



SH 14t

Translation of original instructions



Butterfly valve BR 14t - LTR 43

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1 GENERAL

1.1 Definition of signal words

	DANGER	Hazardous situations which, if not avoided, will result in death or serious injury
	WARNING	Hazardous situations which, if not avoided, could result in death or serious injury
	NOTICE	<i>Property damage message or malfunction</i>
	Note	<i>Additional information</i>
	Tip	<i>Recommended action</i>

1.2 Purpose of this manual

The Safety Manual **SH 14t** contains information relevant for the use of the **BR 14t - LTR 43** Butterfly Valve in safety-instrumented systems according to IEC 61508 and IEC 61511.

The safety manual is intended for planners, constructors, and operators of safety-instrumented systems.

 NOTICE	<i>Risk of malfunction due to incorrect installation or start-up of the device.</i> Refer to the mounting and operating instructions ► EB 14t on how to install and start-up the device. Observe the warnings and safety instructions written in the mounting and operating instructions or operating instructions.
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1.3 Further documentation

The documents listed below contain descriptions of the start-up, functioning and operation of the butterfly valve. You can download these documents from the PFEIFFER website.

- Data sheet BR 14t - LTR 43 ► **TB 14t**
- Mounting and operating instructions BR 14t - LTR 43 ► **EB 14t**
- Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves ► **WA 236**

 NOTICE	In addition to the valve documentation, observe the documentation for the actuator and valve accessories.
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2 SCOPE

2.1 General

The Butterfly valve **BR 14t - LTR 43** is designed according to applicable standards in consideration of technical rules and directives (e.g. Pressure Equipment Directive 2014/68/EU).

The reliability of mechanical components is significantly affected by the operating conditions and, as a result, by systematic failures.

To ensure intended use, only use the valves in applications where the operating pressure and temperatures do not exceed the limits used for sizing upon ordering.

The butterfly valve **BR 14t - LTR 43** is suitable for passing through and/or shut off liquid and gaseous media. The process medium may not contain any solid components that could block the butterfly valve. A typical parts list is shown in Table 1. Figure 1 shows a typical sectional drawing with the utilized parts.

For application in safety circuits, the butterfly valve is normally combined with a pneumatic actuator and additional accessories (e.g. solenoid valve) as an on/off valve.

	Any hazards that could be caused by the process medium, operating pressure, operating temperatures as well as the signal pressure or by moving parts of the valve are to be prevented by taking appropriate precautions.
	The manufacturer does not assume any responsibility for damages caused by unintended use or external forces or any other external factors!

2.2 Use in safety-instrumented systems

The valve can be used in safety-instrumented systems according to IEC 61508 and IEC 61511. In compliance with IEC 61508, the valve can be used for safety-instrumented applications up to SIL 1 or up to SIL 2 in proven-in-use devices. SIL 3 can be reached by means of redundant use (multiple valves in the SIL 2 version).

Characteristics to be observed for use:

Permissible operating mode: Low Demand (once per year)

Hardware Fault Tolerance HFT: 0 = one-channel use

Device type: A = simple device

Proof test interval T_i : 1 year

Additional relevant characteristics (PFDavg, λ , etc.) shall be taken from the valid functional safety certificate or manufacturers declaration.

	The architecture and the interval between proof tests must be considered concerning the safety integrity level.
	Using a positioner with diagnostic features the diagnostic coverage can be increased and, as a result, the probability of failure on demand can be reduced.
	Online tests, such as a partial stroke test and other diagnostic processes integrated into the valve positioner, can be regarded as state-of-the-art test methods. These methods can extend the proof test interval or even be used to improve the safety margin (discovery of undetected systematic errors).

2.3 Actuator versions

Valve combined with actuators equipped with travel stop and/or manual gearbox/hand lever are **not suitable** for use in safety-instrumented systems. The safety function can be influenced/deactivated such that the intended fail-safe position cannot be reached.

