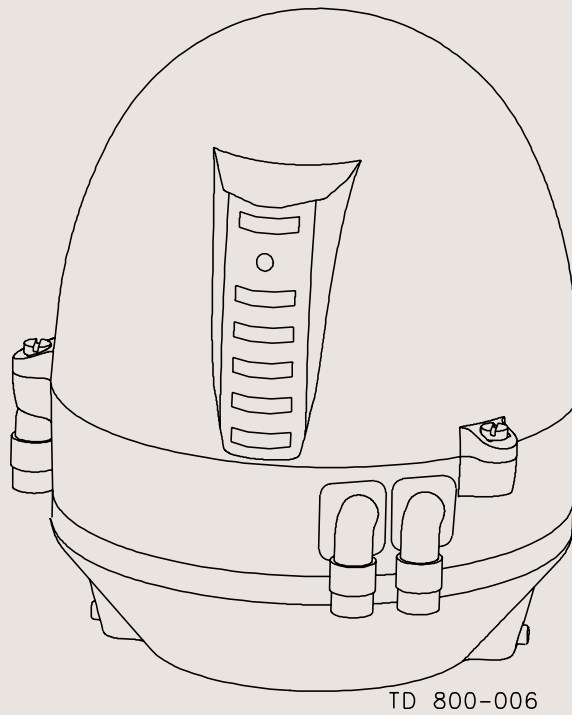




Instruction Manual

ThinkTop® Basic Digital 10 - 30 VDC PNP/NPN



Declaration of Conformity

The designating company

Alfa Laval

Company Name

Albuen 31, DK-6000 Kolding, Denmark

Address

+45 79 32 22 00

Phone No.

hereby declare that

Top Unit for Valve Control & Indication

Denomination

ThinkTop® Basic

Type

2006

Year

is in conformity with the following directives with amendments:

- Low Voltage Directive 73/23/EEC
- EMC Directive 89/336/EEC
- ROHS Directive 2002/95/EC

**Manager, Product Centres,
Compact Heat Exchangers & Fluid Handling**

Title

Bjarne Søndergaard

Name

Alfa Laval Kolding

Company



Signature

Designation



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

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1.1 Important information**1.2 Warning signs****1.3 Safety precautions**

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

Warnings are emphasized by means of special signs.

All warnings in the manual are summarized on this page.

Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

Always read the manual before using the top unit!**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 *ThinkTop® Basic*.

NOTE!

Indicates important information to simplify or clarify practices.

General warning:



Dangerous electrical voltage:



Caustic agents:

**Installation**

- **Always** observe the technical specifications (see chapter 3).
- **Never** install the *ThinkTop® Basic* before valve or relay is in a safe position.
- If welding close to the *ThinkTop® Basic*: **Always** earth close to the welding area.
- Disconnect the *ThinkTop® Basic*.
- **Always** have the *ThinkTop® Basic* electrically connected by authorized personnel.

**Maintenance**

- **Always** read the technical specifications thoroughly (see chapter 3).
- **Always** fit the seals between valve and *ThinkTop® Basic* correctly.
- **Never** service the *ThinkTop® Basic* before valve or relay is in a safe position.
- **Never** service the *ThinkTop® Basic* with valve/actuator under pressure.
- **Never** clean the *ThinkTop® Basic* with high pressure cleaning equipment.
- **Never** use cleaning agents when cleaning the *ThinkTop® Basic*.
Check with cleaning agent supplier.



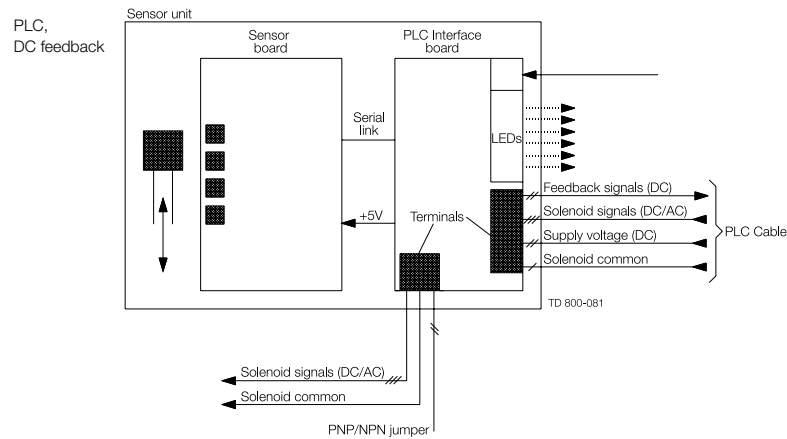
The **ThinkTop® Basic** is designed to ensure optimum valve control in conjunction with Alfa Laval valves and it is compatible with most PLC systems (Programmable Logic Controllers maker with PNP/NPN interface).

The **ThinkTop® Basic** can be equipped with 0-3 solenoid valves. The solenoids are electrically controlled by the Digital PLC and when activated the compressed air is activating the air actuator. All solenoids have built-in throttle function on both air inlet and outlet which means that it is possible to control the opening and closing time of the air actuator. The solenoids are also equipped with a manual hold override.

Visual LED lights are constantly indicating the status of the unit: Valve positions, solenoid activated, setup and local fault indication etc.

The **ThinkTop® Basic** is characterized by a simple and modular design. It is exchangeable and is prepared for upgrading.

3.1 “No Touch” sensor system



Type: Alfa Laval “No Touch” System

For wire connections: See section 4.5 “Electrical connection, internal”.

Features

- Easy and simple set-up, using locally pushbuttons
- No manual sensor adjustments at all
- No sensor “movements” due to vibrations
- Modular and hygienic design with exchangeabilities
- Clear LED’s for visual status indication
- Set-up parameters saved in case of power failure

Sensor system

Unique “No Touch” sensor system without any mechanical sensor adjustments. A magnet is mounted on the valve stem and the magnetic field (axial) is detected by sensor chips inside the sensor unit. The measuring angle from each chip is used to locate the current position of the valve stem with an accuracy of ± 0.1 mm. Note that the distance to the magnet can be $5 \text{ mm} \pm 3 \text{ mm}$.

