



More than **sensors + automation**



Pharmaceuticals and biotechnology

Innovative solutions for your success





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Dear Reader,

Pharmaceutical products are an integral part of our everyday life. But only manufacturers realize how much the production of these materials depends on reliable processes and accurate measurement technology.

JUMO, your reliable partner, is always at your side to help when you have questions and to provide quick solutions, whether you want to monitor your process by pressure, temperature, conductivity or the pH value, or whether you want to control cleaning or reduce production costs.

How do we achieve that for you? Through many years of experience and professional competence. JUMO has been a leading manufacturer of measurement and control systems for more than sixty years. This has helped us become a competent partner for the pharmaceutical industry.

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

JUMO also offers only the best for you in pharmaceuticals and biotechnology: a wide range of solutions for the most diverse applications.

This brochure will give you an overview of JUMO products and systems for pharmaceuticals and biotechnology. Of course we would also be happy to develop individual solutions for you, completely customized to your requirements.

The ultimate result of these solutions is consistently high quality!

Yours,
Christina Hoffmann

P.S.: Detailed information about our products can be found under the specified type/product group number at www.industry.jumo.info

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Pharmaceutical water

The production of pharmaceutical water is one of the most important processes in the pharmaceutical industry. Without it, it would not be possible to manufacture most active substances, because the quality of the water is a prerequisite for consistently high product quality. Whatever water quality you require for your process, with JUMO products, you get pure water of a quality that you can rely on.



Filtration

Pressure monitoring during filtration

Before water can be directed to the reverse osmosis system, it is precleaned by a filter unit. This is necessary to prevent the possibility of the membrane becoming clogged.

You can use the JUMO dTRANS p20 DELTA differential pressure transmitter to measure precisely how long you can still use your filter by determining the increase in differential pressure. This allows you to make optimum use of filtration.

Reverse osmosis

Ultra-pure water monitoring in the reverse osmosis system

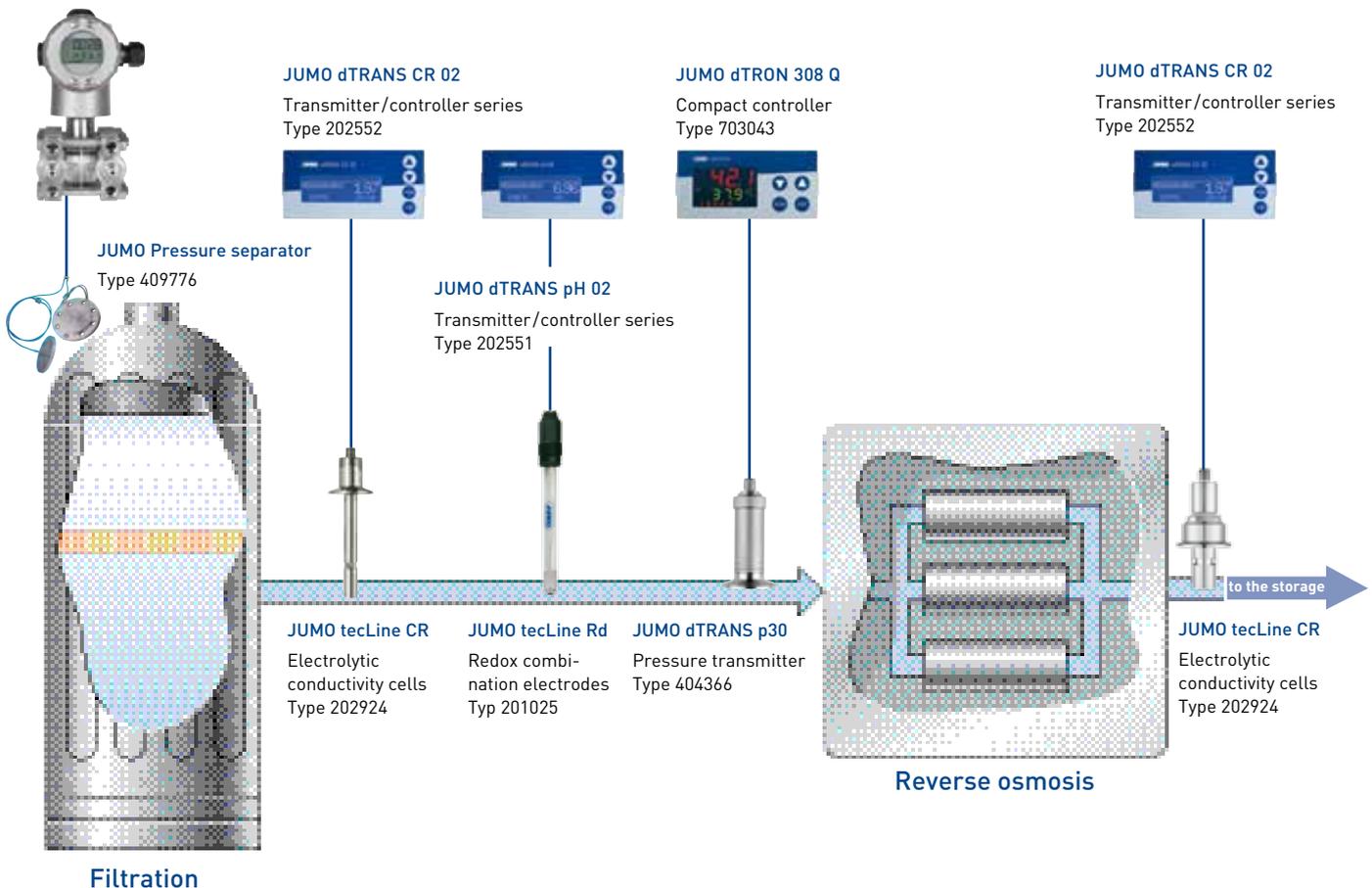
Reverse osmosis is widely used today as a process for producing ultra-pure water. The principle of osmosis is based on the process of equalizing the concentration of two liquids with different concentrations with the aid of a semipermeable membrane as a result of osmotic pressure.

JUMO offers you various options for monitoring the process with hygienic sensors and transmitters.