2.4 Installation

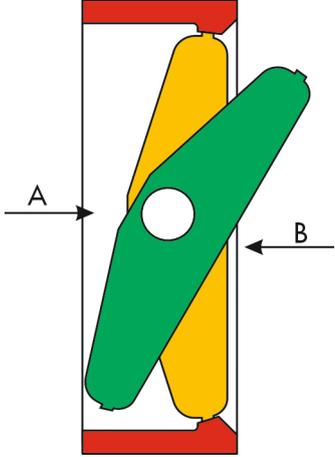
The valve and actuator (including accessories) are assembled by the manufacturer and tested to ensure perfect functionality. If it is necessary to dismount an actuator, the correct mounting position must be observed during reassembly. It must be compared with the mounting position of the valid dimensional drawing and must not be changed. For the fail-safe position "Fail-Close (FC)", the valve disc must be completely closed by spring force, and for the fail-safe position "Fail-Open (FO)", it must be completely opened by spring force.

After reassembling an actuator, always a functional test and a seat leakage test must be performed to ensure proper function. The manufacturer (PFEIFFER) must be informed in advance of such activities.

All works must only be performed by qualified personnel.

 WARNING	<p>Risk of malfunction or damage due to incorrect mounting</p> <p>Assembly must only be performed by qualified personnel. The mounting of the valve and actuator is of vital importance for proper function/operation. Suitable gaskets must be used for the connection between valve and pipeline.</p>
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2.5 Direction of flow

