PROCESS EQUIPMENT

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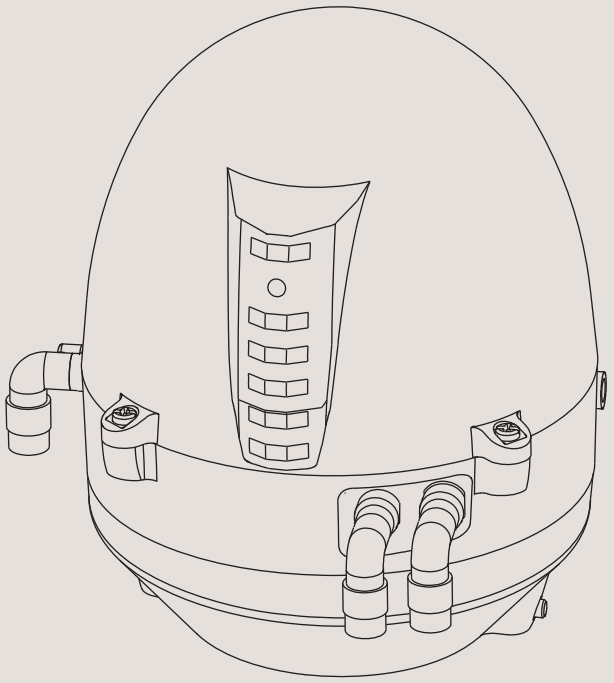
Instruction Manual

ThinkTop® DeviceNet ™ 11-25 VDC



TD800100_4

Patented Sensor System
Registered Design
Registered Trademark

ESE00355-EN13 2014-12

Original manual

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

1 EC Declaration of Conformity

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® DeviceNetTM
Type

is in conformity with the following directive with amendments:

- Low Voltage Directive (LVD) 2006/95/EC
- EMC Directive 2004/108/EC
- RoHS2 Directive 2011/65/EU

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

QHSE Manager, Quality, Health and safety & Environment		Annie Dahl
Title		Name
Kolding	2012-05-01	
Place	Date	Signature

CE

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

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 thoroughly.
Never install the ThinkTop® before valve or relay is in a safe position
If welding close to the ThinkTop®: **Always** earth close to the welding area.
Disconnect the ThinkTop®.

Always have the ThinkTop® electrically connected by authorized personnel

Maintenance:

Always read the technical data thoroughly.
Always fit the seals between valve and ThinkTop® correctly
Never service the ThinkTop® before valve or relay is in a safe position.
Never service the ThinkTop® with 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

Unsafe practices and other important information are highlighted in this manual.
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3.1 DeviceNet™ in generel

DeviceNet™ is a low-cost communication link to connect industrial devices (such as limit switches, photoelectrical sensors, valve manifolds, starter motors, process sensors, bar-code readers, variable frequency drives, display panels and operator interfaces) to a network and eliminate expensive handwiring. The direct connectivity provides improved communication between devices as well as important device-level diagnostics not easily accessible or available through hardwired I/O interfaces. DeviceNet™ is a simple networking solution that reduces costs as well as time during the wiring and installation of industrial automation devices, while providing interchangeabillity of similar components from multiple vendors.

DeviceNet™ is an open network standard.

DeviceNet™ features and functionality

Network size	Up to 63 nodes	
Network length	Selectable end-to-end network distance varies with speed	
	Baud Rate 125 Kbps 250 Kbps 500 Kbps	**Distance** 500 (1,640 ft) 250 (820 ft) 100 (328 ft)
Data packets	0-8 bytes	
Bus topology	Linear (trunk line/drop line); power and signal on the same network cable	
Bus addressing	Peer-to-peer with multi-cast (one-to-many); multi-master and master/slave special case; polled or change-of-state (exception-based)	
System features	Removal and replacement of devices from the network under power	

The basic trunk-line/drop-line topology provides separate twisted-pair busses for both signal and power distribution. Thick or thin cable can be used for either trunk lines or drop lines. End-to-end network distance varies with data rate and cable size

Data rates	125 Kbps	250 Kbps	500 Kbps
Thick trunk length	500 m (1,640 ft)	250 m (820 ft)	100 m (328 ft)
Thick trunk length	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
Maximum drop length	6 m (20 ft)	6 m (20 ft)	6 m (20 ft)
Cumulative drop length	156 m (512 ft)	78 m (256 ft)	39 m (128 ft)

The end-to-end network distance varies with data rate and cable thickness.

DeviceNet™ requires a terminating resistor to be installed at each end of the trunk:

- 121 ohm
- 1% metal film
- 1/4 Watt

Terminating resistors should not be installed at the end of a drop line, only at the two ends of the trunk-line.

For further information please see the DeviceNet™ Standard.

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DeviceNet™ Features

Device type	Generic	Master/scanner	N
Explicit peer-to-peer messaging	N	I/O Slave messaging	
I/O peer-to-peer messaging	N	• Bit strobe	N
Configuration consistency value	N	• Polling	Y
Faulted node recovery	N	• Cyclic	N
Baud rates	125K, 250K, 500K	• Change of state (COS)	N
Configuration method	EDS		

The end-to-end network distance varies with data rate and cable thickness.

DeviceNet™ interface
Baud rates: 125K, 250K and 500K.
Polling I/O slave messaging.

Poll: 1 bytes.
1 bytes = Input/outputs and alarms (class 4).

Node address
Range: 0-63.
Default slave address: 63.

Power supply
The power supply to the complete unit is taken from the DeviceNet™.

Supply voltage: ..... 11-25 V DC, as specified for the DeviceNet™.
Supply current: ..... Max. 45 mA (for sensor unit alone)
(excluding current to the solenoids and the external proximity switches).
Electrical connection: ..... Direct cable gland entry (hard-wired).
PG11 (ø4 - ø10 mm).
PG7 (ø3 - ø6.5 mm) option, external sensor.

4 Technical specifications

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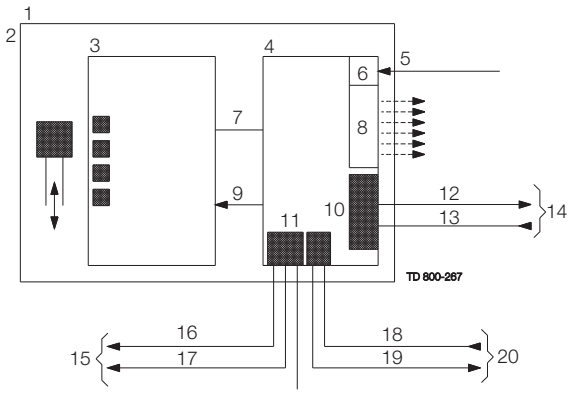
4.1 ThinkTop® DeviceNet ™ features

"No Touch" sensor system



1. Sensor unit
2. PLC, feedback
3. Sensor board
4. PLC interface board
5. IR remote control
6. IR Rx
7. Serial link
8. LEDs
9. +5 V
10. Terminals
11. Terminals
12. ASI +
13. ASI -
14. Bus connection
15. Internal connections
16. Solenoid signals (DC)
17. Solenoid common
18. External seat-lift (PNP)
19. Supply sensors
20. External connections

Type: Alfa Laval "No Touch" System. For wiring connections: See 5.4 Electrical connection, internal".

Features
- Tolerance programmes.
- Self-adjustment programme (SRC/ARC valves only).
- Built-in maintenance monitor.
- Setup by internal push buttons or remote control (IR keypad).
- Setup and local fault supervision.
- Setup saved at power shutdown.
- Visual LED indicator lights.

Sensor System
Unique "No Touch" sensor system without any mechanical sensor adjustments. A magnet (indication pin) is mounted on the valve stem and the magnetic field (axial) is detected by sensor chips inside the sensor board. The measuring angle from each chip is used to locate the current position of the valve stem with an accuracy of ± 0.1mm. Note that the distance to the indication pin can be 5 mm ± 3 mm.

Feedback signals
Input signals (produced by the sensor unit) transmitted over the DeviceNet™ - class 4.
Five feedback signals: Closed valve, open valve, seatlift 1, seatlift 2 and status.

The status signal is used for five purposes:

- To indicate that a setup is in progress (LED D).
- To indicate an error condition (LED D), (flashing = software error), (steady = hardware error).
- To indicate that maintenance is required (LED F).
- To indicate if there is a conflict in the self adjustment programme (LED F).
- To indicate if no communication exists between ThinkTop® and PLC (LED D, steady).