The conductivity transmitter offers you temperature compensation to ASTM D 1125-95 and limit monitoring to USP [water conductivity<645>].

JUMO dTRANS p20 DELTA

Differential pressure transmitter
Type 403022





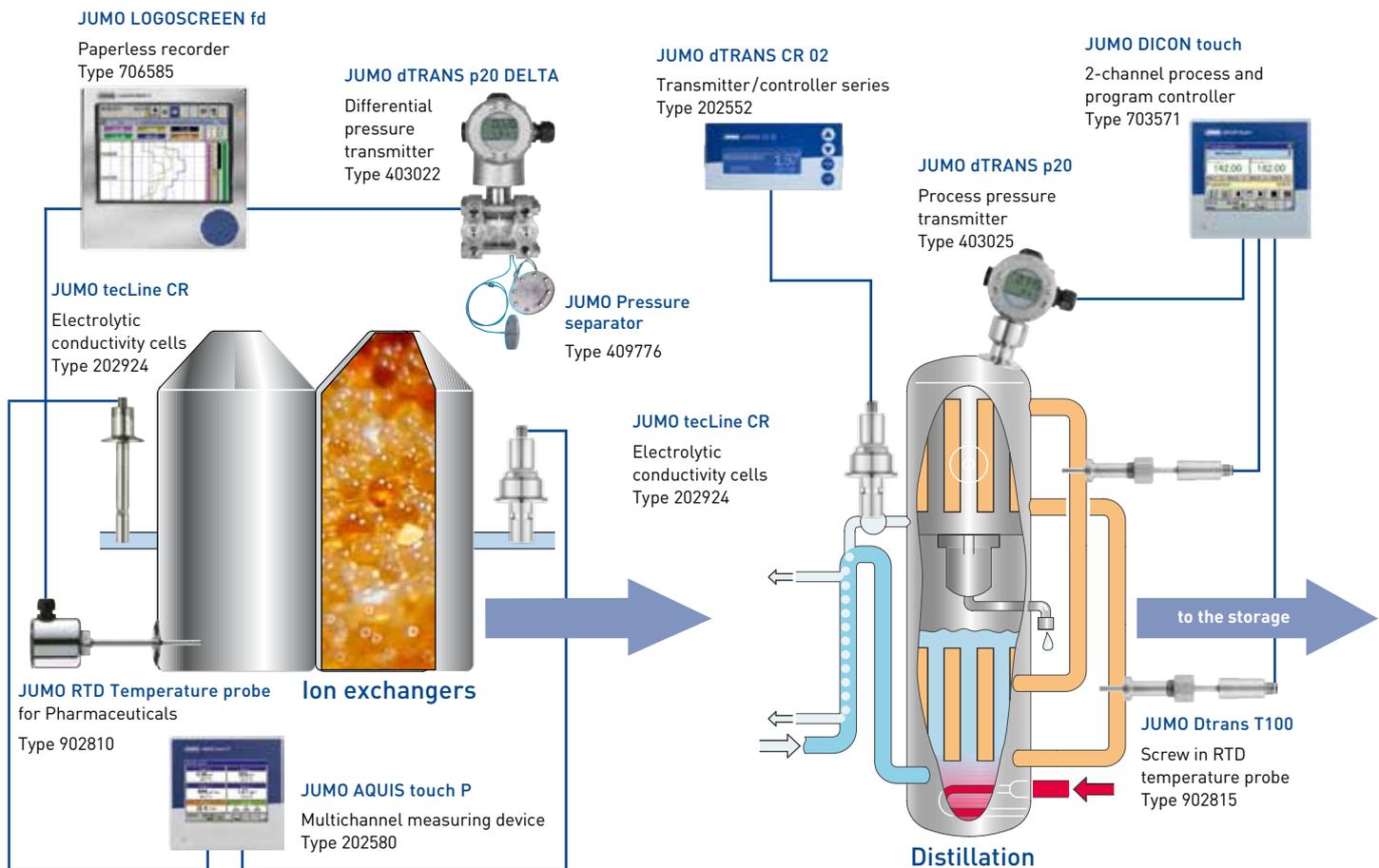
Distillation

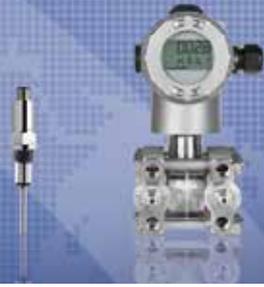
Production of ultra-pure water by means of distillation (WFI)

Distillation according to the European Pharmacopoeia is a stipulation in Europe in the production of water for injection purposes (WFI). Distillation is used almost exclusively for this purpose in the USA as well. One reason for this is the high quality of the water in terms of microbiological impurities. In the distillation process, water that has been previously cleaned (for example with an ion exchanger) is heated with previously produced steam and forced under pressure into the evaporator for distillation.

Temperature monitoring during distillation

Temperature measurement and control is one of the most important measurement variables in distillation. The vapor pressure curve of liquids as a function of pressure is used to determine the boiling point of the liquid. JUMO offers you temperature sensors specially designed for ultra-pure water systems with a surface roughness of $\leq 0.8 \mu\text{m}$ in 316L stainless steel. Temperature sensors have a fast response rate and can be equipped with appropriate hygienic process connections for ultra-pure water systems (for example a clamp or weld-in pocket).





