SensoTech

Beverages & Liquid Food

Inline analytical technology for:

- breweries
- dairies
- juices
- soft drinks
- mixed drinks
- starch
- coffee
- wine
- edible oils
- vinegar

Increase quality, save resources: LiquiSonic®.
With high-quality, innovative sensor technology.
Robust, precise, user-friendly.

LiquiSonic®

LiquiSonic® is an inline analytical system for determining the concentration in liquids directly in the production process. The analyzer is also used for phase separation and reaction monitoring. Sensor installation within the product stream means an extremely fast measurement that responds immediately to process changes.

User benefits include:

- optimal plant control through online and real-time information about process states
- maximized process efficiency
- increased product quality
- reduced lab costs
- immediate detection of process changes
- energy and material savings
- instant warning of irruptions in the process water or process liquid
- repeatable measuring results

LiquiSonic's® ‚state-of-the-art' digital signal processing technology guarantees highly accurate, fail-safe measuring of absolute sonic velocities and liquid concentrations.

Integrated temperature detection, sophisticated sensor design, and know-how from SensoTech's extensive measurement history in numerous applications promises users a highly reliable, long life system.

Advantages of the measuring method are:

- absolute sonic velocity as a well-defined and retraceable physical quantity
- independent from conductivity, color or optical transparency of the process liquid
- installation directly into pipes, tanks or vessels
- robust, all-metal, gasket-free sensor design with no moving parts
- corrosion-resistant by using special material
- maintenance-free
- use in temperatures up to 200 °C (390 °F)
- accurate, drift-free measurements
- stable measurements even amid gas bubbles
- controller connection capacity reaching up to four sensors
- data transmission via fieldbus (Profibus DP, Modbus), analog outputs, serial interface or Ethernet

Inline process analysis

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Processes

Technical production procedures in the food and beverage industry are characterized by various manufacturing processes. Applied in individual process stages, the LiquiSonic® measuring technology enables the user to continuously monitor product quality, increase the yield and decrease raw material and energy consumption in the long term. Typical processes and applications in which the LiquiSonic® analyzers are applied are listed in the table below.

Process	Application
evaporation	wort whey starch cream cheese
separation, decantation and phase detection	filter filler milk standardization
extraction	lauter tun extract manufacturing cooking oil (hexane) coffee, tea, wine herbs
blending, mixing	brewery and mixed drinks soft drinks juices vinegar acetic acid
cooling crystallization	edible oil lactose vitamins sugar / sweeteners

Applications

Brewery

Lauter tun / mash filter

In the outlet of the lauter tun or the mash filter, LiquiSonic® is applied in order to:
- monitor the lautering process,
- exactly determine the sparge water point,
- determine the medium extract content (initial extract in the boiling kettle).

Your advantage:
- optimal initial extract in the boiling kettle
- reduction of the water consumption
- optimal utilization of the lauter tun
- reproducible wort production

Wort boiler

In the wort boiler, LiquiSonic® is applied in order to:
- monitor the evaporation,
- guarantee an exact determination of the cast wort concentration.

As an inline system that measures continuously and without a bypass installation that is necessary for other measuring devices, LiquiSonic® is easy to install and entirely maintenance-free.

For the internal boiler, there is a sensor available that can be directly installed in the wort pan. As a consequence of the specific sensor design, sedimentation can be kept on a very low level. Furthermore, there is an additional option to provide the sensor in the internal boiler with a cleaning unit. For the use in the external boiler, the sensor is installed directly in the circulation line between the wort circulation pump and the heat exchanger.

Your advantage:
- no maintenance-intensive and expensive bypass solutions as needed for density meters
- savings of rinse and cleaning cycles
- savings in energy consumption through targeted process interruption
- guarantee of a constant duration and rate of the boiling process

Wort cooler

At the wort cooler, LiquiSonic® is applied in order to:
- detect the wort, pre- and post- running beer,
- examine the content of original gravity before the pitching of the yeast.

Your advantage:
- hygienic and bypass-free installation of LiquiSonic® at the outlet of the cooler
- additional monitoring of the cooling temperature due to the integrated Pt1000 temperature sensors

Filter

At the filter, LiquiSonic® is applied with two sensors (in the unfiltrate, as well as after the filtration or carbonation) in order to:
- detect the filter pre- and post-running beer from the unfiltered beer,
- exactly meter the pre- and post running beer in the unfiltrate.

