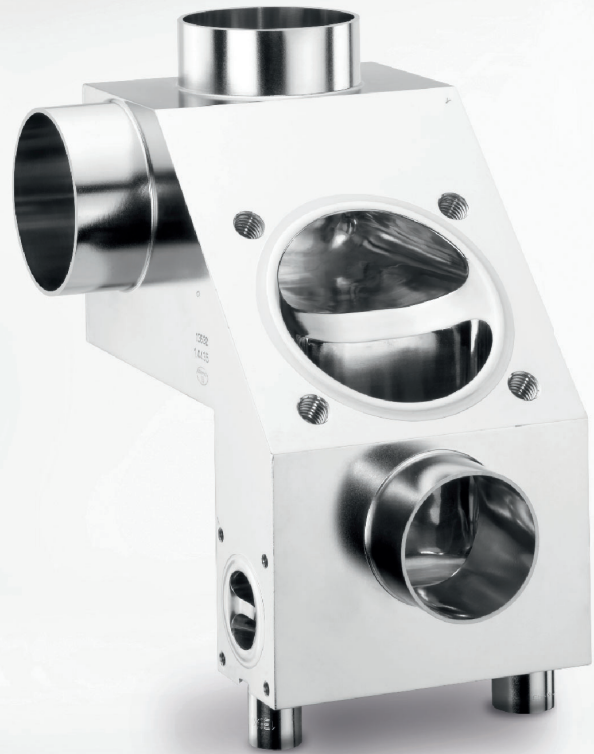
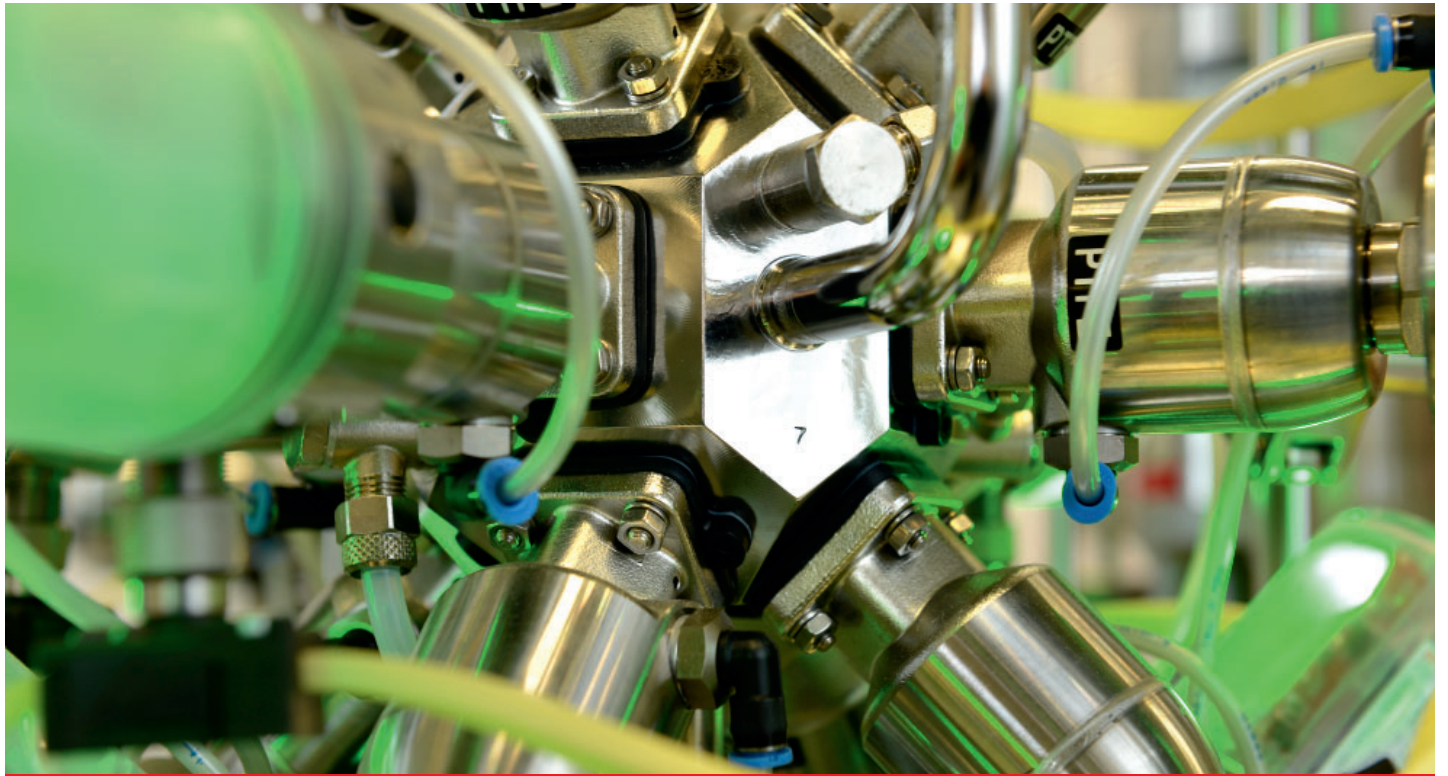


GEMÜ



**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.



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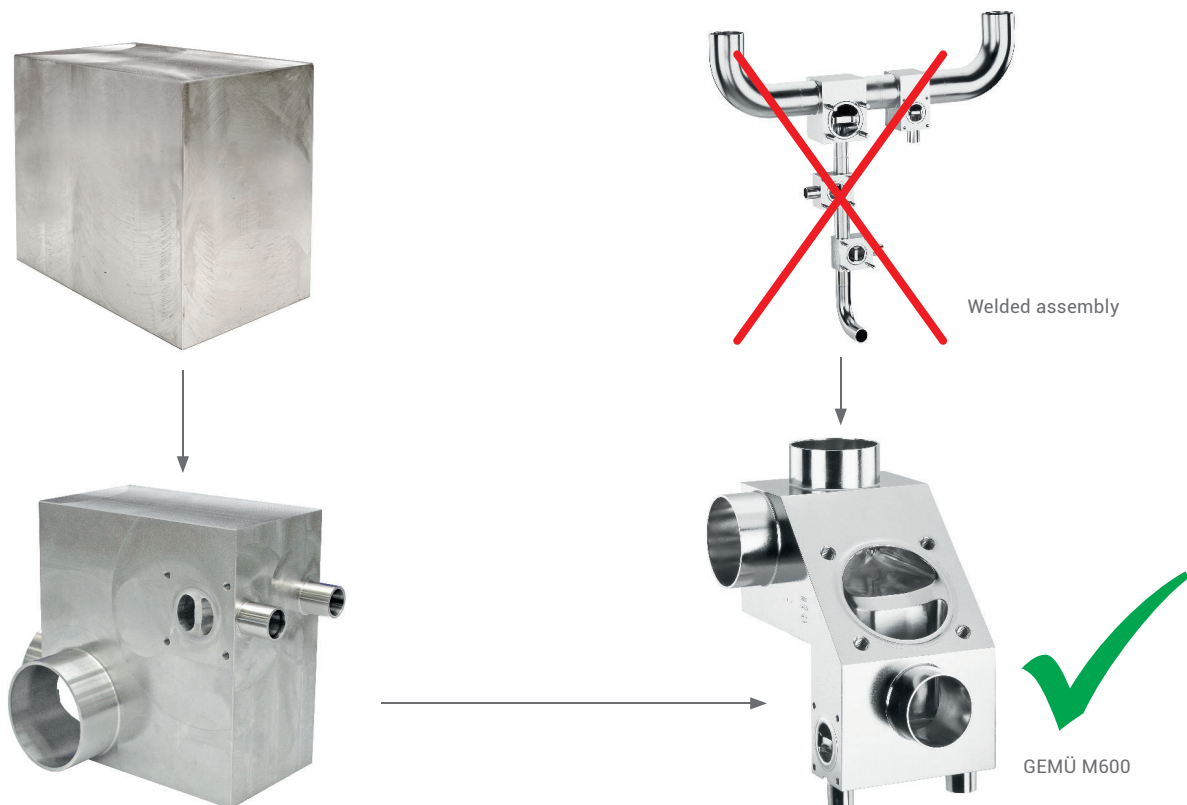
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Multi-port valve blocks for sterile applications

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.

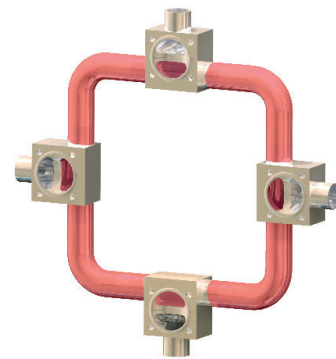
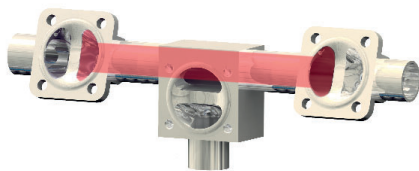
To make processes safer, increase the availability of the plant and reduce the life cycle costs of a plant within the scope of a total cost of ownership concept (TCO), GEMÜ has implemented more than 400 different designs and thousands of customized variants of multi-port valve blocks over the years. 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.



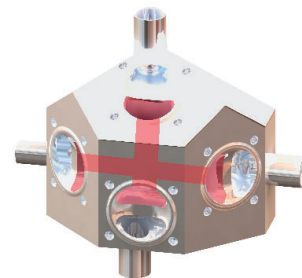
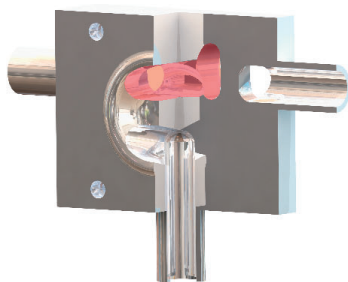
Features

- 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

Conventional designs



M-block design

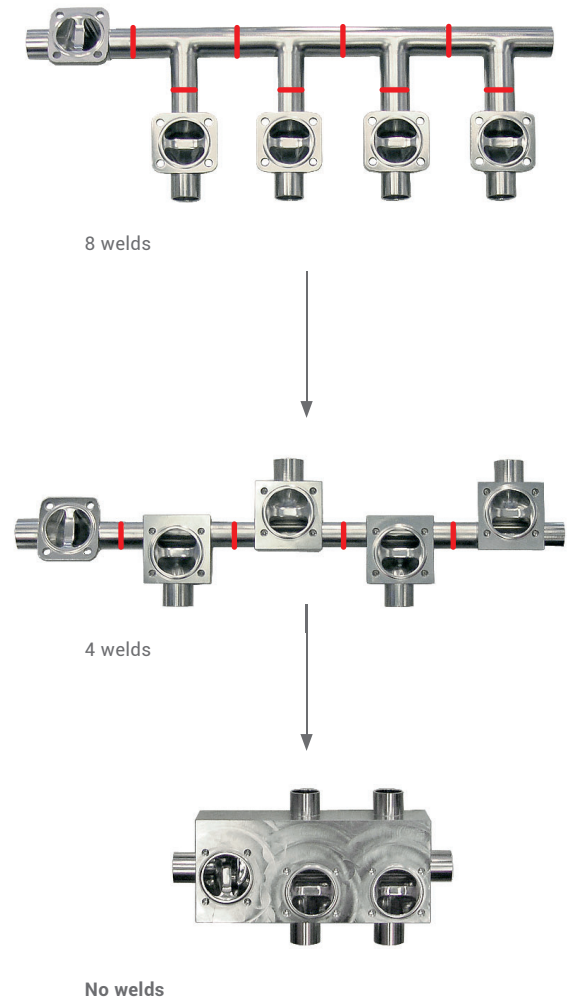
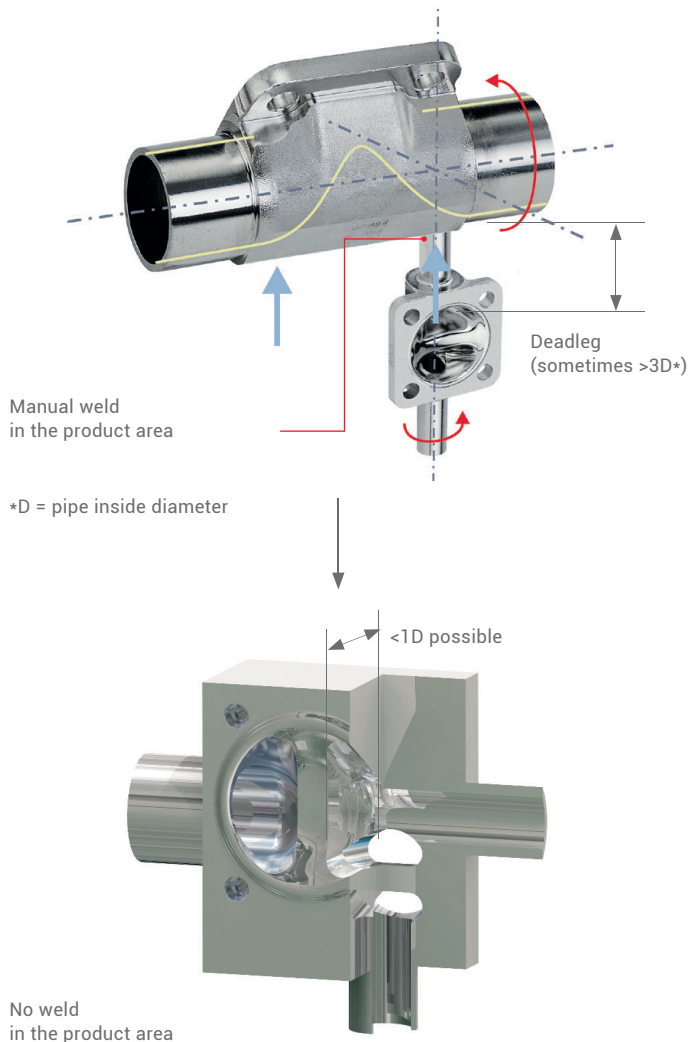


The red coloured line sections mark the hold-up volume.