Feedback signals

The sensor system can be used for 2 digital PNP/NPN feedback signals. Selection of PNP or NPN is done by a jumper. Two of the feedback signals can be used for external sensors if necessary.

Output signals from the sensor unit to the connected digital interface (PLC).

Nominal voltage:	Same as connected to the ThinkTop® Basic .
Load current:	50 mA typical, 100 mA max.
Voltage drop:	Typical 3 V 50 mA.

Power supply - DC:

The **ThinkTop® Basic** is designed to be part of the PLC’s Input/Output (I/O) system. It should be supplied from the same protected power supply as the other I/O devices. The I/O power supply should not be used for other kinds of loads. The unit is reverse polarity and short circuit protected. The power supply must meet the requirements of EN 61131-2.

Supply voltage:	10 - 30 VDC.
Supply voltage nominal:	24 VDC (+20%, -15%) - pr. EN 61131-2.
Max ripple:	5% of nominal supply voltage.
Supply voltage absolute max.:	30 VDC.
Supply voltage absolute min.:	10 VDC.
Supply current*):	Max. 45 mA (for sensor unit alone, excluding solenoids)

*) The initial current during power-on is higher. The actual shape of the current pulse depends on the power supply used. Typical values are 150 mA RMS during 13 ms (regulated PS) to 330 mA RMS during 8 ms (unregulated PS).

The fulfilling of the UL requirements in UL 508 requires that the unit is supplied by an isolating source complying with the requirements for class 2 power units (UL 1310) or class 2 and 3 transformers (UL 1585).

Sensor detection system:

Sensor accuracy: +/- 0,1 mm.
 Tolerance band: +/- 5 mm.
 Distance to magnet: 5 +/- 3 mm.
 Stroke length: 0.1 - 80 mm.

PNP/NPN polarity

PNP (sourcing) or NPN (sinking) function is selected by a jumper in terminals 9 and 10. Jumper present = PNP (standard). If changing to NPN remove the jumper and make a power recycle. A power recycle is always required when changing this function.

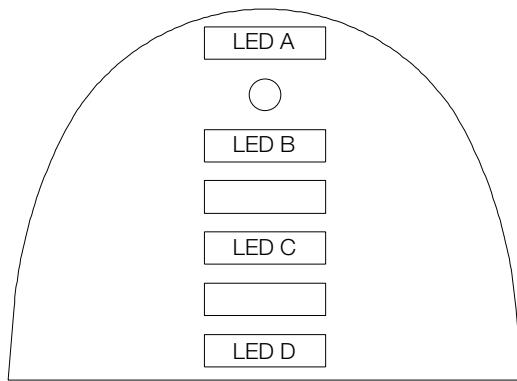
Typical power consumption ThinkTop® Basic:

Test conditions = One ThinkTop® Basic connected and 1 feedback active (on) and:

No solenoids on	Supply voltage 24 VDC	30 mA
1 solenoid active	Supply voltage 24 VDC	75 mA
2 solenoids active	Supply voltage 24 VDC	120 mA
3 solenoids active	Supply voltage 24 VDC	165 mA

Note! "Power-on" current is higher - See power supply - DC.

ThinkTop® Basic visual indications



TD 800-030

LED indications

- A = "Energized" (Yellow)
- B = "Set-up/fault" (red)
- C = "Solenoids" (Yellow)
- D = "De-energized" (Green)

Solenoid Valves:	
0 to 3 solenoid valves in each unit possible.	
Type:	3/2 or 5/2 port (only possible with one 5/2 port).
Air supply:	300-900 kPa (3-9 bar).
Filtered air, max. particles or dirt:	0.01 mm.
Max. flow:	180 l/min.
Max. oil content:	1.0 ppm.
Max. water content:	0.0075 kg/kg air.
Throughput:	ø2.5 mm.
Manual hold override:	Yes.
External air tube connection:	ø6 mm or ¼" (select when ordering).
Nominal voltage:	24 VDC.
Nominal power:	1.0 W.
Silencer/filter **):	Connection possible via ø6 mm or ¼".
Materials	
Plastic parts:	Nylon PA 6, reinforced.
Steel parts:	Stainless steel AISI 304 and 316.
Air fitting:	Special coated brass (FDA approved).
Seals:	Nitrile (NBR).
**) Filter recommended in tropical regions.	

Micro environment demand specifications

Temperature		
Working:	-20°C to +85°C	IEC 68-2-1/2
Storage:	-40°C to +85°C	IEC 68-2-1/2
Temperature change:	-25°C to +70°C	IEC 68-2-14
Vibration	10-55 Hz, 0.7 mm 55-500 Hz, 10g 3 x 30 min, 1 octave/min	IEC 68-2-6
Drop test		IEC 68-2-32
Humidity		
Constant humidity:	+40°C, 21 days, 93% R.H.	IEC 60068-2-78
Cyclic humidity:	+25°C/+55°C 12 cycles (working) 93% R.H.	
Protection class	IP66 and IP67	EN 60529
Input treshold		
Voltage/current:	Type 1 input requirements	EN 61131-2
Solenoid signals		
Isolation voltage	(1000 + 2 x 117) VAC rms/1 min	EN 61131-2
EMC Directive	89/336/EEC	EN 61000-6-3, EN 61000-6-2
UL/CSA	10-30 VDC/AC, Class 2 input, 45 mA max. output	UL 508-E203255

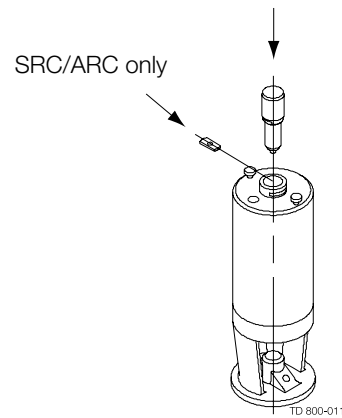
Step 1



- **Always** read the technical specifications thoroughly (see chapter 3).
- **Always** have the *ThinkTop® Basic* electrically connected by authorized personnel.
- **Always** install the *ThinkTop® Basic* before valve or relay is in a safe position.

