

**GEMÜ® 653, 654**

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**Diaphragm Valve**  
Metal, Diaphragm sizes 8 - 100

**GB** INSTALLATION, OPERATING AND  
MAINTENANCE INSTRUCTIONS



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## 1 General information

Prerequisites to ensure that the GEMÜ valve functions correctly:

- x Correct transport and storage
- x Installation and commissioning by trained personnel
- x Operation according to these installation, operating and maintenance instructions
- x Recommended maintenance

Correct installation, operation, servicing and repair work ensure faultless valve operation.

	The descriptions and instructions apply to the standard versions. For special versions not described in these installation, operating and maintenance instructions the basic information contained herein applies in combination with any additional special documentation.
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## 2 General safety information

The safety information does not take into account:

- x Unexpected incidents and events, which may occur during installation, operation and servicing.
- x Local safety regulations which must be adhered to by the operator and by any additional installation personnel.

## 2.1 Information for service and operating personnel

The installation, operating and maintenance instructions contain fundamental safety information that must be observed during commissioning, operation and servicing. Non-compliance with these instructions may cause:

- x Personal hazard due to electrical, mechanical and chemical effects.
- x Hazard to nearby equipment.
- x Failure of important functions.
- x Hazard to the environment due to the leakage of dangerous materials.

### Prior to commissioning:

- Read the installation, operating and maintenance instructions.
- Provide adequate training for the installation and operating personnel.
- Ensure that the contents of the installation, operating and maintenance instructions have been fully understood by the responsible personnel.
- Define the areas of responsibility.

### During operation:

- Keep the installation, operating and maintenance instructions available at the place of use.
- Observe the safety information.
- Use only in accordance with the specifications.
- Any servicing work and repairs not described in the installation, operating and maintenance instructions must not be performed without consulting the manufacturer first.

### DANGER

**Strictly observe the safety data sheets or the safety regulations that are valid for the media used.**

### In cases of uncertainty:

- x Consult the nearest GEMÜ sales office.

## 2.2 Warning notes

Wherever possible, warning notes are organised according to the following scheme:

### SIGNAL WORD

#### Type and source of the danger

- Possible consequences of non-observance.
- Measures for avoiding danger.

Warning notes are always marked with a signal word and sometimes also with a symbol for the specific danger.

The following signal words and danger levels are used:

### DANGER

#### Imminent danger!

- Non-observance will lead to death or severe injury.

### WARNING

#### Potentially dangerous situation!

- Non-observance can cause death or severe injury.

### CAUTION

#### Potentially dangerous situation!

- Non-observance can cause moderate to light injury.

### CAUTION (WITHOUT SYMBOL)

#### Potentially dangerous situation!

- Non-observance can cause damage to property.

## 2.3 Symbols used



Danger - hot surfaces!



Danger - corrosive materials!



Hand: indicates general information and recommendations.

●	Bullet point: indicates the tasks to be performed.
➤	Arrow: indicates the response(s) to tasks.
x	Enumeration sign

### 3 Definition of terms

#### Working medium

The medium that flows through the diaphragm valve.

### 4 Intended area of use

- x The GEMÜ 653 or 654 diaphragm valve is designed for installation in piping systems. It controls a flowing medium by manual operation.
- x **The valve may only be used providing the product technical criteria are complied with (see chapter 6 "Technical data").**
- x Do not paint the bolts and plastic parts of the diaphragm valve!

#### ⚠ WARNING

##### Use the diaphragm valve only for the intended purpose!

- Otherwise the manufacturer liability and guarantee will be void.
- Use the diaphragm valve only in accordance with the operating conditions specified in the contract documentation and in the installation, operating and maintenance instructions.
- The diaphragm valve may only be used in potentially explosive zones confirmed in the declaration of conformity (ATEX).

### 5 Condition as supplied to customer

The GEMÜ diaphragm valve is supplied as a separately packed component.

## 6 Technical data

#### Working medium

Corrosive, inert, gaseous and liquid media which have no negative impact on the physical and chemical properties of the body and diaphragm material.

Operating temperature max. 150 °C  
(dependent on medium wetted materials)

The valve will seal in both flow directions up to full operating pressure (all pressures are gauge pressures).

#### Bonnet material

Bonnet	A4 stainless steel
Cap (DN 10 - DN 40)	PEEK
Cap (DN 50 - DN 100)	PES
653 handwheel	PPS glass filled
654 handwheel	A4 stainless steel

Diaphragm size	Operating pressure [bar]	
	EPDM/FPM	PTFE
8	0 - 10	0 - 6
10	0 - 10	0 - 6
25	0 - 10	0 - 6
40	0 - 10	0 - 6
50	0 - 10	0 - 6
80	0 - 10	0 - 6
100	0 - 10	0 - 6

All pressures are gauge pressures. Operating pressure values were determined with static operating pressure applied on one side of a closed valve. Sealing at the valve seat and atmospheric sealing is ensured for the given values. Information on operating pressures applied on both sides and for high purity media on request.

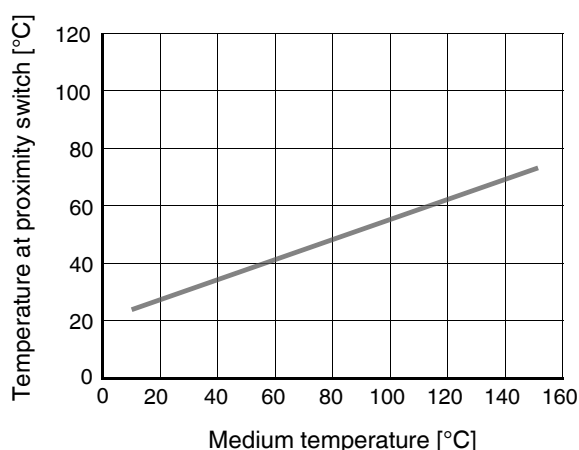
Version with PTFE diaphragm up to 10 bar possible with bonnet special function "H" and forged valve body.

#### Ambient conditions

Max. ambient temperature	Standard	60 °C
Max. ambient temperature	Accessory MAG	35 °C

Temperature at mounting point for proximity switches see ambient temperature diagram below

#### Values measured at 25 °C ambient temperature



Kv values [m <sup>3</sup> /h]								
MG	DN	DIN Code 0	DIN 11850 Series 1 Code 16	DIN 11850 Series 2 Code 17	DIN 11850 Series 3 Code 18	SMS 3008 Code 37	ASME BPE Code 59	EN ISO 1127 Code 60
8	4	0.5	-	-	-	-	-	-
	6	1.1	-	-	-	-	-	1.2
	8	1.3	-	-	-	-	0.6	2.2
	10	-	2.1	2.1	2.1	-	1.3	-
	15	-	-	-	-	-	2.0	-
10	10	-	2.4	2.4	2.4	-	2.2	3.3
	15	3.3	3.8	3.8	3.8	-	2.2	4.0
	20	-	-	-	-	-	3.8	-
25	15	4.1	4.7	4.7	4.7	-	-	7.4
	20	6.3	7.0	7.0	7.0	-	4.4	13.2
	25	13.9	15.0	15.0	15.0	12.6	12.2	16.2
40	32	25.3	27.0	27.0	27.0	26.2	-	30.0
	40	29.3	30.9	30.9	30.9	30.2	29.5	32.8
50	50	46.5	48.4	48.4	48.4	51.7	50.6	55.2
80	65	-	-	77.0	-	68.5	68.5	96.0
	80	-	-	111.0	-	80.0	87.0	111.0
100	100	-	-	194.0	-	173.0	188.0	214.0

Kv values determined acc. to IEC 534 standard, inlet pressure 6 bar, Δp 1 bar, stainless steel valve body and soft elastomer diaphragm.  
MG = diaphragm size

Diaphragm temperature range [°C]				
Diaphragm	Liquid Media		Steam (Sterilisation)	Code
	Min.	Max.		
EPDM	-10	90	150 °C, max. 60 min	13/3A
EPDM	-10	90	150 °C, max. 60 min	16/6A
EPDM	-10	90	150 °C, max. 180 min	17
PTFE	-10	90	Constant temperature* 150 °C	52/5A
PTFE	-10	90	Constant temperature* 150 °C	5E
FPM	-10	90	not applicable	4/4A
PTFE	-10	90	150 °C, max. 40 min	5F

\* The valves concerned must be serviced regularly if steam is applied continuously

**GEMÜ 654 - 0TN (MG 8)**



**GEMÜ 654 - 0TH (MG 8)**



**GEMÜ 653 - T (MG 10 - 100)**



**GEMÜ 654 - T (MG 10 - 100)**



**GEMÜ 653 - D (MG 10 - 50)**



**GEMÜ 654 - D (MG 10 - 50)**





## 7 Order data

Body configuration	Code
Tank valve body	B**
2/2-way body	D
Multi-port design	M**
T body	T*
* For dimensions see T Valves brochure	
** Dimensions and versions on request	

