**Product Overview**

The AX-UL-SP-xx-x is a range of Ultrasonic level sensors designed for level measurement in tanks or sumps and provides a 4-20mA, Hart and two relay outputs to the BMS system or alarm. The unit uses non-intrusive ultrasonic pulse technology so any liquid can be measured. The unit is housed in a IP68 housing and is fixed to the top of the tank. Set-up is by means of push buttons to set up the full/empty levels. There are two standard ranges 6m and 8m. There is the option of an LCD Display and fully functioning programming module.

**Features**

- Non Intrusive Design
- Mounted on the top of a tank
- Easy to set-up
- Built in temperature compensation

**Technical Specification**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring Range</td>
<td>STP-380 0.25 to 6.0m</td>
</tr>
<tr>
<td></td>
<td>STP-370 0.35 to 8.0m</td>
</tr>
<tr>
<td>Process Temperature</td>
<td>-30 to +90 degC</td>
</tr>
<tr>
<td>Power Supply</td>
<td>85 to 255Vac -2V or 20 to 28Vac/dc -3V-3W</td>
</tr>
<tr>
<td>Output</td>
<td>4-20mA loop 4-wire transmitter (600 Ohm)</td>
</tr>
<tr>
<td>Digital Communications (-3 or-4)</td>
<td>Hart</td>
</tr>
<tr>
<td>Integral Relays</td>
<td>2 x SPDT (1 at 3A@250Vac, 1 at 1A@30Vdc)</td>
</tr>
<tr>
<td>Operating Pressure</td>
<td>0.3 to 3bar</td>
</tr>
<tr>
<td>Beam Angle</td>
<td>STP-480 STP-470 5 deg 7deg</td>
</tr>
<tr>
<td>Accuracy</td>
<td>0.05% of range +/- 0.2% measured distance</td>
</tr>
<tr>
<td>Resolution</td>
<td>2 to 5m &lt;2mm</td>
</tr>
<tr>
<td>Display (Optional)</td>
<td>SAP-200 LCD Display - fully featured programming configuration and optimisation</td>
</tr>
<tr>
<td>Weatherproof Rating</td>
<td>Housing IP67</td>
</tr>
<tr>
<td></td>
<td>Sensor IP68</td>
</tr>
<tr>
<td>Materials</td>
<td>Polypropylene as standard (PVDF or EPDM option at additional cost)</td>
</tr>
<tr>
<td>Mounting</td>
<td>2” BSP (NPT Option)</td>
</tr>
<tr>
<td>Electromagnetic Compatibility</td>
<td>EN61326 Class B</td>
</tr>
<tr>
<td>Country of Origin</td>
<td>EU</td>
</tr>
</tbody>
</table>

**Order Codes**

- AX-UL-SP480-1: Ultrasonic Level Sensor 0.25 to 6m depth, 4-20mA +2 relay o/p 2” BSP Mtg 85 to255Vac
- AX-UL-SP480-2: Ultrasonic Level Sensor 0.25 to 6m depth, 4-20mA +2 relay o/p 2” BSP Mtg 24Vac/dc
- AX-UL-SP480-3: Ultrasonic Level Sensor 0.25 to 6m depth, 4-20mA & HART +2 relay o/p 2” BSP Mtg 85 to255Vac
- AX-UL-SP480-4: Ultrasonic Level Sensor 0.25 to 6m depth, 4-20mA & HART +2 relay o/p 2” BSP Mtg 24Vac/dc
- AX-UL-SP470-1: Ultrasonic Level Sensor 0.35 to 8m depth, 4-20mA +2 relay o/p 2” BSP Mtg 85 to255Vac
- AX-UL-SP470-2: Ultrasonic Level Sensor 0.35 to 8m depth, 4-20mA +2 relay o/p 2” BSP Mtg 24Vac/dc
- AX-UL-SP470-3: Ultrasonic Level Sensor 0.35 to 8m depth, 4-20mA & HART +2 relay o/p 2” BSP Mtg 85 to255Vac
- AX-UL-SP470-4: Ultrasonic Level Sensor 0.35 to 8m depth, 4-20mA & HART +2 relay o/p 2” BSP Mtg 24Vac/dc
- add suffix -6: ECX Intrinsically safe version
- AX-UL-SAP-200: SAP 200 LCD Display & fully functioned Programming Module

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Note: If mounting the unit directly to the tank (without our mounting flange) ensure the mounting is non-metallic as a metallic one is likely to resonate and affect the performance of the ultrasonic units.
Programming without SAP Display Module

Programming is only possible if the EchoTREK is in Level Measuring Mode and receives valid echo i.e. "VALID" LED is lit!

