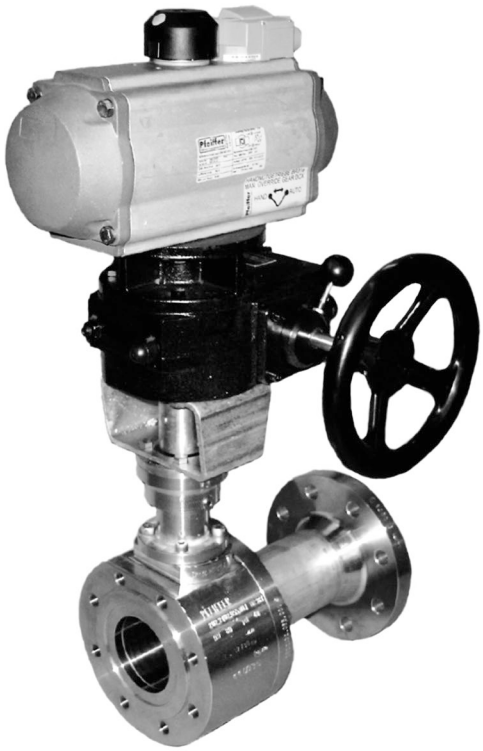
SAFETY MANUAL

SH 28y

Translation of original instructions



BR 28y Piggable Ball Valve
BR 28z Piggable End Station

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

1.2 Purpose of this manual

The Safety Manual **SH 28y** contains information relevant for the use of the **BR 28y** piggable ball valve as well as the **BR 28z** piggable end station 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**	*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 valve. You can download these documents from the PFEIFFER website.

- Data sheet BR 28y ▶ **TB 28y**
- Data sheet BR 28z ▶ **TB 28z**
- Mounting and operating instructions BR 28y ▶ **EB 28y**
- Mounting and operating instructions BR 28z ▶ **EB 28z**
- Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves ▶ **WA 236**

 **NOTICE**	In addition to the ball valve documentation, observe the documentation for the actuator and valve accessories.

2. SCOPE

2.1 General

The **BR 28y** piggable ball valve in combination with an actuator (e.g. **BR 31a** pneumatic rotary actuator) is designed to regulate the flow rate, pressure and temperature control of liquid media in a piggable pipe system.

The **BR 28z** piggable end station in combination with an actuator (e.g. **BR 31a** pneumatic rotary actuator) is designed to regulate the flow rate, pressure and temperature control of liquid media in a piggable pipe system. The pig is stopped in the valve.

2.2 Use in safety-instrumented systems

The piggable ball valve can be used in safety-instrumented systems according to IEC 61508 and IEC 61511. The ball 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

Piggable ball 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 piggable ball valve and actuator are normally delivered already assembled by PFEIFFER.

3. TECHNICAL DATA

Table 1: *DIN version*

Type	**28y**	**28z**
Nominal size	DN 50 ... 200	DN 50 ... 200
Nominal pressure	PN 25, PN 40	PN 25, PN 40
Material [1]	1.4571 / 1.4408	
Face to face	Special face-to-face dimensions	
Flanges	DIN 2430-2 (VS) / DIN EN 1092-1, various forms	
Seat-ball seal	soft seal	
Heating jacket	on request	
Compliance	CE, EAC	
Temperature ranges Permissible operating pressures acc. to pressure-temperature diagrams, see Data sheet ▶ TB 28y or ▶ TB 28z		
Body	-10 ... +200°C (14 °F ... 392 °F)	
Leakage class acc. to DIN EN 12266-1, Test P12		
Metal seal	-	-
Soft seal	A	A

[1] Other materials optionally available

Table 2: *ANSI version*

Type	**28y**	**28z**
Nominal size	NPS 2 ... 8	NPS 2 ... 8
Nominal pressure	cl150, cl300	cl150, cl300
Material [1)]	A182 F316 / A351 CF8M	
Face to face	Special face-to-face dimensions	
Flanges	DIN 2430 / ASME B16.5	
Seat-ball seal	soft seal	
Heating jacket	on request	
Compliance	CE, EAC	
Temperature ranges Permissible operating pressures acc. to pressure-temperature diagrams, see Data sheet ▶ TB 28y or ▶ TB 28z		
Body	-10 ... +200°C (14 °F ... 392 °F)	
Leakage class acc. 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 piggable ball valve, in combination with a pneumatic rotary actuator, controls the process medium flowing through it.