Type	14t
Direction of flow	

3 TECHNICAL DATA

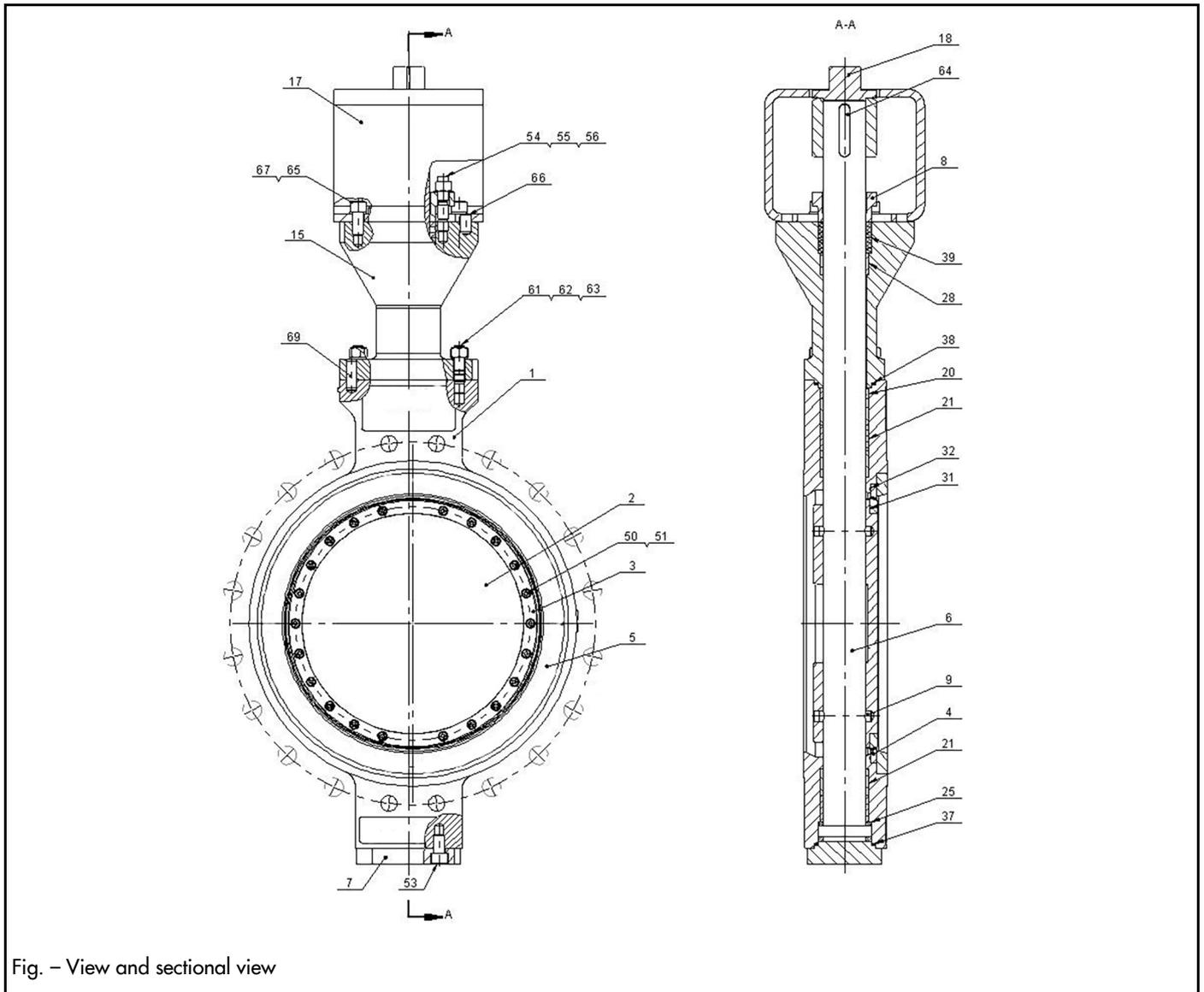


Fig. – View and sectional view

Table 1 – Parts list

Item	Description	Comments
1	Body	
2	Disc	
3	Seat ring	Spare part
4	Seat	Spare part
5	Retainer plate	
6	Shaft	
7	Cover	
8	Gland	
9	Pin	
15	Extension	
17	Bracket	

Item	Description	Comments
18	Coupling	
20	Bushing	
21	Bushing	
25	Thrust ring	
28	Bushing	
31	Seat ring gasket	Spare part
32	Seat gasket	Spare part
37	Cover gasket	Spare part
38	Extension gasket	Spare part
39	Packing	Spare part
51	Wedge plate	

Item	Description	Comments
54	Stad bolt	
55	Washer	
56	Hex nut	
61	Stud bolt	
62	Wedge plate	
63	Hex nut	
64	Key	
66	Pin	
67	Wedge plate	
69	Pin	

4 SAFETY FUNCTION

4.1 Fail-safe feature

The valve with actuator is designed for open/closed applications. When the pressure side of the actuator is vented, spring forces move the final control element of the valve to the open or closed position. In the case of a pressure or power failure, the fail-safe action is triggered.

4.2 Fail-safe action

Signal pressure is applied to the pneumatic actuator. The actuator is vented upon demand of the safety-instrumented function, and normally via a solenoid valve. As soon as the actuator is vented, the spring forces cause movement to the fail-safe position. The valve is then either completely open or completely closed.

Depending on the actuator's direction of action (see the associated actuator documentation), the valve has one of the following fail-safe positions:

- ⇒ **"Fail-Close"** fail-safe position:
In a fail-safe action, the springs of the actuator move the valve shaft together with the valve disk clockwise and close the valve.
- ⇒ **"Fail-Open"** fail-safe position:
In a fail-safe action, the springs of the actuator move the valve shaft together with the valve disk counterclockwise and open the valve.

 DANGER	<i>Risk of malfunction or damage due to impermissible modifications/assembly</i> If the actuator will be assembled in an incorrect/different position (e.g. after disassembly), this causes a malfunction. Sealing elements of the valve also can be damaged or destroyed. Therefore no changes must be made to the unit, in particular to the actuator structure with its accessories.
 WARNING	<i>Risk of malfunction or damage due to impermissible modifications/assembly</i> Assembly work must only be performed by qualified personnel. The mounting of valve and actuator is of vital importance for proper operation.

5 INSTALLATION AND START-UP

The valve is delivered ready to install and can be installed into the pipeline without the need for any additional installation work. The installation and maintenance instructions and safety manuals for the valve, actuator and accessories (solenoid valve, etc.) must be considered during installation and start-up.

Stroking times and valve seat leakage must be measured and documented with start-up at the latest, so that this reference data can be compared with the data measured at the proof test intervals. This data provides an indication about possible wear and/or malfunction.

 Tip	<i>We recommend checking the installation and start-up using a checklist.</i> Examples of such checklists are included in VDI 2180-5 and the SAMSON brochure WA 236 "Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves".
 Tip	<i>Reduction or avoidance of wear.</i> In the case of a safety requirement with fail-safe position "close", it is recommended to establish pressure equalization on both sides of the valve disk before reopening the valve. This reduces the wear on the valve parts (e.g. sealing elements such as the valve seat and seat ring).

6 REQUIRED CONDITIONS

 WARNING	<i>Risk of malfunction due to incorrect selection or wrong installation and operating conditions!</i> Only use valves in safety-instrumented systems if the necessary conditions in the plant are fulfilled.
 Tip	<i>We recommend checking the necessary conditions using a checklist.</i> Examples of such checklists are included in VDI 2180-5 and the SAMSON brochure WA 236 "Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves".

