



More than **sensors + automation**



# Liquid Analysis

Innovative solutions for the highest requirements



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## Dear Reader,

Perhaps you're wondering why JUMO – as a specialist for temperature, pressure, and automation solutions – has chosen to focus on “analytical measurement in liquids.” This question is simple to answer. JUMO began as a manufacturer of technical glass thermometers. In the 1970s the company moved on to produce glass parts and glass sensors for the new area of electrochemical pH value and redox potential measurands as well as electrolytic conductivity.

Overly reckless practices with water as a resource led to increasing pollution of natural water resources. This resulted in regulations to prevent water pollution and requirements for cleaning and detoxifying industrial wastewater. During this time, industry and municipal operators were looking for suitable sturdy measurement and control technology to determine and regulate the main variables in water analysis. Previously this had been the domain of laboratory operations. As a result, JUMO supplied renowned suppliers and plant manufacturers in the new industry of water treatment, dispensing technology, and wastewater treatment technology from the beginning.

Today the components produced in the “JUMO analytical measurement” product line are represented in almost all areas

of water/wastewater engineering. From highly-purified pharmaceutical water to measuring high concentrations of acids, lyes, and salts – and from drinking/swimming pool/aquarium water to process water – JUMO covers nearly all applications that apply to our steadily growing community of satisfied customers. Many of our products make their way into measurement applications throughout the world under our customers' brand names. As a result, JUMO is a reliable OEM supplier and partner for professional customers.

JUMO is continuously developing and improving its sensors and measuring devices. This ensures our analytical measurement technology remains at the cutting edge and that our customers as well as our users have a reliable market position and products. We place great emphasis on ensuring production quality for highly sensitive sensor systems such as this. Our motivation comes from satisfied customers whose plants and investments will protect water as a valuable resource for all humanity.

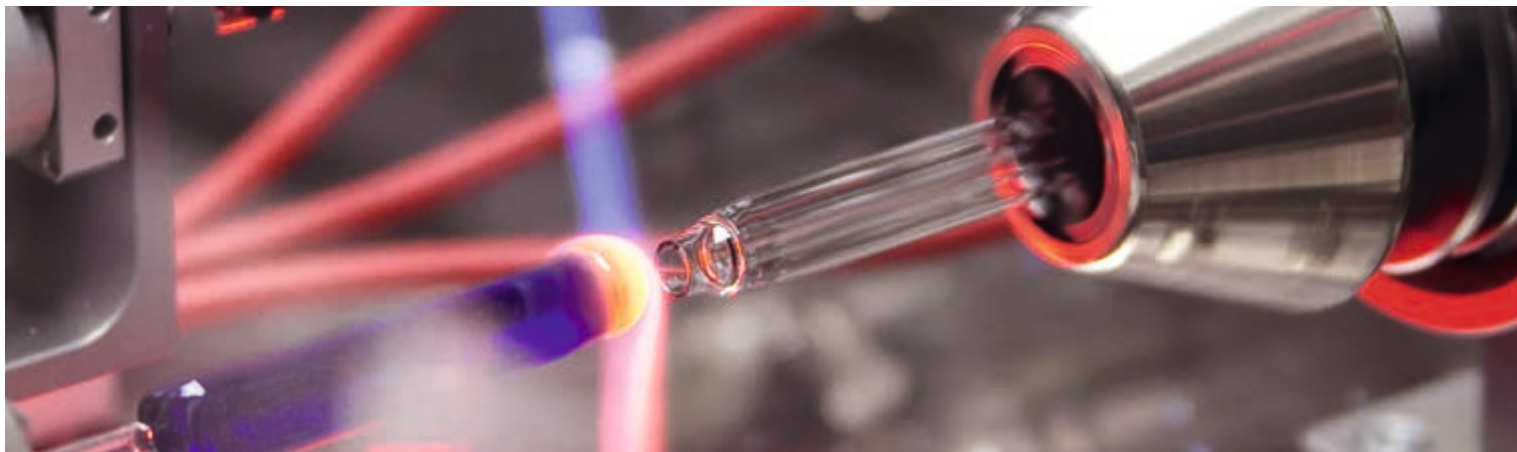
Detailed information about our products can be found under the specified type/product group number at [www.jumo.net](http://www.jumo.net).



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# JUMO electrode manufacturing

JUMO offers the highest quality through internally developed electrodes and measuring systems, flexibility through modern production lines, and long-term experience. Whether you need glass or plastic versions, we can evaluate your needs and customize the pH and redox electrodes during production so that they are optimized to your application.





## JUMO electrode manufacturing



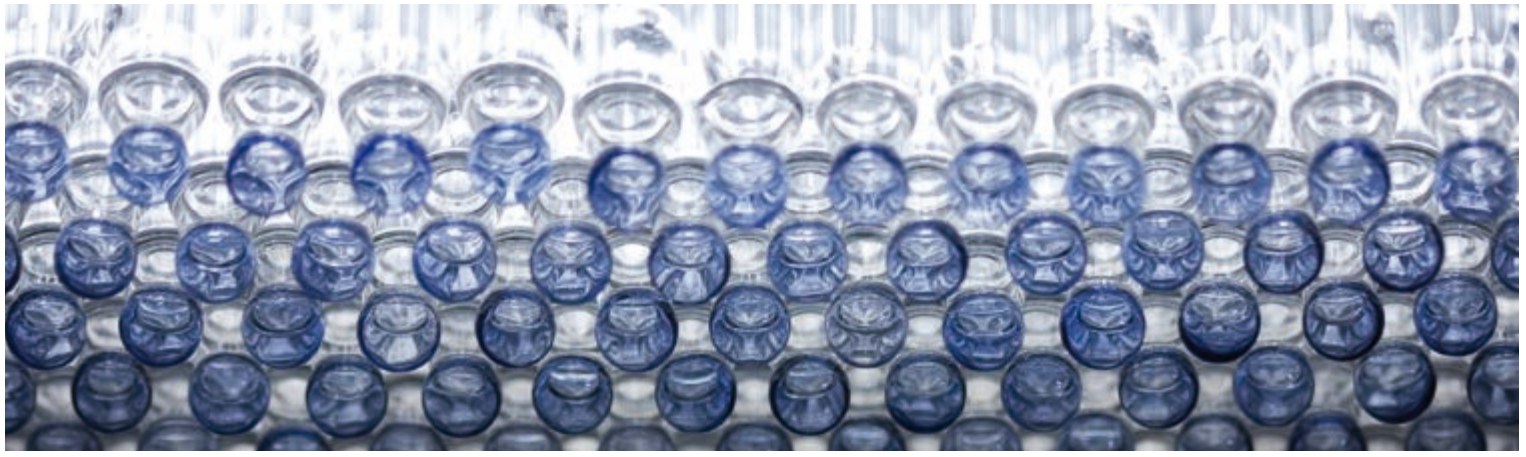
### The success story of JUMO pH electrodes

The success story of JUMO pH electrodes is closely tied to glass technology. Glass thermometers have been produced in Fulda since 1947. On the basis of this experience in working with glass as a material, production of glass parts for pH electrodes began in the 1970s. Today JUMO is one of the largest producers of electrochemical sensors in Europe. Many customers purchase their electrodes from JUMO with their own company logo on the electrodes. One of our strengths is the production of such OEM versions and special designs

### Reliable and accurate: JUMO pH and redox electrodes

Today pH electrodes are produced in semi and fully automated work processes. This ensures consistently high quality.

