AX-UL-Sx

Ultrasonic Level Sensor

Product overview

The AX-UL-Sxx-xx-x are a range of Ultrasonic level sensors designed for level measurement in tanks or sumps. They provide a 4-20mA output to the BMS system or alarm. The units use non-intrusive ultrasonic pulse technology such that any liquid can be measured. The units are housed in an IP68 housing and are fixed to the top of the tank. Set-up is by means of push buttons to set the full/empty levels. Two standard ranges of 6m and 8m are available. Additional options available include relay and HART outputs, and an LCD display/programming module.

Features

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

Product specifications

Power Supply:		12 to 36Vdc 720mW 2-wire loop powered
Output signal:		4-20mA loop (maximum 600 Ohm load)
Measuring Range:	-370	0.35 to 8.0m (20mA to 4mA - can be reversed)
	-380	0.25 to 6.0m (20mA to 4mA - can be reversed)
Accuracy:		± (0.2% measured distance plus 0.05% of the range)
Resolution: <2m		1mm
2m to 5m		2mm
over 5m		5mm
Beam Angle: (this area to be kept	-370	7˚
clear of obstacles in the tank)	-380	5˚
Process Temperature:	-2 and -4 versions	-30 to +90˚C
" for Explosion Proof versions:	-6 and -8 versions	-20 to +70˚C
Operating Pressure:		0.3 to 3 bar
IP Rating: Housing:		IP67
Sensor:		IP68
Materials:	-SxP	Polypropylene
	-SxV	PVDF (recommended for diesel)
Mounting:		2" BSP
Electromagnetic Compatibility:		EN61326
Digital Communications: (option)	-4 and -8 versions	Hart
Integral Relay: (option)	Add R to part no.	SPDT 1A @ 30Vdc
Display: (option)	-SGx	6 digit LCD Display - full programming configuration & optimisation for 11 tank shapes
		Note,display can be ordered separately as part AX-UL-SAP200
Country of Origin:		Hungary

Order code break down:

See page 2 for common codes

AX-UL-S☐☐-3☐0-☐☐

Display	Code
No display	E
With display	G

Housing	Code
Polypropylene	P
PVDF	V

Range	Code
0.35 to 8m	7
0.25 to 6m	8

Output & Type	Code
4-20mA	2
HART	4
4-20mA Ex	6
HART Ex	8

Relay	Code
No relay	-
With relay	R

Annicom Ltd
Unit 21, Highview, Bordon, Hampshire. GU35 0AX
Tel: +44 (0)1420 487788 Fax: +44 (0)1420 487799
Email: sales@annicom.com Website: www.annicom.com

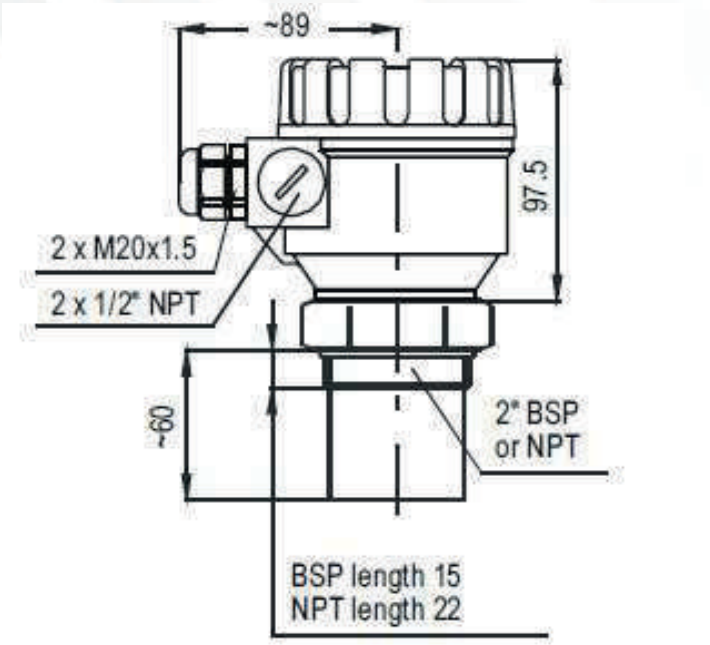
Order codes for 2-Wire, 4-20mA output Ultrasonic Level Sensors

