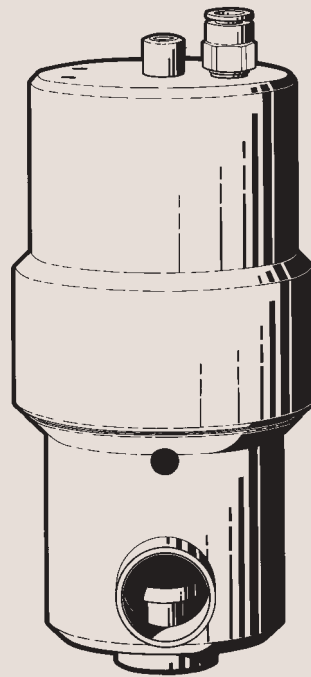




Instruction Manual

LKAP Air-Operated Valve



Declaration of Conformity

The designating company

Alfa Laval

Company Name

6000 Kolding

Address

+45 79 32 22 00

Phone No.

hereby declare that

AIR-OPERATED VALVE

Denomination

LKAP

Type

Year

Was manufactured in conformity with the provisions in the COUNCIL DIRECTIVE of 14 June 1989 on mutual approximation of the laws of the Member States on the safety of machines (89/392/EEC as amended by directives 91/368/EEC and 93/44/EEC) with special reference to Annex 1 of the directive on essential safety and health requirements in relation to the construction and manufacture of machines.

Bjarne Søndergaard

Name

Vice President, R & D

Title

Alfa Laval

Company

B. Søndergaard

Signature

Designation



Table of contents

This manual is divided into main sections. - See below.

Safety

1. Important information	2
2. Warning signs	2
3. Safety precautions	3

Installation

1. Unpacking/Delivery	4
2. General installation	5
3. Welding	6

Operation

1. Operation	7
2. Fault finding	7
3. Recommended cleaning	8

Maintenance

1. General maintenance	9
2. Dismantling	10
3. Reassembly	11

Technical data

1. Technical data	12
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Drawings/Parts list

1. Parts list	14+16
2. Exploded drawing	15
2. Drawing	17

Safety

Unsafe practices and other important information are emphasized in this manual.

Warnings are emphasized by means of special signs.

1. Important information

Always read the manual before using the valve!

2

- WARNING!** : Indicates that special procedures **must** be followed to avoid severe personal injury.
- CAUTION!** : Indicates that special procedures **must** be followed to avoid damage to the valve.
- NOTE!** : Indicates important information to simplify practices or to make them clearer.

2. Warning signs



: General warning.



: Caustic agents.

All warnings in the manual are summarized on this page.

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

3. Safety precautions

Installation:



- : - **Always** read the technical data thoroughly (see page 12).
- **Always** release compressed air after use.

Operation:



- : - **Always** read the technical data thoroughly (see page 12).
- **Always** release compressed air after use.



- : **Never** touch the valve or the pipelines when processing hot liquids or when sterilizing.



- : **Always** handle lye and acid with great care.

Maintenance:



- : - **Always** read the technical data thoroughly (see page 12).
- **Always** release compressed air after use.



- : - **Never** service the valve when it is hot.
- **Never** service the valve with valve and pipelines under pressure.

Installation

The instruction manual is part of the delivery.
Study the instructions carefully.

LKAP-V: Valve body with two valve ports.
LKAP-T: Valve body with three valve ports.

1. Unpacking/Delivery

1

CAUTION!

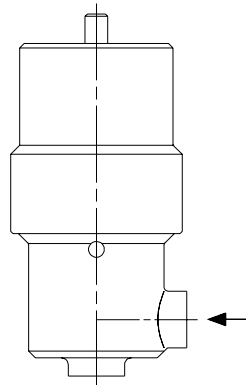
We cannot be held responsible for incorrect unpacking.

2

Check the delivery for:

1. Complete valve, LKAP-V or LKAP-T.
2. Delivery note.
3. Instruction Manual.

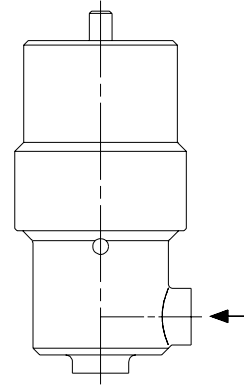
3



TD 402-017

Remove possible packing materials from the valve.

