



More than **sensors + automation**



# Dairy Technology

Innovative solutions for your success





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## Dear Reader,

Dairy products are a permanent part of our everyday life. But only manufacturers know how much the production and processing of food depends on processes that run reliably and measurement technology that works accurately.

Your reliable partner JUMO is always at your side to help when you have questions and to provide quick solutions whether you want to monitor and record pressure, temperature, conductivity, or pH value in your processes or control and document entire cleaning processes. JUMO can help you to lower production costs.

So how do we do it? By applying years of experience and professional expertise. JUMO has been a leading manufacturer of measurement and control systems for more than sixty years and has also been a competent partner for the food industry during that time.

We place special emphasis on regular new development cycles, continuous improvement in existing products and constantly making production methods more economical. This is the only way we will achieve the highest level of innovation.

JUMO offers you only the best in dairy technology as well – a wide range of diverse applications and support in implementing HACCP concepts or the IFS standard.

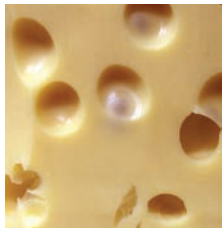
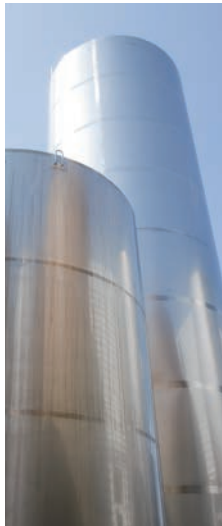
This brochure will give you an overview of JUMO products and systems for the dairy industry. Of course we would also welcome the opportunity to get together with you to develop individually customized solutions that meet your requirements.

The ultimate result of these solutions is consistently good quality!

Best regards, Christina Hoffmann

P.S.: For detailed information about our products arranged by type and product group number, please visit [www.industry.jumo.info](http://www.industry.jumo.info).

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# Milk Processing

Hygiene is essential in dairies. Milk is a sensitive product that requires special protection against contamination. JUMO sensors for hygienic applications support you across the entire milk processing line.



# Milk processing

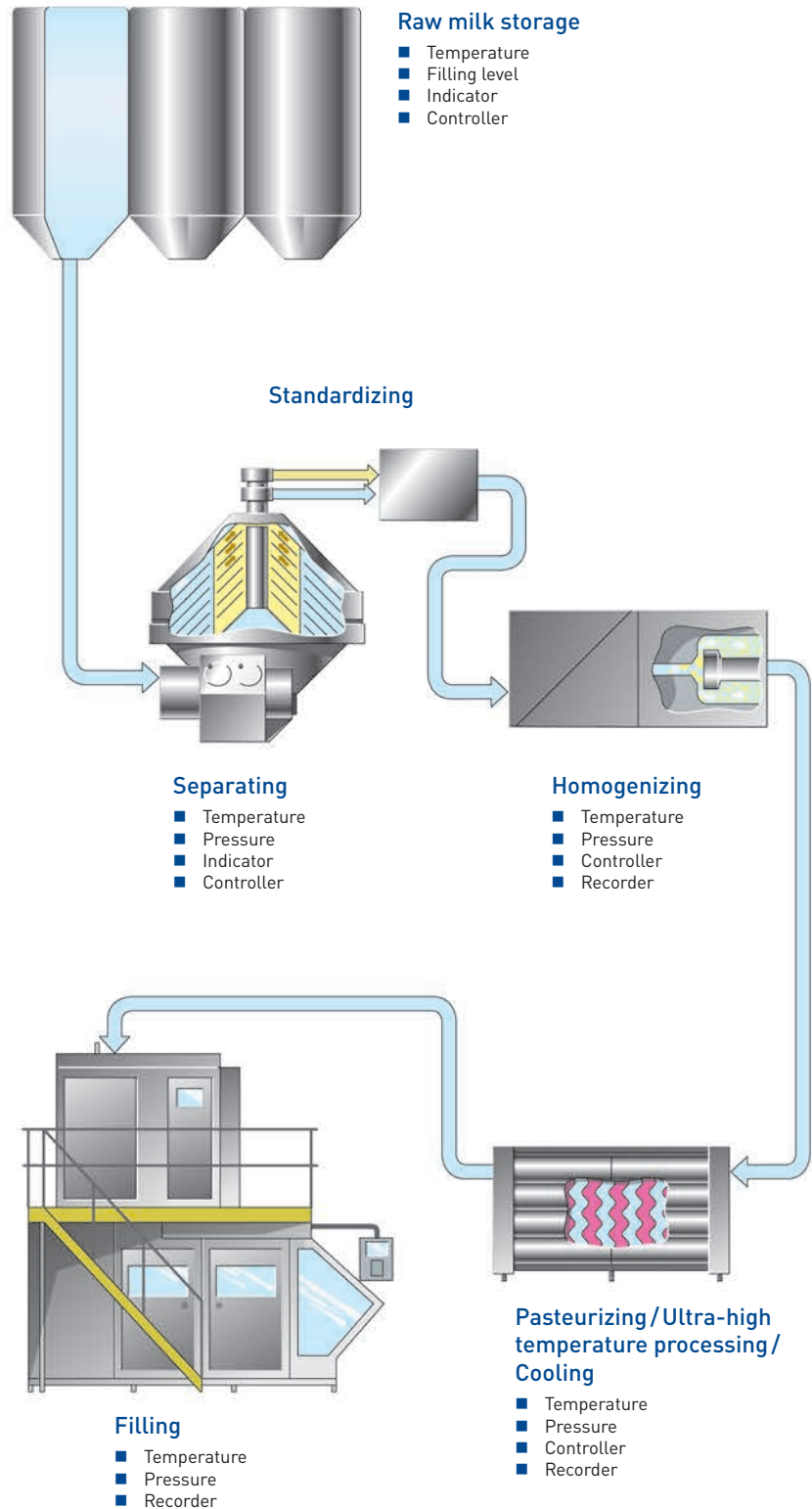
Storage Separating Homogenizing Pasteurizing/Ultra-high-temperature processing/Cooling Filling

## Milk processing

Milk processing involves the basic processes of storage, separation, homogenization and pasteurization. These processes also play a major role in yogurt, butter and cheese making. Precedence is therefore given to them on the following pages as the standard processes of dairy technology.

The process of yogurt production is described as typical for the preparation of fermented products. The use of different bacterial cultures, for example, or changing the sequence of the sub-processes produces semi-solid yogurt or drinking yogurt.

