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MultiSense - a new concept

The **MultiSense** is an exciting new concept in level control. The sensor is built from an array of small sensors into one functional system. This enables multiple measurements to be made at many levels through a fluid to monitor what is happening in a process. This unique product solves measurement problems which could not previously be tackled.

Applications of the **MultiSense system** include: -

- Liquid and Foam Level Control in one sensor
- Foam level measurements accurate over a wide range
- Liquid level measurements ignoring foam
- Foam measurements with widely varying liquid level
- Fed batch control
- Fermentation, microbial and animal cell
- Pure water to concentrated solutions
- Waste water
- Multiphase systems
- Liquid height and volume measurements

Materials of Construction

MultiSense sensors are manufactured using highest quality 316 stainless steel and Peek 450G, for all wettable parts, which are both FDA approved materials. Material certificates to EN 10204 3.1B can be supplied if required. Alternatively 316 S13 stainless steel (EN 1.4435) can be used if required for pharmaceutical applications. Various seals can be used depending on the application.



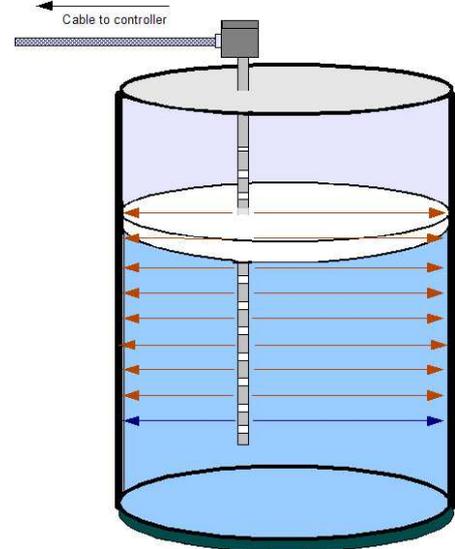
Understanding MultiSense

Principle of operation

The individual sensors operate alone but also in a concerted way to build up a “picture” of the process. By working together each sensor can measure a horizontal disk of material around itself out to the vessel wall. This is not affected by other items in the vessel such as stirrer shafts.

Each sensor measures the impedance of the fluid under test by passing a small current through the material. Interfaces between layers in the fluid are sensed by the rate of change of impedance. Foam is recognized by contrast with the liquid below. In this way the thickness and position of a layer of foam can be determined. The whole measuring range of the system can be used for each sensor individually resulting in a very wide dynamic range. The data from all the sections is combined to give smooth continuous readings.

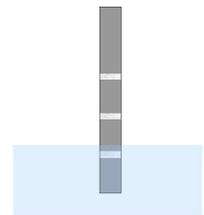
The small sensors are called “sections” and can be specified in size for particular applications. The number of measuring sections varies from 5 to 24 depending on the length required and the resolution. Special sections at the top and bottom called terminators ensure that the top and bottom of the active range are flat and not curved. In addition a passive body and process fitting position the active part of the sensor in the desired range.



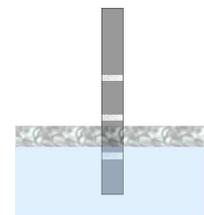
Interface detection

It is important to understand how the interfaces are detected in order to correctly specify the sensor. Two phases cannot be discriminated on the same section. Once the top phase (e.g. foam) crosses a junction it can be detected.

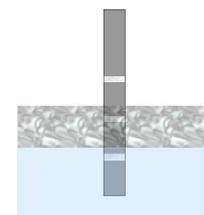
1. Liquid surface is on the middle of the sections shown. In this case the controller will identify the surface as being on that section.



2. Foam develops on the surface but does not exceed past the top of the middle sections shown. The controller cannot discriminate between foam and liquid on the same section. In this case the system will not indicate foam is present.



3. Once foam extends to the next section it can be identified clearly. The system will now indicate foam is present. If the foam increases it will be measured very precisely.



Sensor design

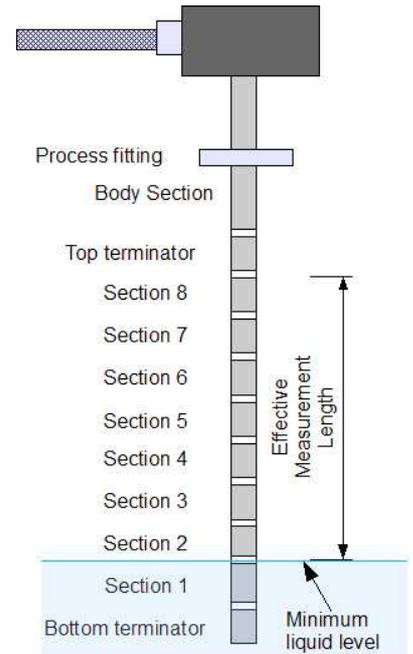
This diagram shows the layout of a typical 8 segment sensor. The standard head is rated to IP65 and includes a connector for the sensor cable. There is alternative version for autoclaving and a stainless version with a fixed cable for more hostile environments.

The sensor diameter can be 12mm for standard duty or 20mm for heavy duty and lengths longer than 1.5m.

The number and length of each section can be chosen to give the active range and the required resolution. If small layers of foam are to be measured on liquid then the sections around the liquid surface are made short.

The body length is set to get the active parts of the sensor into the required region. The body can be as long or short as required.

Section 1 is a special section and is used as a reference for the sensor and so is normally very short.



