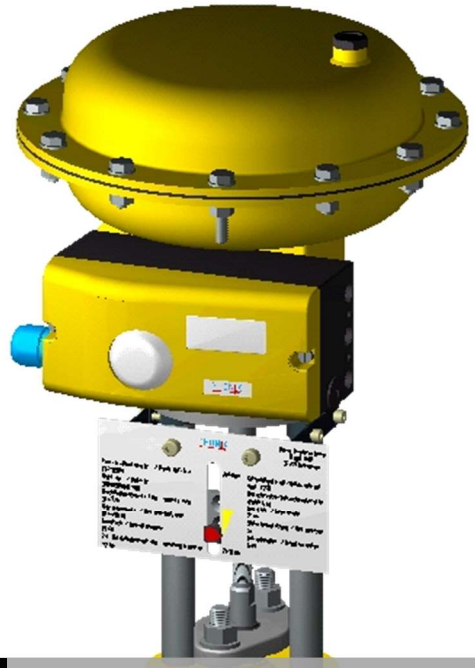
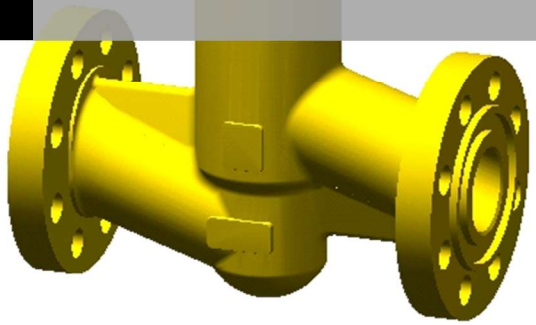


PHOENIX ARMATURENWERKE GMBH

OPERATION, MAINTENANCE AND REPAIR INSTRUCTIONS

BA 118-CV-A-E – 2023-08-00



[Ed.2023-08-00]

[Control Valves for Chlorine and Process Service] |

Declaration of conformity acc. to Directive 2014/68/EU

The manufacturer	**PHOENIX Armaturenwerke GmbH 34471 Volkmarsen**
declares that the valves	**Control valves with bellows seal and secondary stuffing box seal types 359, EC.8 and EC.9 Control valves with stuffing box seal types 311** • **with pneumatic / electric / hydraulic** • **with free spindle for posterior actuator assembling**

1. are pressure bearing equipment's within the meaning of the EC Pressure Equipment Directive 2014/68/EU and in conformity with the requirements of this directive,

   Note : Control valves < DN 32 are not concerned by this directive

2. are not to be considered complete machines in the meaning of EG Machine Directive 2006/42/ EG but meet the relevant requirements of this directive
3. can only be used and operated under observance of the attached operation manual N° A118-CV-A-E.

Related standards :

EN 16668	**Requirements and testing for metallic valves as pressure accessories** **Direction for pressure bearing body components** Body- and Bonnet Material acc. AD 2000 AD-A4 with Inspection Certificate 3.1 to EN 10204
EN 19	**Marking of metallic valves**
DIN-EN-ISO 12100	**General design principles, risk assessment and risk reduction methods**

Description of type and technical features :

PHOENIX-type data-sheets <359, EC.8 and EC.9, 311>
NOTE: This manufacturer declaration is valid for all variants of types mentioned in the PHOENIX catalogue

Applied procedure for the rating of the conformity :

to Annex II of the Pressure Equipment Directive 2014/68/EU Module „H“

Name of the notified body :	*Identification N° of the notified body :*
LRQA Deutschland GmbH	**0525**

Modifications on globe valves and/or components with consequences for the technical features of the valve, of the <defined use> acc. to section 1 of the operation instruction and which will modify the valve essentially cancel these declarations.
According to the guidelines for the application of the Council`s general direction 2014/34/EU (94/9/EG) for adapting legal regulations valid in the single member countries and dealing with apparatuses and safety systems and their application in areas endangered by explosion, globe valves do not have an integrated potential source of sparks as revealed by the danger of releasing sparks analysis. Due to this, globe valves are not subject to the guideline mentioned above.

Volkmarsen, 31.08.2023

Gunter Wodara, CTO

0. General Information

This instruction shall support the user for installation, operation and maintenance of control valves **Type 359, EC.8 and EC.9, 311**.

0.1 Defined use

After their installation in a piping system (either between flanges or by welding) the use of the control valves **Type 359, EC.8 and EC.9, 311** is exclusively defined as control valves which due to their characteristic provide control of flow and/or pressure drop in pipelines.
They differ from on/off-valves as the port is reduced as compared to the line size. This reduction of the port enables an exact control of through put as well as reduction of pressure from high to low pressure level.

0.2 Premises

Before shipment **all PHOENIX valves** are carefully inspected on pressure and leakage. The following instructions should enable the end-user to maintain these valves, and to undertake maintenance work and minor repairs. Before any repair is initiated, the customer should examine whether an overhaul is recommendable and still within an economic proportion.

 **Note**	All dismantling and assembly work of the valve during the warranty period must be performed by PHOENIX personnel or its authorized service provider. In special cases after prior consultation and agreement with PHOENIX, qualified technical personnel can be deployed by the customer.

1. Features

Control valves have essential parts in common with shut-off valves. The seat bore is always smaller (throttling area, port) than nominal size of the connections. Features of seat and regulating disc depend on nominal size and operating conditions.

The chosen throttling area has to be smaller than that of the nominal size to avoid obstruction of downstream flow. There may occur resistances in the downstream section that would reduce the flow, if the port is bigger or equal to the nominal size. Also the port has to be sized SG that flow control is not limited to the scope of the biggest diameter of the regulating cone. In that case high flow velocities would cause jet erosion. The throttling port has to have a smaller area than any other flow area within the pipeline.

- The disc is carried out as a rotary symmetrical part and tightly mounted on the stern. Turbulent flow will not find any lever to cause rotary movement on the disc. Therefore noise and wear or even destruction of the disc is excluded.
- All valves are equipped with a travel indication allowing exact adjustment and readability.