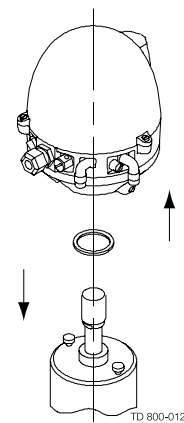
Step 2

1. Fit the air fittings on actuator if not mounted.
2. Fit the activator stem (magnet) and tighten **carefully** with a spanner.



Step 3

1. Place the *ThinkTop® Basic* on top of the actuator.
2. Make sure X-ring is mounted.

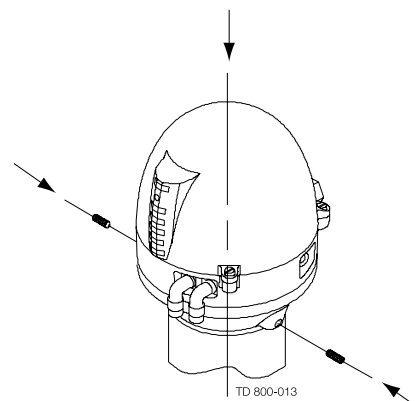


Step 4

1. Ensure that the unit is correctly mounted by pressing down on top of the *ThinkTop® Basic*.
2. Tighten the two Allen screws **carefully**.
3. Turn the actuator to have LEDs in a front view.

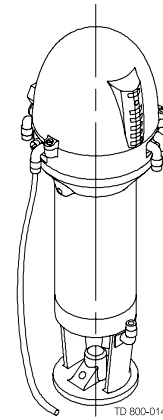
NOTE!

After a relevant period of time after installation (e.g. two weeks) it is recommended to check that all connections are properly tightened.

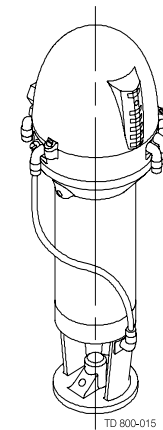


Step 5

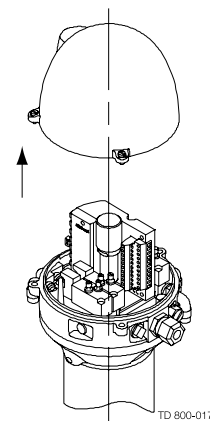
Fit the $\varnothing 6$ mm (1/4") air tubes to *ThinkTop*[®] **Basic**.
(see drawing "Air connections" later in this chapter).

**Step 6**

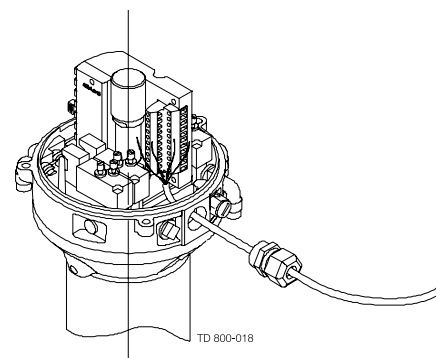
Fit the air tubes to the actuator
(see drawing "Air connections" later in this chapter).

**Step 7**

Untighten the four screws and pull off cover of *ThinkTop*[®] **Basic**.

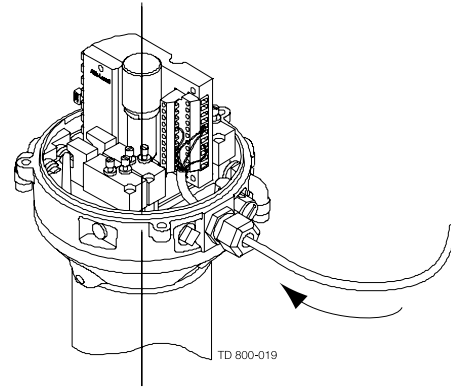
**Step 8**

1. Install cable (if not present) through the cable gland.
2. Connect the *ThinkTop*[®] **Basic** electrically
(see section 4.4 "Electrical connection, internal").



Step 9

Make sure the cable gland is completely tightened.

**Step 10**

Set up the *ThinkTop*[®] **Basic** (see chapter 5).

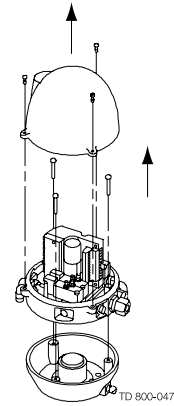
NOTE!

The unit can be set up with the cover installed by using the IR keypad.
To energize the valve, use a separate air tube or be in radio contact with the control room.

Step 1

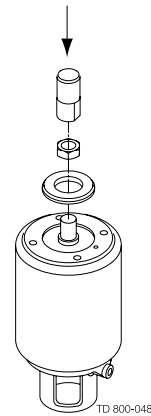
1. Remove the cover by loosening the four cross recess screws.
2. Separate the adapter from the base by loosening the three recess screws on top of the base.

Installation on air actuators:



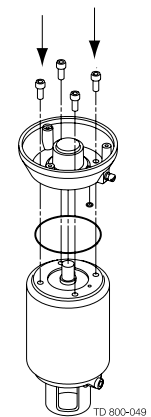
Step 2

1. Fit air fittings on actuator.
2. Position packing retainer in recess on actuator top.
3. Fit counter nut and indicator (magnet) on actuator rod. Engage approx. 1/4" thread. Tighten counter nut and indicator with two wrenches.



