

SH 29a

Translation of original instructions



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






Edition January 2025

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1. GENERAL


1.1 Definition of signal words

	DANGER	<i>Hazardous situations which, if not avoided, will result in death or serious injury</i>
	WARNING	<i>Hazardous situations which, if not avoided, could result in death or serious injury</i>
	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 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.

 NOTICE	<p><i>Risk of malfunction due to incorrect installation or start-up of the device.</i></p> <p>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.</p>
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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**
- Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves ▶ **WA 236**

 NOTICE	<p>In addition to the diverting valve documentation, observe the documentation for the actuator and valve accessories.</p>
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2. SCOPE



2.1 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.

 Note	The architecture and the interval between proof tests must be considered concerning the safety integrity level.
 Tip	Through the use of a positioner with diagnostic features on the control valve, the diagnostic coverage can be increased, and, as a result, the probability of failure on demand reduced.

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.


3. TECHNICAL DATA

Table 1: *DIN version*

Type	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		
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	A	A

¹⁾ Other materials optionally available

Table 2: ANSI version

Type	29a	29b
Nominal size	NPS2 ... 8	NPS2 ... 8
Nominal pressure	cl150, cl300	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		
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	A	A

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.

 Tip	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).
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6. REQUIRED CONDITIONS

 WARNING	<i>Risk of malfunction due to incorrect selection or wrong installation and operating conditions.</i> Only use diverting valves in safety-instrumented systems after the necessary conditions in the plant have been fulfilled.
 Tip	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.


 Tip	Contact PFEIFFER concerning any work not described in the section on servicing or maintenance in the associated diverting valve documentation.
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7. 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	<i>Risk of dangerous failure due to malfunction in the event of emergency (diverting valve does not move to the fail-safe position).</i> Only use devices in safety-instrumented systems that have passed the proof test according to the test plan drawn up by the operator.
 NOTICE	<i>Malfunction due to a non-observance of the required inspection requirements.</i> To test the fail-safe action properly, the following requirements must be met: <ul style="list-style-type: none">– 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}).

 Tip	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).
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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)
- ⇒ Material fatigue
- ⇒ Wear induced by the process medium

- ⇒ Abrasion (material removed by solids contained in the process medium)
- ⇒ Medium deposits
- ⇒ 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 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: [bar]
Inlet and outlet pressure
- Temperatur: [°C]
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. [bar] max. [bar]
For the actuator design we need the air supply

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