Your advantage:
- savings of valuable hectoliter beer due to an exact determination of the required minimum of original gravity
- constant beer quality

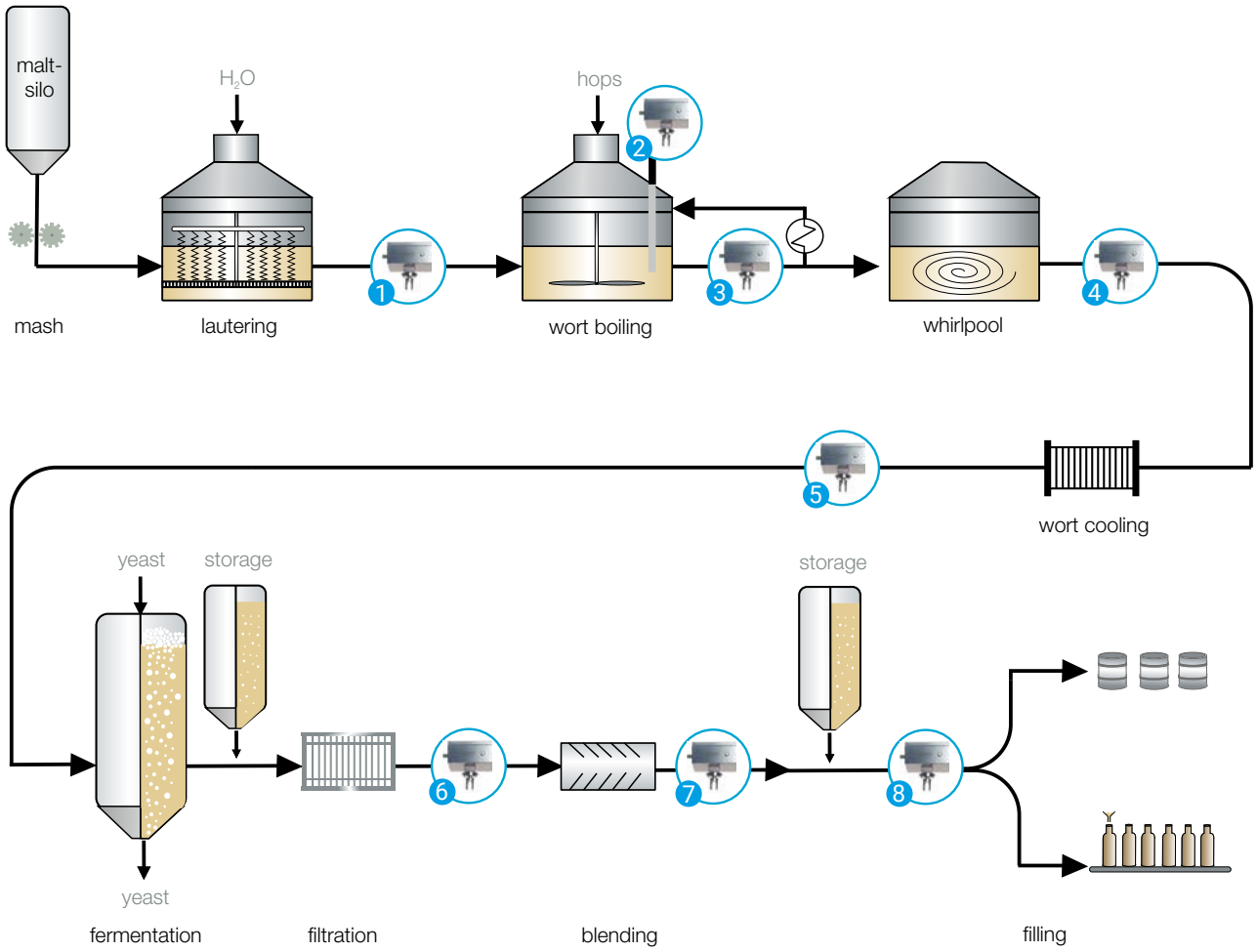
Blending and filler

In the blending and at the filler, the installation of LiquiSonic® allows the user to:
- constantly monitor the content of the original gravity during the filling,
- document and protocol the original gravity of the beer (ISO9000 und HACCP),
- separate the different beer types and CIP agents,
- continuously monitor the blending process,
- regulate the original gravity for High-Gravity-Brewing.

Through the integrated and automatic beer flow detection, a highly accurate measurement of the original gravity is guaranteed even at a low flow rate or during breaks in the filling process. The possibility to handle four sensors with only one controller leads to comparatively lower investment costs also for larger filling lines.

Your advantage:

- display of the original gravity and beer temperature
- storage of the measured concentration values during the filling
- warning in case of incorrect filling (mismatch of bottles etc.)
- accurate control of the filler
- separation of pre- and post running processes
- additional integrated functions such as flow detection and “empty pipe line“ detection



Measuring point	Installation	Measuring task
1	pipeline	monitoring of the lautering wort concentration and the initial extract in the wort boiler, detection of the sparge water point
2 3	wort boiler	control of evaporation, monitoring of the wort
4	pipeline	monitoring of the wort concentration
5	pipeline	monitoring of the cold wort concentration and temperature
6	pipeline	separation of forerunnings and last runnings from the beer, exact dosing of forerunnings and last runnings in the unfiltered beer
7	pipeline	monitoring the blending process (such as High-Gravity-Brewing)
8	pipeline	beer monitoring during bottling, differentiation of different beer types

Beer production process

Dairies

Milk standardization

For milk standardization, LiquiSonic® is applied in order to:
- monitor the concentration during the mixing of cream and skimmed milk,
- immediately display exceeding or undercut of limitations.

