

# GEMÜ R90

Metal disco check valve

EN

## Operating instructions



further information  
webcode: GW-R90



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## 1 General information

### 1.1 Information

- The descriptions and instructions apply to the standard versions. For special versions not described in this document the basic information contained herein applies in combination with any additional special documentation.
- Correct installation, operation, maintenance and repair work ensure faultless operation of the product.
- Should there be any doubts or misunderstandings, the German version is the authoritative document.
- Contact us at the address on the last page for staff training information.

### 1.2 Symbols used

The following symbols are used in this document:

Symbol	Meaning
●	Tasks to be performed
▶	Response(s) to tasks
-	Lists

### 1.3 Definition of terms

#### Working medium

The medium that flows through the GEMÜ product.

### 1.4 Warning notes


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


SIGNAL WORD	
Possible symbol for the specific danger	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	
	<b>Imminent danger!</b> ▶ Non-observance can cause death or severe injury.
⚠ WARNING	
	<b>Potentially dangerous situation!</b> ▶ Non-observance can cause death or severe injury.

⚠ CAUTION	
	<b>Potentially dangerous situation!</b> ▶ Non-observance can cause moderate to light injury.

NOTICE	
	<b>Potentially dangerous situation!</b> ▶ Non-observance can cause damage to property.

The following symbols for the specific dangers can be used within a warning note:

Symbol	Meaning
	Danger of explosion
	Danger - bodily injury!
	Corrosive chemicals!
	Hot plant components!
	Replacement of spare parts

## 2 Safety information

The safety information in this document refers only to an individual product. Potentially dangerous conditions can arise in combination with other plant components, which need to be considered on the basis of a risk analysis. The operator is responsible for the production of the risk analysis and for compliance with the resulting precautionary measures and regional safety regulations.

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

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

The safety information does not take into account:

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

### Prior to commissioning:

1. Transport and store the product correctly.
2. Do not paint the bolts and plastic parts of the product.
3. Carry out installation and commissioning using trained personnel.
4. Provide adequate training for installation and operating personnel.
5. Ensure that the contents of the document have been fully understood by the responsible personnel.
6. Define the areas of responsibility.
7. Observe the safety data sheets.
8. Observe the safety regulations for the media used.

### During operation:

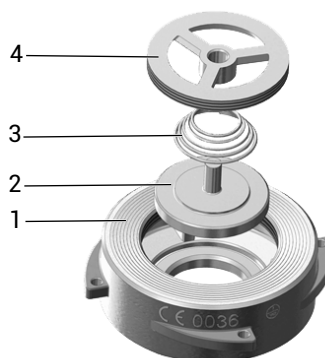
9. Keep this document available at the place of use.
10. Observe the safety information.
11. Operate the product in accordance with this document.
12. Operate the product in accordance with the specifications.
13. Maintain the product correctly.
14. Do not carry out any maintenance work and repairs not described in this document without consulting the manufacturer first.

### In cases of uncertainty:

15. Consult the nearest GEMÜ sales office.

## 3 Product description

### 3.1 Construction



Item	Name	Materials
1	Body	1.4408, CC333G, 1.0619, 1.4469 (super duplex)
2	Disc	1.4408, CC333G, 1.0619, 1.4469 (super duplex)
3	Spring	1.4571, C4 (Hastelloy)
4	Spring cross	1.4408, CC333G, 1.0619, 1.4469 (super duplex)

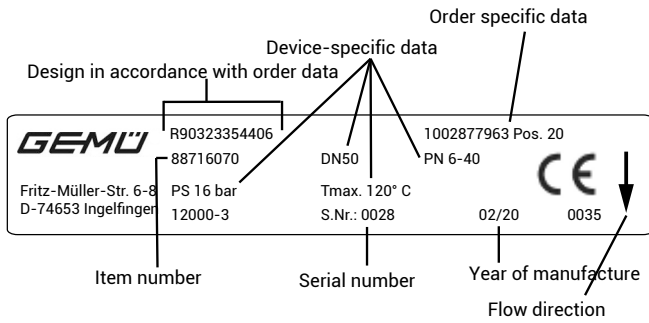
### 3.2 Description

The GEMÜ R90 is a metal disc check valve with flange connection and standardized length to DIN EN 558. The valve body, disc and seal are available in various materials. In the version with metallic seal, the GEMÜ R90 valve can be used at high temperatures up to 400 °C.