1.1 Control Characteristics

The control valves are available with linear or equal percentage characteristic. For nominal sizes < DN80 (NPS 3) the control ratio for these characteristics is kvs/kv0=50, for kvs < 0, 1 and nominal sizes DN80 (NPS 3) and greater the control ratio is kvs/kvO=30. Characteristic kvs-value (cv-value) and control ratio are noted on the valve information plate. Control characteristic and valve specific data will be given on inquire any time.

1.2 Silencer / Perforated Trim (if applicable)

Silencers are applied in valves operating with a high pressure drop. They reduce the pressure in multiple stages. As they represent an additional flow resistance, the kvs/cv-values of control valves with silencers are lower. Usually the nominal size of the valve for those operation conditions is governed by the maximum allowable flow velocity.
As a rule perforated trims are intended for operation conditions, were cavitations occur. The flow will tend to close the valve in those cases.

1.3 Actuators

PHOENIX Control Valves are equipped with a handwheel, electric or pneumatic actuators. The actuators are dimensioned to operate the valve with the supplied energy at the operation site and to shut the valve tightly. The actuator is connected to the lower stern (trim stern) by a coupling that only transfers axial forces, i. e. forces in opening or closing direction. If this connection is removed the disc will move according to the pressure conditions inside the valve. The control valve has a back Beat, which limits the stern travel (trim stern), so that the actuator can be changed without removing the valve from the pipe. Without the actuator assembly the control valve fails to fulfill its function. For this reason the actuator change must not be executed during operation.

2. Marking

For	Marking	Note
CE-Mark	**CE**	Corresponding to PED 2014/68/EU valves shall be marked with the CE-mark only for sizes DN 32 and more
CE-Mark	**0525**	Nominated body to EU Directive = Lloyds Register
Manufacturer	**P**	„P“ is the logo for <PHOENIX-Armaturenwerke>
Manufacturer-N°	**e.g.:98898/02**	The first figures before the strike are the factory number, the last figures after the strike = item n° g.g. /02 = item 2 of the order
Date of manufact	**e.g.: 05/02**	The first figures before the strike indicate the month of manufacture (05 = May), the figures after the strike = year of manufacture, e.g. (02 = 2002)
Valve type	**Type** (and numerical value)	e.g. Type 359, see Data-sheet PHOENIX
Body material	**e.g.: 1.0619.01**	N° of material standard to EN 10027, Part 2
Size	**DN or NPS** (and numerical value)	Numerical value in mm, e.g. DN 200 or NPS 8
Max. pressure	**PS or PN** (and numerical value)	Numerical value in [bar] at 20°C, e.g. PS 40
	ANSI and Class (numerical value)	e.g. ANSI 300
Heat-/ Melt N°	**e.g.: 25652 or GHW**	Heat-/Melt N° of the foundry

3. Installation

Valves are subject to the same safety impositions which are valid for the piping system where the valves shall be installed. Therefore, the present instruction mentions only such kind of safety notes which must additionally be considered for valves.

3.1 General

For the installation of valves into a system the same instructions are valid as for the connection of pipes among themselves and similar piping components. In addition the following instructions are valid for control valves. For the transport to the installation place please mind the information given in section 3.3 of this manual.

3.2 Installation Requirements

The valve must be installed such that the pressure differential across the closure element is in the direction of the arrow marked on the valve body.

In order to avoid turbulent flow through the valve it should be installed within a section of approx. 10 x DN straight pipe upstream and downstream of the valve. There should not be any other valves or apertures in the section of the pipe.

The type and amount of the piping loads must not exceed the planned and envisaged extent at any time. Ideally, expansion joints should be used in order to be able the counter the pipes heat expansion. The selection and construction of the expansion joints is subject to the piping design and layout. Any support required to support the valve weight must be designed such that it avoids external pipe loads.

Unless specifically designed for such purpose the valve must not be used as a fixed point in the piping.

If an installation position is not agreed, the valve must be installed with a vertically positioned valve stem up to a maximum of 90 degree inclination from the verticalness. Any other installation position may be possible after prior consultation with PHOENIX. For valves with planned horizontal stem installation, it is necessary to support the actuator. Usually it is sufficient if the actuator's own weight is supported. The installation instructions from the actuator manufacturer must be observed.

The valve and actuator should be easily accessible. There must be sufficient space for any installation, assembly or dismantling work. For each valve, a dismantling height of approximately 1, 5 * DN is sufficient. If such height isn't available, see the outline drawing of the corresponding CP for exactly information.

3.3 Transport to Installation Site and Unpacking

The valve should be transported to the installation site in its original packaging. It is recommended to remove the valve from the packaging just prior to installation.

Prior to installation valve material, orientation and flow direction should be double checked and verified with the pipe system layout.

Inspect the valve on possible transport damages. Damaged valves shall not be installed.

3.4 Installation into the piping system

Prior to the installation it has to be checked that only control valves will be installed whose pressure rating, type and dimensions of connections correspond to the operating conditions. In this regard also see related marking of the control valve.

 **Note**	The arrow on the valve indicates the flow direction. This arrow shall be matched to the flow direction of the pipe section.

The valve ends are closed with caps or flanges that must be removed and the valve's orifices and internal must be checked for any protective or foreign material prior to installation. Any protective coatings applied to the valve connections shall be removed.

Suitable points (e.g. pillars, valve body) must be chosen for the attachment of lifting aids to lift the valve. The valve handwheel or the actuator shall not be used for the attachment of lifting aids.

 **Danger to life**	Control valves whose admitted pressure-/temperature rating is not sufficient for the operating conditions shall not be installed. **Disregard of this precautionary measure can provoke danger to life for the user and damages in the piping system.**

The connections of the piping system shall be in strict alignment with the end connections of the control valve and have plane parallel ends. Before the installation the valve and the corresponding pipe shall be carefully cleaned from dirt and contaminations, especially hard foreign particles shall be removed. The flow direction of control valve is marked by an arrow.