Water storage

Pressure monitoring during distillation

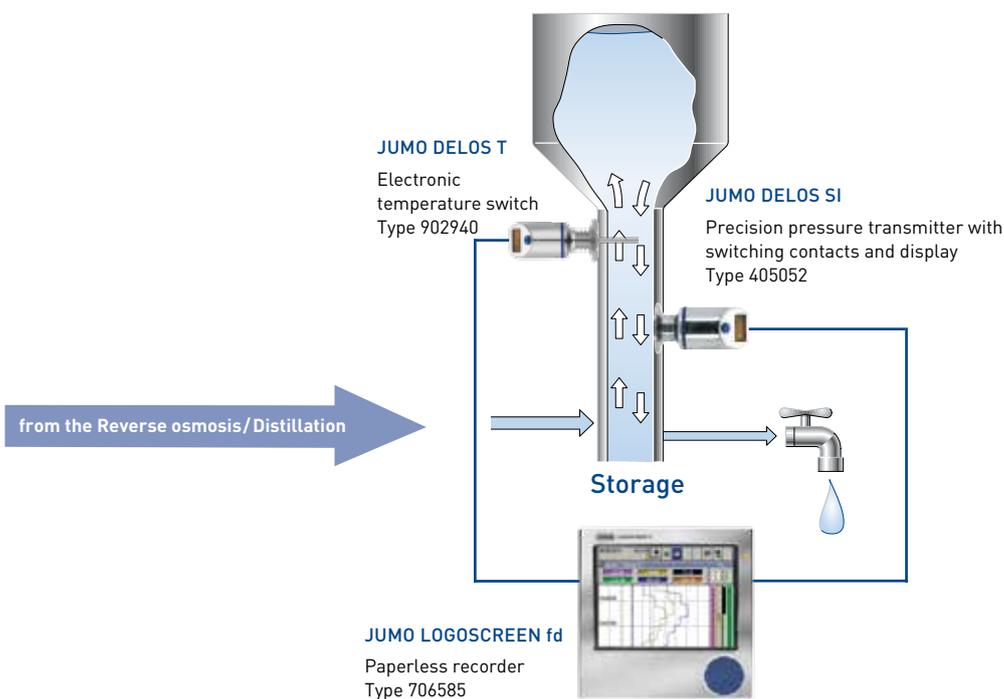
Pressure plays just as significant a role as temperature. Pressure is used to lower the boiling point of a liquid. This not only reduces stress on the liquid, but also requires less energy for the distillation overall, since it takes place at a lower temperature.

The JUMO dTRANS p20 is ideal for this application. The stainless steel version of a process pressure transmitter features superior accuracy for a high level of process safety and reliability.

Level and temperature monitoring in the water storage

A minimum temperature of 70°C is stipulated according to the European Pharmacopoeia for hot storage of distilled water for injection purposes.

With JUMO LOGOSCREEN nt, your process data can be reliably recorded and archived in a tamper-proof way. The paperless recorder also features the option of online process data visualization as well as various limit monitoring procedures, a remote alarm in the event of a fault, and simultaneous recording of 3 totally independent batch processes.



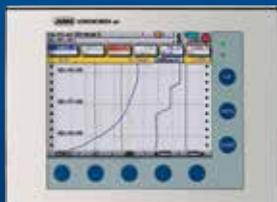


Sterilization of pharmaceutical products

The sterilization process is a very important process in the pharmaceutical industry.

With sterilization, regardless of whether it is steam, hot air or gas sterilization, the factors temperature, pressure and time are enormously important.

When carrying out sterilization, it is essential for the measuring instruments to respond quickly and work accurately and reliably. Here too, JUMO provides solutions that you can rely on.



Sterilization

Monitoring the sterilization process with JUMO LOGOSCREEN es

When carrying out sterilization, it is essential for the measuring instruments to respond quickly and work accurately and reliably.

For measurement control, you can connect the measuring points with the JUMO LOGOSCREEN es, a paperless recorder that documents and archives data for the sterilization process so as to exclude falsification.

The JUMO LOGOSCREEN es meets the requirements of FDA 21 CFR Part 11 and is thus suitable for documentation of all pharmaceutical processes.

Reliable measurement of pressure and temperature

The basic idea of sterilization is to make the products you are sterilizing germ-free. The factors of temperature, pressure and time are enlisted to achieve this. These factors are interdependent and mutually determinable.

JUMO provides you with fast-responding sensors and reliable measurement technology, so that you can rely on the outcome of sterilization.

No matter what type of sterilization you are performing. When the appropriate steam-tight versions are used, our products are suitable for any type of sterilization.

JUMO SVS3000

Process visualization software
Type 700755



JUMO LOGOSCREEN fd

Paperless recorder
Type 706585



FDA 21 CFR Part 11

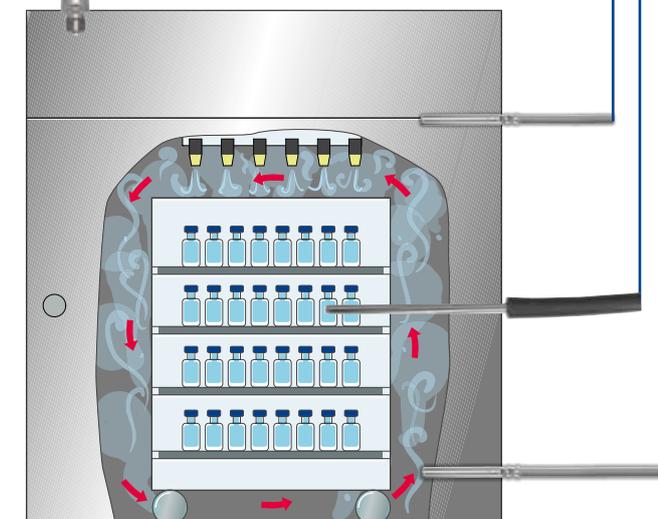
JUMO IMAGO 500

Multi-channel process and program controller
Type 703590



JUMO dTRANS p31

Pressure transmitter
Type 402050



JUMO STEAMtemp

Push-in resistance temperature probe in steam-tight version
Type 902830



Biological additives (Bio API)

Fermentation, a key process in the production of biological additives, is a white biotechnology process. In white biotechnology, microorganisms or enzymes are used to produce chemical or biochemical products. In the production of biological additives, you must rely on precise monitoring of temperature, pressure and the pH value. Top-class JUMO measuring systems, proven over many years, provide ideal support for you in this task.