JUMO pH and redox electrodes are used in almost all areas of industry today: drinking and swimming pool water, municipal and industrial wastewater, neutralization plants, final inspections, the chemical industry, process and rinsing water, food technology, laboratory measurements, biotechnology, and aquariums.



# pH value and redox measurement

The pH value is the measurand most commonly used in analyzing aqueous solutions. Product quality in the chemical and pharmaceutical industries depends significantly on maintaining a narrow pH range. Accurate pH measurements help to improve the yield of the finished product and to reduce the number of unwanted by-products. As one of the largest manufacturers of electrodes in Europe and with more than 35 years of experience in analytical measurement, JUMO is a professional partner offering tailor-made solutions for nearly all applications.



## pH and redox electrodes

pH  
mV



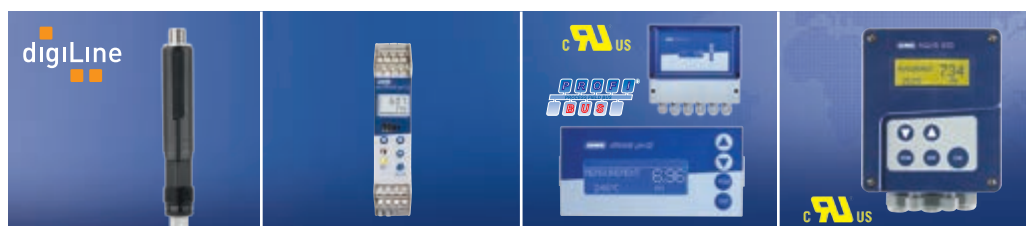
Description		JUMO ecoLine JUMO BlackLine	JUMO tecLine JUMO tecLine HD JUMO tecLine HY	JUMO tecLine PRO	JUMO labLine	JUMO ISFET
Data sheet		201005, 201010	201020, 201021, 201022, 201025, 201026, 201027	201020, 201025	201030, 201035	201050
General information	Features	<ul style="list-style-type: none"> <li>• For standard applications</li> <li>• Glass or plastic version</li> </ul>	<ul style="list-style-type: none"> <li>• For industrial applications</li> <li>• Also available in heavy duty and hygienic version for demanding processes</li> <li>• Integrated temperature sensor (optional extra for pH electrode)</li> </ul>	<ul style="list-style-type: none"> <li>• For industrial applications</li> <li>• High mechanical robustness</li> <li>• With plastic shaft</li> <li>• Integrated temperature sensor (optional extra for pH electrode)</li> </ul>	<ul style="list-style-type: none"> <li>• For laboratory applications</li> </ul>	<ul style="list-style-type: none"> <li>• Glassless</li> <li>• High mechanical robustness</li> <li>• Integrated temperature sensor</li> </ul>
	Areas of application	<ul style="list-style-type: none"> <li>• Drinking water</li> <li>• Greenhouse technology</li> <li>• Hand measuring devices</li> <li>• Swimming pool</li> <li>• Aquaristics</li> <li>• Surface water</li> </ul>	<ul style="list-style-type: none"> <li>• Process measurement</li> <li>• High temperature applications</li> <li>• Suspensions</li> <li>• Galvanic</li> <li>• Varnishes</li> <li>• Wastewater</li> <li>• Highly-purified water</li> <li>• Water</li> <li>• Highly-polluted media</li> <li>• Hygienic and sterile applications</li> <li>• Boiler feed water</li> </ul>	<ul style="list-style-type: none"> <li>• Wastewater treatment</li> <li>• Paper industry</li> <li>• Chemical industry</li> </ul>	<ul style="list-style-type: none"> <li>• General lab applications</li> <li>• Insertion measurements in food</li> </ul>	–
Data	Diaphragm	<ul style="list-style-type: none"> <li>• Ceramic</li> <li>• Glass fiber</li> </ul>	<ul style="list-style-type: none"> <li>• Ceramic</li> <li>• Glass fiber</li> <li>• PTFE</li> <li>• Perforated</li> <li>• Annular gap</li> </ul>	<ul style="list-style-type: none"> <li>• Annular gap</li> </ul>	<ul style="list-style-type: none"> <li>• Ceramic</li> <li>• PTFE</li> <li>• Glass fiber</li> <li>• Perforated</li> </ul>	<ul style="list-style-type: none"> <li>• Ceramic</li> </ul>





## Transmitters/controllers for pH value, redox, and temperature\*

pH  
mV








	Description	JUMO digiLine pH, ORP, T	JUMO ecoTRANS pH 03 Compact DIN rail transmitter	JUMO dTRANS pH 02 Transmitter, controller, indicating device, and data logger in one device	JUMO AQUIS 500 pH Transmitter/controller with high-quality controller functions
	Data sheet	202705	202723	202551	202560
General information	Features	<ul style="list-style-type: none"> <li>• Smart electronics</li> <li>• Sensor and process data</li> <li>• Bus capable/Plug and Play</li> <li>• Reusable</li> </ul>	<ul style="list-style-type: none"> <li>• Easy-to-use device programming with PC setup program</li> <li>• Changeover relay for alarm message or control</li> <li>• Ideal partner for PLC</li> </ul>	<ul style="list-style-type: none"> <li>• Extremely compact design type</li> <li>• Multilingual plain text operation</li> <li>• Modular structure</li> <li>• Variable measured value display</li> <li>• P, PI, PD, and PID control functions</li> </ul>	<ul style="list-style-type: none"> <li>• Multilingual plain text operation</li> <li>• Graphic display with backlighting</li> <li>• P, PI, PD, and PID control functions</li> </ul>
	Areas of application	For universal application	For universal application	For universal application	For universal application
Data	Mounting	Suitable for electrodes with: <ul style="list-style-type: none"> <li>• Plug head N</li> <li>• Plug head VP (severable)</li> </ul>	DIN rail	Surface or control cabinet mounting	Surface or control cabinet mounting
	Measurands	<ul style="list-style-type: none"> <li>• pH/(ORP) redox</li> <li>• Temperature</li> </ul>	<ul style="list-style-type: none"> <li>• pH/redox</li> <li>• Temperature</li> </ul>	<ul style="list-style-type: none"> <li>• pH/redox/NH<sub>3</sub></li> <li>• Temperature</li> <li>• Flow</li> </ul>	<ul style="list-style-type: none"> <li>• pH/redox/NH<sub>3</sub></li> <li>• Temperature</li> </ul>
	Outputs	<ul style="list-style-type: none"> <li>• Digital interface</li> <li>• One analog output (optional)</li> </ul>	<ul style="list-style-type: none"> <li>• Up to two analog outputs</li> <li>• One relay</li> </ul>	<ul style="list-style-type: none"> <li>• Up to three analog outputs</li> <li>• Up to seven relays</li> </ul>	<ul style="list-style-type: none"> <li>• Up to two analog outputs</li> <li>• Up to two relays</li> </ul>
	Protection type	<ul style="list-style-type: none"> <li>• IP66 (M12)</li> <li>• IP68 (on the sensor plug head VP)</li> </ul>	IP20	IP65	IP67