Tolerance programme
Individual programme according to valve types.

Type 0: Bypass valve type / keep present valve type.
Type 1: SRC/ARC and Series 700 valves, only when self-adjustment is enabled - Not recommended.
Type 2: LKB (LKLA-T).
Type 3: Unique Mixproof, SMP-SC Spillage-Free and SRC-PV.
Type 4: SMP-SC, SMP-TO, SMP-BC, SMP-BCA, SBV, SRC, ARC, Unique SSV, Unique SSV Aseptic, Unique-TO and Series 700 valves.
Type 5: All parameters set to default (also valid for MH valve and SMP-EC (seat-lift indication not possible for SMP-EC)).
Preset and reset values: tolerance programme no./type 5 (± 5mm) and all functions are disabled.

Note! Important to select the right tolerance programme in order to ensure optimum controlled closure of valves

4 Technical specifications

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Self-adjustment (SRC/ARC valves only)

The self-adjustment feature is an exceptional aspect of the ThinkTop® design. A programme can be activated to allow an adjustment of the tolerance band if the seals in the valve are being compressed or are worn. When the tolerance band of the unit has been adjusted 0.3 mm, an alert warning will appear in the form of a status signal and a flashing maintenance LED. After 0.5 mm adjustment an alarm warning appears: loss of feedback signal, status signal and steady maintenance light indicating a replacement of the seal.

Built-in maintenance monitor

The unit can be preset to indicate when the time for maintenance of the valve has been reached. A status signal and flashing maintenance LED can be programmed to activate after 3, 6, 9 or 12 months or more.

Technical specifications

Sensor system

Sensor accuracy: .....± 0.1 mm.
Distance to indication pin: .....5 ± 3 mm.
Stroke length: .....0.1 - 80 mm.

Electrical connection:

Direct main cable gland entry (hard-wired) PG11 (ø4 - ø10 mm).
Direct external/sensor cable gland entry PG7 (ø3 - ø6.5 mm) option, external sensor.

Terminals

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

External sensors

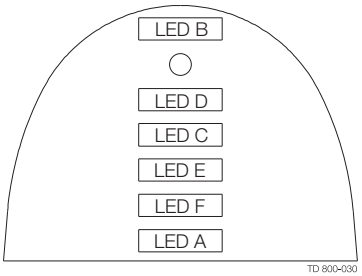
The external sensors are used for seat-lift supervision when seat-lift can not be internally detected. The sensors get their supply voltage from the terminal row. The output signals from the sensors are connected to two inputs on the terminal row on the internal sensor unit. If the actual setup is set for internal seat-lift, the corresponding external signal is not used, otherwise the external signal logically controls the corresponding feedback to the PLC (Programmable Logic Controller).
Note! If using external sensor, the sensor must be active/activated when performing a setup routine of the control head.

Supply voltage: .....As specified for DeviceNet™(typical 24VDC)
Supply current: .....Max. 15 mA per sensor.
Type of sensor: .....VDC, only 3-wire sensor, PNP.
Cable length: .....Max. 3 m.

Alarm mask

Output signals received from the DeviceNet™ (consumed by the sensor unit).
Four-bit mask to disable the alarm functions for the states “closed”, “open”, “seatlift 1” and “seatlift 2” respectively.
See also section 3.1.4 “ThinkTop® DeviceNet™ Attribute List”.

ThinkTop® visual indications



LED indications

LED B	“Open valve” (yellow)
O	IR-receiver
LED D	“Setup/Internal fault” (red)
LED C	“Seat-lift 1/2” (yellow)
LED E	“Solenoid valves” (green)
LED F	“Maintenance” (orange)
LED A	“Closed valve” (yellow)

Note: If the programmer wishes to detect a physical closed valve position in an “Open Valve” sensor position, then there is no longer any consistency between the sensor valve detection position and the visual indications on the ThinkTop®.

4 Technical specifications

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Technical specifications solenoid valves

Solenoid signals

Output signals received from the DeviceNet ™ (consumed by the sensor unit) - class 4.
Three bits to control the solenoid drives located in the sensor unit.

Internal connections (solenoids)

The solenoid drivers are reducing the solenoid power by PWM after activation. The number of solenoids actually mounted in the control head could be 0 - 3.

Technical specifications	
Up 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 ^oC compressed air.
Throughput	ø2.5 mm.
Air restriction (throttle function) air inlet/outlet.	Yes.
Manual hold override.	Yes.
External air tube connection	ø6 mm or 1/4” (specify when ordering).
Silencer/filter	Connection possible via ø6 mm or 1/4". (Filter recommended in tropical regions).
Solenoids drive	
Solenoid valve	8 VDC.
O/P Voltage	8 VDC +/- 5%
Power consumption	0.75W Max.
Current consumption (per solenoid)	30mA Max.
PWM Pull-in pulse length150ms Max.	150ms Max.
PWM duty cycle	40% +/- 10%
PWM frequency	2 kHz +/- 10%
(PWM = Pulse width modulated)	
Note! Filter recommended in tropical regions.	

4 Technical specifications

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Technical specifications aux. outputs

Three aux. outputs can be used for external devices. The drivers are always NPN outputs and PWM mode is not possible. The number of aux. outputs for activation of external devices can be 0-3. Clarification: all 3 outputs can be activated at the same time but if solenoid 1 is in use, aux. 1 can not be used! If solenoid 1 and 2 are in use, aux. 1 and 2 can not be used! If solenoid 1, 2 and 3 are in use, no aux. can be used! A mix of solenoid and aux. outputs is possible.

Output:	NPN (sinking).
Output voltage:	24 VDC ± 15%. Network power connection! User must ensure 24 VDC on the network (at the top) when these outputs are used.
Load current:	Max 75 mA. As these outputs drive constant current, using several nodes in this mode will reduce the number of nodes supported by a typical 8A network supply. The user must ensure that total network current consumption is less than the supply rating.

ThinkTop®, EDS file

The EDS file can be downloaded from www.alfalaval.com by searching "ThinkTop®" at the top of the main landing page. On the ThinkTop® landing page choose Documentation in the menu and look for the EDS package. Alternatively the EDS file and further information on DeviceNet™ can found at www.odva.org

ThinkTop® DeviceNet ™ attribute list

Name	Path		Attributes			R/W/CS	Raw data		
							data type	len.	LSB
Release DNET 4.6	Class	Inst	dec.	hex.	"poll"				
Valve value	4	1	3	-	-	R	Byte	1	-
Valve command	4	3	3	-	-	R/W	Byte	1	-

ThinkTop® DeviceNet™ attribute list

Name	Eng. Units Conv.			Bit maps/data			
	mult.	divisor	units	byte 1	byte 2	byte 3	byte 4
Release DNET 4.6							
Valve value	-	-	-	PLC_image	-	-	-
Valve command	-	-	-	Solenoids	-	-	-

ThinkTop® DeviceNet™ bit mappings

PLC_Image Valve value	x	x	x	Maint.	SL2	SL1	OPEN	CLOSED
Solenoid 1, 2 & 3 (Valve command)	x	x	x	x	Coil #3	Coil #2	Coil #1	x

4 Technical specifications

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ThinkTop® DeviceNet™ Poll command structures

Poll request message format

	bit							
byte	7	6	5	4	3	2	1	0
0	x	x	x	x	Coil #3 de-energize	Coil #2 de-energize	Coil #1 de-energize	x

Poll response message format

	bit							
byte	7	6	5	4	3	2	1	0
0	Travel in Progress	Timer Expired	x	MAINT. ERROR	Seat #2 Status	Seat #1 Status	OPEN Status	CLOSED Status

Typical power consumption

Test conditions:	One ThinkTop® DeviceNet™ 11-25 VDC connected ti the network with 1 input (on) and:		
	No solenoids on	supply voltage 25 VDC	20 mA
	1 solenoid active (PWM)	supply voltage 25 VDC	28 mA
	2 solenoid active (PWM)	supply voltage 25 VDC	36 mA
	3 solenoid active (PWM)	supply voltage 25 VDC	44 mA
	No solenoids on	supply voltage 11 VDC	34 mA
	1 solenoid active (PWM)	supply voltage 11 VDC	58 mA
	2 solenoid active (PWM)	supply voltage 11 VDC	82 mA
	3 solenoid active (PWM)	supply voltage 11 VDC	106 mA

Note: If the Aux. Outputs are used instead of the solenoids for activation of external devicces, the consumption is dependent on the load current (see “Aux. Outputs”).