GEMÜ multi-port valve blocks

Advantages

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.



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



GEMÜ multi-port valve blocks

Functions

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

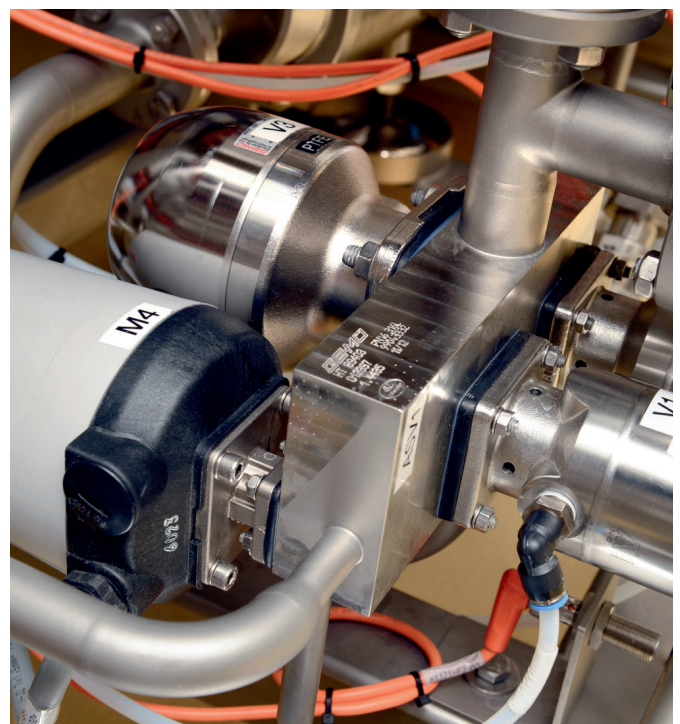
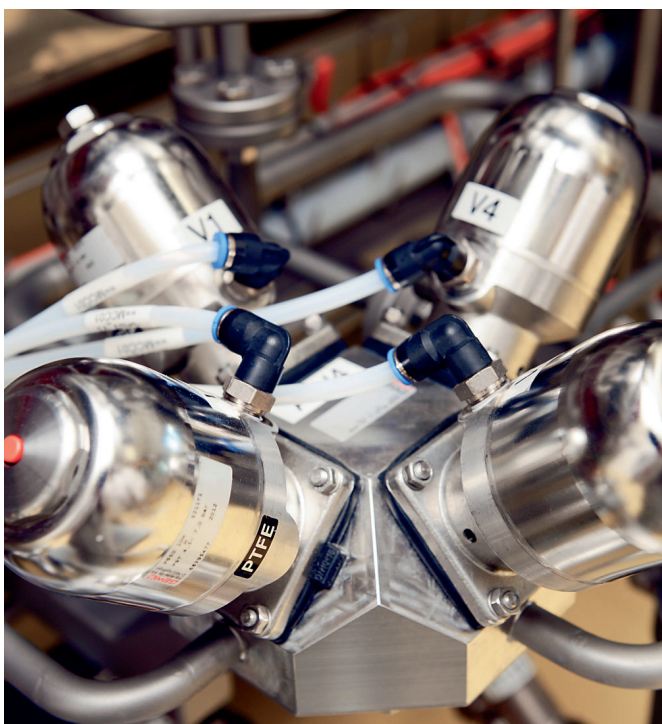
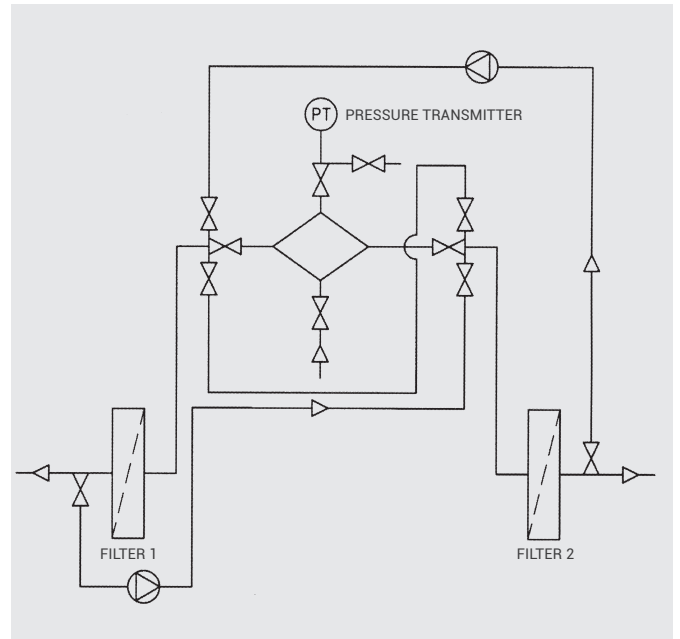
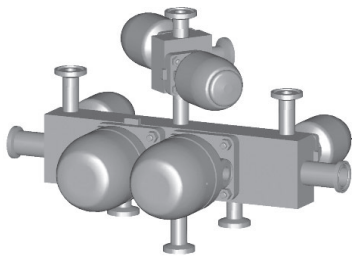
Quite substantial tasks are assigned to these individual functions. These are for example, sampling, sterile steam connection (SIP), connection for cleaning agent (CIP) or guarantee of a minimum flow. In addition to this, there are other functions in the scope of process automation which can be integrated.

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.



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

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.

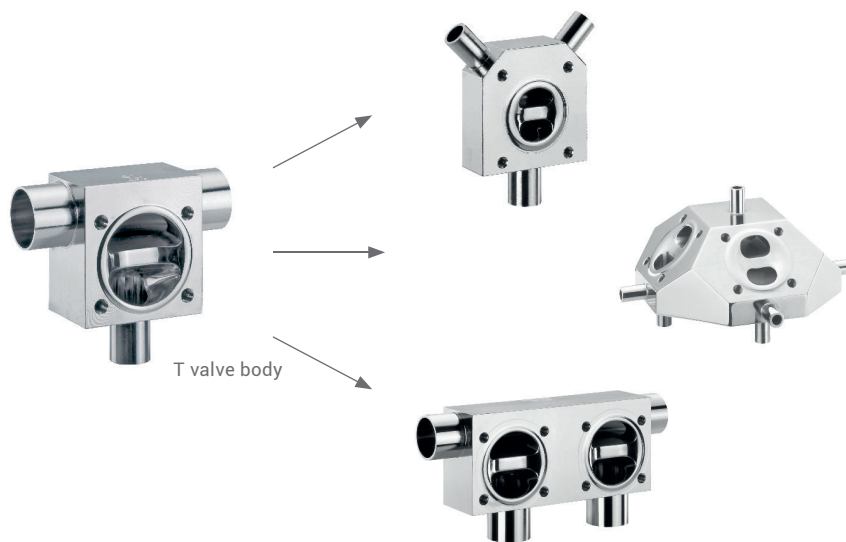


GEMÜ multi-port valve blocks

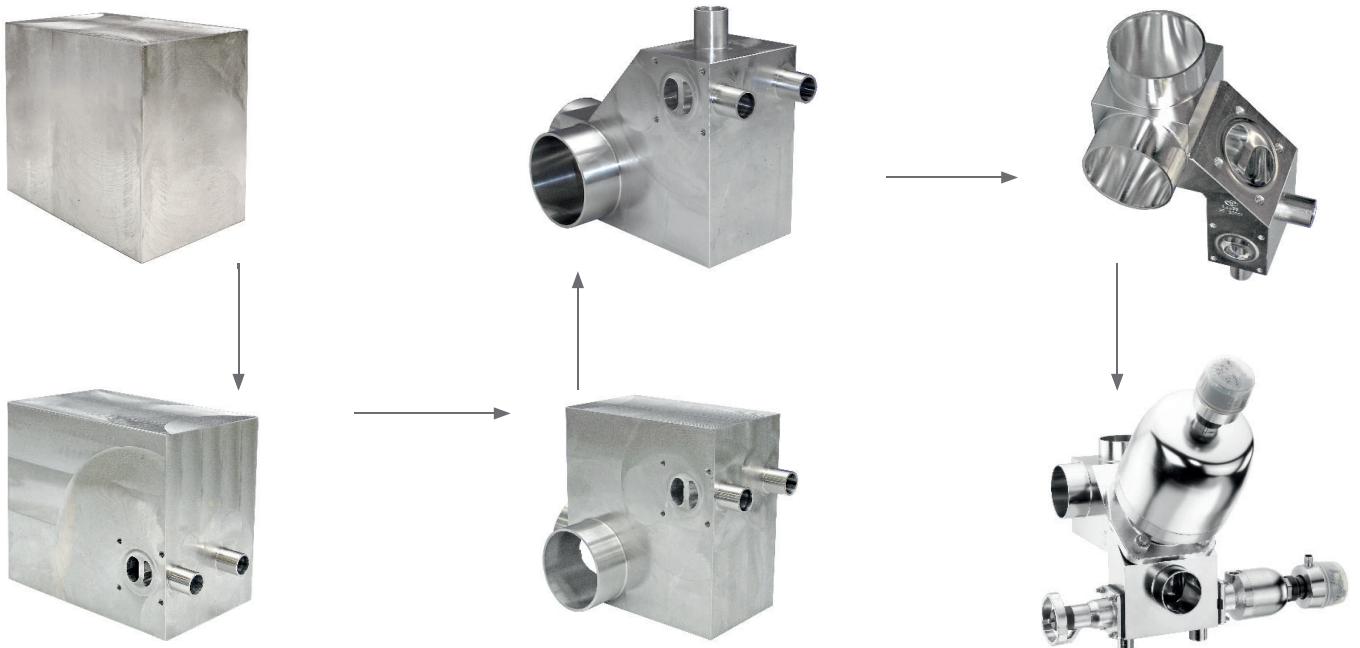
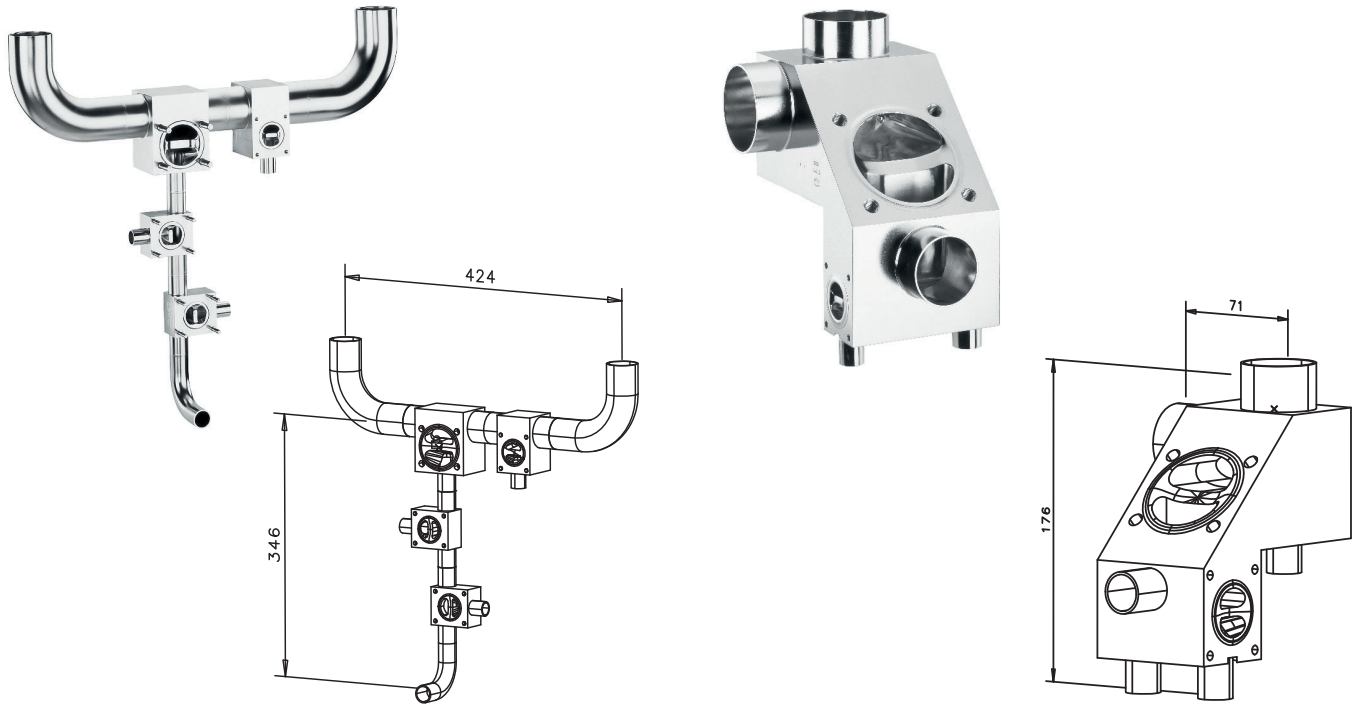
Design example

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.