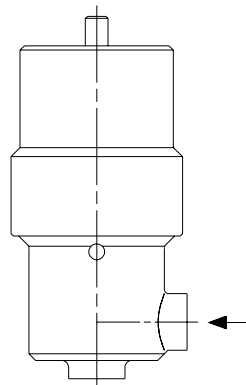
4



TD 402-017

Inspect the valve for visible transport damage.

5



TD 402-017

Avoid damaging the valve.

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.

2. General installation

1

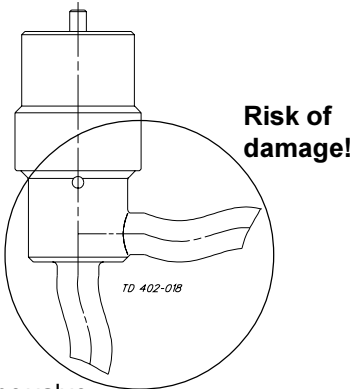


- **Always** read the technical data thoroughly (see page 12).
- **Always** release compressed air after use.

CAUTION!

We cannot be held responsible for incorrect installation.

3



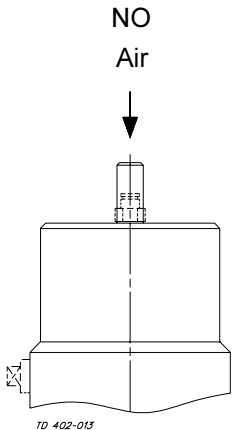
Risk of damage!

Avoid stressing the valve.

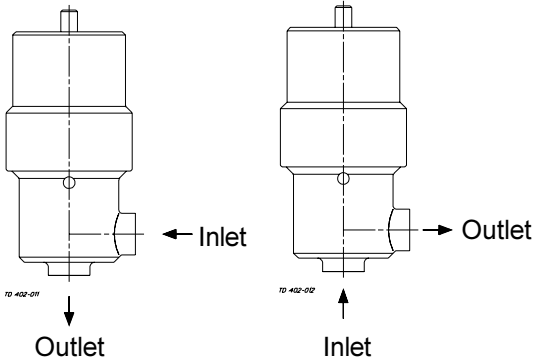
Pay special attention to:

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

5



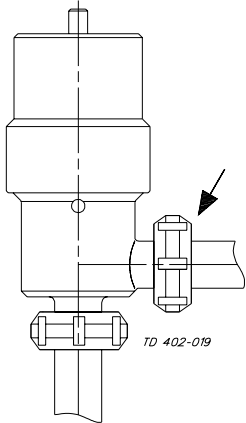
2



Flow direction:

To avoid pressure shocks it is recommended to install the valve with inlet through the bottom connection.

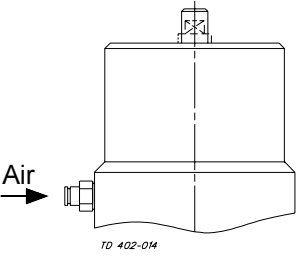
4



Fittings:

Ensure that the connections are tight (remember seal rings).

NC



Air connection: R1/8" (BSP).

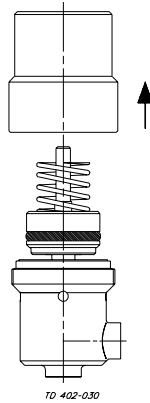
Installation

Study the instructions carefully.

The items refer to the drawings and the parts list on pages 14-17.
Check the valve for smooth operation after welding.

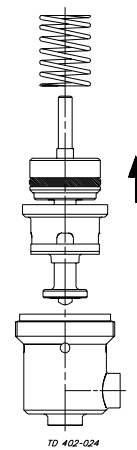
3. Welding

1



1. Turn air cylinder (2) anticlockwise by hand with a strap wrench or with a spanner.
2. Remove the air cylinder from valve body (15).

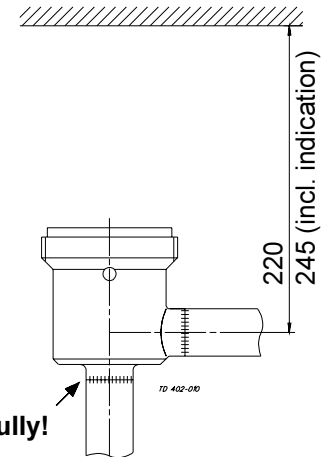
2



Remove spring (5) and the rest of the internal valve parts from valve body (15).

