More than sensors **+** automation

JUMO AQUIS touch S

Multichannel measuring device for liquid analysis

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Dear Reader,

In addition to the process variables temperature and pressure, measuring the most important electrochemical parameters is one of JUMO's core competencies. Whatever your needs – pH value or redox voltage, electrolytic conductivity or dissolved oxygen – you can depend on JUMO for a wide range of sensors and devices covering the main values in water analysis.

Many of these parameters are measured and controlled simultaneously in water and wastewater treatment plants. Typically a separate transmitter/controller is used for each process variable. Up to 10 measured values can be processed centrally simultaneously with the new JUMO AQUIS touch S. Installation overhead is reduced, operation becomes more uniform and orderly, and space requirements in a system for evaluation electronics become smaller. Process variables frequently affect each other directly. This can be taken into consideration more easily by integrated functions or freely programmable math and logic formulas.
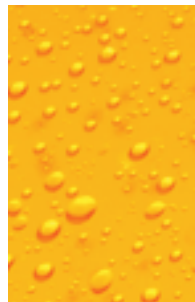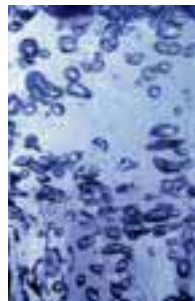
In addition to measuring, displaying and controlling process parameters, integration of other functionalities has yielded good results. Official record-keeping requirements can now be met by the integrated paperless recorder. Measured values can be monitored remotely from an Internet-capable PC via Ethernet/LAN and the integrated web server.

JUMO emphasized good operability in all aspects of functionality without restricting the degree of freedom for adapting applications. A modern touchscreen facilitates intuitive operation. Plain text output in over 30 languages also helps make operation more intuitive.
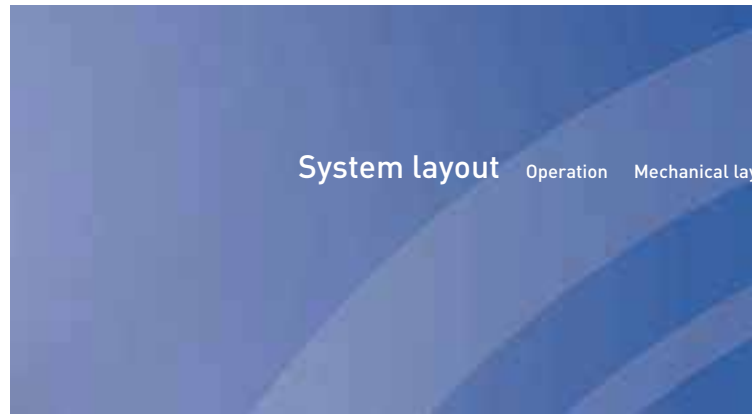
We hope this brochure will spark your interest for the JUMO AQUIS touch S.

P.S.: For extensive information about other products visit **www.jumo.net**.

Contents

System layout – JUMO AQUIS touch S

An innovative, modular multichannel measuring device for liquid analysis

Measure – display – control – record: four tasks, one solution.

Measuring

pH or redox value, electrolytic conductivity, resistance of high-purity water, temperature, disinfecting variables such as free chlorine, total chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid as well as the flow rate quantity: the new JUMO AQUIS touch S provides a central platform for displaying and further processing the corresponding sensor signals. The device can measure and manage up to ten parameters simultaneously. Frequency inputs (counters) are available for flow rate measurements.

Displays

A 5.5" color screen with touch function is used both to display all parameters and to operate and adjust the device. An operating philosophy that uses plain text makes a manual practically unnecessary. Customers can select from a total of 30 user languages including Russian and Chinese, using the language library which can also be expanded. This makes the device ideally suited for international use.

Control

In addition to numerous alarm, limit value or time-controlled switching functions, up to four higher-order loops can be defined simultaneously in the JUMO AQUIS touch S. Sophisticated JUMO control algorithms are used for P, PI, PD and PID control.

Recording

Another highlight is the integrated paperless recorder for data recording. Analog and binary data is recorded and displayed on the screen in temporal sequence. The data is saved in a tamper-proof format which makes it possible to meet official record-keeping requirements. Data can be read with a PC program or conventional USB stick and further processed with a separate software program.

JUMO AQUIS touch S

yout Electrical components Input/output modules Analysis modules Sensors Interfaces Control Recording PCA and PCC Timer Setup Applications
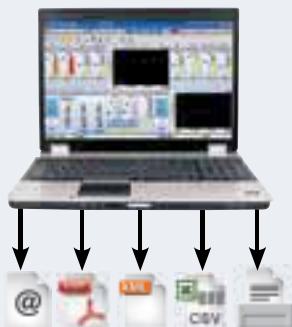
Analysis sensors

Additional input signals

- Standard signals: 0/4 to 20 mA, 0 to 10 V
- Free chlorine
- Total chlorine
- Ozone, chlorine dioxide, hydrogen, etc.
- Level/filling level
- Pt100/1000, NTC/PTC
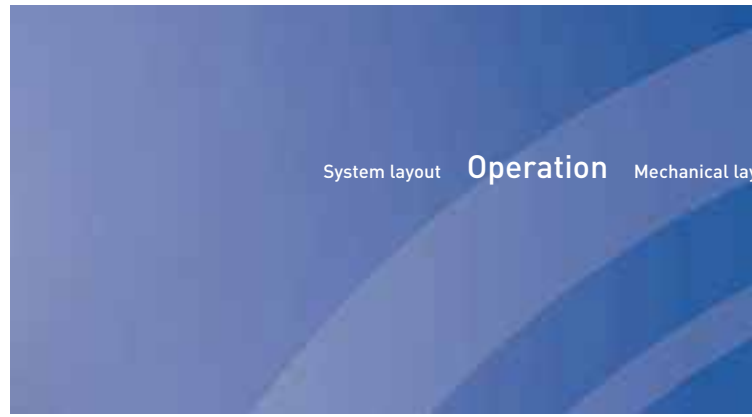- Flow rate (frequency)

Software

- Setup
- PCA
- PCC

Outputs/communication

- WEB
- SMS
- PLC
- Actuators (valves, pumps, etc.)
- USB host interface (externally accessible)

4 | 5

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Operation

Operation and display of the JUMO AQUIS touch S are centrally combined in a color TFT touchscreen. The screen is based on a resistive operating principle, which makes it possible to operate even with gloves on. An additional protective film eliminates reflections on the screen and provides enhanced protection against environmental influences and mechanical damage.

An operating and status line appears in the bottom part of the screen. Softkeys are available to open submenus or other display screens. The date and time are also displayed. All display and operating levels are protected by user rights (code words). In this way graded access is possible to operating, calibration or parameter levels depending on the user. This increases operational security and reliability and prevents improper operation and tampering.

Various view screens are available in measuring and control mode. Measured values can be displayed in an overview with 1, 2 and 4 channels. Auxiliary values and relay status indications are also displayed. The user can freely assign which values are displayed where in the basic programming of the device.

It is also possible to load a system diagram (bitmap) and integrate measured value displays and relay status indications into it. Realistic representations of the application can be created in this way to facilitate rapid status control of plants or machines.