Fermentation

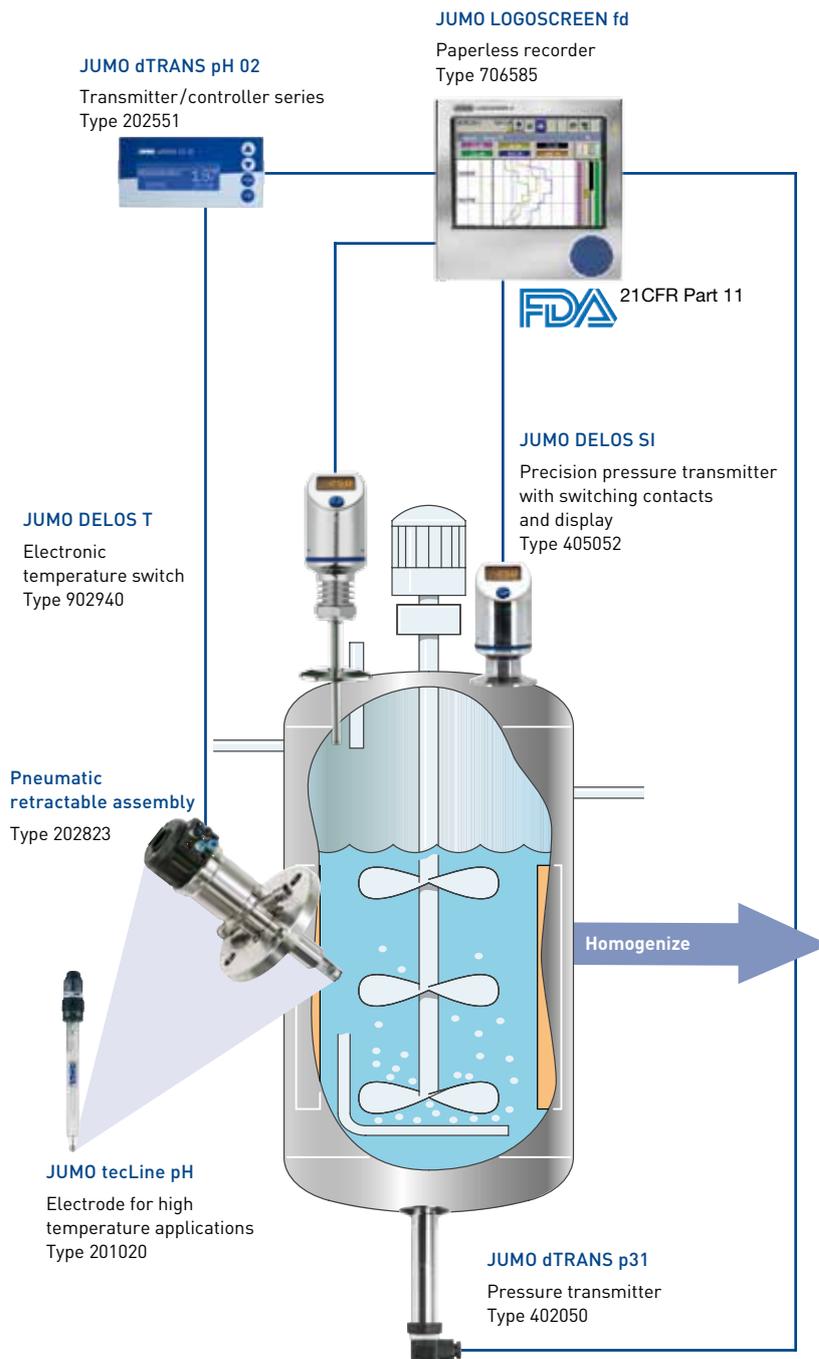
Monitoring the production of biological additives

Biological additives have high temperature and shear sensitivity, and they are also sensitive to the pH value, pressure and contamination. To selectively check all these conditions, JUMO measuring systems offer you specific control and measurement of components, to ensure reproducibility of the additives.

Monitoring pressure, temperature and pH value with the JUMO LOGOSCREEN es

The quality of the active substance being produced during fermentation depends greatly on process conditions. JUMO offers you the LOGOSCREEN series of paperless recorders for reliable documentation. They are able to document all measurement data reliably and reproducibly.

The JUMO LOGOSCREEN es paperless recorder, designed for reliable recording of FDA-compliant measurement data, is especially suitable for monitoring and recording your measurement data.





Harvesting

Pressure monitoring after separation with JUMO DELOS SI

It is important to monitor the pressure while the separator is in operation to ensure consistent separation. A constant pressure must be maintained in the process, regardless of any pressure or flow rate fluctuations that may occur after passing through the separator.

The electronic precision pressure switch JUMO DELOS SI 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. The high-quality stainless steels and front-flush measuring systems with no seals make it especially suitable for use in hygienically sensitive areas.

Pressure control during homogenization with JUMO IMAGO 500

Accurate pressure control and monitoring during homogenization guarantees that this process is always performed efficiently enough to achieve the desired result. The biomass produced in the separator is homogenized during the production of intracellular products. Cells are broken up during this process and the intracellular liquid is liberated.

Controlling pressure as a measurement variable with the JUMO dTRANS p30 pressure transmitter provides you with the reliability, safety and accuracy needed for this process.

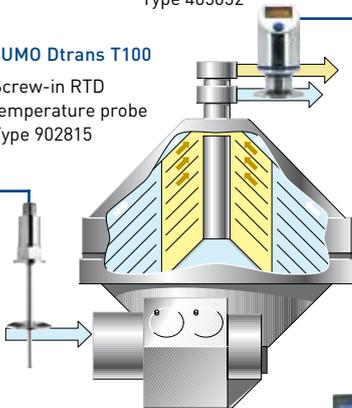
JUMO dTRON 304
Compact controller
Type 703044



JUMO DELOS SI

Precision pressure transmitter with switching contacts and display
Type 405052

JUMO Dtrans T100
Screw-in RTD
temperature probe
Type 902815



JUMO SVS3000
Process visualization software
Type 700755



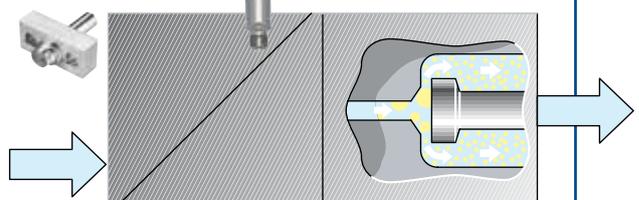
JUMO dTRON 308 Q

Compact controller
Type 703043



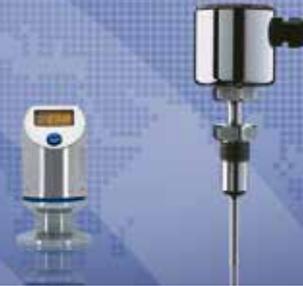
JUMO dTRANS p30
Pressure transmitter
Type 404366

Diaphragm seals



JUMO LOGOSCREEN fd
Paperless recorder
Type 706585





Cleaning

Cleaning the active substance in the separator

Before the active substance can be further processed, it must be cleaned, for example to remove residual cell pieces. A suitable washing liquid is provided for the active substance for this purpose and it is cleaned in the separator. For optimum and reproducible process conditions, JUMO offers you pressure and temperature sensors to ensure that processes are not subject to deviations in quality.