### 3.3 Function

The flow of fluid causes disc 2 in the check valve to open. Check valves need a low opening pressure. The resulting opening force moves the disc 2 against the spring 3 by overcoming the the weight force of the disc 2 and the spring force of the spring 3 so that the medium is released.

### 3.4 Product label



### 4 Correct use

**⚠ DANGER**

**Danger of explosion**

- ▶ Risk of death or severe injury.
- Do **not** use the product in potentially explosive zones.

**⚠ WARNING**

**Improper use of the product**

- ▶ Risk of severe injury or death.
- ▶ Manufacturer liability and guarantee will be void.
- Only use the product in accordance with the operating conditions specified in the contract documentation and in this document.

The product is designed for installation in piping systems and for controlling a working medium.

The product is not intended for use in potentially explosive areas.

## 5 Order data

The order data provide an overview of standard configurations.

Please check the availability before ordering. Other configurations available on request.

### Order codes

1 Type	Code
Disco check valve, metal	R90

2 DN	Code
DN 15	15
DN 20	20
DN 25	25
DN 32	32
DN 40	40
DN 50	50
DN 65	65
DN 80	80
DN 100	100
DN 125	125
DN 150	150
DN 200	200
DN 250	250
DN 300	300

3 Operating pressure	Code
16 bar	3
25 bar	5
40 bar	6

4 Connection type	Code
PN 6 / flange EN 1092, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)	1
PN 10 / flange EN 1092, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)	2
PN 16 / flange EN 1092, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)	3
PN 25 / flange EN 1092, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)	5
PN 40 / flange EN 1092, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)	6
ANSI B16.5, Class 150, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)	D
ANSI B16.5, Class 300, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)	M

5 Body material	Code
1.4408 / ASTM A351 / CF8M	4
1.0619 / ASTM A216 / WCB	5
1.4469, SUPERDUPLEX / ASTM A890 Grade 5A	D
CC333G / 2.0975 / C954	G

6 Shut-off element material	Code
1.4408 / ASTM A351 / CF8M	4
1.4469, SUPERDUPLEX / ASTM A890 Grade 5A	D
CC333G / 2.0975 / C954	G

7 Guide element material	Code
1.4408 / ASTM A351 / CF8M	4
1.4469, SUPERDUPLEX / ASTM A890 Grade 5A	D
CC333G / 2.0975 / C954	G

8 Shut-off seal material	Code
Steel	0
EPDM (DVGW water approval, FDA compliant)	2
PTFE	5
EPDM	E
NBR	N
FPM (FKM)	V

9 Spring material	Code
1.4571	6
HASTELLOY C-4 / 2.4610	7

10 Special version	Code
Without	
ATEX version	X

11 Type of design	Code
Without	
Media wetted area cleaned to ensure suitability for paint applications, parts sealed in plastic bag	0101
Valve free of oil and grease, media wetted area cleaned and packed in PE bag	0107

**Order example**

Order option	Code	Description
1 Type	R90	Disco check valve, metal
2 DN	32	DN 32
3 Operating pressure	3	16 bar
4 Connection type	3	PN 16 / flange EN 1092, face-to-face dimension FTF EN 558-1 series 49 (R90), series 16 (R91)
5 Body material	5	1.0619 / ASTM A216 / WCB
6 Shut-off element material	4	1.4408 / ASTM A351 / CF8M
7 Guide element material	4	1.4408 / ASTM A351 / CF8M
8 Shut-off seal material	0	Steel
9 Spring material	6	1.4571
10 Special version		Without
11 Type of design		Without



## 6 Technical data

### 6.1 Medium

**Working medium:** Corrosive, inert, gaseous and liquid media which have no negative impact on the physical and chemical properties of the body, disc and seal material.

