

01/2014

sensors automation

JUMO

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Water – liquid gold

Products from JUMO guarantee quality
in water technology

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JUMO measurement and
control technology for
seawater desalination

| Page 8 |



Leak monitoring
in cooling systems

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Improved process
reliability and optimum
plant availability

| Page 14 |





Versatile adjustment.

l/min

ppm



pH

$\mu\text{S}/\text{cm}$

mg/l

More than **sensors + automation**

Particularly flexible:
JUMO AQUIS touch -

Welcome to JUMO.

Scan the QR code to find out more
about our products



www.aquis-touch.net

Dear Reader,



Water is now already one of the most important resources around the world. A healthy person only needs approximately 2.5 liters per day to survive, but the per capita consumption in Germany alone currently lies at 130 liters per day. Above all, in emerging industrial nations, such as India or China, the supply of clean drinking water and the reliable disposal of wastewater play an extremely important role.

We have dedicated this customer magazine to the subject of "water" and what the JUMO business group can contribute to this topic. After all, we have already been devoting ourselves to water and wastewater management with our analytical measurement area for decades. Our continuous growth and success in the industry have provided us with further momentum to continuously expand our product range in this field.

You will find two practical reports on pages 8 to 11 about water in its solid and liquid form. Our devices play a vital role in both applications. In the first case, we ensure the enjoyment of a number of winter sports athletes and in the second case, JUMO products help convert seawater into drinking water.

We hope you are enjoying reading these contributions and the other articles in our customer magazine.

JUMO. More than sensors + automation.

Your
Managing Partners,

Bernhard Juchheim

Michael Juchheim



Highlighted Topic 4

Water – liquid gold

JUMO has dedicated itself, with great success, to analytical measurement for decades

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JUMO AQUIS touch S

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Redox potential measurement

A measurand for monitoring chemical processes

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JUMO GmbH & Co. KG
36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-500
Email: mail@jumo.net
Internet: www.jumo.net

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ASTM certificate



JUMO

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number draws their drinking water from manual pumps and 18 percent through well systems. The 1,000 cities with more than 500,000 residents produce 26 million m³ of wastewater each day, with a maximum daily treatment capacity of 7 million m³. As a result, 19 million m³ of wastewater are not cleaned. That is 73 percent of the total wastewater quantity that can end up untreated in the water circulation system. To achieve the millennium development goals set by the United Nations, 116 million toilets must be installed in Indian cities and up to 290 million in the countryside in the next three years.

Reliable and precision measurements are an absolute must for reaching the goal of securing a constant high water and wastewater quality. JUMO therefore offers a number of solutions for a wide range of applications for water and wastewater engineering. For example, the measurands pH-value, filling level, flow, conductivity, pressure, and chlorine play a role in the process of treating groundwater. This starts with sensors for the conductive or inductive conductivity measurement and ranges up to modular multichannel measuring and control devices of the



JUMO AQUIS touch S/P
Modular multichannel measuring
devices for liquid analysis
Type 202581, Type 202580

JUMO tecLine CR
Conductive conductivity sensors
made of stainless steel or titanium
Type 202924



AQUIS touch series for liquid analysis. In emerging and developing countries, the treatment of brackish water and seawater plays a very important role. Around 97.5 percent of the water in the world contains salt. Due to the limited availability of drinking water, seawater represents a significant source of drinking water.

JUMO products are used in seawater desalination plants around the world. The reverse osmosis unit is the heart of the seawater desalination plants. During reverse osmosis, the seawater is pressed under high pressure through a fine porous membrane. This membrane functions like a filter and only allows specific ions and molecules to pass through. Due to the high salt content of seawater, a pressure between 60 and 80 bar is necessary. To ensure that the plant operates safely, the pressure upstream of the reverse

osmosis unit must be monitored. We recommend pressure transmitters from JUMO for this task.

Product range with all the important approvals

Mechanical, biological, and chemical procedures are applied in the treatment of wastewater. The requirements for measuring accuracy in this area are particularly high. With all process steps – from the computer system, sand filter, and the various treatment tanks to the digestion tower – sensors, display devices, and controllers from JUMO can be used.