Cheese products are also presented typically for all common varieties of cheese. Not every process is used for every product. Quark and cream cheese require pasteurization, for example, but these types do not undergo ripening. Again, for other sorts of cheese, such as pasta filata varieties, the cheese curd is subjected to a cooking and stretching process to obtain an elastic-textured cheese.





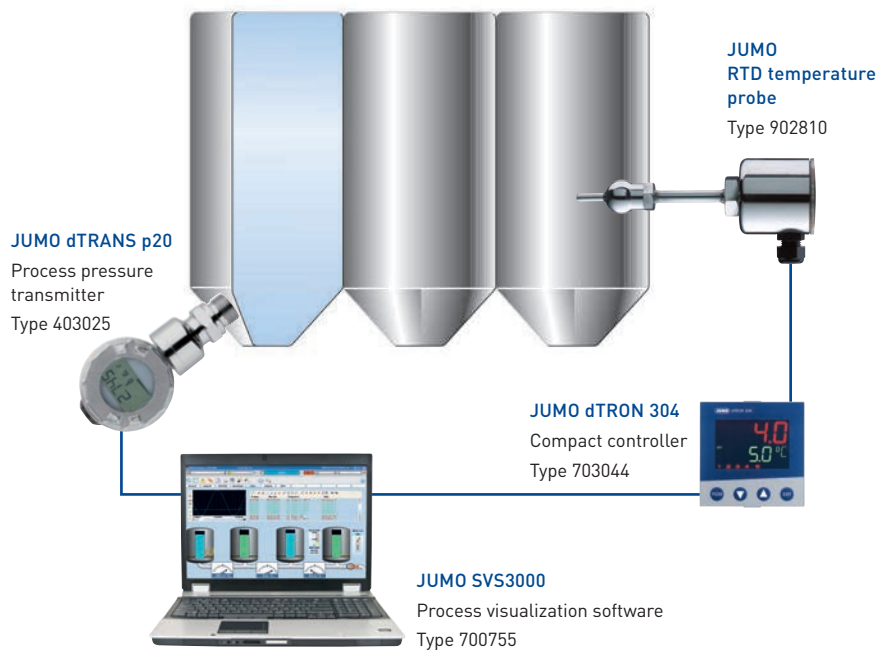
## Storage

### Monitoring filling levels with the JUMO dTRANS p20

The filling level in storage and sterile tanks in dairies is measured by means of hydrostatic pressure. The JUMO dTRANS p20 process pressure transmitter combines maximum precision with easy operation, featuring fast and convenient rotary knobs for making entries. The enclosure and sensors are made of high-quality stainless steel. The pressure transmitter is the-

refore ideally suited for use in hygienically sensitive areas. The compact case has half the overall depth and can also be used when conditions for mounting are restricted.

Hygienic process connections and a surface roughness  $\leq 0,8\mu\text{m}$  guarantee you have the highest process reliability.





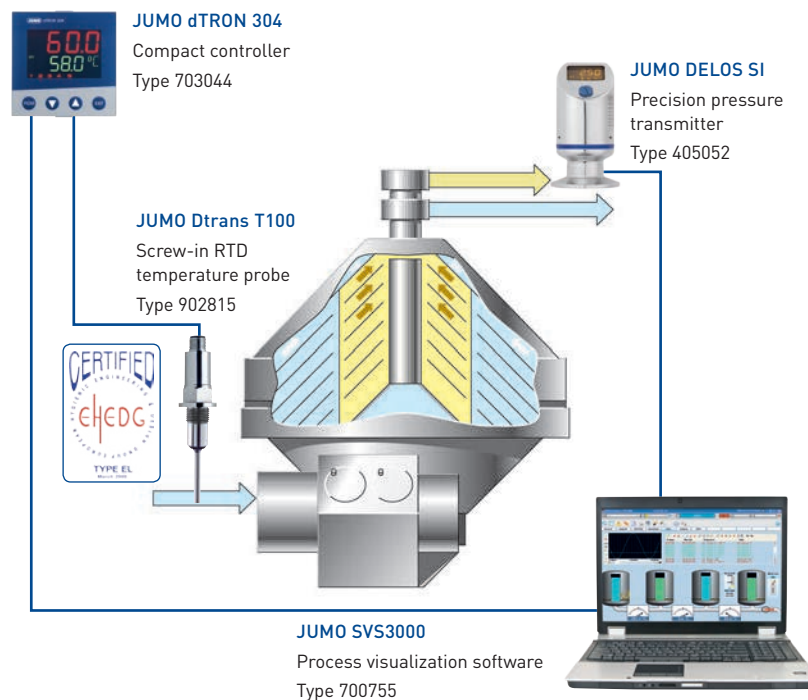
## Separating

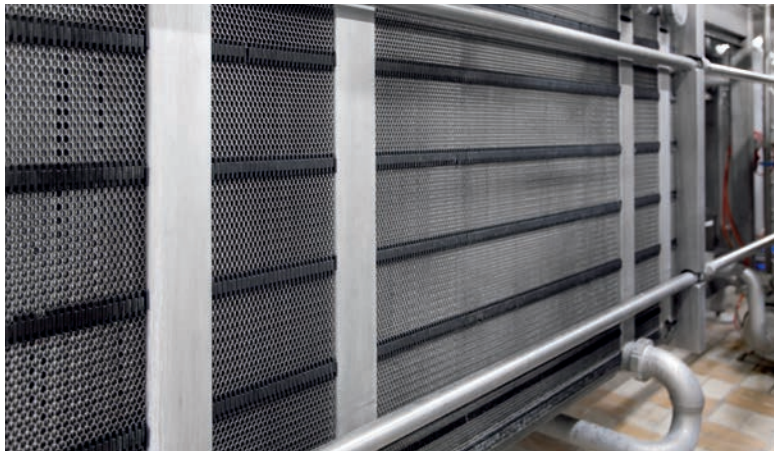
### Pressure monitoring in skim milk runoff with the JUMO DELOS SI after separation

It is important to monitor the pressure in the skim milk runoff to ensure consistent standardization. Regardless of any pressure or flow rate fluctuations that may occur after passing through the separator, a constant pressure must be maintained in the skim milk runoff.

The JUMO DELOS SI electronic precision pressure transmit-

ter is a true multi-talent, with switching contacts, analog output, and a bright LC display for visualization of the current process pressure and switching contact states. Use of high-quality stainless steel and front-flush measuring systems without seals make this device ideally suited for use in hygienically sensitive areas.