Polypropylene housing	PVDF housing (recommended for diesel tanks)	
AX-UL-SEP380-2	AX-UL-SEV380-2	0.25 to 6m depth
AX-UL-SEP370-2	AX-UL-SEV370-2	0.35 to 8m depth
AX-UL-SEP380-4	AX-UL-SEV380-4	0.25 to 6m depth with HART o/p
AX-UL-SEP370-4	AX-UL-SEV370-4	0.35 to 8m depth with HART o/p
AX-UL-SGP380-2	AX-UL-SGV380-2	0.25 to 6m depth, with SAP200 LCD
AX-UL-SGP370-2	AX-UL-SGV370-2	0.35 to 8m depth, with SAP200 LCD
AX-UL-SGP380-4	AX-UL-SGV380-4	0.25 to 6m depth, with HART o/p & SAP200 LCD
AX-UL-SGP370-4	AX-UL-SGV370-4	0.35 to 8m depth, with HART o/p & SAP200 LCD
AX-UL-SEP380-6	AX-UL-SEV380-6	0.25 to 6m depth, explosion proof
AX-UL-SEP370-6	AX-UL-SEV370-6	0.35 to 8m depth, explosion proof
AX-UL-SEP380-8	AX-UL-SEV380-8	0.25 to 6m depth with HART o/p, explosion proof
AX-UL-SEP370-8	AX-UL-SEV370-8	0.35 to 8m depth with HART o/p, explosion proof
AX-UL-SGP380-6	AX-UL-SGV380-6	0.25 to 6m depth, with SAP200 LCD, explosion proof
AX-UL-SGP370-6	AX-UL-SGV370-6	0.35 to 8m depth, with SAP200 LCD, explosion proof
AX-UL-SGP380-8	AX-UL-SGV380-8	0.25 to 6m depth, with HART o/p & SAP200 LCD, explosion proof
AX-UL-SGP370-8	AX-UL-SGV370-8	0.35 to 8m depth, with HART o/p & SAP200 LCD, explosion proof
Add suffix ‘R’ to any code		Relay Output
AX-UL-SAP200		LCD Display/programming module

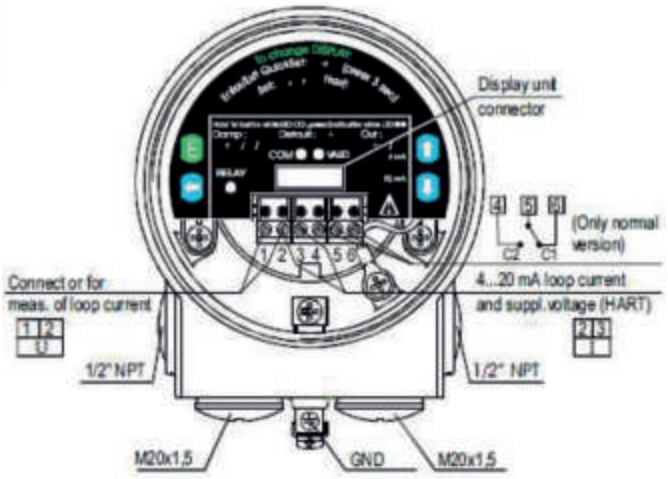
Default measurement outputs:

Measured current mA	Indicated distance m Unit type (range)	
	-370	-380
4.0	8.00	6.00
6.0	7.04	5.28
8.0	6.09	4.56
10	5.13	3.84
12	4.18	3.13
14	3.22	2.41
16	2.26	1.69
18	1.31	0.97
20	0.35	0.25

Dimensions and connections



Top cover including display module



The current loop is connected to pins 2 and 3. Polarity is not important.