### 6.2 Temperature

**Media temperature:**

**Seal material:**

Steel (code 0): -196 to 400 °C (design 1)

NBR (code N): -30 to 90 °C

EPDM (code 2, E): -45 to 120 °C

FPM (code V): -15 to 200 °C

PTFE (code 5): -200 to 250 °C

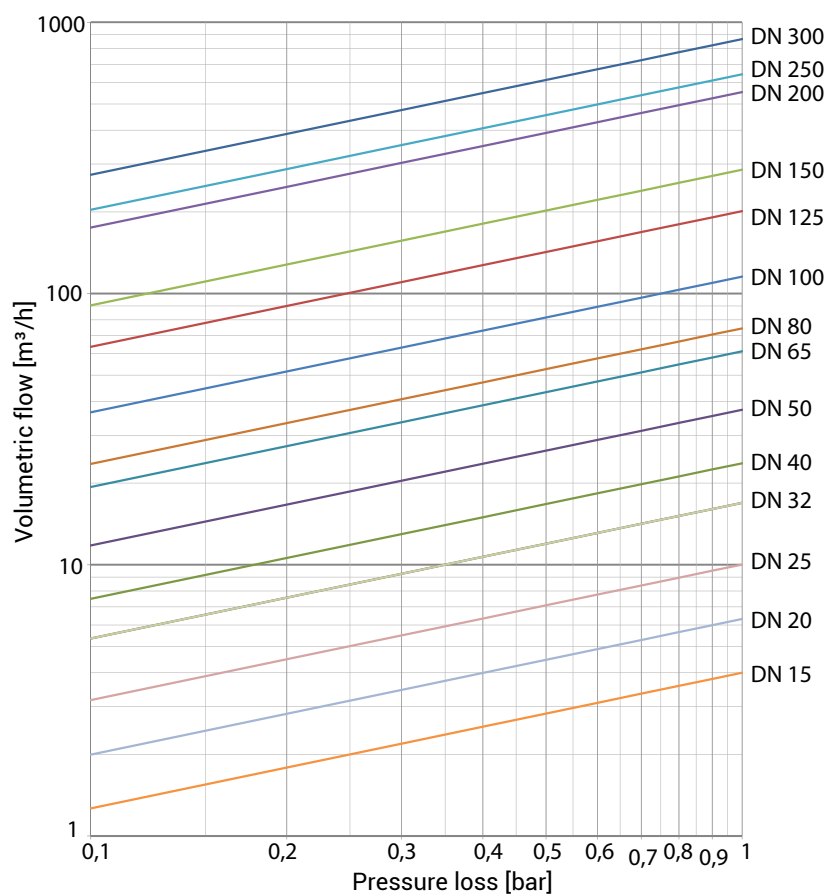
For temperatures above 300 °C a compression spring made of Hastelloy C4 (code 7) is required.

**Ambient temperature:** -20 to 95 °C





### 6.3 Pressure

**Operating pressure:** max. 40 bar

**Pressure loss:**



**Disc opening pressure:**

DN	Piping			
				without spring
				
15	~ 20	~ 16	~ 24	~ 4
20	~ 20	~ 15	~ 25	~ 5
25	~ 20	~ 15	~ 25	~ 5
32	~ 20	~ 14	~ 26	~ 6
40	~ 20	~ 13	~ 27	~ 7
50	~ 20	~ 12	~ 28	~ 8
65	~ 20	~ 11	~ 29	~ 9
80	~ 20	~ 10	~ 30	~ 10
100	~ 20	~ 7	~ 33	~ 13
125	~ 30	~ 46	~ 14	~ 16
150	~ 30	~ 47	~ 13	~ 17
200	~ 30	~ 51	~ 9	~ 21
250	~ 40	~ 64	~ 16	~ 24
300	~ 40	~ 68	~ 12	~ 38

Pressures in mbar

**Leakage rate:**

A acc. to EN 12266-1 (with plastic seal)

G acc. to EN 12266-1 (metallic sealing)

**Pressure/temperature correlation:**

DN	Material 1.4408 (code 4)					
	Temperature [°C]					
	20	100	150	200	250	300
15	40	40	40	40	40	40
20	40	40	40	40	40	40
25	40	40	40	40	40	40
32	40	40	40	40	40	40
40	40	40	40	40	40	40
50	40	40	40	40	40	40
65	40	40	40	40	40	40
80	40	40	40	40	40	40
100	40	40	40	40	40	40
125	40	36	32.7	29.7	27.5	25.6
150	40	33.1	30.2	27.3	25.3	23.2
200	40	29	26.5	23.9	22.2	20.7
250	40	28.9	26.1	23.8	21.8	20.5
300	40	28.1	25.7	23.1	21.5	20