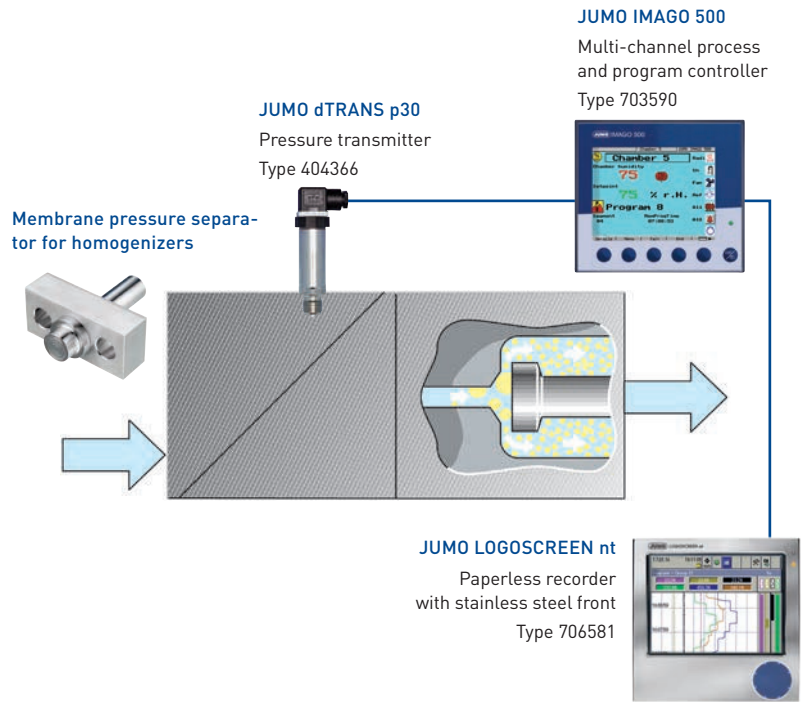




## Homogenizing

### Pressure control with the JUMO IMAGO 500

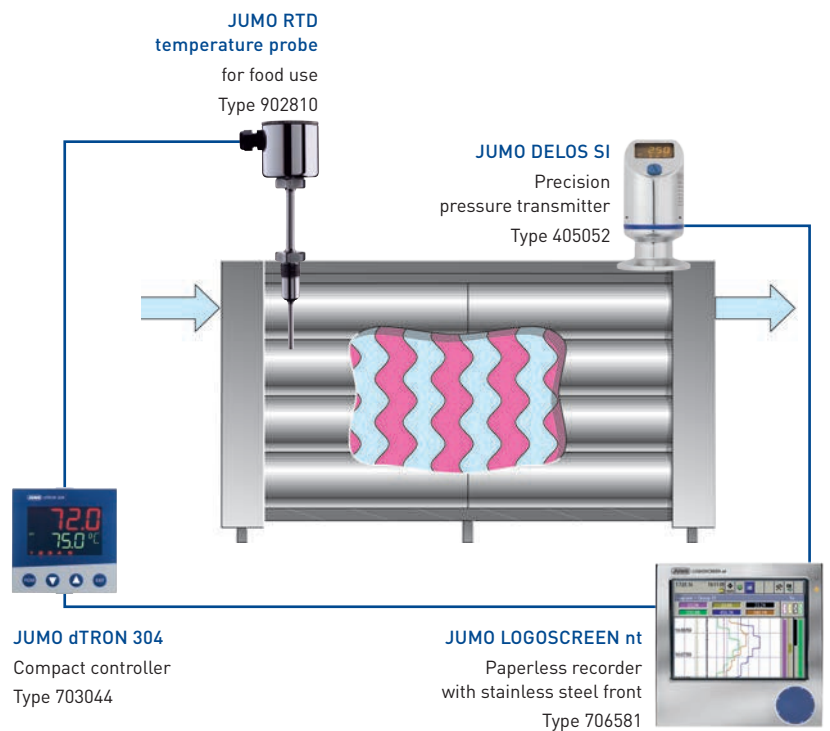
Accurate pressure control and monitoring during homogenization guarantees that this process is always performed efficiently enough to achieve the desired result. In cream production, for example, homogenization sets the viscosity. Using JUMO IMAGO 500 process and program controller to control the pressure variable during this part of production is the easiest solution. This makes it possible to connect several homogenizers immediately.



## Pasteurizing / heat treatment

### Monitoring temperature with the JUMO LOGOSCREEN nt

The JUMO LOGOSCREEN nt is ideally suited for recording the temperature during pasteurization. The instrument meets the guidelines laid down by the Heating Committee with regard to measurement, control and safety equipment for milk heating systems. [EU regulation EC Nos. 852/2004 and 853/2004]. Equally impressive is the high enclosure protection provided by the JUMO LOGOSCREEN nt stainless steel case.







