Beverage Technology

Innovative solutions for your success
Dear Reader,

Drinking is essential for maintaining the right balance of water in the body. Popular beverages include water, juice, milk, coffee, tea, wine, and beer. However, only a producer of these beverages knows to what extent their production and processing depends on efficient procedures and precise measuring technology.

Here, JUMO is at your side as a reliable partner to help when you have questions and to provide you with quick solutions. We do so regardless of whether you monitor your process through pressure, temperature, conductivity, or pH value. We’re also at your side for controlling the cleaning process or reducing production costs.

So how do we do it? Through long-term experience and expertise: because for more than 60 years, JUMO has been one of the leading manufacturers in the field of measurement and control technology. As a result we are also an expert partner for the beverage industry.

We place great value on regular new developments, constant improvement of existing products, and on increasingly economic production methods because only this path allows us to achieve the highest degree of innovation for you.

The beverage industry is another area in which we at JUMO offer you only the best. We do so by providing a multitude of solutions for the most varied applications.

Our solutions support you in implementing HACCP concepts or the IFS standard.

This brochure provides an overview of JUMO products and systems for the beverage technology industry. Of course, we would also be happy to work together with you to create customized solutions for individual requirements.

PS: Detailed information about our products can be found under the product group number at www.industry.jumo.info.
Contents

Mineral water and soft drinks 4
Fruit and vegetable juice 8
Dairy products 12
Wine 16
Beer 20
CIP cleaning 24
JUMO Engineering 26
Mineral water and soft drinks

Each person should drink 1.5 to 2 liters of fluids every day. To ensure beverages exhibit a consistent level of quality, various quality and process checks must be performed during production. This is where the first-rate measuring and control equipment from JUMO comes into play.
Level measurement in water wells
The level height is measured regularly for changes in hydrostatic pressure in well water using a level probe. JUMO MAERA S28 with its piezo-resistive measuring cell is particularly suitable for this type of application. The probe features overvoltage protection which protects its electronic components from an indirect lightning strike. Additional high overload resistance and long-term stability gives the JUMO MAERA S28 a high level of security.

Conductivity measurement in mineral water
Conductivity measurement can be performed as an incoming goods inspection after the water from the well has been transported to the plant. The conductivity value depends on the level of water mineralization. The more minerals that dissolve from the rock layers, the higher this value is. The JUMO CTI-750 transmitter in stainless steel version is used for measuring conductivity. The integrated conductivity measurement allows a precise and quick temperature compensation that is particularly important for temperature measurement. Additional functions, such as the combined toggling of measuring range and temperature coefficient, also allow the optimum use in CIP processes.
Mineral water

According to the mineral and bottled water regulation, mineral water is a type of groundwater with specific characteristics. It must originate from an underground water source and be completely pure. Mineral water is bottled directly at the source or water well and requires official recognition. While it is permissible to intervene in the context of approved procedures when preparing drinking water, mineral water should be changed as little as possible from its original composition. Only iron, manganese, sulphuric, and arsenic compounds as well as fluoride may be withdrawn. Only carbon dioxide [CO₂] may be added, whereby carbonic acid [H₂CO₃] is created in the water. Deferrization is often brought about using ozone. It is carried out for many types of mineral water to prevent a brown coloring from entering the water over time. Most types of mineral water show a much lower carbonic acid content at the outlet location than they do after bottle filling. The acidification of the water through the addition of carbon dioxide promotes, among other things, its shelf life, as it provides a stable antimicrobial environment.

Measurands and devices in the production of mineral water and soft drinks*

*Process flow soft drinks in point 1 and 2 identical with process flow mineral water.
Soft drinks

Cold drinks that are produced by the food industry for refreshment purposes mostly have a sweet-and-sour flavor and are carbonated. These are "Water-based beverages with flavor-giving ingredients" such as sugar, sweeteners, and aromas according to the German Foodstuffs Code as well as the international Codex Alimentarius. In addition, the beverages may contain fruit juice concentrate, carbonic acid, minerals, vitamins, and further ingredients.