GEMÜ multi-port valve blocks

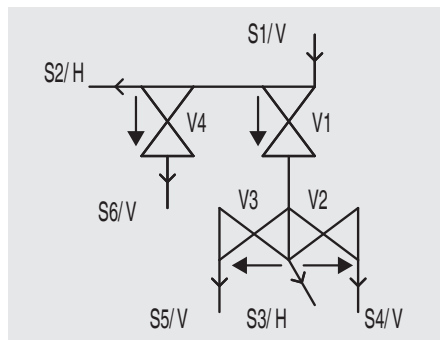
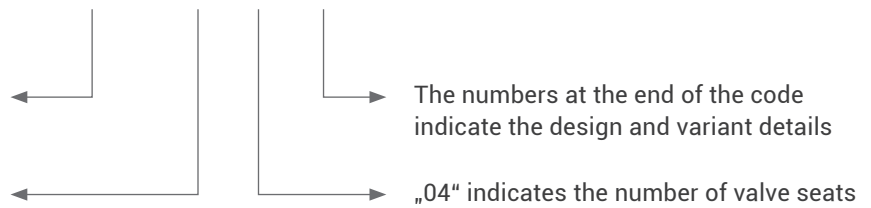
Design example

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

M600 stands for a multi-port valve without operators

„06“ indicates the number of pipe connections

M600 06-04.P1



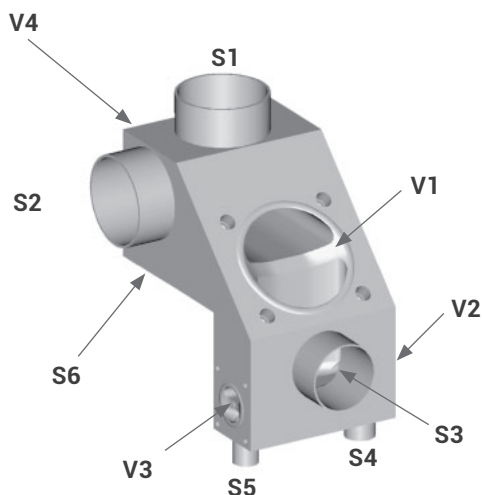
Example: M600 06-04:P1

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

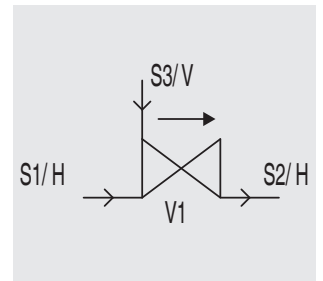
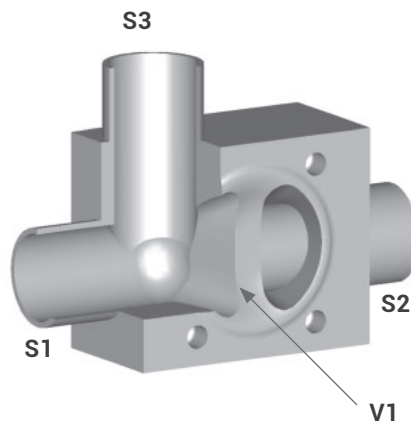
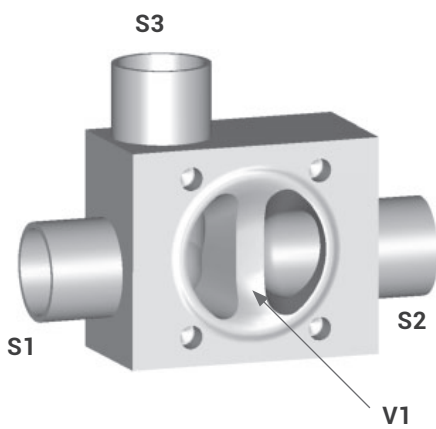
Sterile valve block made of stainless steel block material.

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:

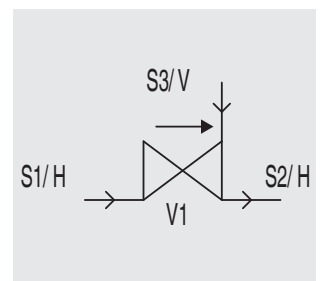
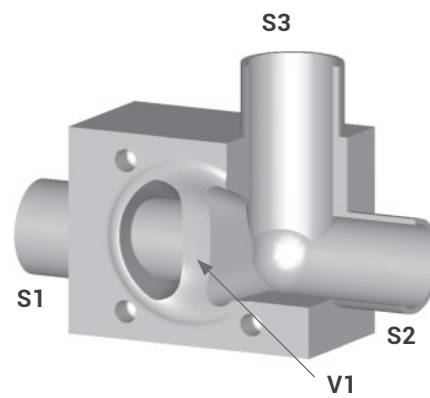
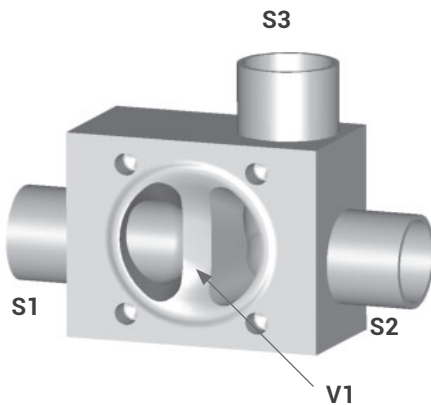
Spigot S3 arranged vertically upwards on the left.



GEMÜ M600 03-01.ER

Installation position:

Spigot S3 arranged vertically upwards on the right.

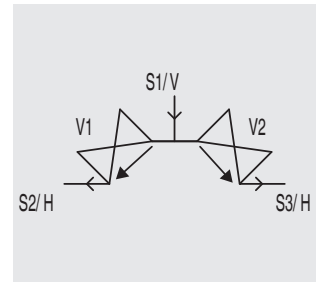
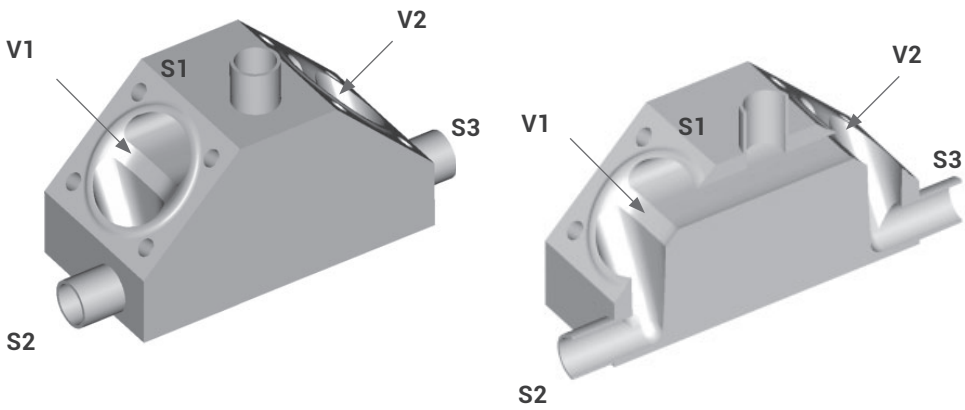


H = horizontal, V = vertical

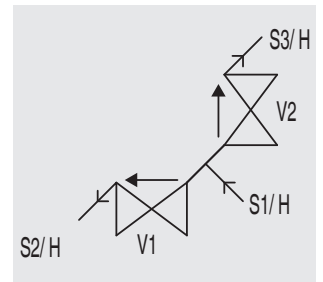
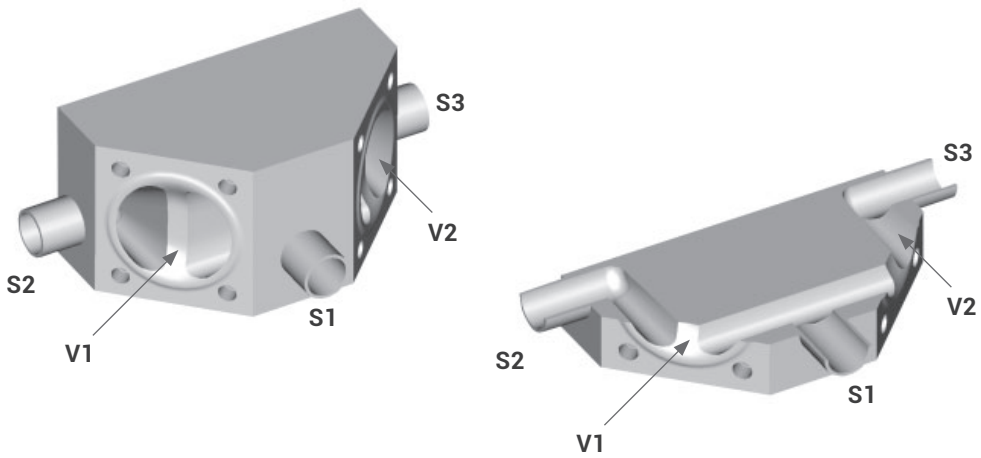
M600 03-02.B

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

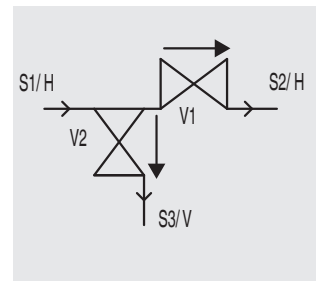
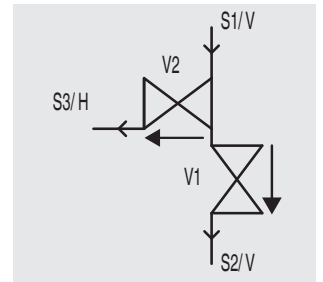
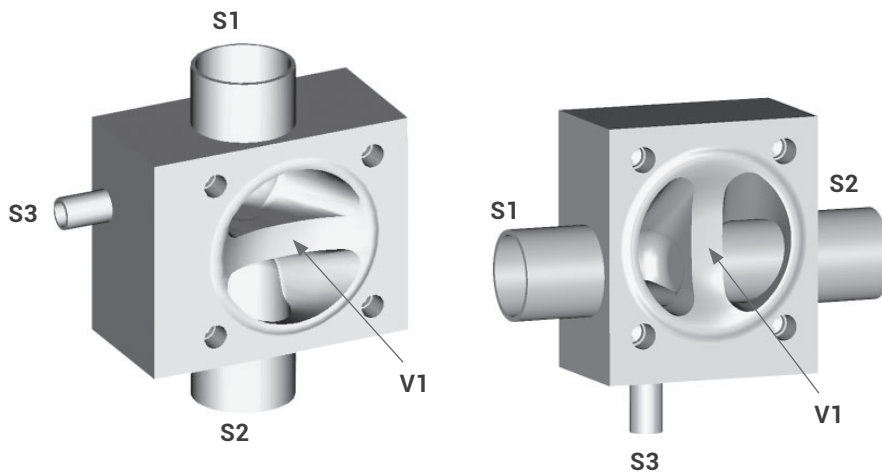
Sterile valve block made of stainless steel block material.

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

GEMÜ M600 03-02.SL

Installation position:

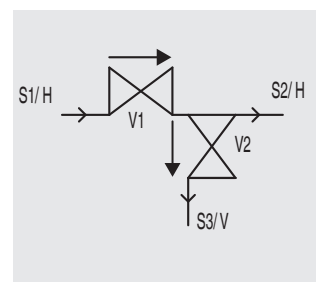
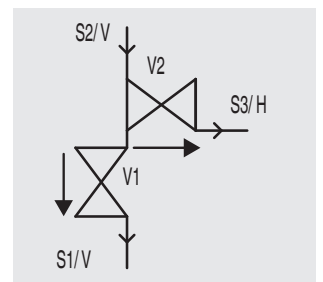
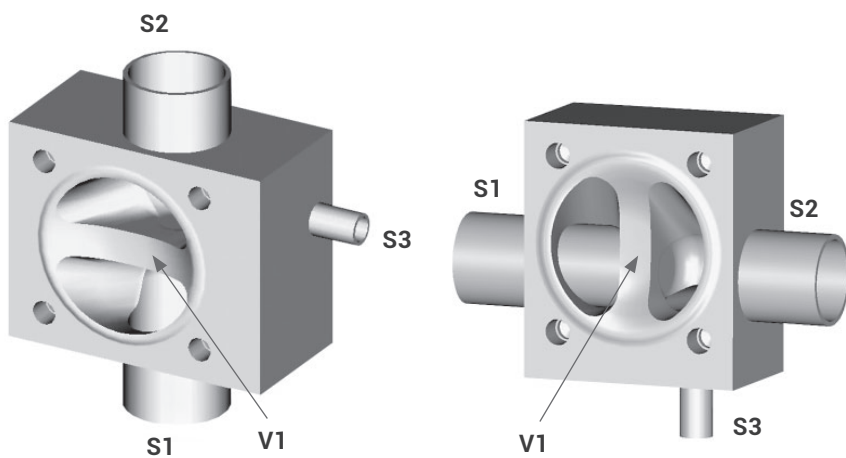
Spigot S3 arranged horizontally to the left or vertically downwards, on the left.