Collecting

Monitoring liquid levels in a collecting container with the JUMO dTRANS p20

After cleaning, the active substance that has been produced is stored in collecting containers for further processing. Liquid level monitoring based on hydrostatic pressure with the JUMO dTRANS p20 helps you ensure optimum utilization of capacity for the collecting container.

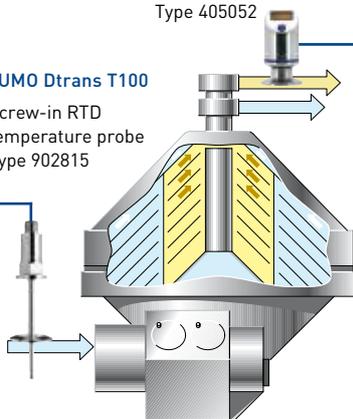
JUMO dTRON 304

Compact controller
Type 703044

JUMO DELOS SI

Precision pressure transmitter with
switching contacts and display
Type 405052

JUMO Dtrans T100
Screw-in RTD
temperature probe
Type 902815



JUMO SVS3000

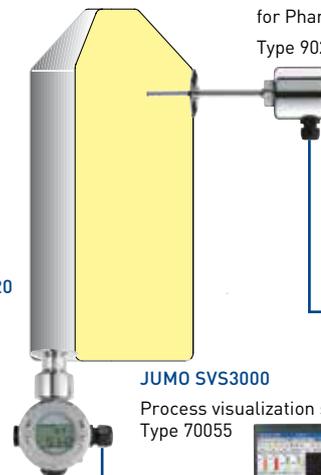
Process visualization software
Type 700755

JUMO RTD temperature probe
for Pharmaceuticals
Type 902810

JUMO dTRON 304
Compact controller
Type 703044

JUMO dTRANS p20

Process pressure
transmitter
Type 403025



JUMO SVS3000

Process visualization software
Type 70055



Drying

Different forms of drying are used in the pharmaceutical industry.

The most widely used methods of drying are freeze-drying, a gentle method, and spray drying.

Whatever drying method you use, JUMO humidity, temperature and pressure sensors support your process and ensure consistent high quality for your final product.



Drying

Control and monitoring of freeze-drying

Freeze-drying makes it possible to freeze products gently. They are subsequently dried in a vacuum. After the product is frozen, the pressure is controlled so it remains under the sublimation pressure. Slightly heating the frozen material while maintaining the same pressure causes the water to sublime. The steam that is liberated freezes on the subcooled condenser.

JUMO offers you temperature and pressure sensors for this process to provide optimum control of the freeze-drying process, for example in combination with the JUMO IMAGO 500 process controller. The JUMO LOGOSCREEN nt paperless recorder further increases reliability and safety by accurately recording your measurement values.

Monitoring temperature and humidity during spray drying or fluid bed drying

In this process, the moist surface of the drop of liquid (the product) draws the energy in the form of heat required for evaporation from the drying gas. The drying air cools off during the process while simultaneously absorbing water vapor.

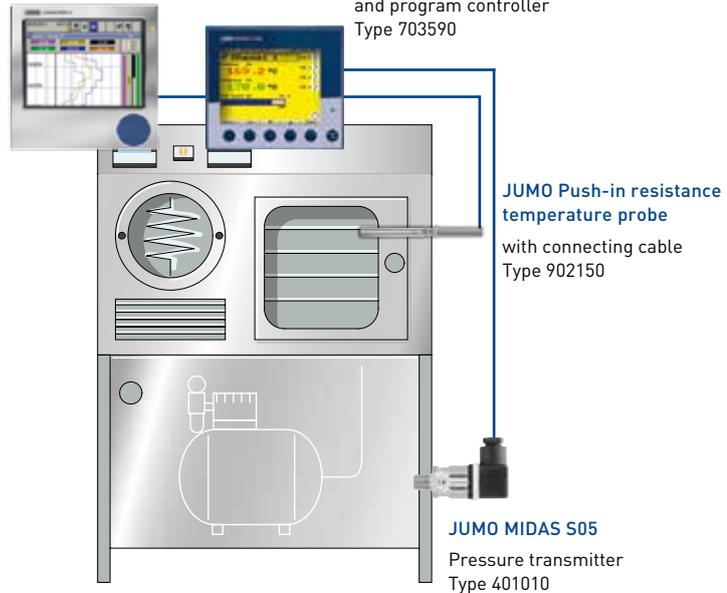
JUMO offers you suitable sensors and recorders for monitoring temperature, pressure and relative humidity to ensure consistent high product quality. We also offer sensors with appropriate ATEX approval for intrinsic safety in areas subject to an explosion hazard.