The following can be programmed without display module:
- Assignment of the 4 mA to a required e.g. min. level / max. distance
- Assignment of the 20 mA to a required e.g. max. level / min. distance
- Error indication by the current output (Hold, 3.6 mA or 22 mA)
- Damping (10, 30 or 60 sec)
- Reset to the factory default

Note: Current output can also be assigned in inverted mode:
4 mA = 100% (Full), 20 mA = 0% (Empty)

Procedure of programming: press button in the relevant sequence and check the state of the LED-s. Symbols for the states of the LED-s:

- ○ = LED is off,
- ● = LED is blinking,
- ●● = LED is on,
- ●●● = LEDs are blinking alternatively
- ○○○ = Don't care

Minimum level (0%, empty tank) assignment to 4 mA

<table>
<thead>
<tr>
<th>Action</th>
<th>Led state following the action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Check for a valid ECHO</td>
<td>●●● = Valid ECHO, transmitter programmable</td>
</tr>
<tr>
<td>2) Press NEXT button steadily</td>
<td>●●● = EchoTREK in programming mode</td>
</tr>
<tr>
<td>3) Press UP button steadily</td>
<td>●●● = 4 mA assigned to the distance (see picture)</td>
</tr>
<tr>
<td>4) Release buttons</td>
<td>○○○ = Programming completed</td>
</tr>
</tbody>
</table>

Maximum level (100%, full tank) assignment to 20 mA

<table>
<thead>
<tr>
<th>Action</th>
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</thead>
<tbody>
<tr>
<td>1) Check for a valid ECHO</td>
<td>●●● = Valid ECHO, transmitter programmable</td>
</tr>
<tr>
<td>2) Press NEXT button steadily</td>
<td>●●● = EchoTREK in programming mode</td>
</tr>
<tr>
<td>3) Press DOWN button steadily</td>
<td>●●● = 20 mA as signed to the distance (see picture)</td>
</tr>
<tr>
<td>4) Release buttons</td>
<td>○○○ = Programming completed</td>
</tr>
</tbody>
</table>

"Error state" indication by the analogue signal (Check for a valid echo as above)

As a result of this setting the value of the analogue output will be 3.8 mA; 22 mA or according last value (hold) until the error is ceased.

<table>
<thead>
<tr>
<th>Action</th>
<th>Led state following the action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Press button steadily</td>
<td>○○○ = EchoTREK in programming mode</td>
</tr>
<tr>
<td>2) Press any of the DOWN, ENTER, NEXT button steadily</td>
<td>●●● = hold last value</td>
</tr>
<tr>
<td>3) Release buttons</td>
<td>○○○ = Programming completed</td>
</tr>
</tbody>
</table>
Programming with SAP200 Display Module

The SAP 200 supports 2 separately accessible programming modes representing 2 layers of programming complexity, dependant on user choice.

Quickset (5.2.4)
Recommended as a simple and fast way to set up the EchoTREK by 6 basic parameters for the following basic settings, marked by abbreviations easy to remember:
- Engineering unit for the display (Metric or US)
- Maximum measuring distance (H)
- Assignment of min level to 4 mA
- Assignment of max level to 20 mA
- Error indication by the current output
- Damping time

Full Parameter Access (5.2.5)
All features of the EchoTREK such as:
- Measurement configuration
- Outputs
- Measurement optimisation
- 11 pre-programmed tank shapes for volume calculation
- 21 pre-programmed formula for flow metering
- 32-point linearisation

5.2.1 SAP-200 Display Module
Symbols used on the LCD:
- DIST – Distance (measuring) mode
- LEV – Level (measuring) mode
- VOL – Volume (measuring) mode
- FLOW – Open channel (flow metering) mode
- PROG - Programming mode
  (device under programming)
- RELAY – ‘C2’ circuit of the relay is closed
- T1 - TOT1 volume flow totaliser
  (resettable aggregate)
- T2 - TOT2 volume flow totaliser (aggregate)
- FAIL - Measurement / device error
- ↑↓ - Level changing direction
- Bargraph assigned to the current output or echo strength
Symbols used on the frame:
- **M** – Metric system
- **US** – US calculation system

**LEDs lit**
- **COM** – digital (Hart) communication
- **VALID** – presence of valid echo

**IrDA** – Infrared communication port for logger readout, diagnostics and software upgrade.

### 5.2.2 Steps of the SAP-200 Display Module
Programming will be performed by the pressing and releasing the relevant one or two keys (simultaneously).

**Single key pressing**
- ENTER **①** to select parameter address and go to parameter value
- to save parameter value and return to parameter address
- NEXT **④** to move the blinking (sign of change) of the digit to the left
- UP **⑧** to increase value of the blinking digit
- DOWN **⑨** to decrease value of the blinking digit

**Double key pressing**
Press the two keys simultaneously for desired programming step.

**yy** parameter address (P01, P02...P99)

**xxx** parameter value (dcba)

**Y** pag graph

**SAP-200 indications**
Depending on the measurement one of the below symbols will light and the process value displayed (see P01 chapter 6.1). Engineering units will be indicated directly (°C, °F and mA) and by the lit arrow showing towards them on the frame:
- **DIST** distance
- **LEVEL** level
- **VOL** volume
- **FLOW** flow
- **T1/T2 totalised values**
- **FAIL** (blinking) Error code displayed

For paging readouts NEXT **④** key should be pressed.

**The following process values can be displayed**
- **Volume / Flow** – if programmed so
- **Level** – if programmed so
- **Distance** – if programmed so
- **Warning indications** – FAIL blinking

Display screens can be scrolled by pressing key NEXT **④**.
To return to the screen of the selected measurement mode key ENTER **①** should be pressed (see P01 chapter 6.1)

Temperature can be displayed by pressing UP **⑨**.

**Current output value can be displayed by pressing DOWN **⑨**.

(°C/°F)

(mA)