SAFETY MANUAL



SH 29a

Translation of original instructions



BR 29a 3-Way Diverting Valve BR 29b Multi-way Diverting Valve

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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	Property damage message or malfunction		
i	Note	Additional information		
	Tip	Recommended action		

Purpose of this manual 1.2

The Safety Manual SH 29a contains information relevant for the use of the BR 29a and BR 29b diverting 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.



Risk of malfunction due to incorrect installation or start-up of the device.

Refer to the respective maintenance instructions or mounting and operating instructions on how to install and start-up the device. Observe the warnings and safety instructions written in the maintenance instructions or mounting and operating instructions.

1.3 **Further documentation**

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

Data sheet BR 29a

▶ TB 29a

Data sheet BR 29b

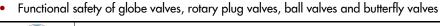
► TB 29b

Mounting and operating instructions BR 29a

► EB 29a

Mounting and operating instructions BR 29b

► EB 29b



► WA 236



In addition to the diverting valve documentation, observe the documentation for the actuator and valve accessories.

SCOPE 2.

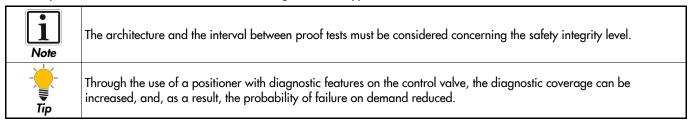
General

In combination with an actuator, e.g. the BR 31a pneumatic rotary actuator, the BR 29a / BR 29b diverting valve is designed for diverting liquid, gases or vapour media in piggable pipes.

2.2 Use in safety-instrumented systems

The diverting valve can be used in safety-instrumented systems according to IEC 61508 and IEC 61511. The valve can be used in safety-instrumented systems up to SIL 2 (single device) and SIL 3 (redundant configuration) on observing the requirements of IEC 61508.

The safety-instrumented function of the valve is to be regarded as a Type A element in accordance with IEC 61508-2.



2.3 Versions and ordering data

Diverting valve combined with actuators with travel stop and/or handwheel as well as manual override are not suitable for use in safety-instrumented systems. All other versions are suitable for use in safety-instrumented systems. Actuators with adjustable limit stops are adjusted after adjustment against subsequent adjustment, e.g. with sealing wax, secured.

2.4 **Mounting**

The diverting valve and actuator are normally delivered already assembled by PFEIFFER.

TECHNICAL DATA

Table 1: DIN version

Туре	29a	29b			
Nominal size	DN 50 200	DN 50 200			
Nominal pressure	PN 25, PN 40	PN 25, PN 40			
Material 1)	1.4408 / 1.4571	1.4408 / 1.4571			
Face to face	Special face-to-face dimensions				
Type of connection	DIN 2430-2	DIN 2430-2			
Seat-ball seal	soft seal				
Heating jacket	on request				
Compliance	C € . ERI				
Temperature ranges Permissible operating pressures according to pressure-temperature diagrams, see Data sheet ► TB 29a or ► TB 29b					
Body	-10 +200 °C (14 °F 392 °F)				
Leakage class according to DIN EN 12266-1, Test P12					
Metal seal		-			
Soft seal	А	А			

¹⁾ Other materials optionally available

Table 2: ANSI version

Туре	29a	29b				
Nominal size	NPS2 8	NPS2 8				
Nominal pressure	d150, d300	cl150, cl300				
Material 1)	A182 F316 / A351 CF8M	A182 F316 / A351 CF8M				
Face to face	Special face-to-face dimensions					
Type of connection	DIN 2430-2	DIN 2430-2				
Seat-ball seal	soft seal					
Heating jacket	on request					
Compliance	C € . ERI					
Temperature ranges Permissible operating pressures according to pressure-temperature diagrams, see Data sheet ► TB 29a or ► TB 29b						
Body	-10 +200 °C (14 °F 392 °F)					
Leakage class according to DIN EN 12266-1, Test P12						
Metal seal		-				
Soft seal	А	Α				

¹⁾ Other materials optionally available

4. SAFETY-RELATED FUNCTIONS

4.1 Safety-related fail-safe action

The diverting valve, in combination with a pneumatic rotary actuator, controls the process medium flowing through it.