Materials

Plastic parts	Nylon PA12
Steel parts	Stainless steel AISI 304 and 316
Seals	FPM (air fittings), EPDM rubber for SMP-EC stem
Gore Vent. membrane	PBT palstic

4 Technical specifications

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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, 10 g 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 68-2-3
Cyclic humidity:	+25°C/+55°C 12 cycles 93% R.H.	IEC 68-2-30
(working)		
Protection class	IP66 and IP67	IEC 529
Input treshold		
Voltage/current:	Type 1 input requirements	EN 61131-2
EMC Directive	2004/108/EC	EN 61000-6-3, EN 61000-6-2
UL Approval	8-30 VAC/VDC, Class 2 input, 45 mA max. output	UL 508-E203255

5 Installation

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5.1 Installation on air actuators

Step 1

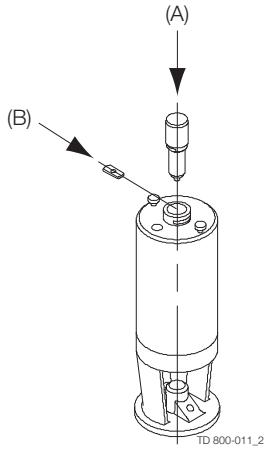
Always read the technical data thoroughly.

Always have the ThinkTop® electrically connected by authorised personnel.

Step 2

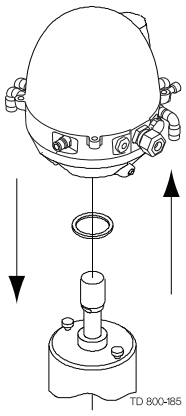
1. Fit the air fittings on the actuator if not mounted.
2. Fit the activator stem (magnet) and tighten **carefully** with a spanner (A).

Note:
The threaded plate (B) is only used for the SRC and SMP valve types.



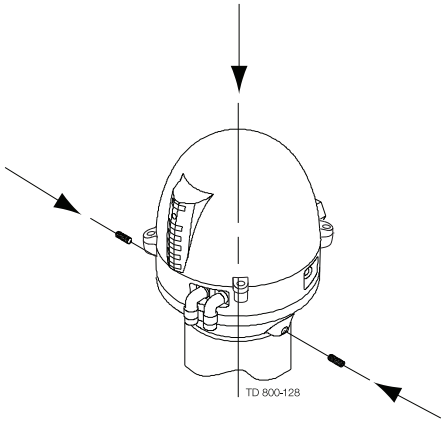
Step 3

1. Place the ThinkTop® 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®.
2. Tighten the two Allen screws **carefully** (1.50 Nm).
3. Turn the actuator to some LEDs are at the front.



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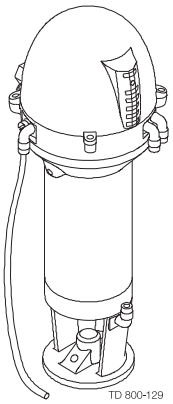
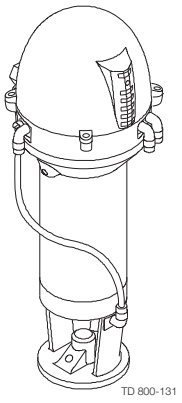
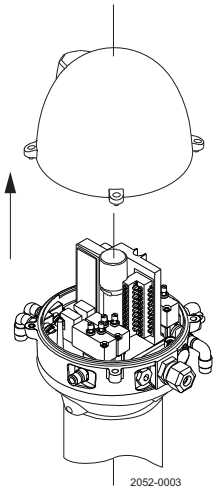
Step 5
Fit the ø6 mm (1/4") air tubes to the ThinkTop®.
(see drawing "Air connections" page 18).



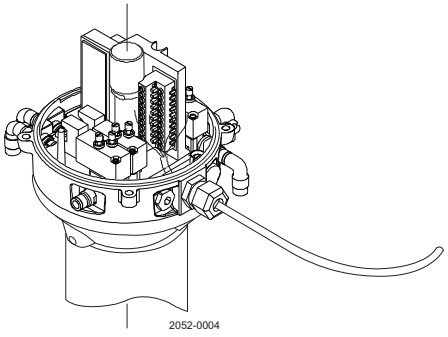
Step 6
Fit the air tubes to the actuator
(see drawing "Air connections" page 18).



Step 7
Loosen the four screws and pull off cover of the ThinkTop®.



Step 8
1. Install cable (if not present) through the cable gland.
2. Connect the ThinkTop® electrically
   (see page 5.4 Electrical connection, internal).



5 Installation

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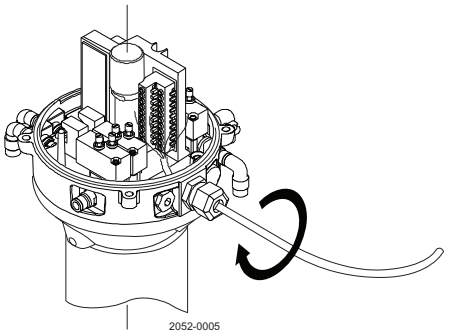
Step 9
Make sure the cable gland is completely tightened.



Step 10
Set up the ThinkTop® (see chapter 6 Setup diagram).

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

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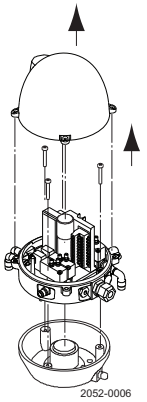
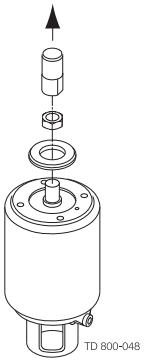
5.2 Installation on Series 700 valves

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

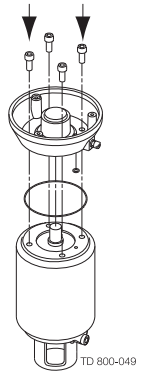
Installation on air actuators:



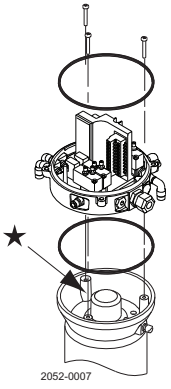
Step 2
1. Fit air fittings onto the actuator.
2. Position packing retainer in the recess on the actuator top.
3. Fit the counter nut and indication pin (magnet) on actuator rod. Engage approx. ¼" thread. Tighten the counter nut and indicator with two wrenches.



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).

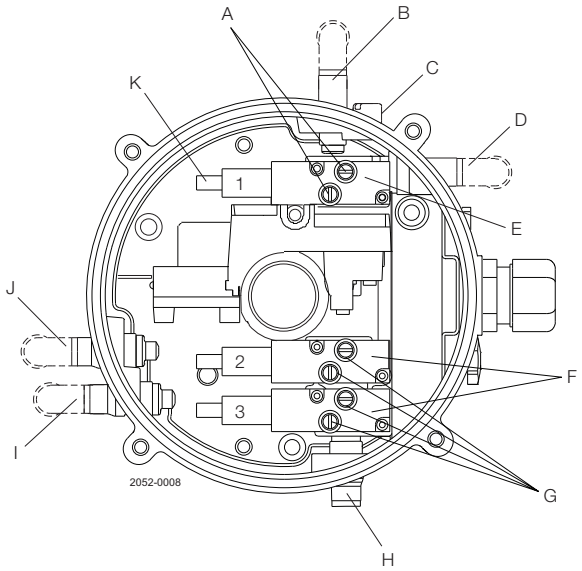


5 Installation

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

5.3 Air connections

A. Air restriction (throttle function) air inlet/outlet
B. Air out 1A
C. Air exhaust
D. Air out 1B (5/2 port solenoid valve only)
E. Solenoid 3/2 or 5/2
F. 3/2 Solenoid valves only
G. Air restriction (throttle function) air inlet/outlet
H. Air in
I. Air out 3
J. Air out 2
K. Manual hold override



5.4 Electrical connection, internal

Electrical connection

DeviceNet™ 63 node
Sensor board
Terminal strip

		P1	P2		
			1	Power bus V- (Black)	Bus cable
Not Connected	N/C	6	2	CAN_L (Blue)	
	N/C	7	3	Drain (Bare)	
	N/C	8	4	CAN_H (White)	
	N/C	9	5	Power bus V+ (Red)	
	N/C	10	12	N/C	Not connection
	N/C	11	13	N/C	
	Earth	Earth	24	Seat-lift 1 "upper"	Signals from external sensors
Internal connections	Solenoid com.blue	20	25	Seat-lift 2 "lower"	
	Solenoid 1, brown	21	26	Supply +	Power supply to external sensors
	Solenoid 2, brown	22	27	Supply-	
	Solenoid 3, brown	23			

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

6.1 ThinkTop® setup utilising IR keypad

General

Flashing LED means no value set. Steady LED means value set as shown.

