**JUMO**

More than **sensors + automation**

# Water and Wastewater Engineering

Innovative solutions for your success

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# Dear Reader,

Water – humanity's most important food resource. As a manufacturer you have to depend on reliable measurement and control systems to help you comply with strict regulations.

JUMO, your reliable partner, is at your side to help when you have questions and to provide you with quick solutions. We do so whether you want to use conductivity, pH-value, redox potential, pressure, or temperature to monitor water quality. Alternatively, these measurands can also be used to regulate and control your systems.

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 60 years and consequently has been a professional partner to the water and wastewater engineering industry.

We place particular importance on regular new developments, on continuous improvements in existing products, and on continually making production methods more economical. These steps are the only way to achieve the highest level of innovation.

Here at JUMO we provide only the best for your water and wastewater engineering tasks with a wide range of solutions for a variety of applications.

This brochure provides an overview of JUMO's products and systems for water and wastewater engineering. Of course we are also happy to work with you to create customized solutions for your individual requirements.

On that note: may water quality always remain consistently high!

Matthias Kremer

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

# Contents

# Measurement and control technology

## Sensors

### pH-electrodes

The pH-value is measured in many water and wastewater engineering processes. JUMO can provide you with a vast selection of pH-electrodes. Whether the glass or plastic versions are involved, we can evaluate your needs and customize the pH-electrodes during production so that they are optimized to your application.

### Pressure, level, and flow

JUMO products allow you to meet all your pressure, level, or flow measurement requirements. Our pressure measuring devices can be adapted to all water and wastewater engineering processes. Various special materials are also available for corrosive media.

The JUMO dTRANS p20 pressure transmitter and the JUMO dTRANS p33 level measurement probe are the ideal solution for measuring the pressure and level in Ex-areas (e.g. in a digester).

**JUMO tecLine pH/JUMO tecLine Rd**
pH and redox combination electrodes
Types 201020/201025

**JUMO tecLine CR**
Conductive two-electrode conductivity sensor
Type 202924

**JUMO tecLine CR-4P**
Conductive four-electrode conductivity sensor
Type 202930

**JUMO tecLine Cl2, TC, ClO2, O3, H2O2, PAA**
For free chlorine, chlorine dioxide, total chlorine, ozone, peracetic acid, and hydrogen peroxide
Types 202630, 202631, 202634, 202636

**JUMO MAERA F27**
Level measurement probe with ceramic measuring cell
Type 404391

**JUMO tecLine HD pH/Rd**
pH/redox electrodes for difficult applications
Type 201021 or 202026

**JUMO DELOS SI**
Precision pressure transmitter with switching contacts and display
Type 405052

**JUMO MIDAS C18 SW**
OEM pressure transmitter – seawater
Type 401012

**JUMO PROCESStemp**
RTD temperature probe for process technology
Type 902820

# Fittings

### Simply safe

Regardless of whether you are measuring pH in closed circuits or redox in open containers – with JUMO fittings you always have the appropriate product for any application. Our fittings are available in different versions and in different materials so that they can withstand both aggressive media and hygienic conditions.

### JUMO pneumatic retractable holder

Difficult process conditions can have a negative effect on the service life of a pH-electrode. Regular, automated cleaning of the pH-electrode can significantly increase its service life and reduce maintenance costs.

JUMO pneumatic retractable holders type 202823 are used wherever sensors are exposed to exceptional loading.

**JUMO Immersion Fitting**
Type 202820

**JUMO VA Immersion Process Fitting**
Type 202821

**JUMO Pneumatic Retractable Holder**
Type 202823

**JUMO Process Fittings**
Types 202825, 202831

**JUMO Flow Fittings**
Type 202810

**JUMO Retractable Holders**
Type 202822

# Transmitters and controllers

## pH and redox transmitters

In addition to sturdy pH and redox electrodes, many processes also require measurement and control equipment that can be mounted according to on-site requirements. JUMO offers a wide selection of models to meet this need. Customers typically choose devices for panel mounting (JUMO dTRANS pH02), installation in a wall-mounted case (JUMO AQUIS 500 pH) with a high protection rating (e.g. IP67), or DIN rail mounting (JUMO ecoTRANS pH03).

## Recording, archiving, evaluating

With the JUMO LOGOSCREEN paperless recorder range, the measured values from drinking water and wastewater treatment that require verification can be recorded, archived, and evaluated in an easy and tamper-proof manner. The new JUMO LOGOSCREEN nt generation in particular has an integrated web server or a remote alarm option in the event of a malfunction.

### JUMO dTRANS O2 01

Two-wire transmitter for dissolved oxygen (DO)
Type 202610

### JUMO AQUIS 500 pH/CR/Ci/AS

Transmitter/controller series for pH-value, redox, ammonia concentration, chlorine, chlorine dioxide, ozone, conductive and inductive conductivity, and temperature
Types 202560/202565/202566/202568

### JUMO AQUIS touch S/P

Multichannel measuring devices for liquid analysis
Types 202580, 202581

### JUMO CTI-500 and CTI-750

Inductive conductivity transmitter with plastic or stainless steel case
Types 202755, 202756

### JUMO ecoTRANS pH/Lf 03

Microprocessor transmitter / switching device for pH-value / redox voltage, conductivity, and temperature
Types 202723, 202732

### JUMO dTRANS pH/CR/AS 02

Transmitter/controller series for pH-value, redox voltage, chlorine, chlorine dioxide, ozone, conductive conductivity, and temperature
Types 202551/202552/202553

# Water and Wastewater Engineering

**Measurement and control technology**  Drinking water   Swimming pool water   Highly-purified water   Cooling water   Wastewater
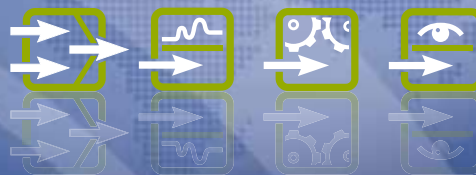
# Display and recorder devices

## Conductivity transmitter

Whether involved in desalination of seawater or monitoring the quality of highly-purified or cooling water, conductivity measurement has an important role to play in all aspects of water and wastewater engineering. JUMO can provide measuring devices to cover all the current measuring systems on the market – conductive conductivity measurement (two and four-electrode technology) as well as low-maintenance inductive measuring with JUMO CTI-500 and JUMO CTI-750.

## Automation and visualization

The SVS3000 process visualization software allows effective operator control, visualization, and documentation. Processes are made transparent by a user-friendly user interface with numerous functions such as an application explorer, alarm list, and event list. The software is quick and easy to configure so that you can save high application costs.