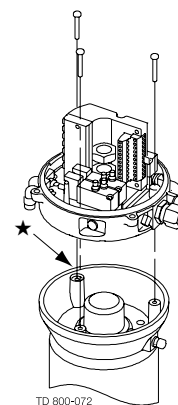
Step 3

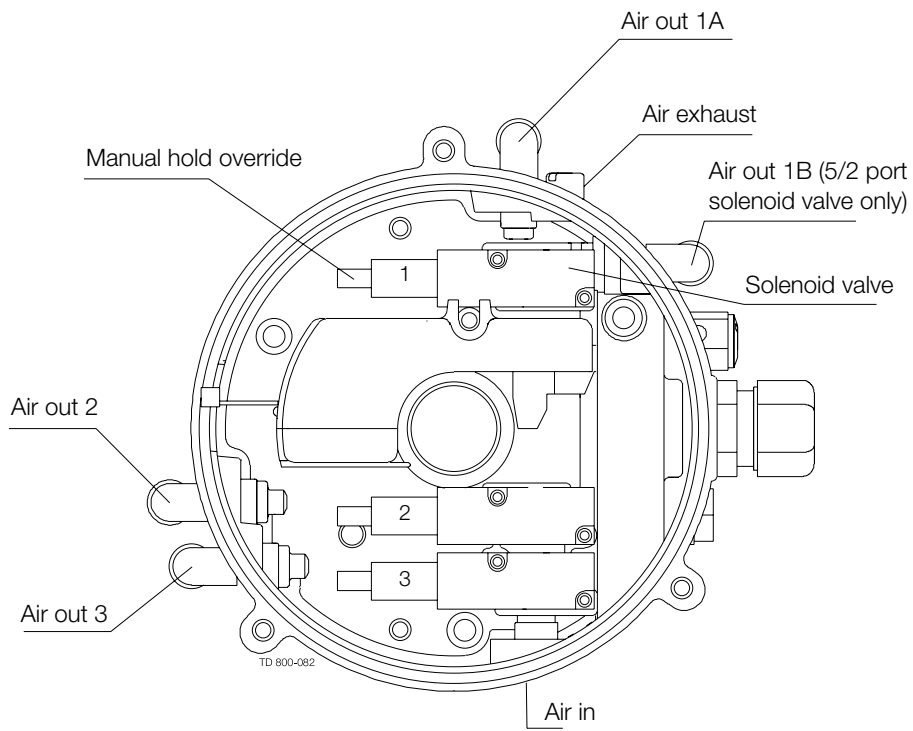
1. Place the two O-rings in the grooves in the bottom of the adapter. Then place the adapter on the actuator top. The small O-ring must be positioned over the air hole on the actuator.
2. Fasten the adapter with the four 5/16" Allen screws.

















Step 4

Mount the base on the adapter in the position needed (can be rotated 120° in both directions). Note that one of the screw towers on the adapter has a guide recess (see ★ on drawing).





 Electrical connections

P1	
	1 De-energized (PLC input)
	2 Energized (PLC input)
	3 Activation of solenoid # 1 (PLC output)
	4 Activation of solenoid # 2 (PLC output)
	5 Activation of solenoid # 3 (PLC output)
	6 Supply voltage sensor (+) 10-30 VDC
	7 Supply voltage sensor (0) 0 V
	8 Common supply solenoids
	9 PNP/NPN jumper*)
	10 PNP/NPN jumper*)
	11 Solenoid common, internal connection
	12 Solenoid # 1, internal connection
	13 Solenoid # 2, internal connection
	14 Solenoid # 3, internal connection

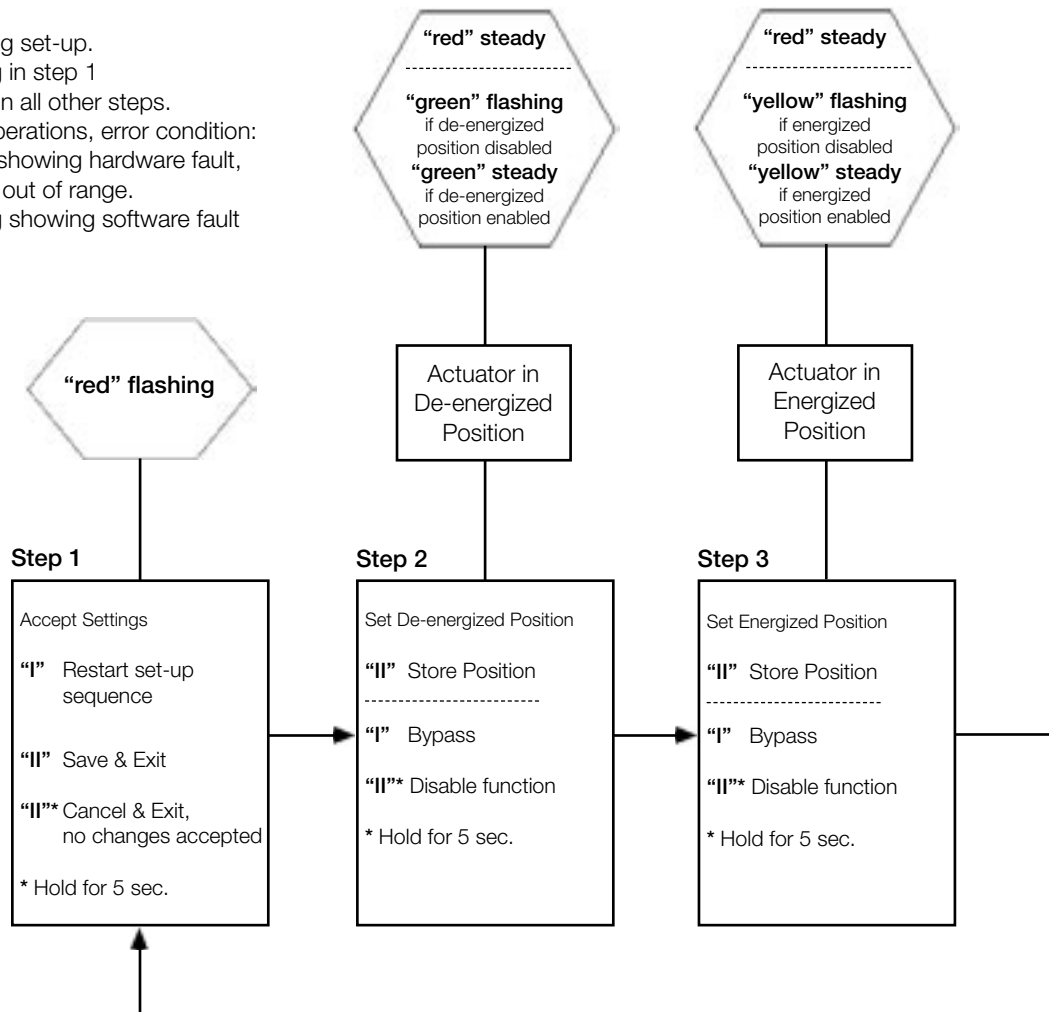
TD 800-007

*) Jumper present = PNP. If changing the function a power recycle is necessary.
The selection NPN/PLC is done by the jumper.