Connection	Code
<b>Butt weld spigots</b>	
Spigots DIN	0
Spigots DIN 11850, series 1	16
Spigots DIN 11850, series 2	17
Spigots DIN 11850, series 3	18
Spigots DIN 11866, series A	1A
Spigots DIN 11866, series B	1B
Spigots JIS-G 3447	35
Spigots JIS-G 3459	36
Spigots SMS 3008	37
Spigots BS 4825, part 1	55
Spigots ASME BPE	59
Spigots EN ISO 1127	60
Spigots ANSI/ASME B36.19M, Schedule 10s	63
Spigots ANSI/ASME B36.19M, Schedule 40s	65

<b>Threaded connections</b>	
Threaded sockets DIN ISO 228	1
Threaded spigots DIN 11851	6
One side threaded spigot, other side cone spigot and union nut, DIN 11851	62
Aseptic unions on request	

<b>Flanges</b>	
Flanges EN 1092 / PN16 / form B, length EN 558, series 1, ISO 5752, basic series 1	8
Flanges ANSI CLASS 125/150 RF, length MSS SP-88	38
Flanges ANSI CLASS 125/150 RF, length EN 558, series 1, ISO 5752, basic series 1	39

<b>Clamp connections</b>	
Clamps ASME BPE for pipe ASME BPE, length ASME BPE	80
Clamps DIN 32676 series B for pipe EN ISO 1127, length EN 558, series 7	82
Clamps ASME BPE for pipe ASME BPE, length EN 558, series 7	88
Clamps DIN 32676 series A for pipe DIN 11850, length EN 558, series 7	8A
Clamps SMS 3017 for pipe SMS 3008, length EN 558, series 7	8E
Aseptic clamps on request	

For overview of available valve bodies see data sheet page 13

Valve body material	Code
1.4435 - BN2 (CF3M), investment casting Fe<0.5%	32
1.4435 (ASTM A 351 CF3M $\triangle$ 316L), investment casting	34
1.4408, investment casting	37
1.4408, PFA lined	39
1.4435 (316L), forged body	40
1.4435 (BN2), forged body Fe<0.5%	42

Diaphragm material	Code
FPM	4 4A*
EPDM	13 3A*
EPDM	16 6A*
EPDM	17 17*
PTFE/EPDM convex PTFE loose	5E**
PTFE/FPM convex PTFE loose	5F
PTFE/EPDM PTFE laminated	52 5A*
* for diaphragm size 8	
** for use with valve bodies see data sheet page 13	
Material complies with FDA requirements, except code 4 and 4A	

Control function	Code
Manually operated	0

Bonnet size	Code
Diaphragm size 8	0
Diaphragm size 10	1
Diaphragm size 25	2
Diaphragm size 40	3
Diaphragm size 50	4
Diaphragm size 80	5
Diaphragm size 100	6

Bonnet version	Code
For body configuration D (diaphragm size 10 - 50)	D
For body configurations B, D, M and T (diaphragm size 8 - 100)	T
Bonnet for special function for body configurations B, D, M and T (diaphragm size 10 - 100)	X

Bonnet function		Code
With seal adjuster and stroke limiter	(GEMÜ 653 diaphragm size 10 - 50) (GEMÜ 654 diaphragm size 8 - 100)	H
Without seal adjuster and without stroke limiter	(GEMÜ 653 diaphragm size 10 - 100) (GEMÜ 654 diaphragm size 8 - 100)	N
With seal adjuster	(diaphragm size 80 - 100)	S
<b>Special versions</b>		
With seal adjuster, stroke limiter and mounting for proximity switches M 8x1	(diaphragm size 10 - 50)	A*
With seal adjuster and mounting for proximity switches M 12x1	(diaphragm size 80 - 100)	
With seal adjuster, stroke limiter and locking device (both directions) and mounting for proximity switches M 8x1	(diaphragm size 10 - 50)	B*
With seal adjuster, locking device (both directions) and mounting for proximity switches M 12x1	(diaphragm size 80 - 100)	
With seal adjuster, stroke limiter and safety gland packing	(diaphragm size 10 - 50)	E*
With seal adjuster and safety gland packing	(diaphragm size 80 - 100)	
With seal adjuster, stroke limiter, locking device to prevent closing and mounting for proximity switches M 8x1	(diaphragm size 10 - 50)	F*
With seal adjuster, locking device to prevent closing and mounting for proximity switches M 12x1	(diaphragm size 80 - 100)	
With seal adjuster, stroke limiter, locking device to prevent opening and mounting for proximity switches M 8x1	(diaphragm size 10 - 50)	K*
With seal adjuster, locking device to prevent opening and mounting for proximity switches M 12x1	(diaphragm size 80 - 100)	

\* only in connection with bonnet version X

Valve body surface finish, internal contour				
		Forged body Code 40, 42	Investment casting Code 32, 34	Code
Ra ≤ 6.3 µm	blasted internal/external	-	X	1500
--	electropolished	-	X	1509
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	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 refer to medium wetted surfaces

Order example	653	50	D	60	40	13	0	4	D	H		1503
Type	653											
Nominal size		50										
Body configuration (code)			D									
Connection (code)				60								
Valve body material (code)					40							
Diaphragm material (code)						13						
Control function (code)							0					
Bonnet size (code)								4				
Bonnet version (code)									D			
Bonnet function (code)										H		
Nominal size (mm)*												
Connection (code)*												
Surface finish (code)												1503

\* only in T-valve version

## Special versions

See chapter 13 for a detailed description of special versions.

The solenoids, padlocks etc. for the "locking device" must be ordered separately as accessories.  
Available only in connection with the bonnet additional functions B, K, F!

Order example	653	MAG	SV	1	C1
Type	653				
Type of accessory		MAG			
Kit			SV		
Control function (code)				1	
Voltage / Frequency (code)					C1

Type of accessory	<b>MAG</b>	- Electrical locking device
Control function	<b>1</b>	- Normally closed (locking device active)
Control function	<b>2</b>	- Normally open (locking device inactive)
Voltage / Frequency	<b>C1</b>	- 24 V DC

Type of accessory	<b>LOC</b>	- Mechanical locking device
Control function	<b>B</b>	- without padlock
	<b>L</b>	- with padlock

EDP No.	Designation	Description
88264576	653MAGSV1 C1 AT	Electromagnetic locking device 24 V DC, normally closed, M22x1 ATEX
88232776	653MAGSV1 C1	Electromagnetic locking device 24 V DC, normally closed, M22x1 IP 54, connector socket design A DIN EN 175301-803
88279388	653MAGSV2 C1	Electromagnetic locking device 24 V DC, normally open, M22x1 IP 54, connector socket design A DIN EN 175301-803
88239348	653LOCSVL	Locking device M22x1 with padlock
88239405	653LOCSVB	Locking device M22x1 without padlock



## 8 Manufacturer's information

### 8.1 Transport

- Only transport the diaphragm valve by suitable means. Do not drop. Handle carefully.
- Dispose of packing material according to relevant local or national disposal regulations / environmental protection laws.

### 8.2 Delivery and performance

- Check that all parts are present and check for any damage immediately upon receipt.
- The scope of delivery is apparent from the dispatch documents and the design from the order number.
- The performance of the diaphragm valve is checked at the factory.

### 8.3 Storage

- Store the diaphragm valve free from dust and moisture in its original packaging.
- Avoid UV rays and direct sunlight.
- Store the diaphragm valve in "open" position.
- Maximum storage temperature: 40 °C.
- Solvents, chemicals, acids, fuels or similar fluids must not be stored in the same room as valves and their spare parts.

### 8.4 Tools required

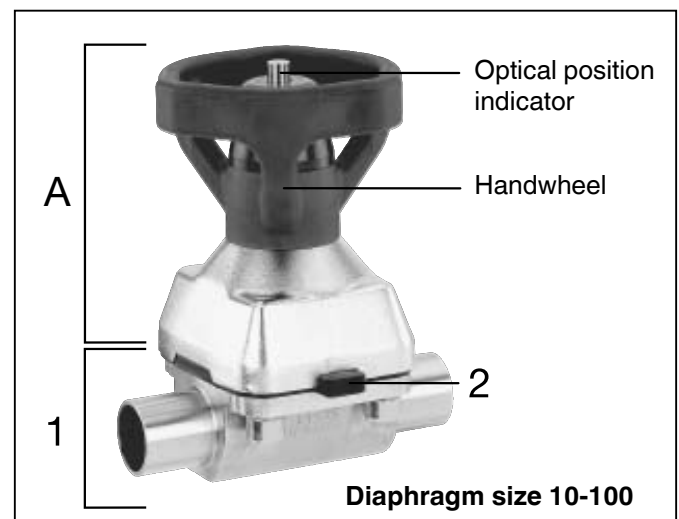
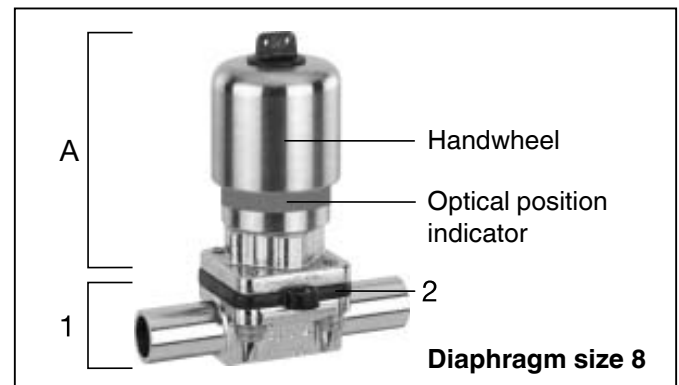
- The tools required for installation and assembly are **not** included in the scope of delivery. Only the setting tool for the stroke limiter of GEMÜ 654 diaphragm size 80 + 100 is included (see page 14).
- Use appropriate, functional and safe tools.