**JUMO ecoLine O-DO**

Optical sensor for dissolved oxygen with JUMO AQUIS 500 RS display unit / controller
Types 202569, 202613



**JUMO di 308**

Digital display unit
Type 701550



**JUMO LOGOSCREEN fd**

Paperless recorder for FDA-compliant measurement data recording
Type 706585



**JUMO LOGOSCREEN nt**

Paperless recorder with TFT display, CF card, and USB interfaces
Type 706581



**JUMO LOGOSCREEN 500 cf**

Paperless recorder with CF card, RS232/485, Ethernet
Type 706510



**JUMO SVS3000**

Visualization software
Type 700755

# Drinking water

Drinking water is humanity's most important food resource which cannot be replaced by other substances.

JUMO pH, conductivity, and level sensors support your process and ensure that your drinking water is of a consistent quality no matter which method of water treatment you use.

# Water and Wastewater Engineering

Measurement and control technology **Drinking water** Swimming pool water Highly-purified water Cooling water Wastewater

## Measuring pH in drinking water

Different parameters are measured to ensure that the drinking water is reliably monitored. One of the most important parameters is the pH-value. The pH-value of drinking water should not be less than 6.5 and not more than 9.5. pH in drinking water is measured by JUMO tecLine pH electrodes in conjunction with the JUMO AQUIS 500 pH transmitter/controller.

## Level measurement in groundwater

In groundwater or in wells the water level should be continuously measured by a level measurement probe using level pressure. The JUMO MAERA S28 level measuring probe with a piezo-resistive measuring cell is particularly suited for this task.

It has an integrated overvoltage pro-tection which protects the electronic components of the level measuring probe from an indirect lightning strike. With the additional high overload resistance and long-term stability the JUMO MAERA S28 offers a high level of security.

## Turbidity measurement in groundwater

Continuous turbidity measurement with JUMO ecoLine NTU is an easy method of monitoring the raw water quality for undissolved substances in water. Furthermore, knowing the turbidity of the raw water makes the estimation of flocculating agents and the energy input in the flocculation stage easier.

**JUMO tecLine pH/JUMO tecLine Rd**
pH and redox combination electrodes
Types 201020, 201025

**JUMO tecLine CR**
Conductive two-electrode conductivity sensor
Type 202924

**JUMO AQUIS 500 pH/CR/Ci/AS**
Transmitter/controller series for pH-value, redox-voltage, ammonia concentration, chlorine, chlorine dioxide, ozone, conductive and inductive conductivity, and temperature
Types 202560, 202565, 202566, 202568

**JUMO dTRANS pH/CR/AS 02**
Transmitter/controller series for pH-value, chlorine, chlorine dioxide, ozone, conductive conductivity, and temperature
Types 202551, 202552, 202553

**JUMO tecLine Cl2**
For free chlorine
Type 202630

**JUMO AQUIS touch S/P**
Multichannel measuring devices for liquid analysis
Types 202580, 202581

**JUMO ecoLine NTU**
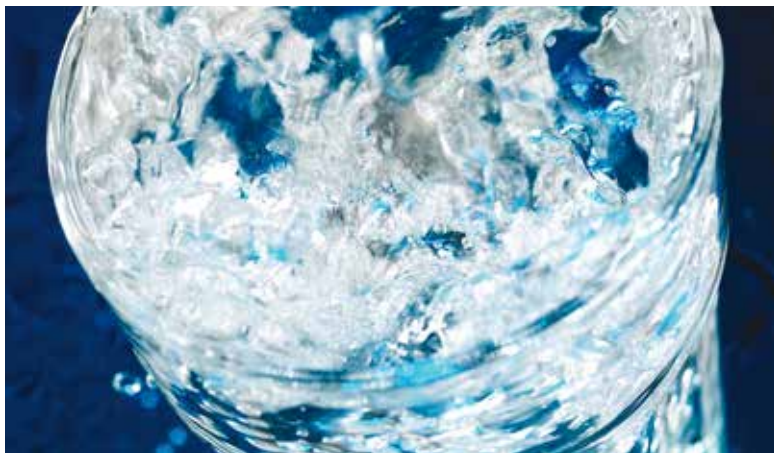Optical turbidity sensor with JUMO AQUIS 500 RS display unit / controller
Types 202569, 202670

**JUMO MAERA S28**
Level measurement probe
Type 404392

**JUMO MID**
Flow transmitter
Type 406010

# Groundwater

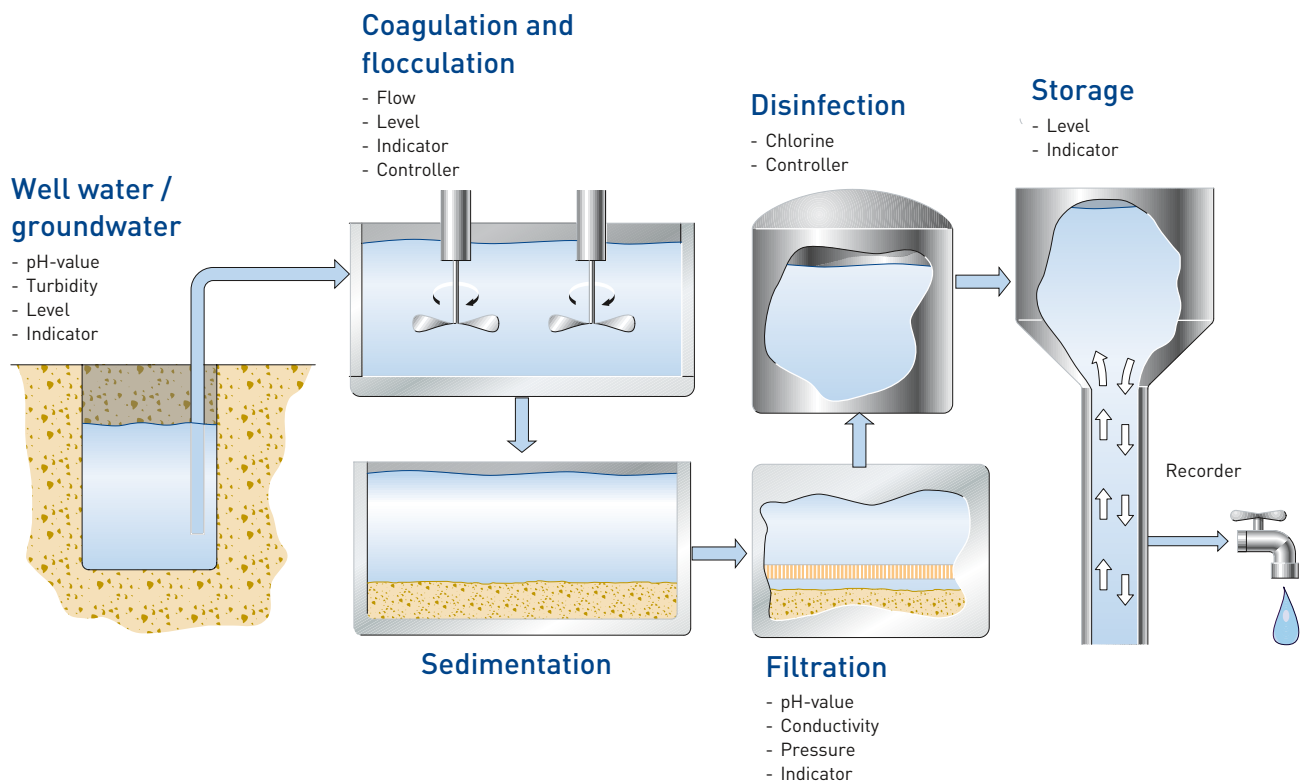### Where does our drinking water come from?

