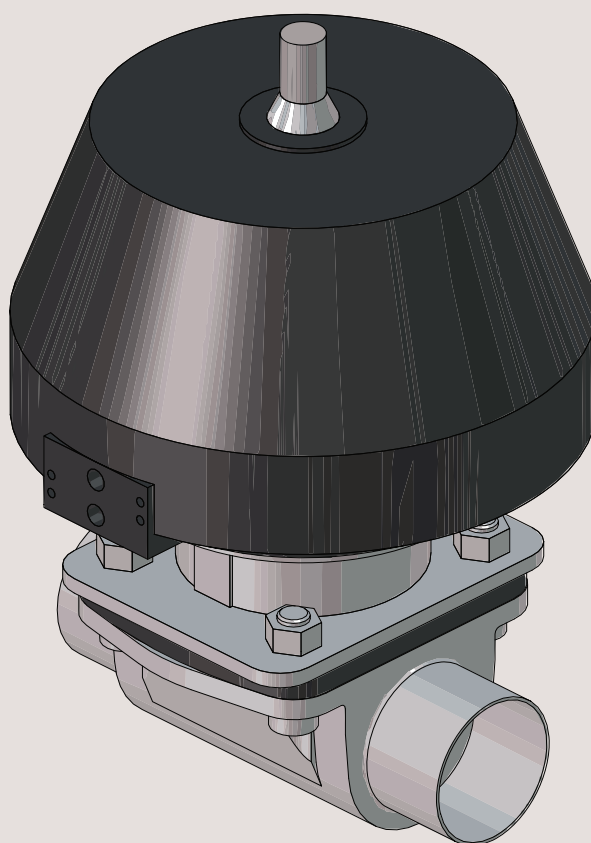




## Instruction Manual

**Unique DV-ST UltraPure - Pneumatic: for valve sizes DN65-DN80**



2510-0011

ESE02718-EN2

2015-12

Original manual



*The information herein is correct at the time of issue but may be subject to change without prior notice*

<b>1. EC Declaration of Conformity</b>	<b>4</b>
<b>2. General information</b>	<b>5</b>
2.1. General information	5
2.2. Valve design	6
<b>3. Safety</b>	<b>7</b>
3.1. Important information	7
3.2. Warning signs	7
3.3. Safety precautions	8
<b>4. Installation</b>	<b>9</b>
4.1. Unpacking/delivery	9
4.2. General installation	9
4.3. Installation angle on self-draining position	10
4.4. Drainability	10
4.5. Welding	10
4.6. Mounting of the bonnet	10
4.7. Recycling information	11
<b>5. Operation</b>	<b>12</b>
5.1. Operation	12
<b>6. Maintenance</b>	<b>13</b>
6.1. Automatic operation	13
6.2. Replacing the diaphragms and seals	13
6.3. Replacing the diaphragm	13
6.4. Fasteners for assembly - Actuator with intermediate part in stainless steel	16
6.5. Replacement of actuator seals	16
<b>7. Technical data</b>	<b>18</b>
7.1. Control diagram/modes	18
7.2. Maximum working pressure	18
7.3. Size	19
7.4. Maximum working temperatures	20
7.5. Control pressure (guidelines)	20
7.6. Control pressure diagram	21

# 1 EC Declaration of Conformity

Revision of Declaration of Conformity: 2012-01-01

The Designated Company

Alfa Laval Kolding A/S

Company Name

Albuen 31, DK-6000 Kolding, Denmark

Address

+45 79 32 22 00

Phone No.

hereby declare that

Valve

Designation

Unique DV-ST UltraPure

Type

From serial number Q 000001- 999999

is in conformity with the following directive with amendments:

- Machinery Directive 2006/42/EC

If the valve is ATEX marked it is in conformity with:

- Equipment Explosive Atmospheres (ATEX) Directive 94/9/EC, valid until 2016-04-19
- Equipment Explosive Atmospheres (ATEX) Directive 2014/34/EC, valid from 2016-04-20

The Unique Diaphragm Valve DV-ST Pneumatic Actuator contains the following labels:

- for composite/stainless steel version: II2GDc TÜV 05 ATEX 2747X
- for stainless steel/stainless steel version: II2GDc TÜV 05 ATEX 2746X

The person authorised to compile the technical file is the signer of this document

Global Product Quality Manager  
Pumps, Valves, Fittings and Tank Equipment

Title

Lars Kruse Andersen

Name

Kolding  
Place

2015-09-11  
Date



Signature



### 2.1 General information

---

The compact diaphragm valve is low maintenance, has a pneumatic actuator and is available in the normally closed, normally open and air/air modes of operation.

The pneumatic actuator is available as a complete composite, composite with stainless steel intermediate part and in a complete stainless steel version - the latter two with ATEX approval. The actuator is dimensionally reduced to a minimum and is especially suited to applications where space is limited.