To best meet the strict hygienic requirements in water and wastewater engi-

neering, a number of JUMO products have approvals from the FDA (Food and Drug Administration) or the EHEDG (European Hygienic Engineering & Design Group). A special range of products with ATEX approvals is available for use in digestion towers. The comprehensive range of JUMO products thereby makes an important contribution for ensuring clean drinking water and treated wastewater.

JUMO products are used around the globe

Additional information

Phone: +49 661 6003-402
matthias.kremer@jumo.net

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Dipl.-Ing. Matthias Kremer

Head of Business Unit Analytical Measurement



Storage container

Treatment tank

JUMO AQUIS touch S
Modular multichannel measuring device for liquid analysis with integrated controller and paperless recorder
Type 202581

JUMO AQUIS touch S

JUMO AQUIS touch S

The all-rounder in use ...



Additional information

Phone: +49 661 6003-493
reinhard.manns@jumo.net

NEW PRODUCT



Type 902928



JUMO Wtrans E01

NEW PRODUCT



Type 406040



JUMO PINOS L01

NEW PRODUCT



Type 604170



JUMO frostTHERM-ATE

JUMO Wtrans E01

L01

JUMO PINOS

가

JUMO frostTHERM-ATE

가

CO2

CO2

JUMO PINOS L01

start-up

가

CO2,

가

RTD

Pt1000

-15°C

가

Additional information

Phone: +49 661 6003-9737
michael.braun@jumo.net

Additional information

Phone: +49 661 6003-2475
stefan.buechner@jumo.net

Additional information

Phone: +49 661 6003-652
britta.goldbach@jumo.net

NEW PRODUCT



Type 202569



Type 202670

JUMO ecoLine NTU –

DIN EN ISO 7027

가

JUMO

가

JUMO AQUIS 500RS

가

ecoLine NTU

JUMO ecoLine NTU

90° (scattered light)

0 ~ +50 °C

0-4000NTU

ecoLine NTU

가

880nm,

JUMO

Immersion flow

INDUSTRIES



"JUMO sets sail"

JUMO

가

JUMO

Additional information

Phone: +49 661 6003-9660
ulrike.storm@jumo.net

Additional information

www.industry.jumo.info
Phone: +49 661 6003-9384
christina.hoffmann@jumo.net





70%
2.5%
2/3
가

가

Reverse osmosis ()

Osmotic pressure ()

2 (60-80bar)

가

가

가

()

