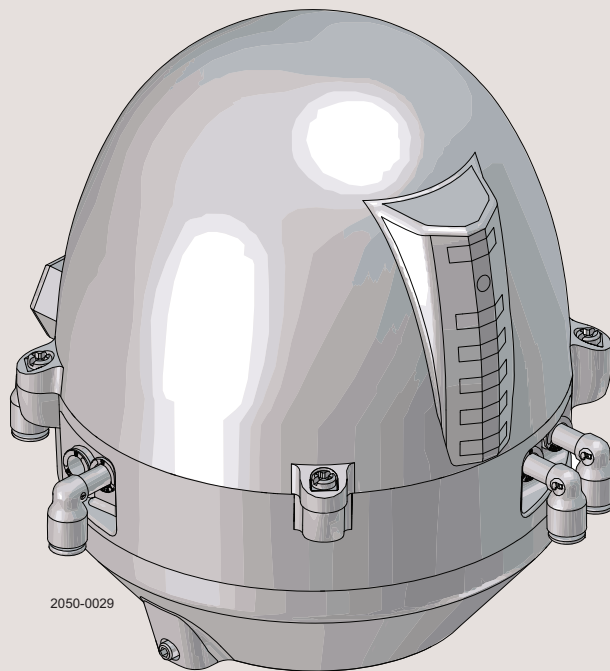




Instruction Manual

ThinkTop Basic Digital and AS-Interface



2050-0029

Patented Sensor System
Registered Design
Registered Trademark

ESE02954-EN3 2017-12

Original manual

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

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1 EC Declaration of Conformity

Revision of Declaration of Conformity 2013-12-03

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

Top Unit for Valve Control and Indication

Designation

ThinkTop® Basic Digital 10 - 30 VDC

ThinkTop® Basic AS-Interface

Type

is in conformity with the following directive with amendments:

- EMC Directive 2014/30/EU
- RoHS2 Directive 2011/65/EU

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

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

Title

Lars Kruse Andersen

Name

Kolding

Place

2017-03-01

Date



Signature



*This manual highlights unsafe practices and other important information.
Warnings are emphasised by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below in order to avoid severe personal injury or damage to the top unit.*

2.1 Important information

Always read the manual before using the top unit!

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 ThinkTop.

NOTE

Indicates important information to simplify or clarify procedures.

2.2 Warning signs

General warning:



Dangerous electrical voltage:



Caustic agents:



2.3 Safety precautions

Installation:

Always read the technical data carefully (See chapter 6 Setup diagram)
Never install the ThinkTop Basic before the valve or relay are in a safe position
If welding close to the ThinkTop Basic: **Always** perform earthing close to the welding area
Disconnect the ThinkTop Basic



Always ensure the ThinkTop Basic electrically connected by authorised personnel



Maintenance:

Always read the technical data carefully (See chapter 6 Setup diagram)
Always fit the seals between the valve and ThinkTop correctly
Never install the ThinkTop before the valve or relay are in a safe position
Never service the ThinkTop with the valve/actuator under pressure
Never clean the ThinkTop with high pressure cleaning equipment



Never use cleaning agents when cleaning the ThinkTop. Check with cleaning agent supplier.



3 General information

3.1 ThinkTop Basic in general

The ThinkTop is designed to ensure optimum and reliable valve control in conjunction with Alfa Laval valves and is compatible with most PLC systems (Programmable Logic Controllers).

The ThinkTop can be equipped with 0-3 solenoid valves. The solenoids are electrically controlled by the PLC system and, when activated, the compressed air is activating the air actuator. Depending on the type of control unit, the primary solenoid valve can be provided with a built-in throttle function on both the 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 constantly indicate the distinct status of the control unit: such as valve positions, solenoid valve energised, setup and local fault indication etc.

The ThinkTop is characterised by its high durability, well-proven features and modular design. It is exchangeable and ready to fit Alfa Laval Sanitary actuators from the past and present.

3.2 Recycling information

• Unpacking

- Packing material consists of wood, plastics, cardboard boxes
- Wood and cardboard boxes can be reused, recycled or used for energy recovery
- Plastics should be recycled or burnt at a licensed waste incineration plant

• Maintenance

- All metal parts should be sent for material recycling
- Worn or defective electronic parts should be sent to a licensed handler for material recycling
- All non-metal wear parts must be handled in compliance with regulations

• Scrapping

- End-of-life equipment shall be recycled according to relevant, local regulations. In addition to the equipment itself, any hazardous residue from the process liquid must be taken into account and handled in the necessary way. When in doubt, or in the absence of local regulations, please contact the local Alfa Laval sales company
-

4.1 ThinkTop Basic common specifications

Sensor System

Unique “No Touch” sensor system with no mechanical sensor adjustments. A magnet (indication pin) is mounted on the valve stem and the magnetic field is detected by the sensor unit. The measuring angle from each chip is used to locate the current position of the valve stem with an accuracy of $\pm 0.1\text{mm}$.

Electrical connection

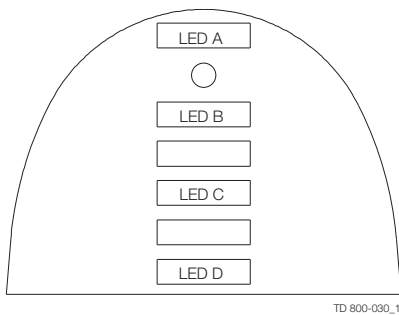
Direct main cable gland entry (hard wired) PG11 ($\phi 4 - \phi 10\text{ mm}$).

Option for AS-i version: Main connection as M12 plug, 2 wire.

Terminals

The terminal row of the sensor board is equipped with screw terminals for both internal and external wires. The terminals are suitable for wires up to 0.75 mm^2 (AWG 19).