Drinking water treatment refers to the treatment of spring water, surface water, or groundwater.

Spring water refers to water that emerges out of the earth from underground water sources. Surface water is taken from standing or flowing bodies of water above ground. Dam reservoir water, lake water, and river water are three types of surface water. Groundwater is part of the natural water cycle. It comes predominantly from rainwater seeping through the soil and the subsoil into the aquifer.

### From groundwater to drinking water

Most drinking water comes from groundwater. The treatment of drinking water involves a number of different processes.

Flocculation is a process of wastewater and drinking water treatment that reduces existing turbidity. The finest, suspended, or colloidal particles in the water coagulate and then settle or can be filtered. The solid matter and turbidities can be isolated by sedimentation. Filtration describes the process whereby a solid matter / liquid mixture in the water or wastewater can be separated or segregated by filters. Disinfection either removes microorganisms from the water or kills them so that hygienically perfect water is attained.

**Coagulation and flocculation**
- Flow
- Level
- Indicator
- Controller

**Disinfection**
- Chlorine
- Controller

**Storage**
- Level
- Indicator

**Well water / groundwater**
- pH-value
- Turbidity
- Level
- Indicator

Recorder

**Sedimentation**

**Filtration**
- pH-value
- Conductivity
- Pressure
- Indicator

# Water and Wastewater Engineering

Measurement and control technology   **Drinking water**   Swimming pool water   Highly-purified water   Cooling water   Wastewater

# Brackish water and seawater

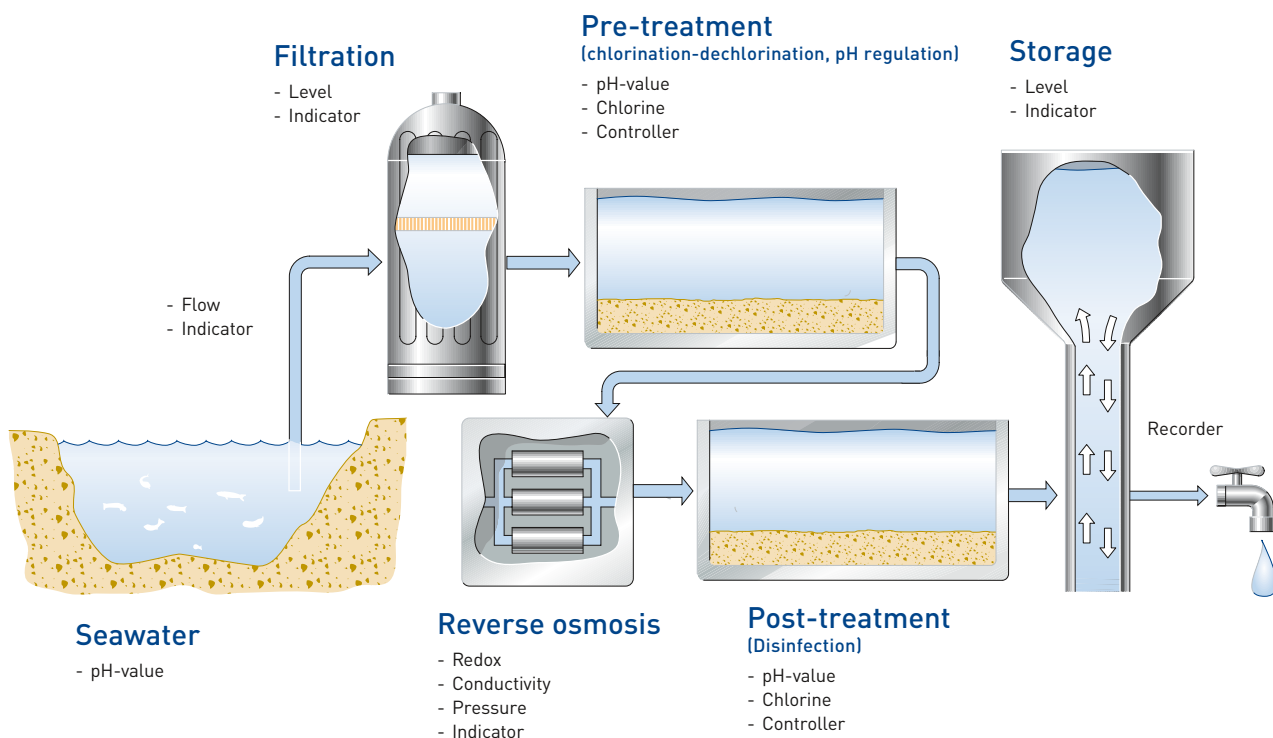**Desalination of brackish water and seawater**

According to UNESCO the supply of drinking water is highly problematic in many parts of the world. A limited amount of water is available on our planet and 97.5 % of the water in the world is salty. Because the availability of drinking water is limited, seawater is an important source of drinking water.

Seawater desalination is a method of obtaining drinking water or process water from seawater by reducing the salt content.

**Pressure measurement before reverse osmosis**

The crucial element in seawater desalination plants is the reverse osmosis unit. During reverse osmosis the seawater is pushed through a semi-permeable membrane at high pressure. This membrane functions like a filter and only allows specific ions and molecules to pass through.

Because seawater has such high salinity, a pressure of 60 to 80 bar is required. To ensure safe system operation, the pressure before reverse osmosis must be monitored. The obvious choice for this task is the JUMO MIDAS C08 pressure transmitter.

**Filtration**
- Level
- Indicator

**Pre-treatment**
**(chlorination-dechlorination, pH regulation)**
- pH-value
- Chlorine
- Controller

**Storage**
- Level
- Indicator

- Flow
- Indicator

Recorder

**Seawater**
- pH-value

**Reverse osmosis**
- Redox
- Conductivity
- Pressure
- Indicator

**Post-treatment**
**(Disinfection)**
- pH-value
- Chlorine
- Controller

# Swimming pool water

Swimming is a popular and healthy leisure activity – as long as the water has the right quality. To keep it consistent, swimming pools are continuously monitored and controlled.

Here, too, JUMO provides solutions that you can rely on.

# Water and Wastewater Engineering

Measurement and control technology    Drinking water    **Swimming pool water**    Highly-purified water    Cooling water    Wastewater

## Measuring pH in swimming pools

The pH-value is one of the most important parameters in swimming pool water. The optimum pH-value for swimming pool water lies between 7.2 and 7.8. pH-values that are too low or too high cause various problems as well as the risk of corrosion and skin/ eye irritation.