JUMO AQUIS touch S

yout Electrical components Input/output modules Analysis modules Sensors Interfaces Control Recording PCA and PCC Timer Setup Applications
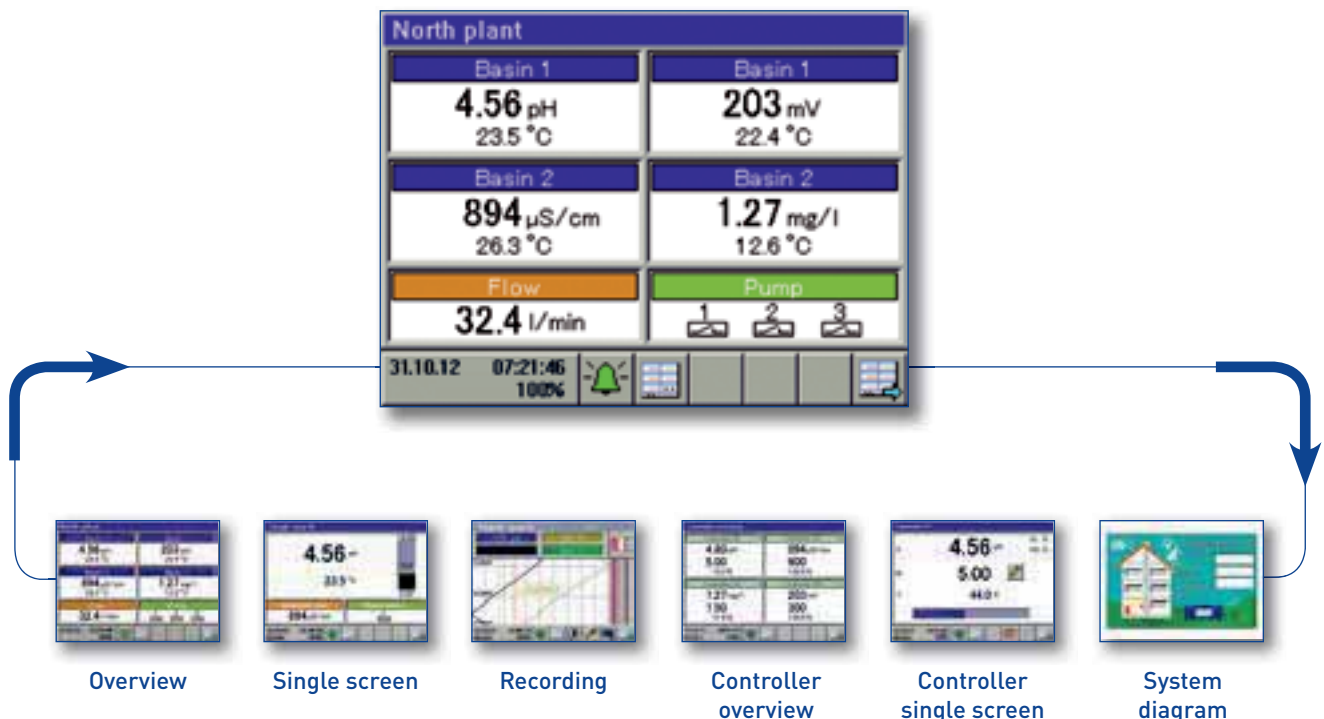
In addition to conventional measured value displays and system diagrams, activated PID controllers can also be displayed in single screens or in groups of four. The actual value and setpoint value are displayed in each case. If the required user rights are activated, actuators can then be manually controlled and setpoint values can be changed in the single screens.
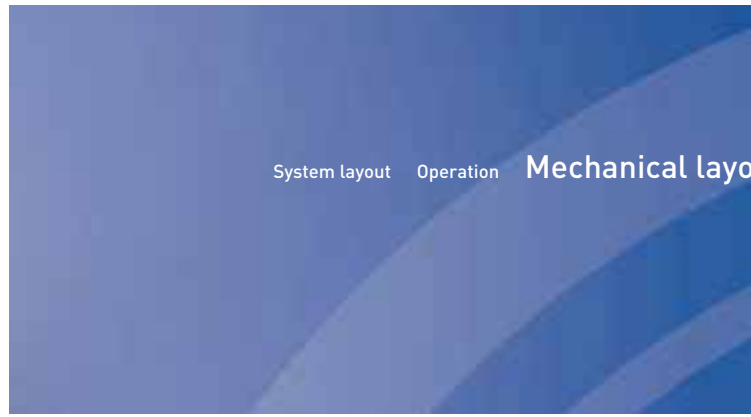
The recording function represents measured values as recorder lines. Up to four analog values can be displayed on each of two recorder displays that can be activated. In addition, three binary traces (status indications of relays, binary inputs, etc.) can be represented. Data is saved in a ring buffer

and can be evaluated separately. The maximum recording duration is about six months. After that the oldest data is overwritten. For additional information see the "Recording" section.

All display screens are created in a ring structure. The user can open the required view simply by following the forward selection on the touchscreen. Screens can also be opened directly from a menu item.

The user can define the number of screens in the ring and which one is the main screen for power-on.

Overview   Single screen   Recording   Controller overview   Controller single screen   System diagram

Mechanical layout

The JUMO AQUIS touch S is housed in a plastic case made of polycarbonate with protection type IP67. Holders are available for mounting on walls, pipes or rails. The case can also be inserted into the appropriate section of a retaining plate (panel installation or rack mounting). A stainless steel weather protection canopy is also available. A pressure balancing element (protective vent) prevents the formation of water condensation in the housing.
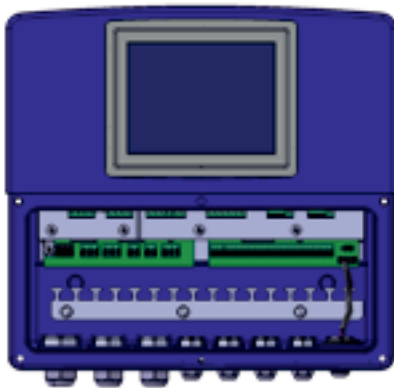

Fig. 1:
Wiring compartment cover opened

Fig. 2:
Input/output modules removed

JUMO AQUIS touch S

ut   Electrical components   Input/output modules   Analysis modules   Sensors   Interfaces   Control   Recording   PCA and PCC   Timer   Setup   Applications

The generously dimensioned connection area is located under a large, removable case lid. Input and output modules can be added or exchanged in this area. Supply, signal and sensor cables are introduced and connected here by a large number of cable glands and M12 connectors. A locking USB host connection makes it possible to retrieve data (for the recording function) or load configurations from the outside with a USB stick without having to open the device.

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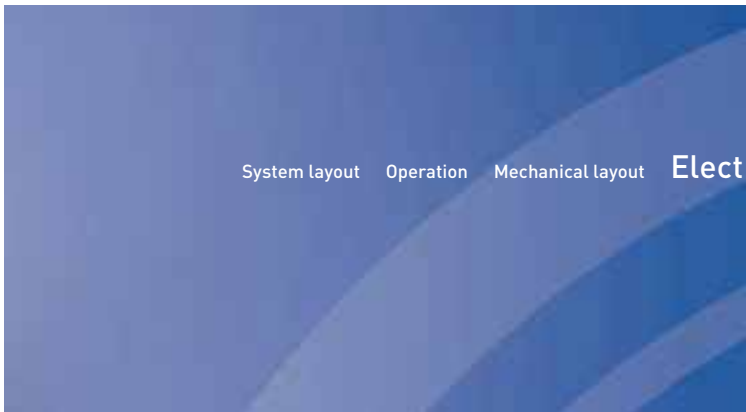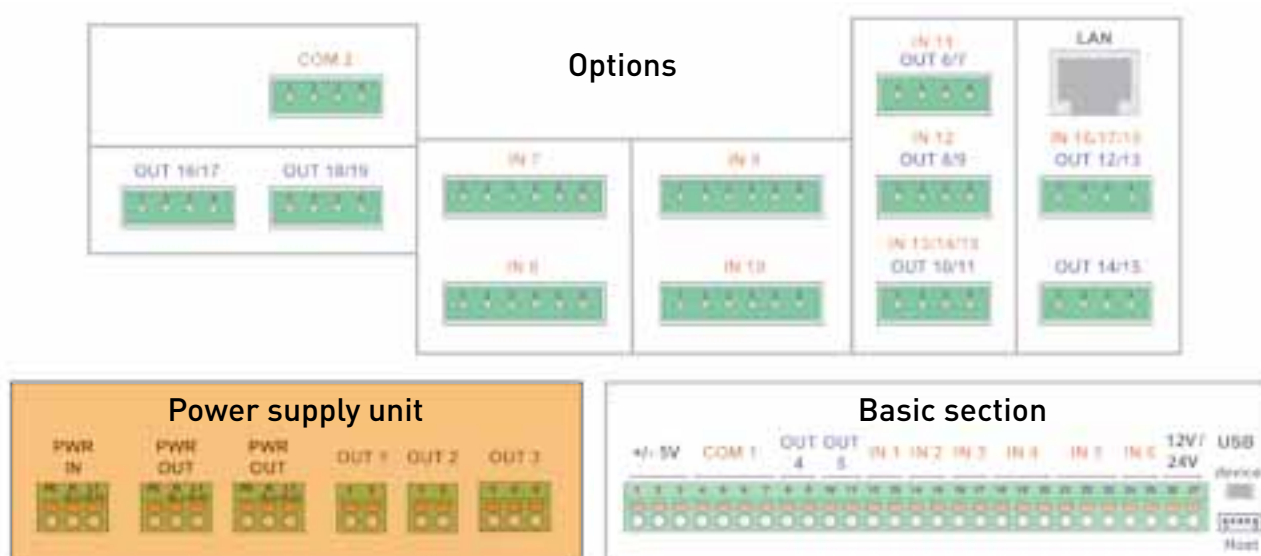
Electrical components

The PSU board and basic board are always permanently fitted.
Additional modules can be inserted or removed in the factory or by the customer with 13 additional slots.

Power supply unit

Depending on the order code, the JUMO AQUIS touch S is configured for two different supply voltage ranges (PWR IN). Supply voltage AC 110 to 240V; -15%/+10%; 48 to 63Hz or AC/DC 20 to 30V; 48 to 63Hz
There are two N/O contacts and one changeover contact relay (OUT 1...3), on the PSU board. They can be used for user-defined alarm and limit value monitoring tasks or they can be assigned to controller functions of any process variable.

The line/supply input voltage from PWR IN is applied to two PWR OUT terminals. This makes it possible to operate external consumers directly from the device without requiring separate wiring boxes. External consumers can be turned on and off directly from the JUMO AQUIS touch S by wiring to one of the internal relays.

