	2.0	29	1.5	33.7	2.0	33.7	2.0
40	32	1 ¼"	34	1.5	34	1.0	35	1.5	36	2.0	35	1.5	42.4	2.0	42.4	2.0
	40	1 ½"	40	1.5	40	1.0	41	1.5	42	2.0	41	1.5	48.3	2.0	48.3	2.0
50	50	2"	52	1.5	52	1.0	53	1.5	54	2.0	53	1.5	60.3	2.0	60.3	2.0
80	65	2 ½"	-	-	-	-	70	2.0	-	-	70	2.0	76.1	2.0	76.1	2.0
	80	3"	-	-	-	-	85	2.0	-	-	85	2.0	88.9	2.3	88.9	2.3
100	100	4"	-	-	-	-	104	2.0	-	-	104	2.0	114.3	2.3	114.3	2.3

MG = diaphragm size

Continued on the next page



Dimensions in mm			JIS-G 3447 Code 35	JIS-G 3459 Code 36		SMS 3008 Code 37		BS 4825 Code 55		ASME BPE Code 59		ANSI/ASME B36.19M 10s Code 63		ANSI/ASME B36.19M 40s Code 65		
			ød	s	ød	s	ød	s	ød	s	ød	s	ød	s	ød	s
8	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	-	-	10.5	1.20	-	-	-	-	-	-	10.3	1.24	10.3	1.73
	8	¼"	-	-	13.8	1.65	-	-	6.35	1.2	6.35	0.89	13.7	1.65	13.7	2.24
	10	⅜"	-	-	-	-	-	-	9.53	1.2	9.53	0.89	-	-	-	-
	15	½"	-	-	-	-	-	-	12.70	1.2	12.70	1.65	-	-	-	-
10	10	⅜"	-	-	17.3	1.65	-	-	9.53	1.2	9.53	0.89	17.1	1.65	17.1	2.31
	15	½"	-	-	21.7	2.10	-	-	12.70	1.2	12.70	1.65	21.3	2.11	21.3	2.77
	20	¾"	-	-	-	-	-	-	19.05	1.2	19.05	1.65	-	-	-	-
25	15	½"	-	-	21.7	2.10	-	-	-	-	-	-	21.3	2.11	21.3	2.77
	20	¾"	-	-	27.2	2.10	-	-	19.05	1.2	19.05	1.65	26.7	2.11	26.7	2.87
	25	1"	25.4	1.2	34.0	2.80	25.0	1.2	-	-	25.40	1.65	33.4	2.77	33.4	3.38
40	32	1 ¼"	31.8	1.2	42.7	2.80	33.7	1.2	-	-	-	-	42.2	2.77	42.2	3.56
	40	1 ½"	38.1	1.2	48.6	2.80	38.0	1.2	-	-	38.10	1.65	48.3	2.77	48.3	3.68
50	50	2"	50.8	1.5	60.5	2.80	51.0	1.2	-	-	50.80	1.65	60.3	2.77	60.3	3.91
80	65	2 ½"	63.5	2.0	76.3	3.00	63.5	1.6	-	-	63.50	1.65	73.0	3.05	73.0	5.16
	80	3"	76.3	2.0	89.1	3.00	76.1	1.6	-	-	76.20	1.65	88.9	3.05	88.9	5.49
100	100	4"	101.6	2.0	114.3	3.00	101.6	2.0	-	-	101.60	2.11	114.3	3.05	114.3	6.02

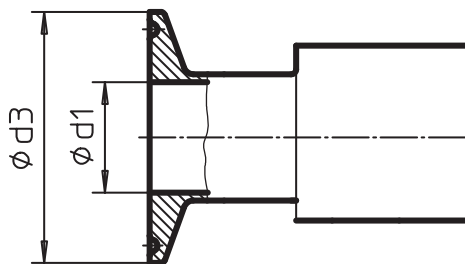
MG = diaphragm size



# Clamp bodies

All clamp connections are machined according to the spigot dimensions e.g. to DIN 11850, EN ISO 1127, SMS 3008 or ASME BPE. We ask our customers to state which version or standard the connections shall comply with.

At GEMÜ all welds are carried out by specially qualified and certified welders utilising state-of-the-art welding technology. In principle, special connections requested by customers can be provided on GEMÜ M-blocks and it is also possible to have different connections on one body. Valve bodies with fully machined clamp connections are also possible as an option.