JUMO provides the following solution for monitoring the pH-value: JUMO tecLine pH-electrodes in conjunction with the JUMO AQUIS 500 pH transmitter/controller.

## Concentration of the disinfectant

In addition, disinfectant content can be determined on a weekly basis. With chlorine, for example, this content ideally lies between 0.3 and 0.6 mg/l (free chlorine). JUMO amperometric measuring cells for free chlorine, chlorine dioxide, and ozone (type 202630) with the JUMO AQUIS 500 AS transmitter/controller are particularly suitable for this task.

### JUMO tecLine pH/JUMO tecLine Rd
pH and redox combination electrodes
Types 201020, 201025



### JUMO AQUIS 500 pH/CR/Ci/AS
Transmitter/controller series for pH-value, redox-voltage, ammonia concentration, chlorine, chlorine dioxide, ozone, conductive and inductive conductivity, and temperature
Types 202560, 202565, 202566, 202568



### JUMO ecoTRANS pH/Lf 03
Microprocessor transmitter / switching device for pH-value / redox voltage, conductivity, and temperature
Types 202723, 202732



### JUMO MAERA F27
Level measurement probe with ceramic measuring cell
Type 404391



### JUMO tecLine Cl2
For free chlorine
Type 202630



### JUMO dTRANS pH/CR/AS 02
Transmitter/controller series for pH-value, chlorine, chlorine dioxide, ozone, conductive conductivity, and temperature
Types 202551, 202552, 202553



### JUMO AQUIS touch S/P
Multichannel measuring devices for liquid analysis
Types 202580, 202581
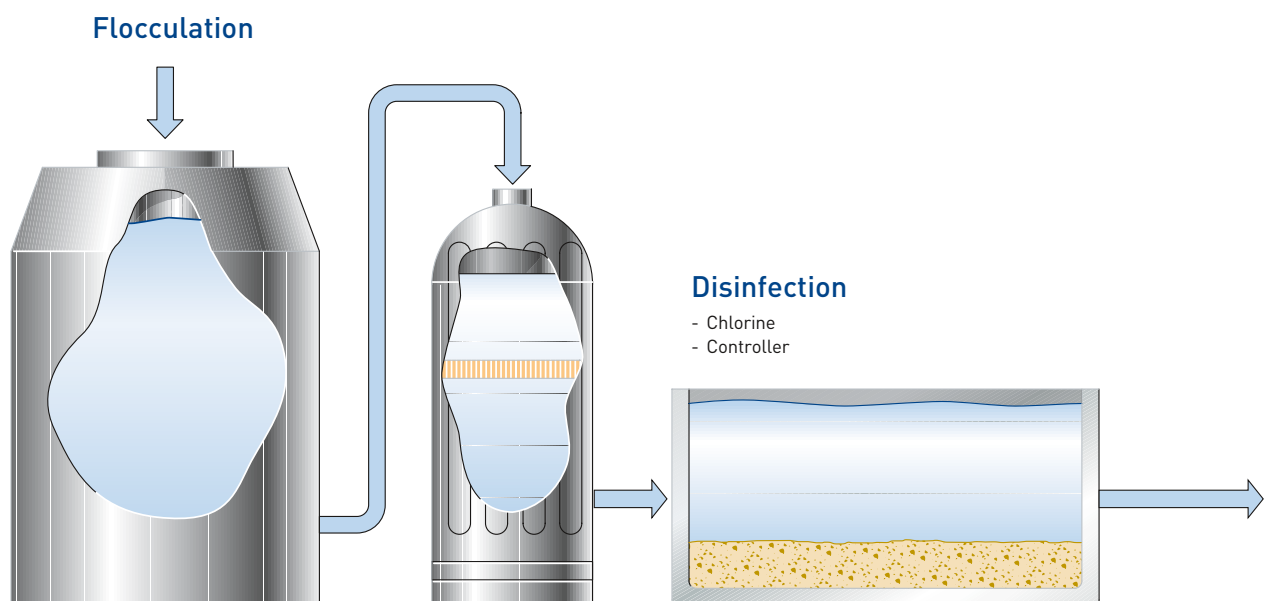


### JUMO Surface-Mounted Thermostat
Type 603026

# Swimming pool water production

Swimming pools include certain risks such as infections so that they must always have a guaranteed water quality. As a result, all swimming pools have to be continuously monitored and controlled.

Water is primarily treated to kill or reduce the microorganisms within it (bacteria, viruses, etc.). This process can also be called disinfection or sterilization. Chlorination is the most commonly used method for water disinfection.

The usual practical procedure is to first prepare a chlorine gas or hypochlorite solution in water and then to add an appropriate quantity of it to the water to be treated.

When the water is treated the aim is to get as few undesirable byproducts as possible to be formed by disinfection. To a certain extent this outcome can be controlled by the conditions (amount of chlorine, temperature, pH-value) prevailing at the time of disinfection.
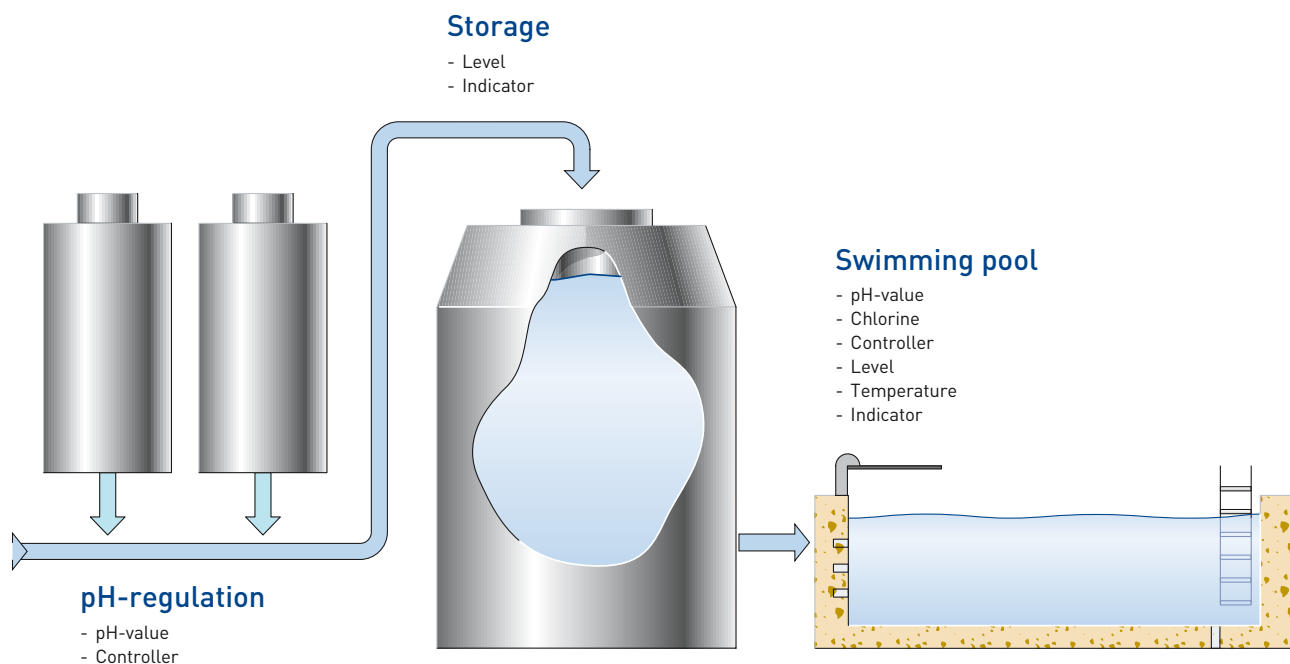
**Flocculation**