Note! Remember to isolate wires that are not in use.

Timeout: A 30 second time-out is started as soon as any button(s) are released.
 If no button is pressed during the time-out period, go to normal condition (cancel & exit).

Red LED: Active during set-up.
 - Flashing in step 1
 - Steady in all other steps.
 or during operations, error condition:
 - Steady showing hardware fault, magnet out of range.
 - Flashing showing software fault



Quick set-up:
 Push: "I", enter setup and wait until red LED flashes.
 Push: "I", restart set-up.

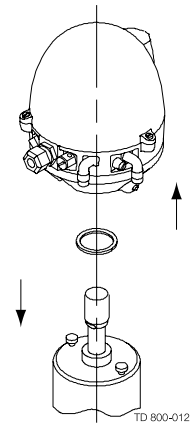
Actuator in De-energized position
 Push: "II", store position

Actuator in energized position
 Push: "II", store position
 Push: "II", when red LED is flashing (save & exit)
 Set-up done.

Study the instructions carefully.
 Handle scrap correctly.
 Always keep spare X-rings in stock.

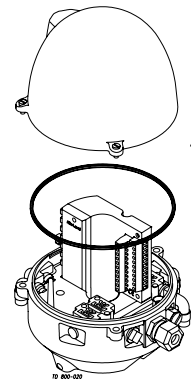
Step 1

1. Remove the *ThinkTop*[®] Basic from the actuator.
2. Pull out X-ring (19) and replace it.



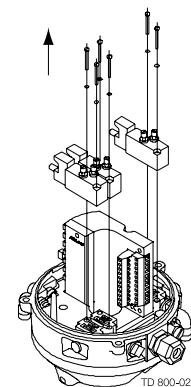
Step 2

1. Untighten the four screws.
2. Pull off cover of *ThinkTop*[®] Basic.
3. Remove X-ring (9).



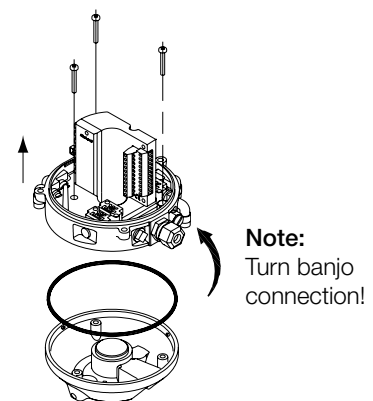
Step 3

1. Untighten screws.
2. Remove solenoid valves (up to three) and replace them with new ones.



Step 4

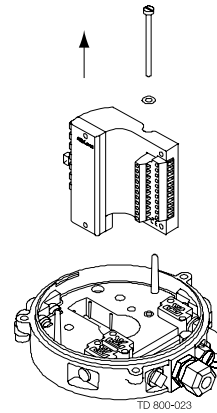
1. To dismantle the adapter (the lower part of the *ThinkTop*[®] Basic[®]) from base (the middle part), unscrew the three screws.
2. Turn the lower part a little clockwise and pull.
3. Replace adapter if necessary.
4. Remove X-ring (16).



*Study the instructions carefully.
Handle scrap correctly.
Always keep spare X-rings in stock.*

Step 5

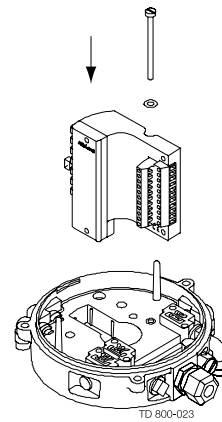
To remove the sensor unit untighten screw and pull out the sensor unit.



Study the instructions carefully.
 Handle scrap correctly.
 Always keep spare X-rings in stock.

Step 1

Place sensor unit in base and tighten screw (torque: 1 Nm).

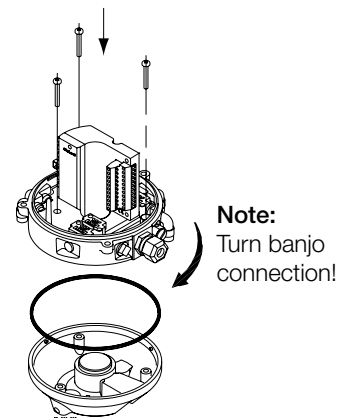
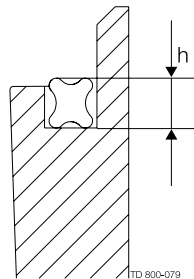


Step 2

1. Assemble base with adapter by turning adapter slightly anticlockwise and tighten the three screws (1.9 Nm).
2. Replace X-ring (16).

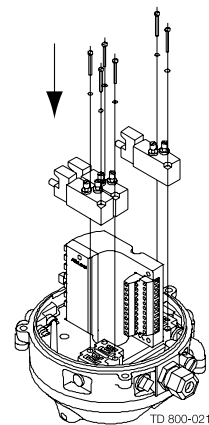
CAUTION!

Do **NOT** twist the X-ring in the groove!
 The X-ring is not square; The highest (h) part must be placed as fig.



Step 3

1. Replace solenoid valves (up to three) with new ones.
2. Tighten screws (0.2 Nm).

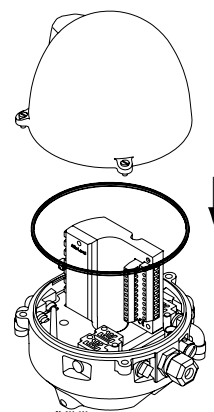
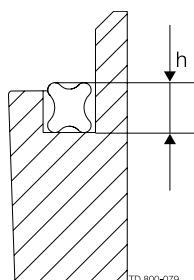


Step 4

1. Replace X-ring (9).
2. Replace cover of *ThinkTop*[®] Basic and tighten the three screws (0.6 Nm).

CAUTION!