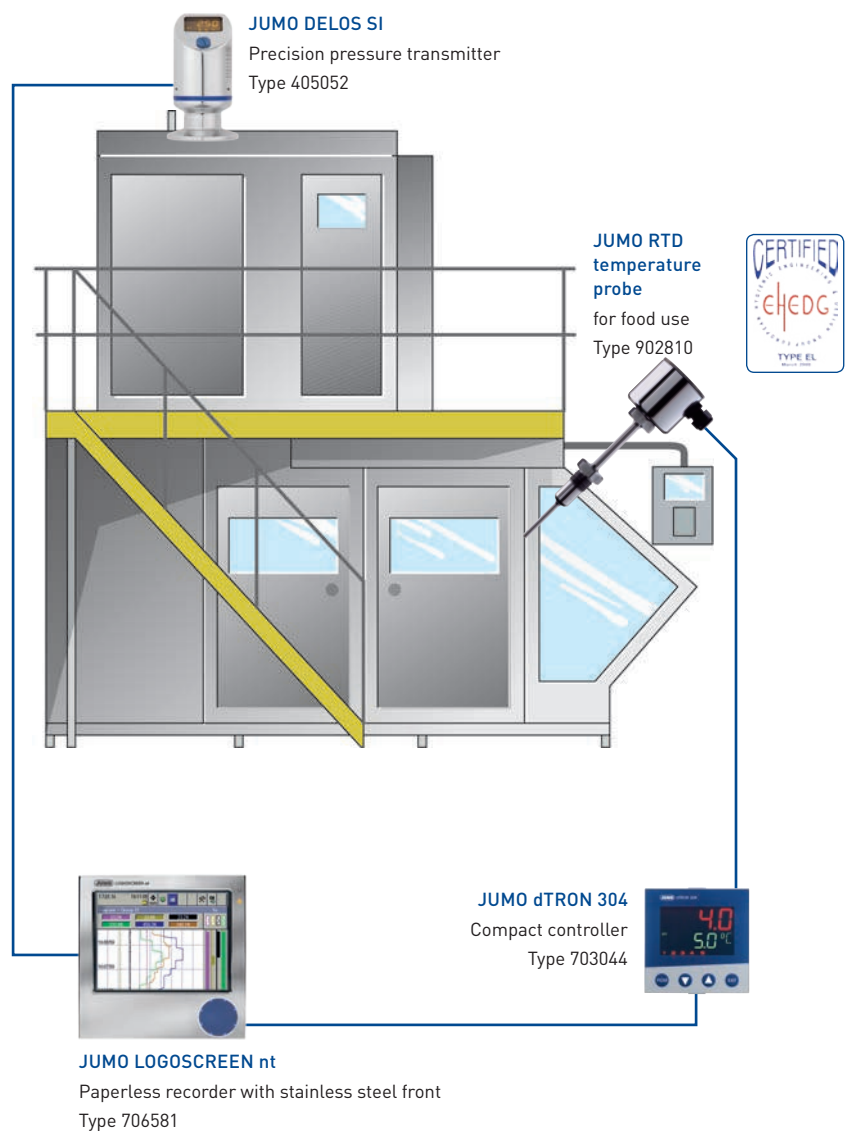
## Filling

### Recording filling conditions with JUMO LOGOSCREEN nt

Aseptic operation is most often the rule for filling systems in a dairy. This means that the measurement technology in use there must maintain the highest standards of hygiene.

Production in aseptic filling systems uses the HTST principle (High Temperature/Short Time). This means that precise control must be accompanied by reliable recording to guarantee the traceability of the aseptic filling process. JUMO LOGOSCREEN nt can record all the parameters. Should the system stop, the integrated web server function immediately generates and sends an email.

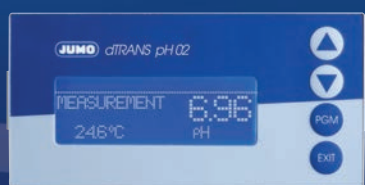
The JUMO LOGOSCREEN nt meets the hygiene requirements of the food industry and at the same time it is resistant to aggressive cleaning agents.





# The Yogurt Production Process

Yoghurt production is a sensitive process. The quality of the final product depends on the temperature. Reliable sensors from JUMO help you produce a high-value premium product.



# The yogurt production process

Preheating Evaporation Homogenizing Pasteurizing Fermentation Cooling Mixing Filling

## Yogurt production

Yogurt production is used as an example of production for all fermented products. The yoghurt type defines the standardized fat content of the processed milk.

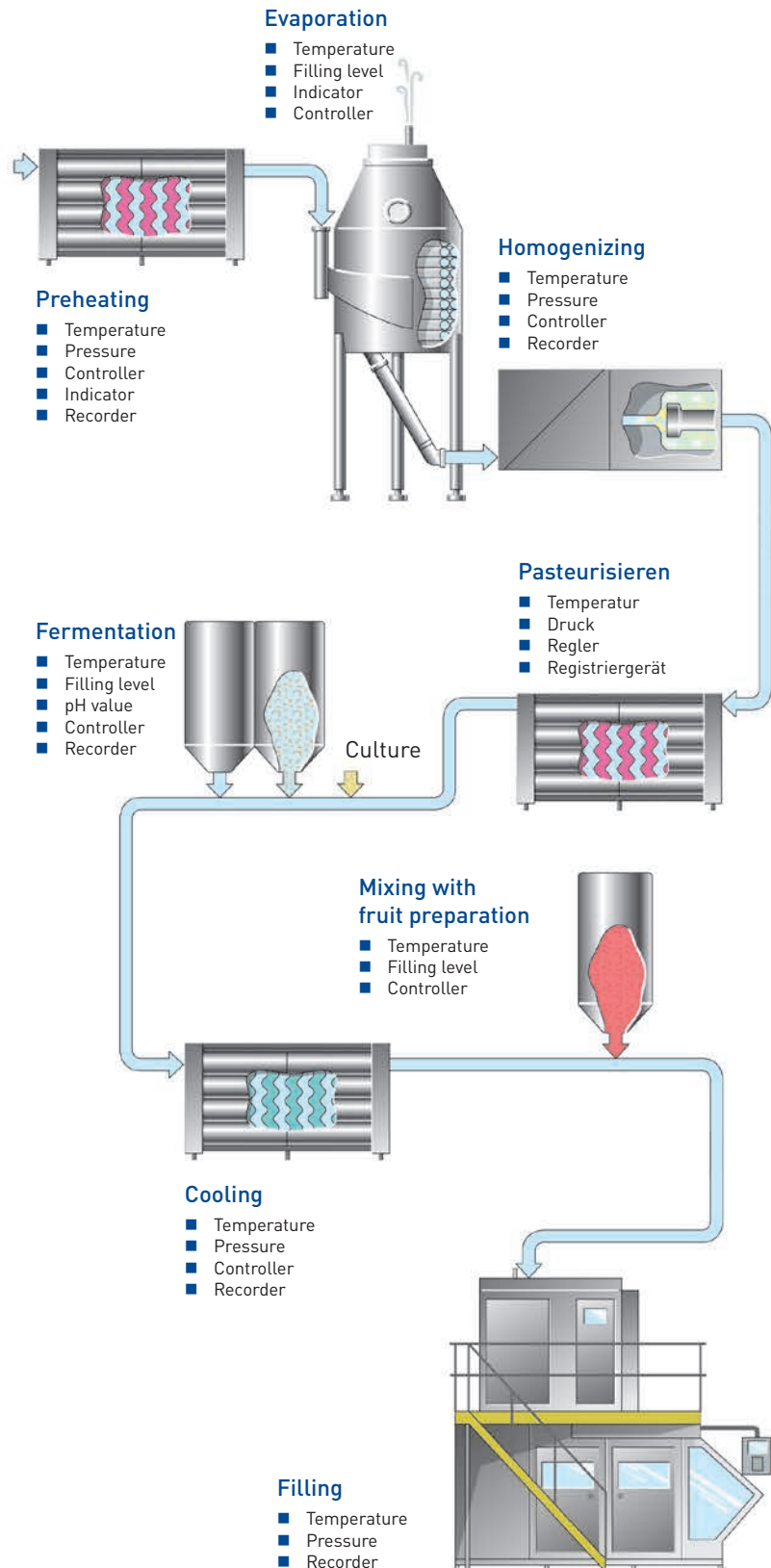
It does not matter whether you are making semi-solid yogurt, stirred yogurt, drinking yogurt or another fermented product such as sour cream, creme fraiche, kefir, buttermilk or sour milk, the core process is the same.

