

## Operating instructions and assembly instructions

### Diaphragm Valve Type 314, 315, 317, 319

**+GF+**

**GEORG FISCHER**  
PIPING SYSTEMS

#### 1. Intended use

These Georg Fischer diaphragm valves are intended exclusively for shutting off and conducting media in the allowable pressure and temperature range or for controlling flow in piping systems into which they have been installed. The maximum service life is 25 years.



In control operations, cavitation is to be avoided. Due to the flexible diaphragm, slight hysteresis occurs in the steady state characteristics when the direction of actuation is changed.

Attention: The allowable pressure range for all allowable temperatures for every housing material is illustrated in diagrams in the „Georg Fischer Planning Fundamentals“ (see paragraph 8). This documentation also contains the „Chemical Resistance List“ for the different types of valve materials.

#### 2. Safety Tips

##### 2.1 Explanation of the symbols

Hazard notices are used in this manual to warn you of possible injuries or damages to property. Please read and abide by these warnings at all times.



• Imminent danger! Failure to comply could result in death or serious injury



• Possible acute danger! Failure to comply could result in serious injury



• Failure to comply could lead to injury or damage to property

##### 2.2 General Safety Information

Diaphragm valves and the piping system into which they are built are subject to the same safety guidelines. To operate the diaphragm valves normal manual application of force is sufficient. It is not permitted to use other tools to increase the torque.



• No increased amount of manual force may be applied because this may damage the diaphragm valve and permit the medium to exit.

##### 2.3 Requirements Placed on the User and Operator Responsibility

It is the responsibility of the piping systems engineer / installer and the operator of such systems into which the diaphragm valve is built to warrant that

- The diaphragm valve is only used according to the specifications for which it has been intended, as indicated in Paragraph 1.
- The piping system is installed by professionals and its functionality checked regularly.
- Only qualified and authorized personnel installs, operates, services and repairs the diaphragm valve. Employees must be instructed on a regular basis in all the aspects of work safety and environmental protection as indicated by the applicable local regulations – in particular those pertaining to pressure-bearing piping.
- These employees are familiar with the operating instructions and adhere to the information contained therein.

##### 2.4 Special Hazards



• If the diaphragm valve which functions as an end valve in a piping system under pressure is opened, the medium can exit uncontrollably! The end valve in a pressure-bearing system may only be opened when the medium can be caught or carried off safely and splashing is prevented by taking the appropriate measures.

##### The following hazardous situations may occur when the diaphragm valve is dismantled:



- The medium may exit uncontrollably from the pipe or the valve, whether under pressure or not
- The medium may flow out of the open pipe
- The valve may contain residue or remnants of an aggressive, hazardous, flammable or explosive medium.

Prior to opening the pipe and dismantling the valve, it is necessary to:

- Release all pressure from the piping system,
- Empty the piping system completely and
- Rinse the system, if aggressive, hazardous, flammable or explosive media are involved
- Empty the diaphragm valve completely when it has been dismantled. In order to do so, let the valve drain completely in the vertical position.

##### 3. Transport and Storage

Diaphragm valves must be handled, transported and stored with care:

- The diaphragm valve should be transported and stored in its original packaging.
- If the diaphragm valve needs to be stored before installation, it must be protected from harmful influences such as dirt, dust, humidity, and especially heat and UV radiation.
- The connection ends of the diaphragm valve in particular may not be damaged mechanically or in any other way.
- The diaphragm valve should be stored with the handwheel in the same position

#### Manufacturer's Declaration

The manufacturer, Georg Fischer Piping Systems Ltd, CH-8201 Schaffhausen (Switzerland) declares, in accordance with the harmonized EN ISO 14138:2001 that the diaphragm valves (manual) type 314, 315, 317 and 319

1. are pressure-bearing components in the sense of the EC Directive 97/23/EC concerning pressure equipment and that they meet the requirements pertaining to valves as states in this directive,

2. correspond to the respective requirements for valves pursuant to Directive 89/106/EC concerning building products.