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JUMO AQUIS touch S

rical components   Input/output modules   Analysis modules   Sensors   Interfaces   Control   Recording   PCA and PCC   Timer   Setup   Applications

Basic section

In addition to a digital RS422/485 interface (COM 1), the basic section already offers two permanently integrated analog outputs OUT 4+OUT 5 (standard signals for current/voltage). The user can assign input variables or controller outputs to these outputs. Specific actions or states can be triggered in the device with three binary inputs (IN 1...IN 3) (hold, switching the measuring range or parameter block, manual mode, screen saver, touchscreen disable and timer functions). Flow rate probes (paddle-wheel or impeller, etc.) can be connected to the binary inputs (IN 2 + IN 3) and evaluated. Both probes with a low pulse level (up to 300 Hz) such as water meters as well as those with frequencies up to 10 KHz can be used.

As a result, software functions integrated into the JUMO AQUIS touch S touch S allow flow rate measurements including measurements of flow volume.

Two resistance transmitters (IN 4+5) are available on the basic section as additional inputs. They can be used for temperature measurements or to connect resistance transmitters. Input IN 4 is available for connecting RTD temperature probes (Pt100, Pt1000 and 400 ohms or 4000 ohms). Input IN 5 can be used for Pt100/Pt1000 as well as 100 Kohms, resistance transmitters and NTC (8 K 55 or 22 K).

A current input IN 6 (0/4 to 20 mA) can be used to connect external devices or sensors with the corresponding current output. The user can then define how to display, control or otherwise process the input signal (math, controller disturbance, etc.).

The basic section also features a voltage output to supply external sensors – you can choose between DC 12 V and DC 24 V (e.g. for sensors with a 2-wire connection that have a 4 to 20 mA signal).
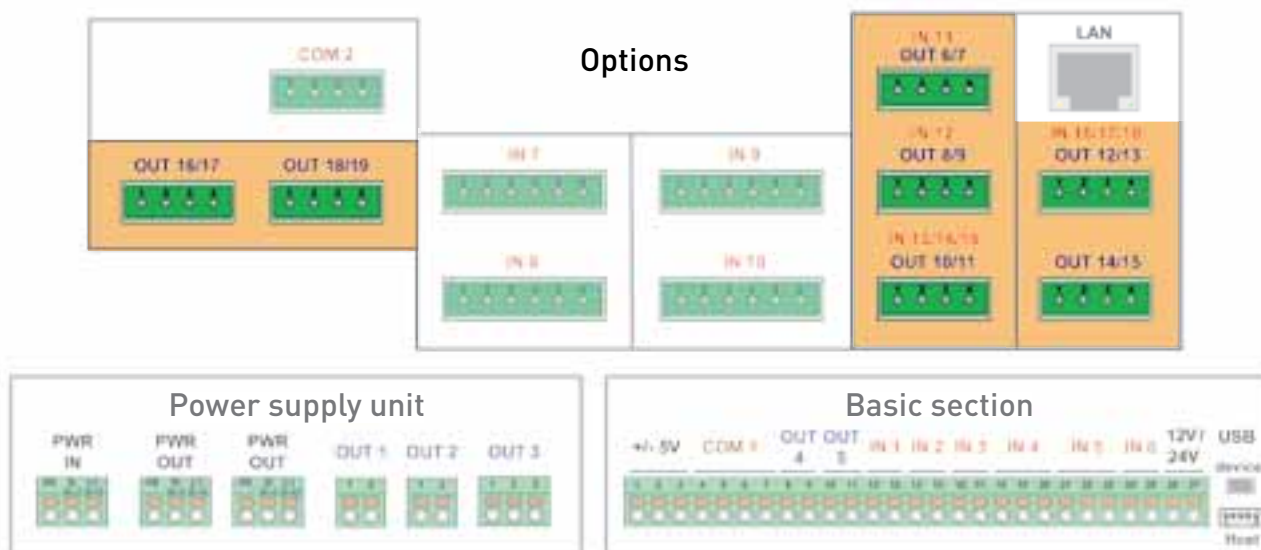

10 | 11
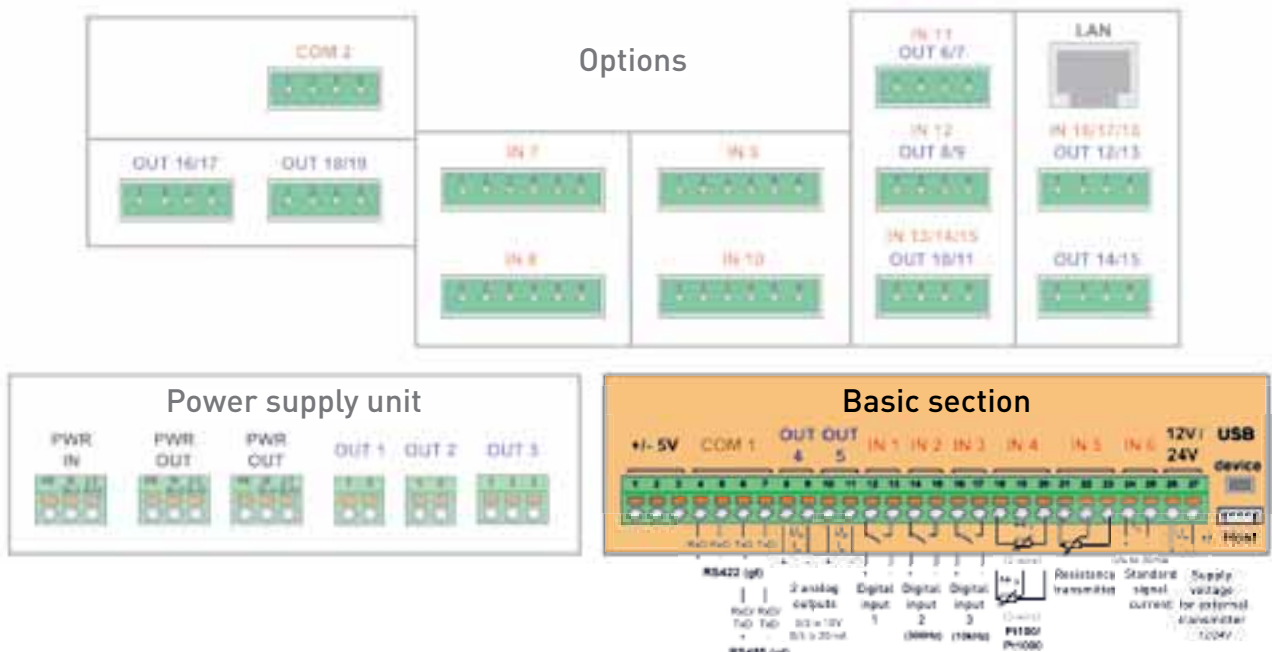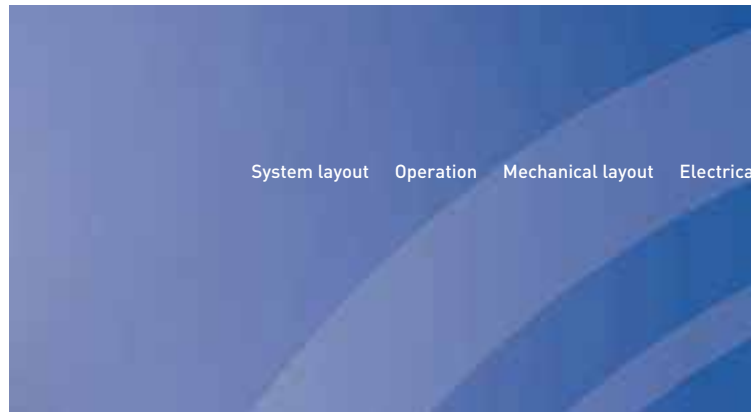
Input and output modules

The JUMO AQUIS touch S concept is extremely flexible for the other seven module slots. A wide range of input and output cards can be inserted in these slots.
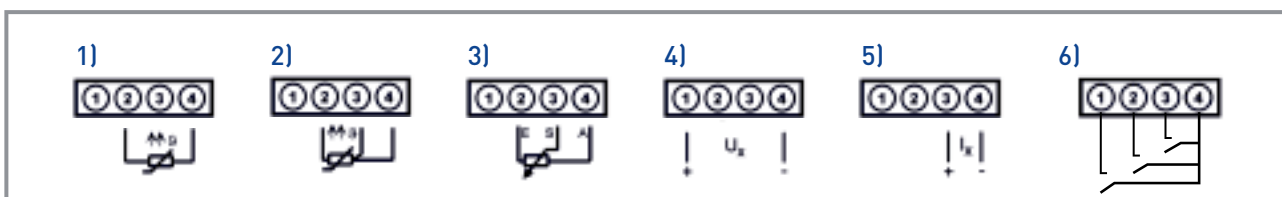
Installation positions OUT14/15, OUT16/17 and OUT18/19 are cards reserved for output signals that can be either analog or switching. Either inputs or outputs can be assigned to all other slots.