\* See also chapter "Multichannel measuring devices" (page 22).





## Fittings

pH mV						
Description*		Flow fittings for installation in pipelines	Immersion fittings for installation in open flumes, tanks, and pools	Retractable holder for installation in closed liquid runs, pools, and tanks	Pneumatic quick-change fitting with automatic sensor cleaning	Permanent fittings for installation in pipelines or tanks
Data sheet		202810	202820, 202821	202822	202823	202825
General information	Features	<ul style="list-style-type: none"> <li>Protects the electrodes against breakage</li> <li>Ensures correct sensor flow to prevent measurement errors</li> </ul>	<b>Type 202820:</b> <ul style="list-style-type: none"> <li>Up to three sensors</li> <li>Enables measurement in different immersion depths</li> </ul> <b>Type 202821:</b> <ul style="list-style-type: none"> <li>Sturdy design</li> <li>Integrated spray nozzles for sensor rinsing</li> <li>Increases sensor service life</li> <li>Reduces maintenance work</li> </ul>	<ul style="list-style-type: none"> <li>Sensor replacement without interrupting the process</li> <li>Installing sensors with an insertion length of 120 mm or 225 mm</li> </ul>	<ul style="list-style-type: none"> <li>For one sensor (225 mm)</li> <li>Cleaning of the sensor in the integrated washing chamber without interrupting the process</li> <li>With pneumatic positional feedback</li> <li>Can be combined with cleaning machine</li> </ul>	<ul style="list-style-type: none"> <li>Used for protecting and mounting the electrode</li> <li>Suitable for use in media with increased hygienic requirements</li> </ul>
	Material	<ul style="list-style-type: none"> <li>PC or PP</li> <li>PVC</li> </ul>	<b>Type 202820:</b> PP <b>Type 202821:</b> stainless steel (1.4404/316L)	Stainless steel (1.4571) and FPM or PP and FPM	Stainless steel (1.4404/316L) or PVDF	Stainless steel (1.4571)
	Immersion length (as of process connection)	–	<b>Type 202820:</b> 500 to 2000 mm <b>Type 202821:</b> 500 to 2500 mm	48 to 135 mm	71 mm	5 to 90 mm
	Process connection	<ul style="list-style-type: none"> <li>G ½ A or bonded socket joints</li> <li>Angled seat DN 20/25</li> <li>T-piece DN 32/40/50</li> </ul>	<b>Type 202820:</b> <ul style="list-style-type: none"> <li>Flange</li> </ul> <b>Type 202821:</b> <ul style="list-style-type: none"> <li>Flange</li> <li>Retainer</li> </ul>	<ul style="list-style-type: none"> <li>Screw-in thread G ¾ A</li> <li>Screw-in thread G 1 A</li> <li>Clamp DN25</li> </ul>	Flange DN50	<ul style="list-style-type: none"> <li>Weld seam</li> <li>Screw-in thread G¾ A</li> <li>Taper sockets DN25/50</li> <li>Hygienic process connections: (clamp DN25/50, VARIVENT® DN40/50)</li> <li>Ingold screw connection</li> </ul>
Data	Accessories	–	<b>Type 202820:</b> <ul style="list-style-type: none"> <li>Cleaning nozzle</li> <li>Wetting cup</li> </ul> <b>Type 202821:</b> <ul style="list-style-type: none"> <li>Integrated flushing nozzle</li> </ul>	–	<ul style="list-style-type: none"> <li>T-piece installation</li> <li>Controller EXmatic 460</li> <li>Cleaning valve kit</li> </ul>	–

\* The fittings are not suitable for JUMO ISFET sensors and JUMO tecLine PRO electrodes.



# Conductive conductivity measurement

After pH measurement, the electrolytic conductivity measurement is the most measured parameter in liquid analysis. For desalination of seawater and for monitoring the quality of highly-purified water or cooling water, conductivity measurement plays an important role in many applications. Whether two or four-electrode systems: with JUMO, you're ready for anything.



## Application example



### Conductivity measurement in highly-purified water






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. A continuous conductivity measurement enables the quality of the highly-purified water to be monitored quickly and reliably. The measurement is made with conductivity sensors that work according to the two-electrode method. According to the European Pharmacopoeia (EP), the cell constant of a measuring cell must be certified by its manufacturer. For many years the JUMO product portfolio has featured measuring cells that meet these requirements. We currently offer the

conductive conductivity measuring cell JUMO tecLine CR in a stainless steel or titanium version with the “ASTM test certificate.” The certificate indicates the precisely measured cell constant that was measured in the factory. This cell constant can be entered directly in the transmitter. The measuring cell is then ready to use. In addition to reliable conductivity sensors, highly-purified water applications also require measurement and control devices that can be mounted according to on-site requirements. JUMO offers a wide selection of models in this field. Customers typically choose panel mounting (JUMO dTRANS CR 02), installation in a surface-mounted case (JUMO AQUIS 500 CR) with a high protection type (for example IP67), or DIN-rail mounting (JUMO ecoTRANS Lf 03).