Pressures in bar

**Pressure/temperature correlation:**

DN	Material 1.0619 (code 5)					
	Temperature [°C]					
	20	100	150	200	250	300
15	40	40	40	40	40	40
20	40	40	40	40	40	40
25	40	40	40	40	40	40
32	40	40	40	40	40	40
40	40	40	40	40	40	40
50	40	40	40	40	40	40
65	40	40	40	40	40	40
80	40	40	40	40	40	40
100	40	40	40	40	40	40
125	40	36	32.7	29.7	27.5	25.6
150	40	33.1	30.2	27.3	25.3	23.2
200	40	29	26.5	23.9	22.2	20.7
250	40	28.9	26.1	23.8	21.8	20.5
300	40	28.8	26.5	23.8	22.1	20.6

Pressures in bar

**Kv values:**

DN	Kv values
15	4
20	7
25	10
32	17
40	24
50	37
65	61
80	74
100	115
125	201
150	286
200	553
250	643
300	867

Kv values in m<sup>3</sup>/h

If disc springs are used, the Kv value is reduced.

**6.4 Product compliance**

**Pressure Equipment Directive:** 2014/68/EU

**Food:** FDA\*  
BfR XXI cat. 4\*

**Drinking water:** KTW\*  
DVGW\*  
\* only with seal material EPDM

**Explosion protection:** ATEX (2014/34/EU)

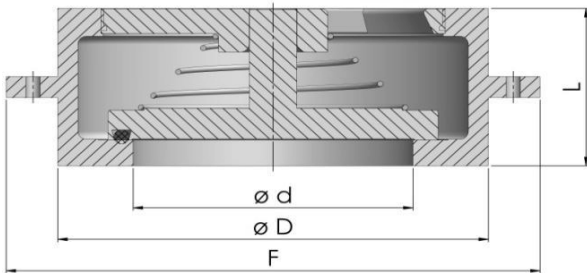
**6.5 Mechanical data****Weight:**

DN	Version				
	1	2	3	4	5
<b>20</b>	0.19	0.19	0.2	0.2	0.19
<b>25</b>	0.31	0.31	0.32	0.32	0.31
<b>32</b>	0.5	0.5	0.52	0.51	0.5
<b>40</b>	0.6	0.61	0.62	0.62	0.61
<b>50</b>	1.02	1.03	1.06	1.05	1.03
<b>65</b>	1.64	1.66	1.71	1.69	1.66
<b>80</b>	2.45	2.48	2.54	2.52	2.48
<b>100</b>	3.83	3.89	3.98	3.95	3.88
<b>125</b>	-	-	8.44	8.37	8.23
<b>150</b>	-	-	12.37	12.26	12.06
<b>200</b>	-	-	23.94	23.74	23.35
<b>250</b>	-	-	39.21	38.88	38.23
<b>300</b>	-	-	58.26	57.81	56.81