3.5 Installation of Control valve with Weld Ends

 **Note**	Check valve position prior to the welding procedure.

The welding operations should be executed according to the specific welding procedures and by qualified welders.

Note	Grounding connection of the welding station has to be fixed on the piping at the side of the weld. Ensure to change the position between the welds. To avoid any arcing on sealing surfaces it is not allowed fixing the grounding connection on valve parts.

Do not stress or strain the pipe in order to adjust the position between pipe and valve for welding operations. When welding the valve, the valve housing must not be used to test the weld electrodes or for polarity. During welding, the valve must be in an intermediate position to ensure good heat extraction.

If the end-user specification comprises the requirement to disassemble the complete bonnet with trim parts before the welding process, it must be guaranteed that, after the welding process, the origin bonnet will be assembled in the same position as before disassembling. To ensure that, the right position of body and bonnet have to be marked before disassembling. For the disassembling and the assembling process of the bonnet with trim parts, the valve must be fully opened.

The welding must be performed workmanlike in such way that the weld seam has all around a uniform temperature. The welding method must be selected in accordance with the requirements from the piping plan.

Irrespective of the used welding method and the resulting welding temperature it has to be ensured by the intermediate position of the valve that the heat will be dissipated well.

Take precautions to keep away any weld splatter from the sealing surfaces.

Only temperatures of less than 300°C, measured on the body wall, are admitted.

Note	Differences in welding temperatures and possible stress relieving to the piping during the welding operation may affect the seats geometry and can cause leaks.

3.6 Function test

A functional test and clearance check must be performed after each installation and prior to commissioning of the valve.

The free movement must be checked over the entire stroke.

4. Pressure Test

For the pressure test of control valves the same instructions are valid as imposed for the piping system. In addition the following shall be considered:

- Newly installed pipe system shall be carefully cleansed to flush off all foreign particles.
- The test pressure “PT” of an **opened valve** shall **not exceed the value 1,5x PN/PS** by virtue of the marking of the valve**.**
- The test pressure “PT” of a ***closed valve*** shall **not exceed the value 1,1x PN/PS** by virtue of the marking of the valve.

5. Commissioning

5.1 Start up

During the start-ups, extreme loads occur throughout the entire system.

The valves are subjected to the operating pressure and heat expansion, therefore the pressure and temperature must be increased slowly.

When a valve is installed in closed position or as final shut-off device, during the commissioning of a piping section it must be assured at temperatures of >100°C that the handled medium will be slowly fed-in - a temperature gradient of approx. 50°C/h shall not be exceeded. Otherwise the valve's body can be distorted and the valve may leak. Leaks must be sealed immediately. Leaks can lead to damage.

After the pressure test and initial set up, the torques of the cover bolting should be verified to the values stated in chapter 11 of this document.

5.2 Measures to Ensure Personnel Safety

 **Danger to life**	Prior to any maintenance and assembly work, make sure that the valve is not under pressure or temperature and that the system before and after the valve is completely blocked of.

It has to be ensured that the valve and the piping section are blocked of, depressurized, and has cooled down prior to assembly work to prevent from being injured.

Serving and maintenance work may only be performed by trained staff. In case of doubt contact PHOENIX before commissioning.

Never use the valve as a step or climbing aid. This entails the risk of slipping-off or damaging the valve.

Do not exceed the maximum permissible pressure. Take always precautionary measures to avoid possible water hammer peaks.

6. Operating Instructions

6.1 Normal Operation

Turning the handwheel clockwise provokes the closing of the control valves and an anticlockwise operation opens the valve. Normal hand force is sufficient for the operation of the handwheel.

Note	The use of extension rods, levers and similar tools to increase the operation moment are not permitted.

Danger to life	Before any maintenance and assembly work, make sure that the valve is not under pressure or temperature and that the system before and after the valve is completely blocked off.

Note	All dismantling and assembly work of the valve during the warranty period must be performed by PHOENIX personnel or its authorized service provider. PHOENIX recommends that all dismantling and assembly work of the valve beyond the warranty period shall be performed by PHOENIX personnel or its authorized service provider.

During the inspection of the valve and piping section no leakage shall appear neither on the flanged and/or screwed connections nor on the stuffing box. In case of leakages see section 6.2 in this document.

It is recommended that control valves which are permanently operated in one position (either open or closed) should be operated to the reversed position for a short period three to four times a year.

6.2 Troubleshooting

Maintenance work should be carried out in accordance with the safety rules form the end user, the relevant Accident Prevention Regulations.

Note	All dismantling and assembly work of the valve during the warranty period must be performed by PHOENIX personnel or its authorized service provider. PHOENIX recommends that all dismantling and assembly work of the valve beyond the warranty period shall be performed by PHOENIX personnel or its authorized service provider.

Trouble Phenomena	Possible causes	Fault remedy
Leakage through gland packing	- Inadequate maintenance - Failure of bellows, insufficient resistance to temperature or medium - Wear of packing material	Tighten the nuts of the gland follower alternating and clockwise in little steps of max. ¼ turn to a ¼ turn until the leakage stops.
Leakage on body-bonnet flange connection	- Settling of the bonnet flange bolts - Excessive pressure stresses on the bonnet flange bolting - Inadequate maintenance - External influences - Failure of seal, insufficient resistance to temperature or medium.	Retighten connecting bolts crosswise.
Leakage in closed position	- Solid particles in the medium have been set onto the sealing surface - Solid particles in the medium damaged the sealing surface	Open valve slightly to flush contaminants from seat area.
Functional failures	- Insufficient lubrication - Deformation of the stem trough excessive tightening of the valve or through thermal stress	Check stem and stem nut. Renew lubrication.

6.2.1 Leakage through gland packing

Possible causes are:
- Inadequate maintenance.
- Wear of packing material,
- Failure of gland caused by the use of a packing material without insufficient resistance to temperature or medium.

Remedy: Tighten the nuts of the gland follower alternating and clockwise in little steps of max. 1/4 turn to a 1/2 turn until the leakage stops. For torque values see chapter 11.3 of this document.