Fruit juices, carbonated fruit juices, lemonades, and sodas are among the most popular soft drinks. For its manufacture, mineral water is mixed with a precisely-defined quantity of juice or syrup and then bottled. To maintain a consistent level of quality across all beverages, it is vital that the quantity of juice or syrup and the CO₂ content is always the same.
Fruit and vegetable juices are considered everyday beverages such as water and coffee. Furthermore, fruit juices are also a common ingredient in fruit juices. For juice production various processes are involved depending on whether direct juice or fruit juice concentrate is being produced. JUMO temperature probes and controllers are particularly suited for quality and process inspection purposes.
Beverage Technology

Temperature measurement and control for juice production

During juice production, the temperature in various processes is measured and controlled. When manufacturing fruit juice concentrate, the most important measuring point is the temperature measurement taken during evaporation or aroma recovery. If the volatile flavored compounds are extracted from the juice either before or during the concentration process – and if these are stored in a cool place separate from the de-flavored fruit juice concentrate – then any undesirable mixing with other juice components is essentially impossible. Each fruity flavor consists of a number of components which differ to a greater or lesser extent from one another in terms of quantity, solubility, and boiling point. The quantity of vapor to be evaporated in the vaporizer depends on the type of juice, the operating conditions, and the intended flavor yield. The flavored concentrate is cooled to a clear liquid and removed from the plant. Both in the production of fruit juice from fruit juice concentrate and the production of direct juice, the juice is pasteurized before it is bottled. The temperature measurement is also an important quality criterion here for guaranteeing the shelf life of the juice. When it comes to safely documenting the reached temperature in a comprehensible manner, the tamper-proof paperless recorder JUMO LOGOSCREEN fd is the perfect device for the job.

JUMO tecLine HY
pH combination electrode
Type 201022

JUMO AQUIS touch S/P
Modular multichannel measuring devices with integrated controller and paperless recorder
Types 202581, 202580

JUMO DELOS SI
Precision pressure transmitter
Type 405052

JUMO mTRON T
Measuring, controlling, and automation system with controller module as well as input and output modules
Type 705000

JUMO LOGOSCREEN fd
Paperless recorder for FDA-compliant data recording
Type 706585

JUMO dTRANS pH 02
Transmitter and controller series
Type 202551

JUMO DICON touch
Two-channel process and program controller
Type 703571

JUMO dTRANS pH 02
Transmitter and controller series
Type 202551

JUMO flowTRANS MAG H01
Electromagnetic flowmeter for hygienic applications
Types 406015, 406018

JUMO DELOS T
Electronic temperature switch with display and analog output
Type 902940

JUMO AQUIS touch S/P
Modular multichannel measuring devices with integrated controller and paperless recorder
Types 202581, 202580

JUMO mTRON T
Measuring, controlling, and automation system with controller module as well as input and output modules
Type 705000

JUMO LOGOSCREEN fd
Paperless recorder for FDA-compliant data recording
Type 706585

JUMO dTRANS T1000/p35
Temperature and pressure sensor with IO-Link
Type 902915, 402058

JUMO dTRANS p30/31
Pressure transmitters
Types 404366, 402050

JUMO flowTRANS MAG H01
Electromagnetic flowmeter for hygienic applications
Types 406015, 406018

JUMO DELOS T
Electronic temperature switch with display and analog output
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Type 902915, 402058
Juice

For the production of fruit juice, only ripe, washed fruit is used. Citrus fruits are pressed in special citrus presses. Other fruits are pulverized to a mash in a grinder and then mechanically pressed. The addition of special enzymes can alleviate the flow of juice from the sacs and increase the overall juice yield. For stone fruit and soft fruit, the stones and stems are removed before pressing. The separating and filtering process turns the naturally cloudy, pulpy juice to a clear fruit juice. There are 2 basic procedures within fruit juice production: the production of fruit juice from concentrate and from direct juice. To create fruit juice concentrate, the flavor and water must be extracted from the freshly pressed juice at low temperatures and in vacuumed conditions. What remains is then condensed to approximately a sixth of its original volume. Fruit juice concentrate and flavoring are stored and transported separately from one

Measurands and devices in the production fruit and vegetable juices

1. Washing machine
   - Level
   - Temperature

2. Press
   - Pressure
   - Indicator

3. Separator
   - Pressure
   - Controller
   - Flow

4. Vaporizer
   - Pressure
   - Temperature
   - Controller

5. Cooler
   - Pressure
   - Temperature
   - Controller
   - Flow
another in tanks. Orange juice concentrate, for example, is stored at -15 °C. To generate juice from the concentrate, water and the relevant fruit flavor are added along with fruit pulp and fruit sacs if necessary. The advantages of this procedure for the manufacturers are savings in transport costs and being independent of the harvest season. For preservation purposes the produced juice is pasteurized at 85 °C for a few seconds. Direct juice, on the other hand, is processed immediately after fruits are pressed. It is first filtered before being pasteurized between 80 and 85 °C to prolong shelf life. This prevents fermentation from taking place and guarantees the shelf life of the juice. The direct juice is then bottled or stored in a sterile condition in a tank for bottling later on.
Dairy products

In dairies major emphasis is placed on hygiene. This is so because milk is a sensitive product that must be especially protected against germ contamination. The sensors for hygienic applications from JUMO support all the stages of milk processing.
Measurement technology for milk processing

The value chain in the dairy industry is shaped by special challenges when it comes to hygiene and process engineering.