Default:	Step 2, factory-set tolerance band +/- 5 mm Step 3-8, disabled	
D LED:	Active during set-up:	Flashing in step 1 Steady in all other steps
	Or during operations, error condition:	Steady showing hardware fault, indication pin out of range Flashing showing software fault
Timeout:	A 60 sec. timeout is started as soon as any button(s) are released On timeout the setup is exited with no changes saved	
IR Keypad:	Remote distance 0-300 mm to ThinkTop®	

Symbols

[X] Push key on IR keypad with the same number

Simple representation of LED indication:

Yellow IR-Reciver	B	
Red	D	Steady LED
Yellow	C	
Green	E	
Orange	F	
Yellow	A	Flashing LED

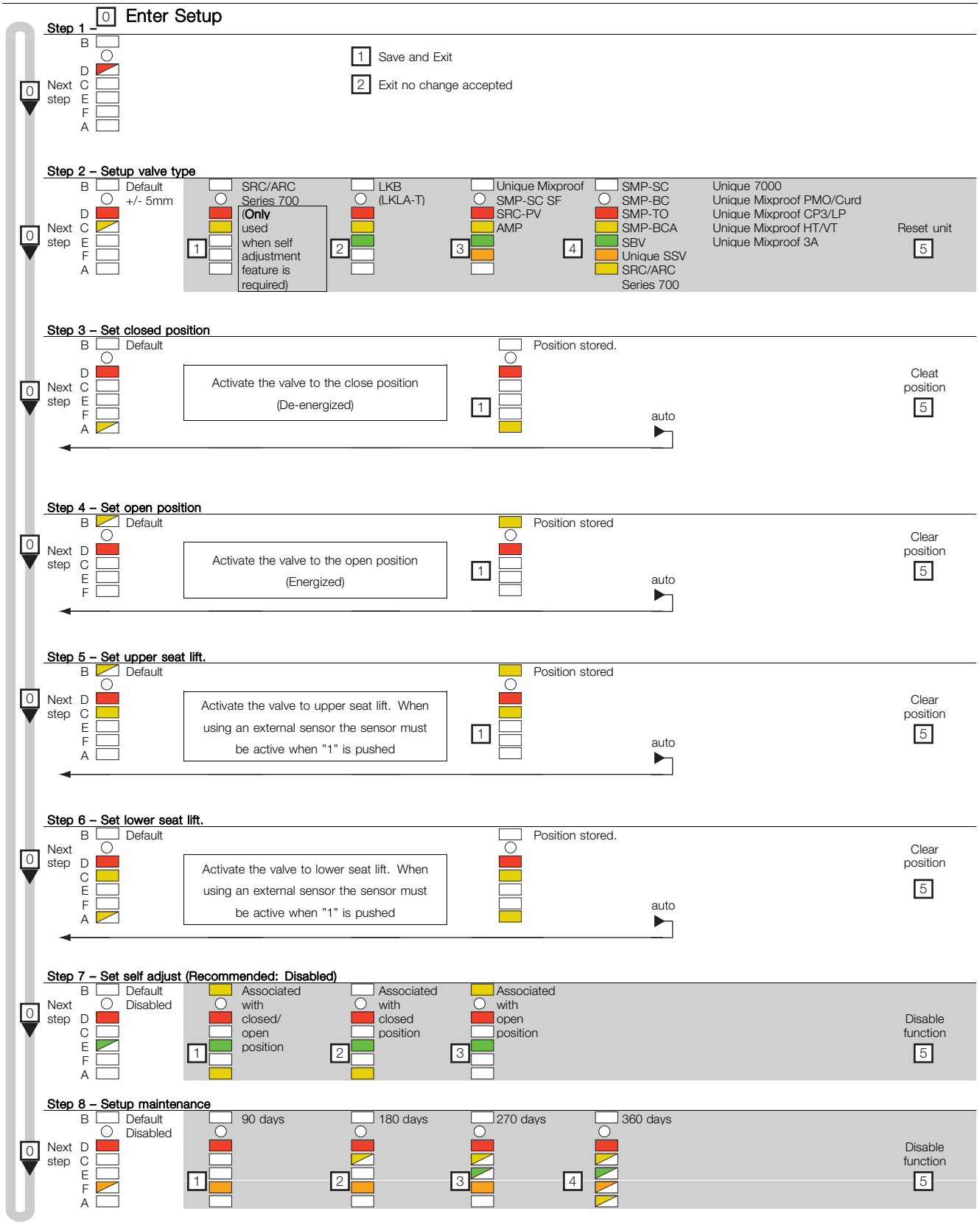
General commands in each step (except step 1):

[0]	Next step / skip step	(In step 3-6 the program automatically moves to the next step when a position is stored)
[5]	Clear / disable step	(In step 2 this resets the unit and sets the step 2-8 to default) (The command is accepted when all unit LED's flash briefly)

It is recommended to reset the unit before performing a setup.
Always check for correct signals after the setup.

6 Setup diagram

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.



Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

6.2 ThinkTop® setup utilising local 'I' and 'II' keys

General

Default is:	Step 2, tolerance is +/- 5 mm Step 3-8, disabled	
Timeout:	A 60 sec. timeout is started as soon as any button(s) is released. On timeout the setup is exited with no changes saved.	
Flashing LED means no value set. Steady LED means value set as shown		
[D] LED:	Active during set-up:	Flashing in step 1 Steady in all other steps
	Or during operations, error condition:	Steady showing hardware fault, indication pin out of range Flashing showing software fault

General commands in each step (except step 1):

Ⓘ	Next step / skip step	(In step 3-6 the program automatically moves to the next step when a position is stored)
Ⓘ Ⓘ 5s	Clear / disable step	(In step 2 this resets the unit to default) (The command is accepted when all unlit LED's flash briefly)

It is recommended to reset the unit before performing a setup.