Pipe			Code 59 ASME-BPE		Code 60 EN ISO 1127		Code 59 ASME-BPE		Code 16,17,18 DIN 11850		Code 37 SMS3008		Code 35 JIS-G3447		Code 36 JIS-G3459	
Clamp connection			Code 80		Code 82		Code 88 *		Code 8A		Code 8E		Code 8F		Code 8H	
MG	DN	NPS	ød1	ød3	ød1	ød3	ød1	ød3	ød1	ød3	ød1	ød3	ød1	ød3	ød1	ød3
8	8	1/4"	4.57	25	10.30	25.0	-	-	-	-	-	-	-	-	10.5	34
	10	3/8"	7.75	25	-	-	-	-	10.00	34	-	-	-	-	-	-
	15	1/2"	9.40	25	-	-	9.40	25	-	-	-	-	-	-	-	-
10	10	3/8"	-	-	14.00	25.0	-	-	10.00	34	-	-	-	-	14.00	34
	15	1/2"	9.40	25	18.10	50.5	9.40	25	16.00	34	-	-	-	-	17.50	34
	20	3/4"	15.75	25	-	-	15.75	25	-	-	-	-	-	-	-	-
25	15	1/2"	9.40	25	18.10	50.5	9.40	25	16.00	34	-	-	-	-	17.50	34
	20	3/4"	15.75	25	23.70	50.5	15.75	25	20.00	34	-	-	-	-	-	-
	25	1"	22.10	50.5	29.70	50.5	22.10	50.5	26.00	50.5	22.60	50.5	23.00	50.5	-	-
40	32	1 1/4"	-	-	38.40	64.0	-	-	32.00	50.5	31.30	50.5	29.40	50.5	-	-
	40	1 1/2"	34.80	50.5	44.30	64.0	34.80	50.5	38.00	50.5	35.60	50.5	35.70	50.5	-	-
50	50	2"	47.50	64	56.30	77.5	47.50	64	50.00	64	48.60	64	47.80	64	-	-
80	65	2 1/2"	60.20	77.5	72.10	91.0	60.20	77.5	66.00	91	60.30	77.5	59.50	77.5	-	-
	80	3"	72.90	91	84.30	106.0	72.90	91	81.00	106	72.90	91	72.30	91	-	-
100	100	4"	97.38	119	109.70	144.5	97.38	119	100.00	119	97.60	119	97.60	119	-	-

Dimensions in mm

MG = diaphragm size

\* Code 88 and Code 80 have different lengths



## Materials and certificates

Type	Designation of the test certificate in accordance with EN 10204	Content of the certificate	Confirmation of the certificate by
2.1	Certificate of compliance with the order	Confirmation of compliance with the order	the manufacturer
2.2	Test report	Confirmation of compliance with the order with specification of results of non-specific testing	the manufacturer
3.1	Inspection certificate 3.1	Confirmation of compliance with the order with specification of results of specific testing	the manufacturer acceptance officer independent of the production division
3.2	Inspection certificate 3.2	Confirmation of compliance with the order with specification of results of specific testing	the manufacturer acceptance officer independent of the production division and the acceptance officer commissioned by the purchaser or the acceptance officer named in the official regulations

Multi-port valve blocks are produced at GEMÜ from block material. The most frequently used material is 1.4435 (316L) and 1.4435 (BN2) with a ferrite content of < 0.5%. In addition, other common alloys such as 1.4539, Titanium, Alloy 59, Hastelloy C and special alloys are available by agreement.

The table above provides an overview of the possible certificates which are generally available. The type of certificate and its content must be specified exactly before ordering to be able to provide the required documents. Later requests of certificates may not be possible or possible only under certain conditions.

Our specialists are happy to answer any questions you might have.



# Certificates and approvals



There is no universal diaphragm for all applications, hence we use different rubber mixtures and materials for our diaphragms. The different diaphragms have been certified according to their main fields of application so that we can certify conformity with the international regulations and rules below.

## FDA (U.S. Food and Drug Administration)

FDA Extraction according to 21CFR 177.2600 for elastomers and 21CFR 177.1550 for PTFE.

## USP (United States Pharmacopeia)

An independent institution has tested our diaphragms according to the regulations of the USP Class VI Chapter 87 In-Vitro and Chapter 88 In-Vivo. Furthermore, our diaphragms are free from animal ingredients.

## EHEDG

Hygiene standards in the foodstuff and beverage industry are continuously increasing and are approaching those of the pharmaceutical industry in sensitive areas. For this reason, the EHEDG was established some years ago (European Hygienic Engineering and Design Group). GEMÜ was the first diaphragm valve manufacturer worldwide to be granted certification for its diaphragm valve system developed in 1999. The examination took place in 2002.

## RoHS

GEMÜ diaphragms comply with the RoHS Directive 2011/65 EC and the WEEE Directive 2002/96 EC.