Milk processing in particular has special demands for monitoring, analyzing, and logging the production processes. Different rules and regulations define essential processing parameters. These include pH value and temperature limits in combination with temperature hold times. The reason here is the microbiological potential of milk in relation to pathogens and external germs. These make processing more difficult and always reduce the shelf life.

In process engineering, the main focus is on optimizing processing steps to ensure stable processes and end products through an increased degree of automation. Continuous flow conditions, constant pressure, and the change between product and cleaning media are monitored through the sensor program from JUMO. At the same time, devices with a high level of protection against tampering record and control these factors. As a result, the milk industry has a complete portfolio at its disposal which reliably fulfils the demanding legal and procedural requirements.
Milk

Specific processing of the raw milk is an essential preliminary step for the production of many different dairy products. Regardless of the end product, key process steps exist that are applied in varying combinations. Yet, the premise still applies that even a slight deviation from defined parameters or non-hygienic constructions significantly affect the production costs and the quality of the end products. For that reason, JUMO offers sensors for the essential measurands as well as suitable evaluation and recording devices for all steps. Temperature control of the milk is the dominant measurand with regard to product safety. After milk production, a temperature of 4 °C must be maintained immediately which must not be exceeded until processing. Pasteurization is the most important step for drinking milk production. Here, programs are implemented the purpose of which is to substantially reduce the colony-forming units of the spore-producing Bacillus cereus: for UHT milk 2 to 10 seconds at up to 150 °C, for fresh milk 15 to 20 seconds at up to

Measurands and devices in the production of milk products

1 Storage tank
- Temperature
- Level
- Indicator
- Controller

2 Separator
- Temperature
- Pressure
- Indicator
- Controller

3 Homogenizer
- Temperature
- Pressure
- Controller
- Recorder
75 °C. At this point, temperature probes must be quick, precise, and reliable so that all risks are completely eliminated. The levels are monitored via pressure. In addition, pressure differences that are deliberately controlled are established to ensure that no contamination of the pasteurized milk takes place in case of equipment damage. Plants such as centrifugal separators or homogenizers are operated and controlled in a pressure range of approximately 5 bar or respectively 250 bar. Pressure losses over pipelines or fittings can have negative impacts on the product stability. They must be permanently monitored as well as compensated through auxiliary systems. The prerequisite here is a smooth embedding of the pressure transmitter into the process automation. Especially designed devices for analysis and recording are available so that all parameters such as pH value and conductivity can be monitored. In summary, JUMO offers a coordinated system for process control and monitoring.
Wine

Wine is considered to be one of humanity’s most ancient cultural goods and has played a significant role since antiquity as an agricultural product, both for the economy as well as for society. In wine production, especially during fermentation and storage, measurement and control devices from JUMO come into play and ensure a consistent quality of wine across the board.
Efficient filtration monitoring with the JUMO dTRANS p20 DELTA differential pressure transmitter

The wine filtration process consists of first cutting out turbid substances and removing any potentially harmful yeasts and/or bacteria before bottling. During sheet filtration, the cloudy wine is pressed through layers of cellulose, diatomaceous earth, and perlite. During membrane filtration, however, a thin plastic film filters the wine so that it becomes clear. The additional filtration prior to bottling is also called sterile filtration; it makes the already very clear wine germfree. During filtration, the pressure on the filter gradually increases. This pressure is related to a certain degree to the purity of the wine. With the JUMO dTRANS p20 DELTA differential pressure transmitter, you can measure precisely how long the filter will last by determining the increase of differential pressure. This enables you to ensure the quality of your wine and optimal use of your filters.