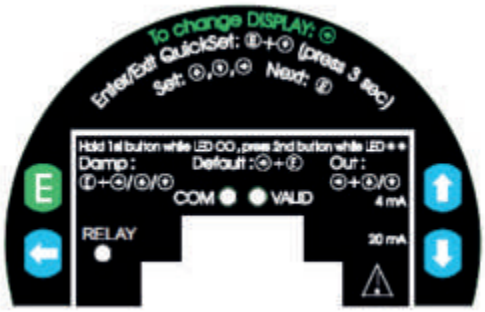
Installation

Installation of the BSP threaded models:

- Screw the unit in to its place. Use open wrench for tightening; max torque is 20Nm.
- After tightening, the enclosure can be rotated to the proper position. (Safety bolt prevents more than 350˚)
- The unit may be damaged by electrostatic discharge (EDS) via its terminal, thus apply the precautions commonly used to avoid electrostatic discharge e.g. by touching a properly grounded point before removing the cover of the enclosure.
- Ensure that the power supply is turned off at the source.
- With the cover of the housing removed and taking out the display module (if any), the screw terminals can be accessed. Suggested cable core cross section: 0.5 to 1.5mm².
- These sensors **must** be connected from the ground screw to an external ground point.
- Switch on the unit and make necessary programming adjustments.
- After programming ensure proper sealing and closing of the cover.
- NOTE: If mounting the unit directly to the tank (without our mounting flange) ensure that the mounting is non-metallic. (A metallic mounting is likely to resonate and affect the performance of the ultrasonic units.)

Programming without AX-UL-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 4mA to a required e.g. min. Level/max. distance
- Assignment of the 20mA to a required e.g. max. Level/min. distance
- Error indication by the current output (Hold, 3.6mA or 22mA)

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

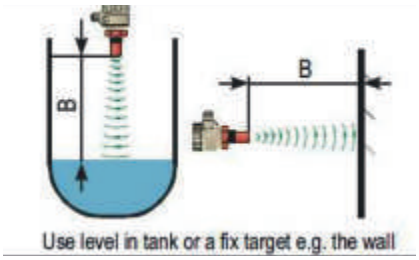
Programming procedure: press buttons in the relevant sequence and check the state of the LEDs as below.

Symbols for the states of the LEDs are:

○ = LED is off, ◐ = LED is blinking, ● = LED is on, ◐◑ = LEDs are blinking alternately , ⊗ = Do not care

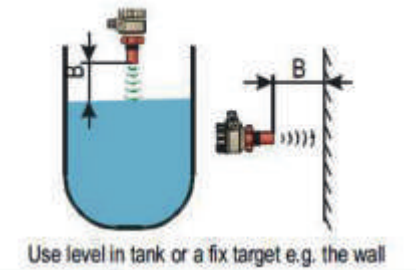
Minimum level (0%, empty tank) assignment to 4mA

Action	LED state following the action
1) Check for a valid Echo	⊗● = Valid Echo, transmitter is programmable
2) Press NEXT (←) button steadily	○○ = Unit in programming mode
3) Press UP (↑) button steadily	●● = 4mA assigned to the distance (see picture)
4) Release buttons	○○ = Programming completed



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

Action	LED state following the action
1) Check for a valid Echo	⊗● = Valid Echo, transmitter is programmable
2) Press NEXT (←) button steadily	○○ = Unit in programming mode
3) Press DOWN (↓) button steadily	●● = 20mA assigned to the distance (see picture)
4) Release buttons	○○ = Programming completed



'Error state' indication

Action	LED state following the action
1) Check for a valid Echo	⊗● = Valid Echo, transmitter is programmable
2) Press NEXT (←) button steadily	○○ = Unit in programming mode
3) Press DOWN (↓) button steadily or ENTER (E) button steadily or NEXT (←) button steadily	●● = for hold last value ●● = for 3.6mA ●● = for 22mA
4) Release buttons	○○ = Programming completed

