Leave Surveillance to the Top

*Think*Top® DeviceNet™ 11-25 VDC

Application

The *Think*Top® 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.

Working Principle

The *Think*Top® is a control head including indication units and solenoid valves to control all kinds of processing valves. It is used to control and supervise pneumatic valves and 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 adapt the sensor unit to the specific valve and to the application, the user sets up the *Think*Top® either by the local keys or by using the key pad (which is ordered separately). When using the key pad it is not necessary to dismantle the top unit.

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 ± 0.1mm. Note that the distance to the magnet can be 5 mm ± 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 programme).
- A conflict in the self adjustment programme.

The LEDs are constantly indicating the status of the unit: Valve

Fig. 1. *Think*Top®

position, solenoid activated, setup and local fault indication, maintenance and seat-lift.

Standard Design

The *Think*Top® 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 is exchangeable. 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 programmes for all Alfa Laval sanitary valve types are part of the *Think*Top® concept ensuring correct feedback to the PLC for open and closed valve position. If the function is disabled, the tolerance band will be ± 5 mm.

Self Adjustment (SRC/ARC valves only)

The self adjustment feature is an exceptional aspect of the *Think*Top® 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 minimum of seal left requiring 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 return after 3, 6, 9 or 12 months or more.

Special features (class 100)

- Time TOTAL   - Time CLOSED
- Time OPEN   - Time to maintenance
- Last Stroke Time   - Last Stroke Length
- Coil Count #1   - CLOSED count
- Coil Count #2   - OPEN count
- Coil Count #3   - 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 12.
Steel parts: Stainless steel AISI 304 and 316.
Seals: Nitrile (NBR). EPDM rubber for SMP-EC activator stem.

Technical Data
Sensor System:

Sensor accuracy: ± 0.1 mm
Distance to magnet: 5 ± 3 mm
Stroke length: 0.1 - 80 mm

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
   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).

The fulfilling of the UL requirements in UL508 requires that the unit is supplied by an isolating source complying with the requirements for class 2 power units (UL1310) or class 2 and 3 transformers (UL1585).

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 switches are used for seatlift supervision when seatlift can not be internally detected. They get their supply voltage from the sensor unit. They connect directly to the terminal strip on the sensor unit. If the actual setup is for internal seatlift, the corresponding external signal is not used. Otherwise the external signal logically controls the corresponding feedback to the bus interface unit.

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

Solenoid valves:

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 .... 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.
Air restriction (throttle function) air inlet/outlet.
Manual hold override.
External air tube connection .... ø6 mm or 1/4".
Silencer/filter*) .... Connection possible via ø6 mm or 1/4″.

*) Filter recommended in tropical regions.

Solenoid drive:

Solenoid valve .... 8 VDC
O/P Voltage .... 9 VDC +/- 5%
Power consumption .... 0.75W Max.
Current consumption (per solenoid) .... 30mA Max.
PWM Pull-in pulse length .... 150ms Max.
PWM duty cycle .... 40% +/- 10%
PWM frequency .... 2 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 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.