The CE-emblem on the valve refers to this accordance (as per the directive on pressure equipment, only valves larger than DN 25 can be labeled with CE).

**Exception:** No printing or labeling is permitted according to the specifications on high purity valves. These products are therefore not marked with the CE emblem.

The operation of these diaphragm valves is prohibited until conformity of the entire system, into which the diaphragm valves are installed, is established according to one of the above mentioned EC directives.

Modifications on the diaphragm valves which have an effect on the given technical specifications and the intended use render this manufacturer's declaration null and void. Additional information is contained in the „Georg Fischer Planning Fundamentals“ (see Paragraph 8).

Schaffhausen, 01.10.2005

*N. B. B.*

Managing Director  
Industrial Systems

*M. Berger*

Authorized Quality  
Management Agent

#### 4. Installation in the Piping System

##### 4.1 General

Diaphragm valve installation in a piping system is subject to the same regulations as other connecting elements of pipes, fittings and related piping system components. Detailed information can be found in the „Georg Fischer Planning Fundamentals“ (see Paragraph 8).



In piping systems which are subject to temperature changes, longitudinal or lateral forces may occur if thermal expansion is hindered. So as not to impair valve operation, these forces must be absorbed via the respective fixed points in front of or after the valve. Diaphragm valves have to be aligned so that the valve will be free of superimposed loading.

##### Information for diaphragm 314

Loosen the cap nuts and push them toward the designated piping end. Depending on the type of piping end, the connecting parts are cemented, screwed or welded.

The diaphragm valve is then positioned between the connecting parts and manually tightened with the cap nuts.

##### Integrated Fixation

The diaphragm valves have an integrated fixation. Mounting blocks are used to compensate the differing distances between the mounting surface and the piping axis. These are matched to +GF+ pipe claps. Forces, which may occur under normal operation of the valve (e. g. initial breakaway torque), are absorbed with this integrated fixation. By using this, no operating forces are transmitted to the piping system.

##### 4.2 Safety Measures during Installation

Procedure:

- Inspect the diaphragm valve for transport damages (damaged valves may not be installed).
- Make sure that only diaphragm valves are used, in which the valve and the diaphragm correspond specifically to the materials, pressure rating, type of connection and dimensions of the particular application.
- Carry out function test: open and close the diaphragm valve manually.
- You may not install valves which do not function properly, e.g. stiffness.
- After installation another function test is to be carried out.



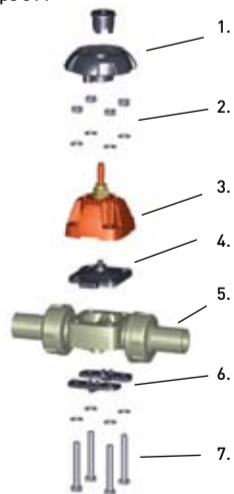
Operation of a valve causes reactive forces in the pipeline to which it is connected. It is therefore necessary to mount the diaphragm valve as a fixed point with the designated fastener (if available). Or to reinforce the piping directly before and after the diaphragm valve with suitable supports.

For fusion and cement connections, only identical materials may be joined together. Pipe sections with solvent cement connections should be rinsed unpressurized with water as soon as possible after completion of the connection.

The tightening torque and other useful information can be found in the „Georg Fischer Planning Fundamentals“ (see Paragraph 8).