ThinkTop Basic Visual Indications



LED Indications

LED A	“Energised” (Yellow)
-	-
LED B	“Setup/Fault” (Red)
-	-
LED C	“Solenoid” (Yellow)
-	-
LED D	“De-Energised” (Green)

4 Technical specifications

Technical specifications	
0 to 3 solenoid valves in each unit.	
Type	3/2 or 5/2 valve (only possible with one 5/2 valve)
Air supply	300-900 kPa (3-9 bar)
Filtered air, max. particles or dirt	5 μ 5-5 mg/m ³
Max. flow	180 l/min
Max. oil content	1 mg/m ³
Max. water content	0.88 g/m ³ -20 °C compressed air
Throughput	ø2.5 mm
Air restriction (throttle function)	No (5/2 yes)
Manual hold override.	Yes
External air tube connection	ø6 mm or 1/4" (specify when ordering)
Nominal voltage	24 VDC
Nominal power	1.0 W
Silencer/filter	Connection possible via ø6 mm (Filter recommended in tropical regions)
Materials	
Plastic parts	Nylon PA6, reinforced
Metal parts	Stainless steel and brass
Seals	Nitrile (NBR)
Gore vent. membrane	PBT plastic

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	IEC 68-2-6
	55-500 Hz, 10g	
	3 x 30 min, 1 octave/min	
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	IEC 60529
Input threshold		
Voltage/current:	Type 1 input requirements	EN 61131-2
EMC Directive		
	2014/30/EU	
UL/CSA		
	10-30 VDC, Class 2 input, 45 mA max. output	UL 508-E203255

4.2 ThinkTop Basic Digital

Power Supply

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 load. The unit is reverse polarity and short circuit protected. The power supply must meet the requirements of EN 61131-2.

Supply voltage nominal:24 ± 10% VDC
 Supply voltage absolute max.:30 VDC
 Supply voltage absolute min.:10 VDC

Typical power consumption: ThinkTop Basic

Test conditions = One ThinkTop Basic connected with 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

Fulfillment of the UL requirements in UL508 requires the unit to be supplied by an isolating source that complies with the requirements for class 2 power units (UL1310) or class 2 and 3 transformers (UL1585).

Feedback signals

The sensor system can be used for 2 digital PNP/NPN feedback signals. Selection of PNP or NPN is performed by a jumper.

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.

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.

4 Technical specifications

4.3 ThinkTop Basic AS-Interface

Power supply

The power supply to the complete unit is taken from the AS-Interface loop. The unit is reverse polarity protected.

Supply voltage: 29.5 - 31.6 VDC

Slave profile v.3.0

Default slave address: 0

IO code: 7 (4 bit bi-directional)

ID code: A

ID1 code: 7

ID2 code: 7

Slave profile = 7.A.7.7

No. of slaves:

AS-Interface specification 3.0 for max. 62 ThinkTop Basic AS-Interface units on a single master/gateway

AS-Interface bits assignment:

For the AS-Interface version with 62 nodes, the following bit assignment will be used:

DI 0 De-Energised position (closed position)

DI 1 Energised position (open position)

DI 2 Not connected

DI 3 Status

DO 0 Not connected

DO 1 Solenoid valve 1

DO 2 Solenoid valve 2

DO 3 Solenoid valve 3

Status signal input bit 3

The status signal is used for two purposes:

- To indicate that the setup is ongoing (LED B).
 - To indicate an error condition (LED B). (Flashing LED = software error), (steady LED = hardware error).
-

5.1 Installation on air actuators

Step 1



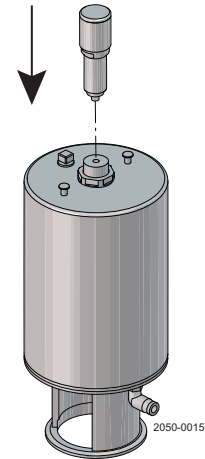
Always read the technical data carefully.



Always ensure the ThinkTop Basic electrically connected by authorised personnel.

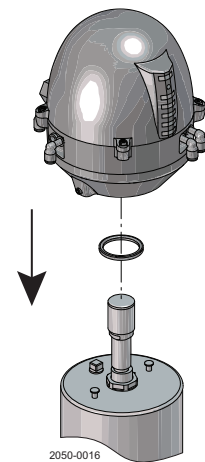
Step 2

1. Fit the air fittings on actuator if not mounted.
2. Fit the indication pin and tighten **carefully** with a spanner.



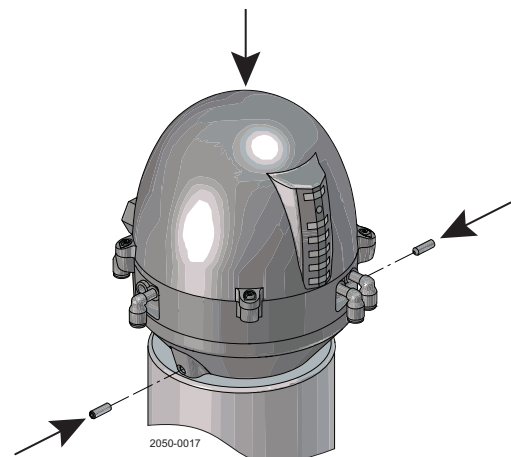
Step 3

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



Step 4

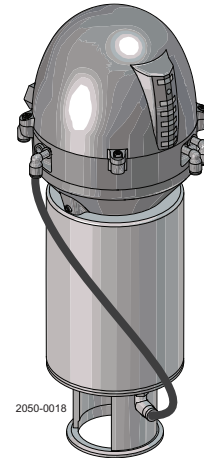
1. Ensure that the unit is correctly mounted by **pressing** down on top of the ThinkTop Basic.
2. Cross tighten the two Allen screws carefully in the two opposite directions.
3. Turn the actuator so that the LEDs are at the front.