Typical power consumption

Test conditions: One *Think*Top® DeviceNet 11-25 VDC connected to 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 solenoids active (PWM) .... supply voltage 25 VDC 36 mA
3 solenoids 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 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
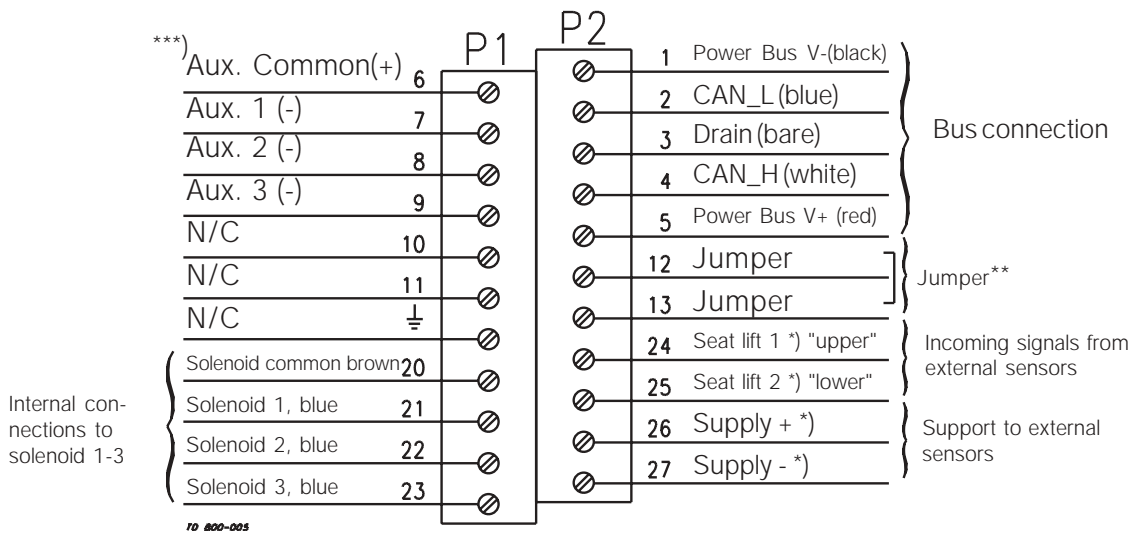
*) **Note!**
Terminals 24, 25, 26 and 27 can be used for external seatlift sensors as well as for any digital input. They are associated
with feedback signal 3 (seatlift 1) and 4 (seatlift 2). External sensor must always be a 8-30 VDC PNP 3 wire sensor.
Connect (-) common on terminal 27, and (+) common 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
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If solenoid 1, 2 and 3 are in use, no aux. can be used! A mix of solenoid and aux. outputs is possible.
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number of nodes supported by a typical 8A network supply. User must ensure that total net work current
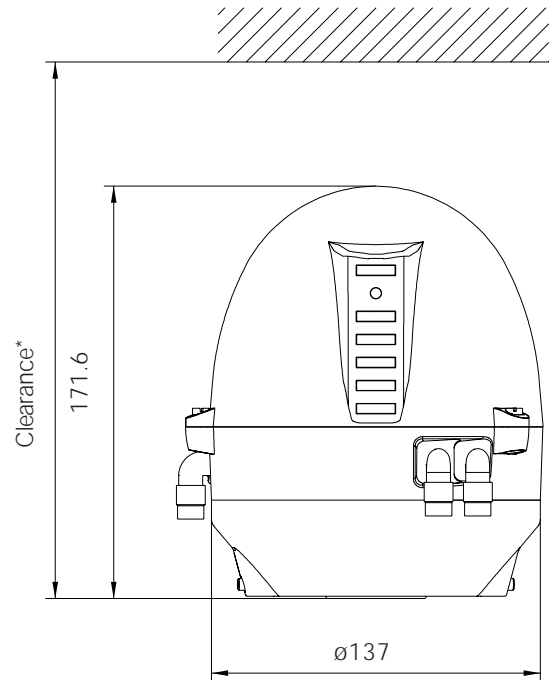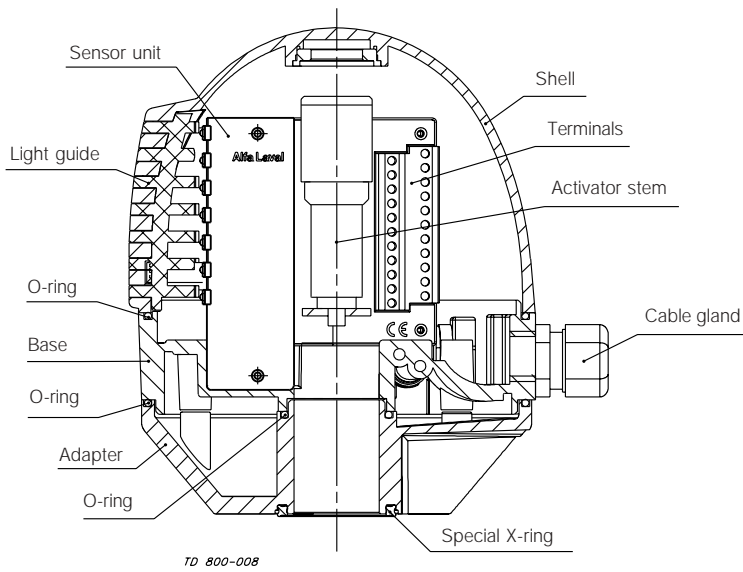consumption is less than the supply rating.

3.

Sensor unit
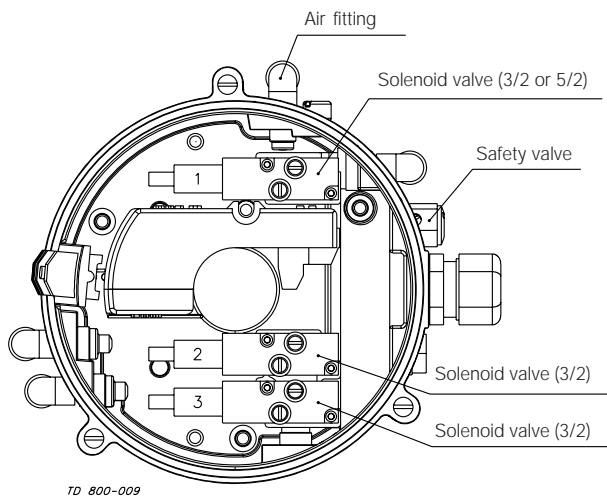Shell
Light guide
Terminals
Activator stem
O-ring
Base
O-ring
Adapter
Cable gland
O-ring
Special X-ring

TD 800-008

Clearance*
171.6
ø137

Fig. 3. Dimensions.

*Note! This is the basic design. The clearance should be approximately:
ø225 x 250 mm (SRC NC, SMP-SC/-BC/-TO, *Unique*, Koltek MH, SBV, AMP)
ø225 x 320 (SRC NO)
ø225 x 300 (LKB/LKLA-T)

Air fitting
Solenoid valve (3/2 or 5/2)
Safety valve
1
2
Solenoid valve (3/2)
3
Solenoid valve (3/2)

TD 800-009

Fig. 2. Basic design, *Think*Top®.

Note! The *Think*Top® for the SMP-EC valve has a longer activator stem which is going through the shell (see Ordering Leaflet).

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.	IEC68-2-3
Cyclic humidity:	+25°C/+55°C	
	12 cycles	IEC 68-2-30
(working)	93% R.H.	
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
ODVA Approval	DeviceNet v. 2.0	Conformance test version 14
UL Approval	8-30 VAC/VDC, class 2 input,	
	45 mA max. output	UL508-E203255

Accessories
- IR keypad.
- External indication bracket for SMP-SC .
- External indication bracket for *Unique*.

Note! For further information: See also IM 70826.

Note! The *Think*Top® 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 series 700 valves.

3.