

Leave Surveillance to the Top

ThinkTop® DeviceNet™ 11-25 VDC

3.6

Application

The ThinkTop® is designed to ensure optimum valve control in conjunction with Alfa Laval sanitary valves and it is compatible with most PLC systems (Programmable Logic Controllers) with DeviceNet. It is for use in food, dairy and brewery installations and in biopharmaceutical applications and can be used indoors as well as outdoors.

Working Principle

The ThinkTop® is a control head including position indication and solenoid valves. It is used to control and supervise sanitary pneumatic valves. It is mounted on top of the valve. It receives signals from a PLC to control the valve and it sends feedback signals to the PLC to indicate when the valve is in a certain position.

To configure the sensor unit to the specific valve and to the application, the user sets up the ThinkTop® either by the local keys or by using the key pad (which is ordered separately). When using the key pad may not be necessary to remove the cover of the top unit.

Sensor System

The ThinkTop® features a "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 $\pm 0.004"$ (0.1mm). Note that the distance to the magnet can be $0.2"$ (5 mm) $\pm 0.12"$ (3 mm).

Feedback Signals (class 4)

The sensor system can be used for 4 feedback signals + 1 status signal = 5 feedback signals. 2 of the feedback signals can be external sensors if necessary.

The status signal is used for detection of the following:

- Set-up is in progress.
- Internal error.
- Maintenance is required (based on time and/or the self adjustment program).

The LEDs are constantly indicating the status of the unit: valve position, solenoid activated, setup and local fault indication, maintenance and seat-lift.



ThinkTop®

Standard Design

The ThinkTop® has a simple, modular and robust design which ensures a quick and easy assembly/disassembly. It consists of a base containing a sensor unit with LEDs, an activator stem, terminals for internal electrical connection, solenoid valves and a shell. See also Fig. 2 "Basic Design". It is prepared for upgrading and components are interchangeable. The design is hygienic and easy to clean.

DEVICENET IS A TRADEMARK OF THE OPEN DEVICENET VENDOR ASSOCIATION, INC. (ODVA)

Features

Tolerance Programmes

Individual tolerance programs for all Alfa Laval sanitary valve types are part of the ThinkTop® concept ensuring correct feedback to the PLC for open and closed valve position. If the function is disabled, the tolerance band will be ± 0.2" (5 mm).

Self Adjustment (SRC/ARC valves only)

The self adjustment feature is an exceptional aspect of the ThinkTop® design. A program 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 0.12" (0.3 mm), an alert warning will appear in the form of a status signal and a flashing maintenance LED. After a 0.2" (5 mm) adjustment, an alarm warning signals the following: loss of feedback, status signal, a steady maintenance light, and indicates the minimum seal remaining before replacement is required.

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 return after 3, 6, 9 or 12 months or more.

Special features (class 100)

- Time TOTAL
- Time OPEN
- Last Stroke Time
- Coil Count #1
- Coil Count #2
- Coil Count #3
- Time CLOSED
- Time to maintenance
- Last Stroke Length
- CLOSED count
- OPEN count
- Time of last maintenance

Other Features

Another very important fact is that the setup is kept until programmed, even during failure in the power supply.

The accurate sensor system enables indication of seat-lift to be integrated in the top unit.

Materials

- Plastic parts: Nylon PA 6. Reinforced.
- Steel parts: Stainless steel AISI 304 and 316.
- Seals: EPDM rubber (SMP-EC), FPM (air fittings)

Technical Data

Sensor System:

- Sensor accuracy: ± (0.1 mm)
- Distance to magnet: 5 ± 0.12" (3 mm)
- Stroke length: 0.1 - 3.15" (80 mm)

Electrical connection

Direct cable gland entry (hard wired)

PG11 0.15" - 0.39" (4-10 mm).

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 mm² (AWG 20).

DeviceNet interface

The baud rates: 125k, 250K and 500K.
Polling and change of state I/O slave messaging.
Poll: 7 or 2 bytes (optional)*
COS: 2 bytes, 7 bytes is not supported.