5 Installation

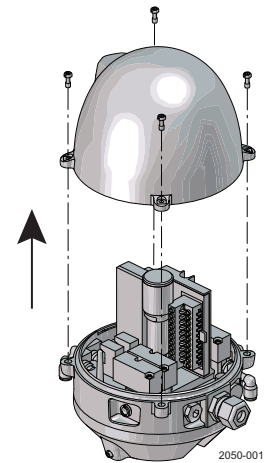
Step 5

Install the air tubes with reference to the Air connections diagram on page 15.



Step 6

Untighten the four screws and pull off the cover of ThinkTop Basic.

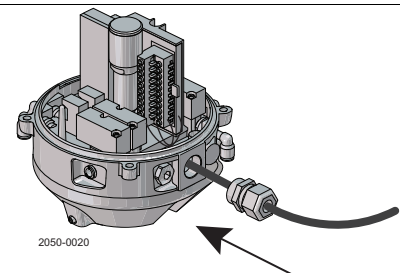


Step 7a - Cable gland version

1. Install cable (if not present) through the cable gland.
2. Connect the electrics of the ThinkTop Basic (see 5.4 Electrical connection, internal - Digital).

NOTE!

Make sure the cable gland is fully tightened.

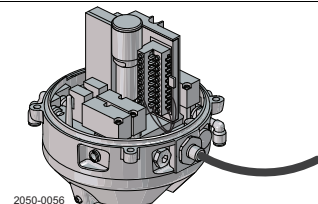
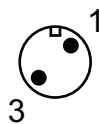


Step 7b - M12 plug version

1. Install M12 socket cable.

NOTE!

M12 plug Electrical connection:



Step 8

Set up the ThinkTop Basic (see chapter 6 Setup diagram).

NOTE!

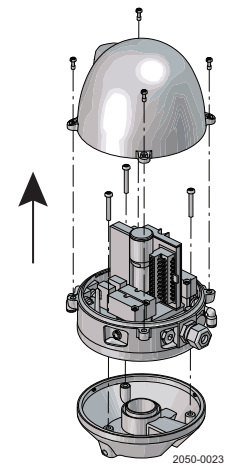
The unit can be set up by the internal push buttons on the sensor board. To energise the valve, use manual hold override on the solenoids valve or ensure you are in radio contact with the control room.

5.2 Installation on Series 700 Valves

Step 1

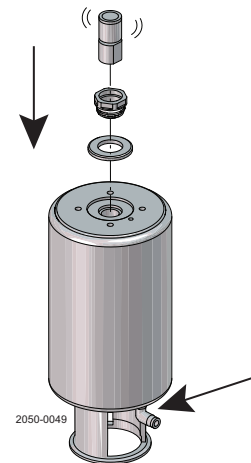
1. Remove the cover by loosening the four cross recess screws.
2. Separate the adapter from the base by loosening the three recess screws on top of the base.

Installation on air actuators:



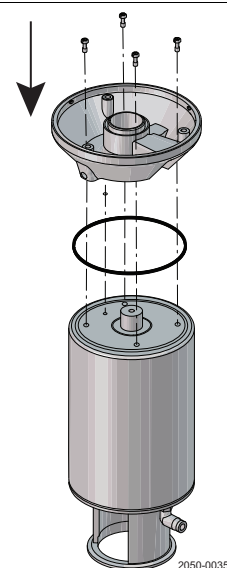
Step 2

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

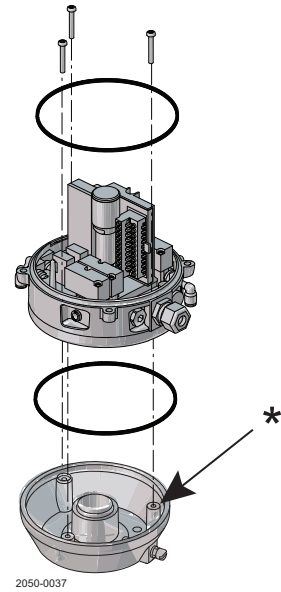
1. Place the two O-rings in the grooves in the bottom of the adapter. Then place the adapter on the actuator top. The small O-ring must be positioned over the air hole on the actuator.
2. Fasten the adapter with the four 5/16" Allen screws.