The free architecture of the software allows users to assign these inputs and outputs for a wide range of tasks with selectors. Switching contacts generate alarms, monitor limit values or perform PID control tasks. They can also switch external units off and on based on either time or event criteria. Analog outputs can generate measured values scaled as standard signals or corresponding to controller output levels. The measured values can also correspond to the results of internal math calculations (see math module) or to new variables.

Sensors or outputs of other devices can be connected to the analog inputs (standard signals or RTD temperature probes). Then they can also be used in the JUMO AQUIS touch S for further processing or recording. For example, pressure transmitters can be connected for liquid level monitoring (level probes). Other possibilities include turbidity sensors and sensors for free and total chlorine or ozone, etc. A wide range of calibration routines can be assigned to standard signal inputs (one, two and three points). This makes it possible, for example, to calibrate uncalibrated signals from simple pH converters like "normal" pH probes. Aside from the user's imagination, there are practically no limits.
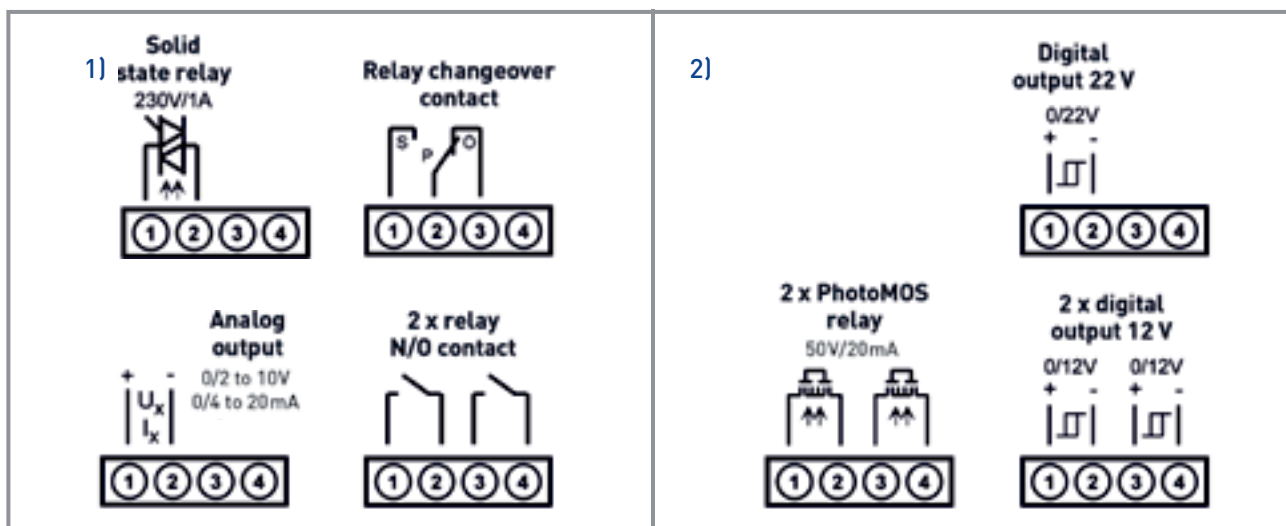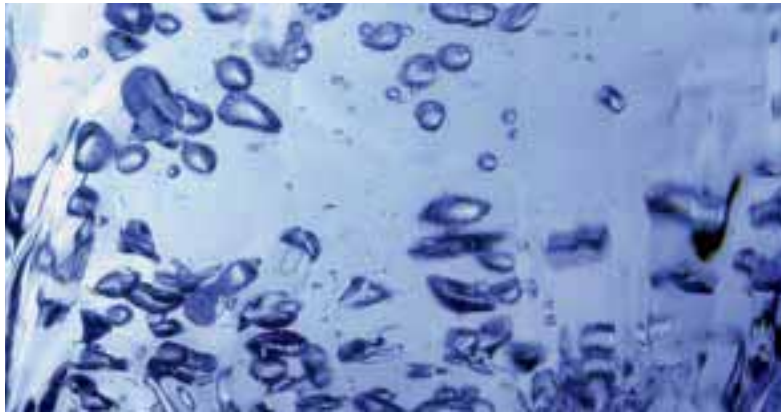
JUMO AQUIS touch S

al components   **Input/output modules**   Analysis modules   Sensors   Interfaces   Control   Recording   PCA and PCC   Timer   Setup   Applications

Input modules

1) **RTD temperature probes (2-wire):**
   Pt100, Pt1000, 0 to 400 Ω / 4000 Ω

2) **RTD temperature probes: (3-wire):**
   Pt100, Pt1000, 0 to 400 Ω / 4000 Ω

3) **Resistance transmitters:**
   Output level feedback from continuous valves

4) **Standard signal voltage 0 to 10 V:**
   Voltage signals 0 to 10 V

5) **Standard signal current 0/4 to 20 mA:**
   Current signals 0/4 to 20 mA

6) **Binary inputs:**
   3x, floating control

Output modules

1)

- Analog output 0 to 10 V or 0/4 to 20 mA
- Solid state relay (TRIAC 1 A / 230 V AC)
- 1 x relay changeover contact 3 A / 250 V AC, resistive load
- 2 x relay N/O contact 3 A / 250 V AC, resistive load

2)

- 1 x digital output 0/22 V DC, 30 mA, electrically isolated
- 2 x photo MOS switch U < 50 V AC / DC, I < 200 mA
  Especially well suited for high switching frequency,
  (pulse frequency output)
- 2 x digital output 0/12 V DC, 20 mA, not electrically
  isolated

Analysis modules

**The four inputs IN 7 to IN 10 hold measurement modules for connecting analog analysis sensors directly.
One sensor can be connected for each module.**

JUMO provides three different modules as starting points. They can be fitted with any combination of mixed options:

1. pH value / redox potential
- For connecting conventional pH and redox sensors as well as NH_3 sensors
- Also for IsFET sensors according to JUMO data sheet 201050
- Symmetrical and asymmetrical operation of pH sensors
- Isolated glass and reference electrodes can be connected
- With liquid potential connection

2. Electrolytic conductivity (conductive measurement method)
- For connecting commonly used conductive conductivity sensors for 2-electrode and 4-electrode systems
- Resistance measurement for high-purity water applications
- Up to 600 mS/cm with 4-electrode sensors

3. Electrolytic conductivity (inductive measurement method)
- For connecting all JUMO sensors of data sheets 202941 to 202943
- Third-party sensors on request
- Measuring range from 50 µS/cm to 2000 mS/cm

The modules are electrically isolated from each other and the other device components.

The calibrations / adjustments required for electrochemical sensors (calibration of sensor / measuring device and/or properties of the medium) are saved in an electronic calibration log.
- Tracking with date and time of calibrations
- Evaluation of sensors
- Optimization of sensor version by evaluating the log

For temperature-dependent process variables / sensors, any temperature inputs of the JUMO AQUIS touch S or programmed fixed values can be assigned to each analysis input as a compensation variable (automatic or manual temperature compensation). A separate temperature can be assigned to each analysis sensor or the same temperature can be used for all of them.

omponents   Input/output modules   **Analysis modules**   **Sensors**   Interfaces   Control   Recording   PCA and PCC   Timer   Setup   Applications

JUMO AQUIS touch S

Sensors

pH / redox / ammonia (NH_3) analysis module

Input range
- **pH:** −2 to 16 pH
- **Redox:** −1500 to +1500 mV
- **Ammonia:** 0 to 20,000 ppm

Temperature compensation
- −20 to +150 °C
- None
- −20 to +50°C

Conductivity analysis module (conductive)

Input range
- From approx. 0.001 µS/cm to approx. 600 mS/cm *
- From approx. 40 mΩ × cm to approx. 1000 MΩ × cm *

*Depending on the sensor that is used

Temperature compensation
- Linear, non-linear (curve)
- ASTM
- USP
- Ph.EUR

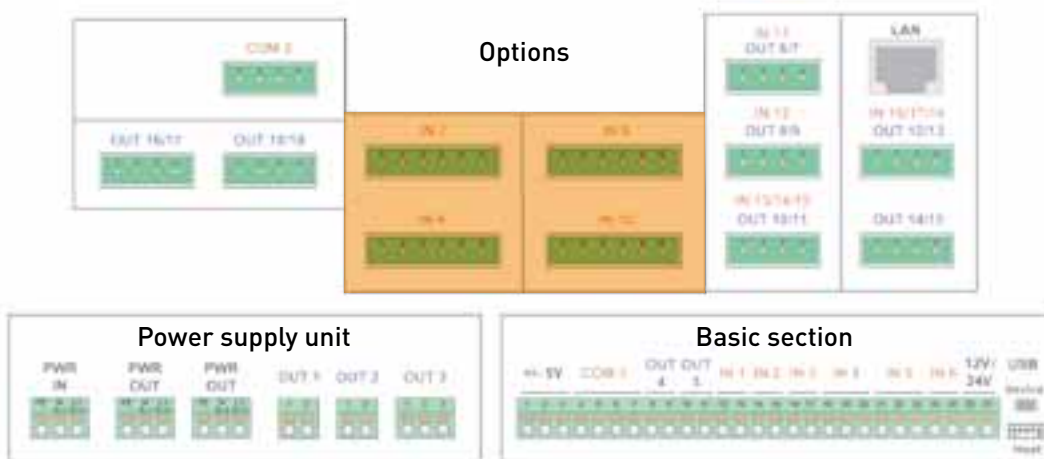## Conductivity analysis module (inductive)