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

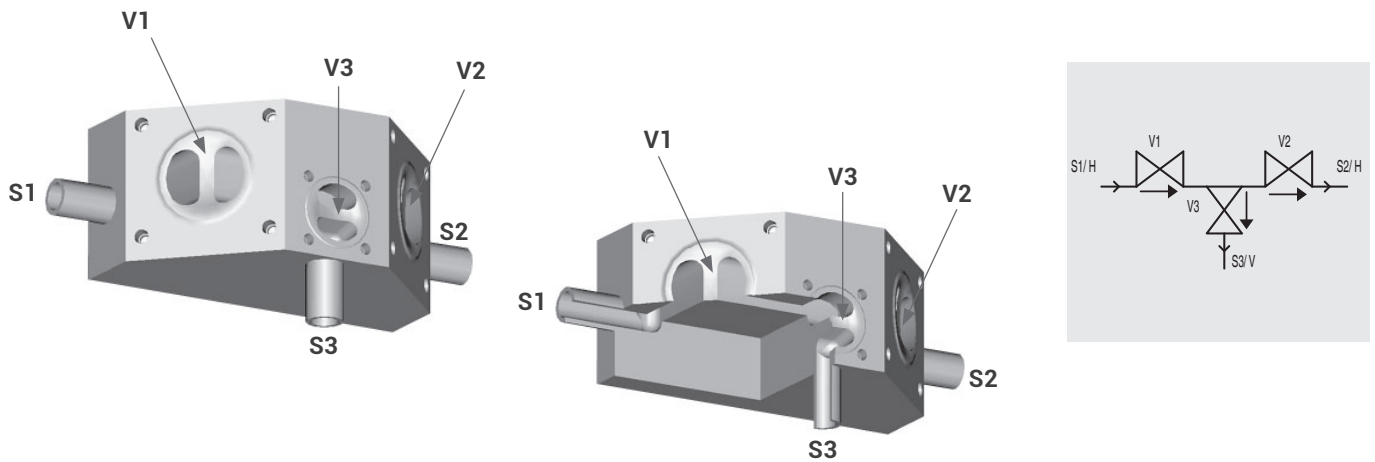
Sterile valve block made of stainless steel block material.

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

GEMÜ M600 03-03.N1

Installation position:

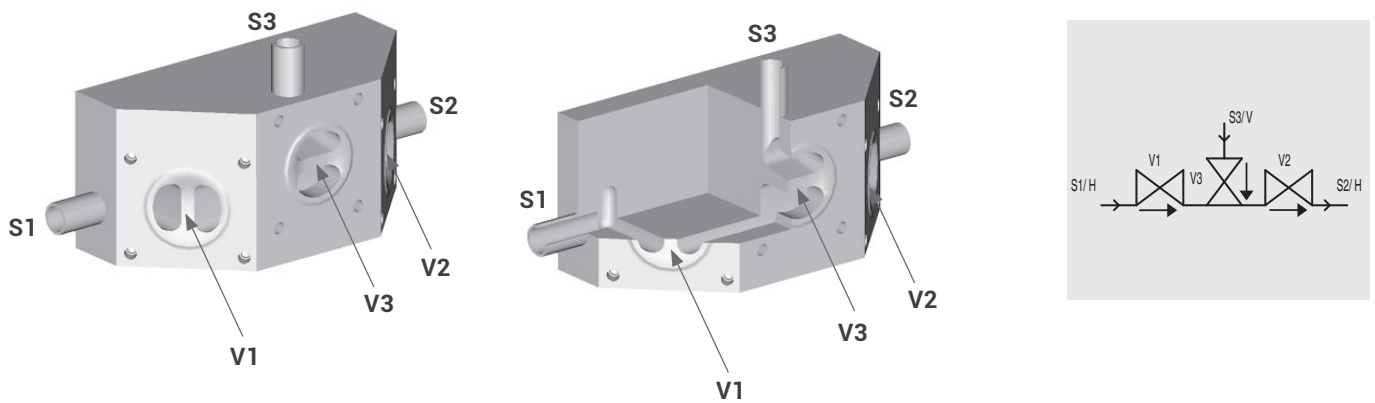
Spigot S3, centred and arranged vertically downwards. Suitable for wall mounting. Manual operators possible.



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.

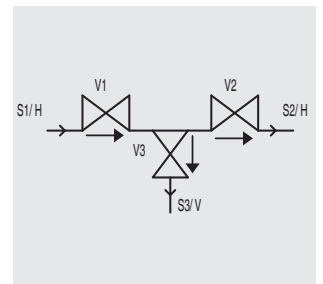
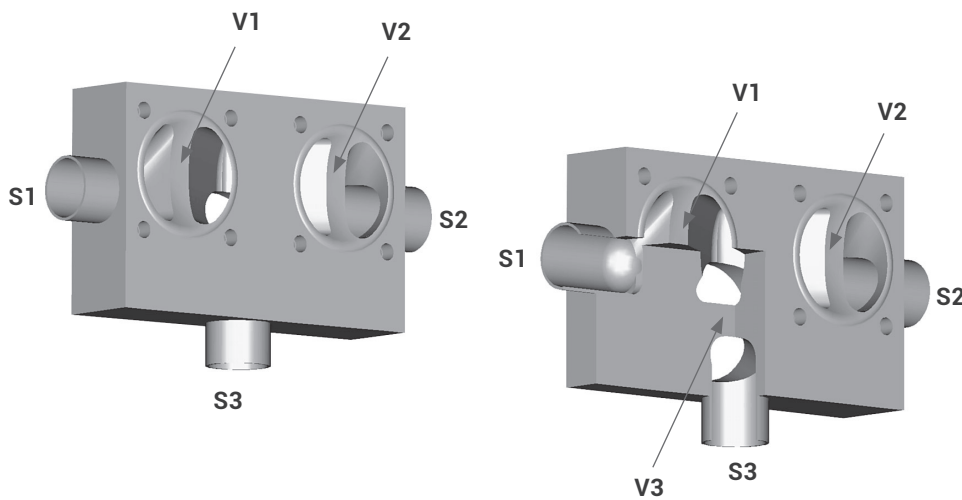
This configuration is used, for example, as a block-and-bleed valve.

GEMÜ M600 03-03.N2

Installation position:

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

This enables very compact construction.

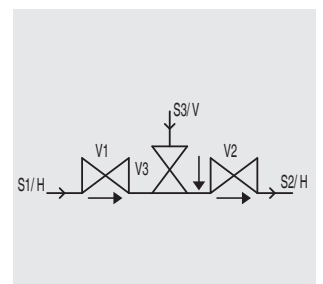
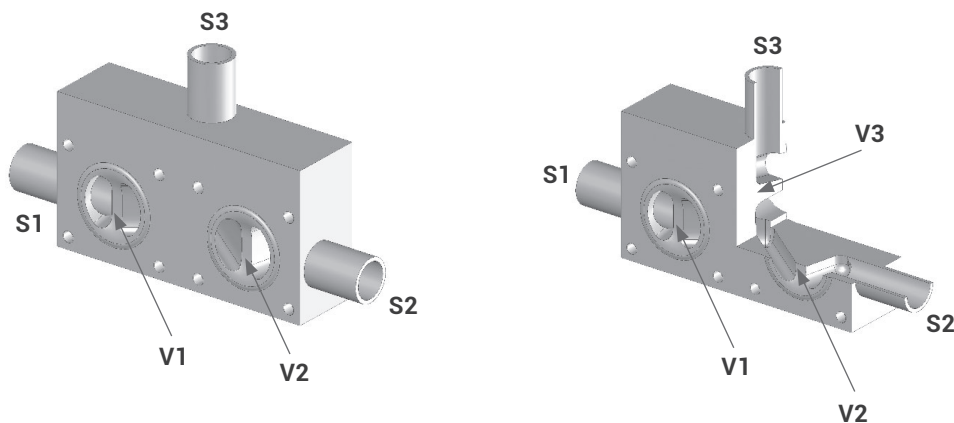


GEMÜ M600 03-03.N9

Installation position:

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

This enables very compact construction.



H = horizontal, V = vertical

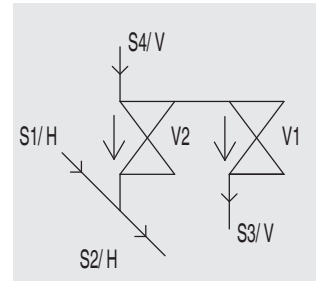
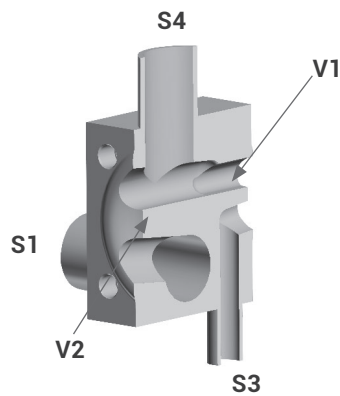
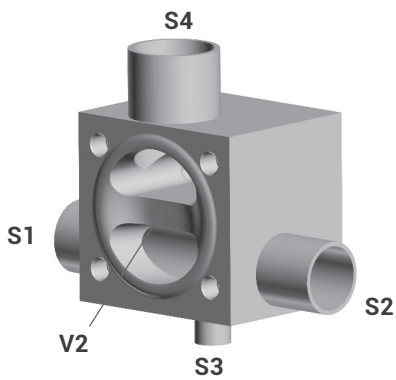
M600 04-02.0C

Sterile valve block made of stainless steel block material.

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

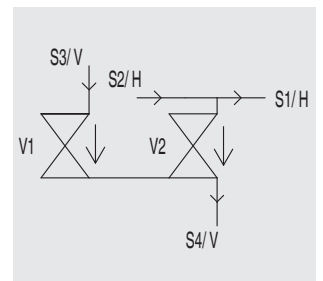
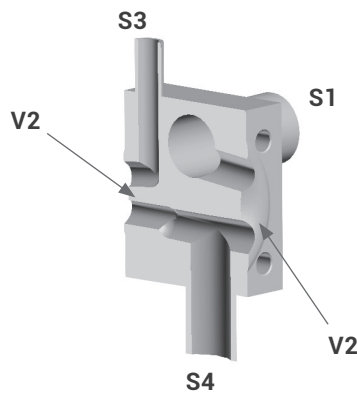
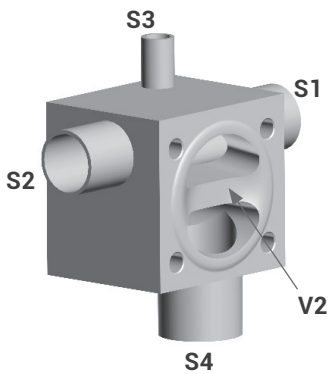
Installation position:

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

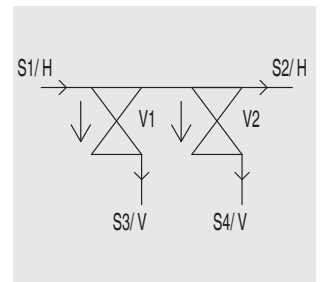
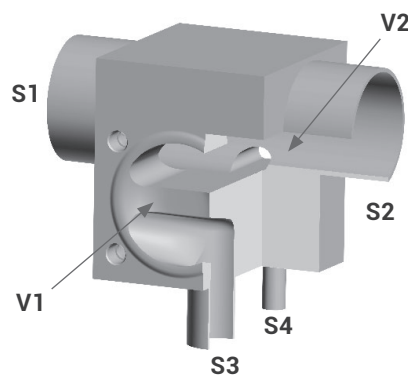
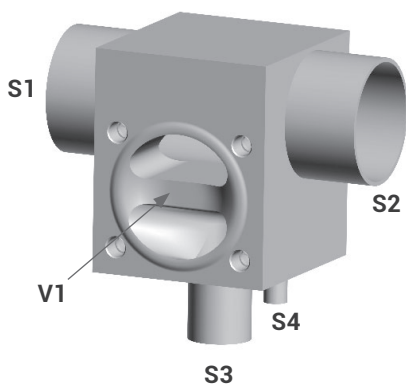
M600 04-02.U5

Sterile valve block made of stainless steel block material.

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

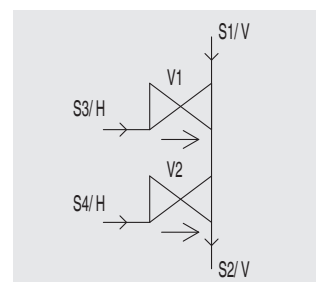
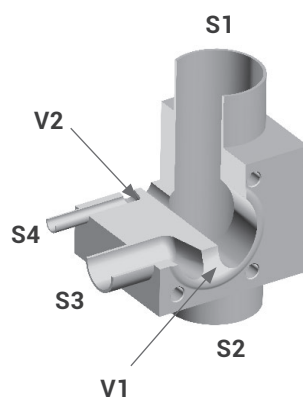
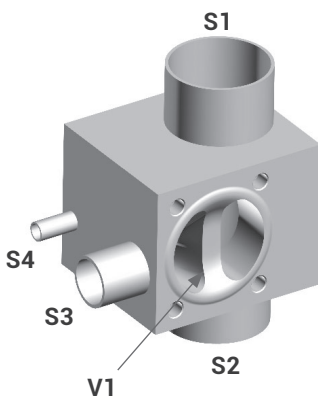
Installation position:

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.