JUMO LOGOSCREEN fd

Paperless recorder
Type 706585

JUMO IMAGO 500

Multi-channel process
and program controller
Type 703590



JUMO Push-in resistance temperature probe
with connecting cable
Type 902150

JUMO MIDAS S05
Pressure transmitter
Type 401010

JUMO Intrinsically safe industrial transducer

for humidity and temperature
Type 907025



JUMO Wtrans Ex

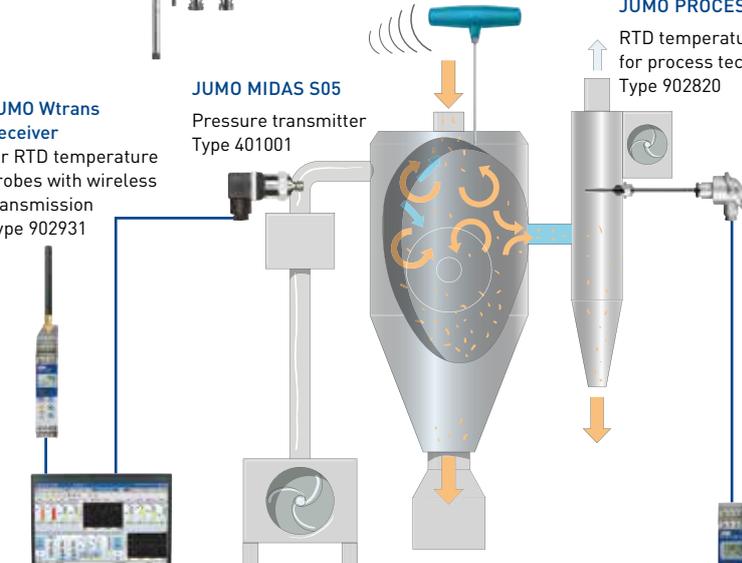
RTD temperature probe
with wireless transmission
Type 902930

JUMO PROCESStemp

RTD temperature probe
for process technology
Type 902820

JUMO Wtrans Receiver
for RTD temperature
probes with wireless
transmission
Type 902931

JUMO MIDAS S05
Pressure transmitter
Type 401001



JUMO dTRANS T02
4-wire transmitter
Type 707020

JUMO SVS3000
Process visualization software
Type 700755



Refining additives

Granulation, pelletizing and coating are all processes that involve a type of refinement of previously produced active substances.

JUMO offers you suitable measuring systems for controlling and monitoring temperature and pressure so that you can have complete and total confidence in your process.

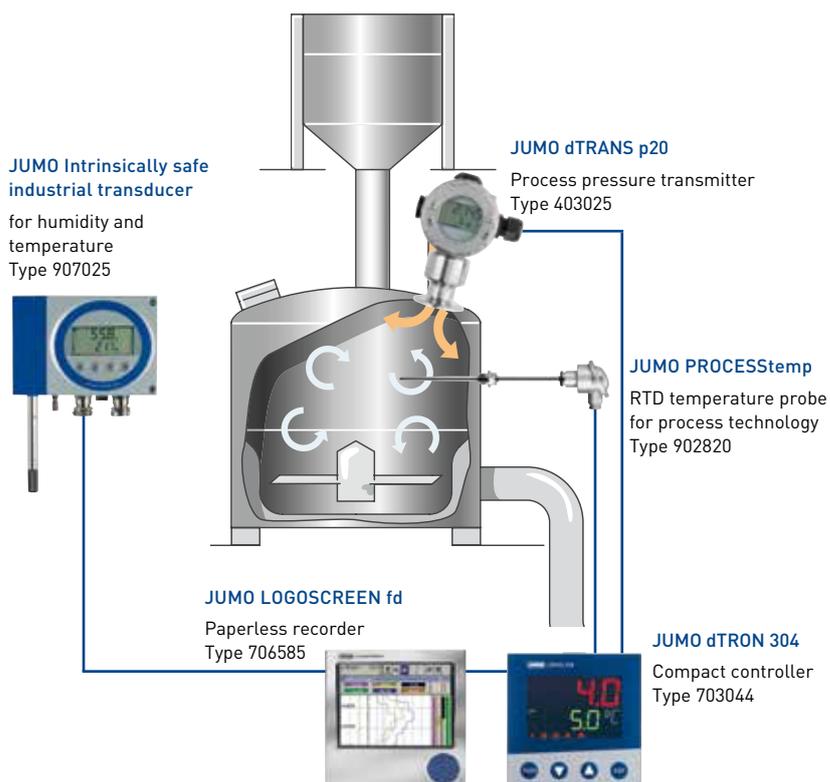


Granulation

Pressure and temperature monitoring during granulation

During granulation, a liquid binding agent is mixed with a powder. Agglomerates are formed, which are then processed by subsequent drying to become finished granulate.

To ensure that you can monitor your process reliably, JUMO offers you the JUMO dTRANS p20 process pressure transmitter for perfect control of pressure shock resistance in your system. Reliable pressure measurements as well as temperature measurements are especially essential for optimum process reliability when using organic binding solutions.

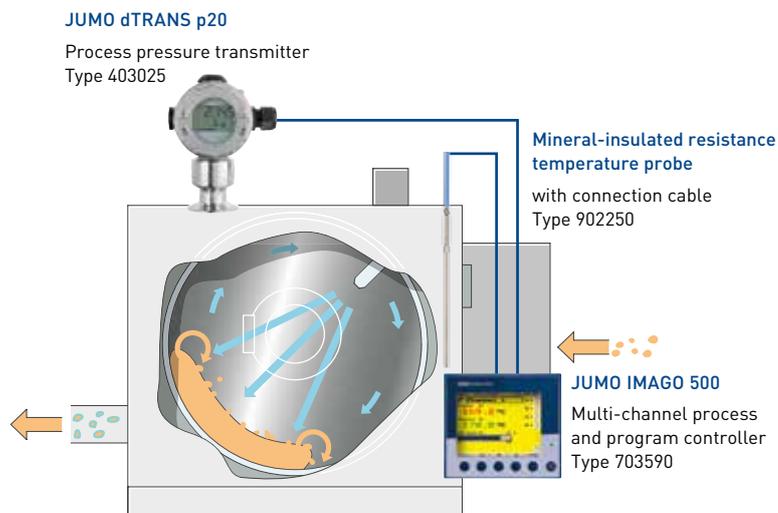


Coating

Temperature and pressure monitoring during coating

Depending on the application, the required pressure and temperature must be precisely controlled when applying a coating suspension to guarantee uniform application of the suspension. JUMO offers you the optimum solution with its measuring systems.

Whether you are working with low-pressure or high-pressure processes, the multi-channel JUMO IMAGO 500 process controller is ready for any challenge. The option of freely configurable screen templates allows you to display the process locally. The additional recording function ensures that you will always be able to reproduce your process and therefore produce high-quality products.





Clean room

A clean room is designed so that the number of airborne particles entering or remaining in the room is as small as possible. Depending on the application, the number of particles only or also the number of microorganisms is monitored. Both are required in the production of pharmaceutical products, for example.