##### 4.3 Assembly

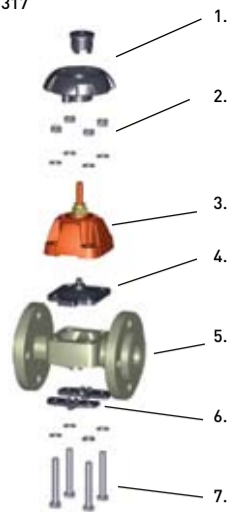
###### Assembly Type 314



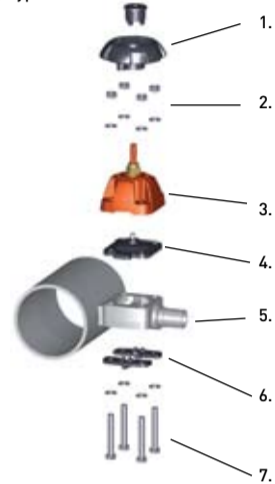
###### Assembly Type 315



###### Assembly Type 317



###### Assembly Type 319



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1. Handwheel
2. Nuts / Washes
3. Bonnet
4. Diaphragm
5. Valve body
6. Support Plates (PP-h, PP-n, PVDF only)
7. Screws / Washes

##### How to assemble:

- Fit diaphragm [4] with compressor [3]
  - Elastomer diaphragms size DN10 - DN20 should be pressed into place
  - Elastomer diaphragms size DN25 - DN50 should be screwed in
  - PTFE diaphragms have a bayonet connection. To fasten it place diaphragm to compressor and turn it by 90°.
- After that, you should join bonnet assembly to body [5] by means of bolts, washers and nuts [7] using correct torque value.

##### How to disassemble:

- Dismantling the valve body [5] by removing the screws [7]
- Dislodging the Elastomer diaphragm [4]:
  - DN 15 - DN20: These have a pressed head on top. To remove the diaphragm, just pull forcefully
  - DN 25 - DN50: These are retained by a threaded bolt. To remove the diaphragm, rotate counterclockwise.
- To remove the PTFE diaphragm [4]: turn the diaphragm 90° and pull it out

##### 4.4 Replacing the diaphragms and the seals

We urgently recommend that the diaphragm is inspected on a regular basis, because in addition to mechanical stress, the diaphragm is subject to wear resulting from the flow media. The diaphragm can be checked by dismantling the valve body.

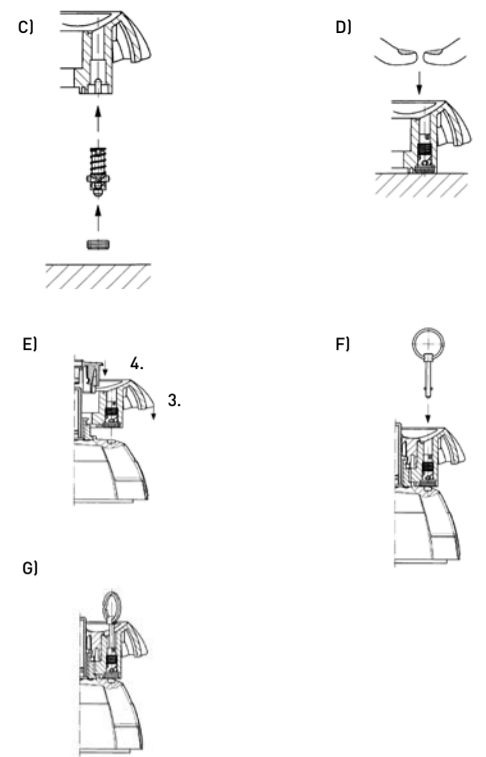
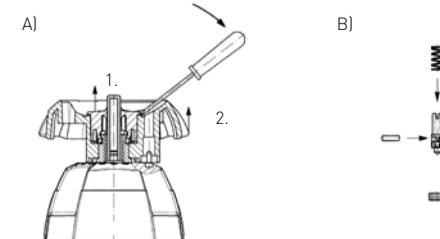
Size d (mm)	Nominal size (inch)	EPDM bolt Torque (inch lbs.)	PTFE Bolt Torque (inch lbs.)	Socket dimensions (mm)
20	3/4"	22.13	33.63	10
25	1"	26.55	39.83	10
32	1 1/4"	35.40	53.10	13
40	1 1/2"	53.10	79.66	13
50	2"	88.51	132.7	17
63	2 1/2"	132.8	203.6	19
75	3"	221.3	221.3	19