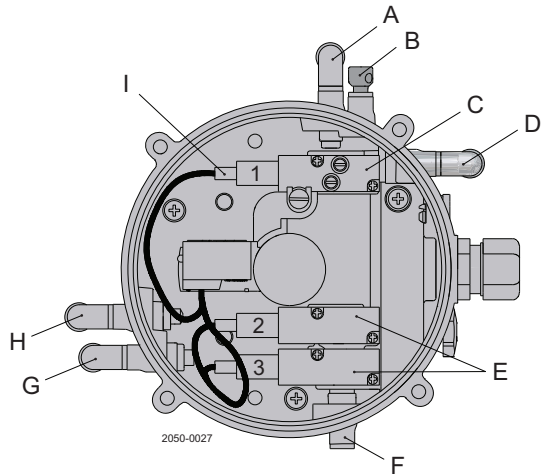
5 Installation

Step 4

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



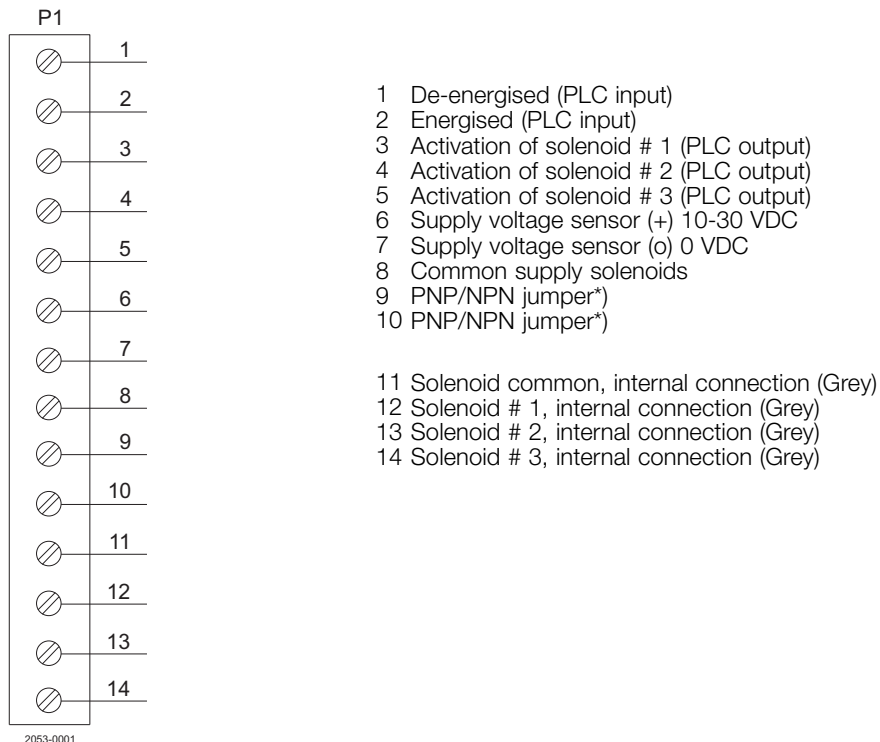
5.3 Air connections



- A. Air out 1A
- B. Air exhaust
- C. Solenoid 3/2 or 5/2
- D. Air out 1B (5/2 port solenoid valve only)
- E. Solenoid valve (3/2) only
- F. Air in
- G. Air out 3
- H. Air out 2
- I. Manual hold override

5 Installation

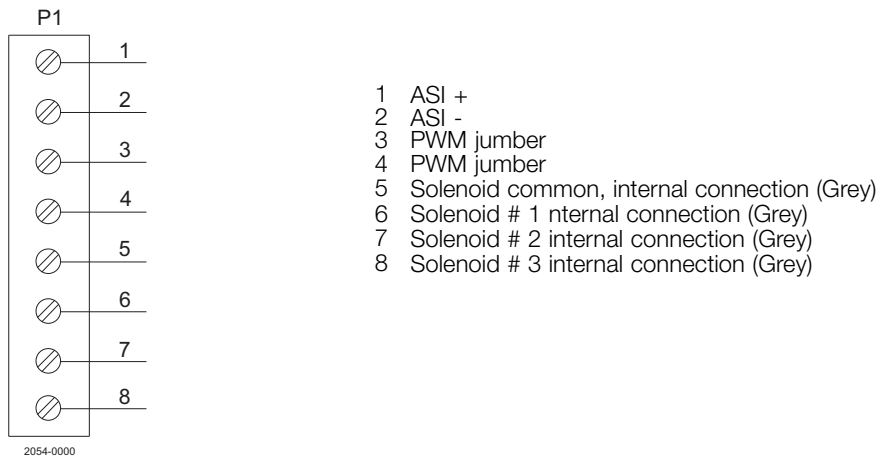
5.4 Electrical connection, internal - Digital



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

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

5.5 Electrical connection, internal - AS-Interface



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

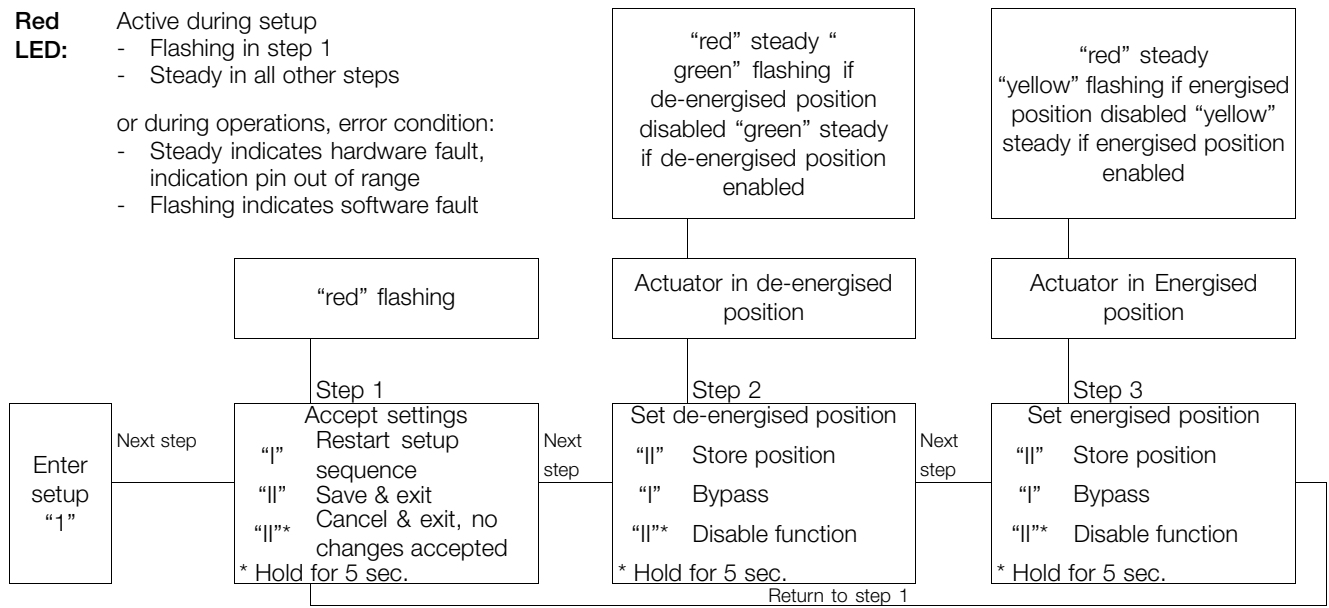
6 Setup diagram

6.1 ThinkTop Basic setup

Time-out: A 60-second time-out is started as soon as any button/s is released. If no button is pressed during the time-out period, go to normal condition (cancel & exit).