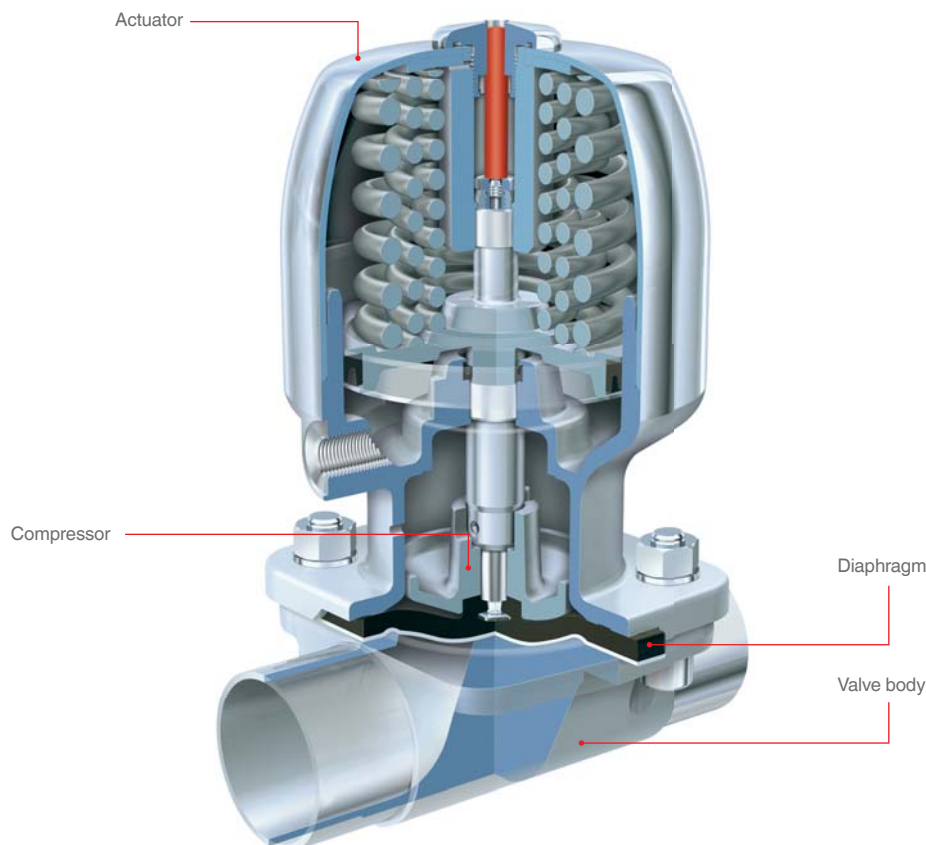
## Pressure Equipment Directive

As all diaphragm valves are pressure bearing components and as the diaphragm is the central sealing element in addition to the valve body, all diaphragms also comply with the European Pressure Equipment Directive 97/23/EC Art. 3 § 3. If no original GEMÜ shut-off diaphragms are installed, GEMÜ cannot accept any responsibility.

## GOST certificate

GEMÜ diaphragm valves are certified to the Russian GOST and meet the hygienic requirements of the foodstuff industry in Russia.

# The original GEMÜ seal system



As a recognised diaphragm valve specialist, GEMÜ are familiar with almost all industrial sectors and applications. We are the leading supplier of stainless steel valves for aseptic and sterile applications in the pharmaceutical industry, biotechnology industry, as well as the foodstuff and beverage industries. As well as this, our valves also stand for reliability and a high standard of quality in the chemical and processing industries. The diaphragm, a central sealing element in the piping system is of major importance. Only the diaphragm and the valve body are in contact with the medium. At the same time, they also guarantee external hermetic sealing of the pipeline.

## The system is more than the sum of the individual parts

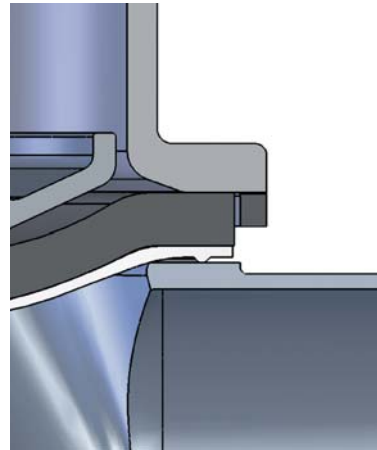
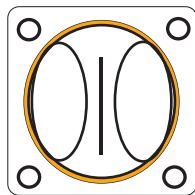
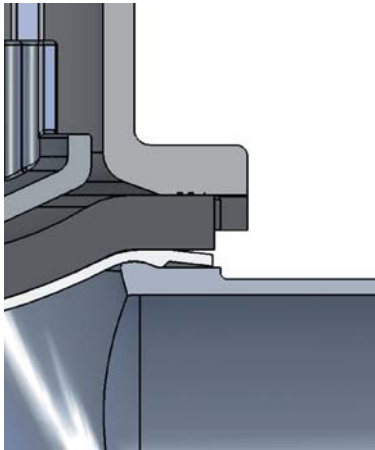
The outstanding characteristics of the diaphragm valve are the result of the perfect interaction of tuned components. These are the valve body, the shut-off diaphragm, the diaphragm fixing, the compressor as well as the actuator. Our many years of experience and intensive dialogue with plant operators has enabled us to continue optimising the diaphragm valve design and its individual components.

## Diaphragm and valve body are "inseparable"

GEMÜ valve bodies have a raised circular sealing bead on the inside diameter, in contrast to the valve bodies of other manufacturers. This results in a defined sealing edge. This measure reduces the ring-shaped gap between diaphragm and valve body in the external sealing area. This special feature makes GEMÜ diaphragm valves suitable for sterile applications. We also consider this crucial design and functional characteristic, which was developed by GEMÜ more than three decades ago and constantly refined, during the development of our diaphragms. Only this ensures that our customers can rely on the valve as a complete unit.

GEMÜ diaphragms have been developed, tested, and approved for applications with GEMÜ valve bodies. Therefore GEMÜ do not recommend or guarantee the use of other manufacturers diaphragms with GEMÜ valve bodies. We shall not accept any liability resulting from the use of diaphragms of other manufacturers inside GEMÜ diaphragm valves.

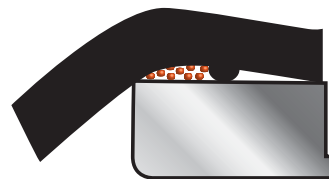
# The original GEMÜ seal system



As a leading manufacturer world-wide we had the GEMÜ diaphragm seal system certified in 2002 and were granted the EHEDG certificate.