6.1 Selection

- ⇒ The suitability of the entire device (butterfly valve, actuator, valve accessories) for the intended use (pressure, temperature) has been checked.
- ⇒ The valve materials are suitable for the process medium.
- ⇒ The process medium must not contain any solids.
- ⇒ The actuator is correctly sized based on the required stroking time and thrust.

6.2 Mechanical and pneumatic installation

- ⇒ The valve is installed properly into the pipeline as described in the mounting and operating instructions. The valve accessories and other accessories are mounted correctly.
- ⇒ The prescribed flow direction is observed. An arrow on the valve indicates the flow direction.
- ⇒ The butterfly valve is configured with the correct fail-safe position (Fail close or fail open).
- ⇒ The tightening torques (e.g. for the packing) are observed.

6.3 Operation

- ⇒ The shaft is not blocked.
- ⇒ The flow rate through the valve is not blocked.
- ⇒ The valve is only used in operating conditions that meet the specifications used for sizing at the ordering stage.

6.4 Maintenance

- ⇒ Maintenance work is performed only by fully trained, qualified personnel.
- ⇒ Only original parts must be used for spare parts.
- ⇒ The maintenance must be performed periodically and results must be recorded. Deviating results must be recorded and reported to PFEIFFER.

 WARNING	<i>Fail-safe action impaired or malfunction due to incorrect repair.</i> Repairs on the BR 14t - LTR 43 butterfly valve must only be performed by qualified personnel authorized by PFEIFFER.
 Tip	Please contact PFEIFFER customer service for operations that are not described in the mounting and operating instruction ▶ EB 14t, section 9.

7 PROOF TESTING

It is the operator's responsibility to fix the proof test interval and the extent of testing. The operator must draw up a test plan, in which the proof tests and the intervals between them are specified. We recommend summarizing the requirements of the proof test in a checklist.

Wear must be expected on the sealing surfaces of the butterfly valve depending on the material pairing, process medium, -pressure, -temperature (slightly lubricated or unlubricated operation). Therefore, with every proof test, stroking times and leakage must be recorded and compared with reference data in order to detect possible failures. The reference data should be recorded during start-up at the latest. The recommended test interval is at least once a year.

Deviating test intervals may possibly be defined by the plant operator based on experience (proven-in-use) or based on measured data, as described in IEC 61508 (2010), note 3, section 7.4.9.5

 WARNING	<p><i>Risk of dangerous failure due to malfunction in case of emergency (valve does not move into the fail-safe position)!</i></p> <p>Only use devices in safety-instrumented systems that have passed the proof test according to the test plan drawn up by the operator.</p>
 NOTICE	<p><i>Malfunction due to non-observance of the test requirements.</i></p> <p>To test the fail-safe action properly, the following requirements must be met:</p> <ul style="list-style-type: none"> - Valve and actuator are assembled properly. - The device is installed properly into the plant.
 NOTICE	<p><i>Periodically check the safety-instrumented function of the entire SIS loop.</i></p> <p>The test intervals are determined, for example by calculating each SIS loop in a plant (PFD avg).</p>
 Tip	<p><i>PFEIFFER recommend performing the proof tests based on a checklist.</i></p> <p>Examples of such checklists are included in VDI 2180-5 and the SAMSON brochure WA 236 "Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves."</p>

8 VISUAL INSPECTION TO AVOID SYSTEMATIC FAILURES

To avoid systematic failures, regular visual inspection of the valve is necessary. It is the operator's responsibility to specify the frequency and the scope of the inspection. Application-specific influences must be considered, such as:

- ⇒ Blocking of the shaft
- ⇒ Corrosion (destruction primarily of metals due to chemical-physical processes)
- ⇒ Material fatigue
- ⇒ Wear induced by the process medium
- ⇒ Abrasion (material removal by solids contained in the process medium)
- ⇒ Medium deposits
- ⇒ Aging (damage caused to organic materials, e.g. plastics or elastomers, due to exposure to light and heat)
- ⇒ Chemical attack (organic materials that swell, leach out or decompose due to exposure to chemicals)
- ⇒ Mufflers must not reduce the exhaust output and must be checked regularly for soiling and proper function.

