

# Analytical Measurement



## pH and Redox Measurement

### JUMO ecoLine, JUMO BlackLine pH and redox combination electrodes



#### Well-proven electrodes with a favorable price/performance ratio

- version with a glass or plastic shaft
- active component for pH: outstanding measurement results, thanks to the tried and tested JUMO U glass, optimized over many years
- active component for redox: rugged platinum tip for reliable measurements and easy sensor cleaning
- reference system: the acrylamide-free JUMO gel is made from a high-viscosity KCl solution

#### Possible application areas

Drinking water monitoring and treatment, swimming baths, aquariums (also seawater aquariums), greenhouses, lightly contaminated service, process and wastewater, rainwater, pond and surface water

**Further information:** Data Sheet 20.1005

### JUMO tecLine pH, JUMO tecLine Rd pH and redox combination electrodes



#### High-quality industrial/process electrodes for a wide range of applications

- versions with solid electrolyte, without a diaphragm
- zirconium dioxide, platinum, teflon ring diaphragms
- for measurement in low-ion media
- high-temperature/high-alkaline versions for up to 135°C
- sterilizable and fluoride-resistant versions
- refillable electrodes for low-ion media

#### Possible application areas

Industrial and municipal as well as general water and wastewater engineering, process measurements, electroplating, final checks, neutralization plant, drinking and well water, boiler feed water, low-temperature applications (-30...+30°C)

**Further information:** Data Sheet 20.1020

### JUMO labLine sensors/single sensors pH- redox- and ion-selective electrode system



#### High-quality electrodes in typical laboratory versions

- insertion, micro and flat membrane versions
- glass conductivity cells and compensation thermometers
- ammoniac sensors

#### Possible application areas

Chemical and pharmaceutical laboratories, coolant checking, measurement with hand-held instruments, agricultural and environmental measurement

**Further information:** Data Sheet 20.1030

### JUMO tecLine PRO pH/redox pH and redox combination electrodes



#### Rugged electrodes with a high level of mechanical and chemical resistance

- integrated temperature sensor
- the stable PVDF body ensures that there is practically no danger of breaking the sensor
- rounded-tip or flat membrane, depending on the application

#### Possible application areas

Chemical industry, wastewater treatment, purification plant, paper industry

**Further information:** Data Sheet 20.1020

### JUMO Multitrode – the combination sensor



#### Just one sensor, just one connecting cable

- a combination of pH, redox and temperature sensors all in one stem
- easy handling
- only one Pg13.5 gland connection required in the application setup

#### Possible application areas

The practical solution for applications where individual sensors can not be used, because of space or handling problems

**Further information:** Data Sheet 20.1030

## pH and Redox Measurement

### Connecting cables and buffer solutions for pH, redox and conductivity sensors



- ① S7/S8 plug cap system
- ② SixPlug system (SMEK)
- ③ VP/Variopin or Variopol system
- ④ BNC connector

**Further information:** Data Sheet 20.1090

### Simulators for pH/redox potential and conductivity



- a simulator can be connected to a transmitter in place of an electrode or conductivity cell
- this facilitates the dry-run commissioning of installations
- for testing connecting cables and investigating faults

**Further information:** Data Sheet 20.1090

### Impedance converter for combination electrodes



This converts the high-impedance signal from the pH electrode into a low-impedance signal

- stabilizes the signal, independent of the electrical supply
- can be retrofitted
- enables the use of longer cables
- can also be supplied for electrodes with SMEK connection

**Further information:** Data Sheet 20.2995

### JUMO dTRANS pH 01 Transmitter/controller for pH or redox potential



CRAUS

PROFI<sup>®</sup>  
PROCESS FIELD BUS



This instrument measures and controls (depending on the configuration) the pH value or redox potential of aqueous solutions

- display of pH or mV/ORP and temperature
- switchable from pH to mV/ORP (redox potential)
- simple, guided calibration procedure
- two relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width or pulse frequency output, or as modulating controller
- two electrically isolated analog outputs 0(4) – 20 mA or 0(2) – 10V, freely configurable as process value output for pH, redox or temperature, or as continuous controller (option)
- two logic inputs
- simulation of the process value outputs, for dry-run commissioning and fault-finding
- PROFIBUS-DP or RS485/422 serial interface with MOD-Bus/J-Bus protocol (option)
- panel-mounting housing to DIN 43 700, IP 65 enclosure protection at front
- wall-mounting housing with IP67 enclosure protection