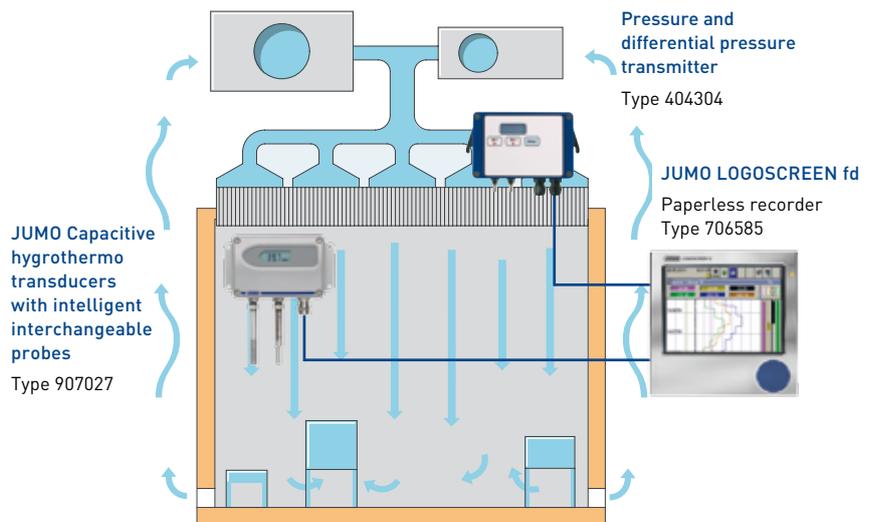
Depending on which product is being manufactured in the clean room, other requirements affect the parameters. JUMO offers you solutions to keep parameters for pressure, temperature and humidity constant and to monitor them.



Clean room

Recording relevant measurement variables with JUMO LOGOSCREEN nt

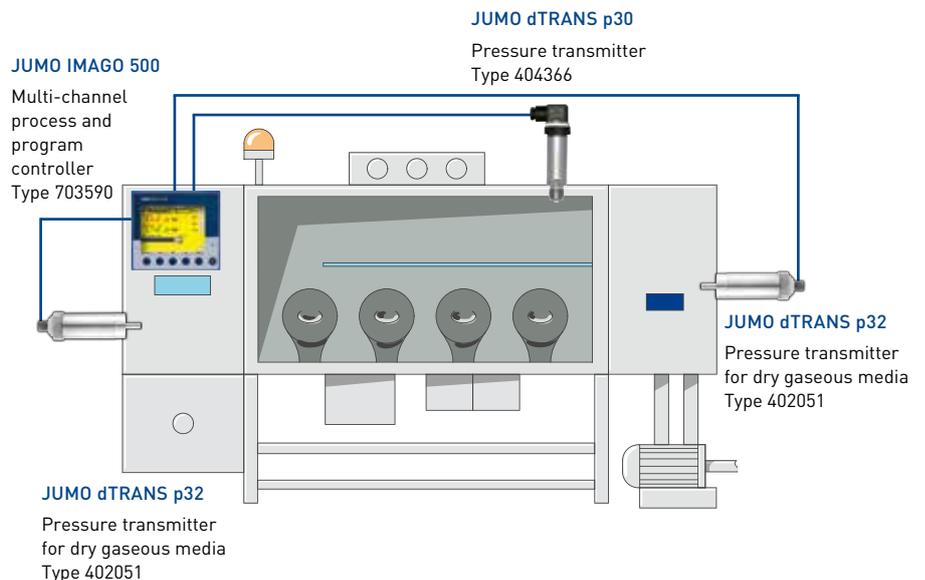
Pressure monitoring plays a key role in a clean room. Monitoring with the JUMO LOGOSCREEN nt paperless recorder ensures that you will be notified immediately by the integrated web server in the event of a failure or fault. To be able to exclude external influences in the production of sensitive products, it is also important for you to maintain reproducible climatic conditions continuously in the clean room. The JUMO LOGOSCREEN nt is also ideally suited for this purpose. Measurement variables can be recorded, displayed and saved simultaneously.



Glove box

Control and monitoring of pressure in glove boxes

A glove box or isolator is a container that is hermetically sealed and gas-tight to the surrounding work area. To control the lock pressure, which adjusts the product to conditions in the glove box, for example by evacuating and then flooding the glove box with a mixture free of oxygen, JUMO offers you the JUMO dTRANS p32 for gaseous, dry media. The heart of the transmitter is a piezoresistive measuring cell with high overload resistance and stability to guarantee maximum reliability and safety for your process.





CIP/SIP cleaning

Hygienic and perfectly cleaned plants are the basis of any good process. This is ensured by CIP or „Cleaning in Place“. JUMO also offers top-class systems and solutions you can rely on for this application.