Your advantage:
- quality assurance of the standardized milk
- optimal control of the whole and skimmed milk inflow

In the **separator,** LiquiSonic® is applied in order to:
- monitor the dry matter content in cream and skimmed milk,
- accurately detect both production streams.

Your advantage:
- optimal control of separation processes
- signaling of fluctuations in the raw material, process irruptions or incorrect separation

An alternative to the separator is the **membrane filtration**. Thereby, the sensors are installed in the retentate flow to continuously measure the concentration. An additional sensor in the permeate is able to detect irruptions and to ensure a high efficiency of the filtration process.

Cream cheese production

At the outlet of the production process or the inlet of the product filling, LiquiSonic® is applied in order to:
- monitor the dry matter content during the separation,
- accurately adjust the fat content in the dry matter content by adding the appropriate amount of cream.

Your advantage:
- precise regulation of the degree of separation or the addition of cream
- assurance of product quality
- prevention of fluctuating compositions and false fillings

Concentration of whey

At the inlet and the outlet of the evaporator, LiquiSonic® is applied in order to:
- control the initial whey concentration,
- continuously detect the dry matter content.

Your advantage:
- energy-efficient line control through targeted process interruptions
- increase of the yield of the whey

Another possibility to concentrate whey is by the means of membrane filtration. For those types of applications, the LiquiSonic® sensors are preferably installed in the retentate.

Lactose crystallization

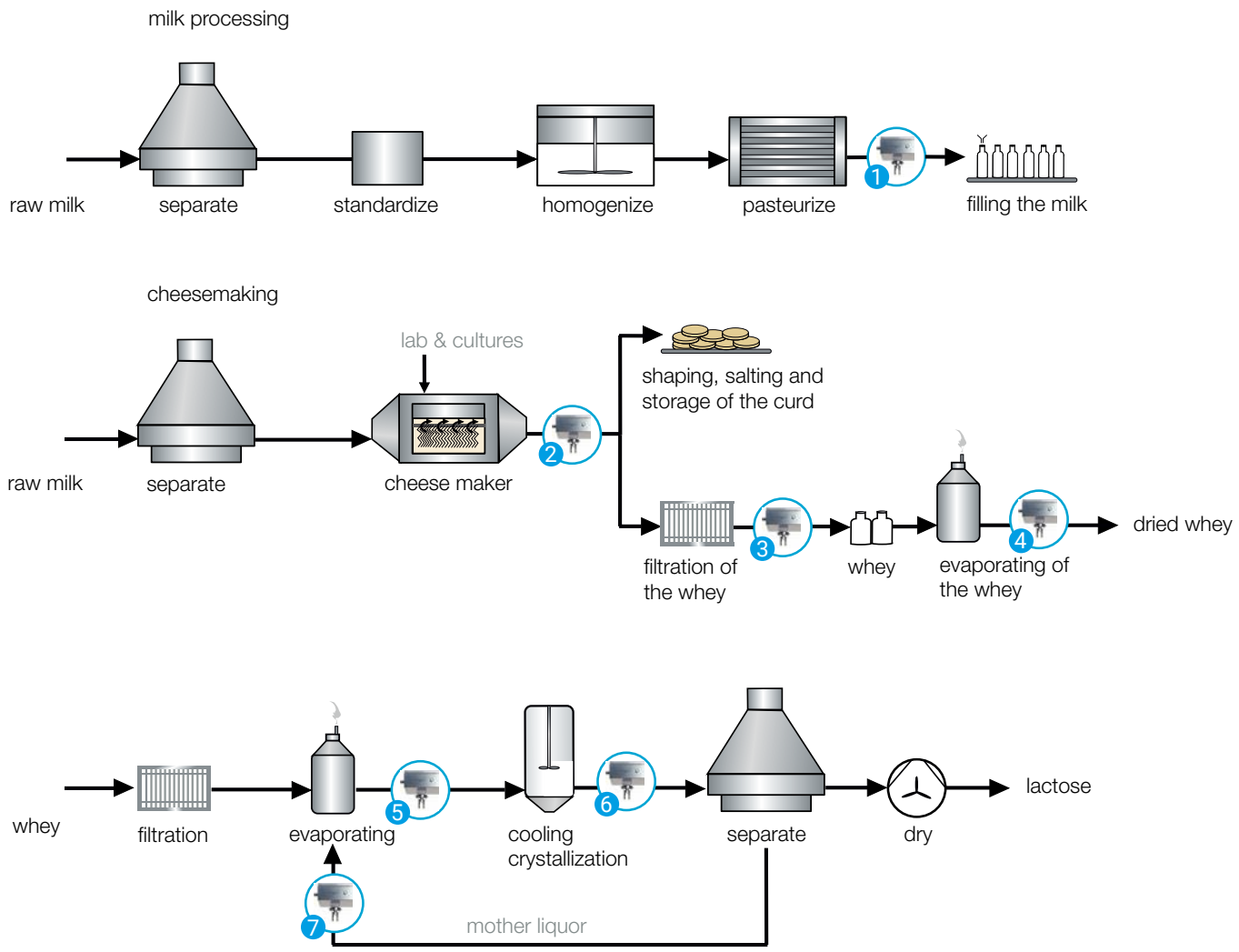
Directly In the crystallization tank or at the outlet, LiquiSonic® is applied in order to:
- determine the temperature difference until the nucleation takes place,
- detect the crystal content in the lactose suspension.