35g / L

가

JUMO MIDAS C18 SW

가 , 가

가 () (PP)), 가 (가 JUMO AQUIS touch 가 touch 가 FDA 가 touch 가 touch 가 5 (ex. 3.5

JUMO MIDAS C18 SW 1.6 - 100bar

JUMO AQUIS touch

AQUIS touch

Summary

Inductive conductivity measurement

JUMO ecoLine Ci

PLC

logic & math

JUMO

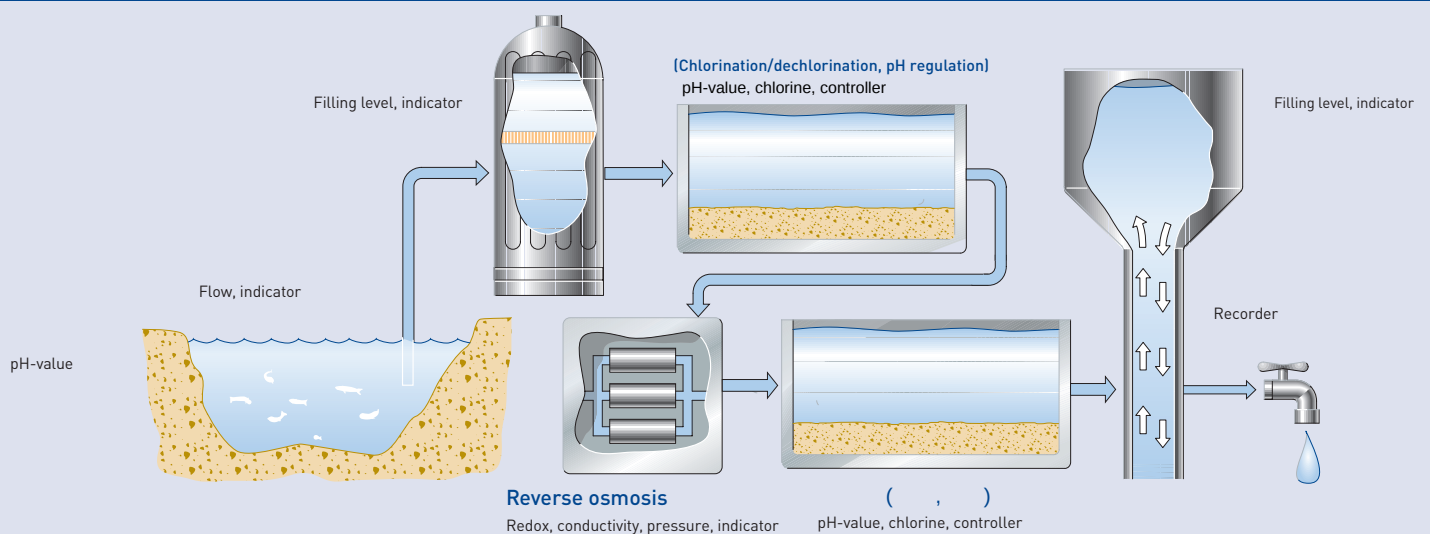
8-analog

6-binary

PT1000

Additional information

Phone: +49 661 6003-493
reinhard.manns@jumo.net





Leak monitoring in cooling systems

JUMO products in use at an ice rink in Wengen, Switzerland

Monitoring of leaks in cooling systems using pH measurement is an alternative to previously utilized methods. Cooling systems are used in many sectors. Reaching the required cooling capacity is only one of the objectives involved here. They should also be safe, environmentally friendly, cost-effective, and energy-efficient. Ammonia (NH_3) is a cooling agent which has regained importance in new cooling systems since the prohibition of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs).

Ammonia

Ammonia is present in cooling circuits in part as a liquid and in part as a gas. Under normal conditions (0 °C and 1013 mbar), ammonia is a colorless, poisonous, and corrosive gas. As a liquid, it is either compressed or cryogenic (boiling point of -33.4 °C, 1013 mbar).

Ammonia is readily soluble in water and the resulting solution is referred to as ammonium hydroxide. The temperature and the molar concentration of the ammonia in water can be used to calculate the pH-value (Figure 1).

Cooling

To achieve the required cooling, compression cooling machines are used in most plants. Here, the gaseous ammonia is drawn in by the compressor and compressed. The temperature of the ammonia rises as a result. At the downstream condenser this heat is removed from the ammonia (e.g. with water cooling) which causes it to become a liquid. The ammonia is then decompressed at the flow regulator and cools down. The resulting thermal energy is now reduced compared to before compression and heat

can therefore be withdrawn from the environment at the evaporator, producing a cooling effect. The ammonia changes its physical condition at this stage and becomes gaseous again. It is then drawn in again by the compressor and the cycle is complete (Figure 2).

Weak point: condenser

The condenser can be a weak point, as the ammonia is under high pressure. Even if only very small quantities of ammonia leak out at this point, it can have disastrous effects on humans and the en-



vironment. As previously mentioned, the ammonia concentration influences the pH-value of a liquid. Ammonia entering the cooling water circuit at a particular point can be determined by measuring the pH-value upstream and downstream of the condenser (applies to cooling circuits with water; with ethylene glycol additives the impact on the pH-value is too little). If large quantities of ammonia leak, a difference between the measurements is evident immediately. In the case of smaller quantities, no substantial difference will result but the absolute pH-value will gradually increase. Monitoring the difference and absolute value is therefore essential (Figure 3).

Application example on an ice rink

The difference monitoring also triggers in the event of a possible drifting (aging) of the pH probes, providing the system with a certain degree of safety. This monitoring principle has been used with great success for some years now at the ice rink in Wengen, Switzerland. The process involves using glacial water to cool the condenser. The heated water is used to

heat the water for an open-air swimming pool. To measure the pH-value, two JUMO pH combination electrodes with subsequent JUMO dTRANS pH02 transmitters are used for each circuit (condenser and evaporator). The measured values are compared with one another using a JUMO di308 display unit and checked for their absolute value. If the predetermined limit values are exceeded, an alarm is activated immediately.

