

Installation, Operation, Maintenance Instructions

Standard Valves with Bellows Seal

Series 035 300 Globe Valves

Series 031 300 Angle Valves

Series 033 300 3-Way-Valves

1 GENERAL INFORMATION

These instructions are designed to support you when unpacking, installing and performing maintenance work on the valves. Users and maintenance personnel should carefully read these instructions before installing, operating or performing maintenance work. There is a separate set of instructions for accessories (special seat/plug fittings, diaphragm actuators, handwheels, special seats, etc.).

These instructions do not contain any information on Kämmer positioners. For this, see corresponding instructions for the installation, maintenance, troubleshooting, adjustment and operation of Kämmer positioners.



To avoid damage or injury to personnel or equipment, always heed all warnings and instructions. Unprofessional re-conditioning, the use of foreign replacement parts or the performance of other maintenance steps than those described here, may cause a loss of efficiency or lead to personnel injury or damage to parts, and render the warranty void

1.1 UNPACKING

- 1.1.1 Each delivery includes a packing slip. When unpacking, check all delivered valves and accessories using this packing slip.
- 1.1.2 Larger valves can be lifted using slings on the yoke rods or, if present, on the lugs provided for this purpose. If slings are used, attach them so that the outer tubing or attaching parts are not damaged.



Important: If slings are used, be aware that the centre of gravity of the valve may be above the lifting point. In this case, secure or support the valve against rotating, to prevent damage or personnel injury.

- 1.1.3 Report transport damage to the carrier immediately.
- 1.1.4 In case of discrepancies, contact your nearest dealer.

1.2 INSTALLATION

- 1.2.1 Clean tubing prior to installing.
- 1.2.2 If possible, install the valve in an upright position (actuator on top), to ease maintenance. An upright installation position is important with low-temperature applications, in order to keep the distance between the packing material and the medium as large as possible. The packing material then retains the ambient temperature as much as possible.



Important: Do not insulate extension bonnets that are provided for hot or cold services

- 1.2.3 Make sure that sufficient overhead clearance above the actuator is maintained, to allow for disassembly of plug from the valve body (see following table).

Actuator size	Clearance (mm)	Actuator size	Clearance (mm)
37/47	95	P2	140
38/48	140	P3	140
39/49	140	P4	140
39D/49D	140	P5	140

- 1.2.4 After installing, check direction of flow again. The direction of flow is shown by the arrow on the housing.
- 1.2.5 If the valve is to be welded into the line, make sure that the valve is shielded from excessive heat.
- 1.2.6 Connect supply pressure and signal lines. Control valves can be supplied with a positioner. The end connections for supply pressure and signal are clearly marked. Actuator and positioner are suitable for max. 4.2 bar (60 psi) supply pressure. If the supply pressure exceeds the pressure specified on the nameplate, a pressure reducing station is required. If instrument air is not available, install an oil separator/air filter in the air inlet line. All connections must be leak free.

1.3 QUICK CHECK:

Before operating, check the valve as follows:

- 1.3.1 Open and close the valve, and observe the movement of the actuator stem. The movement must be smooth and linear.
- 1.3.2 Check for maximum stroke through change of signal (for pneumatic positioners, 0.2 - 1.0 bar or corresponding split-range values; for IP positioners, 4-20 or 0-20 mA).
- 1.3.3 Check all air connections for leaks.
- 1.3.4 The packing gland nut must always be tightened slightly more than finger-tight.



IMPORTANT: An excessively tightened gland nut can cause excessive packing wear and can hinder the free movement of the plug stem.

- 1.3.5 Check fail-safe position. To do this, close supply pressure and observe whether the valve opens or closes as prescribed.
- 1.3.6 After using at fluctuating temperatures, re-tighten all bolt connections and check for leaks.

2 MAINTENANCE

Check valves for correct functioning at regular intervals (at least once every 6 months) as follows. This check can be made when installed and in many cases without interrupting production. If internal defects are suspected, see section on „Disassembly and Assembly of Valve“.

- 2.1 Examine gaskets for leaks and if necessary re-tighten bolts (see Fig. 1).
- 2.2 Check bellows gasket and test connection - if present - for external leaks.
- 2.3 Check valve for damage caused by corrosive residues or corrosive vapours.
- 2.4 Clean valves and if necessary repaint.
- 2.5 Check packing bolts for correct tightening. Gland nuts on packing may only be tightened slightly more than finger-tight, or only tight enough to ensure a proper seal.



