

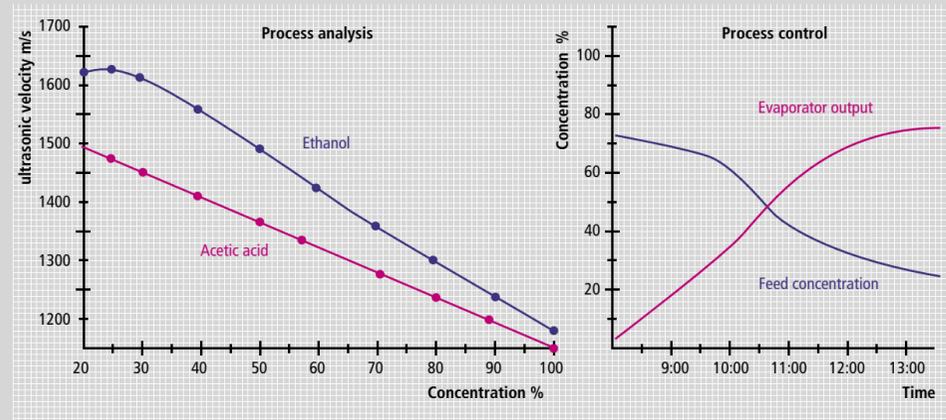
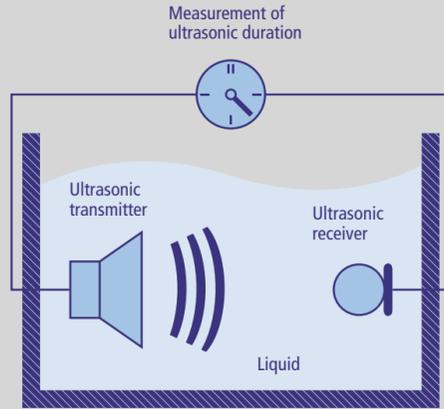
The LiquiSonic®-measuring principle

The ultrasonic velocity of a liquid depends on the concentration of several components. In order to determine the sonic velocity a transmitted pulse is sent through the liquid and the time is measured till this pulse is recognized by the receiver. This time measurement precisely gives the sonic velocity because the distance between ultrasonic transmitter and receiver is constant.

The relation between sonic velocity, temperature and concentration is specific for different fluids and is fully mathematically described inside the controllers software.

The characteristic curves for a wide range of applications are stored in the **LiquiSonic®** controller and are used for the calculation of the correct concentration.

With additional analytical sensors the concentration measurement in multi-component systems like in neutralization or gas scrubber application is possible.



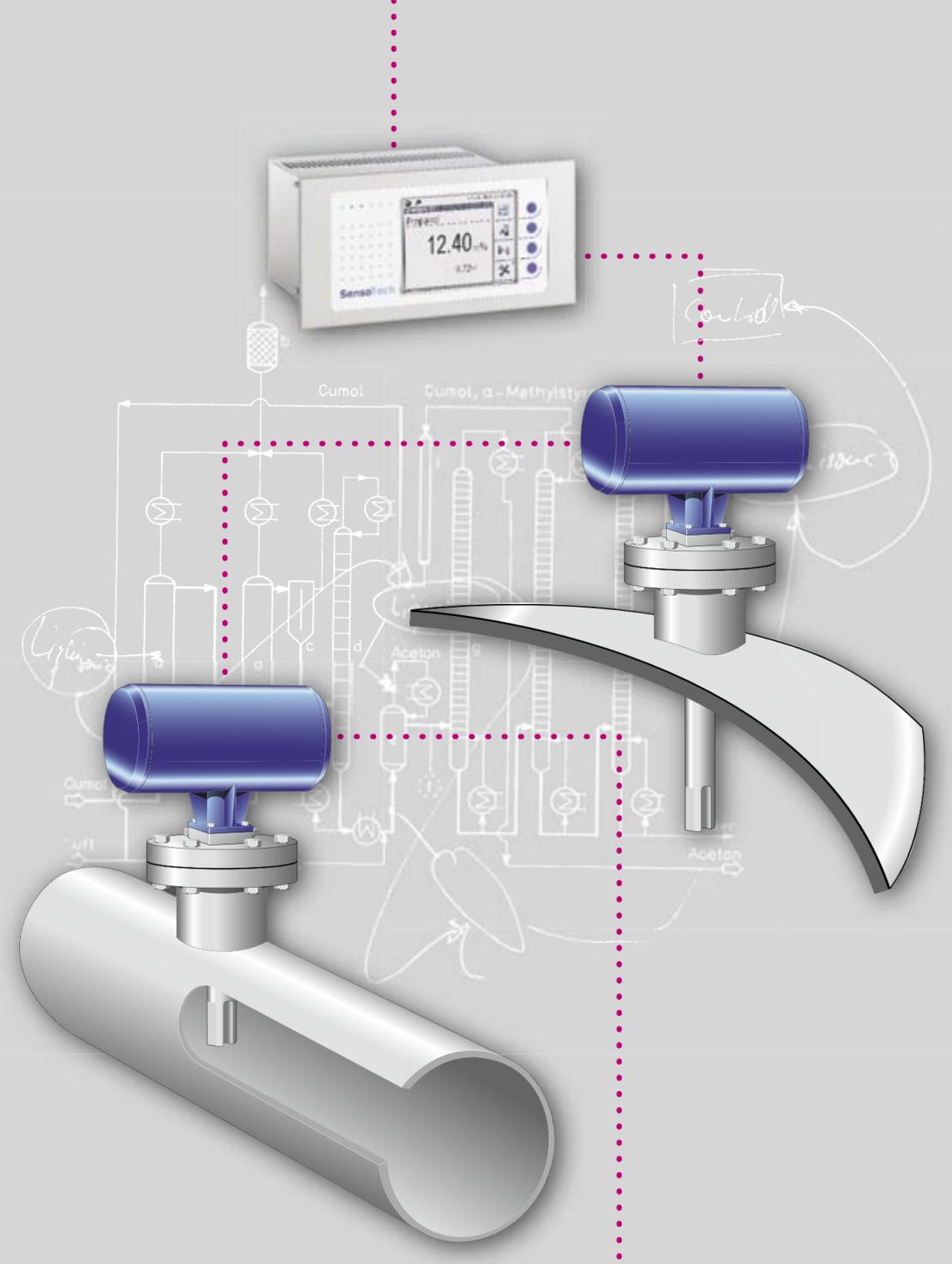
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LiquiSonic® Inline Process Control concentration • ultrasonic velocity • density