 NOTE	<p><i>Malfunction due to impermissible parts.</i></p> <p>Only original parts must be used as spare parts!</p>
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9 FUNCTIONAL TESTING

Regularly check the safety function according to the test plan drawn up by the operator.

 Note	Record any faults on the device and inform PFEIFFER in writing
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9.1 Safety-related fail-safe action

1. Supply the actuator with the minimum allowable signal pressure that moves the disc of the butterfly valve to its end position (completely open or completely closed).
2. Disconnect the signal pressure. Then the spring force of the actuator causes movement to the fail-safe position
3. Check, whether the movement into the end position is within the required stroking time.
4. Check, whether the maximum permissible leakage is observed.

9.2 Fail-safe action of the accessories

⇒ Check the fail-safe actions of the accessories (e.g. solenoid valve, etc.). Therefore, the related safety manuals must be observed.

10 REPAIR

Repairs on the **BR 14† - LTR 43** butterfly valve must only be performed by personnel trained by PFEIFFER. Spare parts (e.g. sealing elements) must be ordered in advance before starting the repair work. Allow for time for the procurement and production of spare parts.

We recommended keeping spare parts in stock in order to have them available in case of a repair.

 DANGER	<i>When performing repair work on the valve, make sure that the valve, the actuator and the accessories as well as any pipes are depressurized.</i>
 NOTICE	<i>Fail-safe action impaired or malfunction due to incorrect repair.</i> Maintenance and repair work on the BR 14† - LTR 43 butterfly valve must only be carried out by qualified personnel authorized by PFEIFFER.

11 USEFUL LIFETIME

According to IEC 61508-2 (2010), section 7.4.9.5, a useful lifetime of eight to twelve years can be assumed. Other values can be used based on the previous experience (prior use / proven-in-use) or based on the measures taken by the plant operator as described in note 3 of IEC 61508-2 (2010), section 7.4.9.5.

12 CUSTOMER REQUEST FORM FOR SIL APPLICATIONS

 Tip	The following form helps to collect relevant information for SIL applications.
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KUNDENABFRAGE DOKUMENTATIONSAUFTRAG FÜR SIL

CUSTOMER REQUEST DOCUMENTATION FOR SIL



PFEIFFER Chemie-Armaturenbau GmbH
Classification: Public

Kunde / customer:

Datum / date: 5. June 2023

Auftrags-Nr. / Anfrage:
Order no. / request

Armatur / valve: BR / type DN / NPS PN / cl

Bitte stellen Sie uns für die Erstellung der SIL-Herstellererklärung folgende zusätzliche Informationen für jede Armatur zur Verfügung / For SIL - manufacturer declaration we ask for providing us following additional information for each valve:

- Medium:
Medium
- Eigenschaft des Mediums: schmierend / greasing nicht schmierend / sticking trocken / dry korrosiv / corrosive
Property of medium
 abrasiv / abrasive auskristallisierend / crystallizing polymerisierend / polymerizing
 feststoffhaltig / solids (hart / hard weich / soft schlammig / slurry faserig / fibrous
- Druck:
Inlet and outlet pressure
- Temperatur:
Medium temperature
- Dichtigkeitsklasse:
Tighten class
- Längste Dauer der Nichtbetätigung (betriebliche Anforderung) (Schaltzyklen pro Jahr)
Longest period of non-operation (operation mode) (quantity of cycles/year)
- Schaltzeit (wenn erforderlich): AUF [sec.] ZU [sec.]
Cycle time (if required) OPEN CLOSE
- Einbauort:
Location for installing (inside or outside)
- Einbaulage:
Installing orientation (horizontal or vertical)
- Betriebsart: kontinuierliche Fahrweise Batchfahrweise
Mode of operation continuous operating conditions changing operating
- Funktion des Stellgliedes: AUF/ZU Regel Sonstiges
Function of the valve ON/OFF Control Other
- Armaturen Isolierung: ja / yes / nein / no Isolierstärke in mm
Valve heat insulation insulation thickness
- Für die Antriebsauslegung benötigen wir den Zuluftdruck: min. [barg] max. [barg]
For the actuator design we need the air supply

Datum, Name und Unterschrift des Kunden _____
Date, name and sign of customer