## 9 Functional description

The metal diaphragm valve is equipped

with a stainless steel bonnet. GEMÜ 653 has a handwheel in high temperature and chemically resistant plastic, GEMÜ 654 a stainless steel handwheel. The handwheels for diaphragm size 8 are rising, those for diaphragm sizes 10-100 are non-rising. An optical position indicator is standard. Two bonnet versions are available: for 2/2-way bodies and for T bodies or multi-port bodies. The valve body and the diaphragm are available in various designs as shown in the data sheet. The diaphragm valve can be continuously opened or closed. Various special versions are described in these installation, operating and maintenance instructions.

## 10 Construction



Construction

1	Valve body
2	Diaphragm
A	Bonnet

## 11 Installation and operation

### Prior to installation:

- Ensure that valve body and diaphragm material are appropriate and compatible to handle the working medium.
- **Check the suitability prior to the installation.**  
See chapter 6 "Technical data".

### 11.1 Installing the diaphragm valve

#### ⚠ WARNING

##### The equipment is subject to pressure!

- Risk of severe injury or death!
- Only work on depressurized plant.

#### ⚠ WARNING



##### Corrosive chemicals!

- Risk of caustic burns!
- Wear appropriate protective gear when installing.

#### ⚠ CAUTION



##### Hot plant components!

- Risk of burns!
- Only work on plant that has cooled down.

#### ⚠ CAUTION

##### Never use the valve as a step or an aid for climbing!

- This entails the risk of slipping-off or damaging the valve.

#### CAUTION

##### Do not exceed the maximum permissible pressure!

- Take precautionary measures to avoid possible pressure surges (water hammer).

- Installation work must only be performed by trained personnel.
- Use appropriate protective gear as specified in plant operator's guidelines.

### Installation location:

#### ⚠ CAUTION

- Do not apply external force to the valve.
- Choose the installation location so that the valve cannot be used as a foothold (climbing aid).
- Lay the pipeline so that the valve body is protected against transverse and bending forces, and also vibrations and tension.
- Only mount the valve between matching aligned pipes.

- x Direction of the working medium: optional.
- x Mounting position of the diaphragm valve: optional.

### Installation:


1. Ensure the suitability of the valve for each respective use. The valve must be appropriate for the piping system operating conditions (medium, medium concentration, temperature and pressure) and the prevailing ambient conditions. Check the technical data of the valve and the materials.
2. Shut off plant or plant component.
3. Secure against recommissioning.
4. Depressurize the plant or plant component.
5. Completely drain the plant (or plant component) and let it cool down until the temperature is below the media vaporization temperature and scalding can be ruled out.
6. Correctly decontaminate, rinse and ventilate the plant or plant component.

### Installation - Butt weld spigots:

1. Adhere to good welding practices!
2. Disassemble the bonnet with the diaphragm before welding the valve body into the pipeline (see chapter 12.1).
3. Allow butt weld spigots to cool down.
4. Reassemble the valve body and the bonnet with diaphragm (see chapter 12.4).

### Installation - Clamp connections:

- When installing clamp connections, insert a gasket between the body clamp and the adjacent piping clamp and join them using the appropriate clamp fitting. The gasket and the clamp for clamp connections are not included in the scope of delivery.

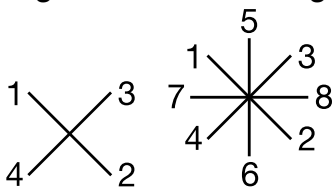
	<p><b>Important:</b> Butt weld spigots / clamp connections: Angle of rotation for welding into pipeline to enable optimised draining see brochure "Angle of rotation for 2/2-way valve bodies" (on request or <a href="http://www.gemu-group.com">www.gemu-group.com</a>).</p>
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### Installation - Threaded connections:

- Screw the threaded connections into the piping in accordance with valid standards.
- Screw the diaphragm valve body into the piping, use appropriate thread sealant. The thread sealant is not included in the scope of delivery.

### Installation - Flange connection:

1. Pay attention to clean, undamaged sealing surfaces on the mating flanges.
2. Align flanges carefully before installing them.
3. Centre the seals accurately.
4. Connect the valve flange and the piping flange using appropriate sealing material and matching bolting. Sealing material and bolts are not included in the scope of delivery.
5. Use all flange holes.
6. Only use connector elements made of approved materials!
7. Tighten the bolts diagonally!




**Observe appropriate regulations for connections!**

### After the installation:

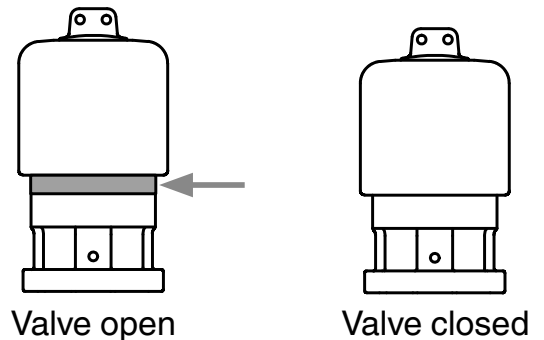
- Reactivate all safety and protective devices.

## 11.2 Operation

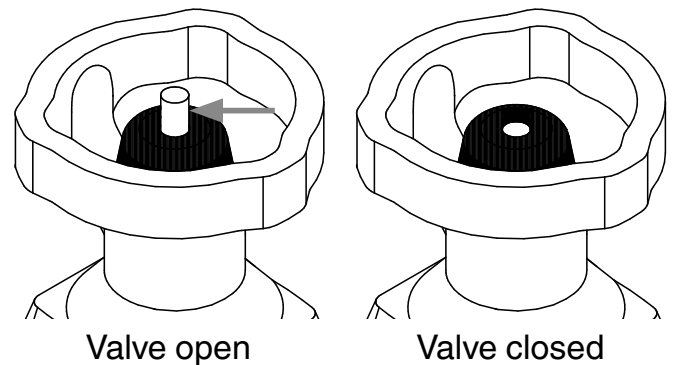
<b>⚠ CAUTION</b>	
	<p><b>Handwheel can become hot during operation!</b></p> <ul style="list-style-type: none"> <li>➤ Risk of burns!</li> <li>● Ensure protective gloves are worn when operating handwheel.</li> </ul>

### Optical position indicator

#### Diaphragm size 8



#### Diaphragm sizes 10 - 100



### Max. permissible operating torques:

Diaphragm size	Nm
8	1
10	2
25	5
40	10
50	15
80	30
100	35

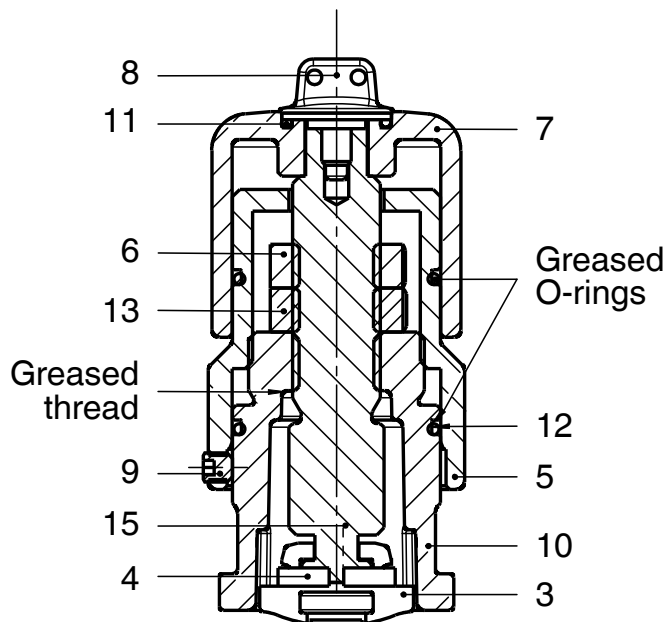
## 11.3 Setting the seal adjuster and the stroke limiter



### Important:

Only set the seal adjuster and stroke limiter when the valve is completely assembled (with diaphragm and valve body) and in a cold condition!

### GEMÜ 654 bonnet size 0TH Diaphragm size 8



### Setting the seal adjuster

- Unscrew locking screw **8** and remove it.
- Pull off handwheel **7**.
- Loosen locking screw **9** with a SW2 Allen key (do not unscrew it completely).
- Unscrew stroke limiting sleeve **5** and remove it.
- Loosen lock nut **6** with a SW19 open-end wrench and unscrew it by 2 to 3 turns.
- To deactivate the seal adjuster loosen the seal adjuster nut **13** with a SW19 open-end wrench unscrew it by 2 to 3 turns.
- Place handwheel **7** upside down on the double flats of the threaded spindle **15**. Gently close the valve with handwheel **7** ("CLOSED position") (valve is tight).
- Screw in the seal adjuster nut **13** until it stops and secure with lock nut **6** (SW19 open-end wrench).