Weights in kg

## 7 Dimensions

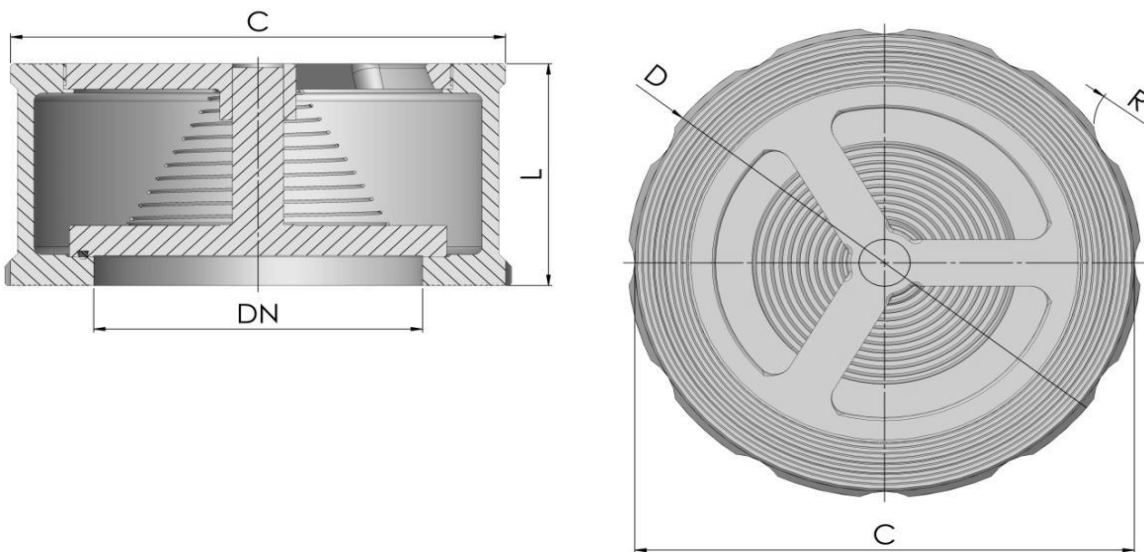
### DN 15 to 100



DN	$\varnothing d$	$\varnothing D$	F	L
15	15	43	56	16
20	19	53	69	19
25	25	63	76	22
32	32	75	87	28
40	38	80	101	31.5
50	47	95	114	40
65	63	115	136	46
80	77	131	154	50
100	97,5	150	178	60

Dimensions in mm

### DN 125 to 300



DN	Connection type							L	DN
	PN 10 (code 2), PN 16 (code 3)			PN 25 (code 5)		PN 40 (code 6)	ANSI (code D)		
	C	D	R	C	R	D	D		
125	194	194	-	194	-	194	194	90	118.5
150	220	220	-	220	-	220	220	106	141
200	275	280	11	286	30	294	280	140	190
250	331	340	11	344	33	356	340	145	229

## 7 Dimensions

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DN	Connection type								
	PN 10 (code 2), PN 16 (code 3)			PN 25 (code 5)		PN 40 (code 6)	ANSI (code D)	L	DN
	C	D	R	C	R	D	D		
<b>300</b>	380	386	11	404	33	421	404	160	280

Dimensions in mm

## 8 Manufacturer's information

### 8.1 Delivery

- Check that all parts are present and check for any damage immediately upon receipt.

The product's performance is tested at the factory. The scope of delivery is apparent from the dispatch documents and the design from the order number.

### 8.2 Packaging

The product is packaged in a cardboard box which can be recycled as paper.

### 8.3 Transport



1. Only transport the product by suitable means. Do not drop. Handle carefully.
2. After the installation dispose of transport packaging material according to relevant local or national disposal regulations / environmental protection laws.


### 8.4 Storage



1. Store the product free from dust and moisture in its original packaging.
2. Avoid UV rays and direct sunlight.
3. Do not exceed the maximum storage temperature (see chapter "Technical data").
4. Do not store solvents, chemicals, acids, fuels or similar fluids in the same room as GEMÜ products and their spare parts.



## 9 Installation in piping


### 9.1 Preparing for installation


 <b>DANGER</b>	
	<p><b>Danger - bodily injury!</b></p> <ul style="list-style-type: none"> <li>▶ Risk of severe injury.</li> <li>● Depressurize the plant before performing any work on the product.</li> <li>● Observe correct handling procedures.</li> </ul>

 <b>WARNING</b>	
<b>The equipment is subject to pressure!</b>	
<ul style="list-style-type: none"> <li>▶ Risk of severe injury or death.</li> <li>● Depressurize the plant.</li> <li>● Completely drain the plant.</li> </ul>	

 <b>WARNING</b>	
	<p><b>Corrosive chemicals!</b></p> <ul style="list-style-type: none"> <li>▶ Risk of caustic burns.</li> <li>● Wear suitable protective gear.</li> <li>● Completely drain the plant.</li> </ul>

 <b>CAUTION</b>	
	<p><b>Hot plant components!</b></p> <ul style="list-style-type: none"> <li>▶ Risk of burns.</li> <li>● Only work on plant that has cooled down.</li> </ul>