Symbols

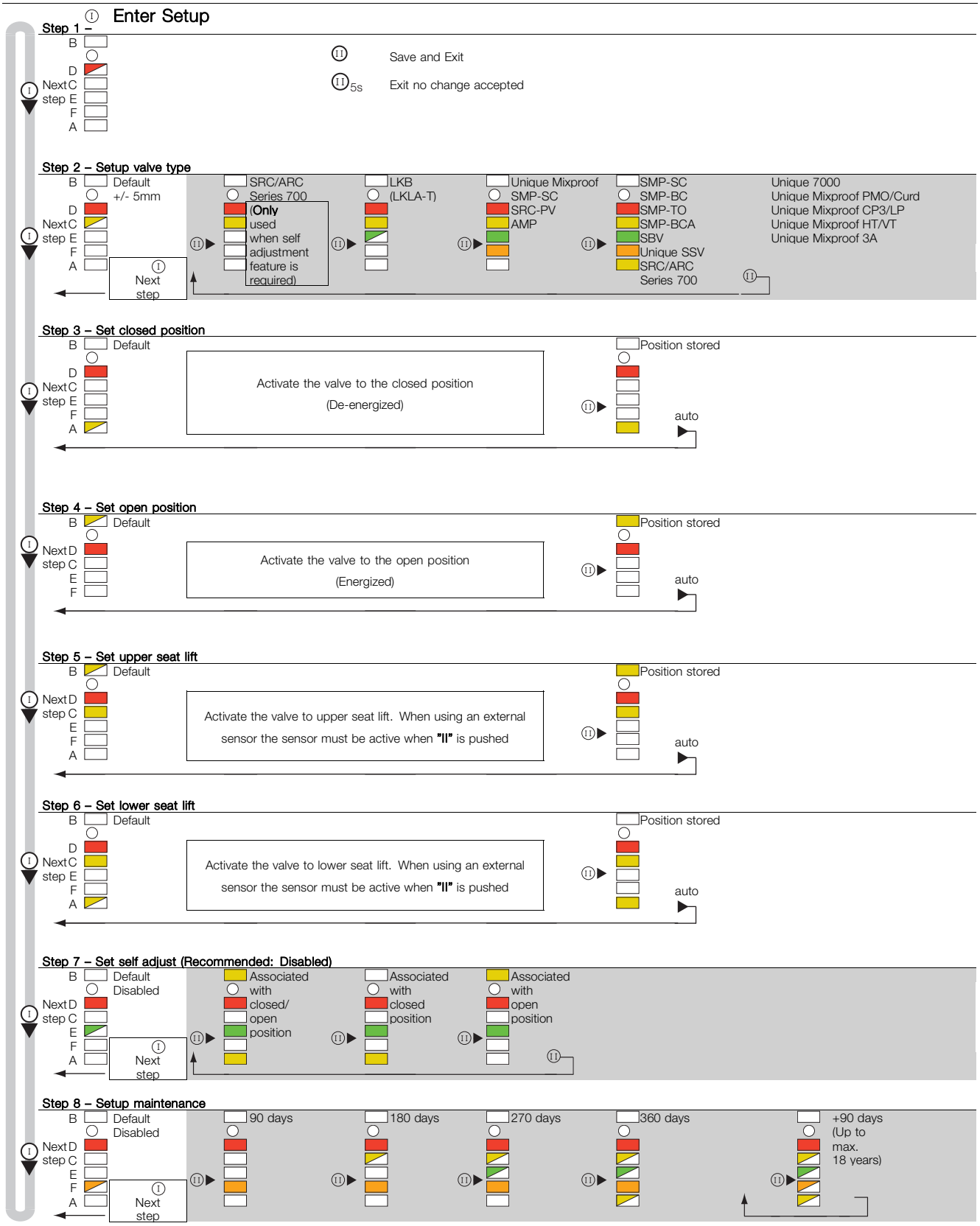
Ⓘ	Push local key "I"
Ⓘ Ⓘ	Push local key "II"
Ⓘ Ⓘ 5s	Hold key "II" for 5 sec

Simple representation of LED indication:

Yellow	B	
IR-Reciver		
Red	D	Steady LED
Yellow	C	
Green	E	
Orange	F	
Yellow	A	Flashing LED

6 Setup diagram

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.



Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

6.3 ThinkTop® Quick setup guide

Valve: Unique SSV, SRC/ARC type NC (self-adjustment disabled)

Push:	I	- and wait until red LED flashes
Push:	I	
Push:	II	- hold for 5 sec (clear all stored parameters)
Push:	II	(red + yellow LED)
Push:	II	(red + yellow + green LED)
Push:	II	(red + yellow + green + orange LED)
Push:	II	(red + yellow + green + orange + yellow LED)
Push:	I	
Push:	II	- to approve valve down (closed)
	Activate	valve opens
Push:	II	- to approve (open)
Push:	I	(no upper seat-lift)
Push:	I	(no lower seat-lift)
Push:	I	(no self-adjustment)
Push:	I	(no maintenance)
Push:	II	red LED flashes (save & exit by push)
	Setup done	

Valve: SRC/ARC type NO (self-adjustment enabled)

Push:	I	- and wait until red LED flashes
Push:	I	
Push:	II	- hold for 5 sec (clear all stored parameters)
Push:	II	(red + yellow LED)
Push:	I	
	Activate	valve closes
Push:	II	- to approve valve closed
Push:	Deactivate	valve opens
Push:	II	- to approve valve is open
Push:	I	(no upper seat-lift)
Push:	I	(no lower seat-lift)
Push:	II	=self-adjustment
Push:	I	
Push:	I	(no maintenance)
Push:	II	red LED flashes (save & exit by push)
	Setup done	

Valve: LKB Valve (Butterfly) NC

Push:	I	- and wait until red LED flashes
Push:	I	
Push:	II	- hold for 5 sec
Push:	II	(red + yellow LED)
Push:	II	(red + yellow + green LED)
	I	
Push:	II	- to approve valve closed (indication-stem up)
Push:	Activate	LKB valve- open position (indication-stem down)
Push:	II	- to approve valve is open
Push:	I	(no upper seat-lift)
Push:	I	(no lower seat-lift)
Push:	I	(no self-adjustment)
Push:	I	(no maintenance)
Push:	II	red LED flashes (save & exit by push)
	Setup done	

6 Setup diagram

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

Valve: LKB Valve (Butterfly) NO

Push:	I	- and wait until red LED flashes
Push:	I	
Push:	II	- hold for 5 sec (clear all stored parameters)
Push:	II	(red + yellow LED)
Push:	II	(red + yellow + green LED)
Push:	I	
	Activate	- to approve valve closed (indication-stem up)
Push:	II	- to approve valve closed
Push:	Deactivate	LKB valve-open position (indication-stem up)
Push:	II	- to approve valve is open
Push:	I	(no upper seat-lift)
Push:	I	(no lower seat-lift)
Push:	I	(no self-adjustment)
Push:	I	(no maintenance)
Push:	II	red LED flashes (save & exit by push)
	Setup done	

Valve: Unique Mixproof Valve (with lower seat-lift)

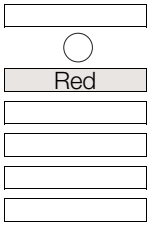
Push:	I	- and wait until red LED flashes
Push:	I	
Push:	II	- hold for 5 sec (clear all stored parameters)
Push:	II	(red + yellow LED)
Push:	II	(red + yellow + green LED)
Push:	II	(red + yellow + green + orange LED)
	I	
Push:	II	- to approve valve closed
	Activate	valve opens
Push:	II	- to approve valve is open
Push:	I	(no upper seat-lift)
Push:	Activate	lower seat-lift active
Push:	II	- to approve
Push:	I	(no self-adjustment)
Push:	I	(no maintenance)
Push:	II	red LED flashes (save & exit by push)
	Setup done	

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

7.1 Troubleshooting and LEDs

Below are the meanings of the LEDs' indications for troubleshooting in connection with the operation of the ThinkTop®.

7.1.1 Status LED (red)

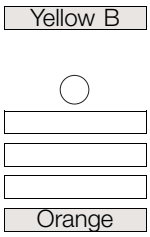


Red flashing: Unit in set-up mode or internal software fault. If internal software fault, re-programme unit.

Red steady: Unit in set-up mode or internal hardware fault. If internal hardware fault, check if magnet is in range and check correct wiring.

Red steady:

7.1.2 Maintenance time out



1.Orange flashing: Time for maintenance has run out. The unit has been self-adjusted into a maintenance alert condition. Valve maintenance is strongly recommended. After maintenance: disabling of maintenance/self-adjustment function is required before setting new position. However, it is strongly recommended to perform a complete new set-up after valve maintenance.

2.Orange steady, yellow flashing (A and/or B): The unit has been self-adjusted into a maintenance alarm condition and the feedback is lost (a minimum of seal left). Valve maintenance is required. After maintenance: disabling of the self-adjustment function is required before setting new position. However, it is strongly recommended to perform a complete new set-up after valve maintenance.

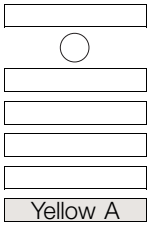
NOTE! **The maintenance indicator lights up and an open or closed light flashes.....**
= Note the following:

- Self-adjustment programme is only valid for SRC/ARC valves: do not use the programme for other valve types.
- Use tolerance/valve type 1.
- In conjunction with valve type change-over, 21, 22, 31 and 32, the open position must be defined as the upper sensor position (when the indication pin is in the highest position).
- A loose top, indication pin or sensor system can also generate the alert/alarm condition.
- Removing the ThinkTop® with self-adjust activated, will immediately generate an alarm condition! If the ThinkTop® has to be removed, not because of a valve maintenance issue, but for some other reasons, and you want to store the already adjusted data, disable the self-adjust function before removing the ThinkTop® and enable it again once the ThinkTop® is back on the actuator.
- After valve maintenance disabling of the self-adjustment function is required before setting a new position, however, it is strongly recommended to perform a complete new set-up (disable all functions in step 2 valve type - and make a complete new set-up).