3

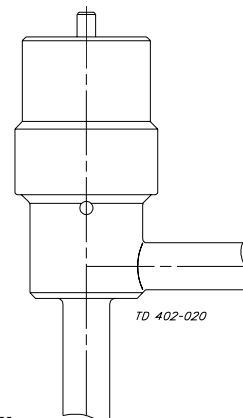
1. Weld valve body (15) into the pipelines.
2. Maintain the minimum clearance so that the internal valve parts can be removed.



4

Reassemble the valve in accordance with the instructions on page 11.

5



Pre-use check:

1. Supply compressed air to the valve.
2. Open and close the valve several times to ensure that it operates smoothly.

Pay special attention to the warnings!

Study the instructions carefully and pay special attention to the warnings!
Ensure that the valve operates smoothly.

Pay attention to possible faults.
The items refer to the drawings and the parts list on pages 14-17.

1. General operation

1

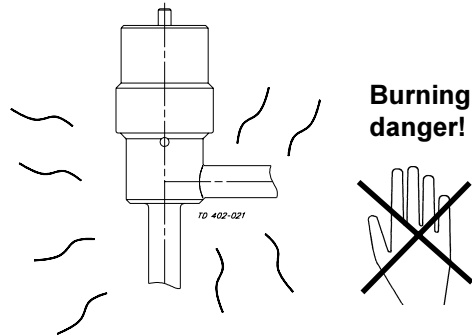


- **Always** read the technical data thoroughly (see page 12).
- **Always** release compressed air after use.

CAUTION!

We cannot be held responsible for incorrect operation.

2



Never touch the valve or the pipelines when processing hot liquids or when sterilizing.

2. Fault finding

NOTE!

Study the maintenance instructions carefully before replacing worn parts. - See page 9!

Problem	Cause/result	Repair
Product leakage through the drain holes	Worn/product affected lip seal (11)	- Replace the lip seal - Select a different rubber grade
Leakage at the valve plug	Worn/product affected O-ring (13)	- Replace the O-ring - Select a different rubber grade
Air leakage through the drain holes	Worn actuator O-rings	Replace the O-rings
Air leakage between air cylinder (2) and valve body (15), (threaded connection)	- Worn O-ring (9) - Loose air cylinder (2)	- Replace the O-ring - Tighten the air cylinder

Operation

8

The valve is designed for cleaning in place (CIP).
CIP = Cleaning In Place.

Study the instructions carefully and pay special attention to the warnings!

NaOH = Caustic Soda.

HNO₃ = Nitric acid.

6. Recommended cleaning

1

Caustic danger!



Always use rubber gloves!



Always use protective goggles!



Always handle lye and acid with great care.

3

Examples of cleaning agents:

Use clean water, free from chlorides.

1. 1% by weight NaOH at 70°C.

1 kg NaOH	+	100 l water	= Cleaning agent.
-----------	---	-------------	-------------------

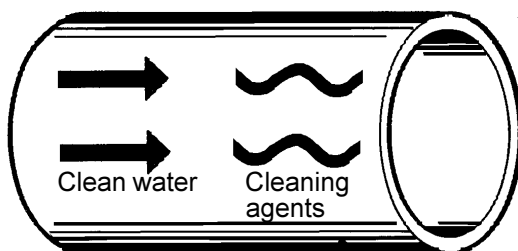
2.2 l 33% NaOH	+	100 l water	= Cleaning agent.
----------------	---	-------------	-------------------

2. 0.5% by weight HNO₃ at 70°C.

0.7 l 53% HNO ₃	+	100 l water	= Cleaning agent.
----------------------------	---	-------------	-------------------

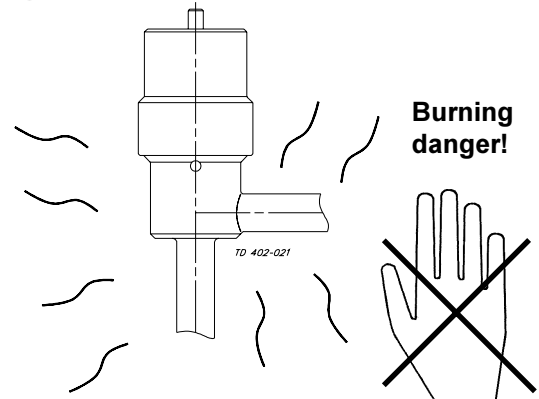
5

Always rinse!