**Further information:** Data Sheet 20.2530

### JUMO dTRANS Rd 01 Transmitter/controller for redox potential

This instrument measures and controls the redox potential of aqueous solutions

- display range +/-2000mV or 0 – 100 %
- 1-point or 2-point calibration ("3-bucket method")
- temperature input can be activated as independent measurement channel
- for further technical description, see dTRANS pH 01

#### Possible application areas

Industrial and municipal water and wastewater engineering, pharmacy and medicine, chemical industry, semiconductor engineering, plant engineering

**Further information:** Data Sheet 20.2535



## Electrolytic Conductivity

### JUMO BlackLine Lf-GT/-EC 2-electrode conductivity cells



Compact conductivity probes with an outstanding price/performance ratio

#### JUMO BlackLine Lf-GT, graphite electrodes

- cell constant  $K = 1.0$  and  $3.0$  for ranges up to  $200 \text{ mS/cm}$
- attached cable or screw-in version with Pg13.5
- 120 mm fitting length, 12 mm diameter
- usable up to  $90^\circ\text{C}$  and pressure up to 6 bar
- integrated temperature probe (option)

#### JUMO BlackLine Lf-EC, electrodes in titanium or stainless steel 1.4571

- cell constants  $K = 0.01, 0.1$  and  $1.0$
- $G \frac{1}{2}$ " screw-in thread with attached cable or  $\frac{1}{2}$ " NPT from 40 mm fitting length
- usable up to  $100^\circ\text{C}$  and pressure up to 6 bar
- integrated Pt 100 temperature probe
- as immersion version with immersion length up to 1500 mm (option)

#### Possible application areas

Drinking and surface water monitoring, ion exchangers and reverse osmosis plant, HVAC and refrigerating systems, horticulture, seawater and freshwater aquariums, lightly contaminated industrial process and flushing water

Further information: Data Sheet 20.2922

### JUMO ecoLine Lf-PVC 2-electrode conductivity cells



#### Tried and tested versions for industrial use

- measuring ranges:  $0 - 1 \text{ mS/cm}$  ( $K = 0.1$ ) or  $0.01 - 15 \text{ mS/cm}$  ( $K = 1.0$ )
- temperature range up to  $55^\circ\text{C}$  and pressures up to 6 bar at  $20^\circ\text{C}$
- stainless steel version,  $K = 0.1$ , with three metallic pin electrodes, graphite version  $K = 1.0$
- PVC flow-through fitting can be supplied

#### Possible application areas

General water engineering, refrigeration and air conditioning systems, drinking and bathing water

Further information: Data Sheet 20.2923

### JUMO tecLine Lf-VA 2-electrode conductivity cells



#### Rugged versions in stainless steel or titanium, with a wide variety of process connections

- for measuring ranges from  $0.05 \mu\text{S/cm}$  to  $1 \text{ mS/cm}$
- pharmaceutical version with factory certificate to EN 10 204-3.1 and FDA verification
- high-temperature version up to  $200^\circ\text{C}$  and 17 bar

#### Possible application areas

Pure and high-purity water, pharmaceuticals, chemicals, food technology, chip production, ion exchangers, reverse osmosis plant

Further information: Data Sheet 20.2924

### JUMO tecLine Lf-GT 2-electrode conductivity cells



#### Industrial version with graphite electrodes for measuring ranges up to $200 \text{ mS/cm}$ .

- cell constants  $K=1.0, 3.0$  or  $10.0$
- various process connections provide optimum adaptation to process conditions

#### Possible application areas

Separating media, drinking water treatment, wastewater checks, concentration monitoring, service water treatment