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LiquiSonic®

Flexible

The **LiquiSonic®** precisely measures the concentration of most likely all liquids inline. By using the unique sonic velocity measuring principle it is possible to determine original gravity in beer, as well as the quality of rolling oil bathes in the steel industry, sugar content in beverages, the concentration of solutions, acids or lye's in the chemical industry, the detection of phase interfaces in tubes or vessels or the control of polymerization and crystallization processes. In all of these cases **LiquiSonic®** is measuring continuously and direct in the running process.

Expensive and dangerous sample drawing or time lost by lab analysis will be avoided. Process data are available immediately for direct evaluation or for process control. This allows our worldwide customer base to increase the plant safety, to improve product quality and to achieve extensive cost savings.

The sonic velocity principle works independent from turbidity, color or conductivity and not affected by variations in flow velocity. An integrated high precision temperature measurement together with the rugged sensor design ensures together with our outstanding application know-how correct 24/7 results.

Proven

SensoTech has taken since many years a leading role in the field of inline process control. Extensive R&D work, industry specific solutions as well as our well-engineered products and technologies ensure high grade and reliable premium solutions for our customers.

Our company is the pioneer in using the sonic velocity measurement for the monitoring of such complex and challenging processes like polymerization and crystallization.

The team of competent and motivated SensoTech professionals is deep linked with the application needs of our customers. They know in detail the requirements, specifications as well as the restrictions of each customer process. With our extensive net of representations this knowledge is available everywhere in the world and at any time.

Reliable

The advantages of **LiquiSonic®** can be clearly seen in the minimal efforts for installation, commissioning and service. The system operates maintenance-free. For the mounting into the process an extensive selection of proven process adapters, tie-ins and accessories will be available.

All **LiquiSonic®** systems include extensive integrated self-validation capabilities. For example, three independent sensors guarantee a high reliable measurement of the process temperature.

One **LiquiSonic®** system consists of one or more sensors and one controller. The connection of these components is digital and allows distances of up to 1,000m or 3,000ft. The digital communication ensures a high precision of the results and a fail-safe data transmission from the field. Influences from wiring don't exist and no extensive re-calibration after exchange of sensors will be required.

The embedded access code based operator management and the integrated event memory ensures together with the system firmware according FDA 21 CFR Part 11 recommendations a maximum system safety and traceability.

Controller

The Controller processes the sensor data and is the interface to the operator by displaying the concentration values. **LiquiSonic®** controller is equipped with powerful 32bit micro-processor even handles complex data set calculations.