A wide range of accessories such as an electrical feedback unit, positioner, BUS systems or stroke limiter, allow optimal adaption to all types of control tasks.

Your attention is drawn to the fact that the valve includes a diaphragm which can possibly load electrostatically because of the flowing medium. Selection of the diaphragm with regard to the medium and temperature is the responsibility of the customer.

As the valve does not generate any heat according to EN 13463- 1 para 14.2 g, it is not necessary to display a temperature class sign with regard to surface temperature.

The defined maximum surface temperature depends on the operating conditions, which is the responsibility of the customers. If the valve is used outside the range of the ambient temperature and/or the process pressure, this manual is to be used as a guideline.

We highly recommend additional test(s) for any known special operating conditions. The customer is responsible for carrying out these tests.

This valve is not to be used in areas when aromatic hydrocarbons, such as Benzene, Toluene, Xylene or higher Alkylbenzene are present or are the main part of organic steams because the nameplate will not withstand these mediums. Should the valve be installed in such areas, the nameplate must be changed.

The hazards caused by chemical reactions between parts of the valve and the chemical mediums used have to be clarified between the manufacturer and customer.

For operating conditions and installation EN 60079-14 must be taken into consideration.

The valve has to be integrated into the potential equalisation system.

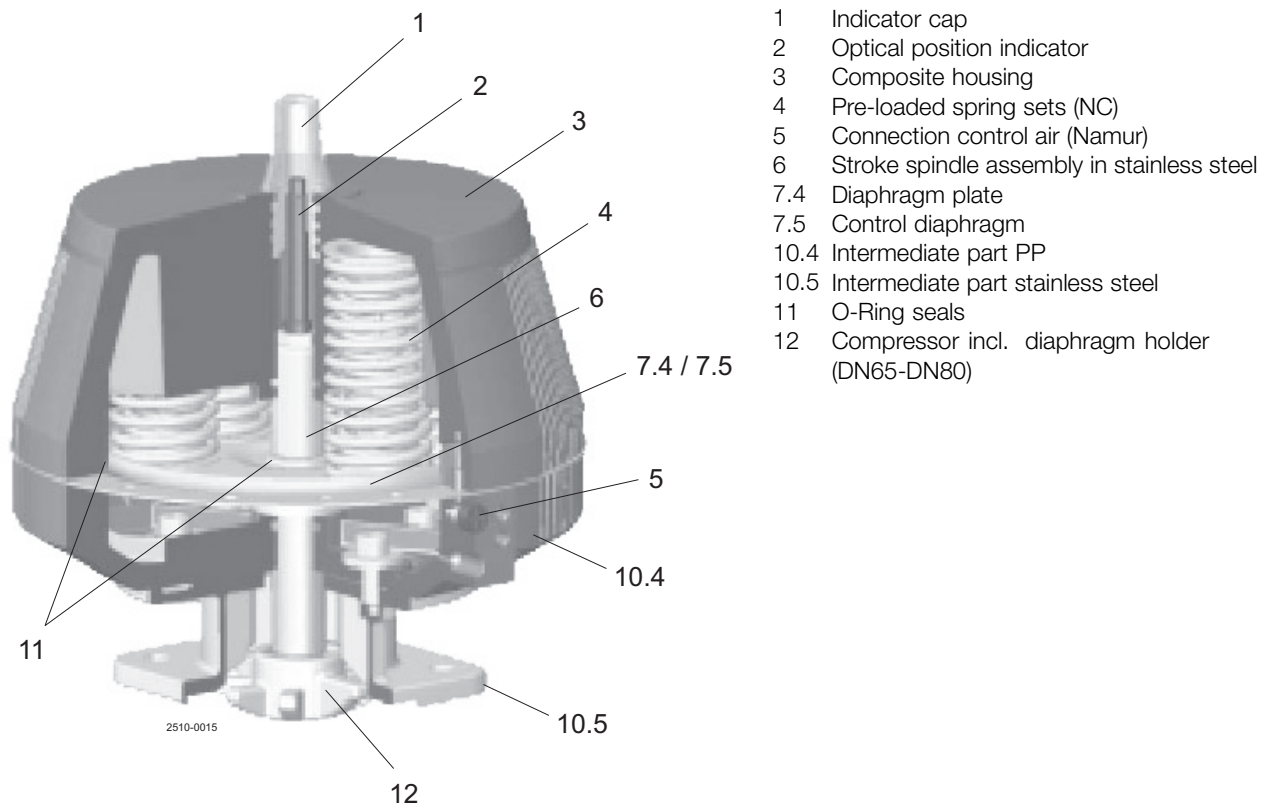
These valves are intended to close the medium (on/off or control) after installation into a pipeline. These valves can be used in potentially explosive areas (Area 1). These valves are not to be used for other applications other than those mentioned.