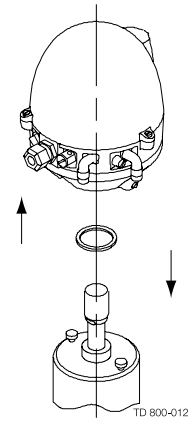
Do **NOT** twist the X-ring in the groove!
 The X-ring is not square; The highest (h) part must be placed as fig.



*Study the instructions carefully.
Handle scrap correctly.
Always keep spare X-rings in stock.*

Step 5

1. Replace X-ring (19).
2. Mount *ThinkTop*® Basic on actuator.

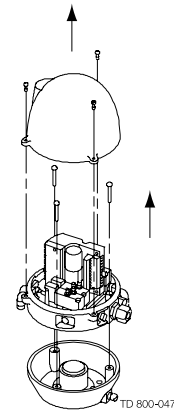


Study the instructions carefully.
 Handle scrap correctly.
 Always keep spare X-rings in stock.

Step 1

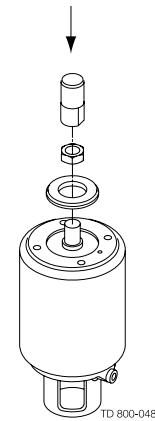
1. Remove the cover by loosening the four cross recess screws.
2. Separate the adapter from the base by loosening the three recess screws on top of the base.

Installation on air actuators:



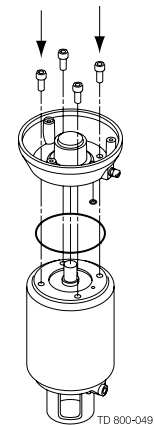
Step 2

1. Fit air fittings on actuator.
2. Position packing retainer in recess on actuator top.
3. Fit counter nut and indicator (magnet) on actuator rod. Engage approx. 1/4" thread. Tighten counter nut and indicator with two wrenches.



Step 3

1. Place the two O-rings in the grooves in the bottom of the adapter. Then place the adapter on the actuator top. The small O-ring must be positioned over the air hole on the actuator.
2. Fasten the adapter with the four 5/16" Allen screws.

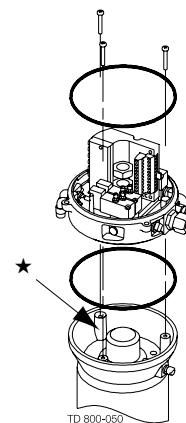
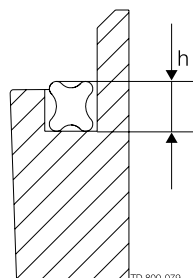


Step 4

- Remove x-rings (9) and (16).
- Replace with new ones.
- Mount the base on the adapter in the position needed (can be rotated 120° in both directions). Note that one of the screw towers on the adapter has a guide recess (see ★ on drawing).

CAUTION!

Do **NOT** twist the X-ring in the groove!
 The X-ring is not square; The highest (h) part must be placed as fig.



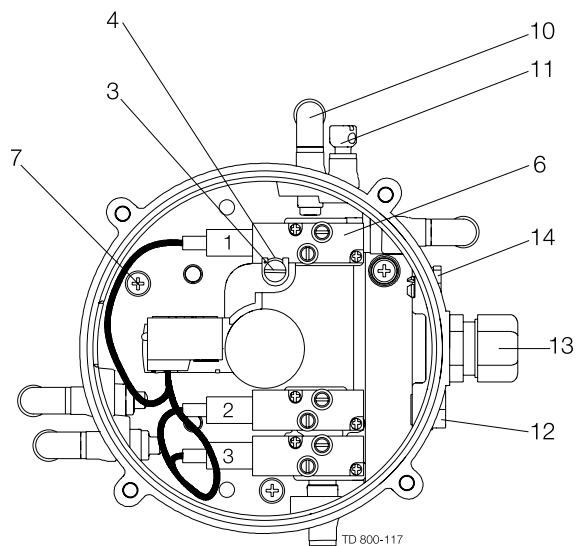
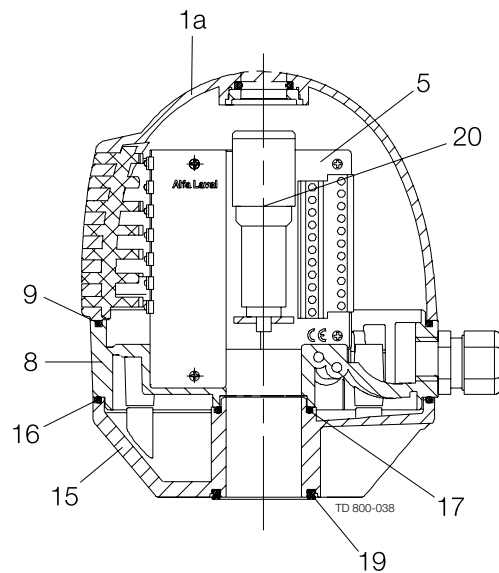
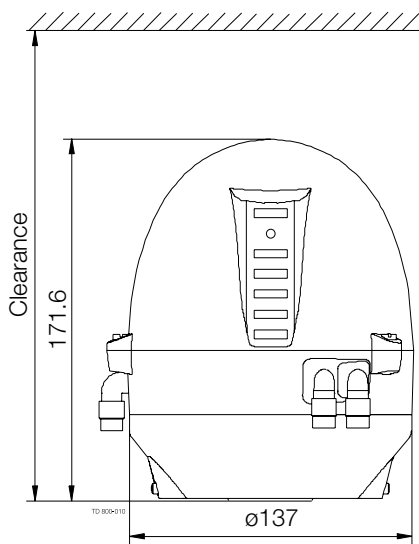
The drawing and the parts list include all items.