The milk is adjusted to the required fat content for the desired end product. After homogenization and pasteurization the bacterial culture specific to the particular product is added to the milk and incubated.

Once products reach the optimum pH value they are cooled, a fruit mixture is added if required and then filling takes place. This is usually under aseptic conditions to avoid recontamination.

### Note:

The following pages only show the processes that have not been described in "Milk Processing".





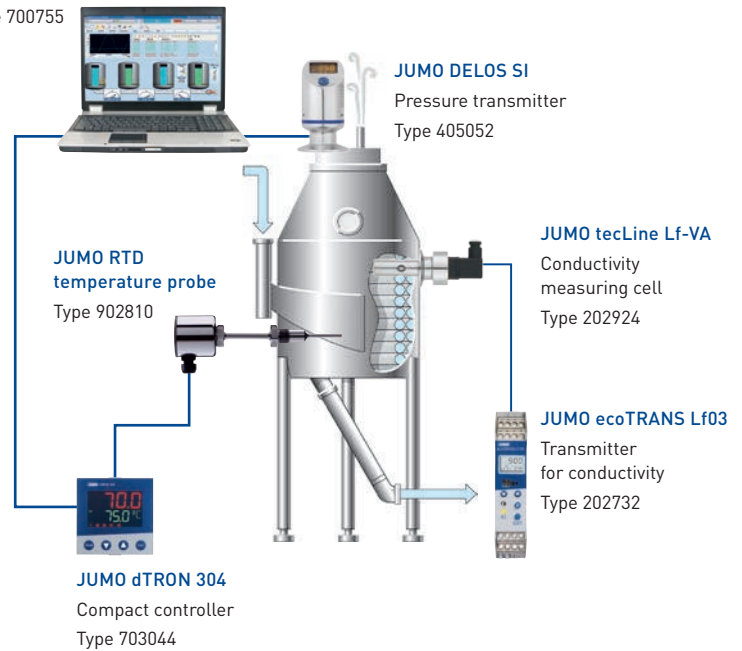
## Evaporation

### Monitoring the increase in dry matter by temperature

The fat content and dry matter of the milk used in yogurt production are standardized. Standardizing the dry matter improves the yogurt gel. There are various ways to perform this standardization. The most common way is to increase the dry matter of the milk by evaporation in a vacuum chamber. This process is monitored by means of the temperature at inflow. The degree of evaporation is determined by the distance covered by the heated milk in the evaporator.

#### JUMO SVS3000

Process visualization software  
Type 700755

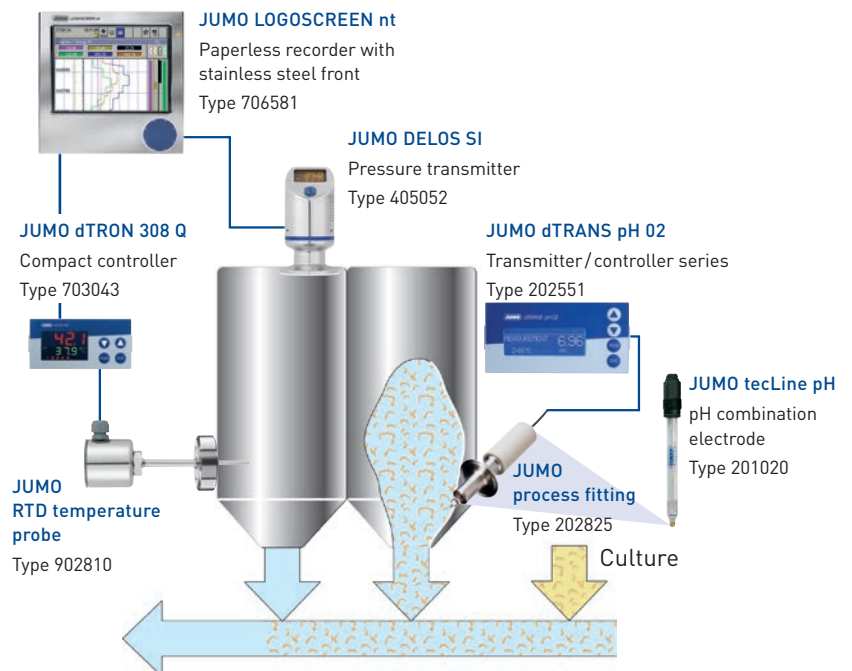


## Fermentation

### Monitoring of fermentation/incubation

Once the relevant yogurt culture has been added to the milk, incubation follows.

The end of the incubation phase is often controlled by the pH value. As soon as the pH value reaches 4.2 to 4.5, the yogurt must be cooled from the incubation temperature to between 15 °C to 22 °C so that acidification is stopped. JUMO tecLine pH electrodes in a hygienic process fitting can safely monitor this process.



# The yogurt production process

Preheating **Evaporation** Homogenizing Pasteurizing Fermentation Cooling **Mixing** Mixing