## 2 General information

### 2.2 Valve design

---

Fig. 2.1



---

*Unsafe practices and other important information are indicated in this manual.  
Warnings are emphasised by means of special signs.*

---

### 3.1 Important information

---

**Always read this manual before using the valve!**

**WARNING**

Indicates that special procedures must be followed to avoid serious personal injury.

**CAUTION**

Indicates that special procedures must be followed to avoid damage to the valve.

**NOTE**

Indicates important information to simplify or clarify procedures.

---

### 3.2 Warning signs

---

General warning:



Caustic agents:



## 3 Safety

---

*All warnings in the manual are summarised on this page.*

*Pay special attention to the instructions below so that serious personal injury and/or damage to the valve are avoided.*

---

### 3.3 Safety precautions

---

#### Installation:

**Always** read the technical data thoroughly (See chapter 7 Technical data)  
**Always** release compressed air after use  
**Never** touch the moving parts if the actuator is supplied with compressed air  
**Never** touch the valve or the pipelines when processing hot liquids or when sterilising  
**Never** dismantle the valve with valve and pipelines under pressure  
**Never** dismantle the valve when it is hot

---



#### Operation:

**Never** dismantle the valve with valve and pipelines under pressure  
**Never** dismantle the valve when it is hot  
**Always** read the technical data thoroughly (See chapter 7 Technical data)  
**Always** release compressed air after use  
**Never** touch the valve or the pipelines when processing hot liquids or when sterilising  
**Never** touch the moving parts if the actuator is supplied with compressed air  
**Always** rinse well with clean water after the cleaning



**Always** handle lye and acid with great care



#### Maintenance:

**Always** read the technical data thoroughly (See chapter 7 Technical data)  
**Always** release compressed air after use  
**Never** service the valve when it is hot  
**Never** service the valve with valve and pipelines under pressure  
**Never** put your fingers through the valve ports if the actuator is supplied with compressed air  
**Never** touch moving parts if the actuator is supplied with compressed air

---



#### Transportation:

**Always** secure that compressed air is released  
**Always** check that all connections are disconnected before attempting to remove the valve from the installation  
**Always** drain liquid from valves before transportation  
**Always** ensure that the valve is adequately secured during transportation - if specially designed packaging material is available, it must be used

---

*The instruction manual is part of the delivery. Study the instructions carefully.  
The items refer to the parts list and service kits section.  
The valve is supplied as separate parts as standard (for welding).  
The valve is assembled before delivery, if it is supplied with fittings.*

### 4.1 Unpacking/delivery

#### Step 1

##### CAUTION

Alfa Laval cannot be held responsible for incorrect unpacking.

##### Check the delivery for:

1. Complete valve.
2. Delivery note.

#### Step 2

1. Remove any packing materials from the valve/valve parts.
2. Inspect the valve/valve parts for visible transportation damage.
3. Avoid damaging the valve/valve parts.

### 4.2 General installation

#### Step 1



**Always** read the technical data thoroughly.

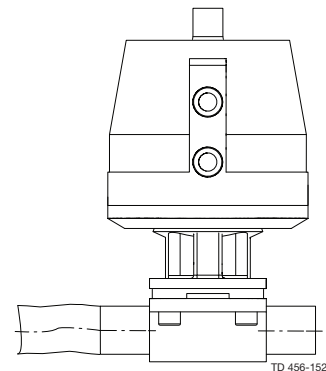
##### CAUTION

Alfa Laval cannot be held responsible for incorrect installation.

Avoid stressing the valve.

Pay special attention to:

- Vibrations.
- Thermal expansion of the pipelines.
- Excessive welding.
- Overloading of the pipelines.



**Risk of damage!**

- For draining the diaphragm valve and pipeline, the appropriate installation position has to be provided.
- Variable installation position for self-draining, see data on the installation angle.
- For diaphragm valves with weld ends, remove the actuator and diaphragm from the valve body before welding
- For applications in ex-proof areas, you must only wipe the composite actuator with a moist cloth.

The valves fulfil the conditions of the ATEX regulations 94/9 EG and can be installed in explosion-proof areas group II category 2.

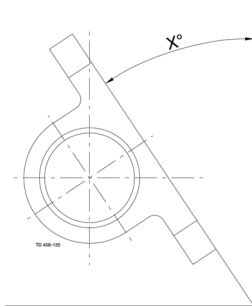
## 4 Installation

*Study the instructions carefully and pay special attention to the warnings!*  
*The valve has welding ends as standard but can also be supplied with fittings.*

### 4.3 Installation angle on self-draining position

replace with table from PD-leaflet see 4.3 drain angle...

Drain angle X:



Port size		ASME	ISO 2037	Series A/ DIN11866	Series B/ ISO 1127	BS 4825
DN	Inch	BPE				
65	2 1/2"	20°	22°	19°	15°	22°
80	3"	22°	25°	22°	15°	25°

### 4.4 Drainability

Proper drainability in horizontally installed pipes requires mounting of valve at the correct angle. See above table

To ensure proper drainability, the valve must be mounted at the correct angle. Proper installation is the responsibility of the system installer and/or user.