**Disinfection**
- Chlorine
- Controller

# Water and Wastewater Engineering

Measurement and control technology   Drinking water   **Swimming pool water**   Highly-purified water   Cooling water   Wastewater

# Level measurement

The term "pool hydraulics" refers to the continuous circulation of water in swimming pools. Good pool hydraulics ensure good distribution of disinfectants.

Pool hydraulics include not only the economical skimmer system to remove water from the surface, but also the more effective overflow system. Here the water that is pushed into the pool by the jets is directed over the edge of the pool into an overflow channel from where it goes to a splash water tank.

This tank is designed so that when the pool is used the tank can hold the volume of water that is displaced – and when the pool is not used it has sufficient water stored for back washing.

Level measurement in the backwash water tank protects the filter pump against dry-running if not enough water is available. Such a measure causes fresh water to be added to the swimming pool when too little water is in it as a result of backwashing. Level measurement also reactivates the pump if too much water is in the splash water / overflow tank. Level measurement can occur hydrostatically. For this purpose level measurement probes are available in unpressurized or open tanks. Level measurement probes are pressure measuring devices that are especially developed for level assessment. In coordination with your specified guidelines JUMO offers a wide variety of level measurement probes out of stainless steel or plastic. These have different process or electrical connections as well as special cables.

**Storage**
- Level
- Indicator

**Swimming pool**
- pH-value
- Chlorine
- Controller
- Level
- Temperature
- Indicator

**pH-regulation**
- pH-value
- Controller

# Highly-purified water

Highly-purified water is required in a wide variety of production processes such as a cleaning agent in the semiconductor industry, as a cleaning operation after the actual washing with cleaning agents in the food industry, and for cleaning and dilution purposes in the pharmaceutical industry.

Whatever water quality you require for your process JUMO products provide pure water of a quality that you can rely on.

# Water and Wastewater Engineering

Measurement and control technology   Drinking water   Swimming pool water   **Highly-purified water**   Cooling water   Wastewater

## pH-measurement in highly-purified water

In some areas a pH-measurement in highly-purified water is mandated. But the low conductivity and low ionic strength of highly-purified water cause technical problems when measuring the pH-value. JUMO's solution here is the refillable JUMO tecLine pH-electrode with a KCl storage vessel.

## Conductivity measurement

Monitoring the quality of highly-purified water through conductivity is the safest and most reliable method. A complete measurement chain for conductivity in highly-purified water consists of a highly-purified water transmitter/controller – JUMO AQUIS 500 CR, JUMO dTRANS CR 02, or JUMO ecoTRANS Lf 03 – a conductivity sensor with the integrated JUMO tecLine CR temperature probe, and a connecting cable.

JUMO highly-purified water measurement converters offer you an exact entry of the cell constants, temperature compensation according to ASTMD 1125-95, and limit value monitoring according to USP (water conductivity <645>).

### JUMO tecLine pH

pH combination electrode with liquid KCl filling, refillable
Type 201020

### JUMO ecoTRANS pH/Lf 03

Microprocessor transmitter / switching device for pH-value / redox voltage, conductivity, and temperature
Types 202723, 202732

**USP<645>**

### JUMO dTRANS pH/CR/AS 02

Transmitter/controller series for pH-value, chlorine, chlorine dioxide, ozone, conductive conductivity, and temperature
Types 202551, 202552, 202553

**USP<645>**

### JUMO tecLine CR

Conductive two-electrode conductivity sensor out of stainless steel and titanium
Type 202924

**ASTM certificate**

### JUMO AQUIS touch S/P

Multichannel measuring devices for liquid analysis
Types 202580, 202581

### JUMO Process and Retractable Holders

Out of stainless steel
Types 202822, 202825, 202831

### JUMO MIDAS C18 SW

OEM pressure transmitter – seawater
Type 401012

### JUMO LOGOSCREEN fd

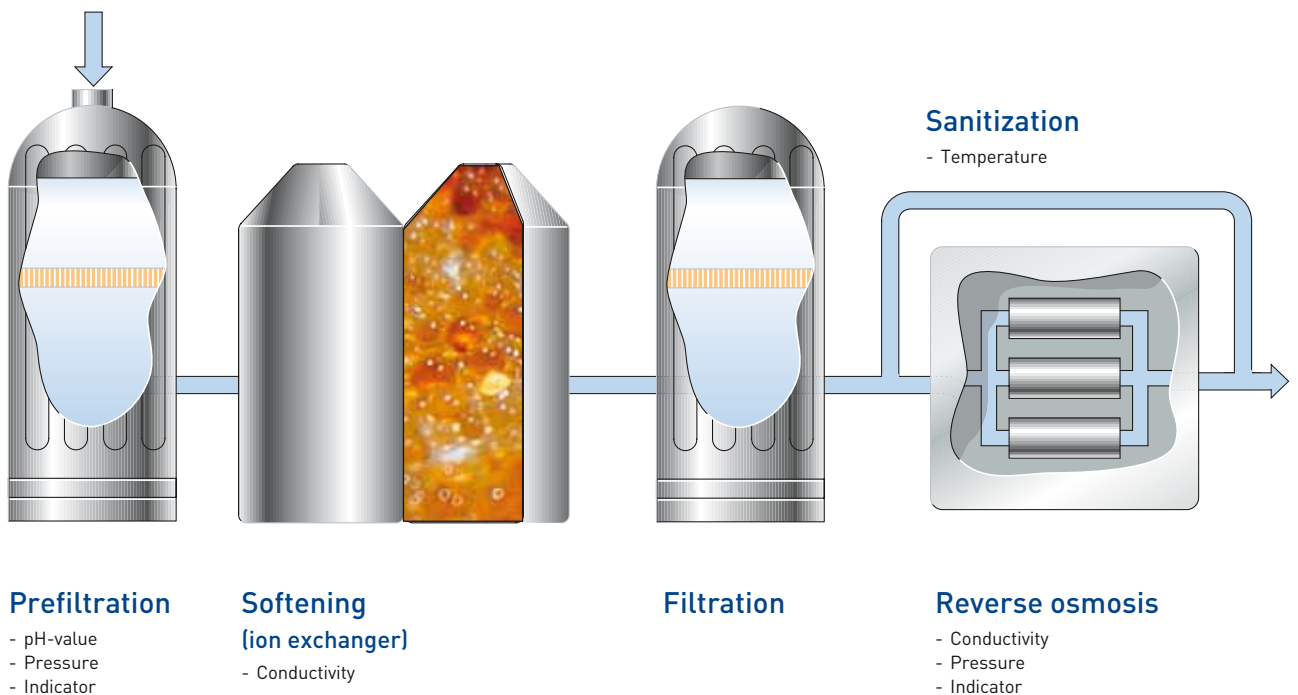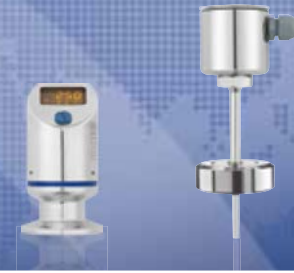Paperless recorder for FDA-compliant measurement data recording
Type 706585