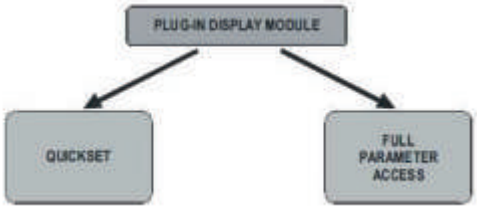
LED indication of errors during programming

Action	LED state following the action	Possible correction
Attempted programming	◐◑ = blinking twice - no Echo	Find a valid echo
Attempted programming	◐◑ = blinking three times = no access possible	With Display module only
Attempted programming	◐◑ = blinking four times = not in Level Measurement mode	With Display module only

Damping (10, 30 or 60 sec) and 'Reset to factory default' can also be completed without the display module. Please ask the factory for details of these settings.

Programming with AX-UL-SAP200 display module

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

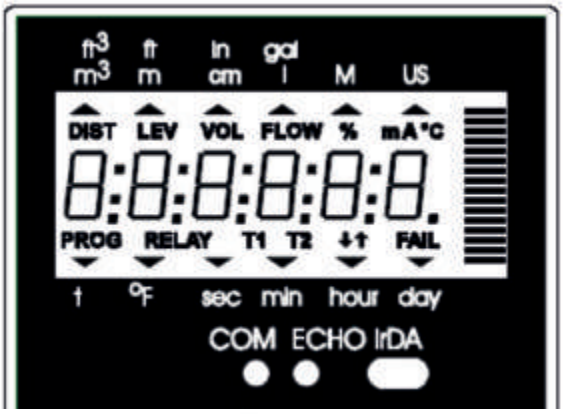


QUICKSET
Recommended as a simple and fast way to set up the EchoTREK by 6 basic parameters for the following basic settings, marked by abbreviations easy to remember:

- Engineering unit for the display (Metric or US)
- Maximum measuring distance (H)
- Assignment of min level to 4mA
- Assignment of max level to 20mA
- Error indication by the current output
- Damping time

Full Parameter Access
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



SAP200 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

LEDs lit

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

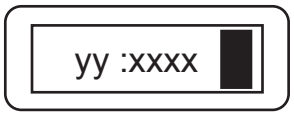
IrDA - Infrared communication port for logger readout, diagnostics and software upgrade.

Steps of the SAP200 Display Module

Programming will be performed by the pressing and releasing the relevant one or two keys (simultaneously).

Single key pressing

ENTER	Ⓔ	To select parameter address and go to parameter value
		To save parameter value and return to parameter address
NEXT	⊖	To move the blinking (sign of change) of the digit to the left
UP	⊕	To increase value of the blinking digit
DOWN	⊖	To decrease value of the blinking digit



yy	Parameter address (P01, P02…P99)
xxxx	Parameter value (dcba)
	baragraph

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

SAP200 indications:
Depending on the measurement, one of the below symbols will light and the process value display. Engineering units will be indicated directly (˚C, ˚F and mA) and by the lit arrow showing towards them on the frame.

- DIST distance
- LEV level
- VOL volume
- FLOW flow
- T1/T2 totalised values
- FAIL (blinking) Error code displayed

For paging readouts NEXT ⊖ key should be pressed.

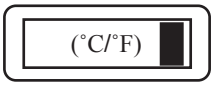
The following process values can be displayed:

- Volume / Flow - if programmed
- Level - if programmed
- Distance - if programmed
- Warning indications - FAIL blinking

Display screens can be scrolled by pressing key NEXT ⊖. To return to the screen of the selected measurement mode key ENTER Ⓔ should be pressed.

Temperature can be displayed

by pressing UP ⊕



Current output value can be displayed

by pressing DOWN ⊖