Controller options

The sensor is connected to a MultiSense controller via a special cable. The controller must have a measuring channel for each measuring section in the sensor and can be supplied with 8, 16 or 24 channels. The controller displays the process variables on the front panel display and also transmits them via two 4-20ma outputs. There are also volt-free outputs to connect to pumps or valves for level control. Set points for liquid and foam level can be used in combination with the outputs to control the levels. Also alarms can be set for additional security with a combined alarm output.



There are several options for the functionality of the controller:

1. Liquid only version

This is designed to measure liquid and to completely ignore foam. This is often used in situations where only one liquid phase will occur. However it can also be used where foam does occur and upsets other measuring instruments. In this case the liquid can be measured without any interference from foam if it occurs.

2. Liquid and Foam

This is the most popular option and is used to measure both liquid and foam. The foam can be measured anywhere in the active range. But as foam is measured in relation to the liquid, section 1 must be in the liquid for measurements to take place. This enables the sensitivity to be automatically set by the system to give a wide range of measurements. For example any aqueous solutions from pure water to concentrated salt solutions can be measured together with foam without any sensitivity adjustments.

3. Foam only

This version should be installed above the liquid surface and can measure foam over a wide range. The liquid should not reach the sensor but if it does it will interpret the liquid as foam. An option is available to generate an alarm if liquid reaches the sensor but requires a sensitivity to be set

Enclosure options

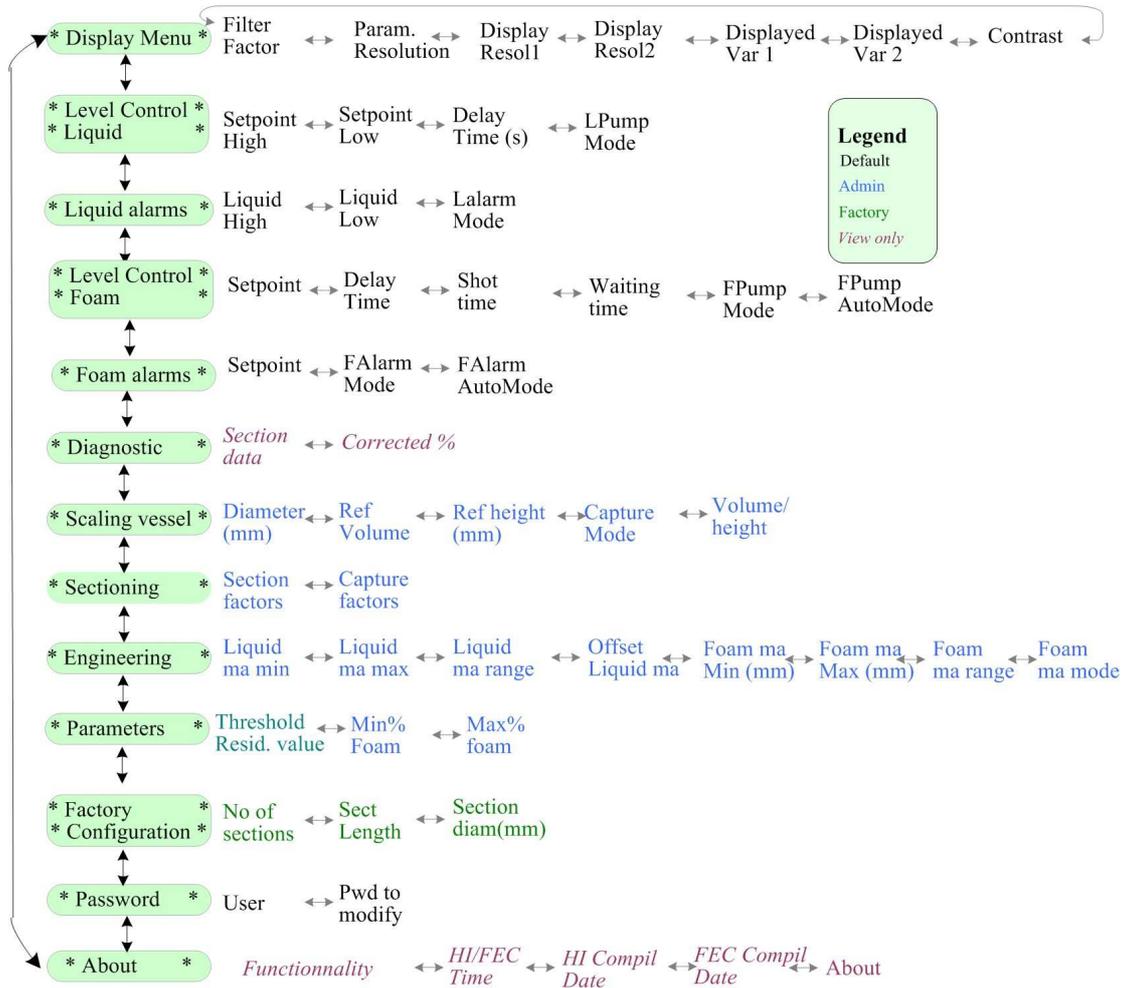


1. Standard version - wall mounting with integral control interface.



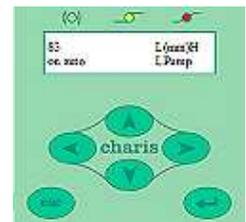
2. Panel mounted interface - with controller mounted remotely.

Controller Menu



The chart above shows the menu system of the foam and liquid **MultiSense** controller. Changing parameters is very simple using the keypad and the display. The display can show two parameters which are chosen by the user. This includes

Liquid volume, Liquid height, Foam depth, Foam height, Set points, Pump functions, Alarms.



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