IMPORTANT: An excessively tightened gland nut can cause excessive packing wear and can hinder the free movement of the plug stem.

- 2.6 If possible, open and close valve and check for maximum stroke and smooth movement of the plug stem. Irregular movement of the plug stem may indicate internal defects.

Note: With graphite packing, irregular movement of the plug stem is normal.



IMPORTANT: Keep hands, hair, clothing, etc. away from all moving parts. Failure to do so can lead to serious injury.

- 2.7 Check all accessories for firm seating.
- 2.8 If possible, close supply pressure and check the fail-safe position.
- 2.10 Check stem boot for wear.
- 2.11 Check actuator for leaks. To do this, spray housing, air connections and plug stem guide with leak spray and note any bubble formation.
- 2.12 Clean plug stem.
- 2.13 Check air filter, if present, and if necessary replace insert.

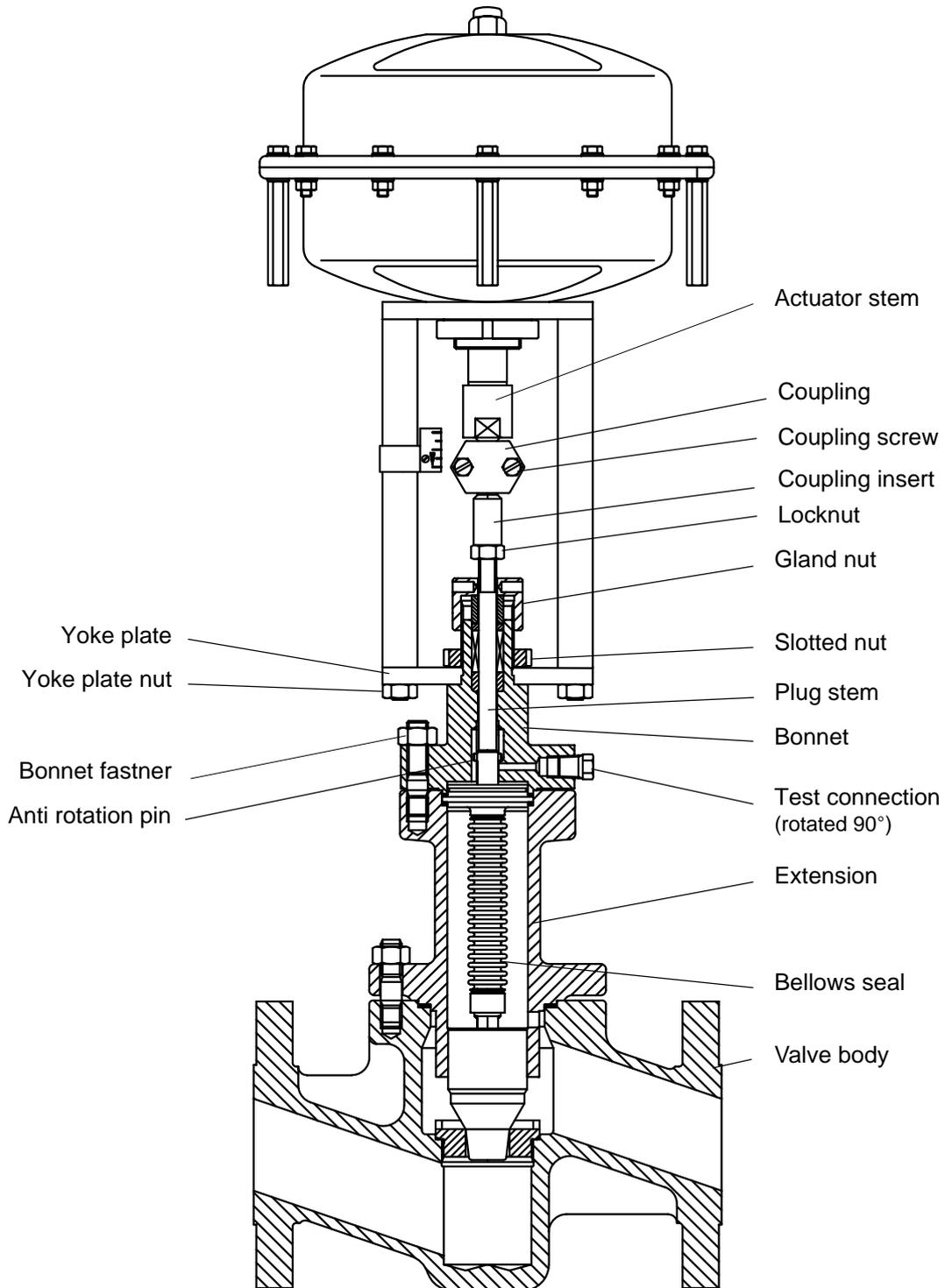


Fig. 1
Typical actuator and valve configuration

REMOVE AND INSTALL ACTUATOR

General Information

We recommend separating the actuator from the valve during all repair work. However, many maintenance and adjusting operations can be carried out in an installed condition.

3.1 Remove actuator

(see Fig. 1)

3.1.1 Shut off air supply.



WARNING: Depressurise the line to atmospheric pressure and drain all fluids from the valve before working on the actuator. Failure to do so can cause serious injury.