Always rinse well with clean water after the cleaning

2



Never touch the valve or the pipelines when sterilizing.

4

1. Avoid excessive concentration of the cleaning agent

⇒ **Dose gradually!**

2. Adjust the cleaning flow to the process

⇒ **Milk sterilization/viscous liquids**

⇒ **Increase the cleaning flow!**

6


NOTE!

The cleaning agents must be stored/disposed of in accordance with current rules/directives.

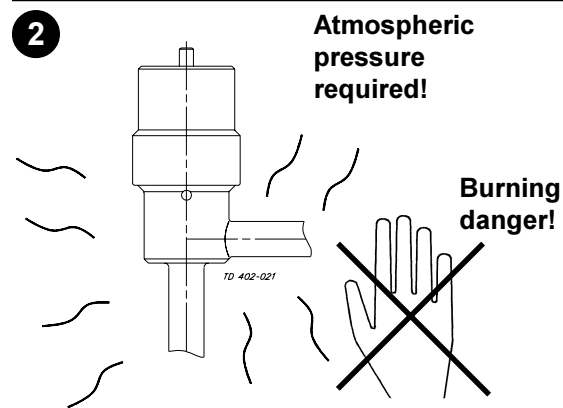
Maintain the valve regularly.
Study the instructions carefully and pay special attention to the warnings!


Always keep spare lip seals and O-rings in stock.
Check the valve for smooth operation after service.

1. General maintenance

- 1**
-  - **Always** read the technical data thoroughly (see page 12).
- **Always** release compressed air after use.

CAUTION!
All scrap must be stored/disposed of in accordance with current rules/directives.



-  - **Never** service the valve when it is hot.
- **Never** service the valve with valve and pipelines under pressure.

Ordering spare parts

- Contact the Sales Department.
- Order from the Spare Parts List.

Recommended spare parts: Service kits (see Spare Parts List).

	Valve lip seal	Valve O-rings	Actuator O-rings
Preventive maintenance	Replace after 12 months	Replace when replacing the lip seal	Replace after 5 years
Maintenance after leakage (leakage normally starts slowly)	Replace at the end of the day	Replace when replacing the lip seal	Replace when necessary
Planned maintenance	<ul style="list-style-type: none"> - Regular inspection for leakage and smooth operation - Keep a record of the valve - Use the statistics for planning of inspections Replace after leakage	Replace when replacing the lip seal	<ul style="list-style-type: none"> - Regular inspection for leakage and smooth operation - Keep a record of the valve - Use the statistics for planning of inspections Replace after air leakage
Lubrication	Before fitting <ul style="list-style-type: none"> - Silicone grease or silicone oil 	None	Before fitting Grease or oil

Maintenance

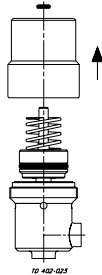
10

Study the instructions carefully.
The items refer to the drawings and the parts list on pages 14-17.

Handle scrap correctly.

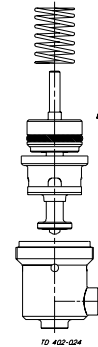
2. Dismantling

1



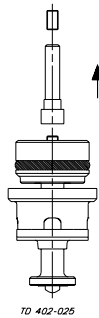
1. Turn air cylinder (2) anticlockwise by hand with a strap wrench or with a spanner.
2. Remove the air cylinder from valve body (15).
3. Pull out O-ring (3) from the air cylinder.

2



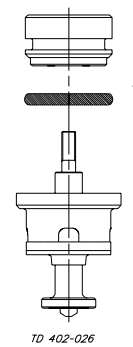
2. Remove spring (5) and the rest of the internal parts from valve body (15).

3



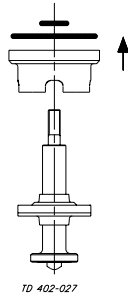
1. Turn nut (4) anticlockwise and remove it from valve plug unit (12, 14).
2. Remove screw (1) from the nut.

4



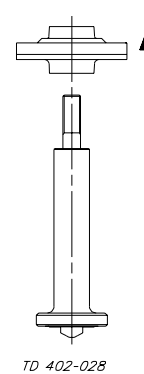
1. Separate piston (6) from valve plug unit (12, 14).
2. Pull off O-ring (7) from the piston.