GEMÜ seal system



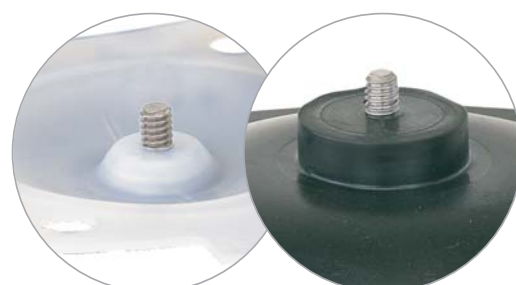
Conventional seal systems

## Flexible diaphragm fixing

The diaphragm is uniformly fixed in the compressor by means of a threaded pin. The only exception is the smallest diaphragm size (diaphragm size 8), which is pushed in with a rubber pin. The uniform fixing method applies both to soft elastomer and PTFE diaphragms. The largest advantage of fixing by means of a threaded pin, e.g. in comparison to a bayonet fitting, is the even transfer of forces onto the large area of the flanks of the screw thread. This prevents damage to the mechanical connection between compressor and diaphragm especially under vacuum operating conditions. The uniform fixing of elastomer and PTFE diaphragms enables subsequent replacement of the diaphragm while using the same actuator.



Diaphragm size 8



Diaphragm sizes 10 - 100

# **GEMÜ diaphragms**

## *Soft elastomer and PTFE*



Code 17, diaphragm size 25



Code 5E, diaphragm size 25

### **Soft elastomer diaphragms**

Soft elastomer diaphragms consist of EPDM rubber mixtures, which are peroxidically cross-linked (vulcanised) with each other. This enables the diaphragms to be used safely, even at high media temperatures. The diaphragms are provided with different technical features dependent on the mixture used and on the processing conditions such as the duration of the cross-linking process, the vulcanisation temperature as well as the vulcanisation pressure. The following statement applies in principle to soft elastomer materials: the higher the temperature load capability, the lower the service life is in relationship to the mechanical stress. Therefore both the temperature load and the deformability of diaphragms must be optimally adjusted to the application. Different constructional designs are available to achieve this. Soft elastomer diaphragms are characterised by a high insensitivity in the case of mechanically contaminated working media, e.g. cellular lumps, solid matter or catalytic solid matter. Slurries usually do not affect the function of the valve or the seal on the valve weir. Different EPDM rubber mixtures can be selected according to the operating/sterilisation temperatures and the chemical characteristics or the working media.

### **PTFE diaphragms**

The GEMÜ PTFE diaphragms are made of a chemically modified second-generation PTFE (TFM™) and provide maximum chemical resistance. Even under steam conditions, PTFE diaphragms wear much more slowly than soft elastomer diaphragms. In the case of highly permeating media the structure of PTFE materials requires appropriately larger bonding thicknesses, stiffening this diaphragm version compared to pure soft elastomer diaphragms. Due to the higher rigidity the service life of the diaphragm may be reduced on high cycle duties depending on the application.



# Selection of diaphragms

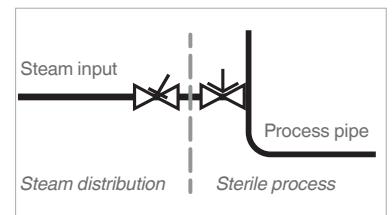
Diaphragm	Material/Design	Diaphragm size	Temperature range [°C]		Code
			Liquid media	Sterilisation <sup>1</sup>	
			Min.	Max.	
EPDM	Ethylene-propylene-diene rubber	8 - 100	-10	100	max. 150 °C <sup>2</sup> max. 60 min. per cycle 13/3A
EPDM	Ethylene-propylene-diene rubber	8 - 100	-10	100	max. 150 °C <sup>2</sup> max. 180 min. per cycle 17
PTFE/EPDM	Fully laminated PTFE diaphragm with EPDM back	8, 10, 100	-10	100	max. 150 °C <sup>2</sup> , no time limit per cycle 52/5A
PTFE/EPDM	Convex two-piece PTFE diaphragm with loose EPDM back	25, 40, 50, 80	-10	100	max. 150 °C <sup>2</sup> , no time limit per cycle 5E

<sup>1</sup> The sterilisation temperature is valid for steam (saturated steam) or superheated water.

<sup>2</sup> If the sterilisation temperatures listed above are applied to the EPDM diaphragms for longer periods of time, the service life of the diaphragms will be reduced. In these cases, maintenance cycles must be adapted accordingly. This also applies to PTFE diaphragms exposed to high temperature fluctuations.

PTFE diaphragms can also be used as moisture barriers; however, this will reduce their service life. The maintenance cycles must be adapted accordingly.

GEMÜ 555 and 505 globe valves are particularly suitable for use in the area of steam generation and distribution. The following valve arrangement for interfaces between steam pipes and process pipes has proven itself over time: A globe valve for shutting off steam pipes and a diaphragm valve as an interface to the process pipes.



Each application must be analysed before the selection of the diaphragm material. Since the most varied operating conditions often prevail within a plant at different locations, it can be necessary to use different valves and materials. In particular, the chemical characteristics and the temperature of the working media often lead to different interactions. The suitability of the materials used must therefore always be examined individually with regard to the current resistance list or checked by an authorised specialist. Only this procedure guarantees that the application will operate safely and economically for a longer period.

Diaphragms are wearing parts. They need to be regularly inspected and replaced otherwise malfunctions can occur, possibly resulting in hazardous situations. Please note: The maintenance intervals for inspecting and replacing diaphragms are application-dependent. In order to determine a suitable maintenance interval, the maintenance history and the stresses placed on the parts due to frequent sterilisation or frequent cycle duties must be taken into account.