Your advantage:
- optimal control of the cooling
- storage of the saturation and nucleation characteristics in the controller for a higher process efficiency

Cleaning

During cleaning and rinsing, LiquiSonic® is applied in order to:
- automatically and accurately distinguish CIP-liquids, such as NaOH or peracetic acid, from the product like whey or milk,
- measure the product concentration.

Your advantage:
- prevention of fault fillings in accordance to HACCP concepts



Measuring point	Installation	Measuring task
1	pipeline	monitoring of the milk concentration during the filling
2	pipeline	phase detection, monitoring of the separation of the curd from the whey
3	pipeline	monitoring the whey concentration
4 5	pipeline	monitoring of the dry solids content of the whey
6	pipeline	monitoring of the dry solids content of the lactose
7	pipeline	determination of the mother liquor concentration

Dairy production processes

Juices and soft drinks

Evaporator

At the inlet and the outlet of the evaporator, LiquiSonic® is applied in order to:
- control the initial concentration,
- continuously monitor the concentrate up to 90 °Bx.

Your advantage:
- energy-efficient line control through targeted process interruptions
- increase of the yield

Blending

In the blending process, LiquiSonic® is applied in the concentrate and after the mixer in order to:
- measure the initial concentration (premix),
- measure additives blending like acetic acid or vitamines
- accurately adjust the target concentration (postmix) during the dilution of the concentrate with water.

Your advantage:
- quality control of the concentrate
- signaling of drifts in the formulation
- targeted control of the respective product stream through the process control system

Phase detection

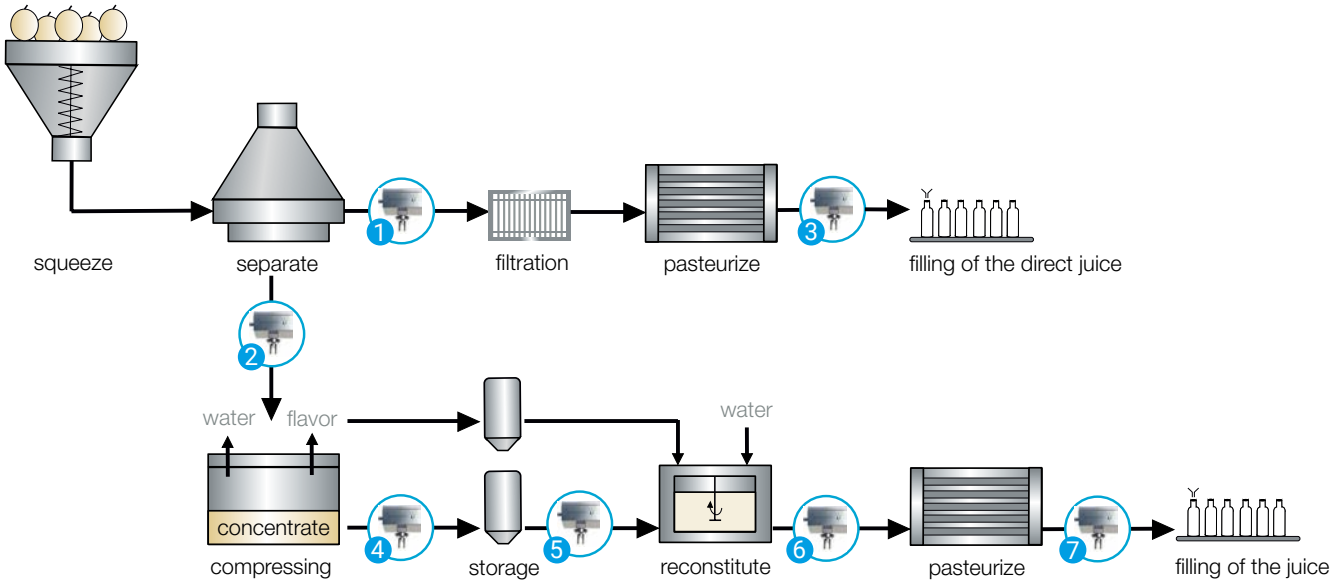
Before bottling or before the sterile tank LiquiSonic® is applied in order to:
- detect quality changes of fruit juice,
- detect the fruit juice and water phase.

Your advantage:
- improvement of fruit juice quality
- increase in fruit juice yield
- extremely fast and accurate phase detection with a response time of less than 1 s

Filler

At the filler, LiquiSonic® is applied in order to:
- constantly monitor the Brix content of the commodities during the filling
- accurately identify various types of products, pre- and post running processes as well as CIP-liquids,
- fully document the Brix content (ISO9000 und HACCP).

