FLOMAG
Measurement
& Control Equipment

ULTRASONIC LEVEL SENSOR

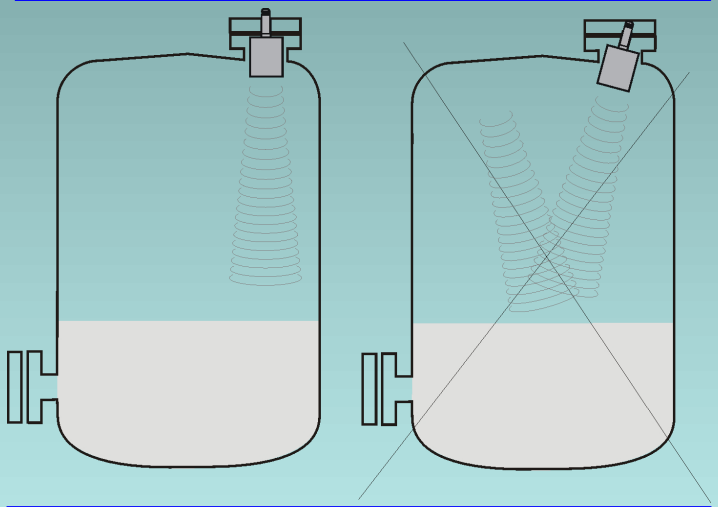
ULS10

I. Application

The ultrasonic sensor is designed for level measurement of liquids in both closed and open tanks and channels. It is used in potable and waste water plants, food, chemical and general industrial measurement applications.

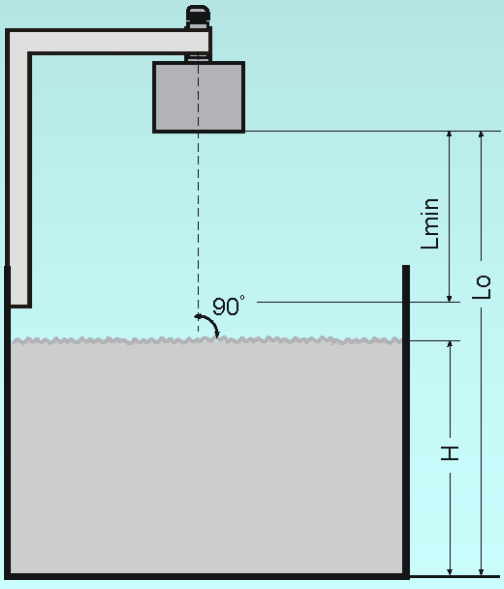
II. Measurement Principle

The ULS10 is a non-contact level measurement sensor generating ultrasonic pulses, which are reflected and received from the liquid surface. The time between emission and return is proportional to the distance between the fluid surface and the sensor. The depth of the fluid is calculated by a microprocessor after the reference level L0 is determined. Automatic temperature compensation is also featured allowing the sensor to automatically adjust to the dynamics of the system.
The information for the measured fluid level is then transferred to a current signal output and RS485 serial interface.