Pharmaceuticals and biotechnology

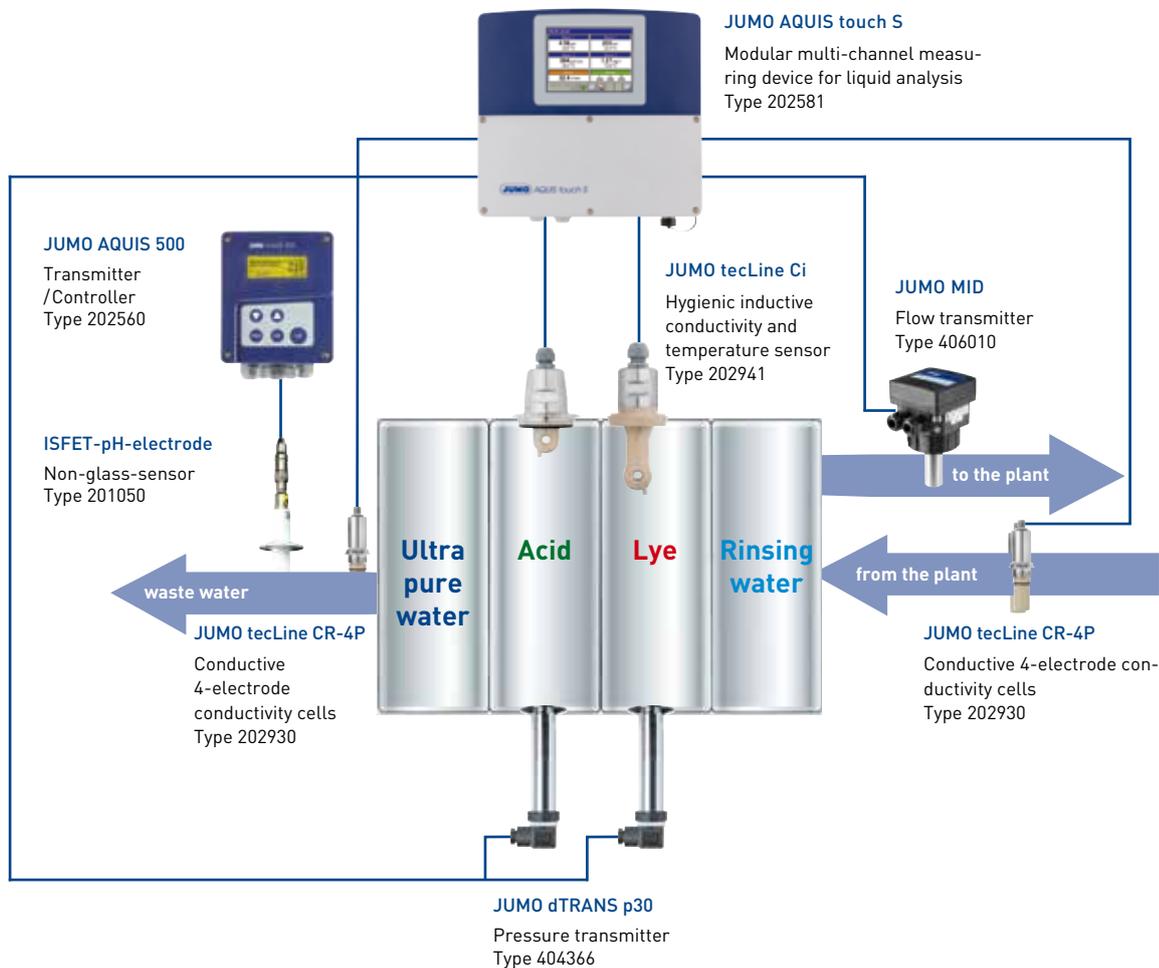
Pharmaceutical water Sterilization Biological additives Drying Refining additives Clean room CIP/SIP cleaning

Reliability and cleanliness for your system with the JUMO tecLine Lf-4P conductivity cell

CIP is used nowadays in all plants with modern technology. It saves time and money. The conductive 4-electrode JUMO tecLine Lf-4P conductivity cell supports this process with accurate measurements to ensure that cleaning proceeds quickly and reliably. The measuring cell covers a wide measuring range, allowing you to measure conductivity from $1\mu\text{S}/\text{cm}$ to $600\text{mS}/\text{cm}$.

Reliability and speed by monitoring cleaning in place (CIP) with the JUMO LOGOSCREEN nt

To document and monitor the CIP process reliably, all the important measurement variables should be recorded and evaluated by a single paperless recorder. That is precisely what the JUMO LOGOSCREEN nt paperless recorder offers: It allows you to track the process accurately, optimize it perfectly and thereby reduce your cleaning agent costs.



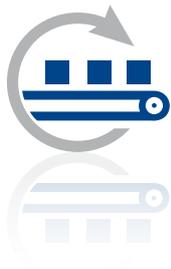


Services & Support

It is the quality of our products that is responsible for such a high level of customer satisfaction. But our reliable after-sales service and comprehensive support are also appreciated. Let us introduce you to the key services we provide for our innovative JUMO products. You can count on them – anytime, anywhere.

JUMO Services & Support – so that it all comes together!

Manufacturing Service



Are you looking for a competitive and efficient system or component supplier? Whether you seek electronic modules or perfectly fitting sensors, whether small batches or mass production – we are happy to be your partner. From development to production, we can provide all the stages from a single source. In close cooperation with your business, our experienced experts search for the optimum solution for your application and incorporate all engineering tasks. Then JUMO manufactures the product for you.

As a result, you profit from state-of-the-art manufacturing technologies and our uncompromising quality management systems.

Customer-specific sensor technology

- Development of temperature probes, pressure transmitters, conductivity sensors, or pH and redox electrodes according to your requirements
- A large number of testing facilities
- Incorporation of qualifications contents into application
- Material management
- Mechanical testing
- Thermal test



Electronic modules

- Development
- Design
- Test concept
- Material management
- Production
- Logistics and distribution
- After-sales service



Metal technology

- Toolmaking
- Punching and forming technology
- Flexible sheet metal machining
- Production of floats
- Welding, jointing, and assembly technology
- Surface treatment technology
- Quality management for materials





Information & Training



Would you like to increase the process quality in your company or optimize a plant? Then use the offers available on the JUMO Web site and benefit from the know-how of a globally respected manufacturer. For example, under the menu item "Services and Support", you will find a broad range of seminars. There are videos available under the keyword "E-Learning" about topics specific to measurement and control technology. Under "Literature", you can learn valuable tips for beginners and professionals. And of course, you can also download the current version of any JUMO software or technical documentation for both newer and older products.

Product Service



We have an efficient distribution network on all five continents available to all of our customers so that we can offer professional support for everything concerning our product portfolio. Whether you need assistance in a consultation, with product selection, engineering, or optimum usage of our products – a team of professional JUMO employees is near you, ready to help. Even after our devices are commissioned you can count on us. Our telephone support line is available to give you answers quickly. If a malfunction needs to be repaired on site, our Express Repair Service and our 24-hour replacement part service are available to you. That provides peace of mind.

Maintenance & Calibration



Our maintenance service helps you to maintain optimum availability of your devices and plants. This prevents malfunctions and downtime. Together with the responsible parties at your company, we develop a future-oriented maintenance concept and are happy to create all required reports, documentation, and protocols. Because we know how important precise measurement and control results are for your processes, we naturally also professionally calibrate your JUMO devices – on site at your company or in our accredited DAkkS calibration laboratory for temperature. We record the results for you in a calibration certificate according to EN 10 204.



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