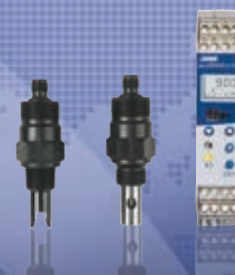


## Conductive two and four electrode conductivity measuring cells





	$\mu\text{S/cm}$ $\text{mS/cm}$					
Description		JUMO BlackLine CR-GT, -EC, -GS	JUMO ecoLine CR-PVC	JUMO tecLine CR	JUMO tecLine CR-GT	JUMO tecLine CR-4P with JUMO PEKA adapters
Data sheet		202922	202923	202924	202925	202930
General information	Features	<ul style="list-style-type: none"> <li>• Compact design type</li> <li>• Low cost version</li> <li>• For universal application</li> </ul>	<ul style="list-style-type: none"> <li>• Proven versions for industrial use</li> <li>• Implementation option with T-piece</li> </ul>	<ul style="list-style-type: none"> <li>• Wide variety of process connections</li> <li>• Sturdy design type</li> <li>• Pharmaceutical version incl. ASTM certificate</li> </ul>	<ul style="list-style-type: none"> <li>• Industrial version</li> <li>• Various process connections provide optimum adaptation to process conditions</li> <li>• With integrated temperature probe</li> </ul>	<ul style="list-style-type: none"> <li>• Very wide measuring range</li> <li>• CIP/SIP capability</li> <li>• Hygienic design</li> <li>• Certificate of quality included</li> </ul>
	Areas of application	<ul style="list-style-type: none"> <li>• Drinking water</li> <li>• Ion exchangers and reverse osmosis plants</li> <li>• Aquaristics</li> </ul>	<ul style="list-style-type: none"> <li>• Cooling and air-conditioning system technology</li> <li>• Drinking and swimming pool water</li> <li>• Industrial rinsing and process water circuits</li> </ul>	<ul style="list-style-type: none"> <li>• Pure and highly-purified water</li> <li>• Boiler feed water</li> <li>• Chip manufacturing</li> <li>• Ion exchangers and reverse osmosis plants</li> <li>• High temperature applications</li> </ul>	<ul style="list-style-type: none"> <li>• Drinking water and wastewater</li> <li>• Service water treatment</li> </ul>	<ul style="list-style-type: none"> <li>• Rinsing processes in the food and beverages industry as well as the pharmaceuticals and biotechnology sector</li> <li>• CIP and SIP applications</li> </ul>
Data	Cell constant	K = 0.01; 0.1 or 1.0	K = 0.1 or 1.0	K = 0.01 or 0.1	K = 1.0	K = 0.3 to 0.4
	Measuring ranges* from to	0.05 $\mu\text{S/cm}$ approx. 10 $\text{mS/cm}$	1 $\mu\text{S/cm}$ 15 $\text{mS/cm}$	0.05 $\mu\text{S/cm}$ 1 $\text{mS/cm}$	10 $\mu\text{S/cm}$ 15 $\text{mS/cm}$	1 $\mu\text{S/cm}$ 600 $\text{mS/cm}$
	Electrode material	JUMO BlackLine CR-GT: Special graphite JUMO BlackLine CR-EC: Stainless steel (1.4571) or titanium JUMO BlackLine CR-GS: Platinum	Stainless steel (1.4571) or graphite	<ul style="list-style-type: none"> <li>• Stainless steel (1.4571 or 1.4435)</li> <li>• Titanium</li> </ul>	Graphite	Stainless steel (1.4435)

\* The measuring ranges depend on the measuring cell types and/or the cell constant.





## Transmitters/controllers for conductivity, TDS, resistance, and temperature\*

									
$\mu\text{S/cm}$ $\text{mS/cm}$									
Description		JUMO ecoTRANS Lf 01/02 Transmitter/switching device		JUMO ecoTRANS Lf 03 Transmitter/switching device		JUMO dTRANS CR 02 Transmitter/controller		JUMO AQUIS 500 CR Transmitter/controller	
Data sheet		202731		202732		202552		202565	
General information	Features	<ul style="list-style-type: none"> <li>• Low cost</li> <li>• Ideal partner for PLC</li> <li>• User-friendly setup program</li> </ul>		<ul style="list-style-type: none"> <li>• Integrated LCD display with varied display units (<math>\mu\text{S/cm}</math>, <math>\text{mS/cm}</math>, <math>\text{k}\Omega\text{m} \times \text{cm}</math>)</li> <li>• USP switching function according to USP&lt;645&gt;</li> <li>• Calibration certificate included</li> </ul>		<ul style="list-style-type: none"> <li>• Extremely compact design type</li> <li>• Transmitter, controller, indicator, and data logger in one device</li> <li>• Simple operation in plain text, multiple languages available</li> <li>• Modular structure – variable measured value display</li> <li>• USP switching function according to USP&lt;645&gt;</li> </ul>		<ul style="list-style-type: none"> <li>• Multilingual plain text operation</li> <li>• Graphic display with backlighting</li> <li>• P, PI, PD, and PID control functions</li> <li>• USP switching function according to USP&lt;645&gt;</li> </ul>	
	Areas of application	General water technology		For universal application		For universal application		For universal application	
Data	Mounting	DIN rail		DIN rail		Surface or control cabinet mounting		Surface or control cabinet mounting	
	Measurands	<ul style="list-style-type: none"> <li>• Conductivity</li> <li>• Temperature</li> </ul>		<ul style="list-style-type: none"> <li>• Conductivity</li> <li>• Temperature</li> <li>• Resistance</li> </ul>		<ul style="list-style-type: none"> <li>• Conductivity</li> <li>• Temperature</li> <li>• Resistance</li> <li>• TDS value</li> </ul>		<ul style="list-style-type: none"> <li>• Conductivity</li> <li>• Temperature</li> <li>• Resistance</li> <li>• TDS value</li> </ul>	
	Outputs	<ul style="list-style-type: none"> <li>• One galvanically isolated analog output</li> <li>• One relay output</li> </ul>		<ul style="list-style-type: none"> <li>• Two analog outputs</li> <li>• One relay output or two open collector outputs</li> </ul>		<ul style="list-style-type: none"> <li>• Up to three analog outputs</li> <li>• Up to seven relays</li> </ul>		<ul style="list-style-type: none"> <li>• Two analog outputs</li> <li>• Two relays with changeover contact</li> </ul>	
	Protection type	IP20		IP20		IP65		IP67	

\* See also chapter "Multichannel measuring devices" (page 22).



# Inductive conductivity measurement

The conductivity sensor in a CIP plant must be resistant to highly aggressive and hot cleaning agents. It must also be suitable for conductivity values that can occasionally be very high. Inductive measurement technology is ideal for this application, since the measuring device has no actual contact with the measurement solution. JUMO offers a wide selection of inductive conductivity sensors in this area. Examples are the JUMO CTI-750 with stainless steel case and the JUMO tecLine Ci hygienic inductive conductivity sensor.