5



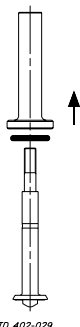
1. Slide off bottom piece (10) from valve plug unit (12, 14).
2. Remove O-rings (8, 9) from the bottom piece.

6



6. Pull off lip seal (11) from valve plug unit (12, 14).

7

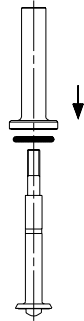


1. Remove hollow spindle (12) from valve spindle (14).
2. Pull out O-ring (13) from the hollow spindle.

Study the instructions carefully.
The items refer to the drawings and the parts list on pages 14-17.

3. Reassembly

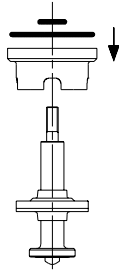
1



TD 402-029

1. Fit O-ring (13) in hollow spindle (12).
2. Slide the hollow spindle onto valve spindle (14).

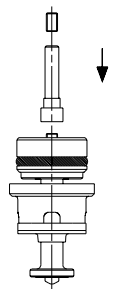
3



TD 402-027

1. Fit O-rings (8, 9) into the grooves of bottom piece (10).
2. Slide the bottom piece onto valve plug unit (12, 14).

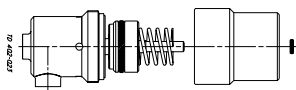
5



TD 402-025

1. Fit screw (1) in indication nut (4).
2. Guide the indication nut onto valve plug unit (12, 14), turn it clockwise and tighten.

7



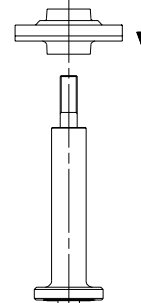
1. Slide O-ring (3) into the groove of air cylinder (2).
2. Fit the air cylinder on valve body (15), turn it clockwise and tighten by hand with a strap wrench or with a spanner.

NOTE!

Fix bottom piece (10) by means of two $\varnothing 6$ mm mandrels so that a free discharge from the drain holes is maintained.

Lubricate the rubber seals before fitting them.

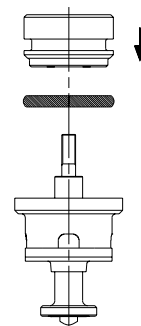
2



TD 402-028

- Fit lip seal (11) on valve plug unit (12, 14).

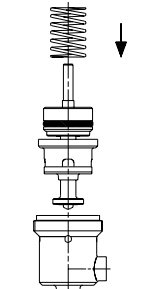
4



TD 402-026

1. Fit O-ring (7) on piston (6).
2. Guide the piston onto valve plug unit (12, 14).

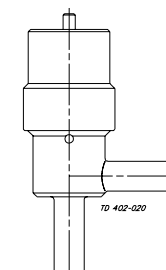
6



TD 402-024

1. Position spring (5) in the groove of piston (6).
2. Fit valve plug unit (12, 14) with the internal parts into valve body (15).

8



TD 402-020

Pre-use check:

1. Supply compressed air to the valve.
2. Open and close the valve several times to ensure that it operates smoothly.

Pay special attention to the warnings!

Technical data

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

*Inform the personnel about the technical data.
NO = Normally open.
NC = Normally closed.*

1. Technical data

12

Data - valve/actuator

Max. product pressure	1000 kPa (10bar)
Max. product pressure under the plug (NC)	600 kPa (6 bar)
Flow Kv ($\Delta p = 1$ bar)	9 m ³ /h
Temperature range	-10° C to + 140° C (EPDM)
Min. air pressure	500 kPa (5 bar)

Materials

Product wetted steel parts	AISI 316L
Finish	Semi bright
Air cylinder	AISI 304
Product wetted seals	Nitrile (NBR), (standard)
Other seals	Nitrile (NBR)
Alternative product wetted seals	EPDM and Fluorinated rubber (FPM)

Note! A bracket for standard M12 sensors is available for the LKAP valve (see ordering leaflet)



Drawing/Parts list

The drawings and the parts list include all items.
NO = Normally open.
NC = Normally closed.

The items are identical with the in the Spare Parts List.
When ordering spare parts, please use the Spare Parts List!