 <b>CAUTION</b>	
<b>Exceeding the maximum permissible pressure.</b>	
<ul style="list-style-type: none"> <li>▶ Damage to the product.</li> <li>● Provide precautionary measures against exceeding the maximum permitted pressures caused by pressure surges (water hammer).</li> </ul>	

 <b>CAUTION</b>	
<b>Use as step.</b>	
<ul style="list-style-type: none"> <li>▶ Damage to the product.</li> <li>▶ Risk of slipping-off.</li> <li>● Choose the installation location so that the product cannot be used as a foothold.</li> <li>● Do not use the product as a step or a foothold.</li> </ul>	

<b>NOTICE</b>	
<b>Suitability of the product!</b>	
<ul style="list-style-type: none"> <li>▶ The product must be appropriate for the piping system operating conditions (medium, medium concentration, temperature and pressure) and the prevailing ambient conditions.</li> </ul>	

**NOTICE**

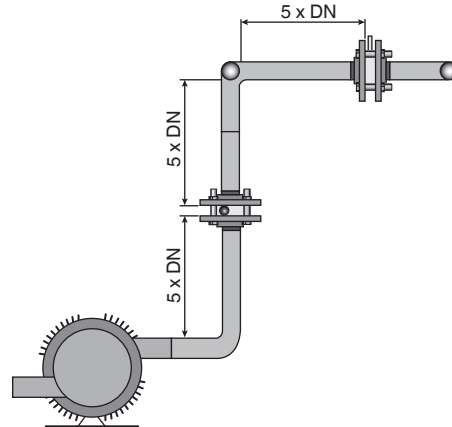
**Tools**

- ▶ The tools required for installation and assembly are not included in the scope of delivery.
- Use appropriate, functional and safe tools.

1. Ensure the product is suitable for the relevant application.
2. Check the technical data of the product and the materials.
3. Keep appropriate tools ready.
4. Wear appropriate protective gear, as specified in the plant operator's guidelines.
5. Observe appropriate regulations for connections.
6. Have installation work carried out by trained personnel.
7. Shut off plant or plant component.
8. Secure plant or plant component against recommissioning.
9. Depressurize the plant or plant component.
10. Completely drain the plant (or plant component) and let it cool down until the temperature is below the media vaporization temperature and cannot cause scalding.
11. Correctly decontaminate, rinse and ventilate the plant or plant component.
12. Lay piping so that the product is protected against transverse and bending forces, and also from vibrations and tension.
13. Only install the product between matching aligned pipes (see chapters below).
14. Pay attention to the installation position: horizontal or vertical.
15. Pay attention to the direction of the working medium: positioned in-line with flow direction

**9.2 Installation**

1. Carry out preparations for installation (see chapter "Preparing for installation").
2. Inspect check valve and suitable gaskets for possible damage before installation. Check the check valve for freedom of movement. Damaged parts must not be installed.
3. Make sure that you only install check valves whose pressure class, chemical resistance, connection and dimensions are appropriate for the conditions of use.
4. Provide a straight pipe section of at least 5 times the nominal diameter upstream and downstream of the check valve.



5. Use flanges to EN1092-1 or EN1092-2 for metal piping.
6. Do not mount directly on a pump flange.
7. Avoid pulsating flow conditions and water hammer.
8. If the medium flows horizontally through the check valve, the eye bolt must point upwards.
9. Guide the check valve between the flanges with the eye bolt. Centring is performed with the outside diameter of the body against the inside of the flange bolts.
10. Observe the flow direction of the check valve.
11. Tighten flange bolts to the appropriate torque in a diagonal pattern.

Flange bolt torques					
Thread	M12	M16	M 20	M24	M27
Torque [Nm]	20	35	60	100	165



## 10 Commissioning

### **WARNING**



#### **Corrosive chemicals!**

- ▶ Risk of caustic burns.
- Wear suitable protective gear.
- Completely drain the plant.

### **CAUTION**

#### **Leakage**

- ▶ Emission of dangerous materials.
  - Provide precautionary measures against exceeding the maximum permitted pressures caused by pressure surges (water hammer).
1. Check the tightness and the function of the product (close and reopen the product).
  2. Flush the piping system of new plant and following repair work (the product must be fully open).
    - ⇒ Harmful foreign matter has been removed.
    - ⇒ The product is ready for use.
  3. Commission the product.