## Application example



### Conductivity measurement in CIP cleaning

CIP cleaning is one of the standard cleaning methods for production plants in both the food and pharmaceutical industries. Automating this cleaning process allows companies to reduce costs and produce more efficiently. Inductive conductivity sensors offer significant advantages in this application. The JUMO CTI-750 conductivity transmit-

ter supports this process with accurate measurements to ensure that cleaning is performed quickly and reliably. JUMO CTI-750 also monitors and controls the concentration of your cleaning agent by measuring conductivity with an inductive conductivity sensor.







## Inductive conductivity sensors

				
		$\mu\text{S/cm}$ $\text{mS/cm}$		
Description*		JUMO tecLine Ci Hygienic conductivity sensor	JUMO tecLine Ci-S Conductivity sensor for process technology	JUMO ecoLine Ci Conductivity sensor for water technology
Data sheet		202941	202942	202943
General information	Features	<ul style="list-style-type: none"><li>• Hygienic sensor design</li><li>• Wide variety of process connections (milk cone, clamp, VARIVENT®)</li><li>• Fast-response internal temperature sensor</li><li>• Seal-free construction</li></ul>	<ul style="list-style-type: none"><li>• Wide variety of mounting measurands</li><li>• Different body materials</li><li>• Immersion version also available</li></ul>	<ul style="list-style-type: none"><li>• Maintenance-free conductivity measurement</li><li>• Compact, proven sensor</li><li>• Various process connections variants</li></ul>
	Areas of application	<ul style="list-style-type: none"><li>• Food industry (dairies, breweries, etc.)</li><li>• Soft drinks manufacturing/ bottling</li><li>• Mineral springs</li><li>• Drinking water</li><li>• CIP/SIP systems</li><li>• Concentration measurements of acids, lyes, and cleaning chemicals</li></ul>	<ul style="list-style-type: none"><li>• Liquid foods</li><li>• CIP/SIP systems</li><li>• Rinsing and cleaning processes</li></ul>	<ul style="list-style-type: none"><li>• Drinking water and wastewater</li><li>• Dilution monitoring in cooling towers</li><li>• Seawater desalination plants</li><li>• Rinsing baths (electroplating plants)</li><li>• Car washes</li><li>• Wet scrubbers</li><li>• Use in media with light chemical pollution</li></ul>
Data	Sensor material	PEEK®	PVDF	PP or PVDF
	Measuring range	0 to 2000 mS/cm**	0 to 2000 mS/cm**	0 to 2000 mS/cm**
	Admissible medium temperature: Brief operation	-10 to +125 °C ≤+150 °C (≤60 min, ≤5 bar)	-10 to +125 °C ≤+140 °C	-10 to +80 °C PP (+100 °C PVDF) ≤+100 °C PP (+100 °C PVDF)




\* The inductive conductivity sensors are intended for connection to JUMO AQUIS 500 Ci or JUMO AQUIS touch S/P.

\*\* Recommended area of application: as of approx. 50 μS/cm.





## Transmitters/controllers for inductive conductivity, concentration, and temperature\*

				
		µS/cm mS/cm		
General information	Description	JUMO AQUIS 500 Ci Transmitters/controllers for inductive conductivity, concentration, and temperature	JUMO CTI-500 Inductive conductivity/concentration and temperature transmitter with switching contacts	JUMO CTI-750 Inductive conductivity/concentration and temperature transmitter in plastic or stainless steel case
	Data sheet	202566	202755	202756
	Features	<ul style="list-style-type: none"> <li>Multilingual plain text operation</li> <li>Graphic display with backlighting</li> <li>P, PI, PD, and PID control functions</li> </ul>	<ul style="list-style-type: none"> <li>Operation via keypad and via setup program</li> <li>Up to four measuring ranges and temperature coefficients can be activated</li> <li>Fast-response temperature sensor</li> </ul>	<ul style="list-style-type: none"> <li>Individual characteristic line for concentration display</li> <li>Easy-to-use programming options with setup program</li> <li>CIP and SIP capable</li> </ul>
	Areas of application	<ul style="list-style-type: none"> <li>Food and beverages industry</li> <li>CIP/SIP systems</li> <li>Concentration measurement of acids and lyes</li> </ul>	<ul style="list-style-type: none"> <li>Water and wastewater engineering</li> <li>Cooling tower monitoring (dilution control)</li> <li>Rinsing baths (electroplating plants)</li> <li>Wet scrubbers</li> </ul>	<ul style="list-style-type: none"> <li>Food and beverages industry</li> <li>CIP/SIP systems</li> <li>Concentration measurement of acids and lyes</li> </ul>
	Measurands	<ul style="list-style-type: none"> <li>Conductivity</li> <li>Concentration of NaOH, HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>, HCl</li> <li>Temperature</li> </ul>	<ul style="list-style-type: none"> <li>Conductivity</li> <li>Concentration of NaOH, HNO<sub>3</sub></li> <li>Temperature</li> </ul>	<ul style="list-style-type: none"> <li>Conductivity</li> <li>Concentration of NaOH, HNO<sub>3</sub></li> <li>Temperature</li> </ul>
Data	Versions	Surface or panel mounting	<ul style="list-style-type: none"> <li>Combined device (transmitter and measuring cell together in one device)</li> <li>Split version (transmitter and measuring cell connected by cable)</li> </ul>	<ul style="list-style-type: none"> <li>Combined device (transmitter and measuring cell together in one device)</li> <li>Split version (transmitter and measuring cell connected by cable)</li> </ul>
	Mounting	Surface or control cabinet mounting	Pipe mounting, wall mounting	Pipe mounting, wall mounting
	Outputs	<ul style="list-style-type: none"> <li>Up to two analog outputs</li> <li>Up to two relays</li> </ul>	<ul style="list-style-type: none"> <li>Two outputs</li> <li>Two potential-free contacts</li> </ul>	<ul style="list-style-type: none"> <li>Two outputs</li> <li>Two potential-free contacts</li> </ul>
	Protection type	IP67	IP67	IP67
	Sensor material	See sensors	PP or PVDF	PEEK® or PVDF

\* See also chapter "Multichannel measuring devices" (page 22).



# Membrane-covered sensors

JUMO offers a wide range of solutions for many different applications from one single source. These include documentation for the disinfectant concentration of your plant, monitoring for ammonia leakage in your refrigeration plant, or controlling the oxygen content of your sewage treatment plant with an amperometric or a luminescence method.