Parts list LKAP

14

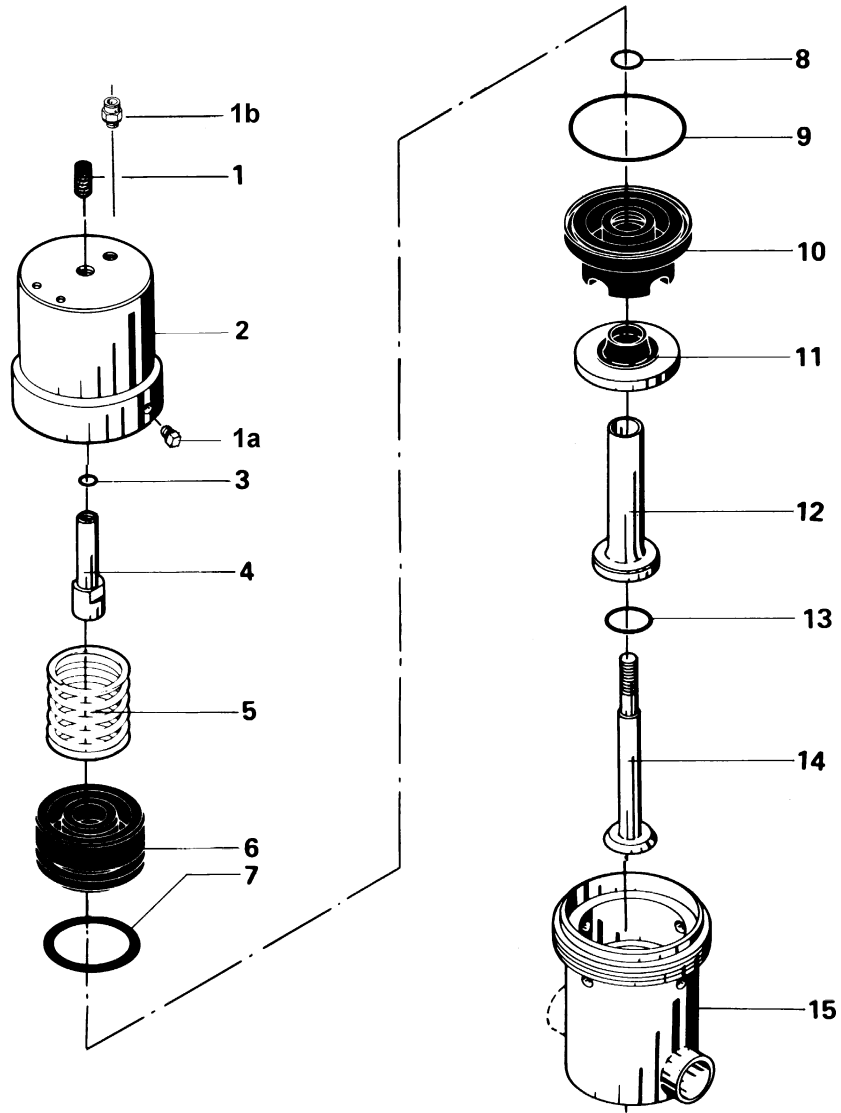
Item	Qty.	Denomination
1	1	Pointed screw
1a	1	Plug
2	1	Air cylinder
3Δ	1	O-ring
4	1	Nut
5	1	Spring
6	1	Piston
7Δ	1	O-ring
8Δ	1	O-ring
9Δ	1	O-ring
10	1	Bottom piece
11Δ	1	Lip seal
12	1	Hollow spindle
13Δ	1	O-ring
14	1	Valve spindle
15	1	L-Valve body
	1	T-Valve body

Δ : Service kit - EPDM, NBR, FPM
(See Spare Parts List)

This page shows an exploded drawing of LKAP.

The drawing includes all items of the valve.
They are identical with the items in the Spare Parts List.

Exploded drawing



Drawing/Parts list

The drawings and the parts list include all items.
NO = Normally open.
NC = Normally closed.

The items are identical with the in the Spare Parts List.
When ordering spare parts, please use the Spare Parts List!

