

## SH 31a

### Translation of original instructions



## BR 31a Quarter-Turn Actuator, Edition 2010 and Edition 2020+ Type SRP and DAP






Edition July 2024

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## 1. GENERAL


### 1.1 Definition of signal words

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

### 1.2 Purpose of this manual

The Safety Manual **SH 31a** contains information relevant for the use of the **BR 31a** quarter turn actuator in safety-instrumented systems acc. to IEC 61508 / IEC 61511.


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

 <b>NOTICE</b>	Risk of malfunction due to incorrect mounting, connection or start-up of the device. Refer to the mounting and operating instructions ► <b>EB 31a</b> or ► <b>EB 31a-22</b> on how to mount the device, perform the pneumatic connections as well as start up the device. Observe the warnings and safety instructions written in the operating assembly and maintenance instructions.
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### 1.3 Further documentation

The documents listed below contain descriptions of the start-up, functioning and operation of the pneumatic actuators. You can download these documents from the PFEIFFER website "[www.pfeiffer-armaturen.com](http://www.pfeiffer-armaturen.com)".

- Data sheet BR 31a - Edition 2010 ► **TB 31a**
- Data sheet BR 31a - Edition 2020+ ► **DB 31a-22**
- Mounting and operating instructions BR 31a - Edition 2010 ► **EB 31a**
- Mounting and operating instructions BR 31a - Edition 2020+ ► **EB 31a-22**
- Functional safety of globe valves, rotary plug valves, ball valves and butterfly valves **WA 236**

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



### 2.1 General

The pneumatic quarter-turn actuators **BR 31a** are single-acting with spring return mechanism or double-acting without spring return mechanism for mounting onto valves. The actuators are used to move rotary valves.

### 2.2 Use in safety-instrumented systems

The quarter turn actuators can be used in safety-instrumented systems acc. to IEC 61508 and IEC 61511.

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

 <b>NOTICE</b>	The architecture and the interval between proof tests must be considered concerning the safety integrity level.
 <b>Tip</b>	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

The actuators **BR 31a** without extra travel stop adjustment are suitable for use in safety-instrumented systems. Actuators with extra travel stop adjustment have threaded bars in their caps.

All actuators with SIL label are suitable for safety-instrumented systems. Further information about additional features can be found on the actuator's label.


Actuators with adjustable limit stops are adjusted after adjustment against subsequent adjustment, e.g. with sealing wax, secured.

## 2.4 Mounting

The pneumatic actuators are mounted onto valves with the DIN EN 5211-interface on the bottom site of the actuator. Moreover the **BR 31a** actuator has an interface acc. to VDI/VDE 3845 for control valves and limit switches. Further descriptions are in the associated actuators documentation.

## 3. TECHNICAL DATA

Technical Data are to be found in the data sheets ► TB 31a or ► DB 31a-22. Special features are mentioned in the corresponding data sheets.

 <b>NOTICE</b>	Special versions can have a different temperature range, allowed maximum pressure and limit stop angle compared to the standard version.
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## 4. SAFETY-RELATED FUNCTIONS

### 4.1 Emergency venting

The supply pressure creates a force at the piston surface, which is opposed by the springs in the actuator. Depending on the operating supply pressure the pistons move inwards or outwards. The force generated at the piston is converted into a rotary motion by the pinion shaft that opens or closes the valve.

### 4.2 Fail-safe action

The actuator is vented. As soon as the actuator is vented (supply pressure = atmospheric pressure) the spring forces cause the actuator to move to the fail-safe position.

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

### 4.3 Protection against unauthorized changes to the configuration

The actuator's direction of action can be reversed. However, this is not possible while the process is running.

## 5 OPERATING, ASSEMBLY AND MAINTENANCE INSTRUCTIONS

### 5.1 Mounting of the actuator BR 31a

The actuators **BR 31a** have to be mounted according to the operating, assembly and maintenance instructions. The environmental conditions have to be verified according to specifications. The actuators have to be accessible for a physical inspection.

### 5.2 Physical placing of the actuators

The actuators **BR 31a** have to have enough space for pneumatic connections and manual tests.

## 6. REQUIRED CONDITIONS



**WARNING**

*Risk of malfunction due to incorrect selection or wrong installation and operating conditions! Only use actuators in safety-instrumented systems after the necessary conditions in the plant have been fulfilled.*

### 6.1 Selection

- ⇒ The suitability of the entire control valve assembly (valve, actuator, valve accessories) for the intended use has been checked
- ⇒ The drive torque is sufficiently large to keep the prescribed actuating time and to move the valve to the end position in the event of emergency despite the prevailing pressure
- ⇒ The actuator is suitable for the ambient temperature
- ⇒ The temperature limits are observed
- ⇒ The actuator does not have an extra travel stop adjustment

### 6.2 Mechanical and pneumatic installation


- ⇒ The actuator is mounted properly as described in the mounting and operating instructions and connected to the air supply.
- ⇒ The actuator is configured with the correct direction of action (CW or CCW)
- ⇒ The pneumatic air supply meets the instrument air specifications (class 3; -20°C or at least 10K under the least expected ambient temperature).
- ⇒ The supply air line and vent plug are designed in such a way that the functioning of the control valve is ensured. The minimum inside diameter of the supply air line is observed. The vent plug is not sealed.
- ⇒ The supply pressure does not exceed the maximum limit. The supply pressure restrictions are observed.
- ⇒ The tightening torque is observed.

### 6.3 Operation

- ⇒ The drive shaft is not blocked.
- ⇒ The medium flow through the valve is not blocked.
- ⇒ The actuator is only used in the operating conditions 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 actuator documentation.


 Tip	Contact PFEIFFER concerning any work not described in the section on servicing or maintenance in the associated actuator documentation.
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## 7. PROOF TESTING

The proof testing interval and the extent of testing lies within the operator's responsibility. The operator must draw up a test plan, stating the proof tests and the interval between them. We recommend summarizing the requirements of the proof test in a check-list.


 WARNING	<i>Risk of dangerous failure due to malfunction in the event of emergency (actuator is not vented or the 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"><li>- The actuator is mounted properly onto the valve.</li><li>- The control valve is installed properly into the plant.</li></ul>

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<sub>avg</sub>).

 Tip	PFEIFFER Chemie-Armaturenbau GmbH recommends performing the proof tests based on a checklist. An example of such a checklist is included in the brochure WA 236 (functional safety of globe valves, rotary plug valves, ball valves and butterfly valves)
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### 7.1 Function testing

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

 Note	Record any faults in the actuator and inform PFEIFFER in writing.
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### 7.2 Emergency venting

- ⇒ Apply supply air within the permissible range to the actuator which allows the valve to move to the maximum travel.
- ⇒ Adjust the supply pressure. This must cause the valve to move to its fail-safe position.
- ⇒ Check whether the actuator is fully vented within the demanded time.

### 7.3 Visual inspection to avoid systematic failure

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

- ⇒ Dirt blocking the pneumatic connections
- ⇒ Drive shaft blocked
- ⇒ Corrosion (destruction primarily of metals due to chemical and physical processes)
- ⇒ Material fatigue
- ⇒ Aging (damage caused to organic materials, e.g. plastics or elastomers, by exposure to light and heat)
- ⇒ Chemical attack (organic materials, e.g. plastics or elastomers, 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.

## 8. REPAIRS

Only perform the work on the pneumatic actuator described in the mounting and operating instructions ► EB 31a or ► EB 31a-22.



**NOTICE**

*Fail-safe action impaired due to incorrect repair!*  
Service and repair work must only be performed by trained staff.