## Sensors for total chlorine, free chlorine, chlorine dioxide, ozone, hydrogen peroxide, peracetic acid, and bromine



Description	JUMO tecLine Cl <sub>2</sub> /TC/ClO <sub>2</sub> , O <sub>3</sub> , H <sub>2</sub> O <sub>2</sub> /PAA, Br membrane-covered amperometric measuring cells*	JUMO AQUIS 500 AS Indicating device/controller	JUMO flow fittings for membrane-covered measuring cells
Data sheet	202630/31/34/36/37	202568	202810, 202811
Features	<ul style="list-style-type: none"> <li>Measuring range: 0 to 50,000 mg/l**</li> <li>Temperature-compensated current output (4 to 20 mA)</li> </ul>	<ul style="list-style-type: none"> <li>Display: mg/l, ppm, pH, mV, µs/cm, etc.</li> <li>Choice of display visualizations</li> </ul>	<ul style="list-style-type: none"> <li>Combination fitting and individual fitting for monitoring water disinfection</li> </ul>
Areas of application	Drinking water, swimming pool water, service water	For universal application	Drinking water, swimming pool water, service water

## Oxygen measurement (DO)



Description	JUMO dTRANS O2 01 – two-wire transmitter for dissolved oxygen with operating unit	JUMO ecoLine O-DO* – optical sensor for dissolved oxygen with JUMO AQUIS 500 RS indicating device/controller
Data sheet	202610	202613, 202569
Measuring principle	Amperometric	Luminescence
Features	<ul style="list-style-type: none"> <li>Measuring range: 0 to 50 mg/l</li> <li>Simple, safer servicing through exchange of modules</li> </ul>	<ul style="list-style-type: none"> <li>Measuring range: 0 to 20 mg/l</li> <li>Long-term stability and low maintenance</li> </ul>
Areas of application	Drinking water, wastewater, fish farming	

## Ammonia measurement



Description	JUMO ammonia-sensitive sensor*	JUMO AQUIS 500 pH Transmitters/controllers	JUMO quick-change fitting for ammonia-sensitive sensor
Data sheet	201040	202560	201040
Features	<ul style="list-style-type: none"> <li>Measuring range: 0.01 to 999 mg/l</li> <li>Simple, safer servicing through exchange of modules</li> </ul>	<ul style="list-style-type: none"> <li>Multilingual plain text operation – graphic display with backlighting</li> <li>P, PI, PD, and PID control functions</li> </ul>	<ul style="list-style-type: none"> <li>Simplifies handling</li> <li>Hose connection G 1/8 A (POM)</li> </ul>
Areas of application	Refrigeration plants***	For universal application	Refrigeration plants***

\* Also suitable for connecting to the JUMO AQUIS touch S/P multichannel measuring devices, see page 21/22.

\*\* Measuring range depends on the measurand.

\*\*\* Monitoring of ammonia leakage (e.g. in indoor ice rinks or cold stores).





# Turbidity measurement

The turbidity measurement according to DIN EN ISO 7027 is a tried-and-tested method for monitoring water with low to medium levels of turbidity. The measuring principle is based on infrared light measurement according to the 90 ° scattered light method. Due to the light measurement at a wavelength of 880 nm and the wide measuring range of 0 to 4,000 NTU the sensor can be used in such areas as fish breeding, water monitoring, and wastewater control.

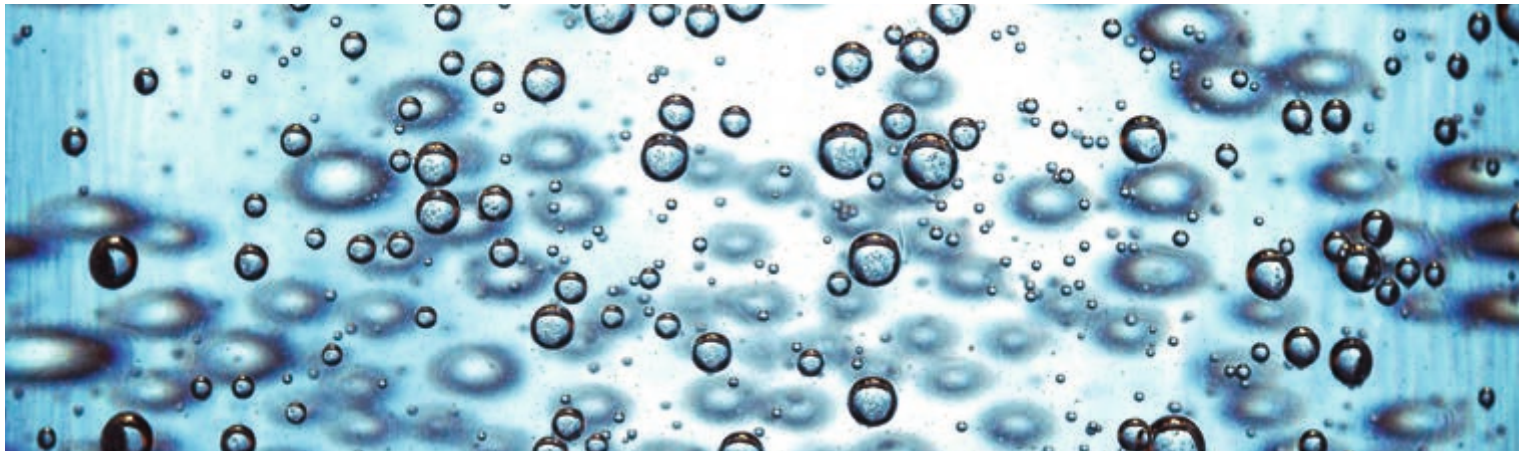




## Turbidity measurement (NTU)

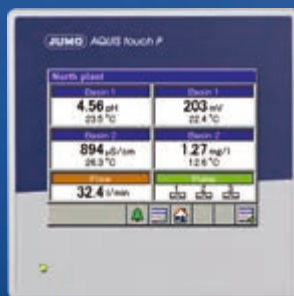


General information	Description	JUMO ecoLine NTU – optical sensor for measuring turbidity with JUMO AQUIS 500 RS indicating device/controller
	Data sheet	202670, 202569
	Features	Robust sensor, low maintenance, and calibration data/history saved in the sensor electronics, complete unit with JUMO AQUIS 500 RS (an indicating device with two integrated controller and two switching outputs)
	Application areas	<ul style="list-style-type: none"> <li>• Municipal and industrial sewage treatment plants</li> <li>• Water protection</li> <li>• Fish farming companies</li> <li>• Process plants</li> </ul>
Data	Measuring principle	Infrared measurement [880 nm] according to the 90 ° scattered light principle (according to DIN EN ISO 7027)
	Measuring ranges	Four measuring ranges: <ul style="list-style-type: none"> <li>• 0 to 50 NTU</li> <li>• 0 to 200 NTU</li> <li>• 0 to 1000 NTU</li> <li>• 0 to 4000 NTU</li> </ul>
	Resolution	0.01 to 1 NTU (depending on the set measuring range)
	Measuring error	< 5 % of the displayed measured value
	Temperature sensor	Integrated NTC (Negative Temperature Coefficient)
	Operating temperature	0 to 50 °C
	Interface	RS485
	Voltage supply	DC 5 to 12 V
	Dimensions	Diameter: 27 mm, length approx. 170 mm
	Material	PVC
	Max. pressure	5 bar
	Protection type	IP68