Your advantage:
- display of the Brix concentration and product temperature
- storage of the measured concentrations during the filling
- warning in the event of faulty fillings
- precise control of the filler concentration
- separation of pre- and post running processes
- maximum process safety in the context of a HACCP concept
- additional integrated functions, such as flow detection and “empty pipe line“ detection



Measuring point	Installation	Measuring task
1 2	pipeline	monitoring the concentration of the juice
3	pipeline	monitoring the direct juice concentration during the filling
4 5	pipeline	monitoring the concentration of the juice concentrate
6	pipeline	determination of the fruit juice concentration
7	pipeline	control the fruit juice concentration during the filling

Fruit juice production process

Wine production

In the wine production, the LiquiSonic® analyzers are applied in order to:

- constantly determine the Oechsle degree in the grape juice,
- measure the alcohol and sugar or the extract content during the fermentation,
- control the blending process,
- differentiate the wine in the pre- and post running water,
- constantly monitor the wine quality during the filling.

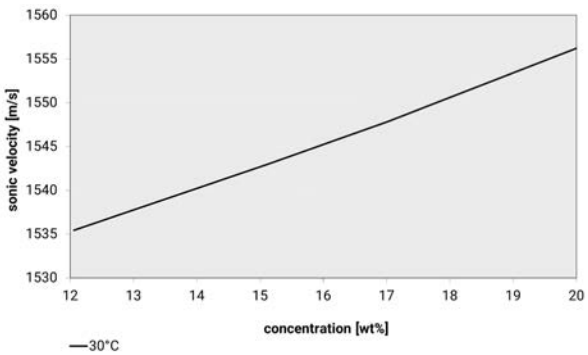
Your advantage:

- ensuring the quality of the juice already with the delivery
- energy saving through selective process breakdown in the concentration of the must
- maximum time savings and increase of the plant utilization
- consistent quality through precise control of the product streams during the blending
- cost savings by minimizing the quantity of excluded wine amount in various stages of the process
- increase of the yield
- documentation and reporting of wine concentrations (ISO9000 and HACCP)

Production of carbohydrates

In production and purification processes, LiquiSonic® is applied in order to:

- determine the dry matter content in the production of wheat protein (gluten) and wheat starch,
- control the suspension in the use of additives such as thickening agents,
- continuously control the Brix content in the production and processing of monosaccharides or disaccharides.



Wheat starch in water

Your advantage:

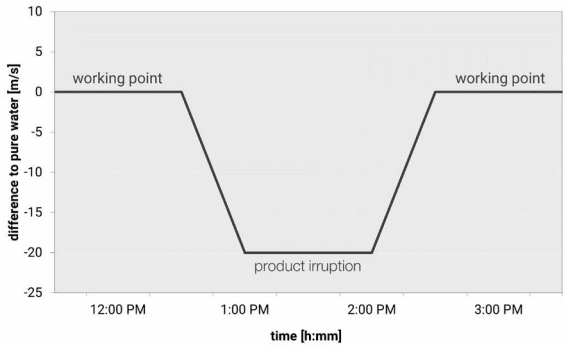
- optimal control of the degree of separation
- maximum plant utilization

The special high-performance technology of the LiquiSonic® sensors ensures stable measuring results even at high signal attenuation by the process fluid. Therefore, the sensors can be used successfully not only in solutions but also in suspensions for evaporation or cooling crystallizations.

Waste water monitoring

Waste water occurs in many different production steps, in which the LiquiSonic® analyzers are applied in order to:

- signalize significant impurities,
- detect product residues in the waste water,
- immediately display breakdowns.

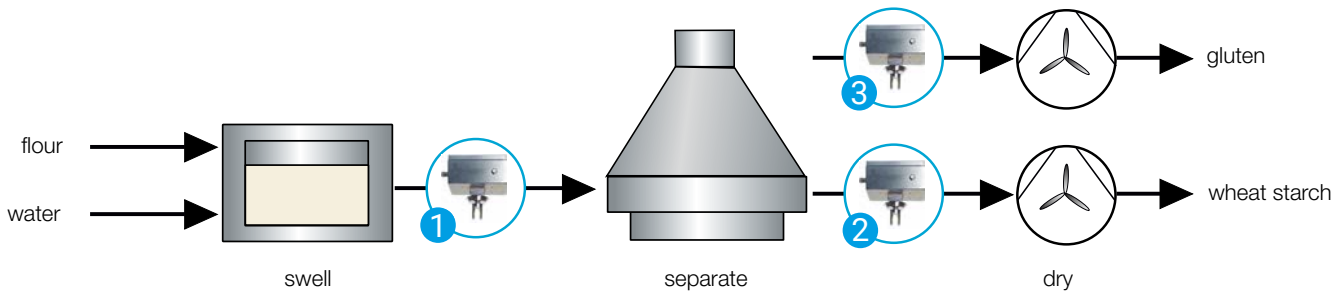


Product residue in waste water

Your advantage:

- compliance with existing guidelines for the maximum load of dissolved substances
- signalization of limit transgressions through leakages or misdirection
- immediate set up of measures in case of breakdowns
- track and analyze process trends to identify areas of improvement

The measuring signal determines the difference to pure water. Thereby, a product-specific configuration of the LiquiSonic® analyzer is not necessary.