- * 2 bytes = Inputs/outputs and alarms (class 4)
- 7 bytes = Inputs/outputs, alarms and class 4+100 attributes

attributes

7 bytes is standard.

Changing from 7 bytes to 2 bytes: Remove jumper (#12 and #13). A power recycle is necessary when changing byte sizes.

Node address

Range: 0 – 63
Default slave address: 63

Power supply

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

- Supply voltage: 11 – 25 VDC, as specified for the DeviceNet
- Supply current: Max. 45 mA (for sensor unit alone) (excluding current to the solenoids and the external proximity switches).

Feedback signals

Input signals (produced by the sensor unit) transmitted over the DeviceNet - class 4.

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)	Y
Configuration method	EDS		

External sensors

The external sensors are used for seat-lift supervision (upper seat-lift) when seat-lift cannot be internally detected. The sensors get their supply voltage from the top unit. They connect directly to the terminal strip on the sensor unit. If the actual setup is set for internal seat-lift (lower seat-lift), the corresponding external signal is not used, otherwise the external signal logically controls the corresponding feedback to the PLC (Programmable Logic Controller).

- Supply voltage:Must match the network power.
- Supply current:Max. 15 mA per sensor.
- Type of sensor** :3-wire PNP-type.

Solenoid valves:

Up to 3 solenoid valves in each unit.

- Type3/2 or 5/2 valve (only possible with one 5/2 valve).
- Air supply43.5 - 130.5 PSI (3-9 bar).
- Filtered air, max. particles or dirt0.0004" (0.01 mm).
- Max. oil content1.0 ppm.
- Max. water content0.0165 lb/lb air.
- Throughput0.98" (2.5 mm) diameter.
- Air restriction (throttle function) air inlet/outlet.
- Manual hold override.

External air tube connection1/4" or 6 mm diameter.

Solenoid drive:

- Solenoid valve8 VDC
- O/P Voltage9 VDC +/- 5%
- Power consumption0.75W Max.
- Current consumption (per solenoid)30mA Max.
- PWM Pull-in pulse length150ms Max.
- PWM duty cycle40% +/- 10%
- PWM frequency2 kHz +/- 10%
- PWM = Pulse width modulated

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 V DC ± 15%. Network power connection! User must ensure 24 V DC on the network (at the top) when these outputs are used.
- Load current: Max 75 mA *).

***) Note!** 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.

**** Note!** Consult Alfa Laval for correct sensor.

Typical power consumption

Test conditions: One ThinkTop® DeviceNet 11-25 VDC connected to the network with 1 input (on) and:

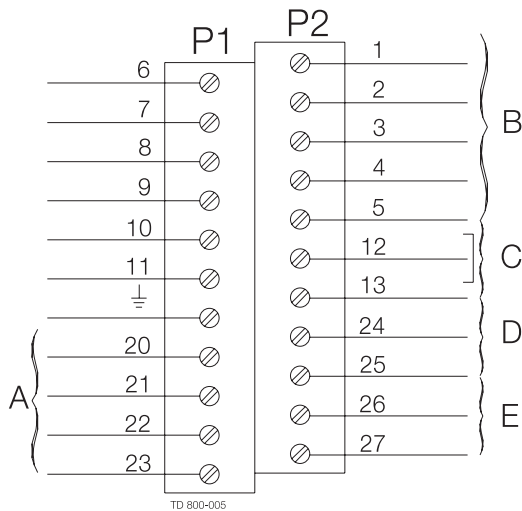
No solenoids onsupply voltage 25 VDC 20 mA
1 solenoid active (PWM)supply voltage 25 VDC 28 mA
2 solenoids active (PWM)supply voltage 25 VDC 36 mA
3 solenoids active (PWM)supply voltage 25 VDC 44 mA

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No solenoids onsupply voltage 11 VDC 34 mA
1 solenoid active (PWM)supply voltage 11 VDC 58 mA
2 solenoids active (PWM)supply voltage 11 VDC 82 mA
3 solenoids active (PWM)supply voltage 11 VDC 106 mA

Note! If the Aux. outputs are used instead of the solenoids for activation of external devices, the consumption is depending on the load current (see "Aux. outputs").