## Note

Since plastics and elastomers are subject to natural aging, we recommend observing the GEMÜ storage conditions for shut-off diaphragms. You thereby guarantee maximum storage and service life of the diaphragms.

The temperatures specified above are merely the permissible temperature ranges for the respective diaphragm. The permissible temperature ranges of the valve must always be taken into account for the overall valve design. These can be found in the respective datasheets.

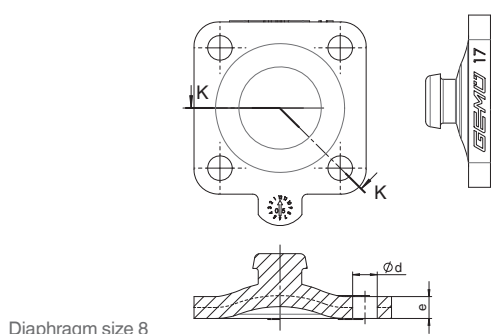
The temperature values are indicated irrespective of operating pressure and diaphragm size and apply to water and/or inert gases. When using water vapour or saturated steam, observe the steam pressure diagram.

Certificates and approvals					Compatibility with media	Special features
FDA compliant	USP Class VI	EHEDG	TA Luft (German Clean Air Act)	O <sub>2</sub> BAM		
●	●	●	●	●	Very good all-round elastomer, resistant to many acidic and alkaline media, demineralised and deionised hot water, inert and many other industrial gases.	Suitable for vacuum, low gas permeability, applicable for steam sterilisation.
●	●	●	●			Compound and construction of the diaphragm have been specially optimised for steam applications, clearly improved service life.
●	●	●	●		Resistant to nearly all chemicals, such as strong acids, alkalis and salts, also at high temperatures, steam, WFI as well as pharmaceuticals. Good resistance to solvents, chlorine, and aromatic hydrocarbons.	Fully laminated diaphragm, can be used in steam. Low gas permeability.
●	●	●	●	●		Convex two-piece diaphragm with loose PTFE face for higher switching cycles, can be used for permanent steam application. Special compounding and production by GEMÜ. Special seal contour for external sealing on the bottom of the diaphragm. Low gas permeability.

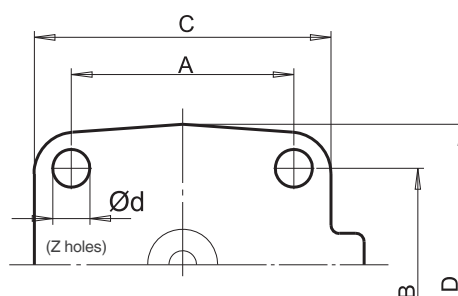
EPDM diaphragm dimensions [mm]															
MG*	DN	NPS	A	B	C	D	ød	e	h	W	α	β	γ	Y	Number of bolt holes
8	4 - 15	¼" - ½"	22	22	31.5	31.5	4.5	4	5.6	-	-	-	-	-	4
10	10 - 20	⅜" - ¾"	39	44	48	53	5.2	5	9	M4	-	-	-	-	4
25	15 - 25	½" - 1"	54	46	71.7	66.7	9	6	8	¼"	-	-	-	-	4
40	32 - 40	1¼" - 1½"	70	65	100	90	11.5	7	8	¼"	-	-	-	-	4
50	50	2"	82	78	124	106	13	7	7	¼"	-	-	-	-	4
80	80	3"	127	114	186	156	18	9	8	⅝"	-	-	-	-	4
100	100	4"	194	-	228	-	13	10	9	⅝"	28°	42°	40°	-	8

\* Diaphragm size

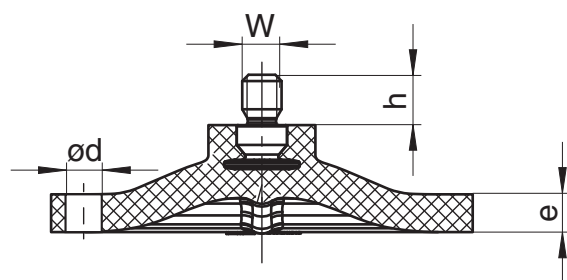
The thread of the diaphragm pin "W" corresponds to Whitworth standard.



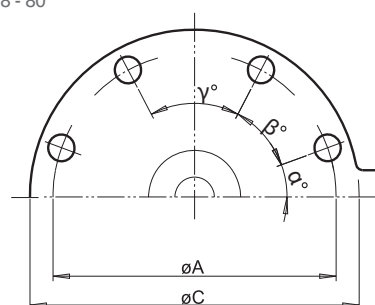
Diaphragm size 8



Diaphragm size 8 - 80



Diaphragm size 10 - 100



Diaphragm size 100

## Selection of operators

### Manually operated



Type	9601	9602	9612	9673	9653	9654
Features	Stainless steel, plastic handwheel, with optical position indicator and seal adjuster	Stainless steel, with optical position indicator and seal adjuster	Stainless steel, plastic handwheel, with optical position indicator and seal adjuster	Stainless steel, plastic handwheel, with optical position indicator and seal adjuster	Stainless steel, plastic handwheel, with optical position indicator, stroke limiter/seal adjuster, lockable, optional: electrical position indicator	Stainless steel, with optical position indicator, stroke limiter/seal adjuster, lockable, optional: electrical position indicator
Autoclavable	●	●	●	●	●	●
Operating temperature*	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C
Operating pressure*	0 to 10 bar	0 to 10 bar	0 to 10 bar	0 to 10 bar	0 to 10 bar	0 to 10 bar
DN	4 to 15	4 to 15	10 to 20	15 to 50	10 to 100	4 to 100
Diaphragm size 8	●	●	-	-	-	●
Diaphragm size 10	-	-	●	-	●	●
Diaphragm size 25	-	-	-	●	●	●
Diaphragm size 40	-	-	-	●	●	●
Diaphragm size 50	-	-	-	●	●	●
Diaphragm size 80	-	-	-	-	●	●
Diaphragm size 100	-	-	-	-	●	●