7 Troubleshooting

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

7.2 LED indication during normal operation



Yellow A	Yellow steady:	Position A (closed valve).
Yellow B	Yellow steady:	Position B (open valve).
Yellow C	Yellow steady:	Position C (Seat-lift 1-2 or external sensors).
Green	Green steady:	Solenoid valves energised.

Note! During set-up LED lights have different functions.

Unsafe practices and other important information are highlighted in this manual.
Warnings are highlighted by means of special signs. All warnings in the manual are summarised on this page.
Pay special attention to the instructions below so that severe personal injury or damage to the top unit are avoided.

7.2 ThinkTop® DeviceNet™ Error conditions and related response from the sensor board

The following tables shows the error conditions and related responses for the upgraded sensor boards related to the previous sensor boards.

If the DeviceNet™ communication is lost the sensor board goes into fail-safe condition and deactivates all solenoid valve signals.

Upgraded Sensor board time-outs, Rev 02.003 (From June 2012)

Error Condition	Delay	Recoverable error	Status feedback
Turn key on PLC	10 msec	Yes	No
BUSOFF	10 msec	No	Yes
TIMED OUT	60 s	Yes	No

Previous Sensor board time-out, Rev 70.073 (Before June 2012)

Error Condition	Delay	Recoverable error	Status feedback
Turn key on PLC	10 msec	Yes	Yes
BUSOFF	10 msec	No	Yes
TIMED OUT	10 msec	Yes	Yes

Error Condition - Turn key on PLC: - From Run to Progm. (Scanner mode: Idle)
A Master device implicitly transmits its current operating mode with every I/O scan. If the Master device (typically a Programmable Controller) is in a non-run mode the Master produces an I/O message with zero data bytes known as an IDLE mode message.

Error Condition - BUSOFF:
In the BusOff state the device has detected significant network errors and has removed itself from network operation.

Error Condition - TIMED OUT:
Messages have failed to arrive on one or more connections with the Master device.

Delay:
The time from when the communication is lost until the sensor board goes into fail-safe mode.

Recoverable error:
A sensor board in a recoverable error condition will return to operation when communication is restored. Otherwise a power recycle is necessary.

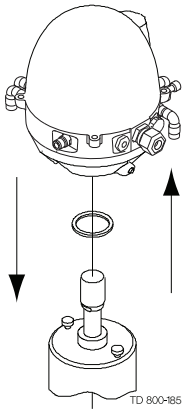
Status feedback:
Status feedback is represented by a red LED on the sensor board.

8 Maintenance

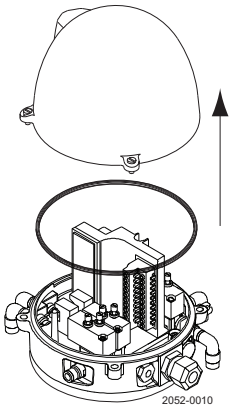
Study the instructions carefully.
Handle scrap correctly.
Always keep spare X-rings in stock.

8.1 Dismantling the ThinkTop®

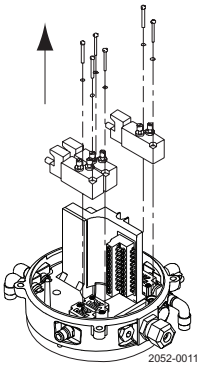
Step 1
1. Loosen the two Allen screws and remove the ThinkTop® from the actuator.
2. Pull out the X-ring (19) and replace it.



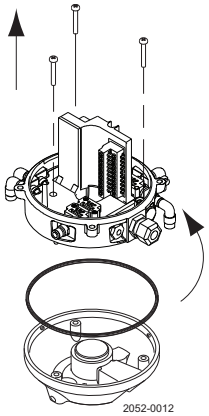
Step 2
1. Loosen the four screws.
2. Pull off the cover of the ThinkTop®.
3. Remove the X-ring (9) (grey).



Step 3
1. Loosen screws.
2. Remove the solenoid valves (up to three) and replace them with new ones.



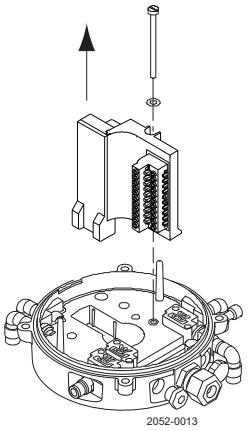
Step 4
1. To dismantle the adapter (the lower part of the ThinkTop®) from base (the middle part), undo the three screws.
2. Turn the lower part slightly clockwise and pull.
3. Replace adapter if necessary.
4. Remove the black X-ring.



Note: Turn banjo connection!

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

Step 5
To remove the sensor unit loosen the screw and pull out the sensor unit.

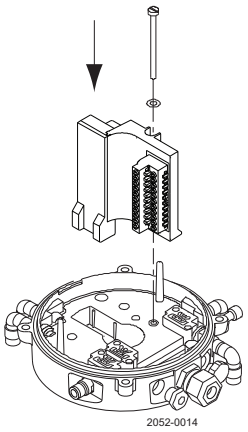


8 Maintenance

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

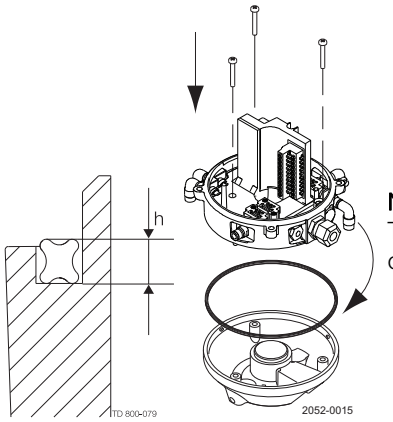
8.2 Assembling the ThinkTop®

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



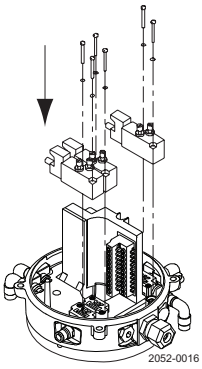
Step 2
1. Replace the black X-ring.
2. Assemble base with adapter by turning slightly anticlockwise and tighten the four screws (1.9 Nm).

CAUTION!
Do NOT twist the X-ring in the groove!
The X-ring is not square, the highest (h) part must be placed as shown

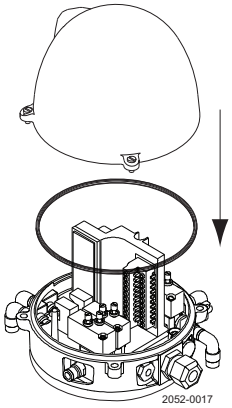


Note:
Turn banjo connection!

Step 3
1. Replace solenoid valves (up to three) with new ones.
2. Tighten screws (0.2 Nm).



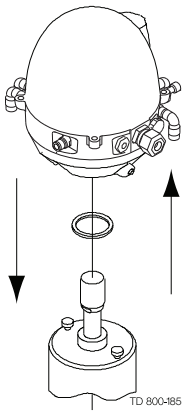
Step 4
1. Replace the grey X-ring.
2. Replace the cover of the ThinkTop® and tighten the four screws (0.6 Nm).



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

Step 5

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



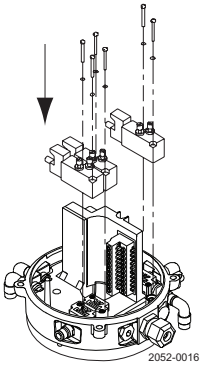
8 Maintenance

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

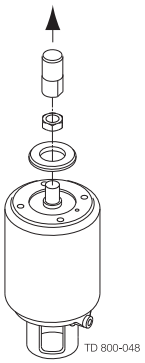
8.3 Dismantling and assembly of Series 700 valves

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

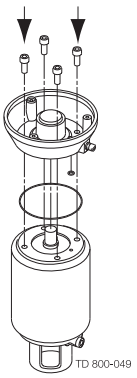
Installation on air actuators:



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. ¼" thread. Tighten counter nut and indicator with two wrenches.

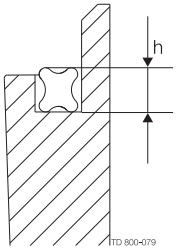


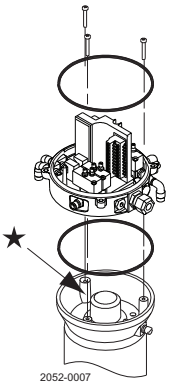
Step 3
1. Place the two O-rings in the grooves in the bottom of the adapter. Then place the adapter on the actuator top. The small O-ring must be positioned over the air hole on the actuator.
2. Fasten the adapter with the four 5/16" Allen screws.