Red LED: Active during setup
 - Flashing in step 1
 - Steady in all other steps

or during operations, error condition:
 - Steady indicates hardware fault, indication pin out of range
 - Flashing indicates software fault



Quick setup:
 Push: "1", enter setup and wait until red LED flashes.
 Push: "1", restart setup.

Actuator in de-energised position
 Push: "||", store position

Actuator in energised position
 Push: "||", store position
 Push: "||", when red LED is flashing (save & exit)
 Setup done.

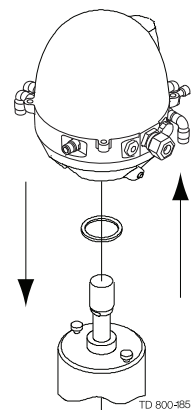
Tolerance program
 The ThinkTop Basic has a fixed tolerance program optimised for valve types such as LKB (LKLA-T) and MH Koltek.

Read the instructions carefully.
Handle scrap correctly.
Always have spare X-rings to hand.

7.1 Dismantling the ThinkTop®

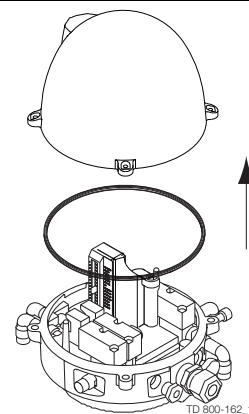
Step 1

1. Remove the ThinkTop Basic from the actuator.
2. Remove X-ring and replace it.



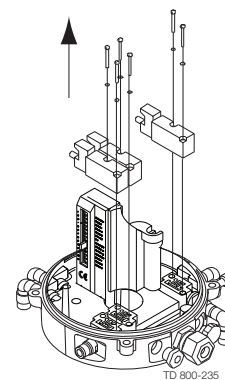
Step 2

1. Untighten the four screws.
2. Remove ThinkTop Basic cover.
3. Remove the grey X-ring.



Step 3

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



7 Maintenance

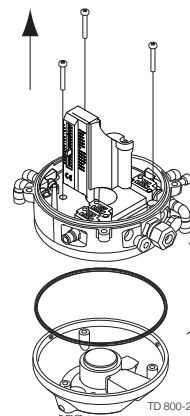
Read the instructions carefully.

Handle scrap correctly.

Always have spare X-rings to hand.

Step 4

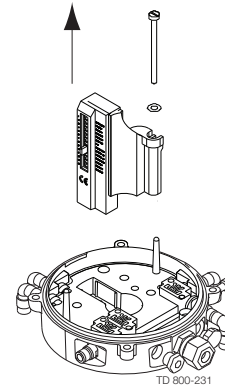
1. To dismantle the adapter (the lower part of the ThinkTop Basic) from base (the middle part), unscrew the three screws.
2. Turn the lower part clockwise slightly and pull.
3. Replace adapter if necessary.
4. Remove the black X-ring.



Note: Turn banjo connection!

Step 5

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

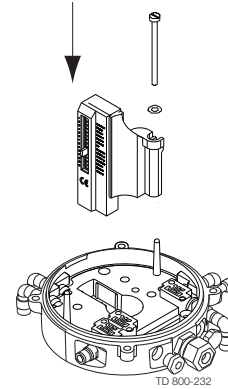


Read the instructions carefully.
 Handle scrap correctly.
 Always have spare X-rings to hand.

7.2 Assembling the ThinkTop®

Step 1

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

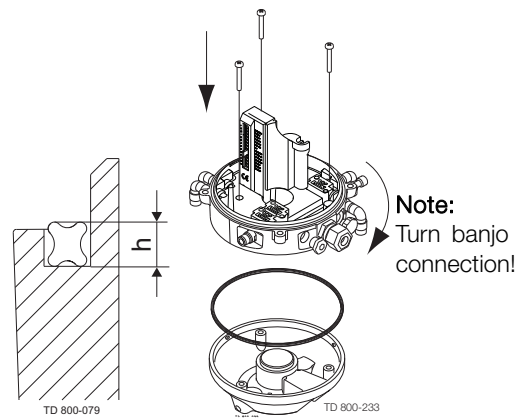


Step 2

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

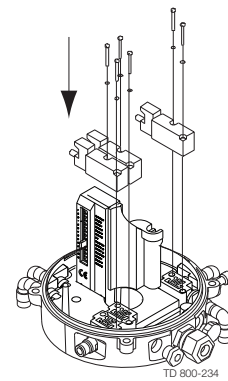
CAUTION!

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



Step 3

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



7 Maintenance

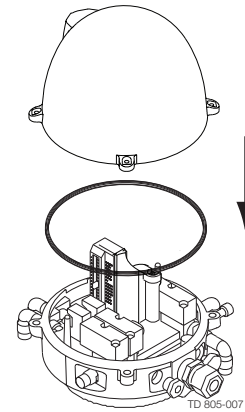
Read the instructions carefully.

Handle scrap correctly.

Always have spare X-rings to hand.