3.1.2 Disconnect all tubing.

3.1.3 Remove 2 screws and remove coupling.

3.1.4 Remove yoke rod retaining nuts and lift actuator assembly from the valve.

3.1.5 Remove coupling insert and its locknut from plug stem.



Attention: Ensure that the plug assembly is not rotated with the plug seated. This may cause irreparable damage to the seating faces.

3.2 Install actuator

(see Fig. 1)

The actuator stem must be fully extended:

Actuators with air-to-open action must be fully vented. Actuators with air-to-close action apply supply pressure.

Manually depress the plug stem to ensure the plug is fully seated.

3.2.1 Screw coupling insert locknut and coupling insert as far as possible onto plug stem.

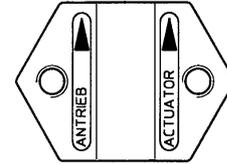
3.2.2 Place the actuator assembly on the valve engaging the yoke rod threads in the lower yoke plate and ensuring the actuator faces in the correct direction.

3.2.3 Unscrew the coupling insert until the yoke rods are raised from the lower yoke plate by around 2 mm.



Attention: Ensure that the plug assembly is not rotated with the plug seated. This may cause irreparable damage to the seating faces.

3.2.4 Refit the coupling, ensuring that the arrows, embossed on the coupling halves, point upward towards the actuator, and secure with 2 retaining screws.