Step 4
1. Mount the base on the adapter in the position required (can be rotated 120° in both directions). Note that one of the screw towers on the adapter has a guide recess (see * on drawing).
2. Remove X-rings (9) (grey) and (16) (black).
3. Replace with new ones.

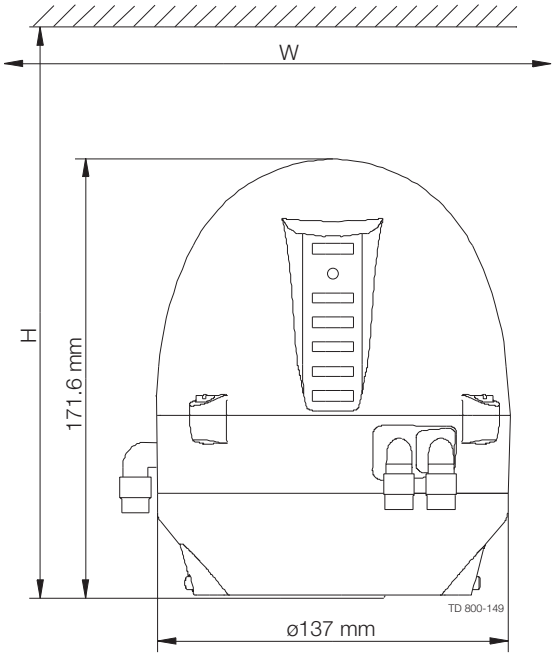
CAUTION! Do NOT twist the X-ring in the groove! The X-ring is not square, the highest (h) part must be placed as shown.

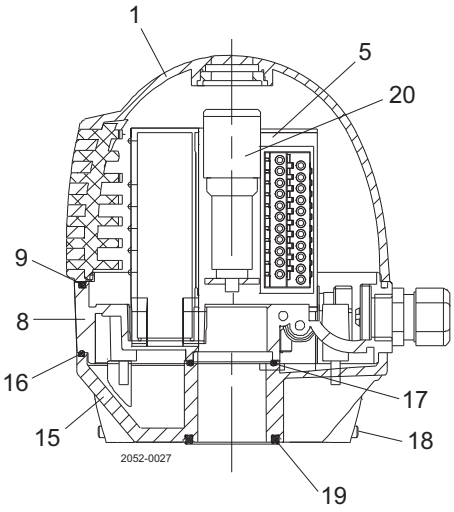




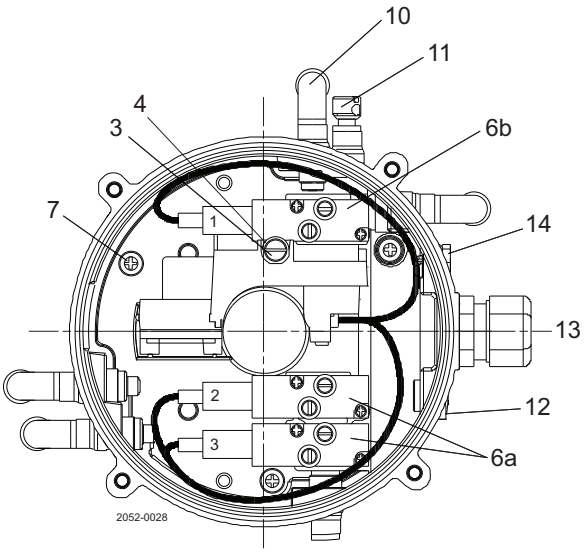
The drawings show ThinkTop® DeviceNet™ 11-25 VDC.
The items refer to the parts lists in the following sections

9.1 Drawings for ThinkTop® DeviceNet™ 11-25 VDC





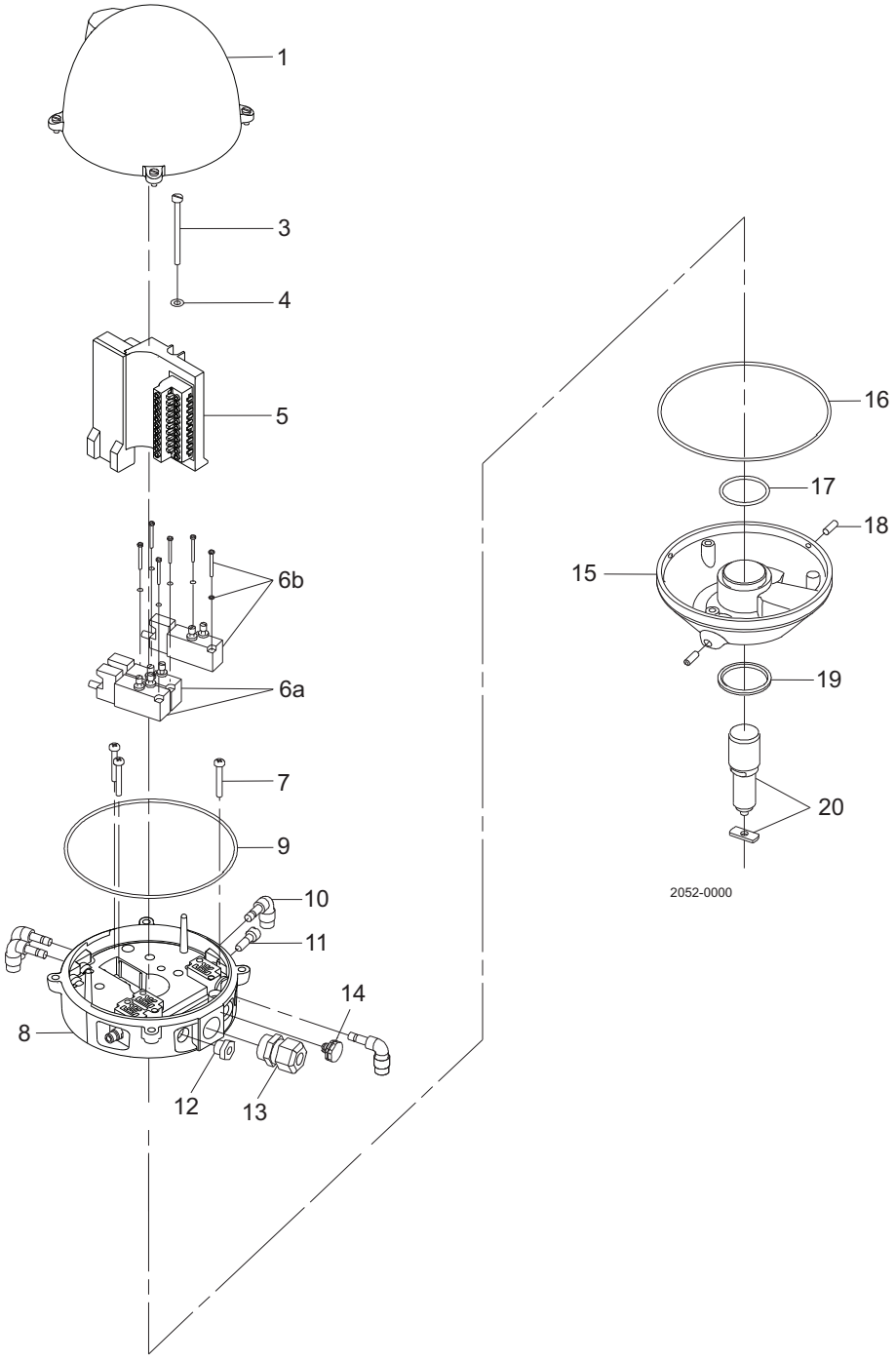
Note! This is the basic design.	
The clearance should be approximately:	
W225 x H250	(Unique SSV NC, SMP-SC/ - BV/ -TO, Unique Mixproof, MH, SBV)
W225 x H320	(Unique SSV NO)
W225 x H300	(LKLA-T)



9 Parts list and Service Kits

The drawings show ThinkTop® DeviceNet™ 11-25 VDC.
The items refer to the parts lists in the following sections