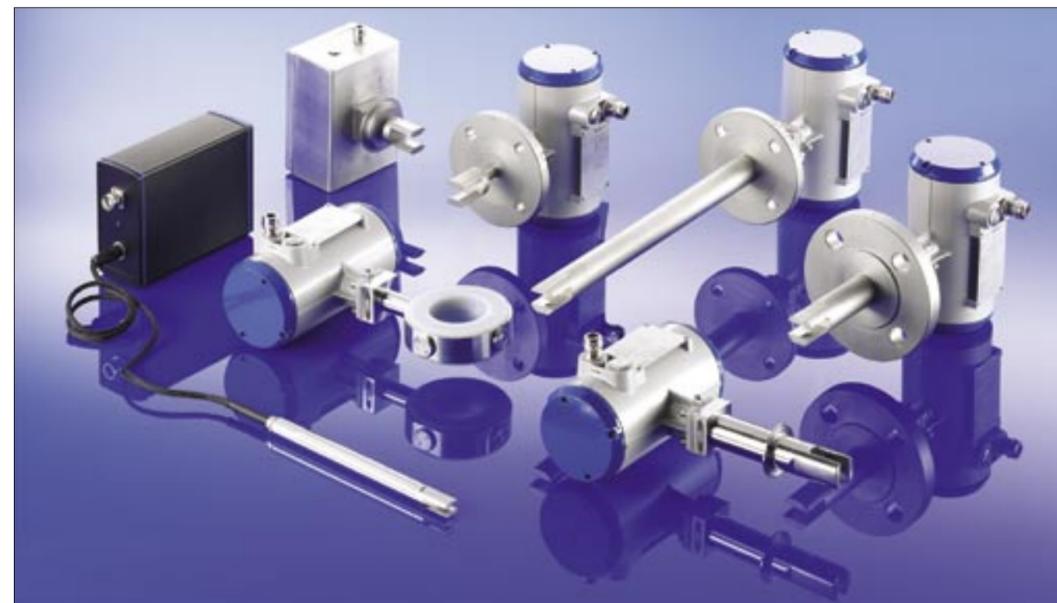
The large display with high resolution color TFT ensures a optimal view under any light condition. Operator can of course define his own identifiers, process tags or physical units. The clear, user-friendly menu structure allows operating the system without extensive reading of the user's manual. Furthermore the real-time trend chart function enables an immediate survey on the process history.

Our unique „**SonicGraph®**“ function brings the high-frequency signal like a scope directly on the controller screen and allows optimal tuning of parameters even under worse process conditions.

The internal data memory has a capacity of up to 15,000 data sets. By readout via an integrated serial or TCP/IP interface it is possible to create own process reports in an easy way. For data download, device re-configuration or remote control via modem interface an easy to handle software package is available.

All process data or related values will be refreshed every second. They can be transmitted via several adjustable analog and digital outputs or various field bus interfaces.

Inline process control



Sensors

The Sensors include the sonic velocity path and the temperature sensors. The tough, completely encapsulated sensor design is made in stainless steel 1.4571 and 5S316Ti respectively and requires no gaskets or process „windows“. This system design guarantees the maintenance free sensor installation. The maximum operating temperature can be up to 200°C and 473°F respectively under operating pressure up to 500bar and 7,250 psi respectively.

For aggressive liquids the sensor design is also available in various alloys like Hastelloy, tantalum, titanium or with plastic coating. Optionally the surface of the wetted parts can be electro-polished.

The mounting of the sensor requires no straight in and outflow distances and can be cleaned in place. The sensors have no mechanical moving parts. The sensors are designed in several standard specifications with immersion lengths up to 3m or 10ft. respectively and meet the various process connector and diameter requirements according DIN, ANSI, JIS, Varivent or Clamp

For application in classified areas approval according to ATEX Eex de IIC T3, T4, T5 or T6 or FM is available. Several integrated add-ons like the SensoTech proprietary „no flow“ monitor or the wet-dry detectors increases customers benefit. A proprietary high-power signal conditioning technology warrants stable results even under high gas bubble concentrations.

LiquiSonic applications

Chemical industry

Concentration and density of: lithium bromide, caustic soda, potassium hydroxide, sulfuric acid, oleum, hydrochloric acid, nitric acid, methyl alcohol, ethyl alcohol, PVA, PMA, DMA, PMAA, nylon, methylaldehyde, glycerin, glycol, electrolyts, iron chloride, ammonium hydroxide, propanol, color, resin, hydrogen peroxide, caprolactam
Polymerisation control of: butadien/styrene (rubber), butadiene solution, styrene, PVC, polyvinylacetate, polyacrylate

Food Processing

Crystallization control of: ammoniumsulphate, citric acid-1-hydrate, adipin acid, caprolactam, cresol, sodium chromate, sodium acetate, potassium sulphate
Phase interface detection in: silicon rubber phases, oil in water, ethyl alcohol acetate, acetic acid ester, butyl alcohol, peroxy acetic acid, wax melt, epoxy resin, jet fuel, gasoline
Multi-component-analysis: caustic soda/caustic chloride, methanol/formalin, sulfuric acid/oleum

Biotechnologie

Fermentation: cell density, recipe and feed control
Ultrafiltration: protein concentration
HPLC: end point detection

Sugar industry

Concentration of: sugar (°Brix) thin and thick juice, molasses, sirup, softdrink

Brewery

Lauter tune: wort concentration
Wort boiler: wort concentration
Filtration: original gravity
Filler and blending: original gravity, rest of extract, alcohol

Pulp and Paper

Concentration of: Cocking liquor, black liquor

Food Processing

Concentration of: coffee extract, starch, glucose, fructose, gelatine, dextrose, sorbit, acetic acid, milk, milk powder, evaporated milk, whey, oil, fruit extract, juice

Steel and rolling mill

Concentration of: cleaning agent, cooling water additive, lubricant, rolling oil, cutting oil, antifreeze solvent

Plant engineering

Process control and monitoring for: Blending and filling units, distillation columns, evaporators, extraction systems, crystalizers, gas scrubbers, fermenters, filtration units.