# Highly-purified water in the pharmaceutical industry

The production of highly-purified water is one of the most important processes in the pharmaceutical industry. Without it, the manufacture of most substances would not be possible as highly-purified water quality is the prerequisite for a consistently high product quality.

Monitoring the quality of highly-purified water through conductivity is the safest and most reliable method.

The quality of highly-purified water (pure water, high purity water, water for injection, etc.,) is described in several standards and recommendations. These include ASTM International (American Society For Testing and Materials), EP (Pharmacopoea Europaea, Ph. Eur.), USP (United States Pharmacopeia), and DIN or ISO standards. Of course, JUMO tecLine CR conductive conductivity sensor for use in highly-purified water meet all the requirements.



**Sanitization**
- Temperature

**Prefiltration**
- pH-value
- Pressure
- Indicator

**Softening (ion exchanger)**
- Conductivity

**Filtration**

**Reverse osmosis**
- Conductivity
- Pressure
- Indicator

# Water and Wastewater Engineering

Measurement and control technology   Drinking water   Swimming pool water   **Highly-purified water**   Cooling water   Wastewater

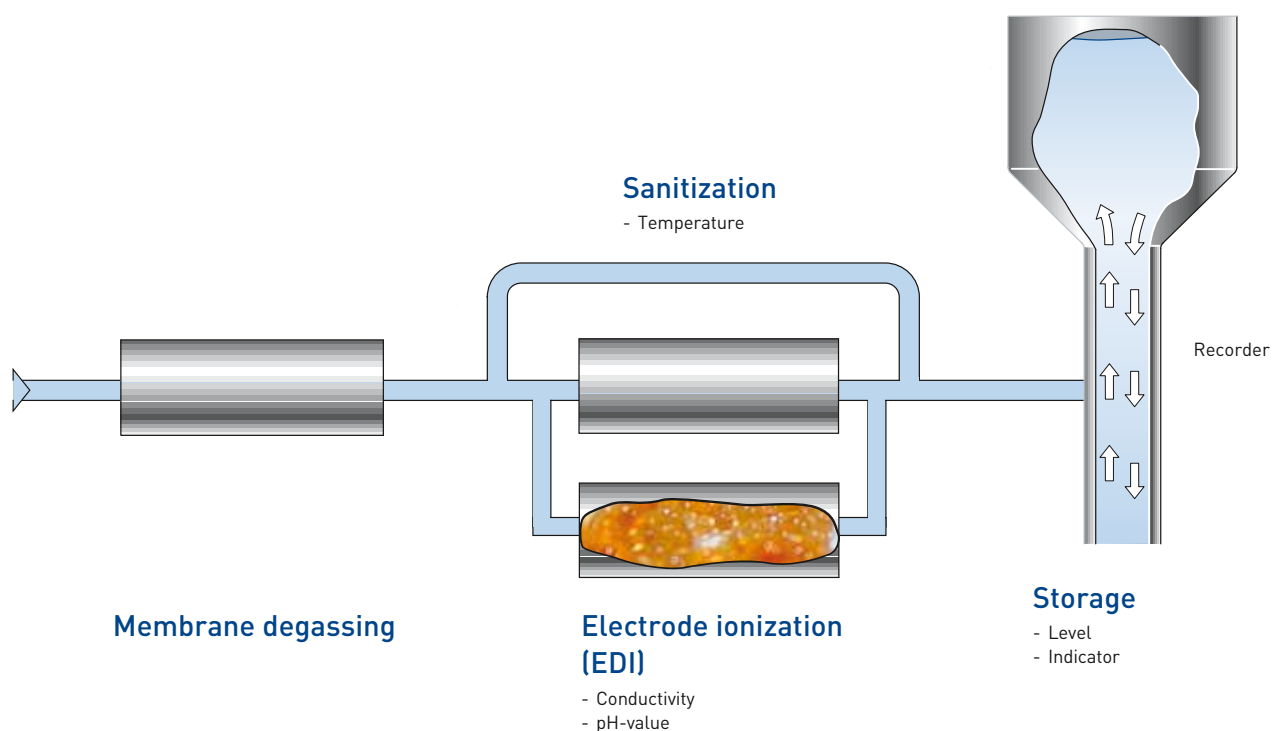# Highly-purified water production

Highly-purified water is required in a wide variety of production processes such as a cleaning agent in the semiconductor industry, as a cleaning operation after the actual washing with cleaning agents in the food industry, and for cleaning and dilution purposes in the pharmaceutical industry.

Depending on the demands on highly-purified water, different processing steps have to be upstreamed or downstreamed. Common production processes include reverse osmosis, ion exchanger, ultrafiltration, and electrochemical deionization.

Ion exchangers contain mobile ions. Their chemical structure enables them to exchange these ions for other ions charged in the same way.

Ultrafiltration is a typical membrane process. The pores are very large for ultrafiltration. Matter is excluded by size so that components larger than the membrane pores are retained.

Electrochemical deionization is the latest technology in highly-purified water production. When a voltage is applied across the anode and cathode, the anions and cations combine, and the resulting ions are removed with ion exchangers from the water stream.



**Sanitization**
- Temperature

Recorder

**Membrane degassing**

**Electrode ionization (EDI)**
- Conductivity
- pH-value

**Storage**
- Level
- Indicator

# Cooling water

Heat has to be dissipated in many industrial plants. Here, cooling water is used as the heat carrier in technological processes. Monitoring water quality makes sense in all applications where water or aqueous solutions is/are used as the cooling medium or as a cooling additive.

Inductive conductivity sensors by JUMO are the ideal solution for this task.