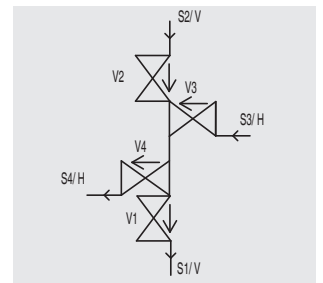
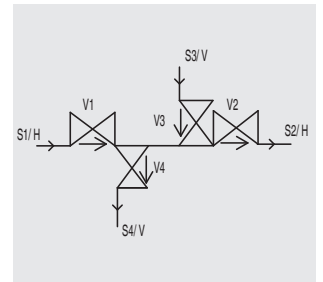
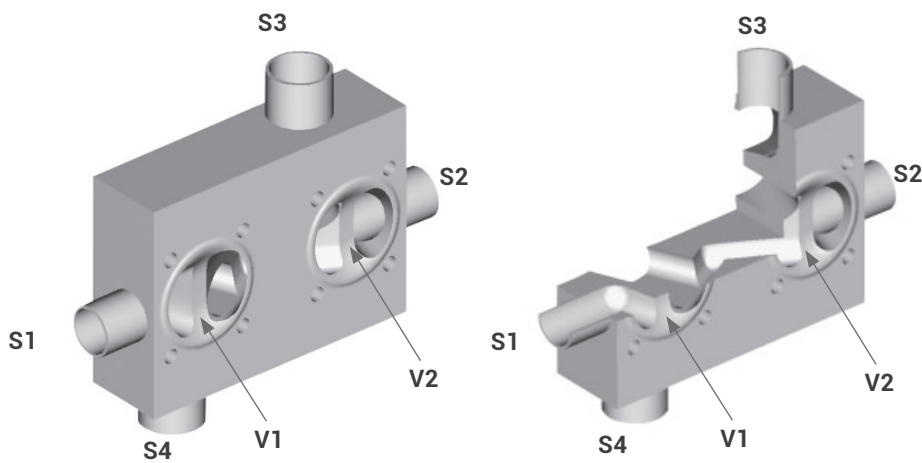
This configuration is used, for example, as a block-and-bleed valve.

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.

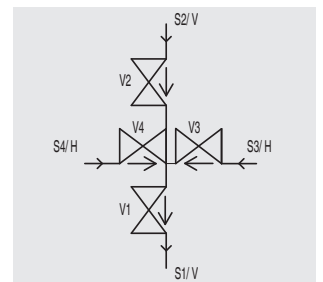
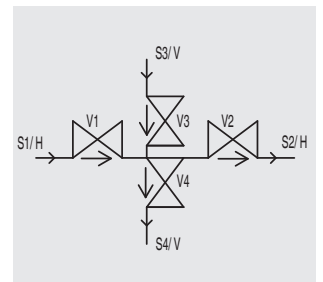
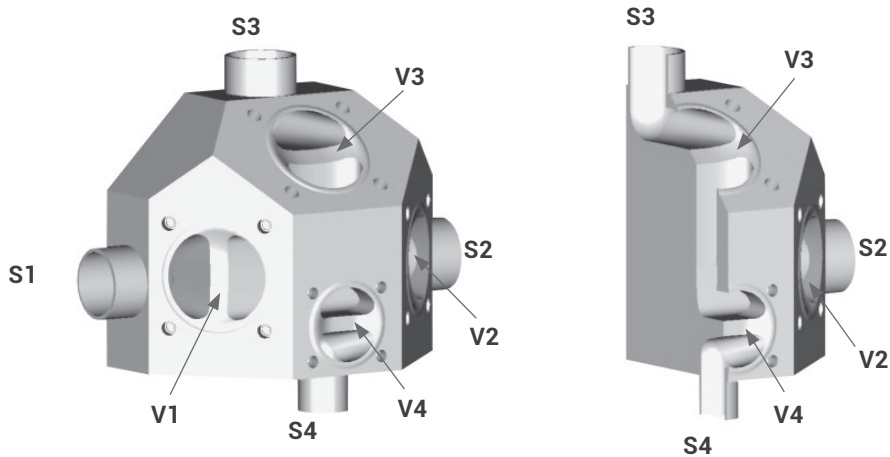


GEMÜ M600 04-04.N2

Installation position:

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

Manual operators possible.



H = horizontal, V = vertical

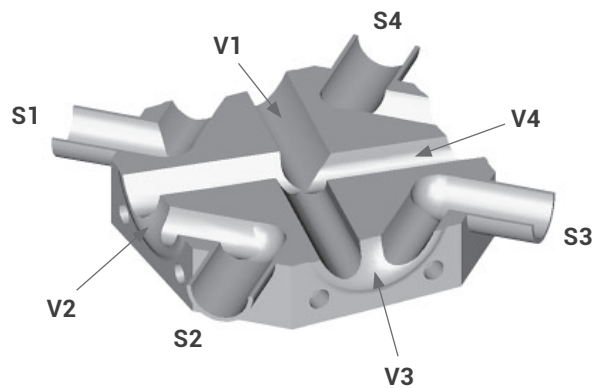
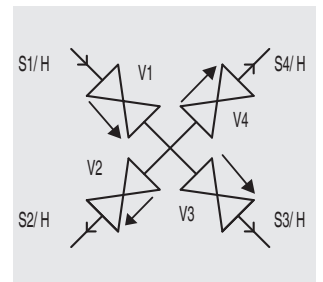
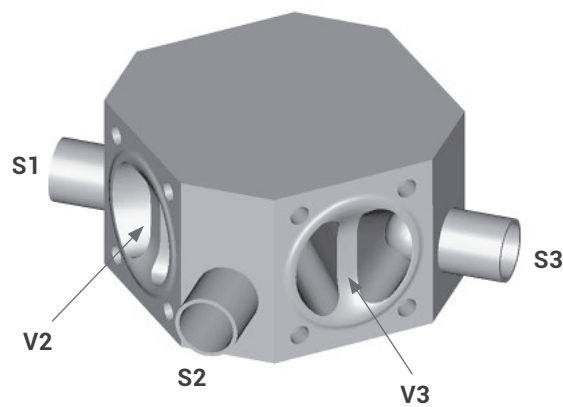
M600 04-04.W

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

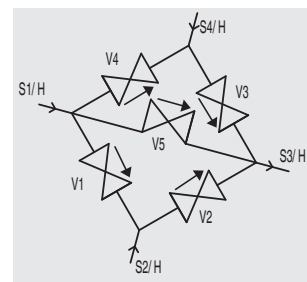
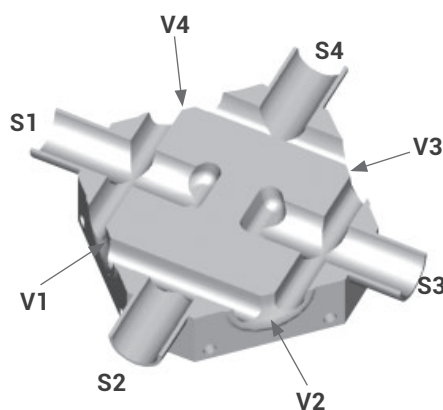
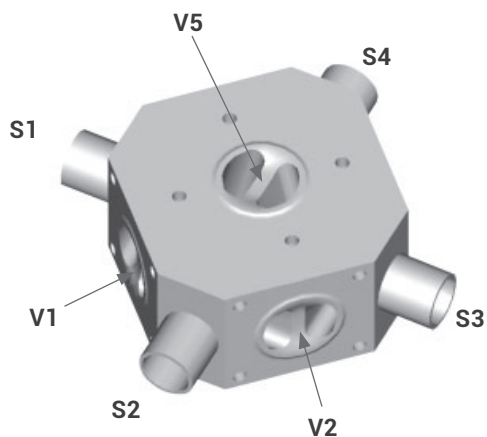
M600 04-05.R

Sterile valve block made of stainless steel block material.

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

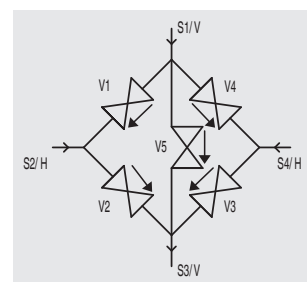
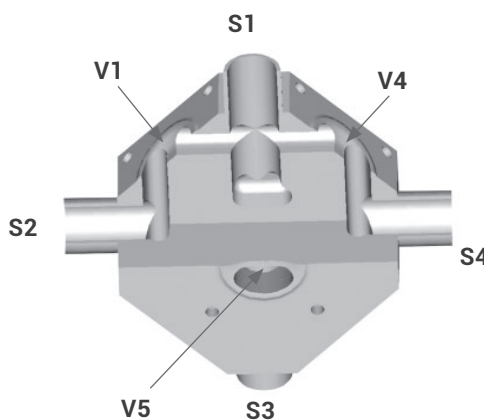
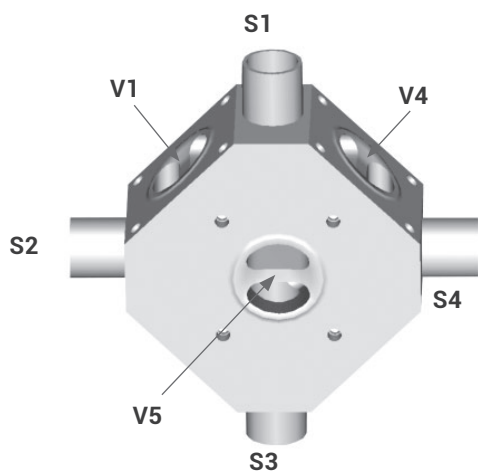
Installation position:

All spigots aligned horizontally.



Alternative Installation position:

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

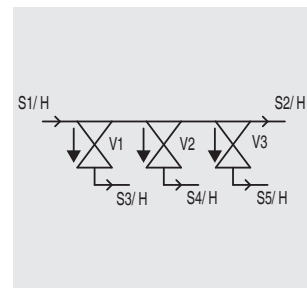
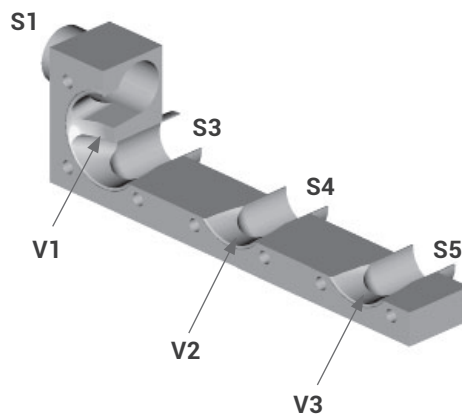
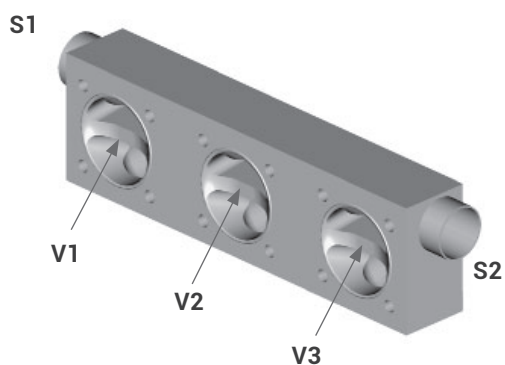


H = horizontal, V = vertical

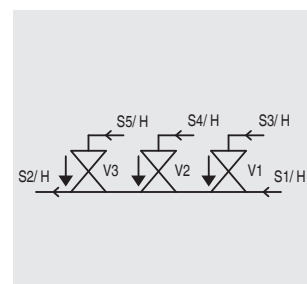
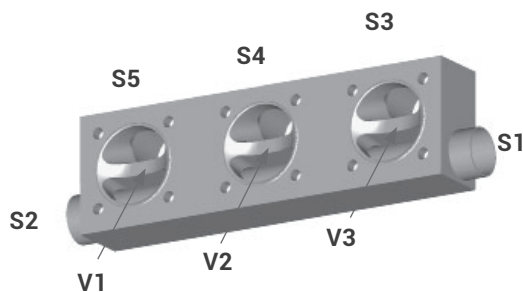
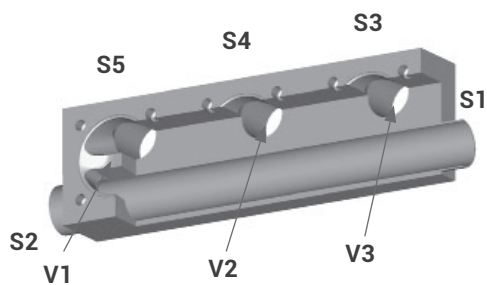
M600 05-03.A7

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

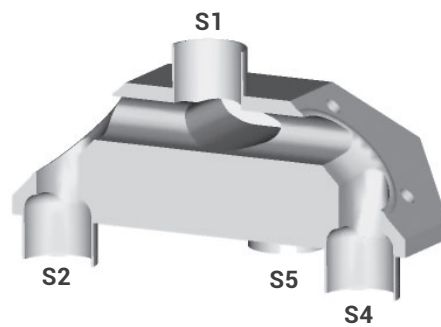
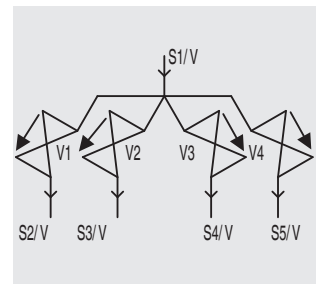
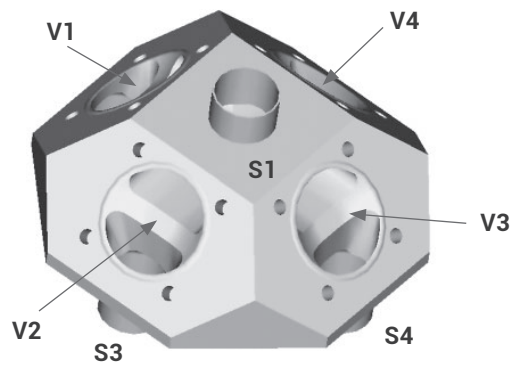
M600 05-04.C

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.