Measuring point	Installation	Measuring task
1	pipeline	determination of the dry matter content
2 3	pipeline	determination of the dry matter content for the monitoring of the separation degree

Wheat starch and gluten production process

Liquid and instant coffee production

During the extraction and the purification, LiquiSonic® is applied in order to:

- determine the precise concentration of the extract,
- monitor the dry matter content of the initial, secondary and tertiary extract,
- precisely adjust the target concentration during the merging of the pre-extracts,
- differentiate the solid content (roasted coffee) at the same total solids levels.

Your advantage:

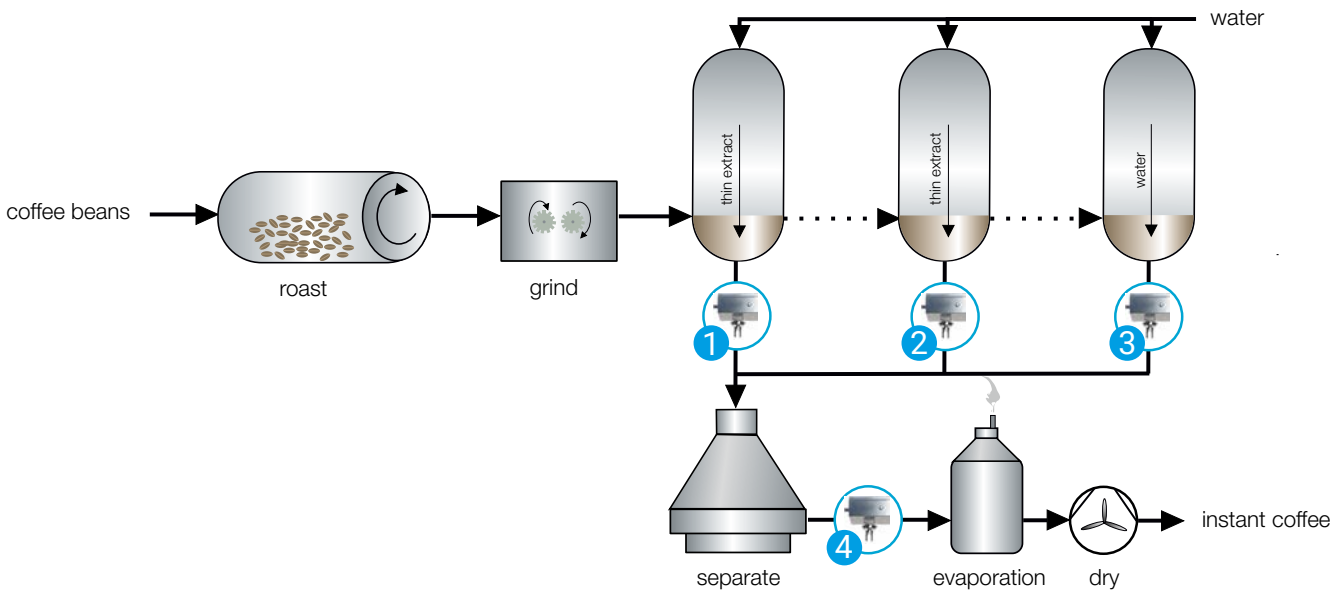
- defined control of the extract line
- energy-optimized purification in the separator
- quality assurance for the production of a sensory high-quality coffee extract

Further liquid food applications

In the food industry, LiquiSonic® is used in a variety of applications to measure the concentration and density, and thus to control quality. The online measurement enables processes and plants to be optimally controlled, and saves resources and time. Especially in filling, faulty batches can thereby be avoided.

Among others, the LiquiSonic® analyzers are applied in the following food applications:

- crystallizations of sweeteners, e.g. acesulfame
- citric acid production
- water in fruit purees
- recipe monitoring for baby food
- extraction with CO_2
- protein production, e.g. soy protein
- tea extraction
- thickening agents, e.g. carrageen
- vitamin production, e.g. vitamin C und B_2
- herbs extraction, e.g. fennel
- water content in pudding
- crystallization of edible oils
- solid fat content (SFC) of palm oil
- vinegar quality
- smoke flavour



Measuring point	Installation	Measuring task
1 2 3	pipeline	measuring the coffee-extract (primary, secondary, teriary)
4	pipeline	measuring the coffee-extract after cleaning

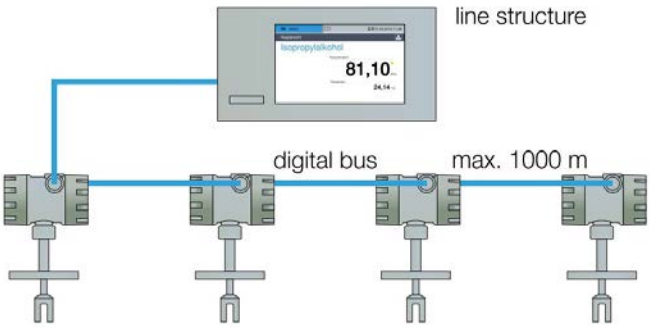
Coffee production process

LiquiSonic® System

Plug & Play Solution

LiquiSonic® is an inline analytical system based on most advanced technologies. By the precise and temperature-compensated measurement of the absolute sonic velocity the concentration of different liquids, e.g. original gravity, extract or alcohol, can be detected.