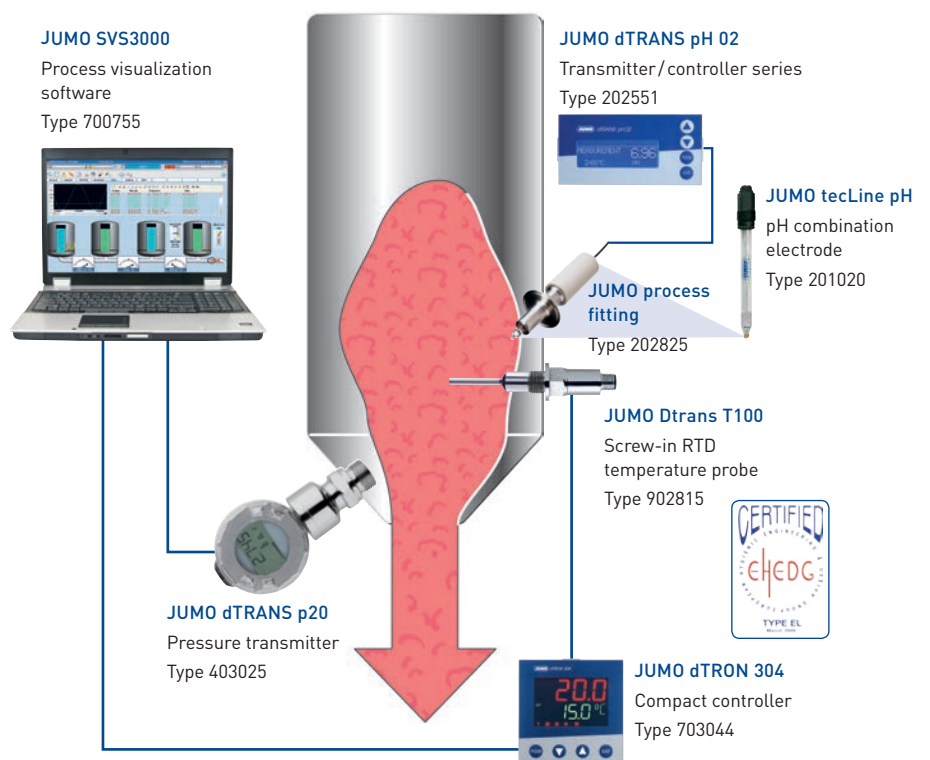
## Mixing

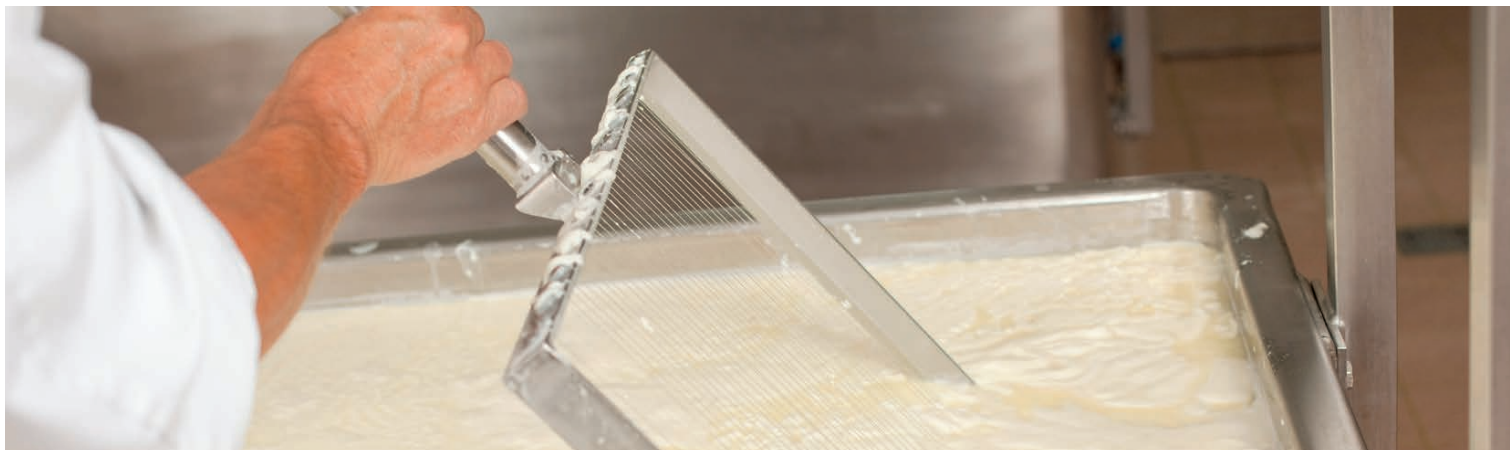
### Mixing the yogurt with the fruit preparation

The fruit preparation is mixed into the finished yogurt before filling takes place.

As there is a high risk of recontamination associated with this process, the fruit preparation must be heat-treated enough beforehand to kill all the vegetative micro-organisms without impairing the taste and texture of the fruit preparation.

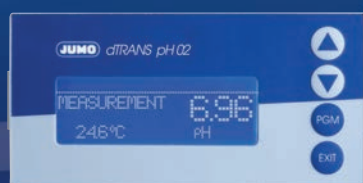
It is crucial to monitor the pH value of the different fruit preparations as a pH value that is too low afterwards can have a negative effect on fermentation.





# The Cheese Production Process

Two measurement variables that play an important role in cheese production are temperature and pH value. With solutions from JUMO you can control and monitor your production process flawlessly.



# The cheese production process

Thermization Storage Pasteurizing Separating Cheese making machine Shaping/pressing Salting Ripening/storage

## Cheese production

The simplified cheese production process depicted here is used as an example of all common cheese varieties (whether hard cheese, cheese slices, soft cheese, cream cheese or quark). Of course, the production processes do vary. With quark and cream cheese, for example, there is no ripening.