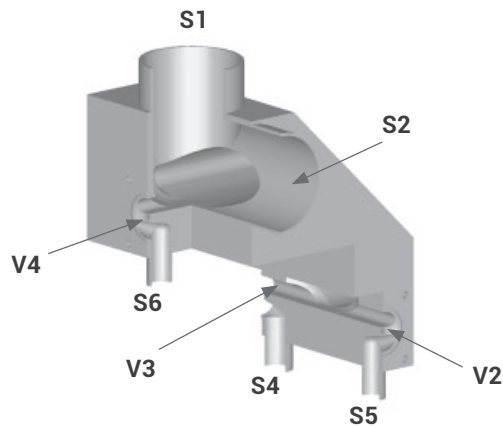
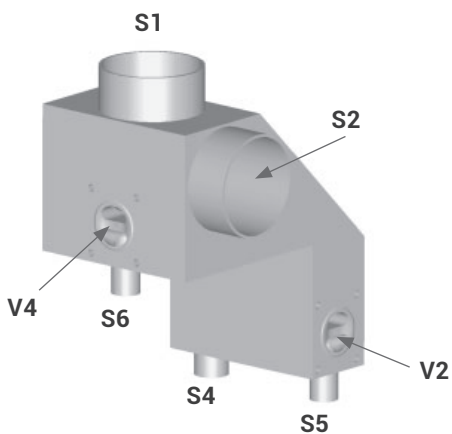
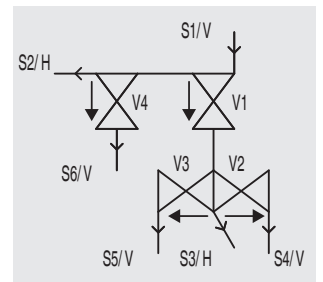
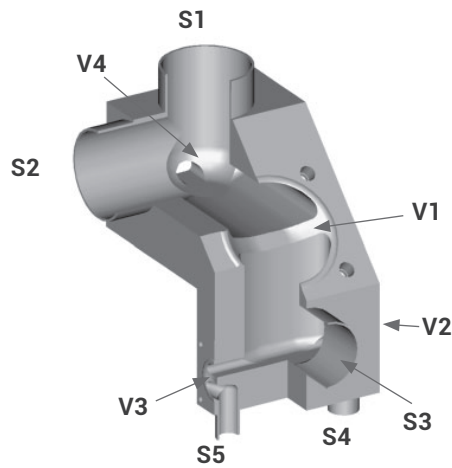
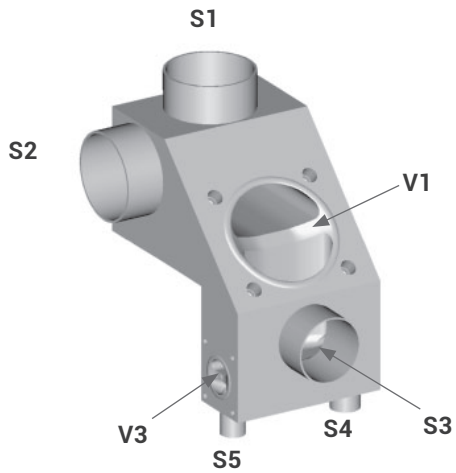


H = horizontal, V = vertical

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

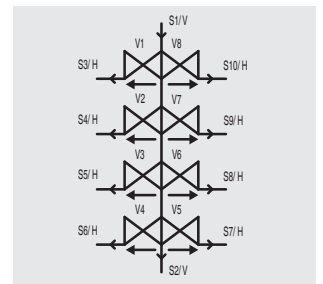
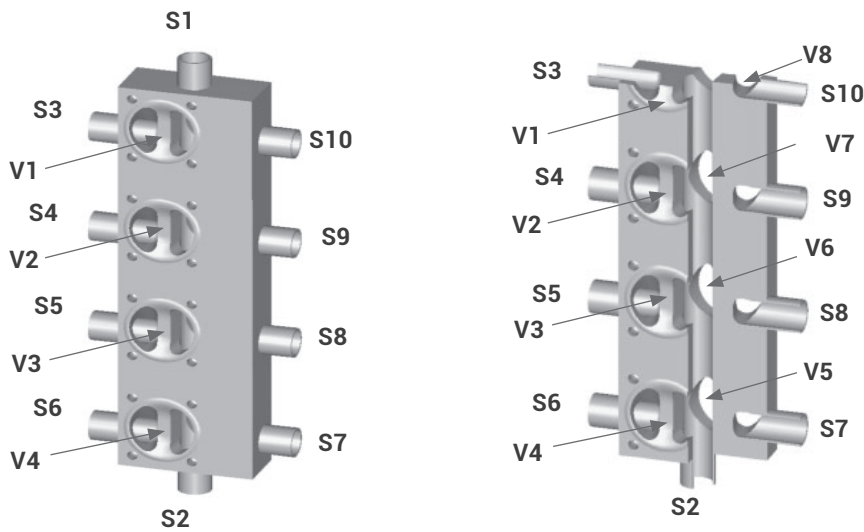
M600 10-08.T

Sterile valve block made of stainless steel block material.

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

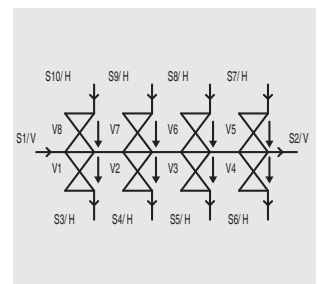
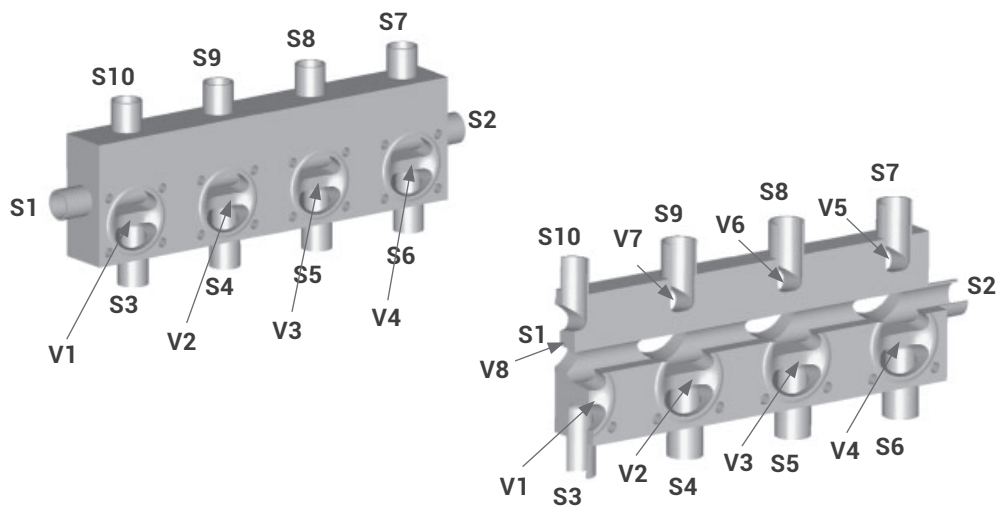
Installation position:

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".

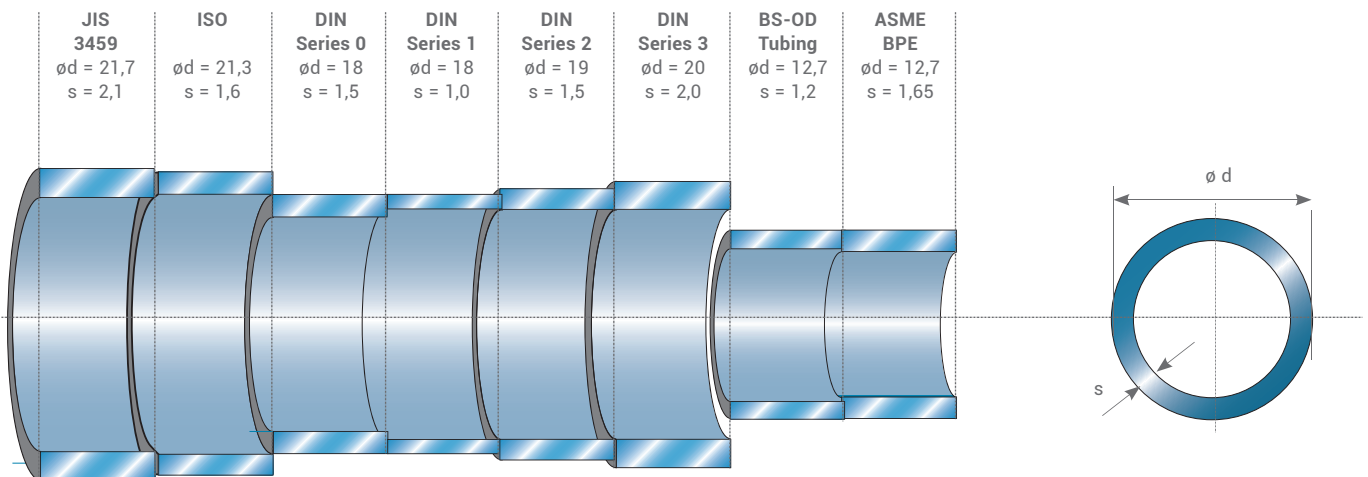
Mechanical hand polishing is carried out at our works to ensure our high quality standard.

Valve body surface finish, internal contour			
	Forged body - Codes 40, 42 Block material - Codes 41, 43	Investment casting Codes 32, 34	Code
Ra ≤ 0.8 µm, mechanically polished internal, blasted external	X	X	1502
Ra ≤ 0.8 µm, electropolished internal/external	X	-	1503
Ra ≤ 0.6 µm, mechanically polished internal, blasted external	X ¹	X ¹	1507
Ra ≤ 0.6 µm, electropolished internal/external	X ¹	-	1508
Ra ≤ 0.4 µm, mechanically polished internal, blasted external	X ¹	-	1536
Ra ≤ 0.4 µm, electropolished internal/external	X ¹	-	1537
Ra ≤ 0.25 µm, mechanically polished internal, blasted external	X ¹	-	1527
Ra ≤ 0.25 µm, electropolished internal/external	X ¹	-	1516

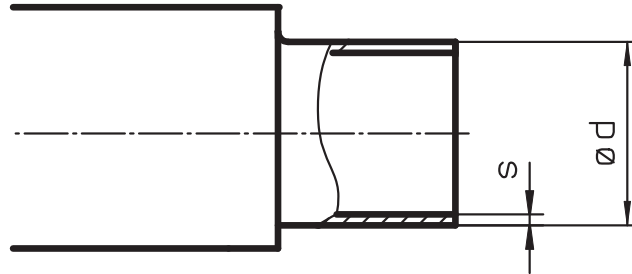
Ra acc. to DIN 4768; at defined reference points. Surface finish data refers to media wetted surfaces.

¹ Not possible for connections DN 8 code 55 and 59, DN 4 code 0 and all other connections ø < 6 mm.

The difference between tube specifications (Example DN 15)



Butt weld connections



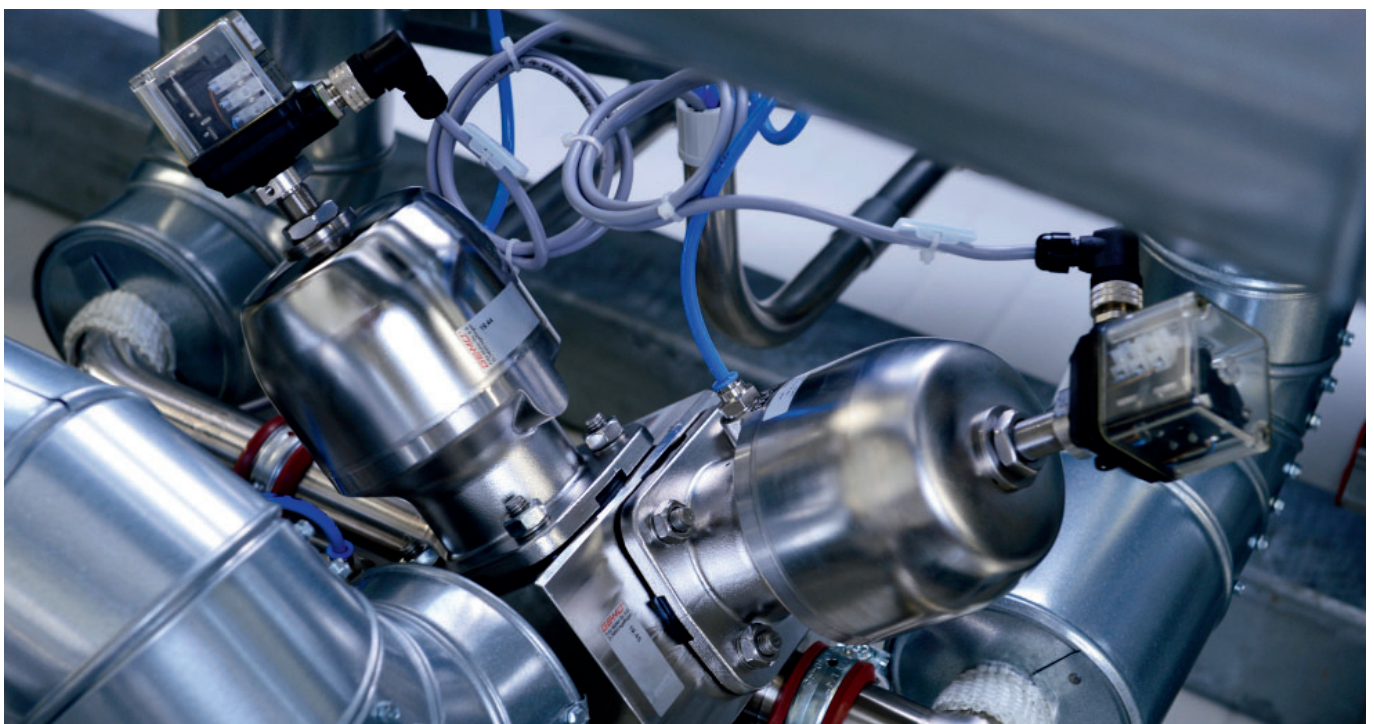
Dimensions in mm		DIN Series 0 Code 0		DIN 11850 Series 1 Code 16		Series 2 Code 17		Series 3 Code 18		DIN 11866 Series A Code 1A		Series B Code 1B		EN ISO 1127 Code 60		
MG	DN	NPS	ød	s	ød	s	ød	s	ød	s	ød	s	ød	s	ød	s
8	4	-	6	1.0	-	-	-	-	-	-	-	-	-	-	-	-
	6	-	8	1.0	-	-	-	-	-	-	8	1.0	10.2	1.6	10.2	1.6
	8	1/4"	10	1.0	-	-	-	-	-	-	10	1.0	13.5	1.6	13.5	1.6
	10	3/8"	-	-	12	1.0	13	1.5	14	2.0	13	1.5	-	-	-	-
	15	1/2"	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	10	3/8"	-	-	12	1.0	13	1.5	14	2.0	13	1.5	17.2	1.6	17.2	1.6
	15	1/2"	18	1.5	18	1.0	19	1.5	20	2.0	19	1.5	21.3	1.6	21.3	1.6
	20	3/4"	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	15	1/2"	18	1.5	18	1.0	19	1.5	20	2.0	19	1.5	21.3	1.6	21.3	1.6
	20	3/4"	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 1/4"	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 1/2"	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 1/2"	-	-	-	-	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							
MG	DN	NPS	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