3.4.5 Apply supply pressure resp. vent actuator to half stroke and refit and tighten yoke rod retaining nuts (15).

3.4.6 Connect all tubing.

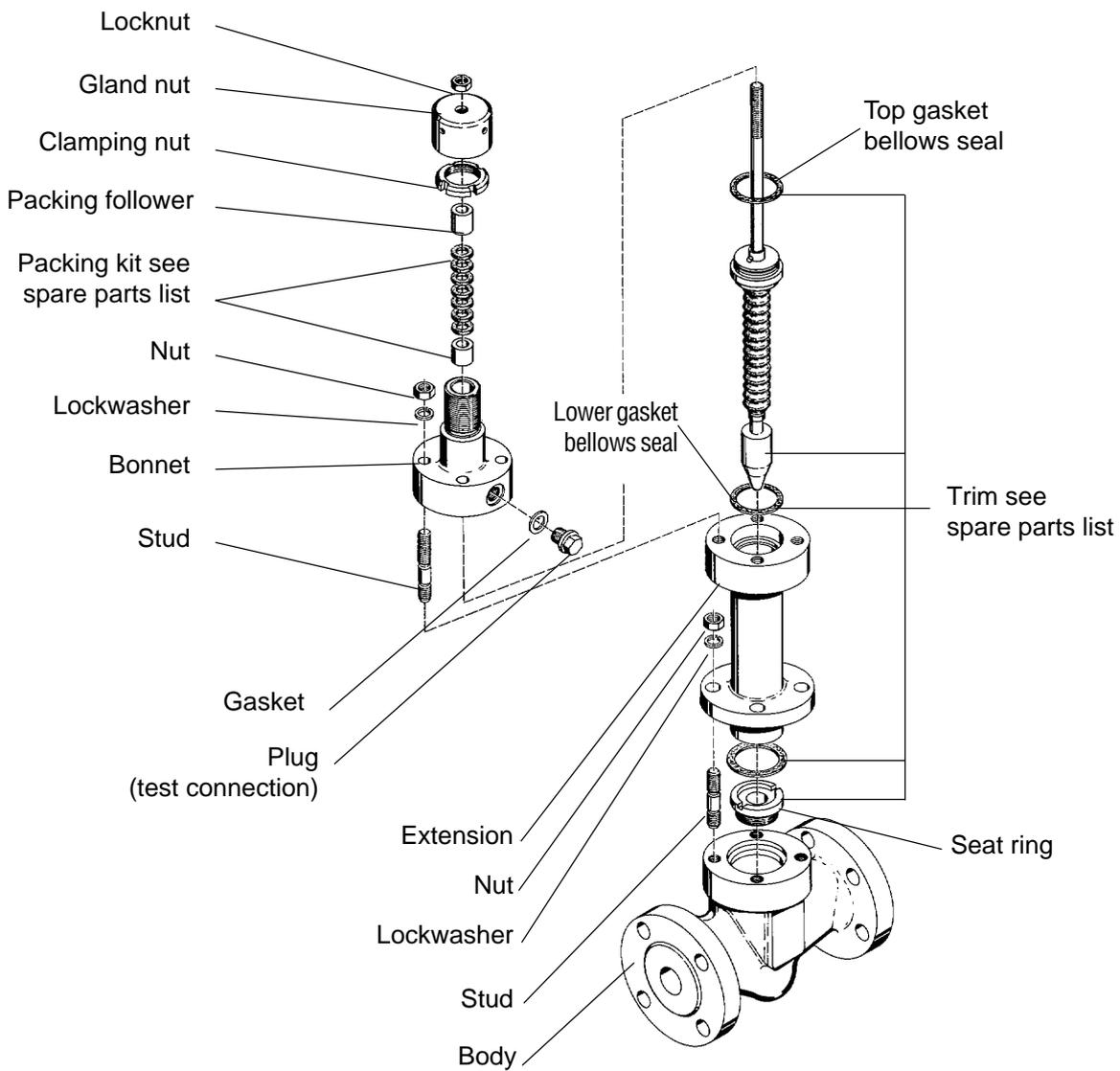


Fig. 2

4 DISASSEMBLE AND ASSEMBLE VALVE

4.1 Disassemble Valve

(see Fig. 2)



IMPORTANT: As poisonous or hazardous materials may be present, the system must be depressurized and all processing materials must be drained. If necessary, decontaminate the valve. Keep hands, hair, clothing, etc. away from all moving parts. Wear face and eye protection. Failure to do so can lead to serious injury.

4.1.1 Carefully loosen test connection and check whether medium has collected in the bellows seal bonnet (defective bellows).

4.1.2 Remove bolts/nuts from bellows seal bonnet and remove bellows seal bonnet.

Note: Due to the friction coefficient of the packing, the bellows usually also comes out when the bonnet is removed. In this case, hold the bellows to ensure that it does not drop and be damaged.

4.1.3 If the bellows remains in the seal housing, the bellows can be carefully levered out using two screwdrivers inserted in the outer groove of the bellows upper part.

4.1.4 Without stretching the bellows, remove the plug/bellows assembly from the bonnet and remove carefully and upright out of the extension. Do not lose anti-rotation pin. Using a drift, press guides, packing and packing follower from below (the drift must have a slightly larger diameter than the plug stem).

4.1.5 With soft seat version, loosen plug tip with appropriate tool and remove soft seat gasket.



IMPORTANT: When the tip of the plug is loosened, medium residue may be released, which has diffused through the gasket.

4.1.6 Remove bellows seal extension bolts/nuts and remove extension..

4.1.7 Unscrew seat ring with seat ring tool.

4.1.8 Check seal faces of seat ring and plug for damage. Gasket surfaces must be clean and free of damage.



IMPORTANT: To prevent damage to the seat, plug or plug stem, follow the above instructions precisely.

4.1.9 If a seating surface needs re-machining , seat and plug seating surfaces must be reworked. The seat angle on the plug is 30°, on the seat ring 25°. If the valve is correctly assembled, lapping is not required.



IMPORTANT: When re-machining the plug, protect plug stem and bellows from damage and support upper part of bellows towards plug stem. The seat surface must be concentric to the plug stem. When re-machining the seat, the seat surface must be concentric to the seat outer diameter.