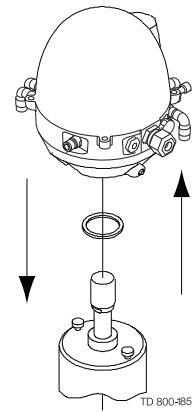
Step 4

1. Replace the grey X-ring.
2. Replace ThinkTop Basic cover and tighten the four screws (0.6 Nm).



Step 5

1. Replace the black X-ring.
2. Mount ThinkTop Basic on actuator.



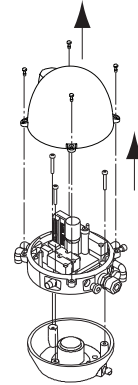
Read the instructions carefully.
 Handle scrap correctly.
 Always have spare X-rings to hand.

7.3 Dismantling and assembling Series 700 Valves

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.

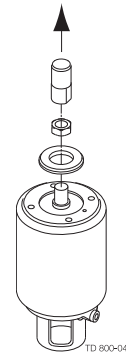
Installation on air actuators:



TD 800-160

Step 2

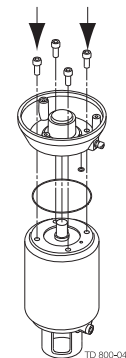
1. Fit air fittings on actuator.
2. Position packing retainer in recess on actuator top.
3. Fit counter nut and indicator (magnet) on actuator rod. Engage approx. 1/4 thread. Tighten counter nut and indicator with two wrenches.



TD 800-048

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.



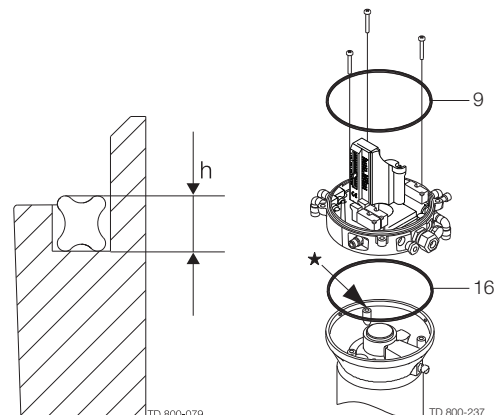
TD 800-049

Step 4

- Remove X-rings (9) (grey) and (16) (black).
- Replace with new ones.
- Mount the base on the adapter in the necessary position (can be rotated 120° in both directions). Note that one of the screw towers on the adapter has a guide recess (see * on diagram).

CAUTION!

Do **NOT** twist the X-ring (16) in the groove! The X-ring is not square; the highest (h) part must be positioned as shown.

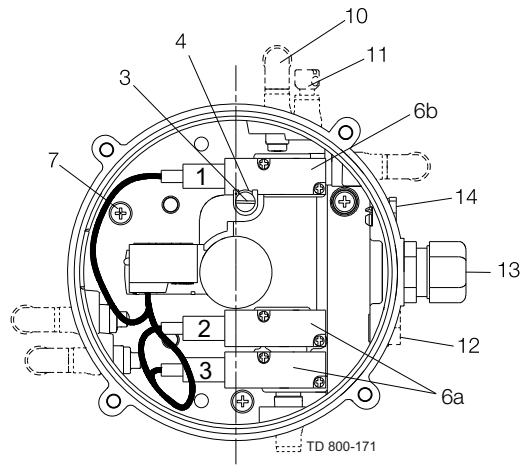
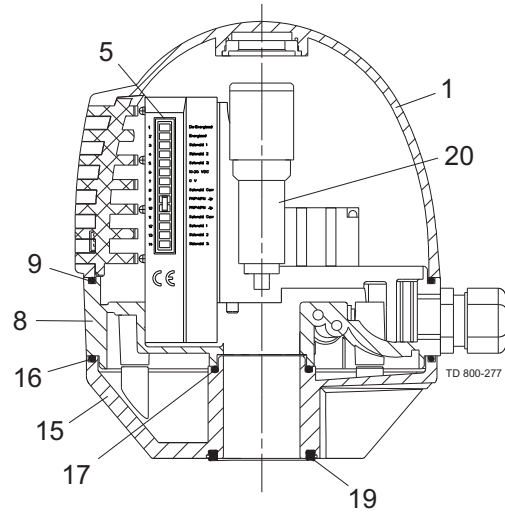
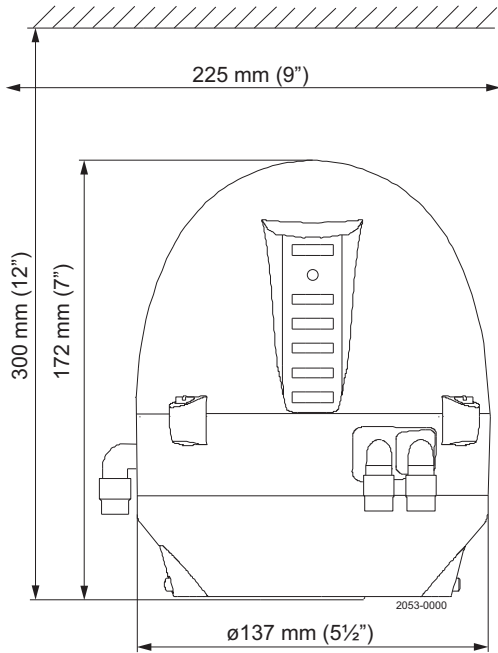