Depending on the specific application, LiquiSonic® consists of one or more intelligent sensors and one controller linked by a bus cable with each other. Investment costs are comparatively low, in particular, for a maximum of four sensors combined with only one controller suited for almost any distance between the individual measuring points.



Controller with connection of maximum four sensors

Advanced production and calibration processes do not only enable highly accurate measurement results but also the extremely comfortable operability of the system.

Using the latest digital signal processing technology ensures a highly accurate and fail-safe measurement of the absolute sonic velocity and concentration. In addition, integrated temperature sensors, a sophisticated sensor design and the know-how resulting from numerous series of measurements and many applications guarantee a high reliability of the system with a long lifetime and minimum maintenance efforts.

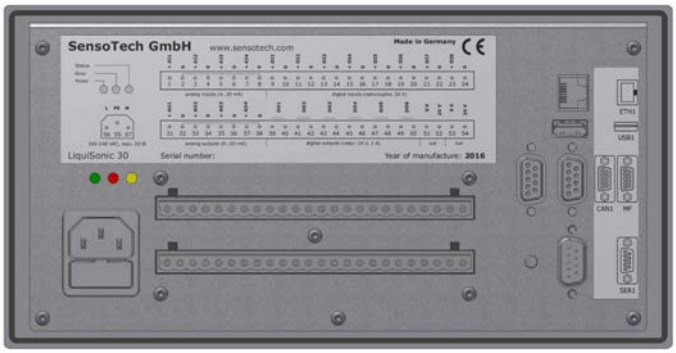
Controller

The controller links the ultrasonic sensors and manages the measuring data. It provides the supply voltage and controls communication. The TFT screen serves to display the measuring values and status information as well as to parameterize the analyzer. The displayed value can be adjusted to internal reference values through a calibration function.

All process data or related values will be updated every second. If the measuring values are outside the threshold, it will be shown immediately in the display. System information and alarm messages are also clearly shown on the display.

The measuring data can be transmitted via several adjustable analog or relay outputs as well as via different fieldbus interfaces to process control systems or computers.

Simple and intuitive controller operation

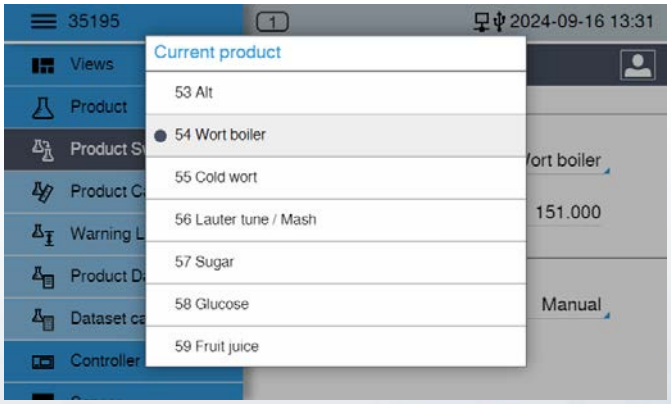


Backside of the controller with electrical connections

Controller 20 and 30

The LiquiSonic® 30 controller is the standard device with all functions. Up to four sensors can be connected with one controller, while the maximum distance between controller and sensor is 1,000 m. Each sensor works autonomous and can be used in different applications.

Several functions, like presentation of trend charts or the data memory make the controller 30 a high-performance and efficient inline analyzer. Furthermore, LiquiSonic® 30 efficiently manages 32 products (optional up to 99), and supports user management with authorization levels. Remote operation via browser (PC, tablet) ensures easy access and control across different devices. This is especially valuable in the food industry, where handling multiple products and formulations is essential.



Example product overview for the food industry

The internal data memory has a capacity of up to 30,000 records. By reading out via the integrated TCP/IP or USB interface, it is possible to create easily own process reports. An additional function integrated in the controller is the event log. This feature documents events like manual product calibration, changes on date, time or system states.

The LiquiSonic® 20 controller is a cost-effective solution with essential functions, ideal for precise measurement and monitoring at a single measuring point.

Controller 40

The LiquiSonic® 40 controller allows the calculation and display of two independent concentrations in a three-component mixture. In addition to the LiquiSonic® ultrasonic sensor, another measuring parameter (e.g. density) is being analyzed. This relationship is stored in the form of a data record in the controller 40, so that for example the alcohol and the sugar content can be determined.

The controller 40 includes full functionality, such as the clear trend chart display, the extensive data storage and the remote access options.