### 4.5 Welding

#### Step 1

**All welding should be done by qualified personnel.**

Disassemble the actuator from the valve body. See Replacing the Diaphragm for details.

#### Step 2

Perform the welding procedure on the body according to standard industrial practices.

#### Step 3

Reassemble the actuator to the valve body.

#### Step 4

Test the valve for correct operation before installing.

### 4.6 Mounting of the bonnet

For T-Valves, Tandem valves, Tank outlet valves and Block valves please note that the bonnet is mounted using studs and nuts instead of bolts and nuts.

*Study the instructions carefully and pay special attention to the warnings!*  
*The valve has welding ends as standard but can also be supplied with fittings.*

---

### 4.7 Recycling information

---

- **Unpacking**

- Packing material consists of wood, plastics, cardboard boxes and in some cases metal straps
- Wood and cardboard boxes can be re-used, recycled or used for energy recovery
- Plastics should be recycled or burnt at a licensed waste incineration plant
- Metal straps should be sent for material recycling

- **Maintenance**

- During maintenance, oil and wear parts in the machine are replaced
- All metal parts should be sent for material recycling
- Worn out or defective electronic parts should be sent to a licensed handler for material recycling
- Oil and all non-metal wear parts must be disposed of in accordance with local regulations

- **Scrapping**

- At end of use, the equipment must be recycled according to relevant, local regulations. Besides the equipment, any hazardous residues from the process liquid must be taken into consideration and dealt with in a proper manner. When in doubt, or in the absence of local regulations, please contact your local Alfa Laval sales company
-

## 5 Operation

*Study the instructions carefully and pay special attention to the warnings!*  
*Ensure that the valve operates smoothly.*  
*The items refer to the parts list and service kits section.*

### 5.1 Operation



**Always** read the technical data thoroughly.  
See chapter 7 Technical data



**Always** release compressed air after use.

#### CAUTION

Alfa Laval cannot be held responsible for incorrect operation.

#### Fig. 1 - Function NC: Normally Closed

In the de-energised status, the valve is closed by spring force. When the control medium is admitted to the actuator (connection below), the valve opens; when the control medium escapes, the valve is closed via spring force.

#### Fig. 2 - Function NO: Normally open

In the de-energised status, the valve is opened by spring force. When the control medium is admitted to the actuator (connection above), the valve closes; when the control medium escapes, the valve is opened via spring force.

#### Fig. 3 - Function AA: Air/Air (double acting)

The valve has no defined basic position. The valve is opened and closed by applying control pressure to the corresponding control connection. Connection below: open, connection above: close.

Fig. 1

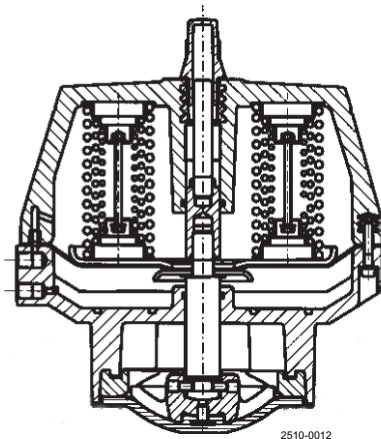


Fig. 2

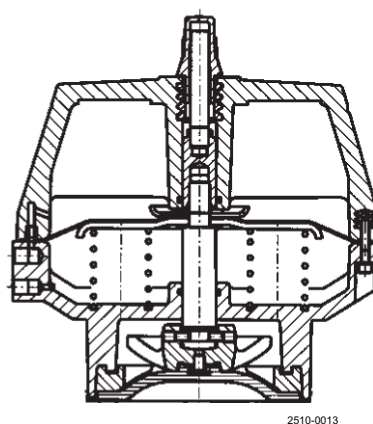
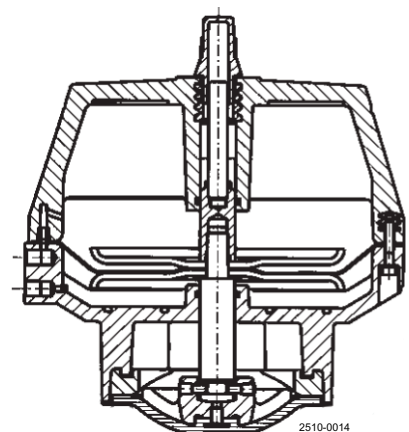


Fig. 3



---

*Study the instructions carefully and pay special attention to the warnings!*  
*Ensure that the valve operates smoothly.*  
*The items refer to the parts list and service kits section.*

---

### 6.1 Automatic operation

The Unique DV-ST UltraPure can be controlled from remote location by means of compressed air using a pneumatic actuator. The actuator controls the axial movement of a piston, thereby opening or closing the valve depending on the actuator function.