TD 800-079

TD 800-237

The items refer to the parts lists in the following sections

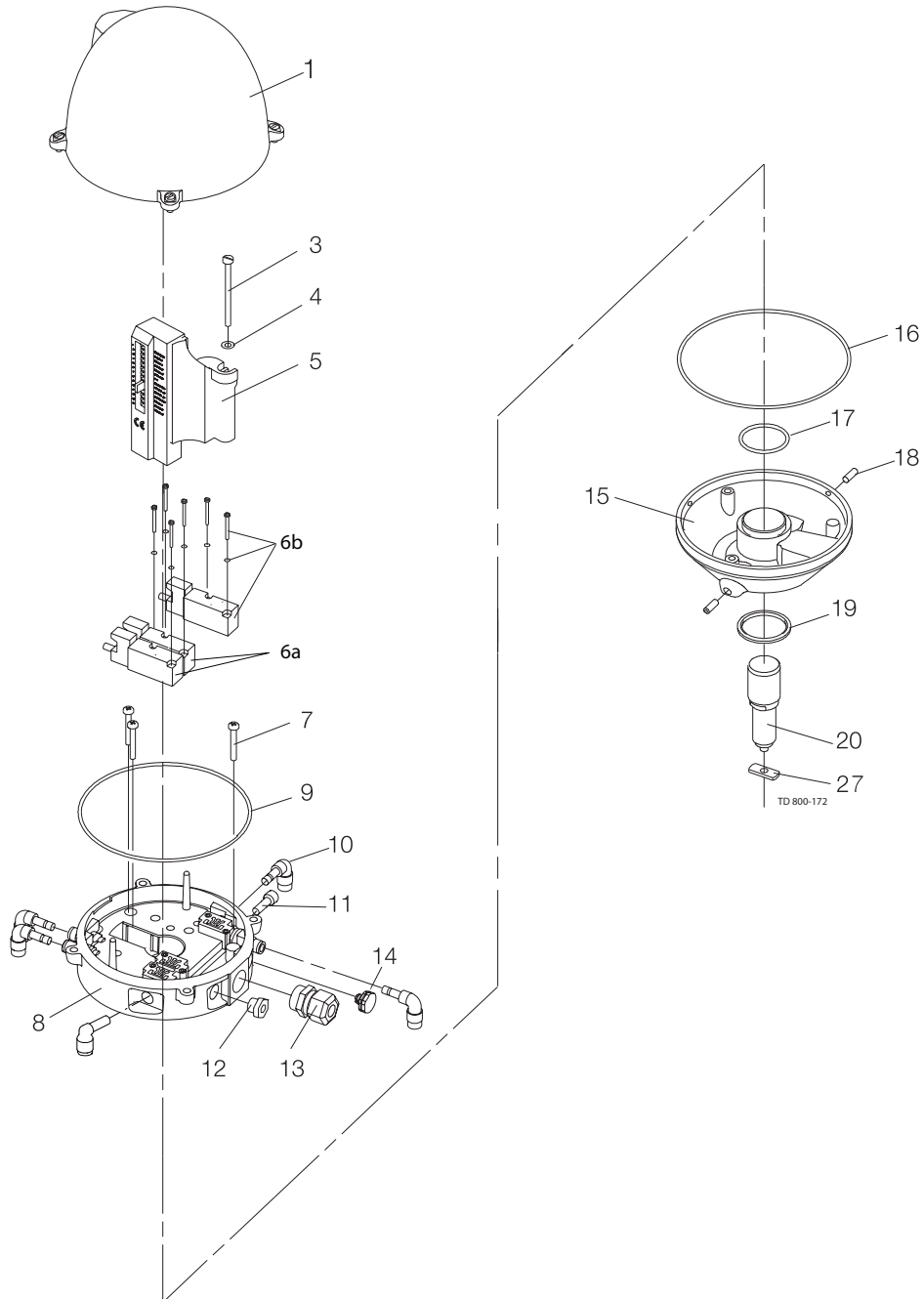
8.1 Diagrams for ThinkTop Basic



8 Part list

The items refer to the parts lists in the following sections

8.2 ThinkTop Basic



The items refer to the parts lists in the following sections

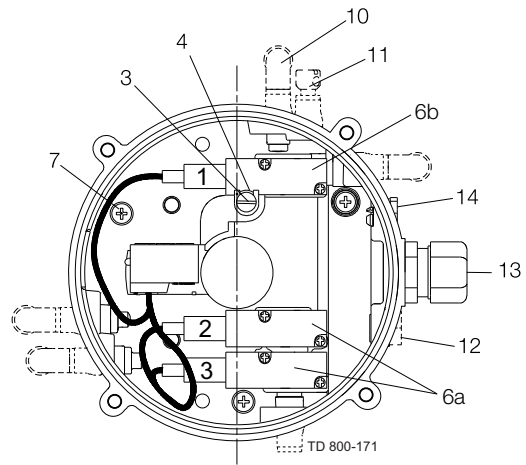
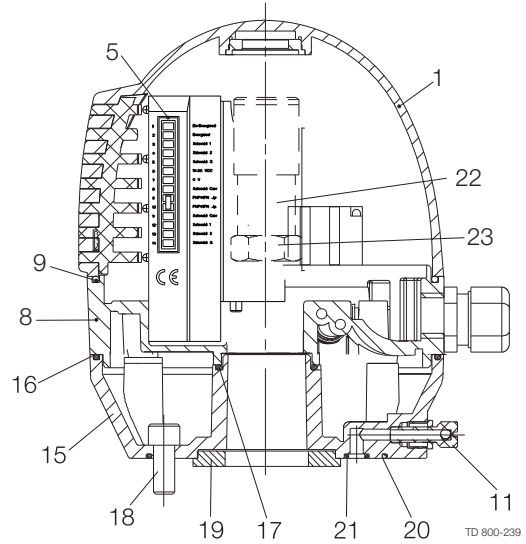
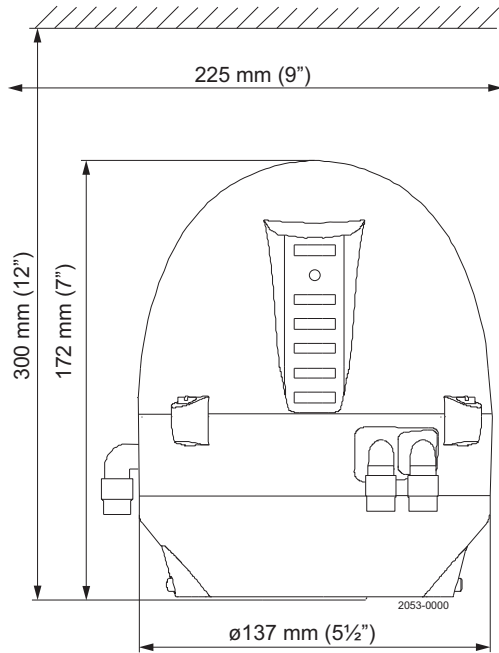
Parts list