Further information: Data Sheet 20.2925

## Electrolytic Conductivity

### JUMO ecoTRANS Lf 01/02 Transmitter/switching device for conductivity



Cell constant K	Measuring range
0.01/cm	0 – 5 µS/cm
0.01/cm	0 – 20 µS/cm
0.1/cm	0 – 200 µS/cm
0.1/cm	0 – 1000 µS/cm
1/cm	0 – 2 mS/cm
1/cm	0 – 20 mS/cm
10/cm	0 – 100 mS/cm
10/cm	0 – 200 mS/cm

#### The instrument measures the conductivity of liquids

- freely programmable through PC setup program
- electrically isolated process value output (Lf 01) 0/4 – 20 mA or 0/2 – 10 V
- switched output: changeover relay (Lf 02); learning function for switching point
- temperature probe input for compensation (Pt 100/Pt 1000/programmable curve)

#### Possible application areas

Installations for freshwater monitoring and water treatment, reverse osmosis installations, ion-exchange plant etc.

**Further information:** Data Sheet 20.2731

### JUMO ecoTRANS Lf 03 Transmitter/switching device for conductivity



**USP <645>**

#### The instrument measures the conductivity (or resistivity) and temperature of liquids

- display units µS/cm, mS/cm, kOhm x cm, MOhm x cm, µmho/cm, mmho/cm
- measuring ranges 0 – 1 µS/cm to 0 – 200 mS/cm, adjustable in 17 stages
- two parallel process value outputs for conductivity and process temperature 0(4) – 20 mA/0(2) – 10 V; freely programmable
- switching output (relay changeover contact or, alternatively, two open-collector outputs)

#### Possible application areas

High-purity water and pharmaceutical applications, ion-exchange plant, drinking and service water

**Further information:** Data Sheet 20.2732

### JUMO dTRANS Lf 01 Transmitter/controller for electrolytic conductivity



#### This instrument measures and controls the conductivity of aqueous solutions

- display of conductivity µS/cm (mS/cm) and temperature
- calibration procedure for the relative cell constant and temperature coefficient of the measuring solution
- measuring ranges from 0 – 0.5 µS/cm to 0 – 200 mS/cm in one instrument
- two relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width or pulse frequency output, or as modulating controller
- two electrically isolated analog outputs 0(4) – 20 mA/0(2) – 10 V freely configurable as process value output for pH, redox or temperature, or as continuous controller (option)
- two logic inputs
- PROFIBUS-DP or RS 485/422 serial interface with MOD-Bus/J-Bus protocol (option)
- panel-mounting housing to DIN 43 700, IP65 enclosure protection at front
- wall-mounting housing with IP67 enclosure protection

**Further information:** Data Sheet 20.2540

### JUMO dTRANS Rw 01 Transmitter/controller for high-purity water

#### The instrument measures the conductivity (or resistivity) of high-purity water

- temperature compensation as per ASTM D-1125-95
- conforms to the current requirements of USP <645>
- additional linear compensation is possible
- USP contact
- for further technical description, see JUMO dTRANS Lf 01

#### Possible application areas

Industrial and municipal water, general water and wastewater engineering, pharmacy and medicine, chemical industry, semiconductor engineering

**Further information:** Data Sheet 20.2545

## Inductive Conductivity

### JUMO CTI-500 Conductivity transmitter with switched contacts



**Split version**  
up to 2000mm  
immersion depth  
(sensor is shown shortened)



**Remote version**



**Combined instrument**

#### Compact measuring cells in polypropylene (PP) up to 100°C and pressures up to 6bar

- measuring ranges from 0 – 500  $\mu\text{S}/\text{cm}$  to 0 – 2000  $\text{mS}/\text{cm}$
- four ranges and temperature coefficients (switchable)
- concentration measurement of
  - caustic soda NaOH
  - nitric acid  $\text{HNO}_3$
  - a freely definable curve (through setup program)
- temperature sensor with a fast response
- temperature compensation
  - linear
  - natural water
  - integrated characteristic (learning function)
- operation
  - through keypad and LC display
  - through setup program
- setup program
  - easy-to-use programming option
  - plant documentation
- two analog process value outputs for conductivity/ concentration and temperature (0/4 – 20mA or 0/2 – 10V), electrically isolated
- large selection of process connections available
- integrated dilution control
- electrical connection through M12 connector (option)
- remote version with 10m connecting cable