In plants where air is used to cool the condenser, only the evaporator circuit is monitored. This is how JUMO products provide safe winter enjoyment.

Additional information

Phone: +49 661 6003-2722
walter.wueest@jumo.net

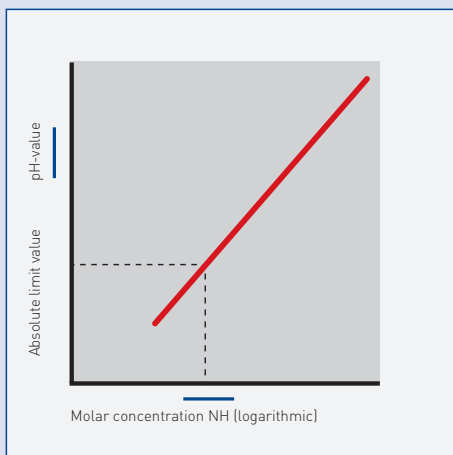


Fig. 1: Determining the pH-value based on the temperature and the molar concentration in water

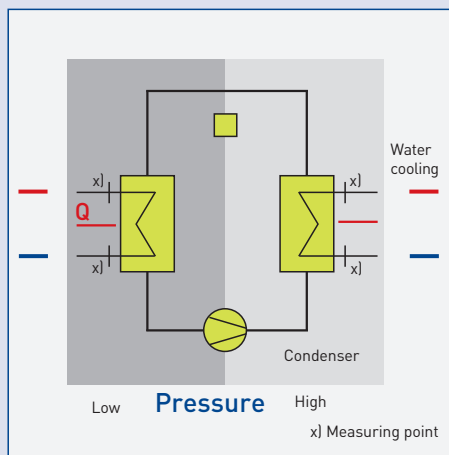


Fig. 2: Cooling circuit diagram

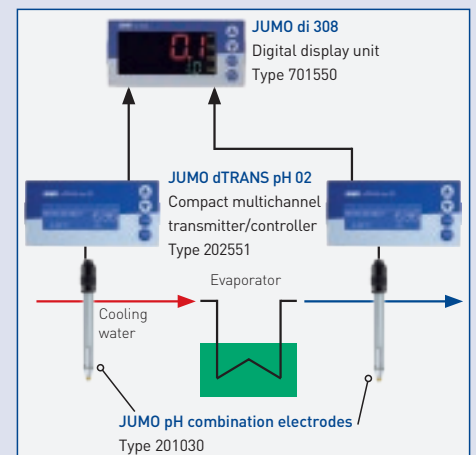


Fig. 3: Monitoring the difference- and absolute value

From product to solution provider

Expanding the JUMO market segment management

JUMO has been ratcheting up its efforts in pursuing an industry strategy for several years. As a result, the company has been continuously developing itself from a component supplier to a system provider. As a "hybrid company", its objective is to offer the customer the entire value-added chain from development to production through to professional services from a single source.

An industry manager is already successfully servicing the pharma & food sector. The solutions that have been developed for dairies, breweries, or meat-processing companies are exemplary. WALTER WUEST has been supporting the business group as an "industry manager for railway technology" since the beginning of the year. He significantly developed the entire railway sector for JUMO as the managing director of the Swiss subsidiary and has acquired a vast wealth of industry knowledge.

The growth figures in the railway sector are impressive. For example, the railway industry in Germany posted new orders totaling 8.7 billion euro in the first half of 2013. That is almost 50 percent more than in the same period of the previous year. The German industry generated over 10 billion euro last year, with this

figure set to increase in the future. If you consider the enormous investment backlog in the infrastructure sector you can expect substantial growth in the next few years. The railway industry in emerging countries in particular, however, is a market of the future with breathtaking outlooks. For example, the annual railway traffic capacity in China in both cargo and passenger transport has for some years been showing constant growth rates hovering around six percent. With the new market sector management, JUMO

is now in a much stronger position to be able to tap into the vast potential of this development.

JUMO has taken a great step forward in expanding its market segment management to provide better customer service. This strategy, which has already enjoyed vast success, will also be continuously pursued in the future.

Additional information

Phone: +49 661 6003-2722

walter.wuest@jumo.net

New management for JUMO in Romania



RAUL GUENTHER ADOCHIEI HANGANU (56) has been the new managing director of the JUMO Romanian subsidiary in Arad since October 1, 2013.