\* dependent on diaphragm material, see technical datasheet



Pneumatically operated



9605	9625	9687	9650	9650TL	9651	9658/9688	9660
Plastic, with stainless steel distance piece, optical position indicator	Plastic, with stainless steel distance piece, optical position indicator	Plastic, with stainless steel distance piece	Stainless steel, with optical position indicator, optionally autoclavable	Safety valve, stainless steel, mounting facility for proximity switches	Stainless steel, with integrated automation module	Two stage actuator, stainless steel	Filling valve, stainless steel with optical position indicator
-	-	-	● (DN 4-25)	-	-	-	-
-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C	-10 to 150 °C
0 to 8 bar	0 to 6 bar	0 to 10 bar	0 to 10 bar	0 to 8 bar	0 to 10 bar	0 to 10 bar	0 to 5 bar
4 to 15	10 to 20	10 to 100	4 to 100	4 to 25	4 to 25	10 to 50	4 to 25
●	-	-	●	●	●	●	●
-	●	●	●	●	●	●	●
-	-	●	●	●	●	●	●
-	-	●	●	-	-	●	-
-	-	●	●	-	-	●	-
-	-	●	●	-	-	-	-
-	-	●	●	-	-	-	-

Note: Other versions and accessories on request

# Selection of operators



## Motorized



Type	9618	9698
Features	Plastic, with stainless steel distance piece, optical position indicator	Plastic, with stainless steel distance piece, optical position indicator and manual override
Autoclavable	-	-
Operating temperature*	0 to 130 °C	0 to 150 °C
Operating pressure*	0 to 6 bar	0 to 10 bar
DN	4 to 15	15 to 50
Supply voltage	24 VAC, 120 VAC, 230 VAC, 50/60Hz	24 VAC, 120 VAC, 230 VAC, 50/60Hz
Diaphragm size 8	●	-
Diaphragm size 10	●	-
Diaphragm size 25	-	●
Diaphragm size 40	-	●
Diaphragm size 50	-	●
Diaphragm size 80	-	-
Diaphragm size 100	-	-

\* dependent on diaphragm material, see technical datasheet





## Automation components



The range of actuators has been extended to include appropriate automation components:

- *Electrical position indicators*
- *Combi switchboxes*
- *Positioners*
- *Process controllers*