**Further information:** Data Sheet 20.2755

## Inductive Conductivity

### JUMO CTI-750 Conductivity transmitter with switched contacts



Combined instrument



Stainless steel

### JUMO CTI-920 Conductivity transmitter



#### Conductivity transmitter CTI-920 for the measurement of specific conductivity in liquid media

- inductive conductivity cell made from PVDF or PEEK®
- insulated and hermetically sealed sensor with an integrated Pt 100 for temperature measurement and correction of the conductivity measurement
- operating temperature 120 °C max. (up to 140 °C for short periods, such as for steam sterilization)
- operating pressure 10 bar max.
- second current output for temperature is standard
- up to nine measuring ranges are integrated
- measuring ranges from 0 – 1 mS/cm to 0 – 2000 mS/cm
- up to four temperature coefficients can be set
- a rugged housing, made from glass-fiber reinforced polyamide, protects the electronics and the electrical connections from corrosive environmental conditions (IP67 enclosure protection)
- the instrument incorporates a 3-wire transmitter for conductivity and a 2-wire transmitter for temperature (output signals 4 – 20 mA)



Remote version



Remote version,  
immersion depth  
up to 2000 mm  
(sensor is shown  
shortened here)

Immersion probe  
made of PVDF

High-quality, well-established measuring cell in polyether-ether-ketone (PEEK®) or PVDF up to 140 °C and 10 bar pressure

- technical description as for JUMO CTI-500

**Further information:** Data Sheet 20.2756

#### Possible application areas

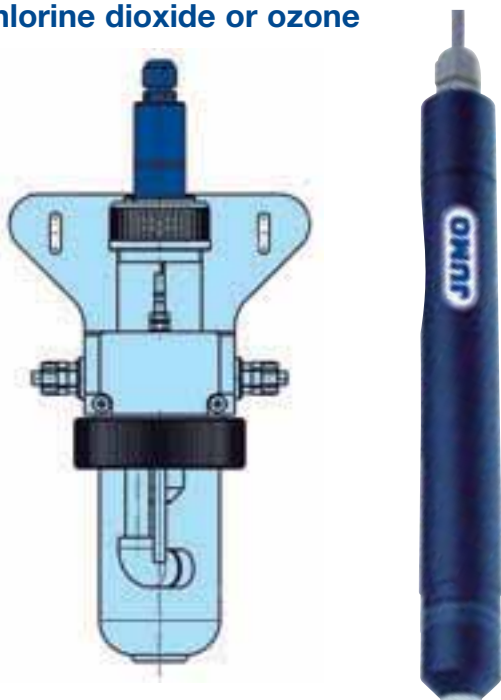
Food, beverage and pharmaceutical industries, product monitoring (phase separation of product/product mix./water) in the beverage industry, breweries and dairies, control (e.g. phase separation of detergent/flushing water) of cleaning processes, such as in bottle cleaning plant and cleaning of containers, regulation of the concentration of acids and caustic solutions e.g. in electroplating and processing chemistry, use in CIP installations, water and wastewater engineering, e.g. car washing and service water monitoring, dosing of chemicals, leak indication in separated circulation systems, e.g. for heating and cooling

**Further information:** Data Sheet 20.2752



## chlorine, chlorine dioxide, ozone, hydrogen peroxide, peracetic acid measurement

### Measuring cells for free chlorine, chlorine dioxide or ozone



Membrane-covered amperometric measuring cells for determining the concentration of free chlorine, chlorine dioxide or ozone

- 2- or 3-electrode principle
- simple calibration
- integrated temperature compensation
- proven measuring system

#### Possible application areas

Drinking, bathing, service, process and cooling water

**Further information:** Data Sheet 20.2630

### Measuring cells for hydrogen peroxide or peracetic acid



Measuring cell for determining the hydrogen peroxide concentration in aqueous solutions

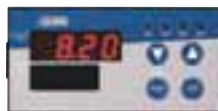
- measures hydrogen peroxide or peracetic acid concentrations at the milligram level
- membrane is insensitive to chemicals and tensides
- integrated temperature compensation
- simple calibration
- 2-electrode principle