Temperature-controlled fermentation

This process includes checking the alcoholic fermentation, which is the process of changing sugar from the grapes into alcohol at low temperatures. To retain as much flavor as possible in the wine, the grape juice is cooled during fermentation to approximately 15 °C. Consequently, fermentation then takes longer, allowing maximum flavor to be retained. The JUMO Dtrans T100, a compact temperature probe with an integrated transmitter, is ideally suited for temperature control.
Wine

Wine is an alcoholic beverage, made from the fermented juice of grapes. The most popular wines are red, white, and rosé. Sparkling wine is made from wine that has undergone a second fermentation process. Lightly sparkling wines are known as semi-sparkling wines and generally have carbonic acid added to them. The main difference between the production of white wine and red wine is the order of the workflow. In the production of red wine, the mash rather than the grape juice (pressed juice) is fermented between 20 and 30 °C. This is because almost all the dyes are found in the skin of the grapes. These dyes are separated from the skin of the fruit during the fermenting of the existing alcohol mash. The most important steps in the production of red wine are de-stemming, mashing, pressing, and fermenting. The most important work steps in the mashing process are the immersion of the pomace (which can be performed

Measurands and devices in the production of white wine

Measurands and devices in the production of red wine
either manually or mechanically), the carbonic maceration, and the heating of the mash. To produce a full-bodied red wine, as intense a color yield as possible must be achieved and the correct quantity of tannin from the skins should be introduced into the wine. To achieve optimum extraction, the skins and the grape juice must remain constantly in contact with one another. For this reason the floating layer of mash is immersed repeatedly in the juice through mechanical means. Alternatively, the mash can be heated to accelerate the process. After fermentation, the red wine is developed. This maturing process can be performed in barrels, barriques, or tanks of varying sizes. Depending on the type, quality, potential, and year of the wine, the time it takes to mature can be between several weeks and years. Finally, the wine is bottled.
Beer

The brewing process takes time. It consists of a large number of work steps: mashing, purification, wort boiling, wort cooling, fermentation, and filtration. For all these processes, the precise monitoring of temperature, pressure, pH value, and conductivity is necessary. A task in which JUMO’s first-class as well as tried-and-tested products provide perfect support throughout the entire process chain.
**JUMO mTRON T – the brewhouse control system**

JUMO mTRON T – a system that can master the measurement and control tasks in the brewery. Up to 9 program generators enable autonomous control of mashing, purification, and wort boiling. This way, for example, the next batch can already be mashed during wort boiling. While the temperature-time-programs of both processes are running, JUMO mTRON T registers all required data such as temperature, pressure, pH value, flow, steam temperature, and stirring speed. The process can be individually automated with the CODESYS PLC programming system.

**Precise control of the cooling zones with the JUMO diraTRON controller**

Several cooling zones exist in the cylindrical fermentation tanks which ensure that the young beer is circulated during storage by using different temperatures. JUMO diraTRON perfectly controls the exact temperature of the individual cooling zones, which ensures the quality of the beer.

**Optimum setting and monitoring with the JUMO CTI-750 conductivity transmitter**

In the bottle cleaning plant, the glass bottles are cleaned by warm lye baths and subsequent rinsing with water at different temperatures. However, the constant transport of the bottles causes caustic soda to be displaced which changes the concentration of the lye. This is where the JUMO CTI-750 comes into play: it continuously adjusts the concentration of the caustic soda to optimum levels via conductivity measurement and thereby ensures reliable cleaning of the glass bottles at a consistently high quality.

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**JUMO tecLine HY**

Hygienic heavy-duty electrodes for measuring pH value
Type 201022

**JUMO CTI-750**

Inductive conductivity transmitter
Type 202756

**JUMO dTRANS p30/p31**

Pressure transmitter
Types 404366, 402050

**JUMO flowTRANS MAG H01**

Electromagnetic flowmeter for hygienic applications
Type 406015, 406018

**JUMO LOGOSCREEN 600**

Paperless recorder with innovative operating concept
Type 706520

**JUMO DICON touch**

Two-channel process and program controller
Type 703571

**JUMO diraTRON**

Compact controllers
Types 702110, 702111, 702112, 702113, 702114

**JUMO DELOS SI**

Precision pressure transmitter
Type 405052

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**JUMO AQUIS touch S**

Modular multichannel measuring device for liquid analysis
Type 202581

**JUMO dTRANS p20/p20 DELTA**

Process and differential pressure transmitter
Types 403025, 403022

**JUMO CTI-750**

Inductive conductivity transmitter
Type 202756

**JUMO dTRANS T1000/p35**

Temperature and pressure sensor with IO-Link
Type 902915, 402058
Beer

Beer is a drink that is obtained by fermentation from substances containing starch. Furthermore, it is not distilled. The carbonated beverage is produced by adding hops or other seasonings. Beer is produced by fermentation. The raw material for the fermentation of beer is always starch. Sugar is obtained from the starch of grains (barley, wheat, rye, oats, millet, rice, maize) by malting or other enzymatic processes. The alcohol content of most beer is between 4.5 % and 6 %. Non-alcoholic beer is produced by 2 different processes – stopping the fermentation or extracting the alcohol from normal beer.