The actuator is available in three standard versions: normally closed (NC), normally open (NO) and air/air activated (A/A). All versions have an integrated optical positioner. The actuator is fitted on the valve by means of four screws and bolts.

### 6.2 Replacing the diaphragms and seals

Generally, the only routine maintenance required is the replacement of the diaphragm. The diaphragm replacement routine, depending on the medium, pressure, temperature and cycle (duration and temperature) of steam sterilisation between process runs, determines the optimum change cycle of the diaphragm.

As with all diaphragm valves, the diaphragm itself is the strongest component used. In addition to mechanical stress, the diaphragm is subject to wear resulting from the flow media. We recommend that the diaphragm is inspected after a maximum of 100,000 cycles.

If the flow medium is muddy or contains abrasive particles, we recommend more frequent inspections. The diaphragm can be checked by dismantling the valve body (see Section 6.3 Replacing the diaphragm)

For installation in ex-proof areas, we recommend that the springs are changed every 250,000 cycles.

### 6.3 Replacing the diaphragm

**Before servicing any installed valve, you must:**

- depressurise the system
- open the valve
- purge the valve

**Note:** The diaphragm can be replaced without removing the valve body

#### Step 1

Only use Alfa Laval diaphragms

#### Step 2

Actuate the valve to the “open” position for:

- normally closed and air/air actuators, apply air pressure of the lower actuator port
- normally open actuators, relieve the air pressure of the upper actuator port

#### Step 3

Remove the body fasteners using a cross-wise sequence

#### Step 4

Actuate the valve in the “closed” position for:

- normally closed actuators, apply air pressure to the lower actuator port
  - normally closed and air/air actuator, apply air pressure to the upper actuator port
-

## 6 Maintenance

*Study the instructions carefully and pay special attention to the warnings!*  
*Ensure that the valve operates smoothly.*  
*The items refer to the parts list and service kits section.*

### Step 5

Remove the diaphragm from the actuator

#### Threaded-style compressor:

- Unthread the diaphragm in a counter-clockwise direction. (See Fig. 1)

#### Bayonet-style compressor:

- Rotate the diaphragm 90° and remove. (See Fig. 2)

**NOTE!:** see fig. 1-2, reverse action of step 9.

### Step 6

Check and clean threads and bayonets of the compressor

### Step 7

Make sure that the new diaphragm and the contact area on the valve body are clean and dry

### Step 8

Make sure the actuator compressor matches the connection on the diaphragm. Should this not be the case, replace the compressor

### Step 9

With the actuators in “closed” position, install diaphragm as follows:

- For threaded-style compressors, thread the diaphragm into the compressor in a clockwise direction (Fig. 1). Do **not** overtighten! Then, if necessary, turn the diaphragm in a counter-clockwise direction until the screw holes match.
- Bayonet-style compressor insert diaphragm with bayonet into the deepening of the compressor. Rotate diaphragm 90° (Fig. 2). Screw holes must match.

Fig.1

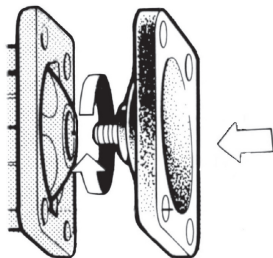
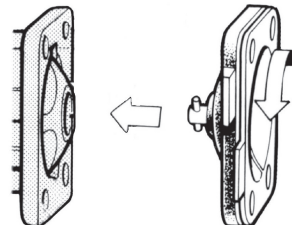


Fig.2



Do **not** overtighten!

### Step 10

Actuate the valve to the “open” position - see step 2

### Step 11

Align the to the valve body using fasteners. Assemble the nuts and, if necessary, use washers. To secure the actuator and body, tighten the fasteners by hand.

### Step 12

Actuate the valve to the “closed” position, so that the diaphragm can properly fit to the weir - see step 4. Tighten the body fasteners cross-wise using a wrench.

---

*Study the instructions carefully and pay special attention to the warnings!*  
*Ensure that the valve operates smoothly.*  
*The items refer to the parts list and service kits section.*

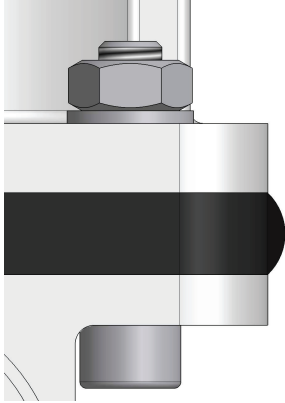
---

### Step 13

Actuate the valve to the “open” position - see step 2. Slightly re-tighten the body fasteners cross-wise with a wrench.