**11 Troubleshooting**

Error	Possible cause	Troubleshooting
The product doesn't open or doesn't open fully	Foreign matter in the product	Remove and clean the product
	Faulty product	Replace product
The product doesn't close or doesn't close fully	Seal or disc faulty	Send the product to GEMÜ for repair
Connection between product and piping is leaking	Incorrect installation	Check installation of product in piping
	Gasket between flange and valve body faulty	Send the product to GEMÜ for repair
	Screws not tightened	Tighten screws
The product is leaking	The product is faulty	Check the product for potential damage, replace if necessary
	O-ring of disc is faulty	Send the product to GEMÜ for repair

## 12 Inspection and maintenance

### WARNING

#### The equipment is subject to pressure!

- ▶ Risk of severe injury or death.
- Depressurize the plant.
- Completely drain the plant.

### CAUTION



#### Hot plant components!

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

### CAUTION

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

The operator must carry out regular visual examination of the GEMÜ products depending on the operating conditions and the potential danger in order to prevent leakage and damage.

The product also must be disassembled and checked for wear in the corresponding intervals.

1. Have servicing and maintenance work performed by trained personnel.
2. Wear appropriate protective gear as specified in plant operator's guidelines.
3. Shut off plant or plant component.
4. Secure plant or plant component against recommissioning.
5. Depressurize the plant or plant component.
6. Actuate GEMÜ products which are always in the same position four times a year.

### 12.1 Spare parts

The product can only be repaired at GEMÜ. The replacement of spare parts may only be carried out by GEMÜ. If this procedure is not observed, the purchaser's guarantee rights and the manufacturer's legal liability cease. This can also lead to a loss of all rights to claim damages.

### CAUTION



#### Replacement of spare parts

- ▶ Damage to the GEMÜ product.
- Do not dismantle the product but send it completely to GEMÜ.

1. Remove the product completely from the plant using appropriate tools.
2. Send the product with return declaration to GEMÜ.

## 13 Removal from piping

### NOTICE

- ▶ If defective, the entire product must be replaced.

1. Observe (see "Safety information", page 5) the safety information.
2. Undo the flange screws.
3. Pull out the check valve between the flanges.
4. Insert and centre the new check valve with new seals.
5. Tighten the flange screws.

### 14 Disposal

1. Pay attention to adhered residual material and gas diffusion from penetrated media.
2. Dispose of all parts in accordance with the disposal regulations/environmental protection laws.

### 15 Returns

Legal regulations for the protection of the environment and personnel require that the completed and signed return delivery note is included with the dispatch documents. Returned goods can be processed only when this note is completed. If no return delivery note is included with the product, GEMÜ cannot process credits or repair work but will dispose of the goods at the operator's expense.

1. Clean the product.
2. Request a return delivery note from GEMÜ.
3. Complete the return delivery note.
4. Send the product with a completed return delivery note to GEMÜ.

**16 Declaration of conformity according to 2014/68/EU (Pressure Equipment Directive)**

# EU Declaration of Conformity

*in accordance with 2014/68/EU (Pressure Equipment Directive)*

We, GEMÜ Gebr. Müller Apparatebau GmbH & Co. KG  
Fritz-Müller-Straße 6-8  
74653 Ingelfingen-Criesbach, Germany

declare that the product listed below complies with the safety requirements of the Pressure Equipment Directive 2014/68/EU.

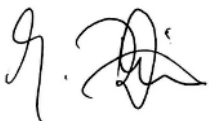
**Description of the pressure equipment:** GEMÜ R90  
**Notified body:** TÜV Rheinland Industrie Service GmbH  
**Number:** 0035  
**Certificate no.:** 01 202 926/Q-02 0036  
**Conformity assessment procedure:** Module H  
**Technical standards used (in parts):** AD2000-leaflet. EN 16668

**Note for products with a nominal size  $\leq$  DN 25:**

The products are developed and produced according to GEMÜ process instructions and quality standards which comply with the requirements of ISO 9001 and ISO 14001.

According to Article 4, Paragraph 3 of the Pressure Equipment Directive 2014/68/EU these products must not be identified by a CE-label.

2020-07-31



Joachim Brien  
Head of Technical Department



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Subject to alteration

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