HANGANU studied electrical engineering and has been a sales engineer, sales manager, and managing director in various companies in Germany, Belgium, and Romania for over 20 years. In addition to customer service and acquisition his tasks in Romania include strengthening the integration of the Romanian location in the global JUMO production network.

New JUMO temperature sensor makes soldering safe

Improved usability through pre-tinning

Platinum temperature sensors are robust, durable, and reliable. They are characterized by good vibration resistance and a fast response behavior and can record temperatures in a range of several hundred degrees. In some cases, however, soldering the nickel connection wires of the sensors has proven difficult. This is why JUMO is now offering a platinum temperature sensor with additional pre-tinning.

With the PCA ET (economic tinned), JUMO is entering new territory in the field of sensor manufacturing. Here, the company benefits from its longstanding experience in sensor production. In the last ten years alone the factory has produced more than 40 million temperature sensors.

The connection wires of the sensors generally consist of nickel. Usually this wire material can be easily soldered. However, the surface must be absolutely free of oxides. Even a few atomic layers of oxide that are invisible to the naked eye hinder the wetting process with tin and lead to unsatisfactory soldering results. To protect the tin against oxidation during the soldering process, flux materials with different degrees of activation are used. These remove the oxides lying on the surfaces to be connected by means of chemical reactions. In addition, flux materials reduce the interfacial surface tensions and allow for improved wetting.

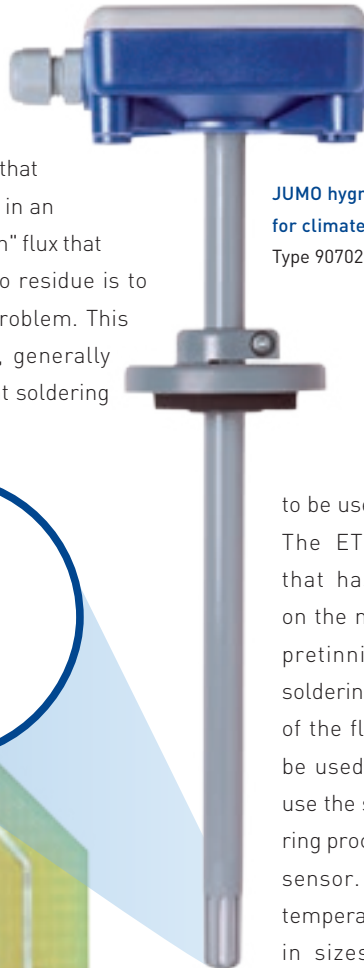
Using these flux materials frequently presents a balancing act. Flux materials with good activating properties can leave salts behind as residue after soldering. Over

time, this can lead to corrosion, shunts, or thermoelectric voltages. It is therefore imperative that these salts are removed in an additional step. "No clean" flux that is considered to have no residue is to be used to rectify the problem. This flux material, however, generally only achieves insufficient soldering results with nickel.



JUMO PCA ET temperature sensor
Type 906121

Up until now, the JUMO temperature sensors have only been offered without tin, since a soldering process is normally qualified by the end customer in which, among other things, the flux material



JUMO hygrothermal transducer for climate monitoring
Type 907021

to be used is precisely specified. The ET temperature sensor that has now been launched on the market already features pretinning. As a result, each soldering process – irrespective of the flux material used – can be used. Customers can easily use the specific, qualified soldering processes on the new JUMO sensor. The PCA ET platinum temperature sensor is available in sizes of 1.5 × 5 × 1 mm and 2 × 1.3 mm. It is also available with the nominal values Pt100, Pt500, and Pt1000 and with tolerances of F0.1, F0.15, and F0.3.

Additional information
Phone: +49 661 6003-585
peter.deiss@jumo.net



Improved process reliability and optimum plant availability

Customers regularly use calibration and maintenance services

In addition to the products, customers from various industries also take advantage of the on-site services from JUMO for monitoring their processes. The key decision-making factors here include economics, safety, and sustainability. First-class technical equipment is essential for these JUMO services. After all, only the interplay of ideally trained service employees and high-precision devices ensures the best user benefits.