Input range
- 0 to 2000 mS/cm
- Resolution 1 µS/cm
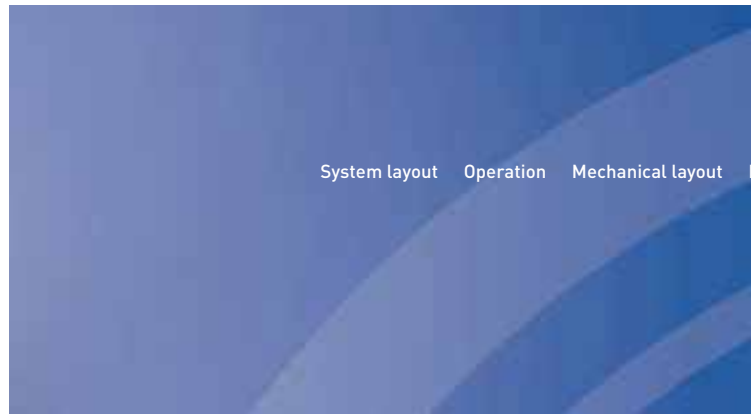- 4x measuring range switching (CIP function)

Temperature compensation
- Linear, non-linear (curve)

Concentration curves
- NaOH, HNO_3, H_2SO_4, HCl and others

Options

Power supply unit

Basic section

Interfaces

The JUMO AQUIS touch S is fit for the future. A wide range of different digital interfaces extends the range of possible uses enormously. The COM1 interfaces and the two USB connections are permanently integrated into the basic board and are therefore always available.

COM1: Conventional RS422/485 with Modbus RTU protocol (slave); allows for connection to control systems, etc.
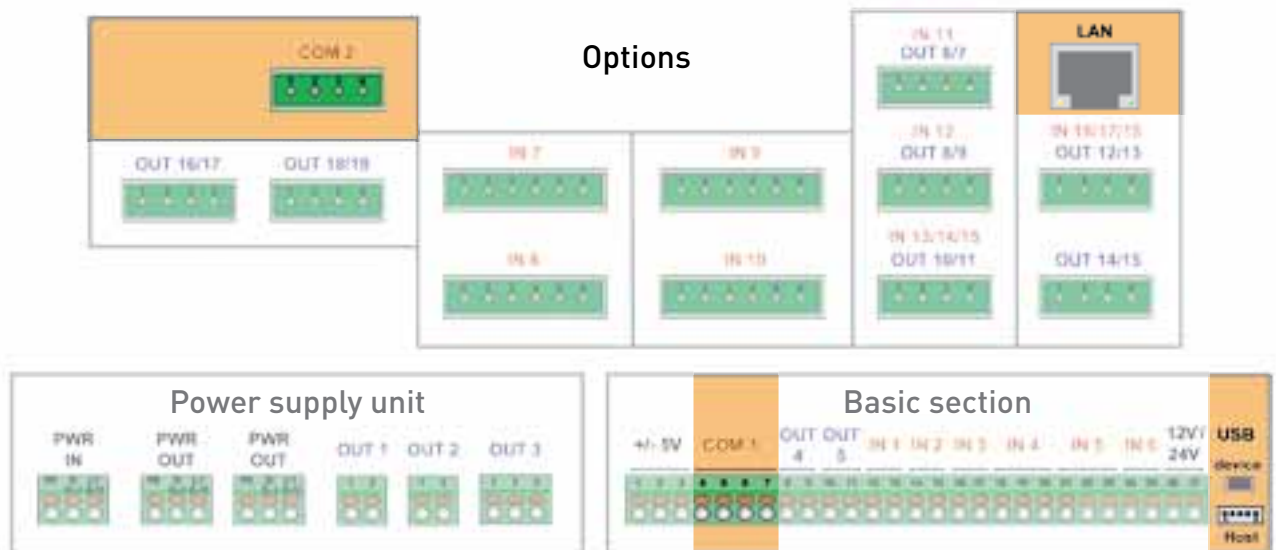
USB device: Connection to laptop/PC via conventional USB cable for convenient device programming using the PC setup program. It is also possible to read internal recorder data.

USB host: For connecting USB sticks. Available via internal cable on the outside of the JUMO AQUIS touch S case for inserting USB sticks (protected by a screw cap).

Data from the (paperless) recorder function can be retrieved here. Previously defined or modified setup data can be loaded and exported. If servicing is required, information for JUMO Support can be read.

USB stick

Options

Power supply unit

Basic section

JUMO AQUIS touch S

Electrical components   Input/output modules   Analysis modules   Sensors   **Interfaces**   Control   Recording   PCA and PCC   Timer   Setup   Applications

Two additional digital interfaces are optionally available for plug-in modules.

COM2: Either a second RS422/485 interface (Modbus RTU (slave)) or a PROFIBUS DP interface can be installed here. The JUMO GSD generator is included in the scope of delivery of the Profibus interface. This program provides support for users in creating the GSD file for integrating the JUMO AQUIS touch S into a Profibus architecture.

LAN: Used to hold an Ethernet interface card. The JUMO AQUIS touch S can be integrated into a LAN/WAN network. Integration into a LAN network facilitates access to all data in the device (recorder data, setup) as well as remote control through the integrated web server.
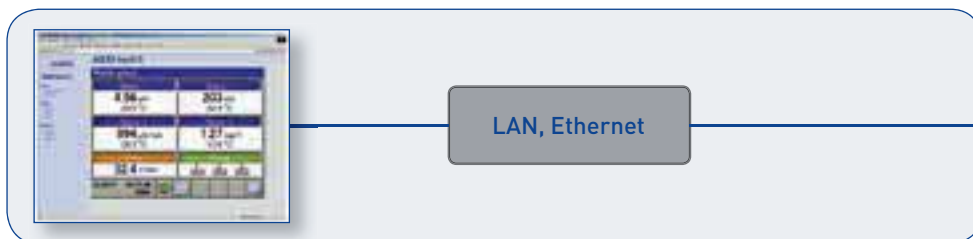
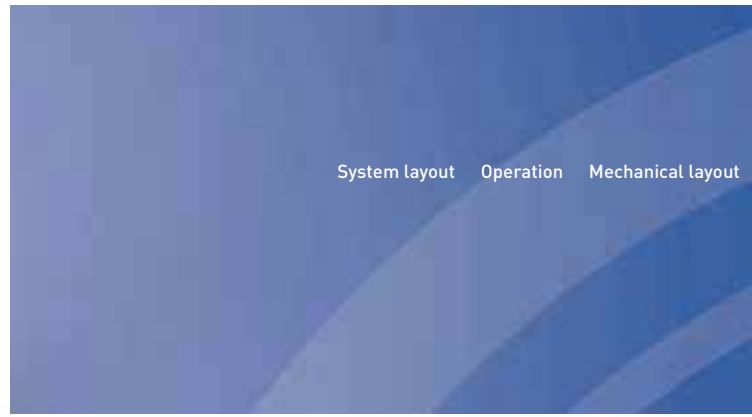**Example of connection to PLC via Profibus:**

PROFIBUS DP
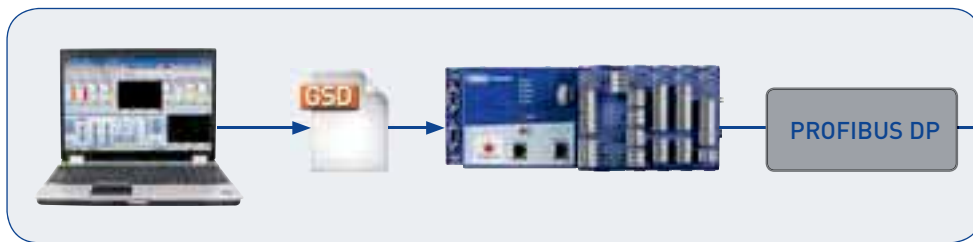
Example of connection to control systems / visualization via RS485:

RS422/485, Modbus
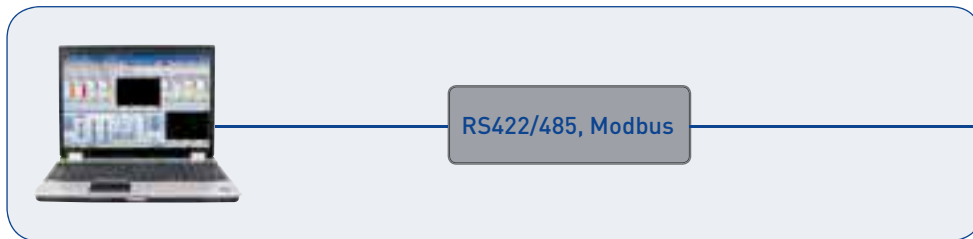
Example of connection via LAN (web server):

LAN, Ethernet

16 | 17

Control

The device is equipped with four controllers, each independent of the others. Any input variable can be freely assigned to the controller modules. Proven JUMO control algorithms are used. Select from P, I, D, PI, PD and PID as characteristic.
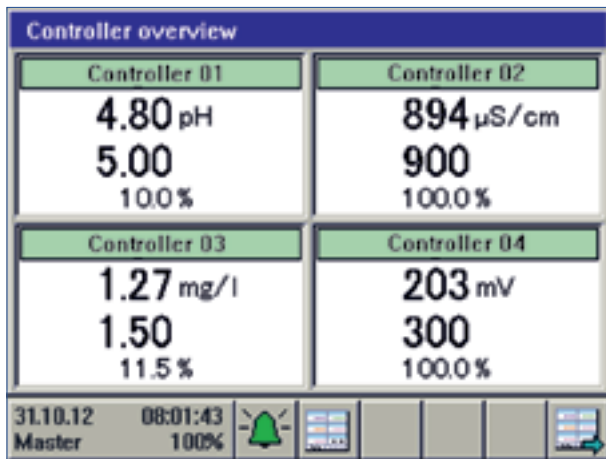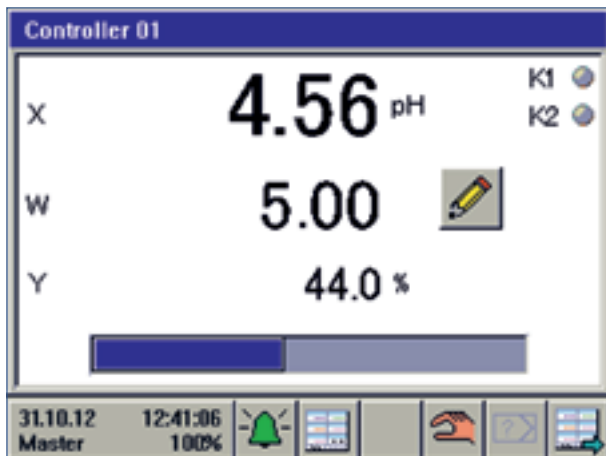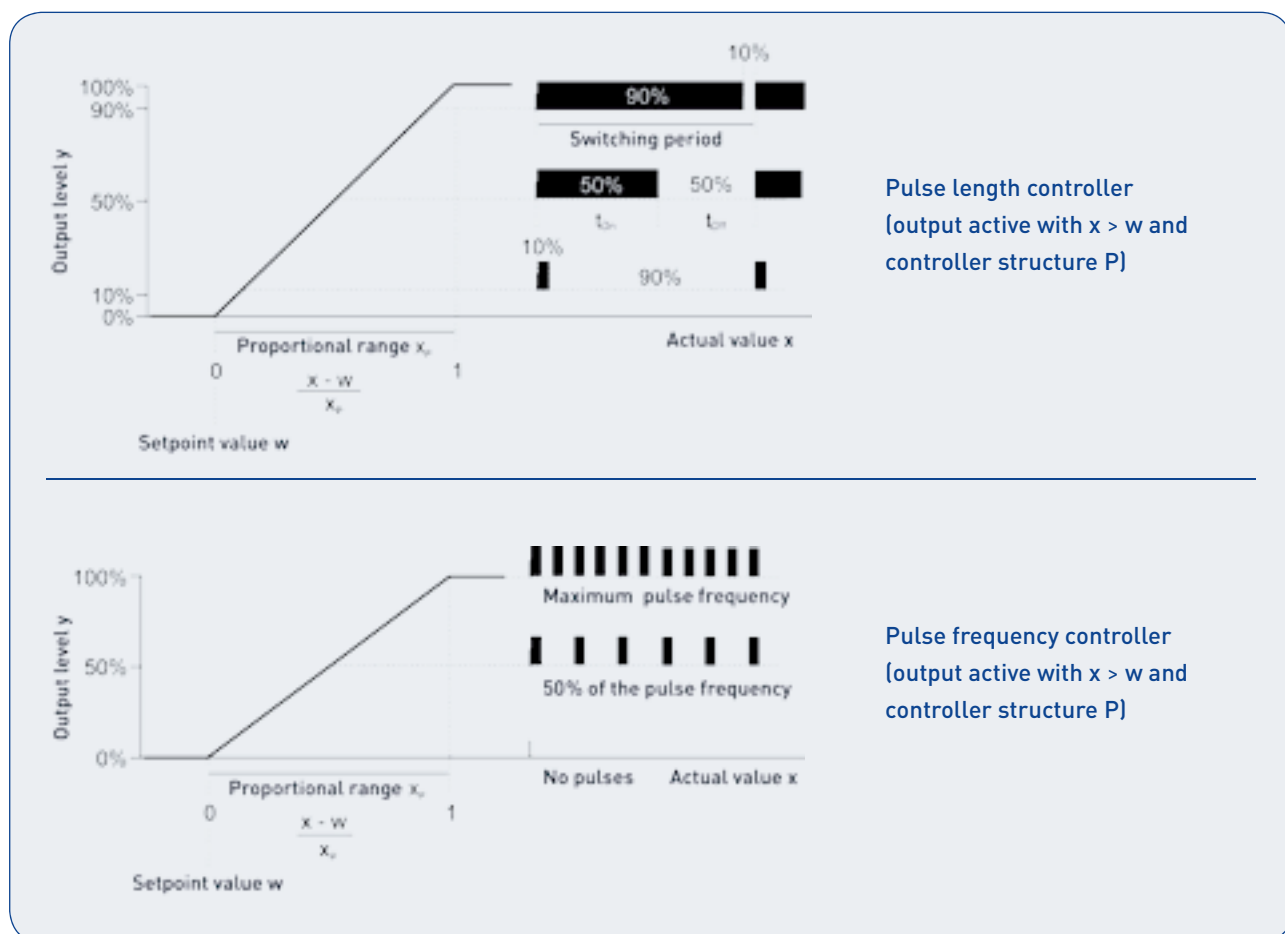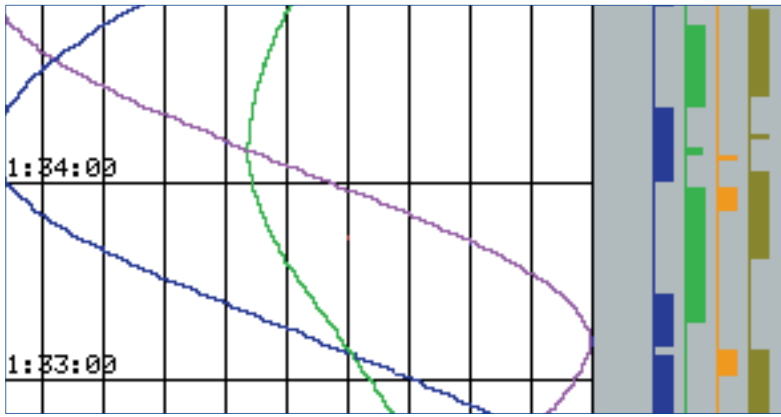

Fig. 1:
Overview screen of all active loops

Fig. 2:
Single screen of one controller

JUMO AQUIS touch S

Electrical components   Input/output modules   Analysis modules   Sensors   Interfaces   **Control**   Recording   PCA and PCC   Timer   Setup   Applications

Controller outputs can be transferred to actuators in various ways. If the output level of the controller is directed to a mechanical relay or an electronic switch, the following types of controller outputs are available for selection:

■ **Limit value output**
  (to activate valves or motor pumps, etc.)

■ **Pulse length output**
  (to activate valves or motor pumps, etc.)

■ **Pulse frequency output**
  (to activate magnetic dosing pumps, etc.)

■ **Modulating controller**
  (to activate motor control valves, etc.)