# Multichannel measuring devices

Measure – display – control – record. These are terms that have been closely associated with the JUMO brand for decades. The four tasks have been combined into a single, innovative device series for the future global liquid analysis market: the JUMO AQUIS touch.



pH

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

ppm

mV

l/min

$\text{M}\Omega \cdot \text{cm}$

mS/cm

JUMO

AQUIS touch S

## Multichannel measuring devices



Description		JUMO AQUIS touch P	JUMO AQUIS touch S
Data sheet		202580	202581
General information	Features	<ul style="list-style-type: none"> <li>• 3.5" touchscreen</li> <li>• 10 inputs and outputs as part of the basic package</li> <li>• Seven slots for input and output modules</li> </ul>	
		<ul style="list-style-type: none"> <li>• Modular structure</li> <li>• Customized process screen</li> <li>• Data monitor, registration function</li> <li>• Web browser with online visualization</li> <li>• Timer functions</li> <li>• Math and logic functions</li> <li>• Setup program, PC evaluation software (PCA3000), PCA communication software (PCC)</li> <li>• Calibration routines/calibration log books/calibration timers</li> <li>• In addition, up to six JUMO digiLine sensors can be connected</li> </ul>	
	Areas of application	<ul style="list-style-type: none"> <li>• For universal application</li> <li>• Water and wastewater engineering</li> <li>• Food and beverages industry (CIP/SIP)</li> <li>• Pharmaceuticals and biotechnology (USP, ASTM)</li> <li>• Drinking water technology/desalination of seawater</li> <li>• Process technology (rinsing baths/galvanic equipment, cooling tower control, gas/air scrubbers)</li> <li>• Swimming pool technology</li> </ul>	
Data	Mounting	Control cabinet mounting (front dimensions 96 x 96 mm)	Surface-mounted case
	Measurands	<ul style="list-style-type: none"> <li>• pH value/redox voltage/NH<sub>3</sub> concentration</li> <li>• Electrolytic conductivity (conductive)</li> <li>• Electrolytic conductivity (inductive)</li> <li>• Acid and lye concentration</li> <li>• Resistance (MΩm x cm; kΩm x cm)</li> <li>• TDS value (ppm)</li> <li>• Temperature (Pt100, Pt1000, NTC, PTC)</li> <li>• Flow (pulse input)</li> <li>• Free chlorine, total chlorine, chlorine dioxide, ozone, hydrogen peroxide, peracetic acid</li> <li>• Universal inputs via standard signal (0 to 20 mA; 4 to 20 mA or 0 to 10 V) for various measurands</li> </ul>	
	Protection type	IP66 (front side)	IP67
	Interfaces	Ethernet, USB host, USB device (setup), RS422/RS485 with Modbus protocol, PROFIBUS DP, PROFINET	
	Approvals	cULus, DNVGL	cULus



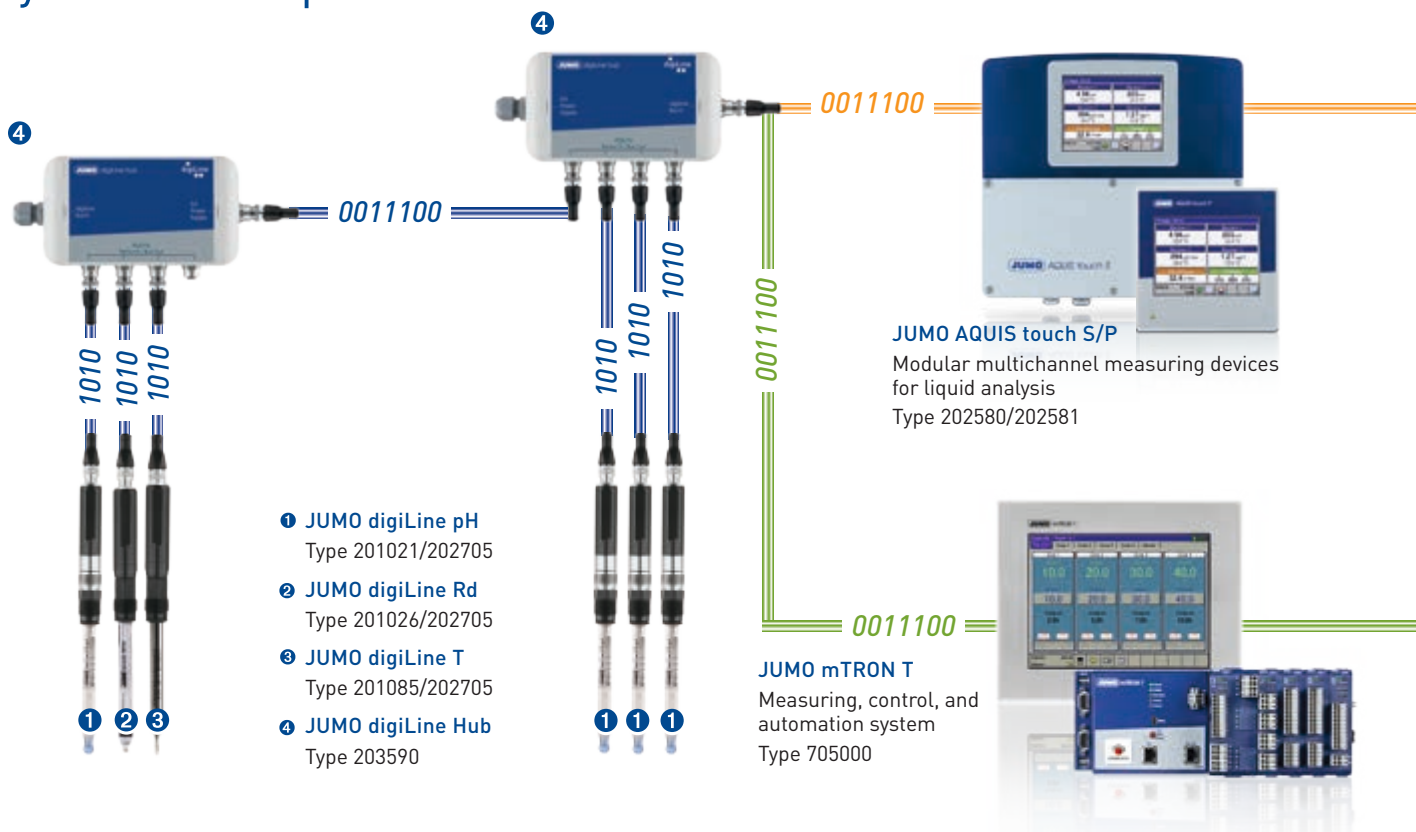
# JUMO digiLine

## Intelligent, bus-compatible connection system for digital sensors

With JUMO digiLine, JUMO presents a bus-compatible connection system for digital sensors used in liquid analysis which also offers Plug and Play functionality.