GEMÜ 1434 µPos®



GEMÜ 1435 ePos®



GEMÜ 1436 cPos®



GEMÜ 4242



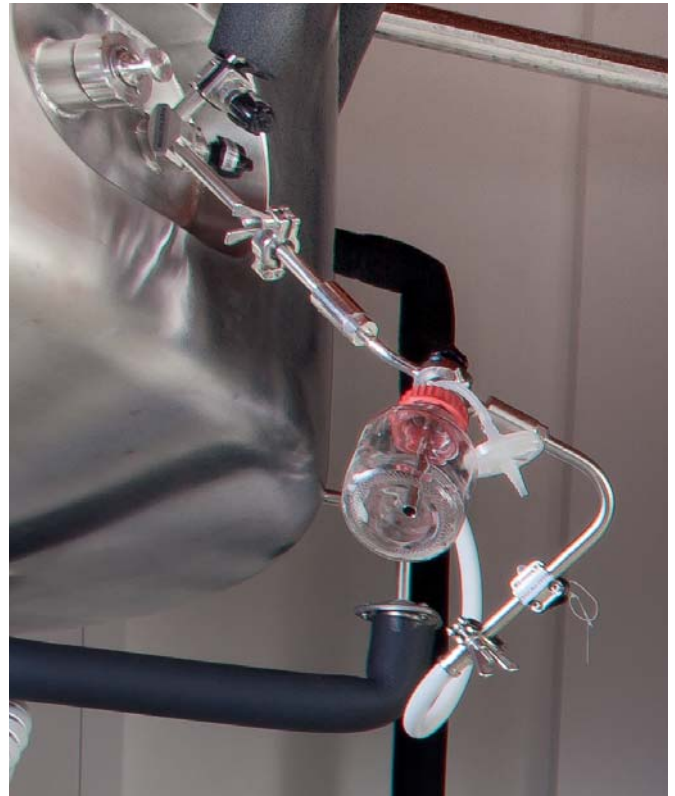
GEMÜ 1236



GEMÜ 4222



## ***Special version of multi-port valve block*** *GEMÜ sampling bottle*

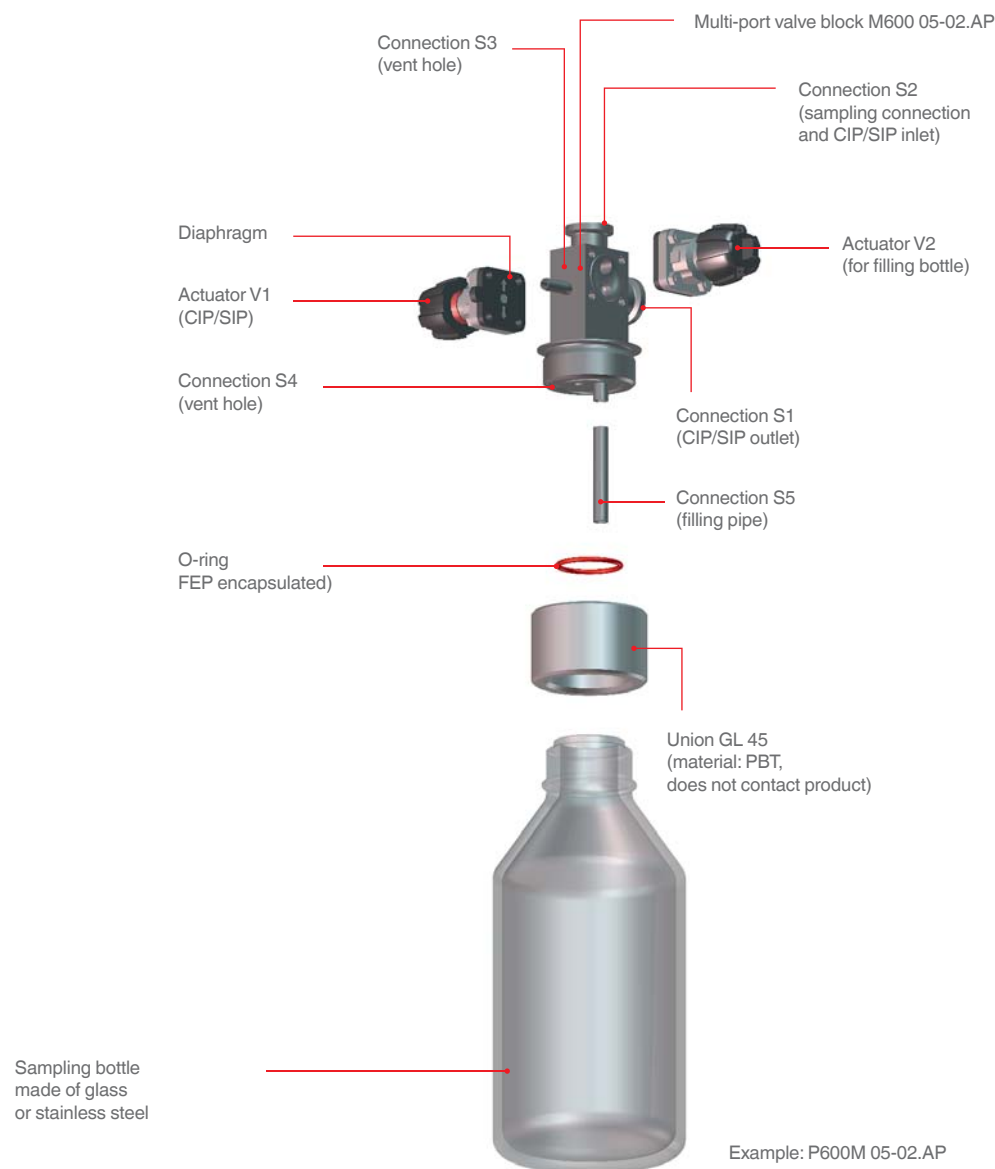


### **Features**

- *Autoclavable*
- *The complete sampling path can be sterilised easily before sampling*
- *Microbiologically flawless sampling via a closed system*
- *Connection to existing lines can be easily implemented*
- *Compact and variable due to multi-port valve block solution with various forms of construction*
- *EHEDG certified diaphragm seal system*
- *FDA compliant materials*

### **Functional principle**

The sampling bottle from GEMÜ is suitable for contamination-free sampling and transport of samples to the laboratory or quality assurance station. The entire sampling unit is easy to sterilise and autoclave-capable.



## Technical specifications

<b>Nominal sizes:</b>	DN 4 to 15
<b>Connections:</b>	Clamps, butt weld spigots, hose barbs, others on request
<b>Seat sizes:</b>	Diaphragm size 8
<b>Materials:</b>	Valve block (1.4435, others on request), sampling bottle (glass or stainless steel 1.4404)
<b>Media temperature:</b>	max. 150 °C (dependent on media wetted materials)
<b>Operating pressure:</b>	Stainless steel bottle up to 10 bar, glass bottle up to 1.5 bar
<b>Seal materials:</b>	PTFE, EPDM, FEP, others on request
<b>Surface finish / Electropolish</b>	down to 0.4 µm

# Specification of multi-port valve blocks

The enormous consequential costs which may be incurred as a result of errors in the planning of production plant more than justify increased planning efforts. Delays and extra costs in validation, late commissioning, contaminated batches, later modifications to the plant are just a few of the points in favour of precise planning.