Parts List

Pos.	Denomination
1a	Shell
3	Screw
4	Washer
5	Sensor unit
6	Solenoid valve
7	PT screw
8	Base
9	Special X-ring
10	Air fittings
11	Blow-off valve
12	Thread plug, PG7
13	Cable gland, PG11 4-10 mm
14	Gore vent High airflow
15	Adapter
16	Special X-ring
17	O-ring
18	Allen screw
19	Special X-ring
20	Indication pin

Spare Parts

Denomination	Item number
Sensor unit Digital 8-30 VDC PNP/NPN.....	9613-4192-01
Solenoid valve 3/2, 24 VDC	9611-99-4635
Solenoid valve 5/2, 24 VDC	9611-99-3327



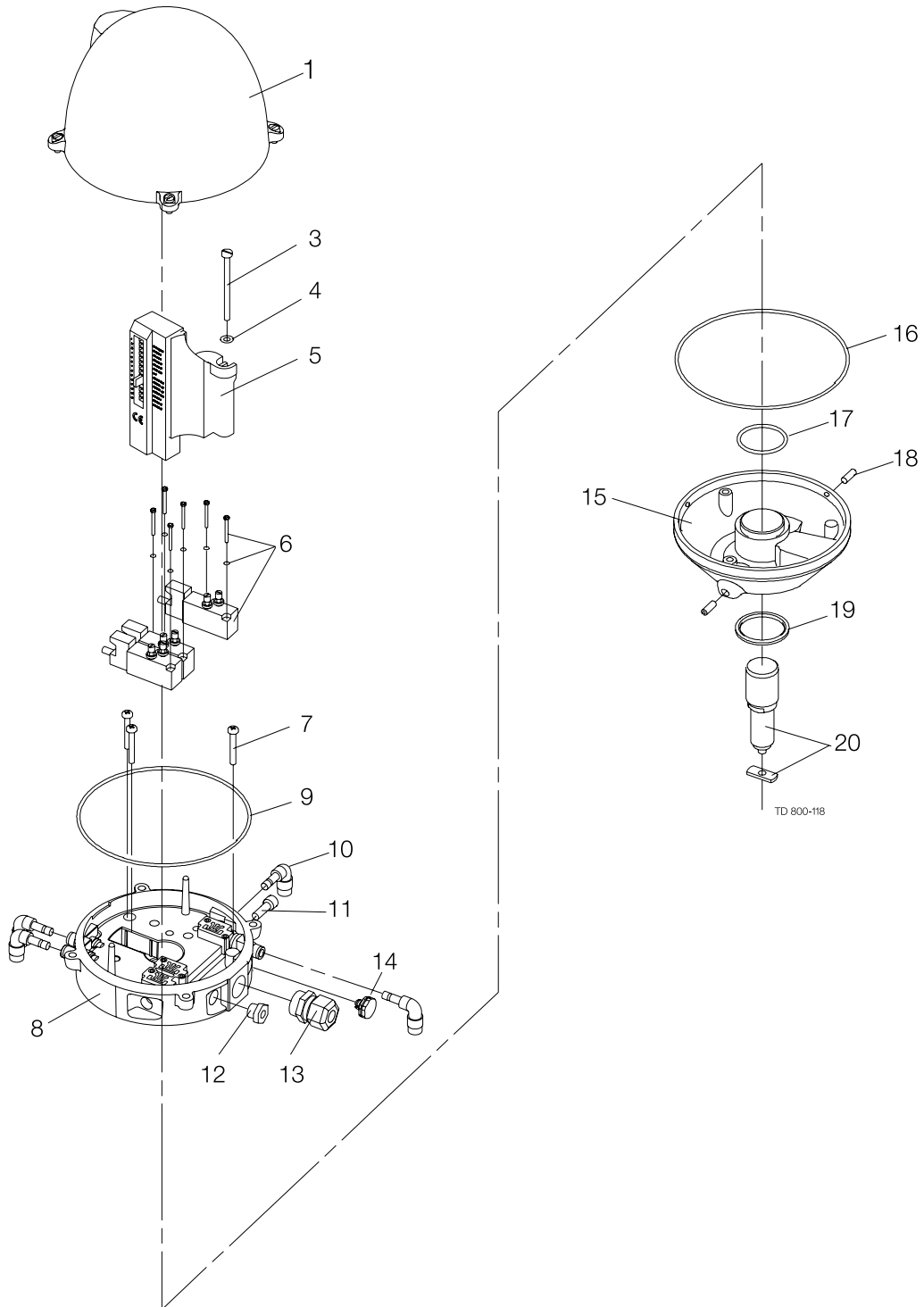
Note! This is the basic design.

The clearance should be approximately:

- ø 225 x 250 (SRC NC, SMP-SC/-BC/-TO, *Unique*, Koltek MH, SBV, AMP)
- ø 225 x 320 (SRC NO)
- ø 225 x 300 (LKB (LKLA-T))

This page shows an exploded drawing of the ThinkTop® Basic. The drawing includes all items of the top unit.

Exploded Drawing



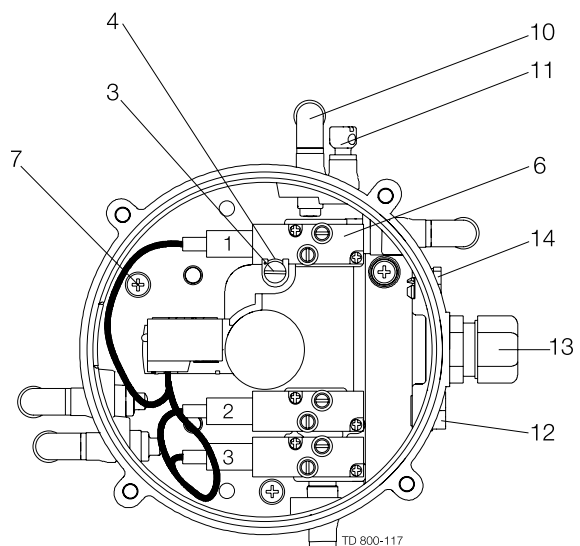
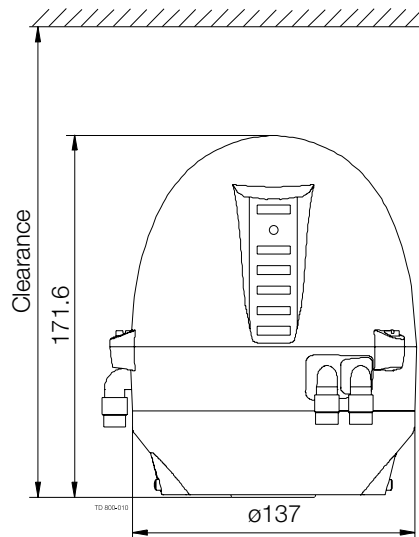
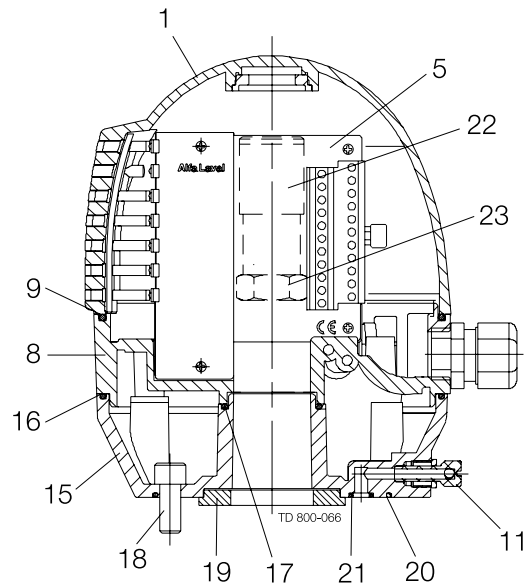
The drawing and the parts list include all items.