Table 1 Torque for screws between upper and lower part / dimensions of fixing thread

See next page for Zero-Static and HTR valves

##### 4.5 Assembly Instructions for Handwheel / Lockingmechanism

1. Remove cover disk
2. Draw off handwheel
3. Fit handwheel
4. Fit cover disk



##### 5. Pressure Test and Commissioning

Prior to commissioning the valve, the torque needs to be checked according to Table 1 and, if necessary, retightened because the diaphragms can settle over the course of time.

Diaphragm valve pressure testing is subject to the same regulations as the piping system; however, the **test pressure may not exceed the PN of the diaphragm valve.**

Detailed information is available in the „Georg Fischer Planning Fundamentals“ (see Paragraph 8).

Also applicable:

- Check that all valves are in the required open or closed position.
- Fill the piping system and deaerate completely.
- The components with the lowest PN determine the maximum allowable test pressure in the piping section.
- The valves and connections should be checked for a tight seal during the pressure test, especially the screwed connections between the upper and lower part. If there is leakage between the upper and lower part, tighten crosswise with a torque wrench according to Table 1. The valve may not be under pressure and not closed when tightening.

##### 6. Normal Operation and Maintenance

The connection between the upper and lower part should be checked for tightness at regular intervals.

Tighten leaky connections as described in Paragraph 5 „Pressure Test and Commissioning“.

If leakage or other defects occur, see Paragraphs 2 „Safety Tips“ and 7 „Help in Case of Failures, Replacement of the Diaphragm“. We recommend checking the functionality of diaphragm valves which are kept permanently opened or closed 1-2x a year.

##### 7. Help in Case of Failures, Replacement of the Diaphragm

Please observe the Safety Tips in Paragraph 2 when handling defects.

If there is leakage in the pipe or to the outside, the diaphragm should be replaced. The dismantled diaphragm valve must be drained completely! Detailed information can be found in the „Georg Fischer Planning Fundamentals“ (see Paragraph 8). Orders for spare parts for diaphragm valves should include all the specifications, e.g. the details given on the typeplate (not on the HP version). Only the prescribed original spare parts from Georg Fischer may be used.

Malfunction Type	Measures to be Taken
Leakage between upper section and valve body	Pull the connection tightly with the torque in accordance with the operating instructions
Leakage to the outside at flange joint	Pull the connection tightly with the torque in accordance with the operating instructions
Leakage to the outside from the valve housing	Dismount valve and replace
Leakage at seat	Dismount valve. Replace seal. Order spare parts using information on label
Sluggish valve Other functional malfunctions	Replace seals and if necessary functional components. Order spare parts using information on label

Table 2 Help for malfunction



##### 7.1 Handling of sealing elements

All parts made of elastomers (EPDM, FPM, etc.) are organic materials, which react to environmental influences. They must therefore be kept in their original packaging, and stored cool, dry and dark. The diaphragms and other sealing elements should be checked before mounting to make sure there are no damages from aging. Aged parts which exhibit hardening or fissures may not be installed.



##### 7.2 Selection of lubricants

All seals should be lubricated with a silicon-based grease. Other lubricants can corrode the material of the diaphragm valve or the seal. Never use mineral oil-based greases or vaseline! For diaphragm valves used in varnishing and high purity applications, please consult the special manufacturer's instructions.