Good planning of the valve designs begins in the project stage. The implementation of complex process sequences demands a wide variety of compact valve designs. GEMÜ places great emphasis on ensuring you get the optimum block for your specific application and not any standard solution from the catalogue. It is therefore important that you give us all the relevant information in the project phase. The GEMÜ specification sheet is a great help here. Please use only one form for each M-block and proceed as follows to fill in the specification:

1. *Enter the operating conditions and desired materials.*
2. *Please state what functions the M-block should fulfil.  
Draw a pictogram or functional diagram and insert it in the specification. You can of course use the examples shown in this brochure as a guide.*
3. *Label all connection spigots starting with S1, all valve seats starting with V1.*
4. *Assign the necessary features to every connection in the table and add explanatory remarks where necessary.*
5. *Specify the necessary operator and type as well as control function for every connection.*
6. *For extra remarks and descriptions, you can use an additional sheet.*

Multi-port valve blocks may be more expensive at first glance but are cheaper than conventional welded constructions when considering the whole application time in the plant. At the same time, they reduce process risks in the plant when installed correctly. The costs for removing a faulty welded configuration and the later replacement by a multi-port valve block by far exceed the higher purchasing costs for a multi-port valve block.

# M600 multi-port valve block specification

Please complete this form and return it to your nearest GEMÜ office or to the address listed below.

Operating pressure:

bar

Medium temperature:

°C

M-block material:

1.4435

1.4435 BN 2 ( $\Delta Fe < 0.5\%$ )

1.4539

Other

Diaphragm material:

EPDM

Code

PTFE

Code

Other

Surface finish of multi-port valve block:

1502 (Ra)  $\leq 0.8 \mu m$

1503 (Ra)  $\leq 0.8 \mu m$  electropolished

1507 (Ra)  $\leq 0.6 \mu m$

1508 (Ra)  $\leq 0.6 \mu m$  electropolished

1536 (Ra)  $\leq 0.4 \mu m$

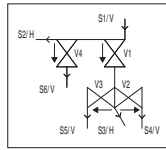
1537 (Ra)  $\leq 0.4 \mu m$  electropolished

1527 (Ra)  $\leq 0.25 \mu m$

1516 (Ra)  $\leq 0.25 \mu m$  electropolished

Quantity:

**Example:**



Please draw functional diagram.

**Important:** Please observe correspondence of table and functional diagram.

Please specify design (e. g. M600 06-04.P1) if possible:

Spigot/Valve seat: S1, S2, ... / V1, V2, ...

Preferred installation position: Horizontal/  
Vertical

Flow direction (medium): →

Draining direction: →

Valve seat:

Spigot	Pipe connection				Operator				Other
Spigot no.	DN	Code	ød(a)[mm]	s[mm]	Operator type		Control function	Operator size	Comment/accessories
S1					V1				
S2					V2				
S3					V3				
S4					V4				
S5					V5				
S6					V6				
S7					V7				
S8					V8				
S9					V9				
S10					V10				
S11					V11				
S12					V12				

The technical details of each enquiry must be checked by GEMÜ.

**Contact (GEMÜ):**

**Customer:**

Department:

Address:

Phone:

E-mail:

Please do not write here!

K-No.:

P600:

M600:

X:

# Sampling bottle specification

Please complete this form and return it to your nearest GEMÜ office or to the address listed below.

Operating pressure (plant-side): \_\_\_\_\_ bar

Medium temperature: \_\_\_\_\_ °C

Multi-port valve block material:

1.4435 ☐

1.4435 BN2 ( $\Delta Fe < 0.5\%$ ) ☐

Other \_\_\_\_\_

Surface finish of multi-port valve block:

1537 (Ra)  $\leq 0.4\mu m$  electropolished. ☐

Other \_\_\_\_\_

Diaphragm material:

EPDM \_\_\_\_\_ Code \_\_\_\_\_

PTFE \_\_\_\_\_ Code \_\_\_\_\_

Other \_\_\_\_\_

Sampling bottle:

Without ☐

With Schott Duran Pressure plus glass bottle (clear)  
(operating pressure: -1 bar to max. 1.5 bar rel.)

1000 ml ☐

500 ml ☐

250 ml ☐

With stainless steel bottle 1.4404 (WAZ 3.1)

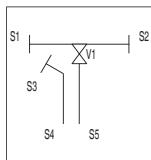
(operating pressure: -1 bar to max. 10 bar rel.)

1000 ml ☐

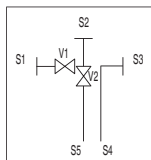
Other \_\_\_\_\_

Quantity: \_\_\_\_\_

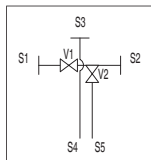
**Standard:**



P600M 05-01.AP






P600M 05-02.AP



P600M 05-02.BP

If you require a customer-specific version of the multi-port valve block, please also fill out specification sheet M600 for the block.

Spigot	Pipe connection				Operator			Other	
					 GEMÜ 601, manual	 GEMÜ 602 manual	 GEMÜ 650 pneumatic		
Spigot no.	DN	Code	ød(a)[mm]	s[mm]	Operator type		Control function	Operator size	Comment/accessories
S1					V1				
S2					V2				
S3					V3				
S4	6	0	8.0	1.0					Vent hole
S5	6	0	8.0	1.0					Filling pipe

The technical details of each enquiry must be checked by GEMÜ.

Contact (GEMÜ): \_\_\_\_\_

Customer: \_\_\_\_\_

Department: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_ E-mail: \_\_\_\_\_

Please do not write here!

K-No.: \_\_\_\_\_

P600: \_\_\_\_\_

M600: \_\_\_\_\_

X: \_\_\_\_\_

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