For bellow sealed valves the packing serves as an emergency backup seal. For bellow sealed valves a discharge of fluid involves damaged bellows in any case. When the bellows is damaged, PHOENIX recommends tightening down the emergency packing. In most cases this procedure makes it possible that the valve can remain in line until the spare bonnet is supplied.

If the stem of a control valve is in good condition, leaks at the stuffing box can usually be stopped by setting up on the gland. Where moisture appears or actual dripping occurs at the

packing chamber around the stem or gland which cannot be eliminated by setting up the gland the following points should be considered.

The packing gland may be binding against the packing chamber or stem and does not compress the packing properly. Make sure the gland fits the packing chamber and is tightened down equally on each side.

If the leak persists, contact PHOENIX and block the valve until further notice.

6.2.2 Leakage on body-bonnet flange connection

Possible causes are:

- Settling of the bonnet flange bolts
- Excessive pressure stresses on the bonnet flange bolting.
- Inadequate maintenance.
- External influences
- Failure of seal as a result of insufficient resistance to temperature or medium.

Remedy: Retighten connecting bolts crosswise. For torque values see chapter 12.2 of this document.
Should the leak fail to stop after tightening, it must be concluded that there is an imperfect seal, and the valve has to be opened for examination. For the disassembly see sections 9.1.1 and 9.1.2 in this document.
The sealing surfaces of the valve body and valve flange must be handled with great care, and any residual sealing material must be completely removed.
The sealing surfaces must be undamaged and smooth, and the surface structure must be equal to the original one. The remachining of the sealing surfaces (valve body, bonnet) should be carried out only by skilled personnel using the correct tools. Regardless of the cause of failure, opened pressure-seal bonnets should always be reassembled with a new gasket.

6.2.3 Leakage in closed position

Possible causes are:

- Solid particles in the medium have been imbedded into the sealing surface preventing a closing
- Solid particles in the medium damaged the sealing surface

Remedy: open valve slightly to flush contaminants from seat area

First, try opening the valve slightly to flush any foreign material from the seating surfaces and then fully close the valve. If this doesn't stop the leakage, it must be concluded that there is an imperfect seal, and the valve has to be opened for examination. Remove the valve's bonnet, clean and check the internal parts. For the disassembly see sections 9.1.1, 9.1.2, 9.3 and 9.4 in this document. In case of damaged seats a repair will be necessary.

 **Note**	**Always replace bonnet gasket (18), when opening the valve bonnet.**

6.2.4 Functional Failures

Possible causes are:
- Insufficient lubrication
- Deformation of the stem trough excessive tightening of the valve or through thermal stress

Remedy: use spare parts if required, renew lubrication

Check stem and stem nut. The stem has to be free of damages. In case that there are scratches or grooves onto the stems surface, it has to be replaced. In case the stem and stem nut are free of damages clean stem from dirt and contaminations and lubricate. After the stem lubrication, the valves should be operated a number of times and lubrication repeated if necessary.

7. Maintenance

7.1 Daily Maintenance

For control valves regular maintenance work is not required. However, during the inspection of the piping section no leakage shall appear neither on the flanged and/or screwed connections nor on the stuffing box.

7.2 Periodic preventive Maintenance

To avoid functional failures preventive maintenance contains the lubrication of the control valve.
The frequency of the lubrication will depend on the valve operation cycle, its ambient conditions (pollution, temperature) and the influence of the valve heat on the grease point.
Under normal conditions the stem thread and stem bushing should be lubricated in intervals of three years.

Prior to the lubrication the soiled parts should be cleaned.

For hand operated valves, the stem thread should be brush greased below the yoke head (valve shut) and below the handwheel (valve open).

Note!	After the stem lubrication, the valves should be operated a number of times and lubrication repeated if necessary.

Under normal conditions the stem thread and stem bushing should be lubricated in intervals of three years.

7.3 Periodic tests

To avoid any external leakage the valves should be visual checked every 18 months. In case that any moisture will be detected follow the instructions in section 6.2 of this document.

If there is no moisture or leakage detectable no further steps are necessary.

8. Repairs

8.1 Replacement of Complete Bonnets

In case of leakages on the stem (i.e. damage of the bellows), PHOENIX recommends to tighten down the emergency packing. In most cases this procedure makes it possible that the valve can remain in line until the spare bonnet is supplied.

 **Danger to life**	Prior to any maintenance and assembly work, make sure that the valve is not under pressure or temperature and that the system before and after the valve is completely blocked off.

Prior to the removal of the body-bonnet connection the control valve has to be removed from the line and the following procedure should be applied:

- make sure that the valve is not under pressure before unscrewing bonnet nuts;
- remove the bonnet, be careful not to damage the surface of the connection flange
- remove the bonnet when the disc is in the half open position

Regardless of its condition, opened bonnets should always be reassembled with a new gasket (18).

8.1.1 Dismounting of Bonnet

Open the valve completely, and loosen the nuts (17) of the bonnet. Remove the bonnet (4) as well as bonnet gasket (18). Clean sealing areas and nuts (17). If necessary, replace nuts (17).

8.1.2 Reassembly of Bonnet all types of Chlorine Valves from PHOENIX

Prior to the reassembly of the bonnet the sealing surfaces have to be cleaned and visually checked. After cleaning and checking a new bonnet gasket (18) must be inserted. Position the new bonnet (4) on the studs (16) and tighten the hexagon nuts (17).
Make sure to tighten the hexagon nuts (17) crosswise in order to secure the proper seating of sealing surfaces and the bonnet gasket. For torques see section 12.2.

8.2 Replacement of Bellows Unit EC.1 and / EC.14 and 15 – only for approved Repair Shops

The bellows unit includes the Bellows (3), lower spindle (7), and the stuffing box (5).
The bellows unit should only be exchanged as a whole unit.