Pos.	Qty	Denomination
1	1	Shell complete
3	1	Screw
4	1	Washer
5	1	Sensor board
6a	1-2	Solenoid valve (3/2)
6b	1	Solenoid valve (3/2 or 5/2)
7	3	PT screw
8	1	Base
9	1	Special X-ring, grey
10	1	Air fitting elbow
11	1	Blow-off valve
12	1	Thread plug
13	1	Cable gland (or optimal M12 plug)
14	1	Gore vent
15	1	Adapter complete
16	1	Special X-ring, black
17	1	O-ring
18	2	Allen screw
19	1	Special X-ring
20	1	Indication pin
22	1	5 m flying PVC cable
27	1	Threaded plate only for SRC/ARC valves (accessory for the Think Top)

8 Part list

The items refer to the parts lists in the following sections

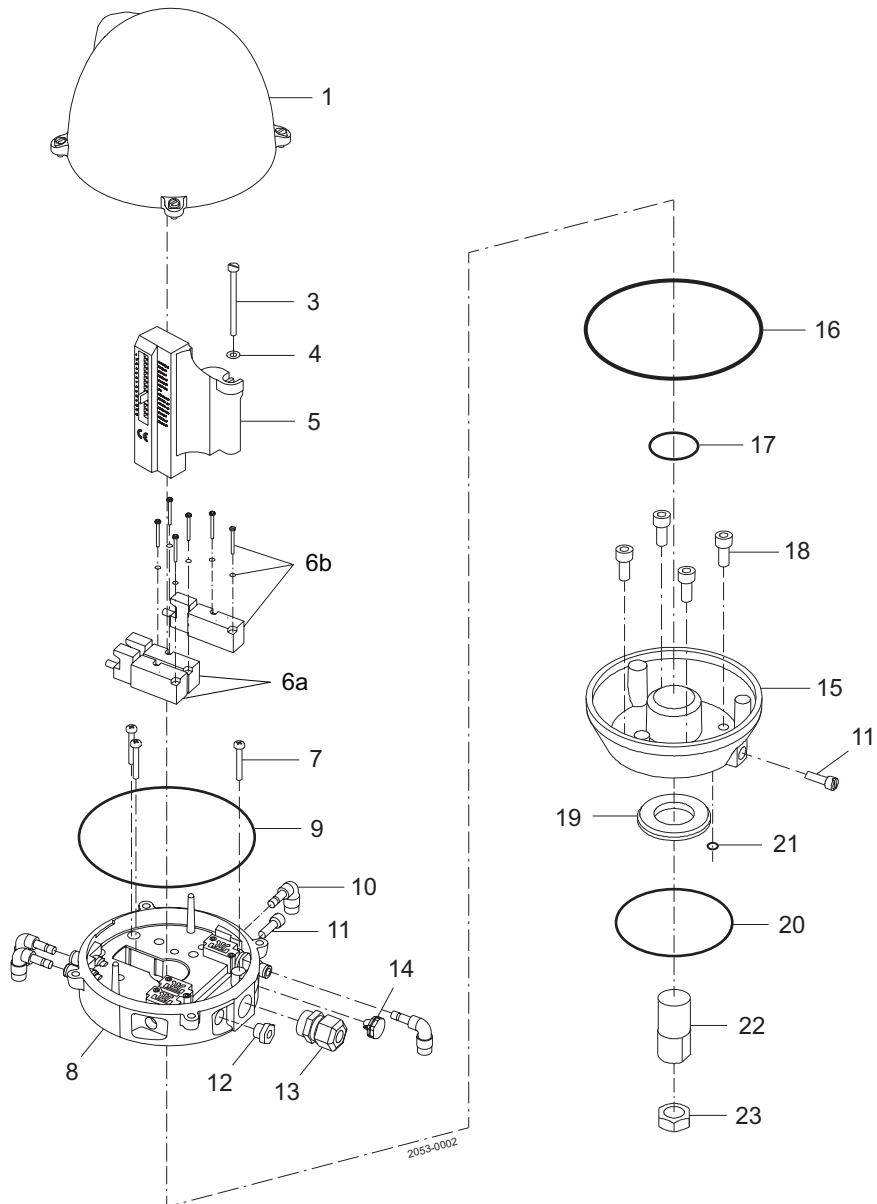
8.3 Diagrams for ThinkTop Basic for Series 700



8 Part list

The items refer to the parts lists in the following sections

8.4 ThinkTop Basic for Series 700 Valves



The items refer to the parts lists in the following sections

Parts list

Pos.	Qty	Denomination
1	1	Shell complete
3	1	Screw
4	1	Washer
5	1	Sensor board
6a	1-2	Solenoid valve (3/2)
6b	1	Solenoid valve (3/2 or 5/2)
7	3	PT screw
8	1	Base
9	1	Special X-ring, grey
10	2-5	Air fitting
11	2	Blow-off valve
12	1	Thread plug
13	1	Cable gland
14	1	Gore vent
15	1	Adapter complete
16	1	Special X-ring, black
17	1	O-ring
18	4	Screw
19	1	Retainer
20	1	O-ring
21	1	O-ring
22	1	Indicator pin
23	1	Nut

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