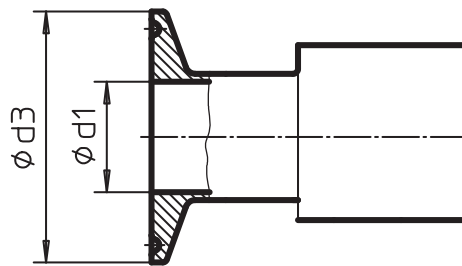


Clamp bodies

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 SMS 3008			Code 35 JIS-G3447			Code 36 JIS-G3459				
Clamp connection			Code 80			Code 82			Code 88*			Code 8A			Code 8E			Code 8F			Code 8H				
DN	NPS	MG	H1	$\varnothing d1$	$\varnothing d3$	L	$\varnothing d1$	$\varnothing d3$	L	$\varnothing d1$	$\varnothing d3$	L	$\varnothing d1$	$\varnothing d3$	L	$\varnothing d1$	$\varnothing d3$	L	$\varnothing d1$	$\varnothing d3$	L	$\varnothing d1$	$\varnothing d3$	L	
8	¼"	8	8	4,57	25	63,5	10,30	25,0	63,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
10	⅜"		8	7,75	25	63,5	-	-	-	-	-	-	10,00	34	88,9	-	-	-	-	-	-	-	-	-	-
15	½"		8	9,40	25	63,5	-	-	-	9,40	25	108	-	-	-	-	-	-	-	-	-	-	-	-	-
10	⅜"	10	12,5	-	-	-	14,00	25,4	108	-	-	-	10,00	34	108	-	-	-	-	-	-	-	14,00	34	108
15	½"		12,5	9,40	25	88,9	18,10	50,5	108	9,40	25	108	16,00	34	108	-	-	-	-	-	-	17,50	34	108	
20	¾"		12,5	15,75	25	101,6	-	-	-	15,75	25	117	-	-	-	-	-	-	-	-	-	-	-	-	-
15	½"	25	19	9,40	25	101,6	18,10	50,5	108	9,40	25	108	16,00	34	108	-	-	-	-	-	-	17,50	34	108	
20	¾"		19	15,75	25	101,6	23,70	50,5	117	15,75	25	117	20,00	34	117	-	-	-	-	-	-	-	-	-	
25	1"		19	22,10	50,5	114,3	29,70	50,5	127	22,10	50,5	127	26,00	50,5	127	22,60	50,5	127	23,00	50,5	127	-	-	-	
32	1 ¼"	40	26	-	-	-	38,40	64	146	-	-	-	32,00	50,5	146	31,30	50,5	146	29,40	50,5	146	-	-	-	
40	1 ½"		26	34,80	50,5	139,7	44,30	64	159	34,80	50,5	159	38,00	50,5	159	35,60	50,5	159	35,70	50,5	159	-	-	-	
50	2"	50	32	47,50	64	158,75	56,30	77,5	190	47,50	64	190	50,00	64	190	48,60	64	190	47,80	64	190	-	-	-	
65	2 ½"	80	62	60,20	77,5	193,68	72,10	91	216	60,20	77,5	216	66,00	91	216	60,30	77,5	216	59,50	77,5	216	-	-	-	
80	3"		62	72,90	91	222,25	84,30	106	254	72,90	91	254	81,00	106	254	72,90	91	254	72,30	91	254	-	-	-	
100	4"		100	76	97,38	119	292,1	109,70	144,5	305	97,38	119	305	100,00	119	305	97,60	119	305	97,60	119	305	-	-	-

Dimensions in mm

MG = diaphragm size

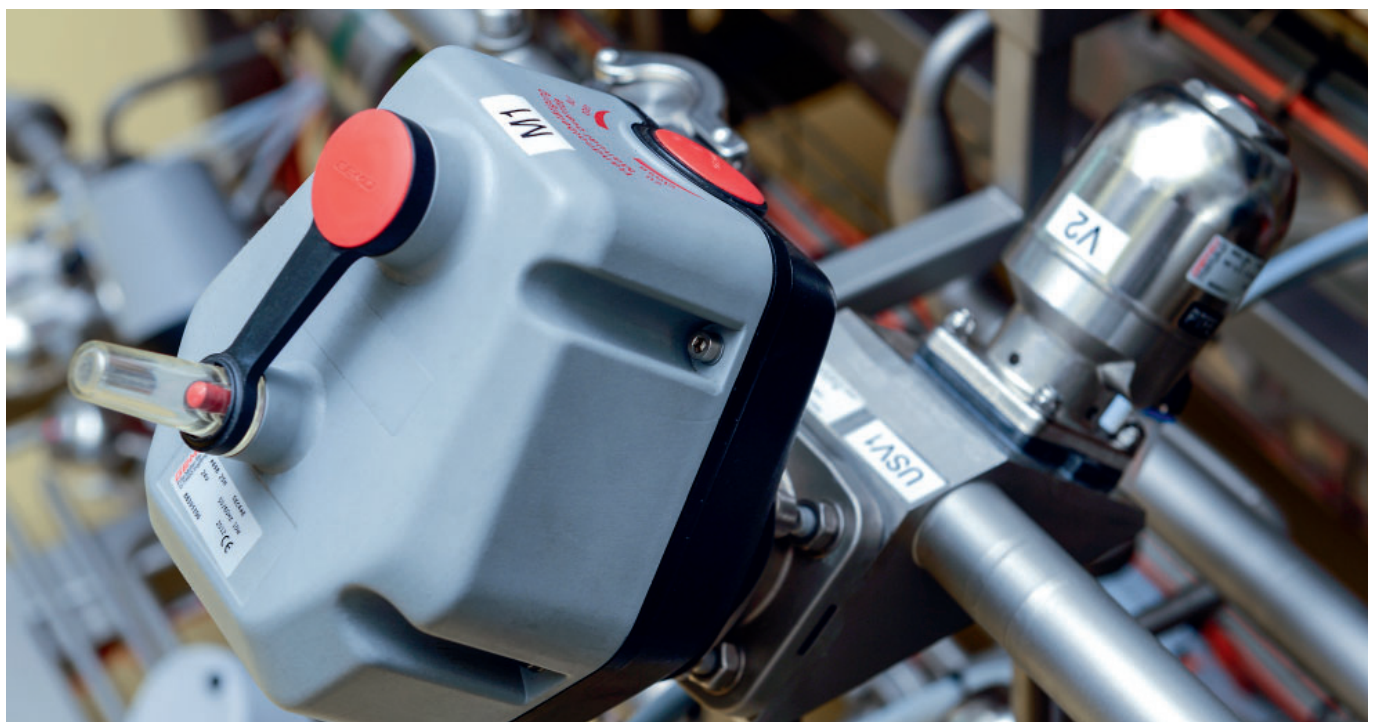
* Code 88 and Code 80 have different lengths

Materials and certificates

The table below 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.

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



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.



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 2014/68/EU Art. 3 § 3. If no original GEMÜ shut-off diaphragms are installed, GEMÜ cannot accept any responsibility.

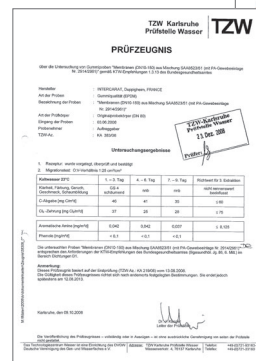


EAC

Certification of conformity with the standards, quality and safety standards of the customs union between Russia, Kazakhstan, Belarus, Armenia and Kyrgyzstan.

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. The examination took place in 2002.



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.

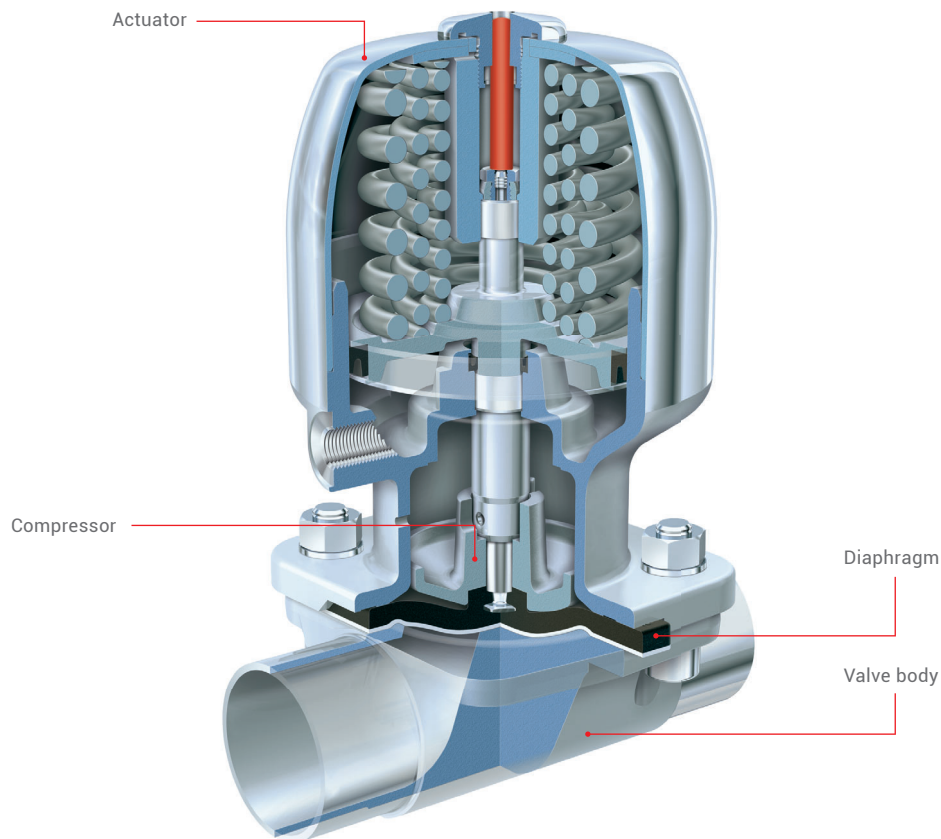
The system is more than the sum of the individual parts

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.



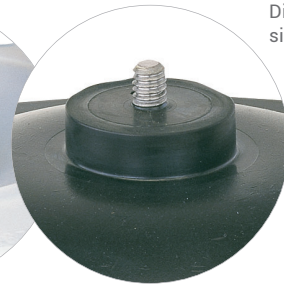
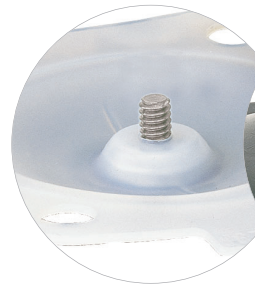
The original GEMÜ seal system

Flexible diaphragm fixing

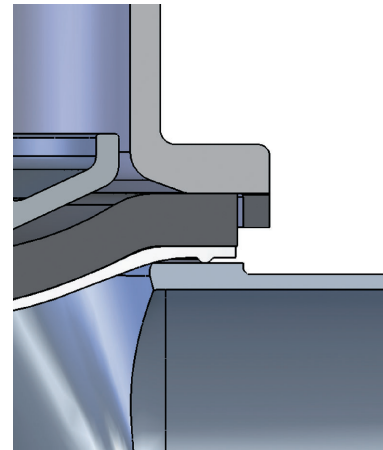
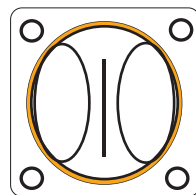
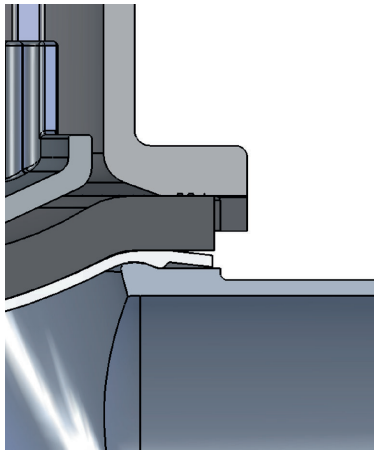
The diaphragm is uniformly fixed in the compressor by means of a threaded pin. The only exception is the smallest diaphragm size (diaphragm size 8), which is pushed in with a rubber pin. The uniform fixing method applies both to soft elastomer and PTFE diaphragms. The largest advantage of fixing by means 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.