A change in the signal pressure acting on the rotary actuator causes the two pistons to move and the shaft to swivel. The diverting valve is opened or closed by force. The fail-safe action is triggered when no signal pressure is applied to the actuator.

4.2 Fail-safe action

4.2.1 3-way diverting valve BR 29a

Depending on customer requirements, the 3-way diverting valve is equipped with a pneumatic quarter-turn actuator. The design of a double-acting part-turn actuator with "STOP" safety position is preferable.

⇒ 3-way diverting valve with "Stop" actuator If the air supply fails, the diverting valve remains in its position.

4.2.2 Multi-way diverting valve BR 29b

The setup position, and the control functions of the actuator are carried out using an incremental controlled coupling for positioning in order to be able to move to all positions. Depending on the specific customer requirements, the multi-way diverting valve are constructed and equipped.

➡ Multi-way diverting valve with "Stop" actuator and incremental controlled coupling If the air supply fails, the diverting valve remains in its position.

4.3 Protection against unauthorized changes to the configuration

The diverting valve's fail-safe position depends on the mounted actuator's direction of action. The actuator's direction of action can be reversed. However, this is not possible while the process is running.

5 INSTALLATION AND START-UP

The diverting valve is delivered ready to install and can be installed into the pipeline without the need for any additional installation work

Refer to the diverting valve documentation on how to install and start-up the diverting valve.



PFEIFFER recommend checking the installation and start-up using a checklist. 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. REQUIRED CONDITIONS



Risk of malfunction due to incorrect selection or wrong installation and operating conditions.

Only use diverting valves in safety-instrumented systems after the necessary conditions in the plant have been fulfilled.



PFEIFFER recommend checking the necessary conditions using a checklist. 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 diverting valve assembly (diverting valve, actuator, valve accessories) for the intended use (pressure, temperature) has been checked.
- ⇒ The diverting valve materials are suitable for the process medium.
- ⇒ The design of the diverting valve is suitable for the required leak rate and for the indicated switching cycles.
- ⇒ The actuator is correctly sized based on the required transit time and thrust.
- ⇒ For the actuator design, the longest period of the non-operation must be specified and taken into account.

6.2 Mechanical and pneumatic installation

- The diverting valve is installed properly into the pipeline as described in the mounting and operating instructions and the actuator mounted on it. Valve accessories are mounted correctly.
- ⇒ The prescribed direction of flow is observed. The optional arrow on the diverting valve indicates the direction of flow.
- ⇒ The diverting valve is configured with the correct fail-safe position (STOP).
- The tightening torques (e.g. for the flanged joints) are observed, see mounting and operating instructions EB 29a and EB 29b.
- The end connection of the pipeline is aligned with the diverting valve's end connections and their ends have parallel planes.

 Connection flanges that are not parallel can damage the diverting valve and lead to increased operating torques!

6.3 Operation

- ⇒ The control shaft is not blocked.
- ⇒ The medium flow through the diverting valve is not blocked.
- ⇒ The diverting valve is only used in applications that meet the specifications used for sizing at the ordering stage.

6.4 Maintenance

- ⇒ Maintenance is only performed by fully trained, qualified operating personnel.
- ⇒ Only original parts are used for spare parts.
- Maintenance is performed as described in the section on servicing or maintenance in the associated diverting valve documentation.



Contact PFEIFFER concerning any work not described in the section on servicing or maintenance in the associated diverting valve documentation.

PROOF TESTING

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



WARNING

Risk of dangerous failure due to malfunction in the event of emergency (diverting valve does not move to the fail-safe position). Only use devices in safety-instrumented systems that have passed the proof test according to the test plan drawn up by the operator.



Malfunction due to a non-observance of the required inspection requirements.

To test the fail-safe action properly, the following requirements must be met:

- Diverting valve and actuator are assembled together properly.
- The diverting valve is installed properly into the plant.