**Note:** Proper assembly extends the life of the diaphragm. Correctly assembled diaphragms have a Crescent-shaped bulge in the diaphragm edge which can be observed from the side (Fig. 3).

Fig 3



### Step 14

Test the valve for proper function

**NOTE!** Check the fasteners 24 hours after operation of the valves. In case of leakage at the body, depressurise the system and, if necessary, tighten the fasteners again as described. If leakage continues, replace the diaphragm.

---

## 6 Maintenance

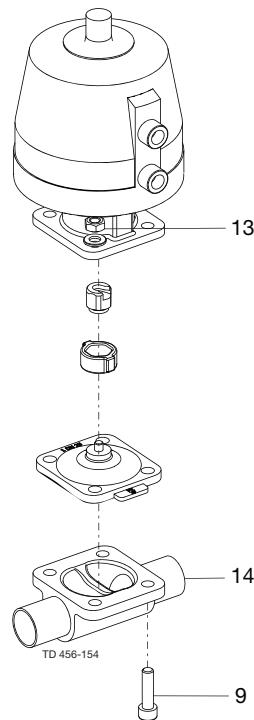
*Study the instructions carefully and pay special attention to the warnings!*  
*Ensure that the valve operates smoothly.*  
*The items refer to the parts list and service kits section.*

### 6.4 Fasteners for assembly - Actuator with intermediate part in stainless steel

- Pos. 9 4 cylindrical hexagon fasteners DIN 912 ST-A2  
Pos. 13 4 nuts + washer DIN 934 ST A4 / DIN 125 ST A2  
Pos. 14 Body forged

DN	Rubber / PTFE
65	M 12 x 45
80	M 16 x 55

Note: Tighten the 4 fasteners cross-wise



### 6.5 Replacement of actuator seals

#### Disassembly of pneumatic actuator Function NC and AA

- Remove valve body and diaphragm, see section 6.2
- Remove compressor (12) and diaphragm holder piece
- Remove indicator cap (1) turn actuator completely
- Remove Screws (15)
- Remove compound housing (3) from compound housing base part (10.4)
- Remove Stroke spindle assembly (6) from compound housing
- Remove preloaded springs from compound housing
- Replace Seals, O-rings and control diaphragm (lubricate)
- Reassembly should be done in reverse order as described above

Note: GSA recommends Klüber Lubrication Syntheso per AA4

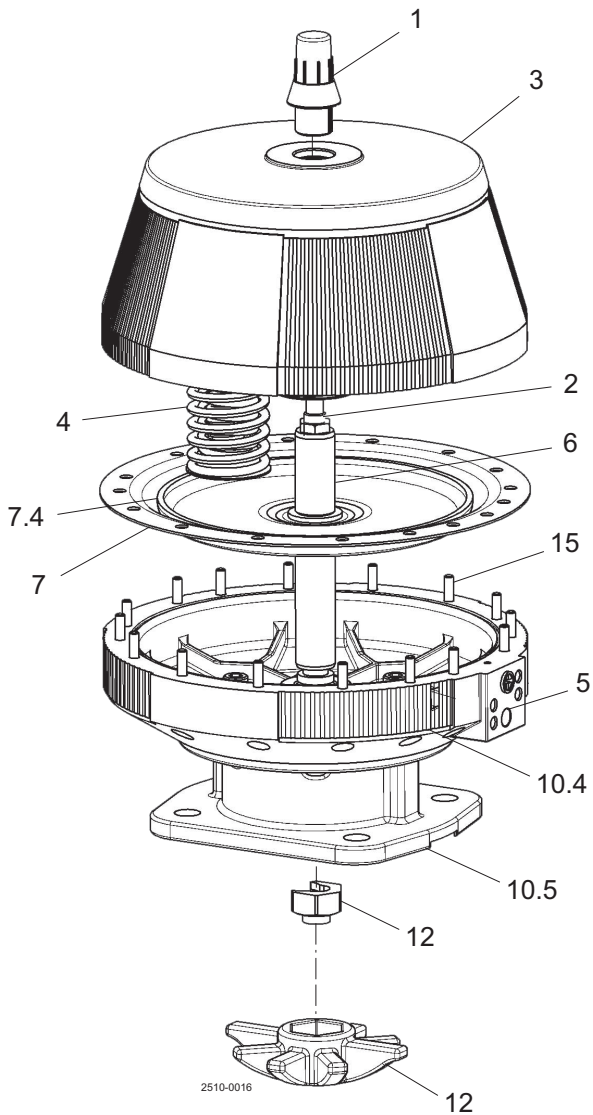
Tightening torque of the screws (15) 6 Nm.

#### Function NO

Disassembly and replacement of actuator seals for NO mode should only be carried out by Alfa Laval.

When used in ex-proof areas it's only allowed to wipe the actuator by using a moist cloth.

Study the instructions carefully and pay special attention to the warnings!  
Ensure that the valve operates smoothly.  
The items refer to the parts list and service kits section.