Why is regular calibration essential? Each measuring instrument works with a defined tolerance that is guaranteed by the manufacturer at the time of the purchase. You cannot assume that the measuring instrument maintains this required measuring accuracy during its entire service life. External influences, the operating conditions themselves, or improper use can result in systematic changes in the measured values and thereby the tolerance. This is why a calibration at defined intervals is part of the basic requirement for ensuring the defined tolerances during the operational phase and for recognizing faults early on.

Since the demand for monitoring and

adjustment measures with the corresponding documentation in the form of calibration certificates continues to grow, JUMO decided to add another device from a renowned supplier to its existing array of measuring equipment.

This product replaces a number of individual devices such as a pressure calibrator, current loop calibrator, temperature calibrator, a resistance decade, or a frequency generator.

Just reducing the amount of equipment needed to one multifunctional process calibrator that can display and archive a wide range of measured values in a standard calibration certificate saves setup and subsequent costs.

On-site calibration makes the detection and evaluation of influencing factors and their inclusion in the measurement result possible.

Advantages for the user:

- Monitoring of the specified regular calibration and maintenance dates by JUMO
- Optimum plant availability
- Improved process reliability
- Reducing the load of internal service personnel
- No costs incurred for qualified testing devices and accessories
- Assessment of faulty devices, including repair or replacement so that the plant is immediately available again

Our range of services

JUMO calibrates and qualifies sensors for temperature, pressure, and liquid analysis as well as the entire measuring chain from the sensor to the automated solution.

Additional information

Phone: +49 661 6003-447
ernst.schmidt@jumo.net



*The new calibration device saves setup
and subsequent costs for customers.*

JUMO tecLine pH combination electrode
Type 201020

- ① Rounded gold or platinum end
- ② Internal conduction system
- ③ Reference electrolyte
- ④ Conduction system
- ⑤ Diaphragm

Redox potential measurement

A measurand for monitoring chemical processes

Redox potential is a commonly occurring measurand for monitoring chemical processes in industrial and municipal wastewater plants as well as in bathing water monitoring facilities.

Redox potential – reduction and oxidation

The redox potential is a measure for the reduction or oxidation potential of chemical reactants such as in liquid media. It describes the degree to which substances are able to absorb or release electrons. The redox potential is measured in mV or V.

A substance that releases electrons is oxidized and the electron-absorbing substance is reduced.

The substance that oxidizes the other substance is referred to as an oxidant. It has the higher redox potential. At the same time, it absorbs electrons and is reduced. Examples for oxidants include oxygen, disinfectants such as chlorine or ozone, peroxide, sulfur, or bleach.

Reducing agents refer to a substance that reduces the other substance. It simultaneously releases electron itself and is oxidized. Its redox potential is lower. Examples for reducing agents include organic substances – such as sugars, fats, and proteins as well as sulfides, nitrogen oxides, and metals – such as zinc and sodium. The redox potential is determined by referencing the redox potential of a substance compared with the redox potential of hydrogen.

Application example – water treatment in a swimming pool

Swimming pool water is chlorinated for disinfection purposes. The concentration of free chlorine allowed according to the requirements for swimming pool and bathing water (DIN 9643) is 0.3 to 0.6 mg/l. In this application, chlorine acts as an oxidant. (Clean water with the specified chlorine concentration has a redox potential of approx. 750 mV). To achieve a sufficient disinfecting effect the redox potential must be 750 mV and higher depending on the pH-value. In this application, organic contamination (dandruff, etc.) acts as a reducing agent and reduces the redox potential of the bathing water. The redox potential is thereby an indicator for the cleanliness and sanitation level of the water. If the redox potential of the water continues to drop despite the filtration and set chlorine concentration then the treatment plant or measuring device must be tested.

Structure of redox combination electrodes

A redox combination electrode includes a measuring and reference system. The measuring system (MS) consists of a rounded gold or platinum end depending on the application. The measuring solution's redox potential occurring at the rounded end is relayed into the internal conduction system. The reference system (BS) consists of a diaphragm, reference electrolyte, and conduction system.

The diaphragm establishes the conductive connection between the measuring solution and the reference electrolyte (KCl solution). The reference electrolyte and conduction system create a constant reference potential compared to the metal electrode potential.