##### 8. A special note for users of „High Purities“ valves

Occasionally it is necessary to demount the valve bonnet from the body to facilitate fusion. Whenever possible it is better to remove just the handle than the complete bonnet. If complete demounting is the only solution or if you are disassembling the valve for maintenance we recommend the following procedure:

In a cleanroom environment The two halves of the valve should be held firmly together while all bolts are removed. The bolt holes should then be blown clean with filtered air or an inert gas. This will substantially reduce the risk of contamination of the inner surfaces of the valve caused by particles rubbed from the elastomer backing diaphragm when the bolts are removed. If there is any evidence of contamination this should be removed using a cleanroom approved cloth and cleanroom grade Iso Propyl Alcohol prior to reassembly. Again the two halves of the valve must be closed before inserting the bolts and final tightening. After disassembly of the diaphragm valve we recommend to use a new PTFE-diaphragm for the reassembly. Only with a new diaphragm an optimal tightness is ensured.

##### Additional information

If the above mentioned Planning Fundamentals may be obtained from the Georg Fischer sales company responsible for your country or from the internet Georg Fischer, Piping Systems Ltd, CH-8201 Schaffhausen/Switzerland info.ps@georgfischer.com www.piping.georgfischer.com

The technical data are not binding. They are not warranted characteristics and are subject to change. Please consult our General Conditions of Supply.

**319 Zero Static Valves (non-HTR)**

Size [mm]	Diaphragm size [mm]	Bolt Torque inch lbs
20x20	20	33.63
25x20	25	39.83
25x25	25	39.83
32x20	32	53.10
32x25	32	53.10
32x32	32	53.10
40x20	32	53.10
40x25	32	53.10
40x32	32	53.10
40x40	40	79.66
50x20	32	53.10
50x25	32	53.10
50x32	32	53.10
50x40	50	132.7
50x50	50	132.7
63x20	32	53.10
63x25	32	53.10
63x32	32	53.10
63x40	63	203.6
63x50	63	203.6
63x63	63	203.6
75x40	40	79.66
75x50	63	203.6
75x63	63	203.6
90x20	32	53.10
90x25	32	53.10
90x32	32	53.10
90x50	63	203.60
90x63	63	203.60
110x20	32	53.10
110x25	32	53.10
110x32	32	53.10
110x50	63	203.6
110x63	63	203.6

**319 HTR Zero Static Valves**

Size [mm]	Diaphragm size [mm]	Bolt Torque inch lbs
20x20	20	22.13
25x20	25	26.55
25x25	25	26.55
32x20	32	35.40
32x25	32	35.40
32x32	32	35.40
40x20	32	35.40
40x25	32	35.40
40x32	32	35.40
40x40	40	53.10
50x20	32	35.40
50x25	32	35.40
50x32	32	35.40
50x40	50	88.51
50x50	50	88.51
63x20	32	35.40
63x25	32	35.40
63x32	32	35.40
63x40	63	132.8
63x50	63	132.8
63x63	63	132.8
75x40	40	53.10
75x50	63	132.8
75x63	63	132.8
90x20	32	35.40
90x25	32	35.40
90x32	32	35.40
90x50	63	132.8
90x63	63	132.8
110x20	32	35.40
110x25	32	35.40
110x32	32	35.40
110x50	63	132.8
110x63	63	132.8

**HTR PTFE valves**

Size [mm]	Bolt Torque inch lbs
20	22.13
25	26.55
32	35.40
40	53.10
50	88.51
63	132.8

**PTFE Standard valves**

Size	Bolt Torque inch lbs
20mm - 1/2"	33.63
25mm - 3/4"	39.83
32mm - 1"	53.10
40mm - 1 1/4"	79.66
50mm - 1 1/2"	132.70
63mm - 2"	203.6
75mm - 2 1/2"	221.3
90mm - 3"	248.0
110mm - 4"	266.0
160mm - 6"	354.0

**EPDM Standard valves**

Size	Bolt Torque inch lbs
20mm - 1/2"	22.13
25mm - 3/4"	26.55
32mm - 1"	35.40
40mm - 1 1/4"	53.10
50mm - 1 1/2"	88.51
63mm - 2"	132.8
75mm - 2 1/2"	221.3
90mm - 3"	248.0
110mm - 4"	266.0
160mm - 6"	354.0