Pulse length controller
(output active with x > w and controller structure P)

Pulse frequency controller
(output active with x > w and controller structure P)

Recording

A high-quality recorder can also be optionally activated in the JUMO AQUIS touch S. Two screens/groups, each with up to four analog values and up to three binary signals can be recorded. Data from internal memory from the last six months can be accessed. If data before this time is exported through an interface or the USB host interface and saved (see also chapter evaluation and communication software), data can be stored seamlessly and tamper-proof. This is useful for meeting official record-keeping requirements.
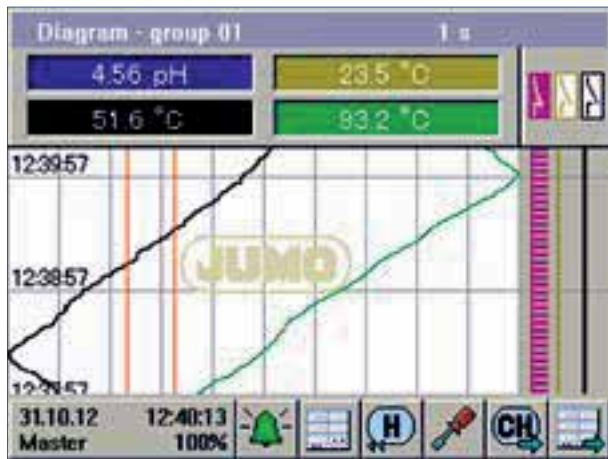
Fig. 1:
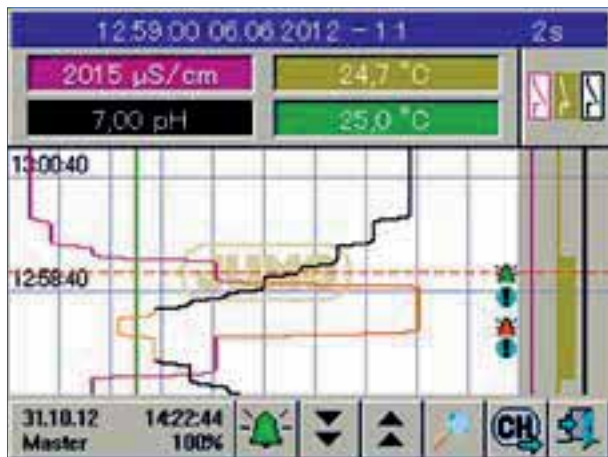The button is used to access history data (data from past events).

Fig. 2:
Accessing history data

JUMO AQUIS touch S

components   Input/output modules   Analysis modules   Sensors   Interfaces   Control   **Recording   PCA and PCC**   Timer   Setup   Applications

JUMO PCA3000 PC evaluation software

This professional evaluation software is used to manage, archive, visualize and evaluate historical process data (measurement data, messages, etc.). Process data can be read in via USB memory stick or made available for central data processing with the PCC software.

Properties – Fig. 1:

- **Data storage:**
  Backup and archiving of all process data in a single data file is easy and comprehensible
- **Data backup:**
  Archive data can be read and visualized directly from the CD-ROM/DVD
- **Data export:**
  In different formats (CSV, HTML, PDF) with PCA3000 form output
- **Graphical preparation of measured values:**
  Evaluation of measured data with min./max. search and zoom function
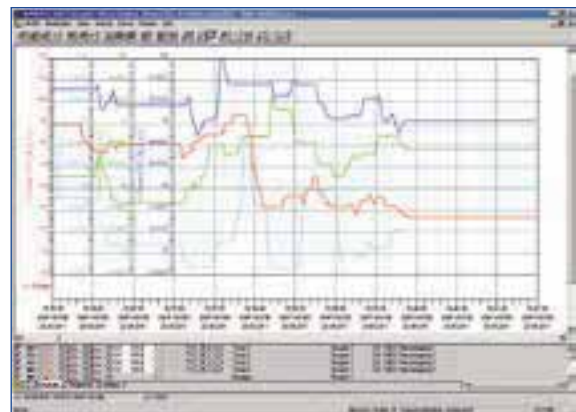
Fig. 1

JUMO PCA communication software PCC

The communication software is optimally adapted to the PCA3000, which makes it easy to read data via the interface or modem.

Properties – Fig. 2:

- **Data storage:** Backup and archiving of all process data in a single data file is easy and comprehensible
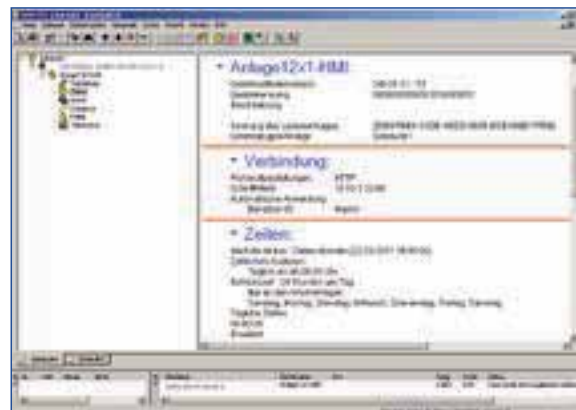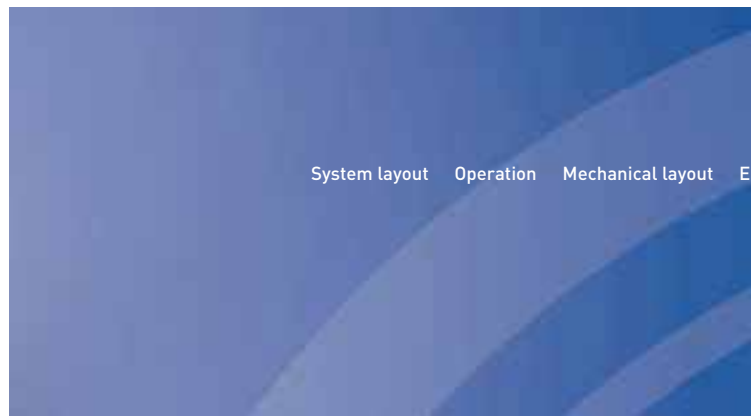- **Teleservice function:** Display of current process data (e.g. over modem, Ethernet, …)

Fig. 2

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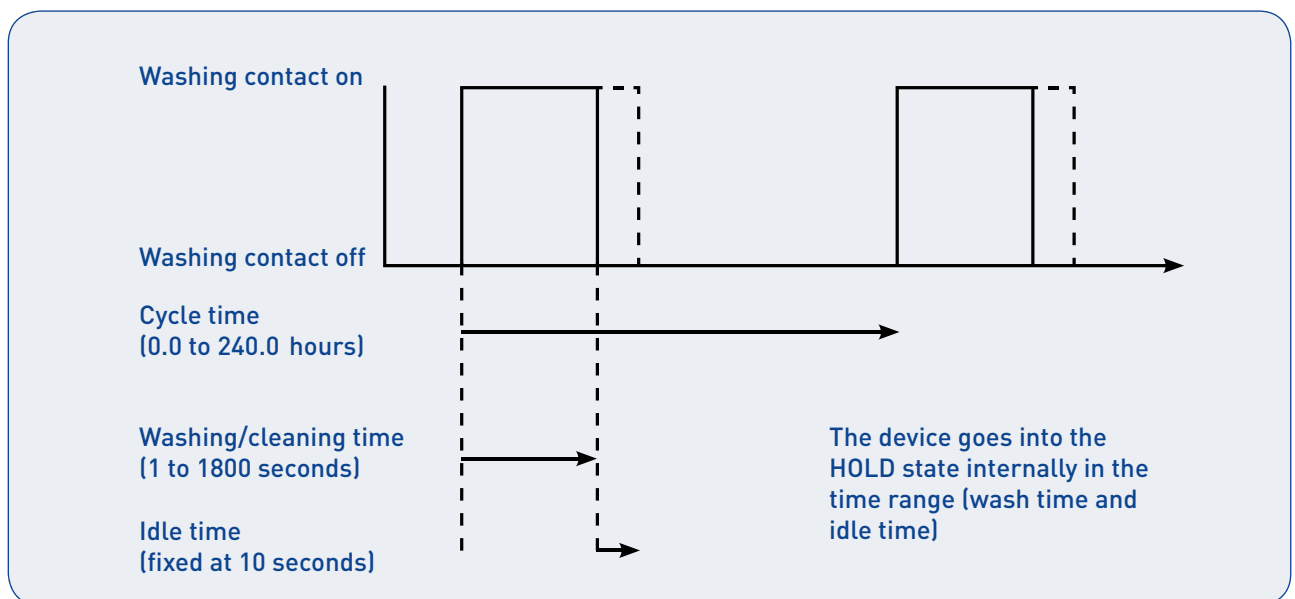
Timer, math and logic

Other useful functions can also be integrated into the device:

Timer (standard)

This module offers the option of having recurring actions performed automatically. One or two timer modules can be used. Up to four switching on and off times can be used for each day of the week.

Wash timer (standard)

The wash timer can be used to activate automatic cleaning (e.g. with pH sensors). Using this function can significantly extend the operating life of the sensor and increase the availability of a measuring point.

Washing contact on

Washing contact off

Cycle time
(0.0 to 240.0 hours)

Washing/cleaning time
(1 to 1800 seconds)

Idle time
(fixed at 10 seconds)

The device goes into the HOLD state internally in the time range (wash time and idle time)

Math (option)

The measured value of all analog signals can be converted to other values by using the math module. For example the retention value, an important parameter in reverse osmosis plants, could conceivably be calculated by evaluating the input and output conductivities.