III. Installation

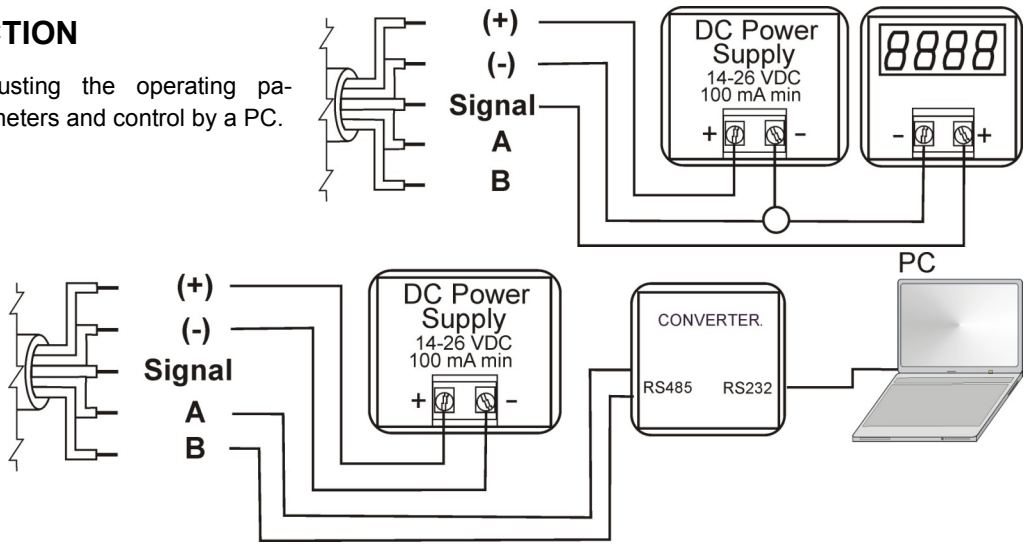
The sensor is installed above the liquid to be measured with the sensor element parallel to the surface of the liquid. The sensor may either be installed in the top of a tank, reservoir or open channel as detailed right.
Barriers or other obstacles must not interrupt the signal path between the sensor and fluid surface. The sensor should be located away from direct sunlight or other heat



FLOMAG s.r.o.
Šumavská 5
602 00 Brno
Czech Republic
Tel: +420 541212539
Fax: +420 549240356
E-mail: info@flomag.com
www.flomag.com

IV. ELECTRICAL CONNECTION

Cables must be connected to the sensor, indicators or PC in accordance with fig. 1.
If there is necessity for longer cables, a terminal box with correct IP rating may be used.
The power supply sources have to be 14 ÷ 26 VDC and not less than 100 mA. Integral protection against over voltage is 30V.
It is possible to connect to an RS485 / RS232 converter for adjusting the operating parameters and control by a PC.



V. FUNCTIONAL DESCRIPTION

For the normal function of the sensor it is necessary to set the following parameters:

L_0	distance between the sensor and the point corresponding to the base (zero) level (0000÷9999 mm)
Lmin	minimum distance between the sensor and the surface of the liquid (300÷9999 mm)
Lmax	maximum operational distance
dL	maximum allowed change of the level between two measurements (max 50mm)
Gain	maximum allowed amplification of the echo max 90dB
Hmin	level corresponding to 0/4mA
Hmax	level corresponding to 20/24mA
Integration time	time constant of the current output
No echo	period after which the current output is reset to 0 if there is no receipt of echo

During measurement the following processes are realized: ultrasonic pulse generation, evaluation of the received echo, regulation of the amplification, measurement of the air temperature, ultrasonic signal speed calculation, the distance is calculated, the level is fixed and the value of the current output is calculated.
Measurements are checked against the limit conditions Lmax, dL, and Gain.
The current output has three possible ranges 0÷20 mA, 4÷20 mA, and 0÷24 mA with the possibility for independent choice of the levels corresponding to the top and bottom limits of the range.
The measured information is available each second (asynchronous) on the RS 485 serial interface (distance, amplification, temperature, value of the current output, etc).
With the help of the serial interface, the operational and limit parameters are set and checked.
Customers can put in the memory of the sensor their own text information up to 64 symbols.

VI. TECHNICAL DATA

range**	0,3 ÷ 10 m
resolution	1 mm
accuracy*	± 0,1 % from the measured distance ± 2 mm
operational frequency	70kHz
angle	5°
material	PE, PVC
temperature coefficient	± 0,03 %/ °C
temperature	-20 ÷ 60 °C
relative humidity	(5 ÷ 95)%
protection	IP68
current output	0 ÷ 20 mA ,or 4 ÷ 20 mA , or 0 ÷ 24 mA
digital output	RS485
power supply	14 ÷ 26VDC
power consumption	max 100mA

Note:
* *background – air with constant temperature*
** *background – air 25^{0}C , liquid - water*

VII. DIMENSIONS