### Setting the stroke limiter

- Move the valve to the OPEN position by turning handwheel **7** (upside down) until the required flow rate is reached.
- Pull off handwheel **7** from the threaded spindle **15**.
- Screw stroke limiting sleeve **5** on until it stops.

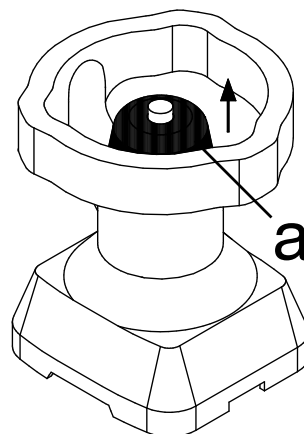


### Important:

The threaded spindle **15** must **not** turn during this process! If necessary, hold with a SW8 open-end wrench!

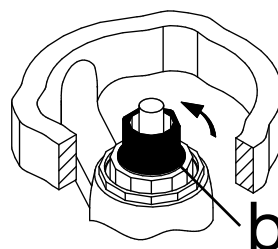
- Fix the stroke limiting sleeve **5** with locking screw **9** (SW2 Allen key).
- Push handwheel **7** into its original position on the double flats of the threaded spindle **15** and secure it with locking screw **8**.

### Diaphragm sizes 10 - 50



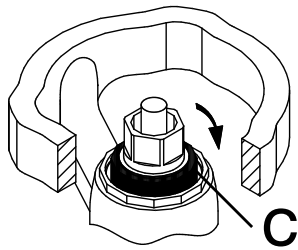
### Preparation for setting

- Remove protective cap **a**.
- Move the bonnet out of the end positions to enable the handwheel to be turned in both directions.



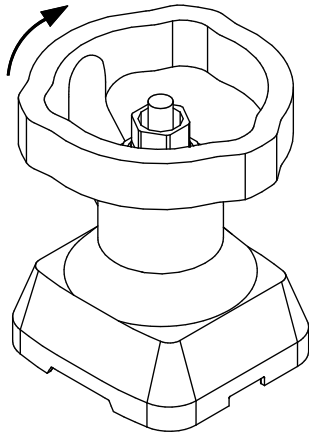
### Releasing the stroke limiter

- Turn stroke limiter **b** anticlockwise upwards until the male thread is visible.



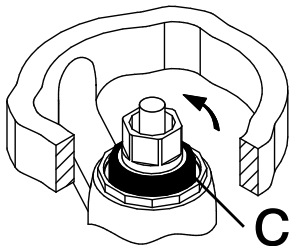
#### Releasing the seal adjuster

- Turn seal adjuster **c** clockwise downwards until it stops.

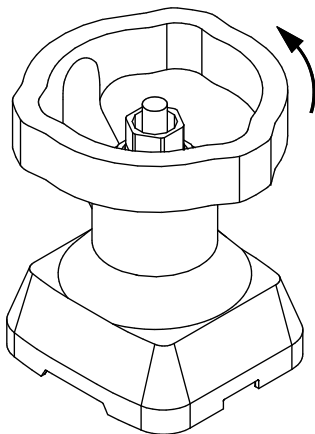


#### Setting the seal adjuster

- Move the bonnet to the desired CLOSED position by turning the handwheel.

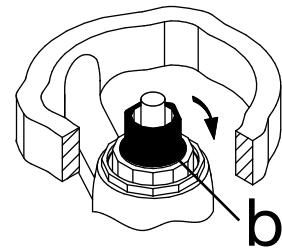


- Turn seal adjuster **c** anticlockwise upwards until it stops.



#### Setting the stroke limiter

- Move the bonnet to the desired OPEN position by turning the handwheel.

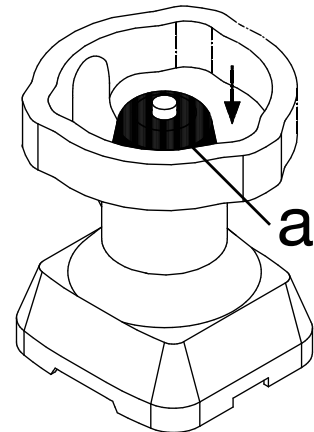


- Turn stroke limiter **b** clockwise downwards until it stops.



#### Important:

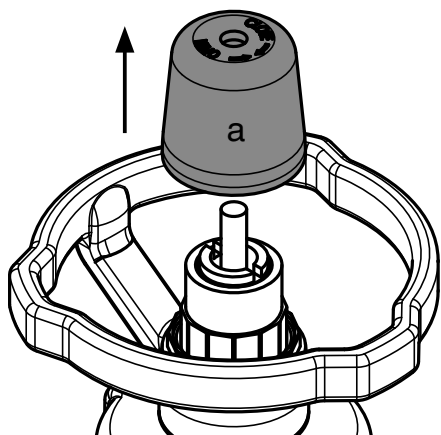
The seal adjuster must **not** turn during this process.



#### Completing the settings

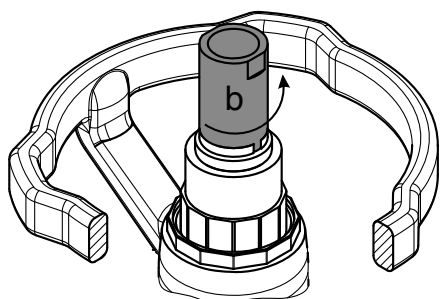
- Put protective cap **a** in place and align the flats by a light twisting movement.
- Press protective cap **a** down.

## Diaphragm sizes 80 - 100



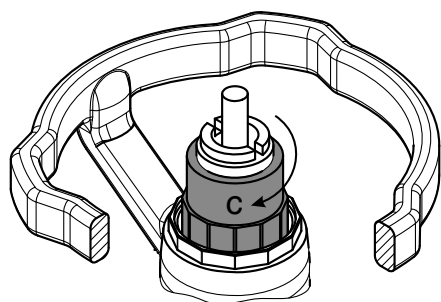
### Preparation for setting

- Remove protective cap **a**.
- Move the bonnet out of the end positions to enable the handwheel to be turned in both directions.



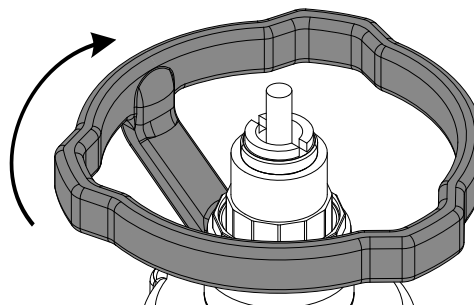
### Setting the stroke limiter

- Turn the stroke limiter anticlockwise upwards using the supplied setting tool **b** until the male thread is visible.



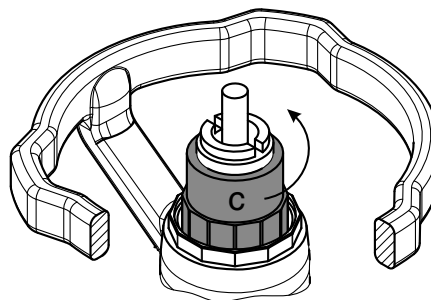
### Releasing the seal adjuster

- Turn seal adjuster **c** clockwise downwards until it stops.

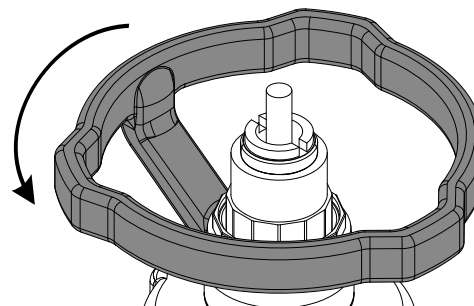


### Setting the seal adjuster

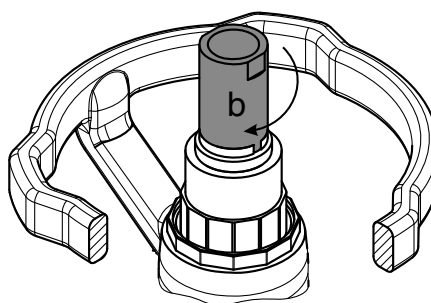
- Move the bonnet to the desired CLOSED position by turning the handwheel.



- Turn seal adjuster **c** anticlockwise upwards until it stops.



- Move the bonnet to the desired OPEN position by turning the handwheel.

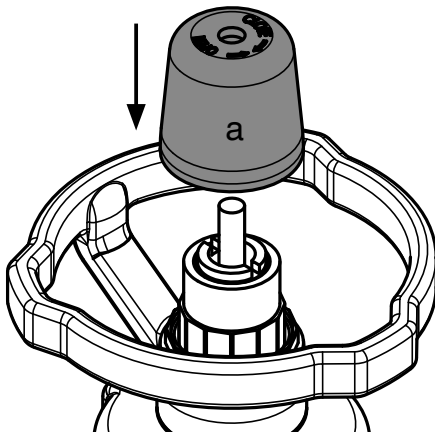


- Turn the stroke limiter clockwise downwards until it stops using the supplied setting tool **b**.