When the signal pressure acting on the actuator is changed, the springs in the actuator move the actuator stem downward or upward to close or open the piggable ball valve.
The fail-safe action is triggered when no signal pressure is applied to the actuator.

4.2 Fail-safe action

4.2.1 Piggable ball valve BR 28y

If the ball valve is used in a piggable pipe system, the "**HOLD**" safety position **is always preferable**.

⇨ **Piggable ball valve with double-acting "Stop" actuator**
If the air supply fails, the ball valve remains in its position.

4.2.2 Piggable ball valve BR 28x and piggable end station BR 28z

The signal pressure is normally applied to the pneumatic single-acting quarter-turn actuator. The actuator is vented upon demand of the safety-instrumented function. As soon as the actuator is vented, the spring forces cause the actuator stem to move to the fail-safe position. The piggable end station is completely open or completely closed.

Depending on the location of the pistons the actuators direction of action is either clockwise (CW) or counterclockwise (CCW).

Depending on the actuator's direction of action (see the associated actuator documentation), the end station **BR 28z** and **optionally** the ball valve **BR 28y** has one of the following fail-safe positions:

⇨ **Piggable end station with single-acting actuator "Spring closes":**
When the air supply fails, the end station closes [**FC = Fail Close**]. The end station opens when the air control pressure increases acting against the force of the springs.

⇨ **Piggable end station with single-acting actuator "Spring opens":**
When the air supply fails, the end station opens [**FO = Fail Open**]. The end station closes when the air control pressure increases against the force of the springs.

4.3 Protection against unauthorized changes to the configuration

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

Refer to the valve documentation on how to install and start-up the piggable ball 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).

6. REQUIRED CONDITIONS

 **WARNING**	*Risk of malfunction due to incorrect selection or wrong installation and operating conditions.* Only use piggable ball 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 piggable ball valve assembly (ball valve, actuator, valve accessories) for the intended use (pressure, temperature) has been checked.

⇨ The piggable ball valve materials are suitable for the process medium.

⇨ The design of the piggable ball 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 piggable ball 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. An optional arrow on the valve indicates the direction of flow.

⇨ The piggable ball valve is configured with the correct fail-safe position (FC or FO).

⇨ The tightening torques (e.g. for the flanged joints) are observed, see mounting and operating instructions ▶ EB 28y and ▶ EB 28z.

⇨ The end connection of the pipeline is aligned with the piggable ball valve´s end connections and their ends have parallel planes. Connection flanges that are not parallel can damage the ball valve and lead to increased operating torques!

6.3 Operation

⇨ The control shaft is not blocked.

⇨ The medium flow through the piggable ball valve is not blocked.

⇨ The piggable ball 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 valve documentation.

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

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**	*Risk of dangerous failure due to malfunction in the event of emergency (ball 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.
 **NOTICE**	*Malfunction due to a non-observance of the required inspection requirements.* To test the fail-safe action properly, the following requirements must be met: - Piggable ball valve and actuator are assembled together properly. - The piggable ball 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).

8. VISUAL INSPECTION TO AVOID SYSTEMATIC FAILURE

To avoid systematic failure, inspect the piggable ball 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)

NOTICE	*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.

Info	Record any faults in the piggable ball 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 piggable ball valve to move to the end position (completely open or closed).
2. Disconnect the signal pressure. This must cause the piggable ball valve to move to its fail-safe position.
3. Check whether the ball 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 piggable ball valve described in the ball valve documentation.

NOTICE	*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

Tip	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:* 1. March 2024

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