Parts List

Pos.	Denomination
1	Shell
3	Screw
4	Washer
5	Sensor unit
6	Solenoid valve
7	PT screw
8	Base
9	Special X-ring
10	Air fittings
11	Blow-off valve
12	Thread plug, PG7
13	Cable gland, PG11 4-10 mm
14	Gore vent High airflow
15	Adapter
16	Special X-ring
17	O-ring
18	Screw
19	Retainer
20	O-ring
21	O-ring
22	Indicator pin
23	Nut

Spare Parts

Denomination	1/4" Air connec.
Sensor unit Digital 8-30 VDC PNP/NPN.....	9613-4192-01
Solenoid valve 3/2, 24 VDC	9611-99-4635
Solenoid valve 5/2, 24 VDC	9611-99-3327



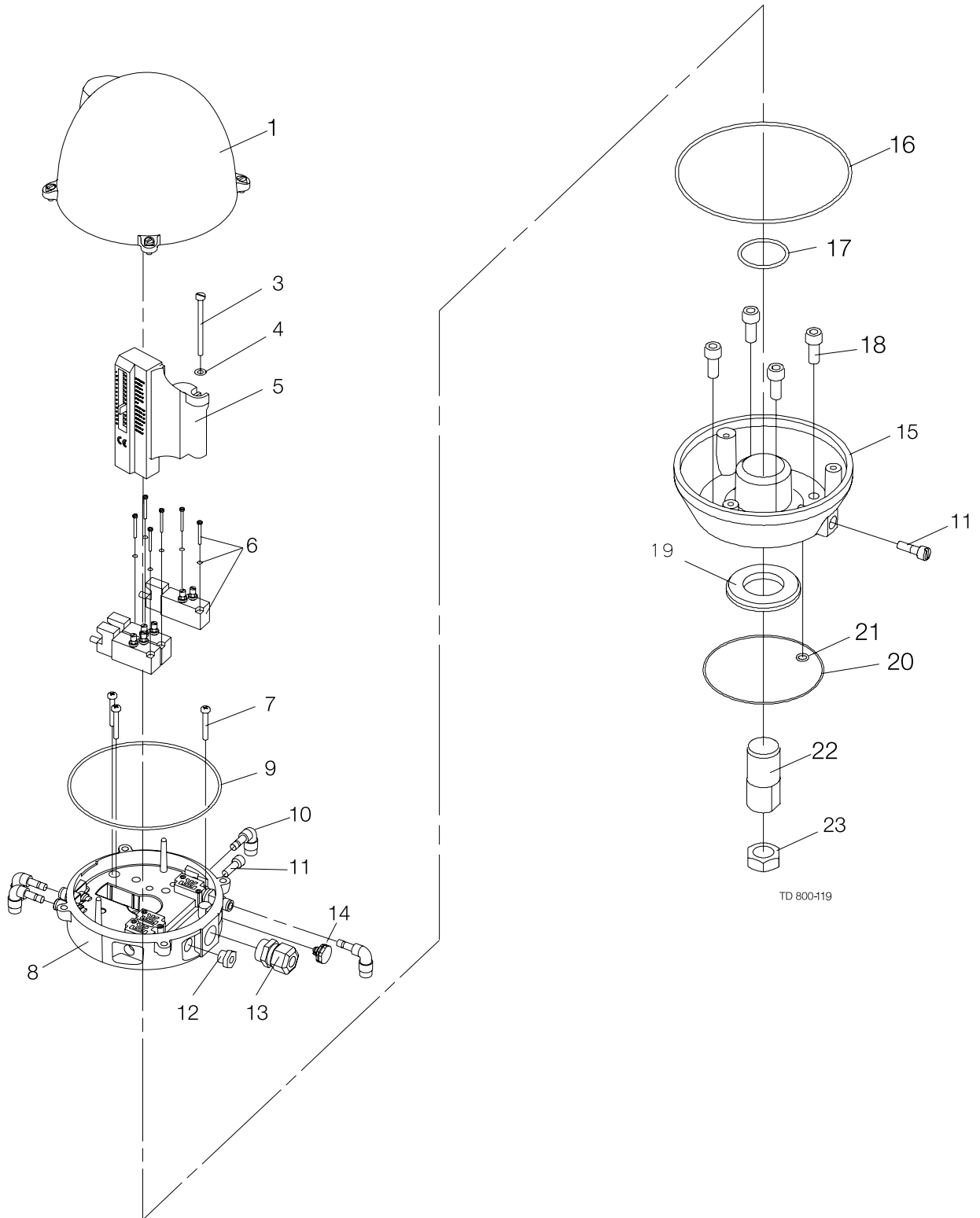
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This page shows an exploded drawing of the ThinkTop® Basic. The drawing includes all items of the top unit.

Exploded Drawing



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.