#### Possible application areas

Electroplating plant, pharmaceutical, food and beverage industries, dairies, swimming baths and the chemicals industry

**Further information:** Data Sheet 20.2630

### JUMO dTRANS Az 01 Indicator/controller for analytical measurement



Indicator/controller for the measuring cells on this brochure page

- input: standard 0/4 – 20 mA signal and Pt 100/Pt 1000 temperature sensor
- supply output for 2-wire transmitter (option)
- for technical features, see also JUMO dTRANS pH 01 or JUMO dTRANS Lf 01

#### Possible application areas

Monitoring of disinfectant concentration in water circulation systems, in combination with the measuring cells according to the data sheet: 20.2630

**Further information:** Data Sheet 20.2550



# Oxygen Measurement

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



### Two-wire transmitter with optional terminal box or operating unit for measuring dissolved oxygen in aqueous solutions

- measuring dissolved oxygen in aqueous solutions
- simple, reliable servicing through chemical-free module replacement
- reliable 1-point calibration
- 2-wire transmitter (for the basic and standard versions)
- electrical isolation of the signal being measured (DO) and the output signal (mA)
- easily incorporated into an existing system (e.g. PLC)
- maximum version as a stand-alone solution with switching contacts
- compensation for temperature, air pressure and salinity
- output of the measurement point temperature
- setup program for user-friendly configuration and documentation of the measurement points
- background lighting, i.e. easy to read, even in the dark (with maximum version)
- numerous accessories

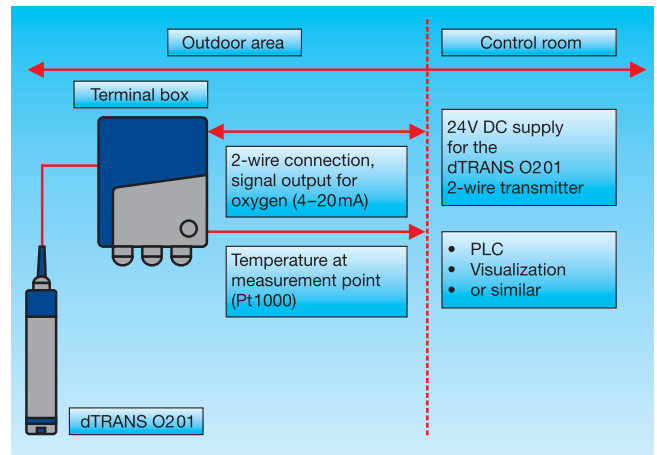
#### Available accessories

- setup software
- PC interface cable
- replacement sensor modules (set)
- fittings

#### Possible application areas

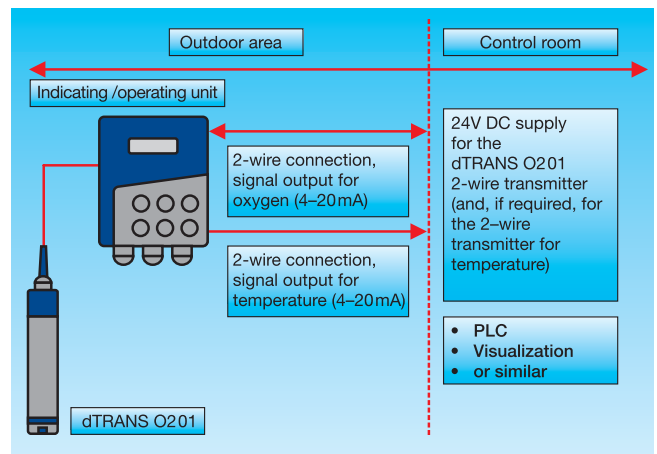
Communal and industrial wastewater treatment plants, drinking water monitoring, water protection, fish farming (seawater and freshwater), processing plant