Parts list LKAP

16

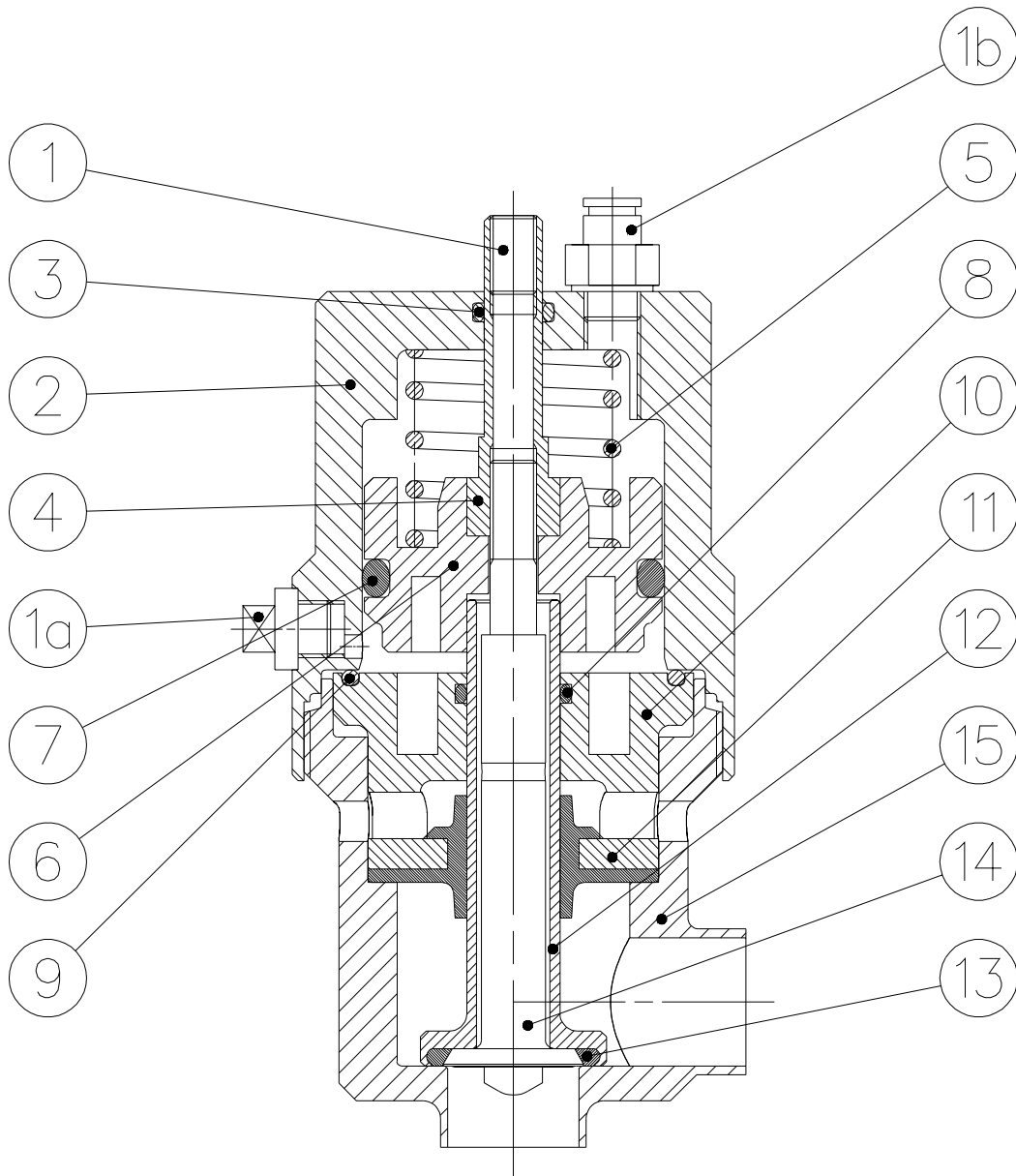
Item	Qty.	Denomination
1	1	Pointed screw
1a	1	Plug
2	1	Air cylinder
3Δ	1	O-ring
4	1	Nut
5	1	Spring
6	1	Piston
7Δ	1	O-ring
8Δ	1	O-ring
9Δ	1	O-ring
10	1	Bottom piece
11Δ	1	Lip seal
12	1	Hollow spindle
13Δ	1	O-ring
14	1	Valve spindle
15	1	L-Valve body
	1	T-Valve body

Δ : Service kit - EPDM, NBR, FPM
(See Spare Parts List)

The drawings below show LKAP.

The items refer to the parts list on the opposite part on the page.

Drawing



TD 402-022

How to contact Alfa Laval

Contact details for all countries are continually updated on our website. Please visit www.alfalaval.com to access the information direct.