Regularly check the safety-instrumented function of the entire SIS loop. The test intervals are determined, for example on calculating each single SIS loop in a plant (PFD_{avg}).



PFEIFFER recommend performing the proof tests based on a checklist. An example of such a checklist is included in the SAMSON brochure WA 236 (Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves).

8. VISUAL INSPECTION TO AVOID SYSTEMATIC FAILURE

To avoid systematic failure, inspect the diverting valve regularly. The frequency and the scope of the inspection lie within the operator's responsibility. Take application-specific influences into account, such as:

- ⇒ Blockage of control shaft
- ⇒ Corrosion (destruction primarily of metals due to chemical and physical processes)
- ⇒ Wear induced by the process medium

- ⇒ Abrasion (material removed by solids contained in the process medium)
- Aging (damage caused to organic materials, e.g. plastics or elastomer, by exposure to light and heat)
- ⇒ Chemical attack (organic materials, e.g. plastics or elastomer, which swell, leach out or decompose due to exposure to chemicals)



Risk of malfunction due to the use of unauthorized parts.
Only use original parts to replace worn parts.

9. FUNCTION TESTING

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



Record any faults in the diverting valve and inform PFEIFFER of them in writing.

9.1 Safety-related fail-safe action

- 1. Supply the actuator with the signal pressure to allow the diverting valve to move to the end position (completely open or closed).
- 2. Disconnect the signal pressure. This must cause the diverting valve to move to its fail-safe position.
- 3. Check whether the diverting valve reaches the end position within the required time.
- 4. Check whether the maximum permissible leakage is observed.

9.2 Safety-instrumented function of valve accessories

⇒ Check the safety-instrumented function of valve accessories. Refer to the associated safety manuals.

10. REPAIRS

Only perform the work on the diverting valve described in the diverting valve documentation.



Fail-safe action impaired due to incorrect repair.

Service and repair work must only be performed by trained staff.

11. CUSTOMER REQUEST FORM FOR SIL APPLICATIONS



The following form helps to collect relevant information for SIL applications.

KUNDENABFRAGE DOKUMENTATIONSAUFTRAG FÜR SIL

CUSTOMER REQUEST DOCUMENTATION FOR SIL



PFEIFFER Chemie-Armaturenbau GmbH Classification: Public

Kunde / customer:			Datum / date: 8. January 2025
Auftrags-Nr. / Anfrage: Order no. / request			
Armatur / valve: BR	/ BR	DN / NPS	PN / cl
Bitte stellen Sie uns für die Erste Armatur zur Verfügung / For Sh valve:			cliche Informationen für jede Following additional information for each
• Medium: Medium			
• Eigenschaft des Mediums: Property of medium	abrasiv / abrasive 🔲 aus	nicht schmierend / <i>sticking</i> [skristallisierend / <i>crystallizing</i> hart / <i>hard</i> weich / <i>soft</i>	polymerisierend / polymerizing
Druck: [bar] Inlet and outlet pressure			
Temperatur: [°C] Medium temperature			
• Dichtigkeitsklasse: Tighten class			
Längste Dauer der Nichtbetö Longest period of non-operatio		orderung)	(Schaltzyklen pro Jahr) (quantity of cycles/year)
• Schaltzeit (wenn erforderlich Cycle time (if required)	n): AUF [sec.]	ZU [sec.]	
• Einbauort: Location for installing (inside of	r outside)		
• Einbaulage: Installing orientation (horizontal	nl or vertical)		
	erliche Fahrweise us operating conditions	Batchfahrweise changing operating]
• Funktion des Stellgliedes: Function of the valve	AUF/ZU ON/OFF		Sonstiges Other
• Armaturen Isolierung: ja /) Valve heat insulation	ves / nein / no	Isolierstärke in mm insulation thickness	
• Für die Antriebsauslegung b For the actuator design we nee		lruck: min. [bar]	max. [bar]
Datum, Name und Unterschrift Date, name and sign of customer	des Kunden		