8.2.1 Preparation

Initially the pneumatic actuator shall be removed as described in chapter 9.5.1. Loosen the hexagon nuts (17). Remove bonnet (4) and gasket (18). Clean sealing areas and nuts (17). Fix the bonnet (4) for the further disassembling into an auxiliary device, e.g. a bench vise. Disassemble the coupling (8) from the lower stem (7) and the upper stem (10).
Remove hexagon nuts (9.1) from the pillars (12) and the yoke (9). Unscrew pillars (12). Loosen stuffing box nuts (13). Remove gland follower (6) and packing rings (15).

8.2.2 Replacement Procedure only for EC.1and 2 /EC.14 and 15

Cut off the weld seam on the bonnet (4) and be careful not to damage the bonnet (4) in order to refit the replacement unit without problems. If necessary all concerned parts should be remachined. Push the bellows unit upwards for removal. Clean the bonnet (4).

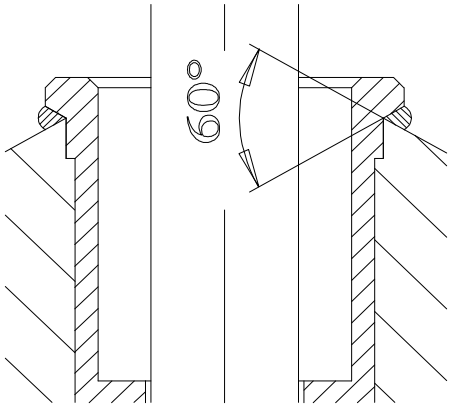
Insert the replacement unit from the top. Weld the stuffing box (5) of the replacement assembly on the bonnet (4). (See 8.2.3)

After the replacement reassemble the parts in reversed order.

8.2.3 Welding Procedure for Bellows Assembly only for EC.1and 2 /EC.14 and 15

The concerned areas shall be mechanically machined acc. to valid rules and standards and shall be absolutely degreased.

The necessary welding procedures for the assembling of the bellows unit into the bonnet part are shown in the picture below. For reasons of higher security the weld seam shall not be realized as a fillet but as V-shaped seam (butt weld design).



8.3 Replacement of Disc

PHOENIX valves have a conical sealing surface. For all valves the disc is harder than the seat. Due to this arrangement the disc remains free from scratches and markings and it is also possible to polish-off minor damages and/ or scratches on the seat area using a high closing force. When there is a more extensive damage, however, the complete seat area shall be remachined

Possible causes are:

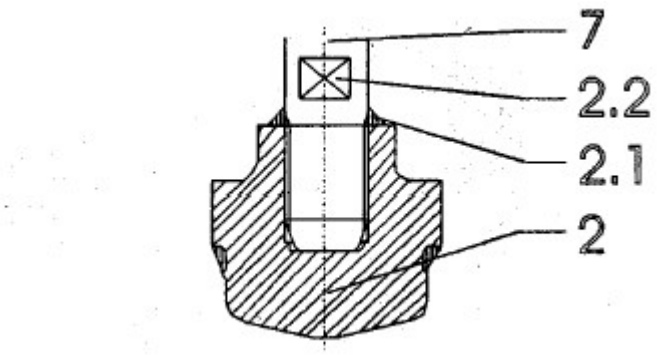
- Solid particles in the medium that has damaged the seat
- Deformation of the seat faces trough excessive tightening of the valve or through thermal stress
- Erosion or corrosion caused for instance by incorrect selection of valve nominal diameter or valve material.

Remedy: use spare parts if required, regrind seat

The replacement of the disc must be performed by PHOENIX personnel or its authorized service provider. In special cases after prior consultation and agreement with PHOENIX, qualified technical personnel can be deployed by the customer. For the disassembling process of the bonnet with trim parts, the valve must be fully opened. For safety and economic reasons discs should be replaced as a complete unit instead of long repair works. For replacement first remove bonnet (4) as mentioned in chapter 8.1.1.

Note!	**For the following procedures make sure that the lower spindle (7) cannot rotate and is not subject to torsion to avoid damages of the bellows (3)**

Cut the welding seam (2.1). Prevent the valve stem (7) from rotation by applying a wrench on the groove (2.2) and unscrew the disc (2) by means of a wrench.

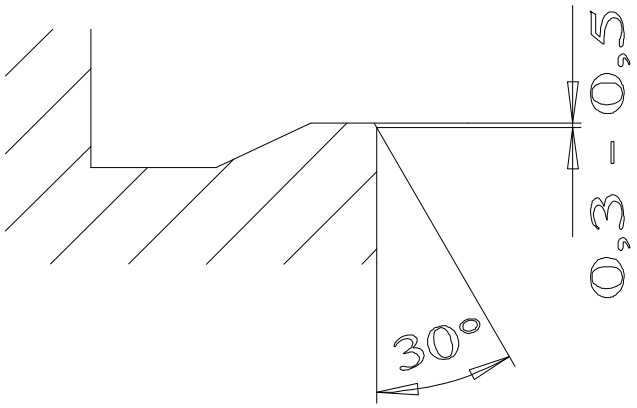


To remount the new disc (2) screw it on the stem (7) and tighten it, again securing the valve stem against rotation by applying a wrench on the groove (2.2). Weld the seam (2.1) again, to prevent loosening of the disc.
Replace also the bonnet gasket (18) and put on bonnet assembly (4).

8.4 Seat Repair

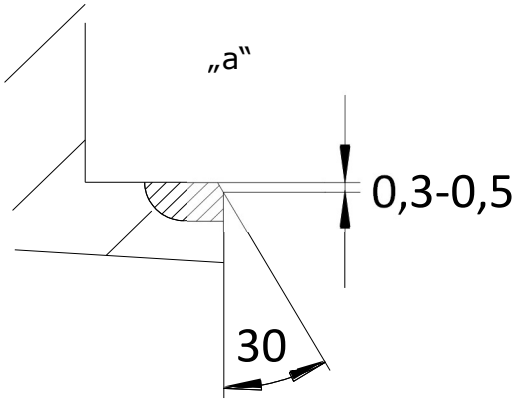
8.4.1 Regrinding of valve seats

Coat the surface of an abrading cone of grey cast iron with a commercial grinding paste and distribute it uniformly. The using of special tools is also possible (e. g. grinding tools for valves from EFCO).
For the initial grinding we recommend a paste with a grain of approximately 4 μm and for the final grinding one should use a grain < 1 μm. Insert the grinding tool lightly on the upper seat surface, rotate various times slowly, raise it and repeat this procedure for various times. As necessary, remove excess paste and metallic particles from the working area. Seats can be refurbished to a maxi-mum depth of 0,3 to 0,5 μm (acc. to valve diameter).