# Water and Wastewater Engineering

Measurement and control technology   Drinking water   Swimming pool water   Highly-purified water   **Cooling water**   Wastewater

## Desalination control in the cooling tower

Monitoring water quality makes sense in all applications where water or aqueous solutions is/are used as the cooling medium or as a cooling additive. But the cooling capacity of the water can be reduced by evaporation or contamination. The salts and solids that are left increase conductivity. As a result, the appropriate conductivity measurement is important in cooling towers (desalination control).

Suitable measuring devices can monitor a defined limit value. The inductive measurement method of the JUMO CTI-500 conductivity transmitter facilitates reliable monitoring of the cooling water in cooling towers. In addition, the separate sensor of the device version can be easily integrated into existing systems.

**JUMO tecLine Rd**
Redox combination electrodes
Type 201025

**JUMO tecLine Cl2**
For free chlorine
Type 202630

**JUMO AQUIS 500 pH/CR/Ci/AS**
Transmitter/controller series for pH-value, redox-voltage, ammonia concentration, chlorine, chlorine dioxide, ozone, conductive and inductive conductivity, and temperature
Types 202560, 202565, 202566, 202568

**JUMO dTRANS pH/CR/AS 02**
Transmitter/controller series for pH-value, chlorine, chlorine dioxide, ozone, conductive conductivity, and temperature
Types 202551, 202552, 202553

**JUMO ecoTRANS pH/Lf 03**
Microprocessor transmitter / switching device for pH-value / redox voltage, conductivity, and temperature
Types 202723, 202732

**JUMO CTI-500**
Inductive conductivity transmitter with plastic case
Type 202755
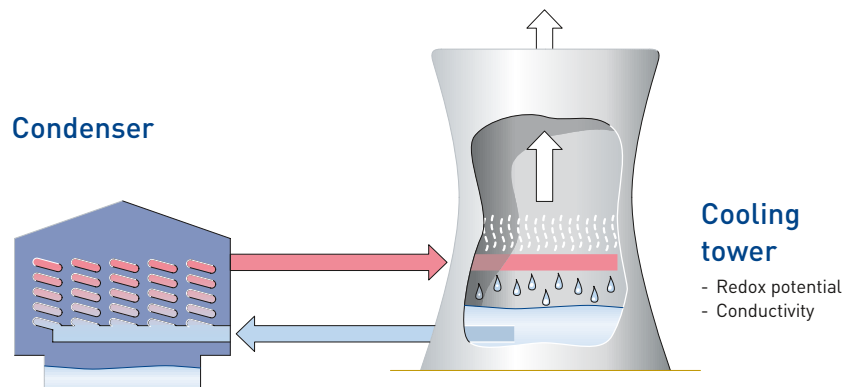
**Condenser**

**Cooling tower**

- Redox potential
- Conductivity

# Wastewater

Wastewater is treated in sewage treatment plants. Biological and chemical processes as well as mechanical ones are used here.

Whether pressure, level, or flow: with JUMO, you are ready for everything. Our pressure measuring devices can be adapted to all wastewater engineering processes.

# Water and Wastewater Engineering

Measurement and control technology  Drinking water  Swimming pool water  Highly-purified water  Cooling water  **Wastewater**

## Controlling the oxygen supply in the aeration tank

To create optimum living conditions for the bacteria, the aeration tank must be continuously supplied with oxygen ($O_2$). Because ventilation – with a power consumption of 50 to 80 % – is the single greatest energy user in a sewage treatment plant, the first and obvious starting point for saving energy is the oxygen content in the aeration tank. Determining and continuously regulating the oxygen content in the aeration tank is absolutely essential. The JUMO dTRANS O2 01 two-wire transmitter provides a sturdy and cost-effective measuring device.

## Monitoring digestion

To survive in the digester the bacteria need a constant temperature of 35 to 37ºC. As a result, monitoring the temperature in the digester is absolutely essential. The JUMO PROCESStemp RTD temperature probe with ATEX approval and the JUMO di 308 digital display unit are the right products for this task.

Additional measurands to be monitored in the digester are level and pressure. The JUMO dTRANS p20 pressure transmitter and the JUMO dTRANS p33 level measurement probe are the ideal solution for measuring the pressure and level in Ex-areas.

To monitor measurements the measuring points can be connected to the JUMO LOGOSCREEN nt recorder.

### JUMO tecLine HD pH/Rd
pH/redox electrodes for difficult applications
Type 201021 or 202026

### JUMO ecoTRANS pH/Lf 03
Microprocessor transmitter / switching device for pH-value / redox voltage, conductivity, and temperature
Types 202723, 202732

### JUMO AQUIS touch S/P
Multichannel measuring devices for liquid analysis
Types 202580, 202581

### JUMO dTRANS O2 01
Two-wire transmitter for dissolved oxygen (DO)
Type 202610

### JUMO ecoLine O-DO
Optical sensor for dissolved oxygen with JUMO AQUIS 500 RS display unit / controller
Types 202569, 202613

### JUMO ecoLine NTU
Optical turbidity sensor with JUMO AQUIS 500 RS display unit / controller
Types 202569, 202670

### JUMO exTHERM-AT
Explosion protected surface-mounted thermostat
Type 605055

### JUMO dTRANS p20
Process pressure transmitter with display
Type 403025

### JUMO dTRANS p33
Pressure transmitter and level measuring probe
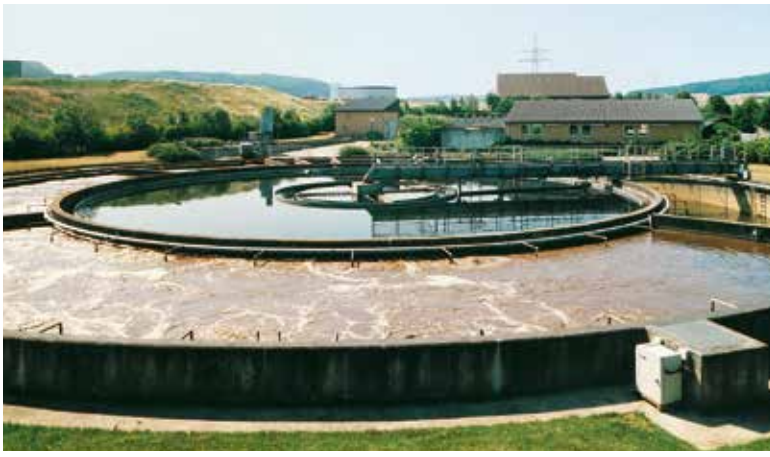Type 404753

### JUMO LOGOSCREEN nt
Paperless recorder with TFT display, CF card, and USB interfaces
Type 706581

### JUMO PROCESStemp
RTD temperature probe for process technology
Type 902820

# Industrial wastewater

Industrial wastewater refers to the wastewater that arises from industrial production processes (e.g. in the food, paper, chemical, textile, and metal industries). The composition of the industrial wastewater can vary greatly depending on which branch of industry is involved. Wastewater in the paper industry contains organic substances that are not easily degradable. Oils, greases, and heavy metals are found in metalworking.