- 1 Indicator cap
- 2 Optical position indicator
- 3 Compound housing
- 4 Preloaded spring setsfor NC actuator
- 5 Connection control air (Namu)
- 6 Stroke spindle assembly stainless steel
- 7 Control diaphragm
- 7.4 Diaphragm plate
- 10.4 Compound housing base part
- 10.5 Intermediate part stainless steel
- 12 Diaphragm holder
- 12 Compressor
- 15 Befestigungsschrauben Screws (deutch)

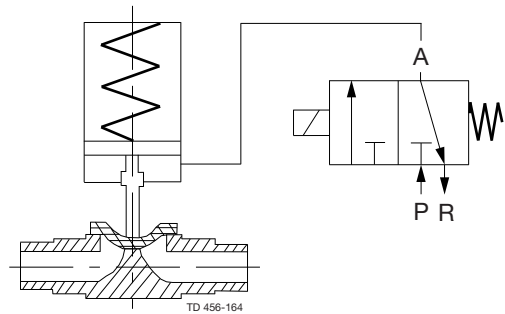
# 7 Technical data

It is important to observe the technical data during installation, operation and maintenance.  
Inform the personnel about the technical data.

## 7.1 Control diagram/modes

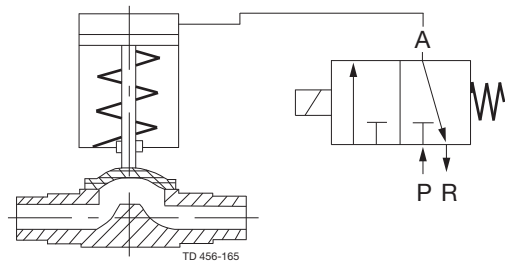
- a) **Function NC: normally closed** with a solenoid valve 3/2 way for connection below

Fig. a



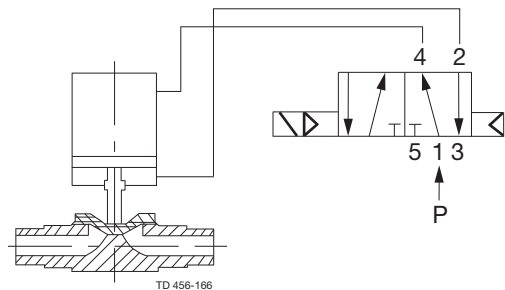
- b) **Function NO: normally open** with a solenoid valve 3/2 way for connection above

Fig. b



- c) **Function AA: air/air** with a solenoid valve 4/2 and 5/2 way for connection below and above

Fig. c



## 7.2 Maximum working pressure

Table 1. Actuator NC, NO, AA  
Max. working pressure at 23°C (73°F) medium temperature

Size		EPDM					PTFE				
		Gr.	→		↔		Gr.	→		↔	
DN	Inch		bar	psi	bar	psi		bar	psi	bar	psi
65	2 1/2"	6	10	145	10/9	145/130.	6	10	145	7/6	101/87
80	3"	7	10	145	10/9	145/130.	7	10	145	7/6	87/72.5

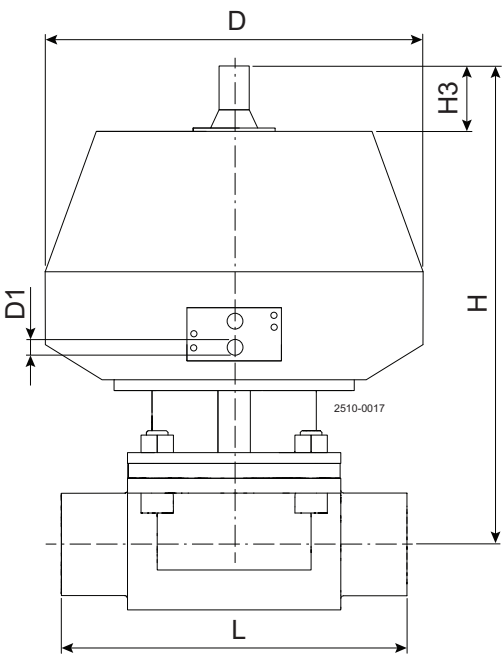
→ Working pressure on one side

↔ Working pressure on both sides

6 bar max. allowed control pressure for NC mode  
5 bar max. allowed control pressure for NO and AA mode

It is important to observe the technical data during installation, operation and maintenance.  
Inform the personnel about the technical data.