Electrical connection, internal



- A. Internal connections to solenoid 1-3
- B. Bus connection
- C. Jumper **)
- D. Incoming signals from external sensors
- E. Supply to external sensors

- | | |
|---------------------------|----------------------------|
| 6. Aux. Common (+) | 1. Power Bus V-(black) |
| 7. Aux.1 (-) | 2. CAN_L (blue) |
| 8. Aux. 2 (-) | 3. Drain (bare) |
| 9. Aux. 3 (-) | 4. CAN_H (white) |
| 10. N/C | 5. Power Bus V+ (red) |
| 11. N/C | 12. Jumper |
| N/C | 13. Jumper |
| 20. Solenoid common brown | 24. Seat-lift 1 "upper" *) |
| 21. Solenoid 1, blue | 25. Seat-lift 2 "lower" *) |
| 22. Solenoid 2, blue | 26. Supply + *) |
| 23. Solenoid 3, blue | 27. Supply - *) |

- *) **Note!**
Terminals 24, 25, 26 and 27 can be used for external seatlift sensors as well as for any digital input. They are associated with feedback signal 3 (seatlift 1) and 4 (seatlift 2). External sensor must always be a 8-30 VDC PNP 3 wire sensor. CONNECT (-) common on terminal 27, and (+) common on terminal 26.
- **) **Note!**
Jumper present = 7 I/O bytes (Rx size 7 and Tx size 7) - standard. Changing from 7 bytes to 2 bytes: Remove jumper (#12 and #13). A power recycle is necessary when changing byte sizes.
- ***) **Note!**
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 ****).
- ****) **Note!**
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. User must ensure that total network current consumption is less than the supply rating.