**Further information:** Data Sheet 20.2610



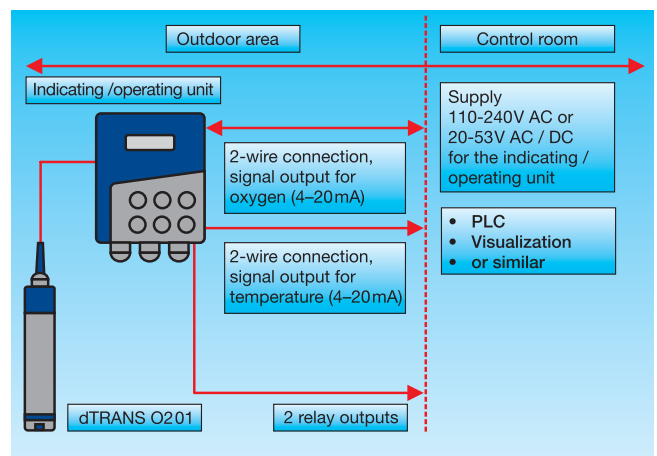
#### Basic version

- in the basic version, the parameterization of the transmitter is made entirely through the PC setup program



#### Standard version

- in the standard version, the parameterization of the transmitter is made through the keyboard and the text-guided operation in the graphics display or the setup program



#### Maximum version

- the integrated power supply enables implementation of a stand-alone solution with two additional switched outputs

# Measurement and Control

## JUMO AQUIS 500 Transmitter/Controller Series for Liquid Analysis



### Transmitter/controller series in on-site housing

- operation
  - plain-text operation
  - multi-lingual: German, English, French; additional languages can be loaded
  - unambiguous key assignment
- graphics display with background lighting
- menu-guided sensor calibration
- full controller functionality (with outputs fitted)
- surface-mounting housing, IP 67 protection
- cabinet mounting, IP 65 protection
- plug-in terminal blocks for easy installation
- electrode monitoring
- complete family of instruments
- maximum of two relays (changeover contacts, 3A 250V AC)
- PID action (can be activated)
- maximum of two continuous outputs (0/4 – 20mA / 0 – 10V)

### Instrument versions

#### JUMO AQUIS 500 pH

For the measurement of pH, redox potential and ammonia concentration

- Asymmetrical/symmetrical high-impedance input
- Single-point, 2-point and 3-point calibration
- ISFET electrodes (glass-free measurement) can be connected

#### JUMO AQUIS 500 CR

For the measurement of electrolytic conductivity or specific resistance, using 2- and 4-electrode sensors

- integrated temperature compensation (linear, natural water, ASTM)
- USP function (pharmaceutical water)
- High-purity water

#### JUMO AQUIS 500 AS

For the measurement of disinfectants (such as free chlorine, chlorine dioxide, ozone) and dissolved oxygen

- Flow monitoring can be directly connected

#### JUMO AQUIS 500 Ci

For the measurement of electrolytic conductivity or concentration in liquid media

(inductive measurement principle, especially suited to higher conductivities and media that form deposits)

- Stored concentration curves, e.g. for
  - caustic soda
  - nitric acid

### Mounting variants

#### Wall mounting



#### Cabinet mounting



### Possible application areas

Drinking water monitoring and treatment, process measurements, electroplating, final checks, neutralization plants, industrial/municipal and general water and wastewater engineering, service/process and wastewater, drinking and well water, boiler feed water, rain/pond and surface water, greenhouse technology, swimming pools, aquariums (also seawater aquariums)

**Further information:** Data Sheets 20.2560, 20.2565

## Fittings

### Flow-through fittings



Flow-through fittings are used for holding electrochemical transducers (e.g. pH and redox combination electrodes, glass conductivity cells, compensation thermometers etc.) with a Pg13.5 screw thread and a mounting length of 120mm. Fitting types are available for 1 to 3 transducers. The fittings are mounted directly in the feed lines of the substance being measured, or in bypasses. They protect the installed sensors from breakage and, thanks to their special construction, prevent measurement errors by ensuring the correct incident flow on the sensor. Various mounting methods and materials are available.

**Further information:** Data Sheet 20.2810

### Manual quick-change fittings



Manually operated quick-change fittings make it possible to remove and replace the sensors under process conditions, i.e. the circulation or main feed that is concerned does not have to be interrupted.

The principal areas of application for quick-change fittings are in closed circulation systems or measurement in the inlets or outlets of wastewater systems. Quick-change fittings can also be mounted in the side walls of containers – in this case, a sensor can be removed without first having to empty the container. The fittings enable the mounting of sensors with a Pg13.5 thread and a mounting length of 120 or 225 mm.