Transmitters and controllers

A transmitter is generally required for measuring the redox potential. A redox combination electrode and transmitter are interconnected via a coaxial cable. In addition to signal processing, the transmitters also offer a calibration option.

A number of liquid analysis applications require the measurement of several parameters. The redox potential, chlorine concentration, and pH-value are determined in the described water treatment process. The pH-value must be measured, since, for example, the risk of corrosion increases with insufficient values and the chlorine's disinfection effect drops with excessive pH-values. The JUMO AQUIS touch device series, which also controls the chlorine concentration and the pH-value, is ideal for this application.

Additional information

Phone: +49 661 6003-396
manfred.schleicher@jumo.net

JUMO at trade fairs 2014

We look forward to your visit!

Trade fairs in Germany

HANNOVER MESSE	<i>April 7-11</i>	<i>Hanover</i>
World's premiere industrial technology showcase		
IFAT	<i>May 5-9</i>	<i>Munich</i>
World's leading trade fair for water, sewage, waste, and raw materials management		
SENSOR + TEST	<i>June 3-5</i>	<i>Nuremberg</i>
The measurement fair		
InnoTrans	<i>September 23-26</i>	<i>Berlin</i>
International trade fair for transport technology		
Brau Beviale	<i>November 11-13</i>	<i>Nuremberg</i>
Trade fair for the beverage industry		
SPS/IPC/DRIVES	<i>November 25-27</i>	<i>Nuremberg</i>
International exhibition and conference for electronic automation, systems, and components		

Additional information

www.fairs-germany.jumo.info



Trade fairs in other countries

Austria

SMART AUTOMATION AUSTRIA	<i>May 6-8</i>	<i>Vienna</i>
Trade fair for industrial automation		

Belgium

Automation & Engineering	<i>May 14-15</i>	<i>Brussels</i>
Trade fair for automation		

China

CRTS	<i>May 7-9</i>	<i>Beijing</i>
International rail transit technology		

ISH China & CIHE	<i>May 13-15</i>	<i>Beijing</i>
International trade fair for sanitation, heating, ventilation, and air-conditioning		

EnerChina	<i>June 8-11</i>	<i>Beijing</i>
International energy saving, and environmental protection exhibition		

Denmark

AUTOMATIK 2014	<i>September 9-11</i>	<i>Brøndby</i>
Industrial automation process automation		

France

SIAL	<i>October 19-23</i>	<i>Paris</i>
The international exhibition of food processing and packaging		

Korea *** Cancelled ***

ENVEX	<i>June 10-13</i>	<i>Seoul</i>
International exhibition on environmental technology and green energy		

Netherlands

World of Technology & Science	<i>Sep 30-Oct 3</i>	<i>Utrecht</i>
Meeting point for technology		

Norway

Eliaden	<i>June 2-5</i>	<i>Lillestrøm</i>
Fair for industrial service & products		

Russia

NEFTEGAZ	<i>May 26-29</i>	<i>Moscow</i>
Trade fair for oil and gas		

ECWATECH	<i>June 3-6</i>	<i>Moscow</i>
International water forum - ecology and technology		

Serbia

SAJAM TEHNIKE	<i>May 12-16</i>	<i>Belgrade</i>
International fair of technique and technical achievements		

Spain

Expoquimia	<i>Sep 30-Oct 3</i>	<i>Barcelona</i>
International chemistry exhibition		

Matelec	<i>October 28-31</i>	<i>Madrid</i>
International trade fair for the electrical and electronics industry		

Sweden

VA-MÄSSAN	<i>Sep 30-Oct 2</i>	<i>Joensuu</i>
Fair for water and wastewater		

SCANAUTOMATIC	<i>October 7-9</i>	<i>Gothenburg</i>
Fair for industrial automation and process engineering		

United Arab Emirates

WETEX	<i>April 14-16</i>	<i>Dubai</i>
Exhibition for water, energy technology and environment		

United Kingdom

WWEM	<i>November 5-6</i>	<i>Telford</i>
Exhibition for water, wastewater, and environmental monitoring		

United States of America

Sensors Expo & Conference	<i>June 25-26</i>	<i>Chicago</i>
Annual exhibition and conference for sensors, and sensor integrated systems		

Additional information

www.fairs-international.jumo.info