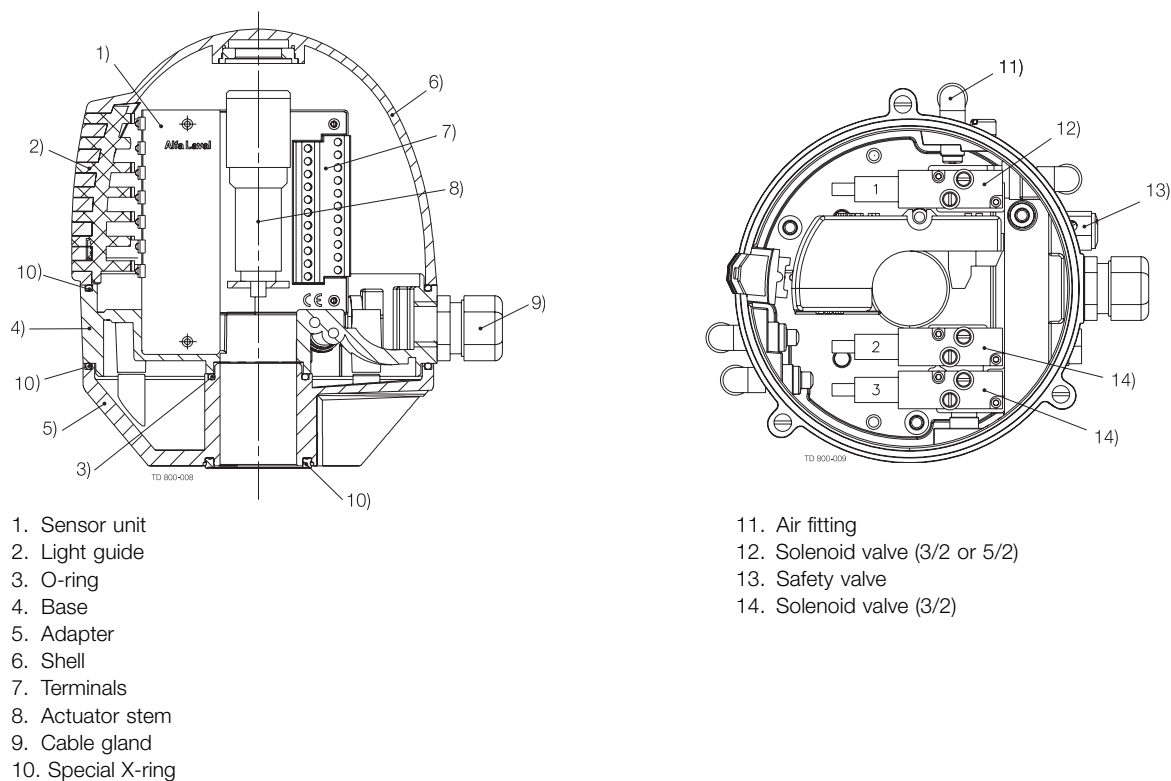


Fig. 2. Basic design, ThinkTop®.

Note!

- 1) The ThinkTop® for the SMP-EC valve has a longer activator stem which is going through the shell (see Ordering Leaflet).
- 2.) The ThinkTop® for the SRC-LS requires a special magnet. Contact Alfa Laval.

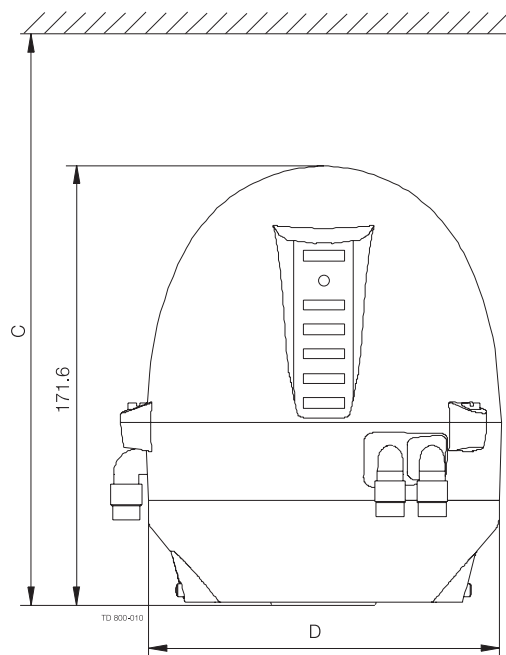


Fig. 3. Dimensions.

- Note!** This is the basic design. The clearance should be approximately:
- 7.1" dia. x 9.8" (ø180 x 250 mm) (SRC NC, SMP-SC/-BC/- TO, Unique, Koltek MH, SBV, AMP)
 - 7.1" dia. x 12.6" (ø180 x 320 mm) (SRC NO)
 - 7.1" dia. x 11.8" (ø180 x 300 mm) (LKB/LKLA-T)

Micro environment demand specifications:

Temperature		
Working:	-4°F to +185°F (-20°C to +85°C)	IEC 68-2-1/2
Storage:	-40°F to +185°F (-40°C to +85°C)	IEC 68-2-1/2
Temperature change:	-13°F to +158°F (-25°C to +70°C)	IEC 68-2-14
Vibration	10-55 Hz, 0.03" (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:	104°F (+40°C), 21 days, 93% R.H.	IEC68-2-3
Cyclic humidity:	77°F/131°F (+25°C/+55°C) 12 cycles 93% R.H.	IEC 68-2-30
(working)		
Protection class	IP67	IEC 529
Input treshold		
Voltage/current:	Type 1 input requirements	EN 61131-2
EMC Directive	89/336/EEC	EN 50081-1, EN 50082-2 KA 2791.30 Tetra Pak Corporate Standard
ODVA Approval	DeviceNet v. 2.0	Conformance test version 14

Accessories

- IR keypad.
- External indication bracket for SMP-SC .

Note!

The ThinkTop® has Patented Sensor System, Registered Design and Registered Trademark.

Ordering

Please state the following when ordering:

- DeviceNet.
- Number of solenoids (0-3).
- Type of solenoids (3/2, 5/2).
- Air connection ø6mm or 1/4"
- Please state if SMP-EC or SRC-LS