7.3 Size



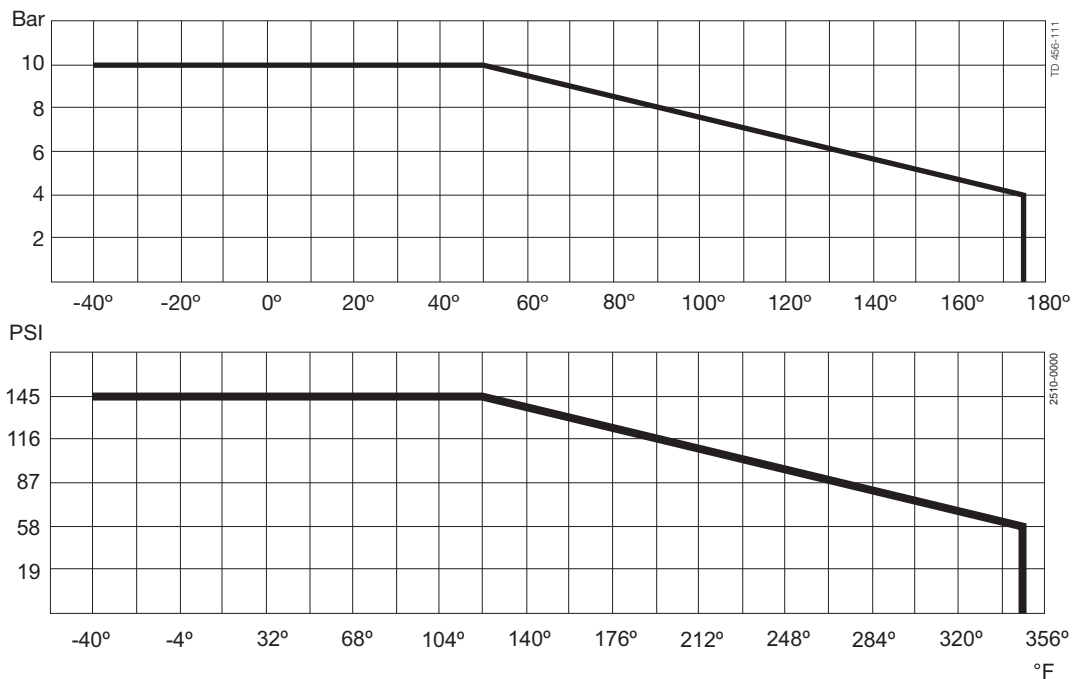
Size		D	D1	H	H3	L
DN	Inch	mm	G	mm	mm	mm
65	2 1/2"	280	1/4"	344	46	218
80	3"	280	1/4"	354	46	256

## 7 Technical data

*It is important to observe the technical data during installation, operation and maintenance.  
Inform the personnel about the technical data.*

### 7.4 Maximum working temperatures

Temperatures for actuator



### 7.5 Control pressure (guidelines)

- Maximum allowable control pressure: 6 bar (87 psi) for mode NC
- Lower control pressure possible by reducing the spring sets / 5 bar (72,5 psi) for mode NO, AA
- Control medium: compressed air (oil-free) inert, non-aggressive gases
- Maximum temperatures of control medium 40° C (104° F)

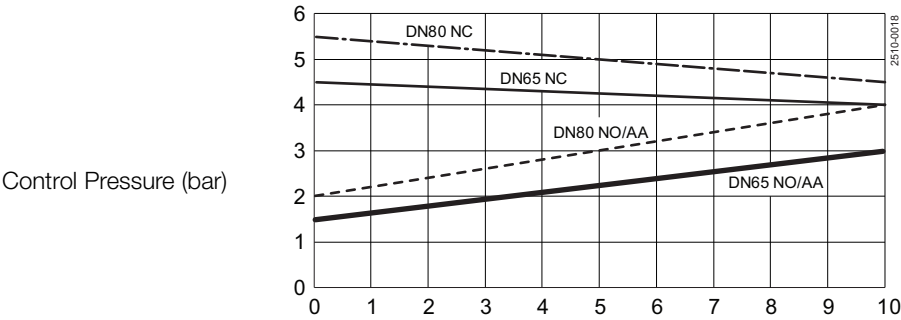
It is important to observe the technical data during installation, operation and maintenance.  
Inform the personnel about the technical data.

7.6 Control pressure diagram

DN65			
Working pressure bar	psi	Control pressure bar	psi
0	0	4.5	65.3
10	145	4	58.0

DN80			
Working pressure bar	psi	Control pressure bar	psi
0	0	5.5	79.8
10	145	4.5	65.3

NC - EPDM-Membrane



**How to contact Alfa Laval**

Contact details for all countries are continually updated on our website.

Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information directly.

© Alfa Laval Corporate AB

This document and its contents is owned by Alfa Laval Corporate AB and protected by laws governing intellectual property and thereto related rights. It is the responsibility of the user of this document to comply with all applicable intellectual property laws. Without limiting any rights related to this document, no part of this document may be copied, reproduced or transmitted in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), or for any purpose, without the expressed permission of Alfa Laval Corporate AB. Alfa Laval Corporate AB will enforce its rights related to this document to the fullest extent of the law, including the seeking of criminal prosecution.