### Important:

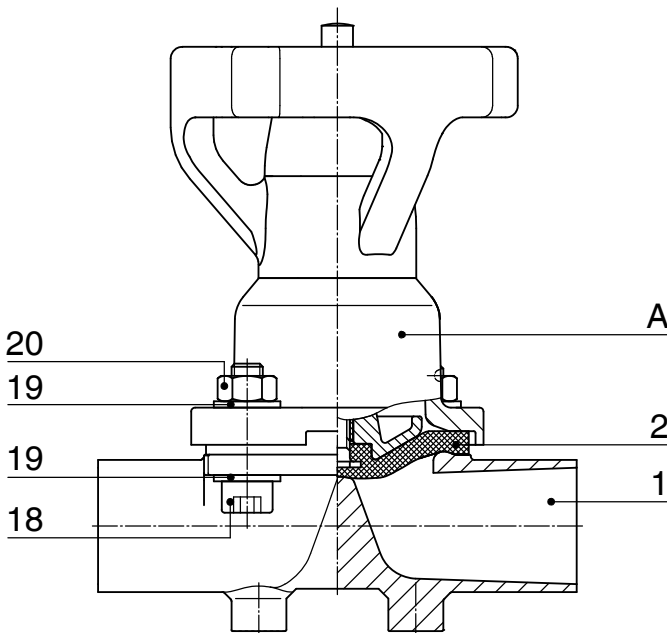
The seal adjuster must **not** turn during this process.



Completing the settings

- Put protective cap **a** in place and align the flats by a light twisting movement.
- Press protective cap **a** down.

## 12 Assembly / disassembly of spare parts



### 12.1 Valve disassembly (removing bonnet from body)

1. Move bonnet **A** to the open position.
2. Remove bonnet **A** from valve body **1**.
3. Move bonnet **A** to the closed position.



#### Important:

After disassembly, clean all parts of contamination (do not damage parts). Check parts for potential damage, replace if necessary (only use genuine parts from GEMÜ).

## 12.2 Removing the diaphragm



#### Important:

Before removing the diaphragm, please remove the bonnet, see "Valve disassembly (removing bonnet from body)".

1. Unscrew the diaphragm or pull it out (diaphragm size 8).
2. Clean all parts of the remains of product and contamination. Do not scratch or damage parts during cleaning!
3. Check all parts for potential damage.
4. Replace damaged parts (only use genuine parts from GEMÜ).

## 12.3 Mounting the diaphragm

### 12.3.1 General information



#### Important:

Mount the correct diaphragm that suits the valve (suitable for medium, medium concentration, temperature and pressure). The diaphragm is a wearing part. Check the technical condition and function of the diaphragm valve before commissioning and during the whole term of use. Carry out checks regularly and determine the check intervals in accordance with the conditions of use and / or the regulatory codes and provisions applicable for this application.

**Important:**

If the diaphragm is not screwed into the adapter far enough, the closing force is transmitted directly onto the diaphragm pin and not via the compressor. This will cause damage and early failure of the diaphragm and thus leakage of the valve. If the diaphragm is screwed in too far no perfect sealing at the valve seat will be achieved. The function of the valve is no longer ensured.

**Important:**

Incorrectly mounted diaphragm may cause valve leakage / emission of medium. In this case remove the diaphragm, check the complete valve and diaphragm and reassemble again proceeding as described above.

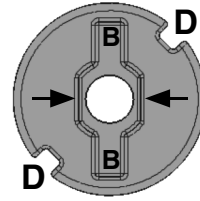
**Diaphragm size 8:**

The compressor is fixed to the spindle. Compressor and bonnet flange seen from below:

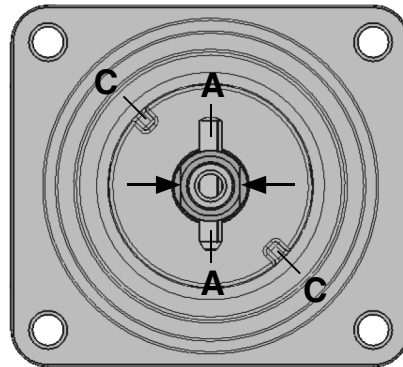
**Diaphragm size 10:**

The compressor is loose. Compressor and bonnet flange seen from below:

Pict. 1



Pict. 2

**Anti-twist system of the spindle at the compressor**

A double flat (arrows picture 1) is fitted at the end of the bonnet spindle to protect the spindle against twisting. When mounting the compressor, the double flat must be in correct alignment with the recess of the compressor back (arrows picture 2).

If the bonnet spindle is not in the correct position, it must be turned to the correct position. The position of **A** is offset by 45° to the position of **C**.

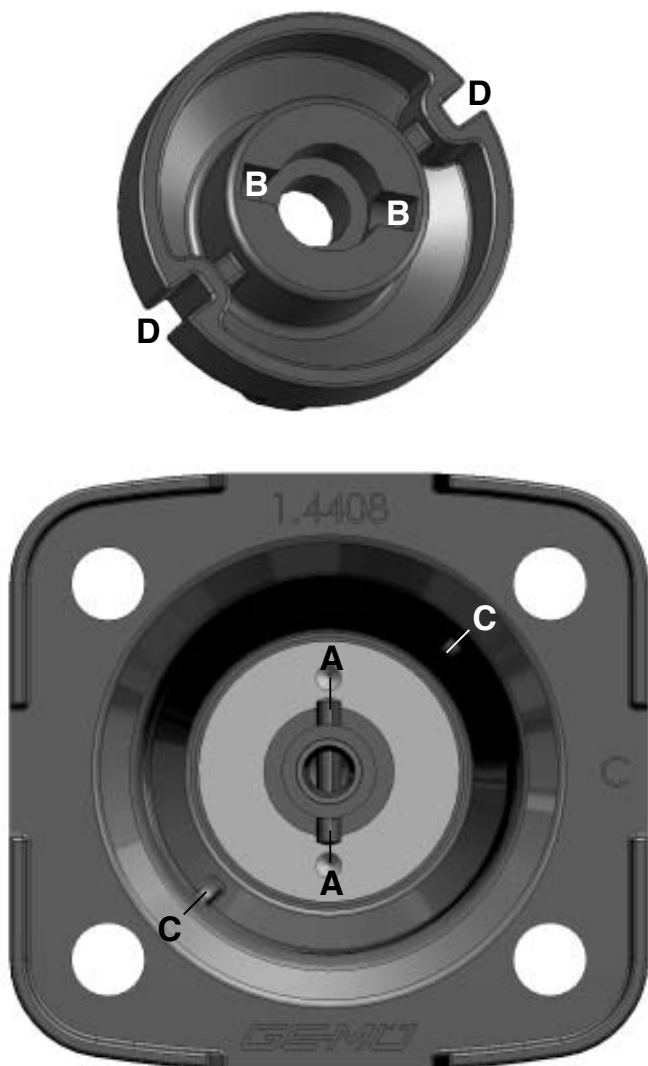
Place the compressor loosely on the bonnet spindle, fit the recesses **D** into the guides **C** and **A** into **B**. The compressor must be able to be moved freely between the guides!



### Diaphragm sizes 25 - 80:

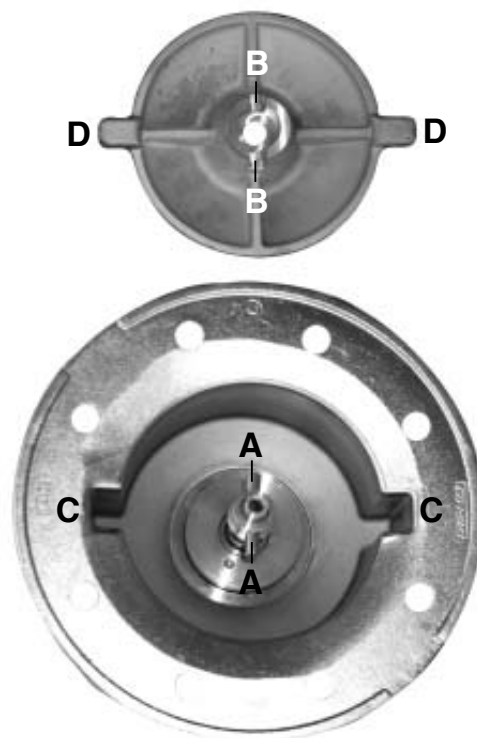
The compressor is loose.

Compressor and bonnet flange seen from below:



### Diaphragm size 100:

The diaphragm is round. Compressor and bonnet flange seen from below:



Place the compressor loosely on the bonnet spindle, fit **A** into **B** and **D** into **C**.

If the bonnet spindle is not in the correct position, it must be turned to the correct position. The position of **A** is offset by 45° to the position of **C**.

Place the compressor loosely on the bonnet spindle, fit the recesses **D** into the guides **C** and **A** into **B**. The compressor must be able to be moved freely between the guides!