**Further information:** Data Sheet 20.2822

### Immersion fittings



Immersion fittings are used for holding electrochemical transducers (e.g. pH and redox electrodes, glass conductivity cells, compensation thermometers etc.) with a Pg13.5 screw thread and a mounting length of 120mm. Fitting types are available for 1 to 3 transducers.

The fittings are mounted in open sluices or containers. They protect the installed sensors from breakage, and permit measurement at various immersion depths. Options and accessories make it possible to adapt the fittings to match the application conditions. The standard versions use two pipe clamps for wall mounting, but optionally available sliding flanges also permit mounting in container lids and the like.

**Further information:** Data Sheet 20.2820

### Stainless steel process fittings



These fittings are used to mount and protect the transducers. They can be installed directly in existing stainless steel piping systems or in the walls of containers. Type 202825 fittings are primarily used in processing installations that are subject to enhanced hygienic requirements. The parts in contact with the medium, and the sealing materials that are used, comply with the requirements of the FDA (Food & Drug Administration). Type 202831 fittings are primarily used in water engineering and process technology. Both types of fitting are intended to be used for installing sensors with a length of 120mm.

**Further information:** Data Sheet 20.2825

# High-profile products and services

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## Analytical Measurement

- pH/redox: sensors and transmitters/controllers
- Conductivity instrumentation: conductive and inductive
- Dissolved oxygen measurement
- Chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid instrumentation
- Fittings and accessories



## Controllers, Power units, System/Recording technology

- Process controls and programmers
- Automation software
- Electronic thermostats/microstats
- Safety temperature monitor/limiter
- Digital indicators
- Process controller
- Recording instruments
- Temperature transmitters
- Thyristor power switches/power units
- Software and accessories



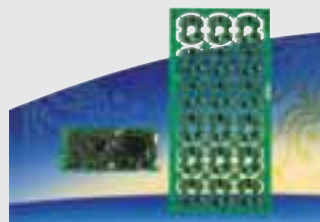
## Thermostats and Dial Thermometers

- Panel and surface mounting thermostats in TR, TW, TB, STW and STB versions
- Room thermostats
- Warm-air thermostats
- Ex thermostats (ATEX)
- Electronic thermostats
- Dial thermometers as indicating and control instruments
- Bimetallic temperature switches
- Electronic temperature indicators with transmitter



## Pressure measurement technology

- Pressure transmitters
- Level probes
- Pressure gauge
- Pressure switch
- Pressure cells
- Chemical seals and accessories



## Electronic modules

- CAD layouting
- Component procurement
- THT and SMD placing
- AOI-testing
- In-circuit testing
- Functional testing
- Run-In
- Final assembly
- Final instrument test



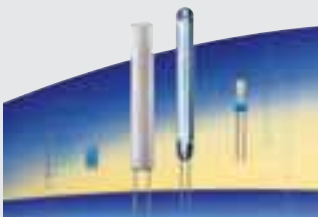
## Transducers for Temperature and Humidity

- Thermocouples
- Resistance thermometers
- Ex temperature probes (ATEX)
- Wireless temperature probe
- Humidity measuring instruments
- DKD (German Calibration Service) laboratory
- Nationally accredited testing station for heat



## Metalworking

- Stamping and forming systems
- Tool manufacture
- Flexible sheet metal working
- Welding, jointing and assembly systems
- Surface engineering
- Machining
- Float
- Materials laboratory



## Platinum temperature sensors

in wirewound technology:

- Glass
- Glass with glass extension
- Ceramic
- Foil

in thin-film technology:

- Chip with connecting wires
- Chip in SMD style on epoxy board
- Chip with terminal clamps
- Chip in cylindrical style
- Chip in SMD style



## Service

- Planning and project design for automation solutions
- German Calibration Service (DKD) for temperature
- Support during commissioning and optimization
- Worldwide service network
- Technical support line
- Seminars and workshops
- Fieldbus center
- Technical literature
- JUMO home page: [www.jumo.net](http://www.jumo.net)



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