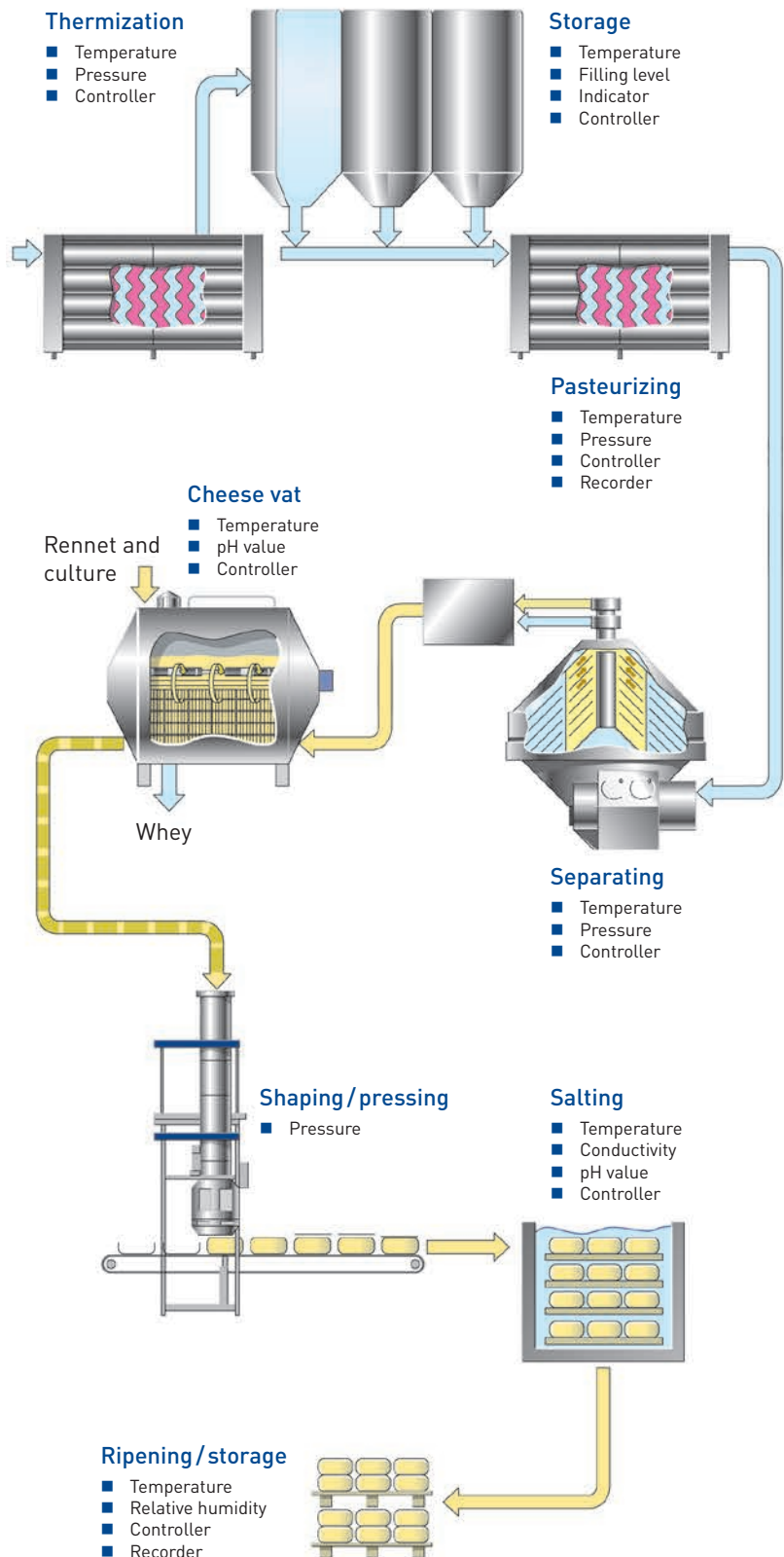
Once the milk is delivered, if it cannot be processed immediately, it is first thermized. Thermization slows down bacterial growth, thus allowing for a longer processing time.

Depending on which cheese is being made, before curdling, the milk is standardized, pasteurized and even sometimes, for special semi-soft cheese slice varieties, partly homogenized.

In the cheese making machine curdling is achieved by relevant bacterial cultures or rennet. The cheese curd is then cut up with a so-called cheese harp to make it easier for the whey to escape. After the whey has escaped the cheese curd is shaped, pressed, salted and stored for ripening.

### Note:

The following pages only show the processes that have not been described in "Milk Processing".

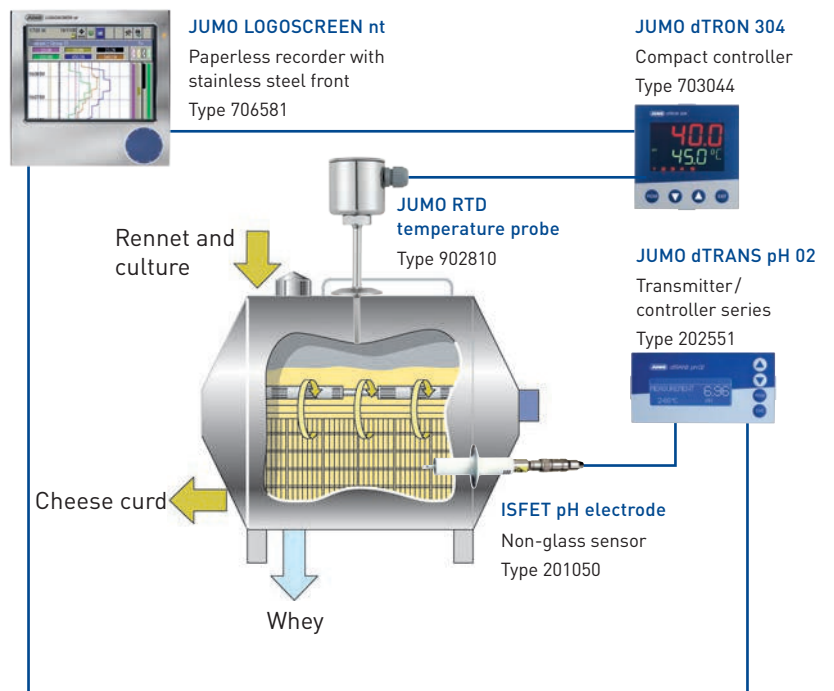




## Cheese vat

### pH value and temperature control in the cheese vat

The pH value and temperature in the cheese vat have to be controlled and recorded. The two measurement variables are parameters for the later quality of the cheese and determine the steps of the process that are to follow. For example, the duration of the stirring period depends on the required level of acidity. The temperature/time diagram is determined by the method of heating and the variety of cheese. The combination of a hygienic temperature probe and the JUMO dTRON compact controller allows fast temperature recording and optimized control. This also makes it possible to save energy, as unnecessarily long switching and heating periods are avoided.





# The cheese production process

Thermization Storage Pasteurizing Separating **Cheese making machine** Shaping/pressing **Salting** Ripening/Storage

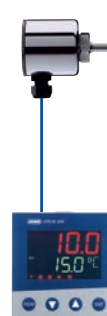


## Salting

### Monitoring salt concentration in the salt bath via conductivity with the JUMO CTI-750

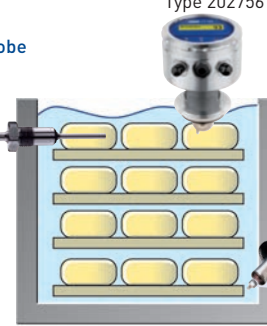
Measuring salt concentration in the salt bath via conductivity with the JUMO CTI-750. There are several reasons for salting the cheese loaf, the most important being to achieve the right product consistency. During this process sodium from the salt is deposited in the cheese, which consistently changes the concentration of salt in the brine. The process must be monitored. This can be done with the JUMO CTI-750 inductive conductivity transmitter. The temperature is measured at the same time, as the duration of the cheese loaf in the brine also depends on this process variable.