## 12.3.2 Mounting a concave diaphragm

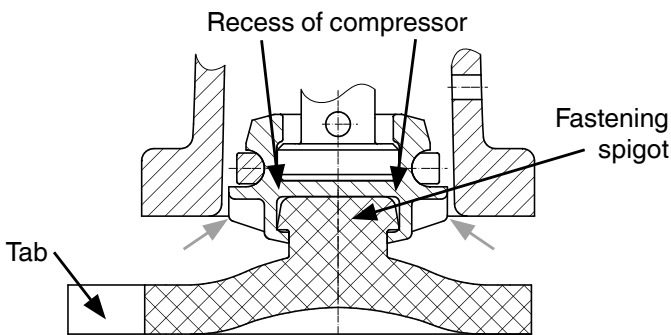
### Diaphragm size 8

#### Push-fit diaphragm:

#### CAUTION

Diaphragm may be damaged if the compressor is wound down too far!

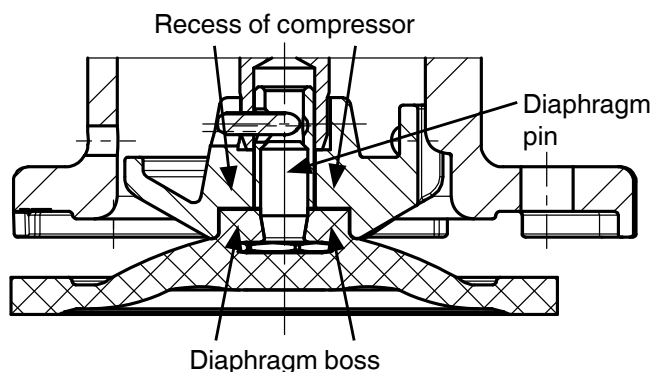
- Take care not to wind down the compressor beyond the max. area (see picture / grey arrows).



1. Move bonnet **A** to the closed position.
2. Place the diaphragm **2** with the fastening spigot in an inclined position at the recess of the compressor.
3. Turn the diaphragm as manual force is applied to push the spigot into the compressor.
4. Align diaphragm tab (identifying manufacturer and material) in parallel to compressor weir.

### Diaphragm sizes 10 - 100

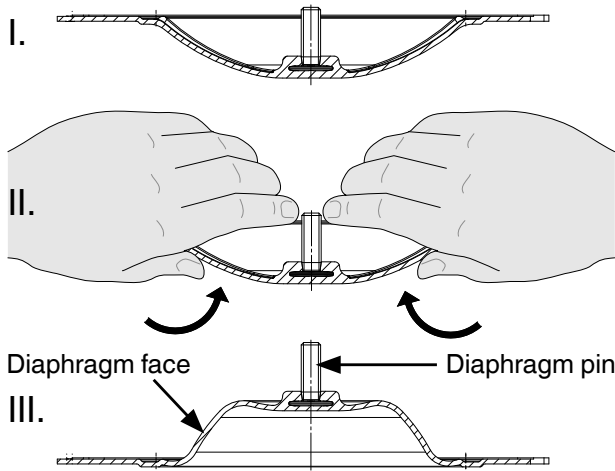
#### Threaded pin type diaphragm:



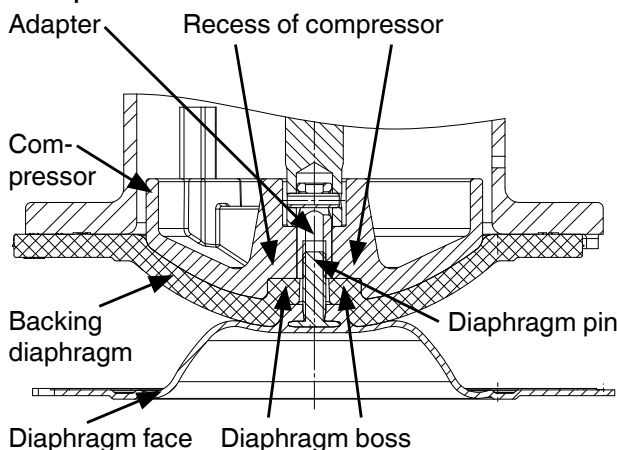
1. Move bonnet **A** to the closed position.
2. Place the compressor loosely on the bonnet spindle, fit **A** into **B** and **D** into **C** (see chapter 12.3.1 "General information").
3. Check if the compressor fits closely in the guides.
4. Screw new diaphragm tightly into the compressor manually.
5. Check if the diaphragm boss fits closely in the recess of the compressor.
6. If it is difficult to screw it in, check the thread, replace damaged parts (only use genuine parts from GEMÜ).
7. When clear resistance is felt turn back the diaphragm anticlockwise until its bolt holes are in correct alignment with the bolt holes of the bonnet.

### 12.3.3 Mounting a convex diaphragm

1. Move bonnet **A** to the closed position.
2. Place the compressor loosely on the bonnet spindle, fit **A** into **B** and **D** into **C** (see chapter 12.3.1 "General information").
3. Check if the compressor fits closely in the guides.
4. Invert the new diaphragm face manually; use a clean, padded mat with bigger nominal sizes.



5. Position the new backing diaphragm onto the compressor.
6. Position the diaphragm face onto the backing diaphragm.
7. Screw diaphragm face tightly into the compressor manually. The diaphragm boss must fit closely in the recess of the compressor.

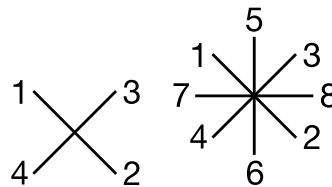


8. If it is difficult to screw it in, check the thread, replace damaged parts.
9. When clear resistance is felt turn back the diaphragm anticlockwise until its bolt holes are in correct alignment with the bolt holes of the bonnet.

10. Press the diaphragm face tightly onto the backing diaphragm manually so that it returns to its original shape and fits closely on the backing diaphragm.

### 12.4 Bonnet mounting on the valve body

1. Move bonnet **A** to the closed position.
2. Open bonnet **A** approx. 20 %.
3. Position bonnet **A** with the mounted diaphragm **2** on the valve body **1**, take care to align the compressor weir and valve body weir.
4. Tighten bolts **18**, washers **19** and nuts **20** by hand (hand tight only) (fastening elements may vary dependent on diaphragm size and / or valve body version).
5. Fully tighten the bolts **18** with nuts **20** diagonally.



6. Ensure that the diaphragm **2** is compressed evenly (approx. 10-15 %, visible by an even bulge to the outside).
7. Check tightness of completely assembled valve.



#### Important:

Service and maintenance:  
Diaphragms degrade in the course of time. After valve disassembly / assembly check that the bolts and nuts on the body are tight and retighten as necessary (at the very latest after the first sterilisation process).

## 13 Special versions

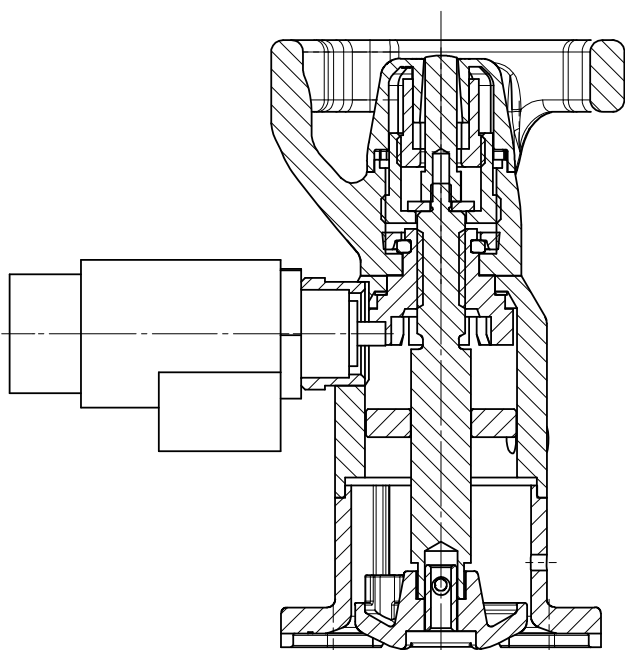
### 13.1 Special version with electrical locking device

Special version of GEMÜ 653 / 654: the locking device is actuated by a solenoid (see figure below).

With additional functions B, K, F (types of locking devices) the locking device is electrically locked or unlocked (solenoid, order data: MAG).

"Normally closed version (locking pin extended)" in 24 V DC (see type key).

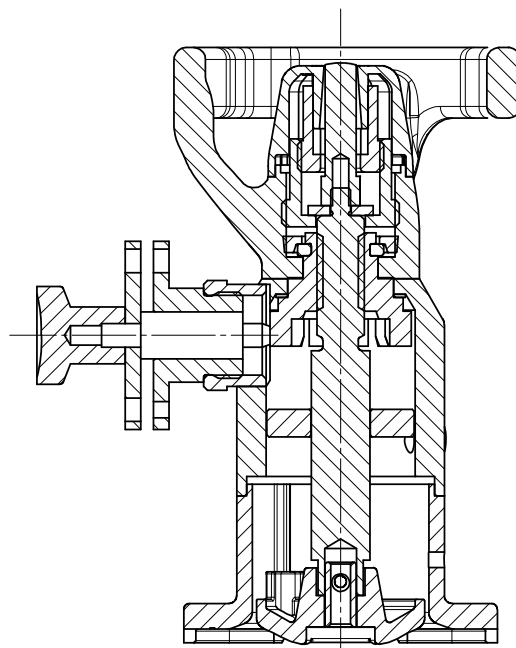
The locking device is also available with ATEX approval.