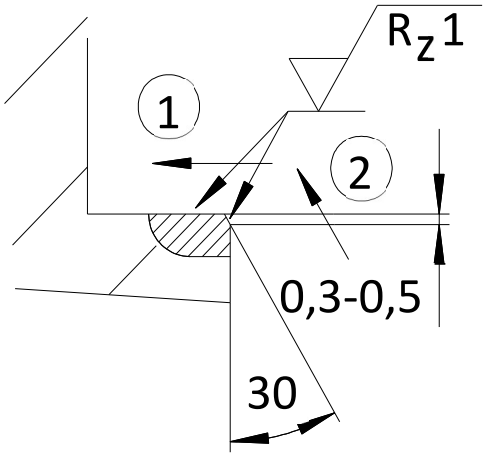


If the valve seat is still leaking, the surface area of the seat must be reworked, and then the conical chamfer must be grinded again.
In case of major damages of the seat seal, however, the surface must be built-up by welding procedures. After the weld support the surface must be grinded once again. For the remachining the valve must be placed on a lathe in such a way that it can be rotated without striking its top flange.

PHOENIX recommends to rework the sealing area for the bonnet gasket (18) for a few tenth of a mm (reference point „a“), while refurbishing the seat area. The seat shall be turned on a lathe with a fine head feed.



The seat should be reworked from inside to outside to avoid accumulations of burrs (reference point 1). The grinding tool shall be set at an angle, the seat slightly grinded and then lapped (reference point 2).



8.4.2 Replacement of the Seat

Seats are just screwed in and screwed out with special tools. Silencers are normally designed as a unit containing the seat and will be replaced together with the seat.

The replacement of the seat must be performed by PHOENIX personnel or its authorized service provider. In special cases after prior consultation and agreement with PHOENIX, qualified technical personnel can be deployed by the customer.

In case that the seat has to be replaced contact PHOENIX for further instructions and all necessary tools.

8.5 Pneumatic Actuator

Before each modification on the actuator the future dimensioning and definition of the actuator and the volume of alterations shall be performed in co-operation with and agreed by the technical department of PHOENIX-Armaturenwerke

Modifications on actuator only by qualified staff under the guidance of PHOENIX!

Modifications on actuator only with depressurised system!

The following modifications on the actuators are possible:

- Modification of the effective direction of pneumatic actuators
- Use of a larger or smaller actuator of the same type
- Use of an actuator of another type

For all these modifications the actuator shall be dismounted from the valve.

For a change of the effective direction of pneumatic actuators the relevant instructions of the pertinent actuator shall be considered.

8.5.1 Disassembly of the Pneumatic Actuator

First of all cut off the actuator from the air supply system. Remove piping from actuator to positioner, solenoid valves, vent valves, volume amplifiers and similar equipment if necessary.

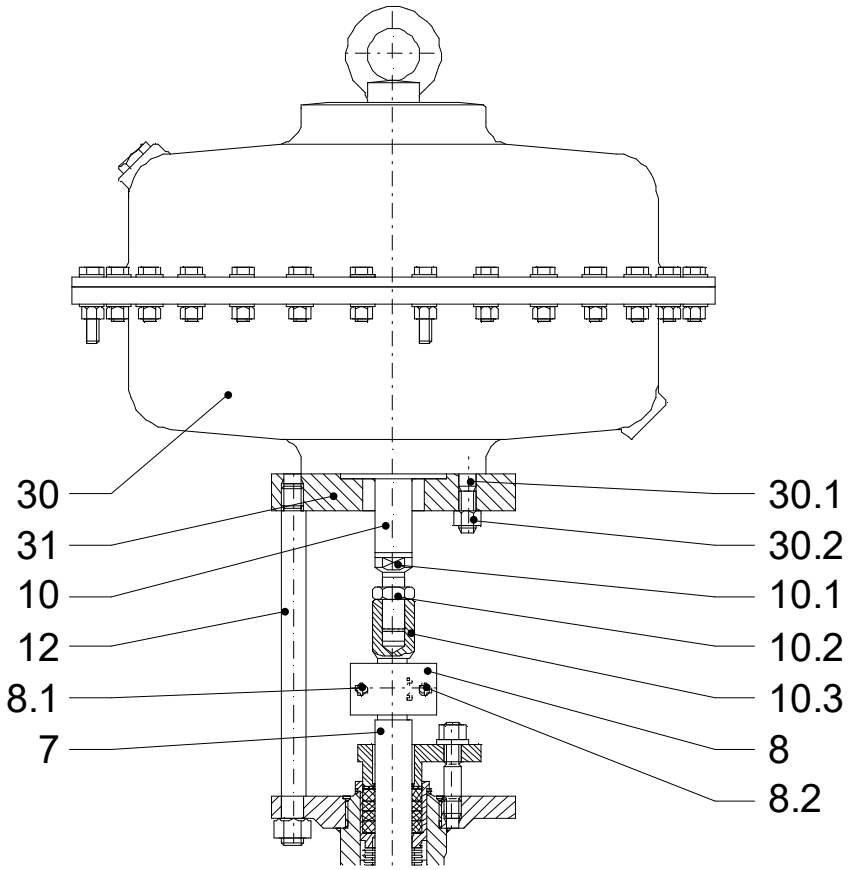
Subsequently reconnect the actuator with the air supply system using the PHOENIX-P-fitter device (might not be necessary with actuators without springs).
Close the valve. In case of using actuators with springs pushing the shaft into the actuator (FE-action), the valve will be closed with compressed air. In case of using actuators with springs pushing the shaft out off the actuator (FA-action) and in case of using actuators without springs the actuators shall be ventilated, however, the air supply shall be maintained in this initial phase.
If necessary remove accessories which might impede an easy access to the coupling. Loosen nuts (8.2) and bolts (8.1) of the coupling (8). Remove nuts (8.2) and bolts (8.1) but secure coupling (8). Take off coupling (8). Run the shaft of the actuator (10) in slightly by use of adequate aeration (1-2 mm).
After the disconnection of the coupling and prior to the removal of the actuator from the mounting flange (31) the actuator shall be secured against overturning by the proper use of lifting aids. Thereafter remove cautiously the actuator (30) from the mounting flange (31). Make sure that the shaft of the actuator (10) will no be damaged. While re-warehousing the actuator (30) it must be made sure that the shaft (10) cannot be distorted or otherwise damaged. Vent the actuator.