**JUMO RTD temperature probe**  
Type 902810



**JUMO dTRON 304**  
Compact controller  
Type 703044

**JUMO CTI-750**  
inductive conductivity transmitter  
Type 202756



**JUMO AQUIS 500 pH Transmitter**  
Type 202560



**JUMO tecLine pH**  
pH-Einstabmesskette  
Typ 201020



**JUMO process fitting**  
Type 202825



## Ripening/storage

### Monitoring temperature and moisture during ripening

Different storage conditions are required for different cheese varieties.

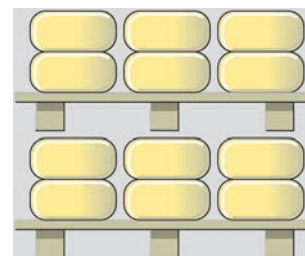
The important measurement variables during ripening are temperature, relative humidity and time.

To ensure optimum and reproducible ripening those measurement variables must be continually monitored and recorded.

**JUMO indoor, outdoor and duct RTD temperature probe**  
Type 902520/13



**JUMO dTRON 304**  
Compact controller  
Type 703044



**JUMO LOGOSCREEN nt**  
Paperless recorder with stainless steel front  
Type 706581



# Cleaning in Place (CIP)

Hygienic and perfectly cleaned plants are the basis of any good process. This is ensured by CIP (Cleaning in Place) cleaning. JUMO also offers top-quality, reliable systems and solution for you in this area.



# Cleaning in place (CIP)

## Measure – control – display – record

### New possibilities with JUMO AQUIS touch S

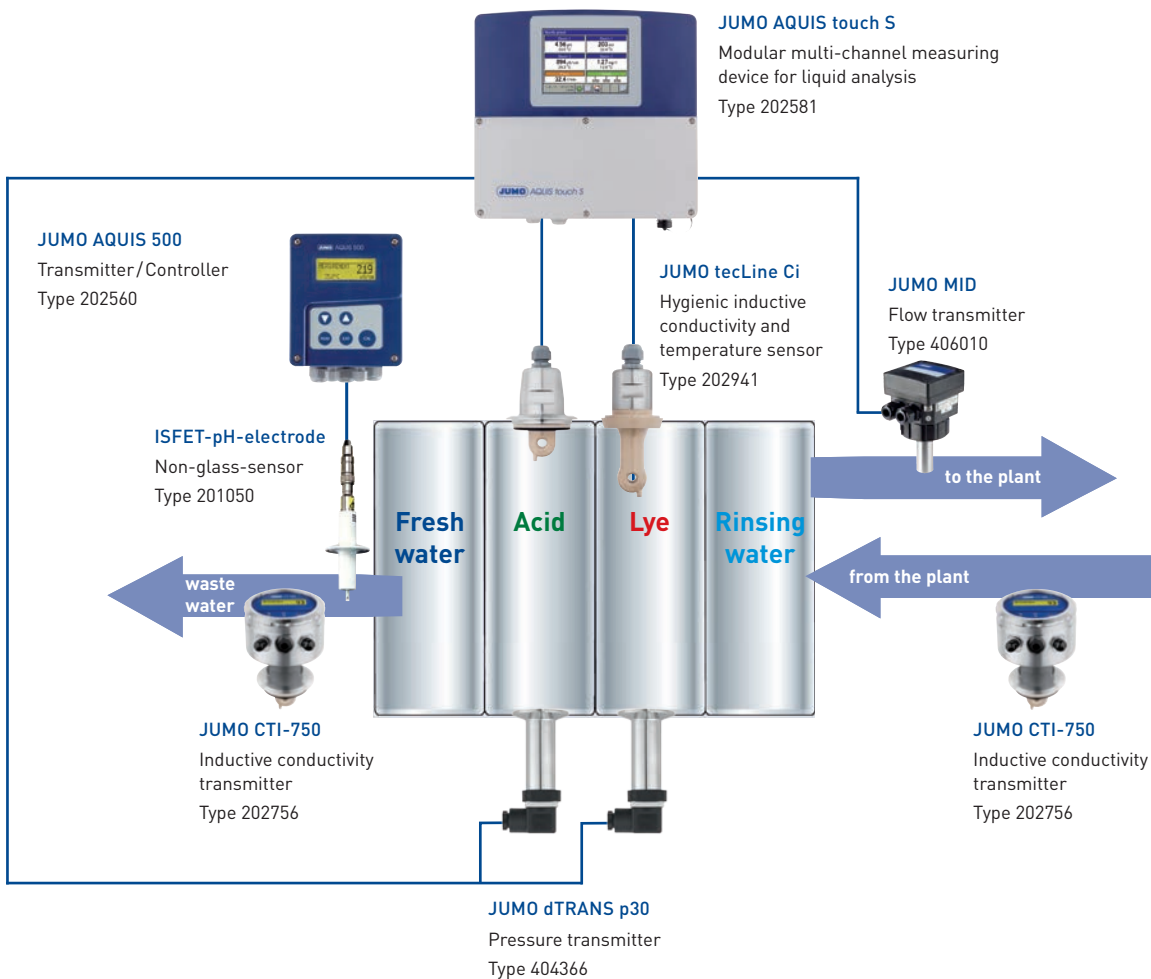
The JUMO AQUIS touch S is a modular multi-channel measuring device that allows for new approaches in CIP cleaning. For example, you can measure, control, display locally and record the concentration adjustment of acidic and lye solutions, the filling level of the two tanks and the flow velocity – all with one device. Normally up to four analog analysis sensors and as many as ten parameters can be measured and managed simultaneously.

In addition to numerous alarm, limit value or time-controlled switching functions, up to four higher-order loops can be defined simultaneously in the JUMO AQUIS touch S.

## Protect resources – reduce maintenance cost

Whichever system you choose, the modular multi-channel device JUMO AQUIS touch S or the proven inductive conductivity transmitter JUMO CTI-750, you have made an excellent investment.

Both systems have impressive advantages. For example, the JUMO CTI-750 is the ideal solution if you are working with a PLC in the background. On the other hand, the JUMO AQUIS touch S works as a standalone solution. The low-maintenance sensor and highly accurate, inductive measurement of conductivity help preserve resources and cut down on the maintenance overhead of your system.





[www.jumo.net](http://www.jumo.net)