### 13.2 Special version with mechanical locking device

A special version of GEMÜ 653 / 654 is available with a mechanical locking device. With additional functions B, K, F (types of locking device) the locking device can be mechanically locked or unlocked (order data: LOC).

The device is supplied with a padlock (L) or without a padlock (B) (see type key).

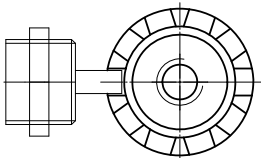
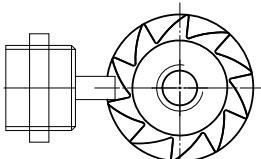
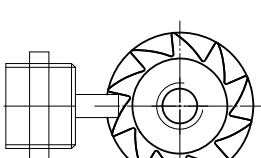


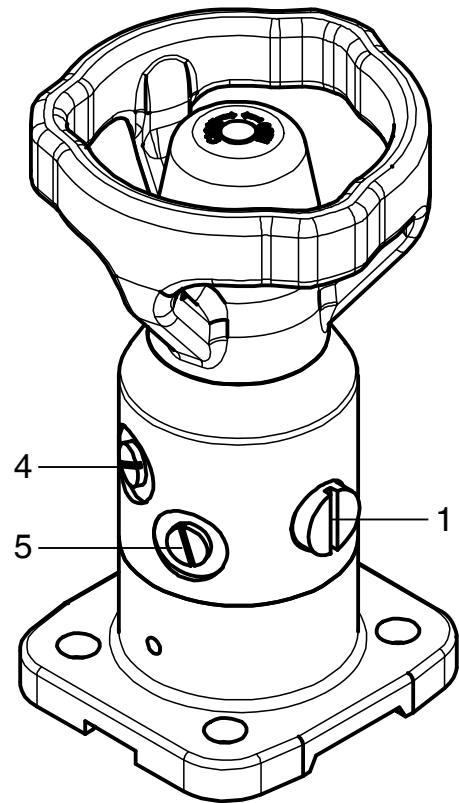
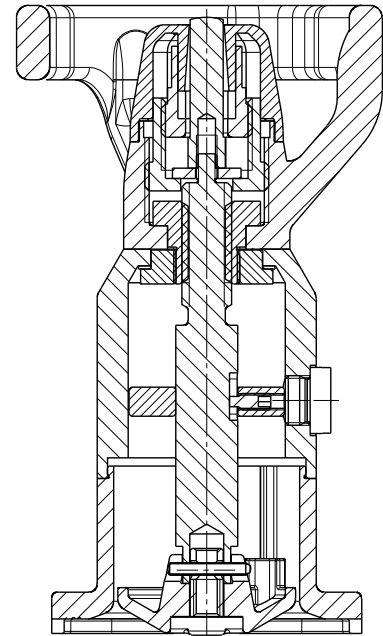


The solenoids, padlocks etc. for the "locking device" must be ordered separately as accessories.  
Available only in connection with the bonnet additional functions B, K, F!

### Additional function B, K, F

Types of locking devices:

	<p><b>B</b> Mounting of locking device (both directions), proximity switch possible</p>
	<p><b>K</b> Mounting of locking device to prevent opening, proximity switch possible</p>
	<p><b>F</b> Mounting of locking device to prevent closing, proximity switch possible</p>



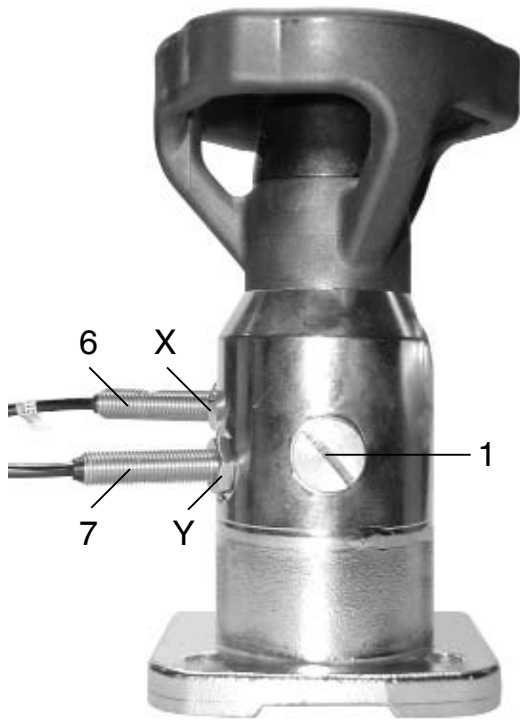
Delivery condition

### 13.3 Special version for mounting of proximity switches



Only use proximity switches that can be mounted flush.

A special version of GEMÜ 653 / 654 is available for mounting of proximity switches (additional function A, see type key). Proximity switches can also be mounted in combination with additional functions B, K, F (see type key).



Mounting of proximity switch

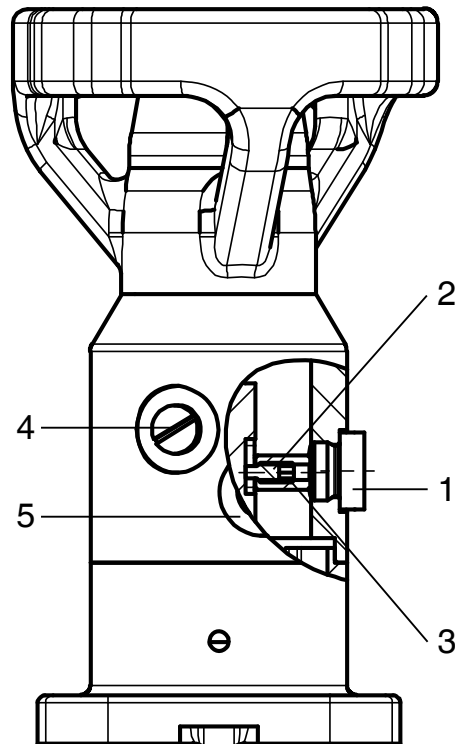
Proximity switches are set when the valve is completely assembled (with valve body).

### Setting the proximity switch for the OPEN position:

- Remove upper screw **4** (see delivery condition on page 21) from bonnet.
  - Move the bonnet to the open position.
  - At least 2/3 of the damping cam **3** must be visible.
- Otherwise please proceed as follows:
- Remove threaded plug **1**.
  - Loosen grub screw **2** by 1-1.5 turns. Do not unscrew grub screw **2** more than that to prevent it from falling inside the valve.
  - Correct the position of the damping cam **3**.
  - Secure the position of damping cam **3** by fixing it with grub screw **2**.
  - Screw in threaded plug **1**.
- Screw in proximity switch **6** until it touches damping cam **3**.
  - Turn back proximity switch **6** by 1/2 to 3/4 turns.
  - Secure this position by fixing it with nut **X**.

### Setting the proximity switch for the CLOSED position:

- Remove lower screw **5** (see delivery condition on previous page) from bonnet.
  - Move the bonnet to the closed position.
  - At least 2/3 of the damping cam **3** must be visible.
- Otherwise please proceed as follows:
- Remove threaded plug **1**.
  - Loosen grub screw **2** by 1-1.5 turns. Do not unscrew grub screw **2** more than that to prevent it from falling inside the valve.
  - Correct the position of the damping cam **3**.
  - Secure the position of damping cam **3** by fixing it with grub screw **2**.
  - Screw in threaded plug **1**.
- Screw in proximity switch **7** until it touches damping cam **3**.
  - Turn back proximity switch **7** by 1/2 to 3/4 turns.
  - Secure this position by fixing it with nut **Y**.



Setting the damping cam

## 14 Commissioning

### ⚠ WARNING



#### Corrosive chemicals!

- Risk of caustic burns!
- Check the tightness of the media connections prior to commissioning!
- Use only the appropriate protective gear when performing the tightness check.

### ⚠ CAUTION

#### Protect against leakage!

- Provide precautionary measures against exceeding the maximum permitted pressures caused by pressure surges (water hammer).

#### Prior to cleaning or commissioning the plant:

- Check the tightness and the function of the diaphragm valve (close and reopen the diaphragm valve).
- If the plant is new and after repairs rinse the piping system with a fully opened diaphragm valve (to remove any harmful foreign matter).

#### Cleaning:

- x The plant operator is responsible for selecting the cleaning material and performing the procedure.



#### Important:

Service and maintenance: Diaphragms degrade in the course of time. After valve disassembly / assembly check that the bolts and nuts on the body are tight and retighten as necessary (at the very latest after the first sterilisation process).

## 15 Inspection and servicing

### ⚠ WARNING

#### The equipment is subject to pressure!

- Risk of severe injury or death!
- Only work on depressurized plant.

### ⚠ CAUTION



#### Hot plant components!

- Risk of burns!
- Only work on plant that has cooled down.

### ⚠ CAUTION

- Servicing and maintenance work may only be performed by trained personnel.
- GEMÜ shall assume no liability whatsoever for damages caused by improper handling or third-party actions.
- In case of doubt, contact GEMÜ before commissioning.

1. Use appropriate protective gear as specified in plant operator's guidelines.
2. Shut off plant or plant component.
3. Secure against recommissioning.
4. Depressurize the plant or plant component.