JUMO digiLine allows for the simple creation of sensor networks by connecting a wide array of sensors in various bus topologies (linear, star). A single shared signal line is used for communication with the next evaluation unit or controller. This way plants in which several parameters need to be measured at the same time in different places can be wired efficiently and quickly.

### System example

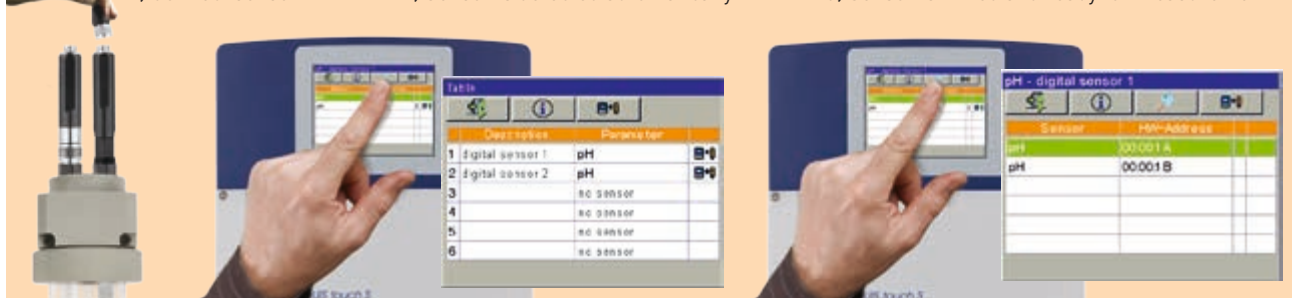


### Ready for measurement in just three steps – thanks to Plug and Play

1) Connect sensor

2) Sensor is detected automatically

3) Sensor is linked and ready for measurement





### Connection option 1

The multichannel measuring devices of the JUMO AQUIS touch series are especially designed for liquid analysis. They are ideal as a central platform for the display and further processing of measurement data. Up to six digiLine sensors can be connected to the modular devices and as many as 25 sensors can be connected in total using corresponding input modules and interfaces. In addition to measured value recording up to four independent control loops can be implemented and process values can be recorded in a tamper-proof manner with an integrated paperless recorder.

### Connection option 2

JUMO digiLine sensors can also be connected to the universal measuring, control, and automation system JUMO mTRON T. This means that entire automation solutions can be implemented while the scalability also enables individual adaptation to a particular task. An integrated PLC is used to integrate up to 62 JUMO digiLine sensors.

### Measure various liquid analysis measurands with just one system

- Measurands: pH value, temperature, redox potential, conductivity, oxygen concentration, turbidity
- Disinfection measurands for industrial applications in the process, food, pharmaceutical, and water industry
- Fail-safe digital data transfer for optimal process monitoring
- Modular system: for both individual measuring points and for setting up sensor networks
- Plug and Play function for connection to transmitters from the JUMO AQUIS touch series: facilitates the replacement of expended sensors or the brief exchange of sensors for calibration purposes
- The digiLine electronics can still be used when the sensor becomes worn
- Simple and reliable calibration of sensors as well as comprehensive measuring point management can both be easily done on a PC with the JUMO DSM (digital sensor management) software tool



# Accessories

Useful for maintenance, troubleshooting, and startup of pH/redox and conductivity measuring points, technical buffer solutions, or connecting cables – JUMO offers a large selection of proven designs.





## Accessories for liquid analysis



Description		Cables, connectors, and sockets for pH, redox, and conductivity measurement	Technical buffer and cleaning solutions	Impedance converters for pH and redox electrodes	Simulators and calibration adapters for pH, redox, and conductivity measurement	Handheld device
Data sheet		202990	202950	202995	202711	202710
General information	Features	<ul style="list-style-type: none"> <li>• Pre-assembled high-quality connecting cables</li> <li>• Highest possible protection type when fully assembled</li> <li>• Wide selection of special connectors/sockets available</li> <li>• Customer-specific versions</li> </ul>	<ul style="list-style-type: none"> <li>• pH buffer solutions according to DIN 19267</li> <li>• Redox test solutions according to ASTM D 1498</li> <li>• Reference solutions for conductivity can be traced back to PTB and NIST</li> <li>• Diaphragm and electrode cleaners</li> </ul>	<ul style="list-style-type: none"> <li>• Network independent and signal stabilizing</li> <li>• Retrofitting is possible</li> <li>• Allows longer cable lengths</li> </ul>	<ul style="list-style-type: none"> <li>• Simulates a pH/redox or conductivity sensor in an application</li> <li>• Makes the dry startup of plants easier</li> </ul>	<ul style="list-style-type: none"> <li>• Compact design type</li> <li>• Min./max. value</li> <li>• Memory and hold function</li> <li>• Easy-to-operate membrane keypad</li> <li>• Easy to read LCD display</li> </ul>
	Areas of application	<ul style="list-style-type: none"> <li>• For use with electrochemical sensors</li> </ul>	<ul style="list-style-type: none"> <li>• For calibrating pH/redox electrodes and conductivity measuring cells</li> </ul>	<ul style="list-style-type: none"> <li>• Converts the high-impedance signal of the pH electrode</li> </ul>	<ul style="list-style-type: none"> <li>• For startup, calibration, and inspection of pH, redox, and conductivity measuring points</li> <li>• For testing connecting cables and troubleshooting</li> </ul>	<ul style="list-style-type: none"> <li>• General water monitoring</li> <li>• Aquaristics</li> <li>• Fish farming</li> </ul>
Data	Mounting	–	–	–	–	• Handheld device
	Measurands	–	–	–	–	<ul style="list-style-type: none"> <li>• pH/redox</li> <li>• Temperature</li> <li>• Conductivity</li> </ul>
	Outputs	–	–	–	–	• Indicating device
	Protection type	–	–	–	–	• IP65



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