Industrial wastewater must be cleaned before disposal. The treated water can either be returned to the production process or discharged into the sewers.
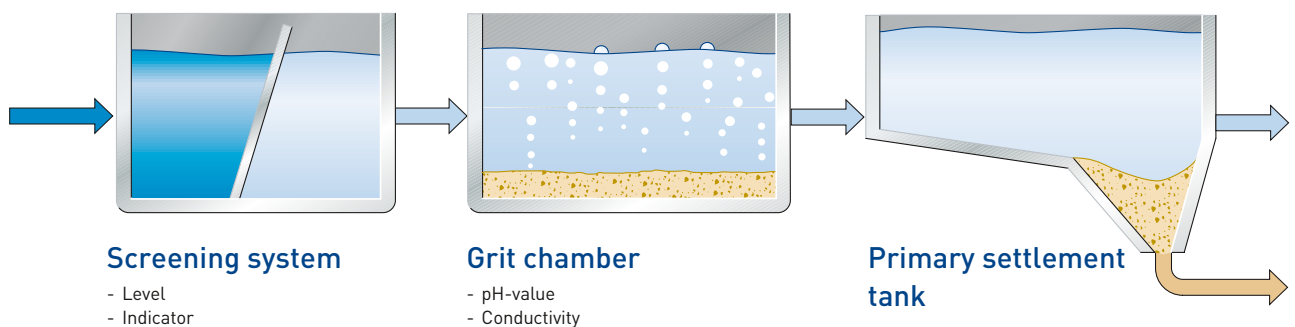
### Example: treating wastewater from electroplating

In a plating bath, objects made of base metals such as zinc or iron are given a protective finish. This coating can consist of chemical elements such as copper or nickel. The first wastewater treatment stage for plating wastewater is cyanide and chromate detoxification. Detoxification is performed in continuous-flow systems. Once detoxification is complete the next stages take place: neutralization precipitation, removal of the precipitation products, and disposal of the sludge. At this point the cleaned wastewater is delivered to the sewer system.

### pH-measurement in plating plants

A pH-value of at least 10 is necessary for cyanide detoxification. Chromate is removed from the wastewater in the acidic range. Here, pH-measurement is used to monitor the plating baths and the detoxification processes. The tecLine pH-electrodes with the JUMO AQUIS 500 pH transmitter/controller are the right products for this task.

## Sewer system



**Screening system**
- Level
- Indicator

**Grit chamber**
- pH-value
- Conductivity

**Primary settlement tank**

# Water and Wastewater Engineering

Measurement and control technology   Drinking water   Swimming pool water   Highly-purified water   Cooling water   **Wastewater**

# Municipal wastewater

Wastewater is treated in sewage treatment plants. Biological and chemical processes as well as mechanical ones are used here. Most of the clogging material is caught by the screening system.

Heavy matter, such as particles of sand that are being carried along, should settle here.
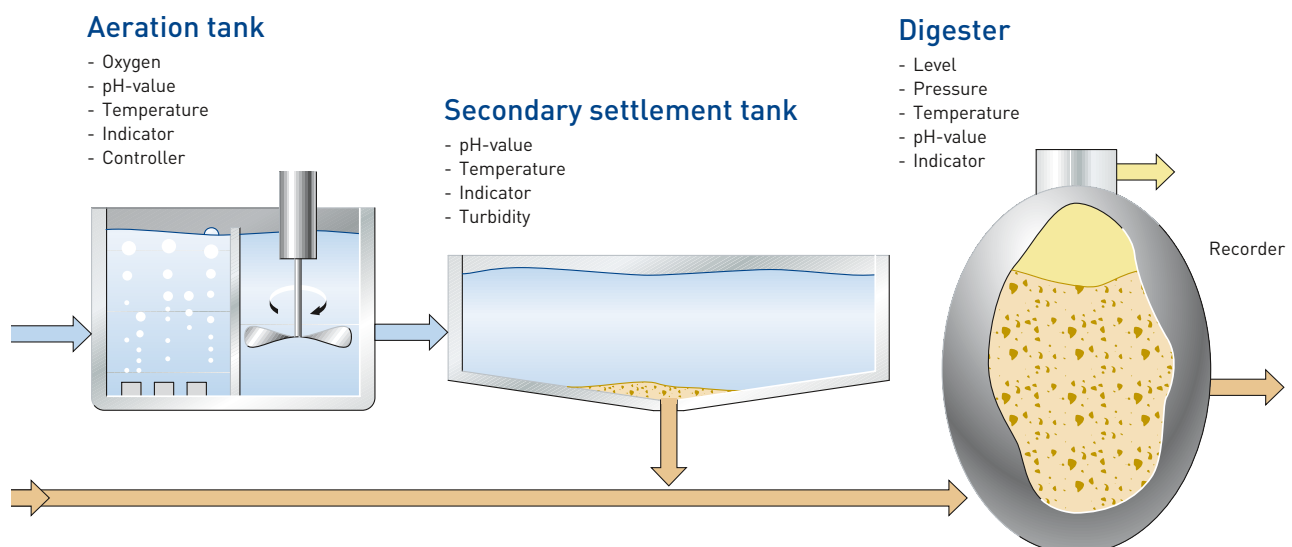
The final station of the mechanical treatment stage is the primary settlement tank. All the lighter materials that are still in the wastewater and which have not been removed in the grit chamber settle to the floor of this tank to form so-called raw sludge. While the pretreated water is forwarded to the aeration tank the raw sludge is conveyed to the digesters.

The biological treatment of the wastewater takes place in the aeration tank. Before the wastewater gets to this tank the wastewater is mixed with activated sludge. This sludge contains countless microorganisms (e.g. bacteria) that are able to break down the colloidal, organic contaminants dissolved in the wastewater.

The activated sludge settles in the secondary settlement tank and collects at the bottom. The collected sludge is either removed and taken back to the aeration tank as return activated sludge or the collected sludge is conveyed to the digesters as surplus activated sludge.

Digestion is the last station of the biological treatment stage. The sludge is stabilized in the digester. Stabilization refers to the most advanced anaerobic degradation of organic compounds with the aid of specific bacteria. These bacteria convert the organic components of the anaerobic digested sludge into biogas.

### Aeration tank
- Oxygen
- pH-value
- Temperature
- Indicator
- Controller

### Secondary settlement tank
- pH-value
- Temperature
- Indicator
- Turbidity

### Digester
- Level
- Pressure
- Temperature
- pH-value
- Indicator

Recorder

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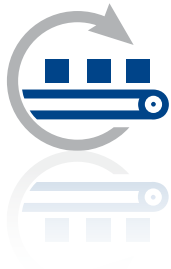
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- Production of floats
- Welding, jointing, and assembly technology
- Surface treatment technology
- Quality management for materials

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