9.2 ThinkTop® DeviceNet™ 11-25 VDC



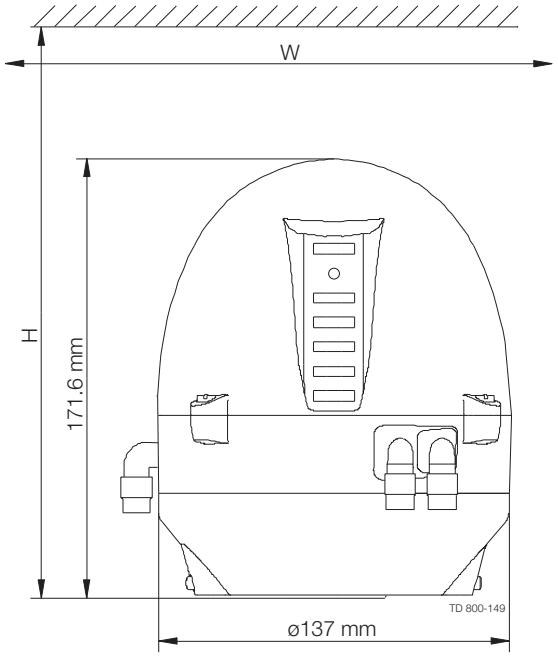
The drawings show ThinkTop® DeviceNet™ 11-25 VDC.
The items refer to the parts lists in the following sections

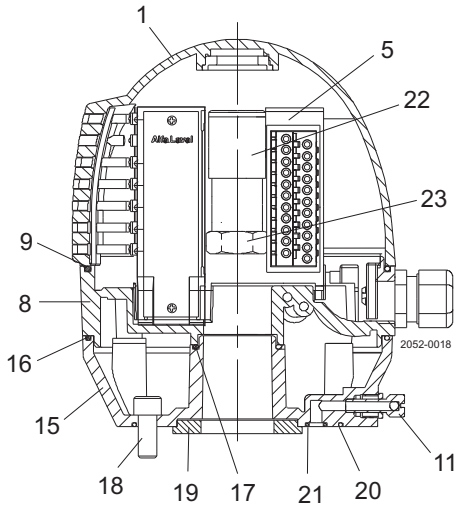
Parts list

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	1	PT screw
8	1	Base
9	1	Special X-ring, grey
10	1	Air fittings
11	1	Blow-off valve
12	1	Thread plug, PG7
13	1	Cable gland, PG11
14	1	Gore vent
15	1	Adapter
16	1	Special X-ring, black
17	1	O-ring
18	1	Allen screw
19	1	Special X-ring
20	1	Indication pin

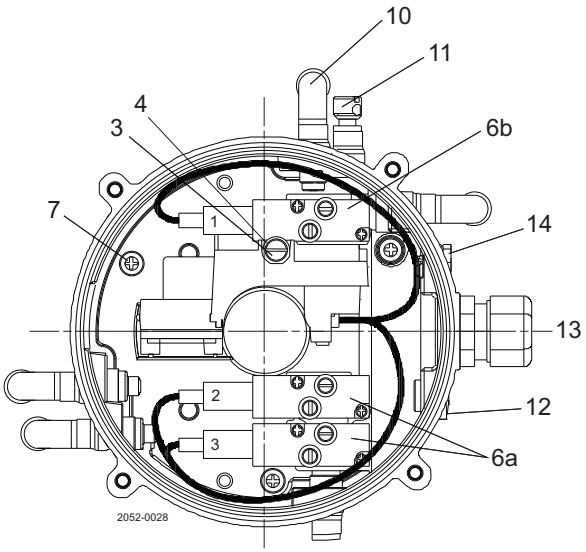
The drawings show ThinkTop® Series 700 Valves
The items refer to the parts lists in the following sections

9.3 Drawings for ThinkTop® Series 700 Valves





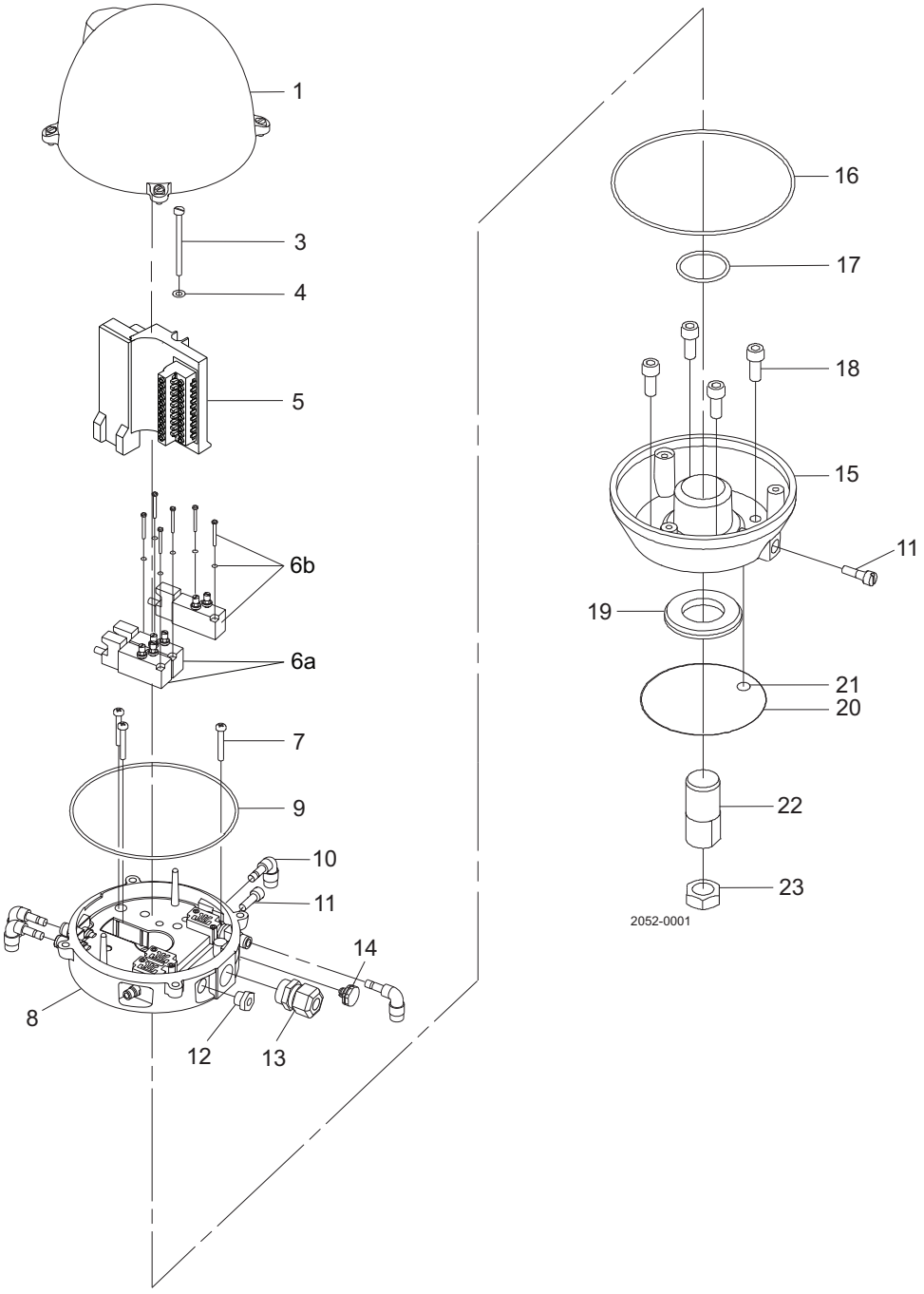
Note! This is the basic design.	
The clearance should be approximately:	
W225 x H250	(Unique SSV NC, SMP-SC/ - BV/ -TO, Unique Mixproof, MH, SBV)
W225 x H320	(Unique SSV NO)
W225 x H300	(LKLA-T)



9 Parts list and Service Kits

The drawings show ThinkTop® Series 700 Valves
The items refer to the parts lists in the following sections

9.4 ThinkTop® Series 700 Valves



9 Parts list and Service Kits

The drawings show ThinkTop® 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	1	PT screw
8	1	Base
9	1	Special X-ring, grey
10	1	Air fittings
11	2	Blow-off valve
12	1	Thread plug, PG7
13	1	Cable gland, PG11
14	1	Gore vent
15	1	Adapter
16	1	Special X-ring, black
17	1	O-ring
18	1	Screw
19	1	Retainer
20	1	O-ring
21	1	O-ring
22	1	Indicator pin
23	1	Nut

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 directly.