8.5.2 Replacement of the Mounting Flange

For a replacement of the mounting flange the actuator has to be dismounted as described in section 10.5.1.
After dismounting the actuator, the nuts (12.1) of the pillar (12) have to be removed. Remove flange (31) and pillars (12). Remount new mounting flange (31).

8.5.3 Assemblage of the Pneumatic Actuator

Equip the actuator with the assembling set and connect to air supply. In case of using actuators with springs pushing the shaft out off the actuator (FA-action) and in case of using actuators without springs run the actuator shaft (10) in by using compressed air. Intercept the connection to air supply with the 3-way valve. If necessary separate from the air supply. Place the actuator (30) on the flange and tighten actuator mounting nut (30.2) strongly. Connect the assembling set with the air supply system.



After mounting the actuator on the mounting flange (31) move the actuator shaft (10) downwards until the shaft (10+10.3) and the lower stem (7) come in contact to each other. Attach the coupling (8) and fix it. Check whether the lift corresponds to the value (= setting lift) indicated on the valve info tag plate. For this purpose a full stroke shall be realised with the connected air supply. Measure the effective stroke and log the values.
If required correct the stroke closing the valve with the actuator. Secure the shaft (10) on the undercut (10.1) with a fork wrench against torsion and loosen counter nut (10.2) and turn it downwards. Remove coupling (8). Run shaft (10) in into the actuator (actuator type FA = fed in compressed air, actuator type FE = vent compressed air). Turn the stem nut (10.3) by the difference between measured stroke and setting stroke in direction to the valve (= increase the stroke) or away from the valve (= reduce the stroke). Secure stem nut (10.3) with the nut (10.2), and then proceed as mentioned afore.
If necessary change the marking on the pillars. Close the valve using the actuator and punch the marking on the pillars on the height of the middle of the coupling (8). Refit previously disassembled accessories to the valve.
Finally perform a complete stroke using the actuator. If necessary reset the limit switches or positioner.

9. Tests / Preservation

9.1 Tests

Reassemble the valve. Bonnet gasket (18) and packing (15) shall be replaced at each revision. Before mounting gaskets and packings inspect the state of sealing areas.
Rework if necessary. Be careful not to damage the sealing surfaces while removing the old gaskets and packings.

	Tests of bellows sealed valves	
1.	**Pressure test of shell**	At disassembled bellows
	Test pressure	1,5 x PN
	Test medium	Water
	Test procedure	Pressure load from inside
	Test duration	2 minutes
	Test requirements	No leakages
	Post test treatment	Cleaning, drying : 120°C/3h
2.	**Leak test on closure**	
	Test pressure	6 bar
	Test medium	Dry air* or Nitrogen (N_2)
	Test procedure	Disc in closing position, Stuffing box released
	Test duration	2 minutes
	Test requirements	No leakages
3.	**Leak test on stem (Bellows efficiency)**	
	Test pressure	6 bar
	Test medium	Dry air* or Nitrogen (N_2)
	Test procedure	Stuffing box released
	Test duration	2 minutes
	Test requirements	No leakages
4.	**Leak test of stuffing box**	
	Test pressure	6 bar
	Test medium	Dry air* or Nitrogen (N_2)
	Test procedure	Disc in semi-closed position Stuffing box tightened up to 50 % of the lift
	Test duration	2 minutes
	Test requirements	No leakages
Note :	**(*) Dry air means air with a dew point of at least 233°K = -40°C = -40°F**	

9.2 Preservation and Storage

Before storing the valves shall be dried in an oven at a minimum temperature of 120°C (248°F) for at least 3 hours.
After drying and before the temperature of the valve body falls below 35°C (95°F) both the inlet and outlet flange shall be fitted with suitable gaskets and metal blank flanges having silicagel sachets or a similar drying agent attached to their inner faces.
The valves shall be stored in a way which prevents moisture condensation.
Storage shall be made in rooms with a minimum temperature of +20° (68°F) or more.
The valves shall be clean and free from all kind of grease, oils and/or solvents which might lead to a reaction when in contact with chlorine.
Components which require to be lubricated shall be treated with chlorine compatible (chloro-fluorinated) grease, only.
Discs shall be in the closed position. Unfinished surfaces of components which are not made of stainless steel shall be coated with an anti-rust primer.
Overhauled valves shall be identified with an identification plate mentioning the name of the repair shop, month and year of intervention or an alternative identification number. This plate shall be securely fixed on the bonnet or connecting flange.
PHOENIX strongly recommends to keep for each valve a file were all repairs or interventions will be registered.

10. Certificates

10.1 New Valves

Before shipment each new PHOENIX valve will be carefully inspected on pressure, leakage, dimensional check and material identification. Upon request an appropriate certificate will be issued.

10.2 Repaired Valves

When the valves are repaired or revised by third parties, a certificate shall be issued for each lot confirming and showing that all tests and preservation methods have been performed under strict observation of the precedent paragraphs.