Measurands and devices in the production of beer
Temperature is one of the most important measurands in beer production. Only through exact control of the processes and precise temperature control can the work steps of mashing, wort boiling and cooling, fermentation, and storage be carried out reliably and reproducibly. In addition, exact temperature measurement with regularly-calibrated temperature probes can optimize costs. Even a process temperature correction of only 1 °C in the right direction can, for example, significantly reduce energy costs.
CIP cleaning

The basis for every good process is a hygienic, thoroughly cleaned plant. This is guaranteed by “CIP cleaning”, or “Cleaning in Place”. In this area JUMO also offers first-class systems and solutions that you can rely on.
Measuring – Controlling – Displaying – Recording

New possibilities with the JUMO AQUIS touch S

The JUMO AQUIS touch S, a modular multichannel measuring device, provides new approaches to CIP cleaning. For example, the concentration setting of the acid and lye solutions, the level of both tanks, and the flow velocity can be measured, controlled, and displayed as well as registered on-site – all with one device. Essentially, a maximum of 4 analog analysis sensors can be used while a total of up to 10 parameters can be measured and managed simultaneously. Alongside countless simple alarm, limit value, or time-controlled switching functions, up to 4 higher-order control loops can be defined in the JUMO AQUIS touch S at the same time.

Conserve resources – reduce maintenance costs

Whether the application is implemented with the modular multichannel measuring device JUMO AQUIS touch S or the proven inductive conductivity transmitter JUMO CTI-750 depends on the orientation of the plant. Both systems have proven themselves through their numerous benefits. For instance, the JUMO CTI-750 is the ideal solution if a PLC is worked with in the background. The JUMO AQUIS touch S on the other hand works as a stand-alone solution. The low-maintenance sensor and the highly precise measuring by the inductive transmitter help to conserve resources and reduce maintenance costs for your plant.
JUMO Engineering

- Personalized consulting and support
- Individual and market-oriented solutions
- Wide range of technologies
- Decades of experience

- Project management
- Feasibility analysis
- Product requirement specifications
- Project planning
- Startup
- Training

- Control
- Recording
- Monitoring
- Automation
- Pressure
- Humidity
- Flow
- Level
- Analytical measurement technology
- Temperature

- Renewable energy
- Mechanical engineering
- Pharmaceutical engineering
- Chemical industry
- Water and wastewater engineering
- Industrial furnace construction
- Food technology
- Railway technology
- Shipbuilding
- Heating and air-conditioning industry

- Service and maintenance concepts
- Technical support
- Training courses and workshops
- Implementation concepts
- On-the-job training
System solutions – JUMO Engineering

What began with a customer application in climate control that required sensor technology, control, recording, and automation has now become the basis for JUMO Engineering. As a system provider specialized in complete solutions, we take a holistic yet individual approach to meeting your needs in a customized manner. In addition to the required devices that we provide we also take on project planning and project management of plants. You benefit from the expertise we have acquired over decades of working in a variety of industries. Our engineers and technicians are always available for clarifying technical details, for your further training in our workshops, for the development of subapplications or complete solutions, and much more. The structured process covering the specification sheet creation, implementation, documentation, and startup through to final training delivers clear and transparent solutions. Our worldwide sales organization is your reliable contact and would be happy to provide you with further information.

Our services
- Feasibility analysis
- Creating a technical concept including product requirements specification and specification sheet
- Complete project planning and documentation
- Project planning including PLC programming, visualization, network technology, etc.
- Continuous project management
- On-site startup
- Training and support

Your advantages
- As a central contact partner JUMO develops technical system solutions
- Extensive expertise with all measurement and automation devices
- Global support through experienced specialists
- A flexible, tailored solution to suit your individual needs and application

In a nutshell
- Precise and prompt communication channels: This saves time and prevents mistakes!
- Highly developed expertise for maximum flexibility: For fully reliable and secure project planning!
- Technology that has proven itself over decades reduces downtimes: For excellent plant and process reliability!