The operator must carry out regular visual examination of the valves dependent on the operating conditions and the potential danger in order to prevent leakage and damage. The valve also has to be disassembled in the corresponding intervals and checked for wear (see chapter 12 "Assembly / disassembly of spare parts").



#### Important:

Service and maintenance: Dependent on the operating conditions, regrease the threaded spindle. GEMÜ recommends the grease "TUNGREASE DAB" from TUNAP.

## 16 Disassembly

Disassembly is performed observing the same precautionary measures as for installation.

- Disassemble the diaphragm valve (see chapter 12.1 "Valve disassembly (removing bonnet from body)").

## 17 Disposal



- All valve parts must be disposed of according to relevant local or national disposal regulations / environmental protection laws.
- Pay attention to adhered residual material and gas diffusion from penetrated media.

## 19 Information



### Note on Directive 94/9/EC (ATEX Directive):

A supplement to Directive 94/9/EC is included with the product if it was ordered according to ATEX.



### Note on staff training:

Please contact us at the address on the last page for staff training information.

Should there be any doubts or misunderstandings in the preceding text, the German version of this document is the authoritative document!

## 18 Returns

- Clean the valve.
- Request a goods return declaration form from GEMÜ.
- Returns must be made with a completed declaration of return.

If not completed, GEMÜ cannot process  
x credits or  
x repair work  
but will dispose of the goods at the operator's expense.



### Note for returns:

Legal regulations for the protection of the environment and personnel require that the completed and signed goods return declaration is included with the dispatch documents. Returned goods can be processed only when this declaration is completed.

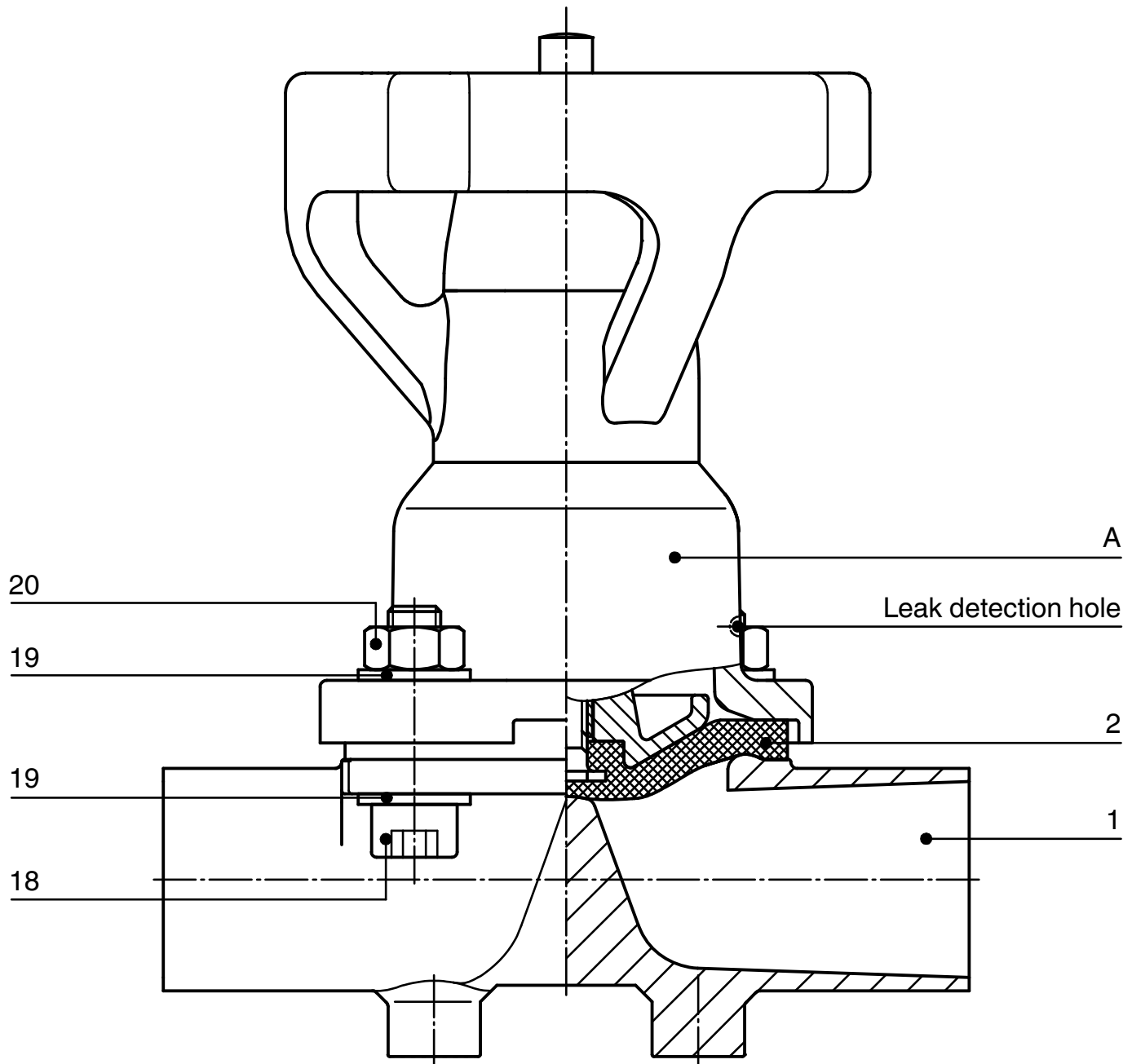


## 20 Troubleshooting / Fault clearance

Fault	Possible cause	Fault clearance
Working medium escapes from leak detection hole*	Shut off diaphragm faulty	Check shut off diaphragm for damage, replace diaphragm if necessary
Valve doesn't open or doesn't open fully	Bonnet faulty	Replace bonnet
	Shut off diaphragm incorrectly mounted	Remove bonnet, check diaphragm mounting, replace if necessary
	Stroke limiter is incorrectly set	Reset stroke limiter
	With special version "K (MAG / LOC)" locking device closed	Unlock locking device
Valve leaks downstream (doesn't close or doesn't close fully)	Operating pressure too high	Operate valve with operating pressure specified in data sheet
	Foreign matter between shut off diaphragm and valve body weir	Remove bonnet, remove foreign matter, check diaphragm and valve body weir for damage and replace if necessary
	Valve body weir leaking or damaged	Check valve body weir for damage, if necessary replace valve body
	Shut off diaphragm faulty	Check shut off diaphragm for damage, replace diaphragm if necessary
	Seal adjuster is incorrectly set	Reset seal adjuster (see chapter 11.3)
	With special version "F (MAG / LOC)" locking device closed	Unlock locking device
Valve leaks between bonnet and valve body	Shut off diaphragm incorrectly mounted	Remove bonnet, check diaphragm mounting, replace if necessary
	Bolting between valve body and bonnet loose	Retighten bolting between valve body and bonnet
	Shut off diaphragm faulty	Check shut off diaphragm for damage, replace diaphragm if necessary
	Bonnet / valve body damaged	Replace bonnet / valve body
Valve body connection to piping leaks	Incorrect installation	Check installation of valve body in piping
	Bolting / threaded connections loose	Tighten bolting / threaded connections
	Sealing material faulty	Replace sealing material
Valve body leaks	Valve body faulty or corroded	Check valve body for damage, replace valve body if necessary
Handwheel cannot be turned	Bonnet faulty	Replace bonnet
	With special version "B (MAG / LOC)" locking device closed	Unlock locking device
	Threaded spindle seized	Dependent on the operating conditions, regrease the threaded spindle; replace bonnet if necessary. See chapter 15.
Proximity switch continuously responds	Wrong proximity switch used	Only use proximity switch that can be mounted flush

\* see chapter 21 "Sectional drawing and spare parts"

## 21 Sectional drawing and spare parts



Item	Name	Order description
1	Valve body	K600...
2	Diaphragm	600...M
18	Bolt	} 653...S30... 654...S30...
19	Washer	
20	Nut	
A	Bonnet	9653... 9654...

# Declaration of Conformity

## According to annex VII of the Directive 97/23/EC

Hereby we, **GEMÜ Gebr. Müller GmbH & Co. KG**  
**Fritz-Müller-Straße 6-8**  
**D-74653 Ingelfingen**

declare that the equipment listed below complies with the safety requirements of the Pressure Equipment Directive 97/23/EC.

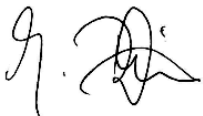
### Description of the equipment - product type

**Diaphragm Valve**  
GEMÜ 653, GEMÜ 654

Notified body: TÜV Rheinland  
Berlin Brandenburg  
Number: 0035  
Certificate no.: 01 202 926/Q-02 0036

Conformity assessment procedure:  
**Module H**

Valves DN  $\leq$  25 comply with section 3 paragraph 3 of the Pressure Equipment Directive 97/23/EC. They are not identified with a CE label as per Pressure Equipment Directive 97/23/EC and no conformity is declared.



Joachim Brien  
Head of Technical Department

Ingelfingen-Criesbach, February 2013



**GEMÜ**® VALVES, MEASUREMENT  
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