4.2 Assemble Valve

(see Fig. 2)

4.2.1 All worn or damaged parts must be replaced. Reusable parts must be clean. Expendable parts such as gaskets, packing and O-rings should always be replaced.

4.2.2 Insert seat ring and tighten. For torques, see following table.

Size	Body material	Torque
DN 15/25 (1/2")	1.4581 cast	125 Nm
	1.4571 forged	125 Nm
DN 40/50 (1 1/2")	1.4581	200 Nm
	1.4571	250 Nm
DN 80 (3")	1.4581	230 Nm
	1.4571	270 Nm
DN 100 (4")	1.4581	400 Nm
	1.4571	500 Nm
DN 150 (6")	1.4581	450 Nm
	1.4571	600 Nm

4.2.3 With soft seat, using a new soft seat gasket, screw plug tip back on.

4.2.4 Insert new gasket for bellows seal extension.

4.2.5 Position bellows seal extension slowly and upright into the bonnet and tighten retaining screws/nuts alternating crosswise.

4.2.6 Insert lower bellows gasket.

4.2.7 Carefully insert plug/bellows assembly in bellows seal extension and install anti-rotation pin.

4.2.8 Insert upper bellows gasket in bellows seal bonnet.

4.2.9 Position bellows seal bonnet (test connection forwards) and uniformly tighten screws/nuts hand-tight, alternating crosswise.

4.2.10 Using a torque wrench, gradually tighten all screws/nuts to the prescribed torques (see following table), alternating crosswise.

Thread	Hex bolt DIN 933 A2-70	Waisted bolt DIN 2510		Studs DIN 939 CK 35
		1.7709	1.7258	
M 8	20 Nm	–	–	–
M 10	35 Nm	–	–	20 Nm
M 12	60 Nm	44 Nm	36 Nm	35 Nm
M 16	145 Nm	115 Nm	92 Nm	80 Nm
M 20	280 Nm	–	–	–
M 24	250 Nm	–	–	270 Nm

IMPORTANT: ensure that the gaps in the packing rings are distributed evenly around the circumference in the packing box (gaps not in line).

Note: different packings and fitting sequence is shown in the spare parts list.

6.2.12 Insert packing follower. Fit gland nut for transport purposes only. Gland nut to be fitted correctly and tightened down when actuator is mounted.

4.2.13 When performing subsequent pressure test, note the max. permissible pressure for the bellows. After the check for leaks, close off test connection with plug or suitable gauge.

4.2.11 Replace packing by inserting packing rings one at a time tapping each one down with a suitable bushing.

Trouble-shooting Chart

Fault	Possible Cause	Remedy
Stem motion impeded	<ol style="list-style-type: none"> 1. Packing excessively tightened 2. Operating temperature too high for selected trim 3. Supply pressure inadequate 4. Positioner defective 	<ol style="list-style-type: none"> 1. Tighten gland nut slightly more than „finger-tight“ 2. Note operating data and contact dealer 3. Check system for leaks in the supply pressure or signal lines. Re-tighten the connections, if necessary replace leaky lines 4. See operating instructions for positioner
Excessive leakage	<ol style="list-style-type: none"> 1. Bonnet loose 2. Worn or damaged seat ring/plug 3. Gaskets damaged 4. Inadequate actuator thrust 5. Plug incorrectly adjusted 6. Incorrect direction of flow 7. Handwheel incorrectly adjusted (acts like end stop) 	<ol style="list-style-type: none"> 1. See step 4.2.5 for correct tightening of bonnet. 2. Re-machine or replace seat ring/plug. 3. Replace gaskets 4. Check air feed. If air feed is OK, contact dealer. 5. Correctly adjust plug according to step 3.2.4 6. Check specification. Contact dealer 7. Adjust handwheel
Inadequate flow	<ol style="list-style-type: none"> 1. Plug incorrectly adjusted (short stroke) 2. Positioner defective 3. Operating requirements too high 	<ol style="list-style-type: none"> 1. Correctly adjust plug according to step 3.2.4 2. See operating instructions for positioner 3. Check operating data. Contact dealer
Plug slams	<ol style="list-style-type: none"> 1. Plug adjustment incorrect 2. Inadequate supply pressure 3. Trim too large for flow rate 	<ol style="list-style-type: none"> 1. Correctly adjust plug according to step 3.2.4 2. Check supply pressure, seal leaks, remove blockage 3. Replace trim

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