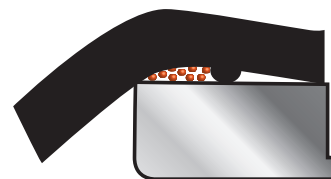
Diaphragm size 8



Diaphragm sizes 10 - 100



GEMÜ seal system



Conventional seal systems

GEMÜ diaphragms

Soft elastomer and PTFE

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.



Code 17, diaphragm size 25

PTFE diaphragms-Membranen

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.



Code 5E, diaphragm size 25

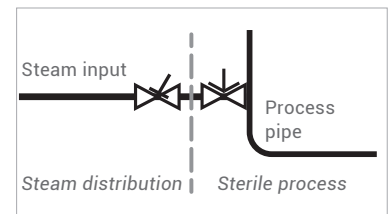
GEMÜ diaphragms

Selection

Diaphragm	Material/Design	Diaphragm size	Temperature range [°C]		Sterilisation ¹	Code
			Min.	Max.		
EPDM	Ethylene-propylene-diene rubber	8 - 100	-10	100	max. 150 °C ² max. 60 min. per cycle	13/3A
EPDM	Ethylene-propylene-diene rubber	8 - 100	-10	100	max. 150 °C ² max. 180 min. per cycle	17
PTFE/EPDM	Fully laminated PTFE diaphragm with EPDM back	8, 10, 100	-10	100	max. 150 °C ² , 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 ² , no time limit per cycle	5E

¹ The sterilisation temperature is valid for steam (saturated steam) or superheated water.

² 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

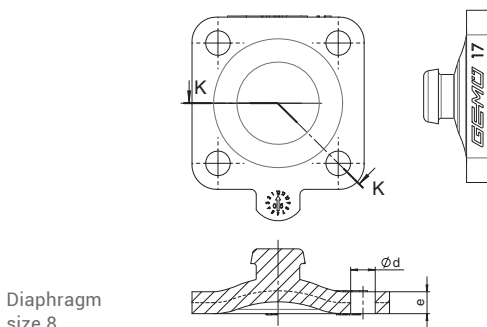
FDA compliant	USP Class VI	EHEDG	TA Luft (German Clean Air Act)	O ₂ BAM	Compatibility with media	Special features
•	•	•	•	•	Very good all-round elastomer, resistant to many acidic and alkaline media, demineralised and deionised hot water, inert and many other industrial gases.	Suitable for vacuum, low 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]

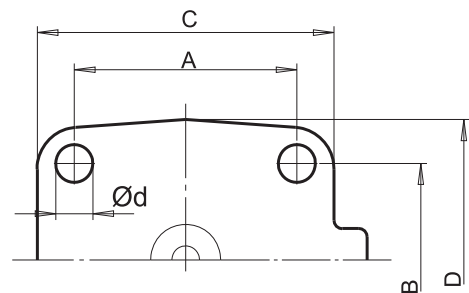
MG*	DN	NPS	A	B	C	D	ød	e	h	W	α	β	γ	Y	Number of bolt holes
8	4 - 15	¼" - ½"	22	22	31,5	31,5	4,5	4	5,6	-	-	-	-	-	4
10	10 - 20	⅜" - ¾"	39	44	48	53	5,2	5	9	M4	-	-	-	-	4
25	15 - 25	½" - 1"	54	46	71,7	66,7	9	6	8	¼"	-	-	-	-	4
40	32 - 40	1¼" - 1½"	70	65	100	90	11,5	7	8	¼"	-	-	-	-	4
50	50	2"	82	78	124	106	13	7	7	¼"	-	-	-	-	4
80	80	3"	127	114	186	156	18	9	8	5/16"	-	-	-	-	4
100	100	4"	194	-	228	-	13	10	9	5/16"	28°	42°	40°	-	8

* Diaphragm size

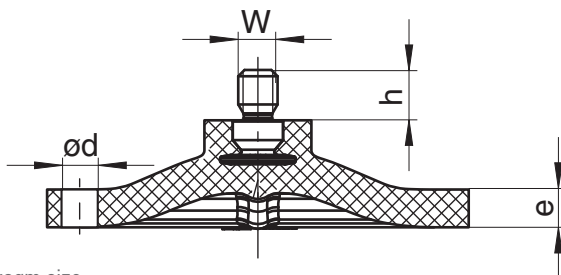
The thread of the diaphragm pin „W“ corresponds to Whitworth standard.



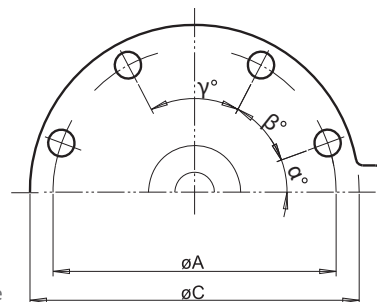
Diaphragm size 8



Diaphragm sizes 8 - 80



Diaphragm size 10 - 100



Diaphragm size 100

GEMÜ multi-port valve blocks

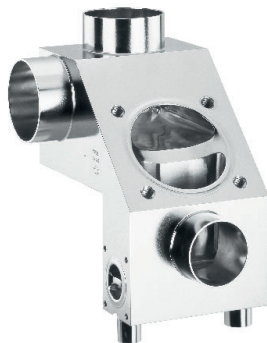
Selection of operators

Manually operated





Type	GEMÜ 9601	GEMÜ 9602	GEMÜ 9612	GEMÜ 9673	GEMÜ 9653	GEMÜ 9654
Material	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

							
GEMÜ 9605	GEMÜ 9625	GEMÜ 9687	GEMÜ 9650	GEMÜ 9650TL	GEMÜ 9651	GEMÜ 9658/9688	GEMÜ 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 to 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.

GEMÜ multi-port valve blocks

Selection of operators

Motorized



Typ	GEMÜ 9618	GEMÜ 9698
Material	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 (ohne Zwischenstück 15 to 50 °C)	-10 to 150 °C
Operating pressure*	0 to 6 bar	0 to 6 bar
DN	4 - 15	15 - 50
Anschlussspannung	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 multi-port valve blocks

Special version

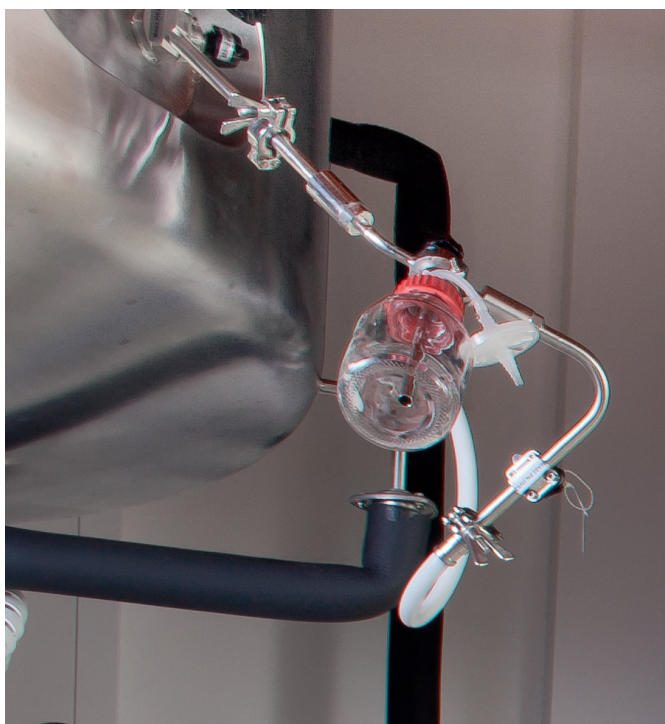
GEMÜ sampling bottle

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
- Tried and tested GEMÜ seal system
- FDA compliant materials

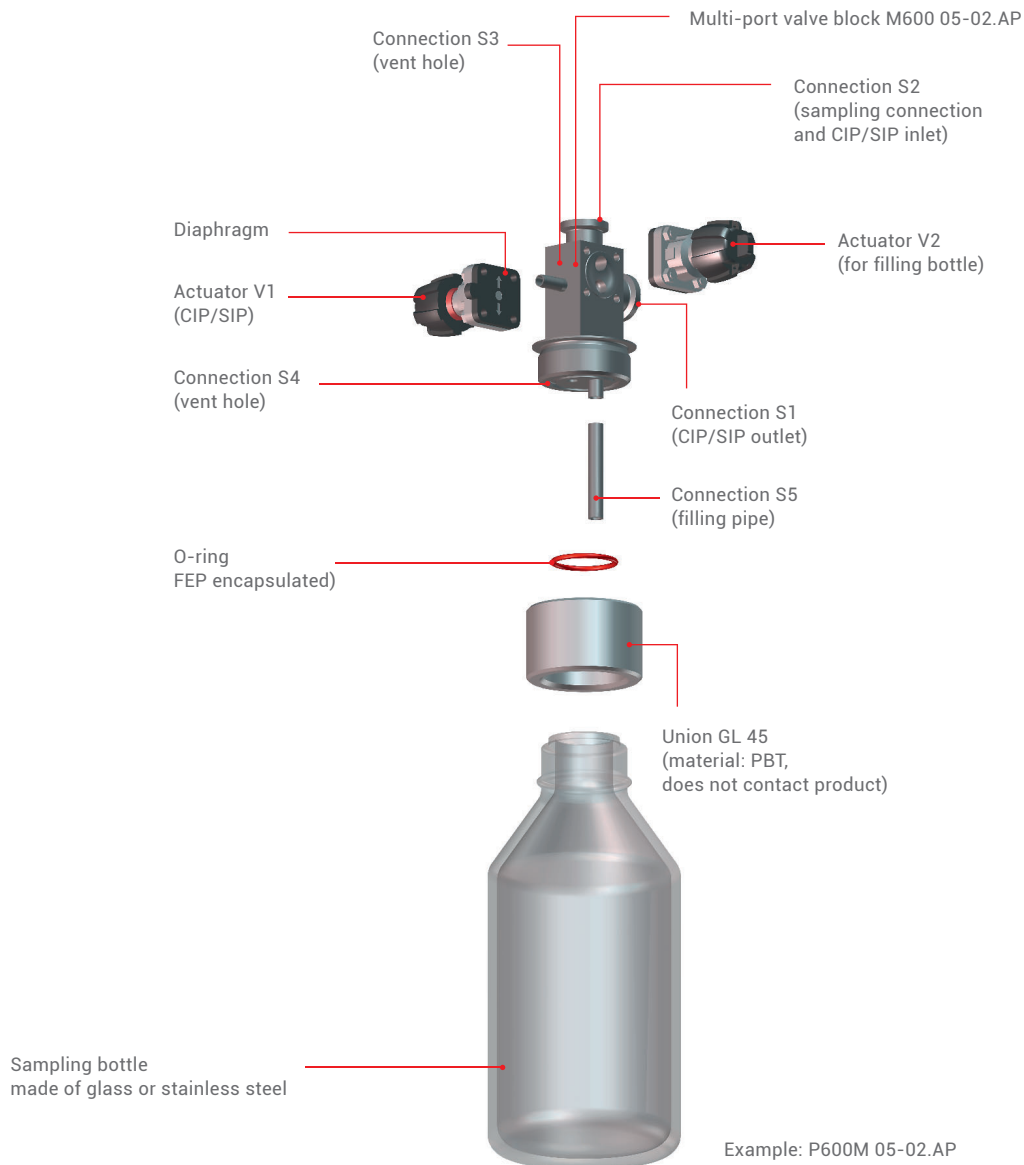
Functional principle

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

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



GEMÜ multi-port valve blocks

Specification

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:

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.

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.

Specification of multi-port valve blocks

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

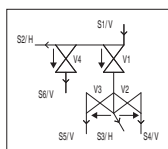
Surface finish of multi-port valve block:

- 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
- Other

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 no.	Pipe connection				Operator			Other
	DN	Code	$\varnothing d(a)[mm]$	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: _____

Specification of sampling bottle

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

Valve block material:

1.4435

1.4435 BN2 ($\Delta Fe < 0.5\%$)

Other _____

Surface finish of valve block:

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

Other _____

Shut-off 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)

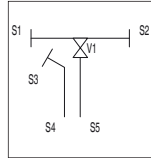
(operating pressure: -1 bar to max. 10 bar rel.)

1000 ml

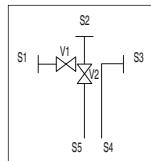
Other _____

Quantity: _____

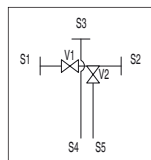
Standard:



P600M 05-01.AP






P600M 05-02.AP



P600M 05-02.BP

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

Spigot	Pipe connection				Actuator			Other
					  GEMÜ 601, GEMÜ 602 manual		 GEMÜ 650 pneumatic	
Spigot no.	DN	Code	$\phi d(a)$ [mm]	s [mm]	Actuator type	Control function	Actuator size	Comment/accessories
S1					V1			
S2					V2			
S3					V3			
S4	6	17	8.0	1.0				Vent hole
S5	6	17	8.0	1.0				Filling pipe

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

Contact (GEMÜ): _____

Customer: _____

Department: _____

Address: _____

Telephone: _____ E-mail: _____

Please do not write here!

K-No.: _____

P600: _____

M600: _____

X: _____

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