11. Technical Data

11.1 Seat Bores of kvs-Values

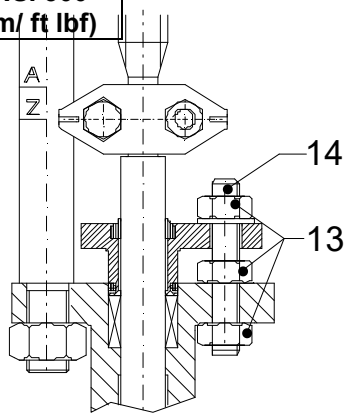
kvs DN	15	25	40	50	80	100	150	200	250
0,02	3,2	3,2							
0,04	3,2	3,2							
0,06	3,2	3,2							
0,1	3,2	3,2							
0,16	3,2	3,2							
0,25	3,2	3,2							
0,3	3,2	3,2							
0,4	5	5							
0,63	5	5							
0,9	5	5							
1	8	8							
1,6	8	8							
2	8	8							
2,5	12,5	12,5							
3,2	12,5	12,5							
4		12,5							
5		20	25	25					
6,3		20	25	25					
8,3		20	25	25					
10			25	25					
16			25	25					
21				25					
25				40	40				
31				40	40				
40					40				
50					40				
63					50	50			
75					50	50			
90					63	63			
100						63			
150						80	80		
160							80		
200							100	100	
225							100	100	
250							125	100	
320							125	125	
350							125	125	
400								125	
550								150	150
630									200
750									200

11.2 Torques for Body-Bonnet-Connection

DN	PN 25	PN 40	ANSI 300
25	40	40	40
40, 50	120	120	120
80	100	100	100
100	140	140	140
150	170	300	300
200	200	330	330
250	290	650	650

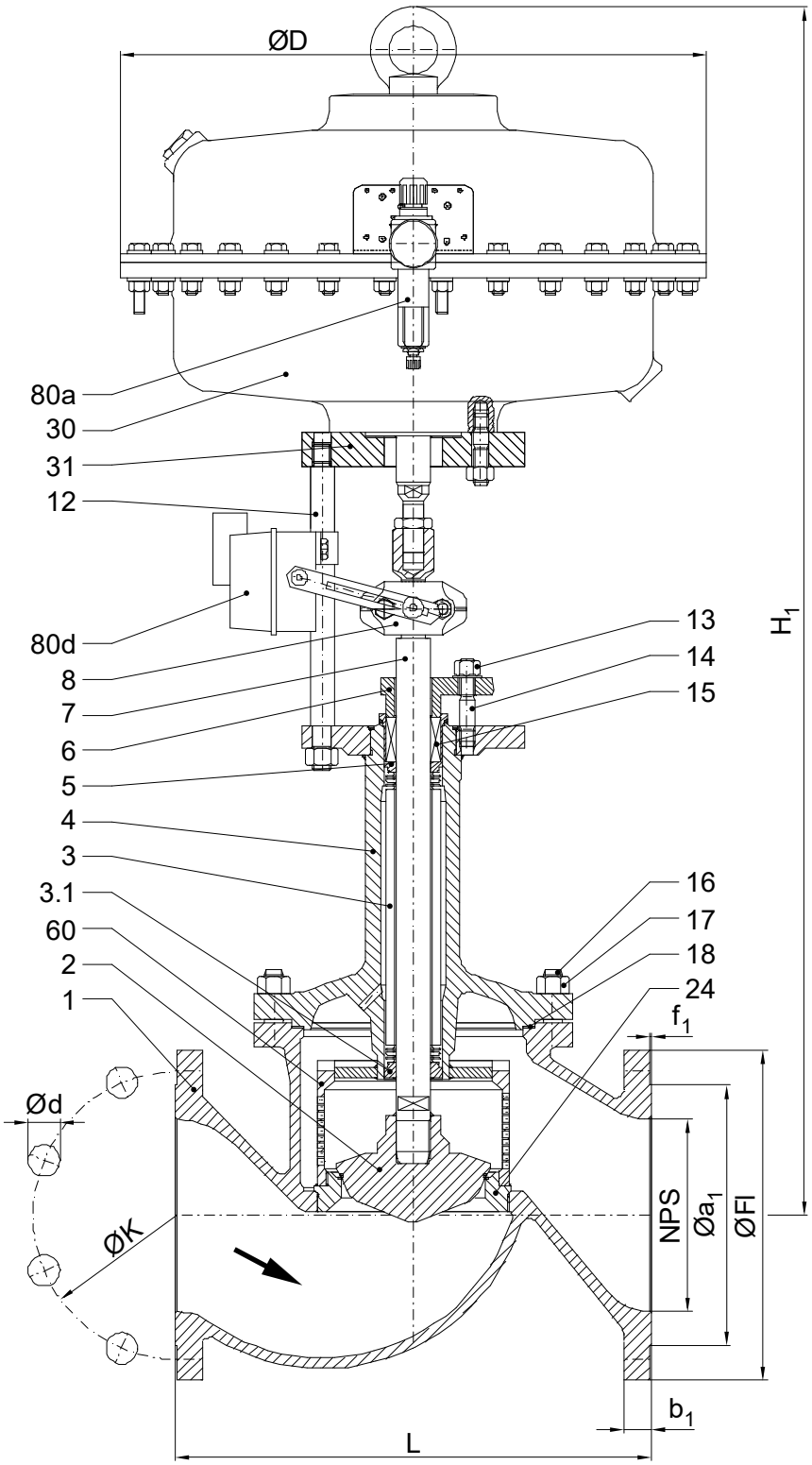
11.3 Torques the Stuffing Box Nuts

	PTFE - rings			
DN	**NPS**	**PN 40 Nm**	**ANSI 300 (Nm/ ft lbf)**	**ANSI 300 (Nm/ ft lbf)**
25	**1**	**5**	**5**	
40 - 50	**1,5 – 2**	**8**	**8**	
80	**3**	**12**	**12**	
100	**4**	**19**	**19**	
150	**6**	**30**	**30**	
200	8	36	36	
250	10	36	36	



12. Sectional Drawing

12.1 EC.1 and 2 /EC.14 and 15 – basic type 350



12.2 EC.8 and 9