Sensors

The sensor contains the measurement of sonic velocity and temperature. The wetted parts are usually made of stainless steel DIN 1.4571. The rugged and completely enclosed design does not need any gaskets or “windows” for process and is thus completely maintenance free.

Different additional functions integrated in sensor like flow stop monitoring and full/empty liquid monitoring in pipes increase the customer’s benefit significantly. A special high power technology ensures stable measurement results, even at high portions of gas bubbles and strong signal attenuation by process liquid.

Immersion sensor Varivent with stainless steel housing

The sensor electronics is mounted in a closed stainless steel housing with IP68 degree of protection and enables the cleaning of process systems, for example, by high-pressure cleaner or steam.

The sensors are available with various types of process connections:

- Varivent flange
- DIN flange
- APV flange
- Dairy flange
- Clamp flange

The sensor with separated electronic housing enables the space-saving integration in cramped installation situations as well as the protection of electronics at strong vibrations within the pipeline or high temperatures around the pipe system.

Immersion sensor Varivent with separated electronics

Immersion sensor Clamp 3“

Due to the high hygienic requirements in the food industry, the LiquiSonic® sensors have an aseptic design.

Accessories

There are individual options available to adequately install the LiquiSonic® systems and to simplify the integration into the respective process control.

Controller stainless steel housing

Controller stainless steel housing

The controller is designed for the installation in control panels. In order to install the controller in the field, a stainless steel housing is available.

- material: stainless steel DIN 1.4301 (AISI 304)
- protection degree: IP66 (NEMA 4X)
- dimensions: 430 x 300 x 230 mm
- window: VSG with 6 mm thickness
- application: in areas with highly hygienic requirements like pharmaceutical and food industry, e.g. breweries

Quality and Support

Enthusiasm for technical progress is the driving force behind our company as we seek to shape the market of tomorrow. As our customer you are at the center of all our efforts and we are committed to serving you with maximum efficiency.

We work closely with you to develop innovative solutions for your measurement challenges and individual system requirements. The growing complexity of application-specific requirements means it is essential to have an understanding of the relationships and interactions involved.

Creative research is another pillar of our company. The specialists in our research and development team provide valuable new ways to optimize product attributes, such as testing new types of sensor designs and materials or the sophisticated functionality of electronics, hardware and software components.

Our SensoTech quality management also only accepts the best production performance. We have been certified according to ISO 9001 since 1995. All device components pass various tests in different stages of production. The systems have all gone through an internal burn-in procedure. Our maxim: maximum functionality, resilience and safety.

This is only possible due to our employee`s efforts and quality awareness. Their expert knowledge and motivation form the basis of our success. Together we strive to reach a level of excellence that is second to none, with passion and conviction in our work.

Customer care is very important to us and is based on partnerships and trust built up over time.

As our systems are maintenance free, we can concentrate on providing a good service to you and support you with professional advice, in-house installation and customer training.

Within the concept stage we analyze the conditions of your situation on site and carry out test measurements where required. Our measuring systems are able to achieve high levels of precision and reliability even under the most difficult conditions. We remain at your service even after installation and can quickly respond to any queries thanks to remote access options adapted to your needs.

In the course of our international collaboration we have built up a globally networked team for our customers in order to provide advice and support in different countries.

We value effective knowledge and qualification management. Our numerous international representatives in the important geographical markets of the world are able to refer to the expert knowledge within the company and constantly update their own knowledge by taking part in application and practice-oriented advanced training programs.

Customer proximity around the globe: an important element of our success worldwide, along with our broad industry experience.

In liquids, we set the measure.
With innovative sensor technology.
Tough, accurate, user-friendly.

SensoTech

SensoTech is a provider of systems for the analysis and optimization of process liquids. Since our establishment in 1990, we have developed into a leading supplier of process analyzers for the inline measurement of liquid concentration and density. Our analytical systems set benchmarks that are used globally.

Manufactured in Germany, the main principle of our innovative systems is to measure ultrasonic velocity in continuous processes. We have perfected this method into an extremely precise and remarkably user-friendly sensor technology. Beyond the measurement of concentration and density, typical applications include phase interface detection or the monitoring of complex reactions such as polymerization and crystallization.

Our LiquiSonic® measuring and analysis systems ensure optimal product quality and maximum plant safety. Thanks to their enhancing of efficient use of resources they also help to reduce costs and are deployed in a wide variety of industries such as chemical and pharmaceutical, steel, food technology, machinery and plant engineering, car manufacturing and more.

It is our goal to ensure that you maximize the potential of your manufacturing facilities at all times. SensoTech systems provide highly accurate and repeatable measuring results even under difficult process conditions. Inline analysis eliminates safety-critical manual sampling, offering real-time input to your automated system. Multi-parameter adjustment with high-performance configuration tools helps you react quickly and easily to process fluctuations.

We provide excellent and proven technology to help improve your production processes, and we take a sophisticated and often novel approach to finding solutions. In your industry, for your applications – no matter how specific the requirements are. When it comes to process analysis, we set the standards.

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