Logic (option)

This function is used to create logical links between individual measurement values. Operators include and, or, xor, etc.

lectrical components   Input/output modules   Analysis modules   Sensors   Interfaces   Control   Recording   PCA and PCC   Timer   Setup   Applications

JUMO AQUIS touch S

Setup program

The setup program is used for project design and configuration of the entire measuring and control system. Additional functions (recorder, math, logic) can optionally be activated.

Properties:

- User-friendly configuration, parameterization
- Teleservice function (display of process data)
- Input of math and/or logic formulas

- Process screen editor
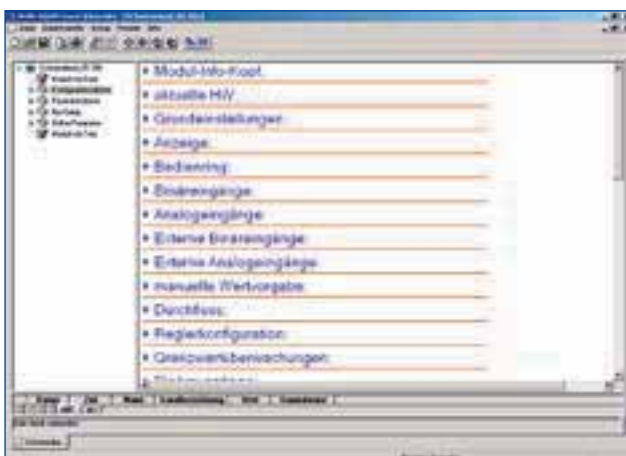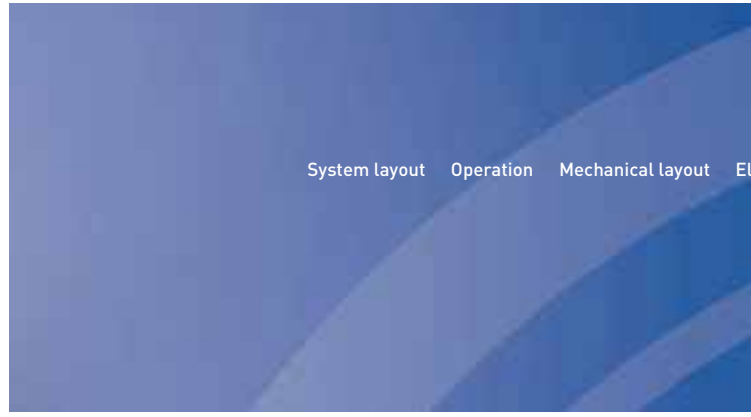- System documentation
- Connection via standard USB cable

Fig. 1:
User interface of the setup program

Fig. 2:
Graphical overview for simple combination of optional hardware components

Applications

Drinking water monitoring

In addition to the traditional parameters pH value, conductivity, temperature, chlorine concentration, level and flow rate quantity and other process variables such as turbidity can also be added with the many optional inputs on the JUMO AQUIS touch S. In this way it forms the central monitoring unit for all important drinking water or wellwater parameters. Digital interfaces (for example Ethernet / LAN) can be used for remote control via the Internet (integrated web server). Warnings and alarms can also be sent as SMS text messages.

For example: Wells
Control of various parameters:
- pH value
- Conductivity
- Temperature
- Level

Alarm modem

JUMO AQUIS touch S

lectrical components   Input/output modules   Analysis modules   Sensors   Interfaces   Control   Recording   PCA and PCC   Timer   Setup   **Applications**
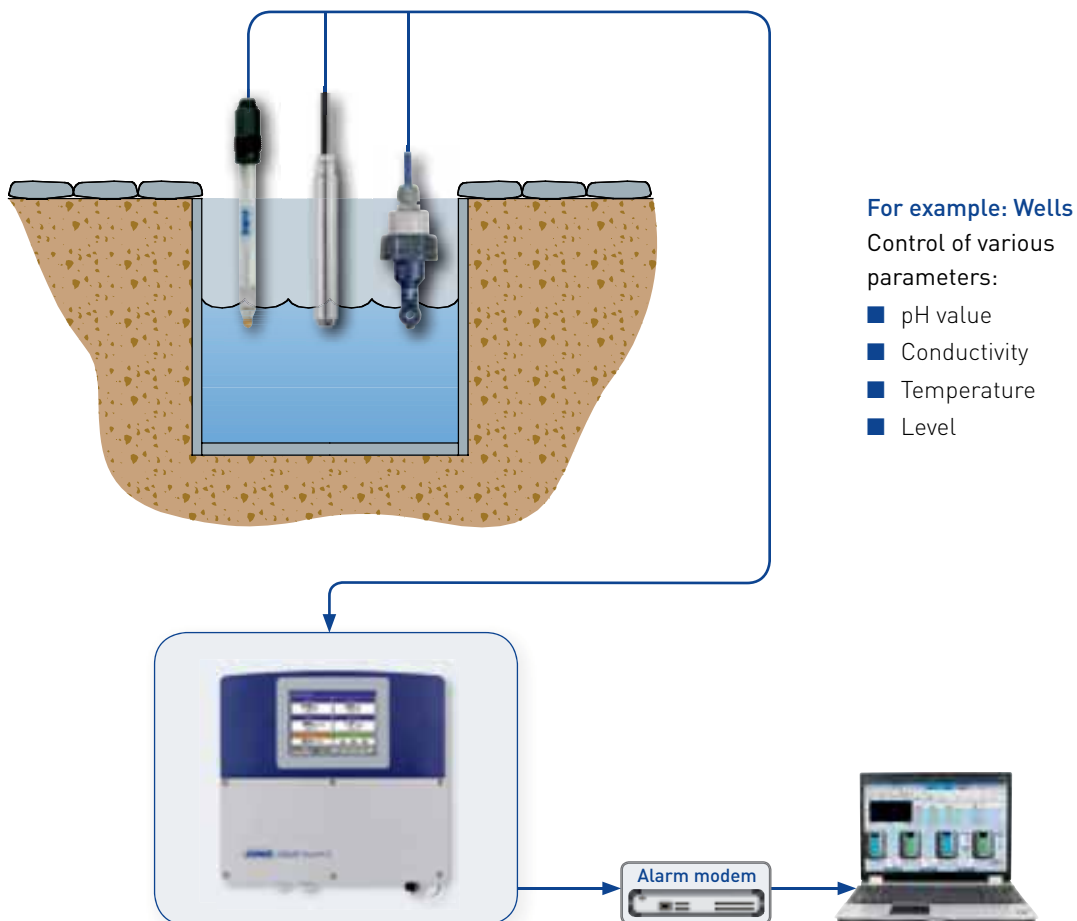
Applications

Cooling tower control

The JUMO AQUIS touch S is almost predestined for use in control / monitoring of cooling towers. A single device can perform all the traditional tasks:

- Measuring conductivity – conductively or inductively (as is common today) and therefore maintenance-free
- Plant temperature monitoring
- Limit value monitoring (dilution) including activation of the dilution valve

- Time-controlled addition of biocide
- Temporary inhibiting of the dilution valve after adding biocide
- Redosing of cooling water including quantity check

Industrial wastewater

Often the wastewater which is a byproduct of industrial processes cannot be drained directly into the sewer system due to its pollution level, pH value or salt content. This wastewater is generally collected in tanks. When the tank reaches the appropriate level, the wastewater first undergoes chemical/mechanical cleaning and/or pH neutralization. After the water is cleaned it is subjected to a final check before it can be drained. A single JUMO AQUIS touch S can perform all the following tasks in this scenario:

- Redox voltage measurement for chemical precipitation of toxins including limit value checks
- pH neutralization of wastewater by 2-sided control
- Final check of parameters for pH value and temperature

- Optional measurement of flow rate measurement
- Recording (paperless recorder) of data with officially recognized paperless recorder function (tamper-proof data format)

Desalination of brackish water and sea water

Monitoring and control of the individual process steps in a seawater desalination plant (reverse osmosis, pre-treatment and post-treatment) requires numerous sensors. The JUMO AQUIS touch S is a good economical solution for evaluating these sensors simultaneously, making it possible to set up compact, mobile units to produce drinking water.

- Simultaneous measurement of pH value, redox voltage, conductivity (inductively and conductively), chlorine concentration, pressure and temperature

- Integrated math module makes it possible to calculate the efficiency of the reverse osmosis unit
- Tamper-proof recording measured values according to official requirements

Services & Support

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

JUMO services & support – so that it all comes together!

Production Service

Are you looking for a competitive and efficient system or component supplier? Whether you seek metal technology, electronic modules or perfectly fitting sensors, whether small batches or mass production – we will gladly be your partner. From development to production we can provide all the stages from a single source. Our experts will work together in close collaboration with your company to find the optimum solution for your application and will take on all the engineering. JUMO will then make the product for you. You will benefit from state-of-the-art production technologies as well as our uncompromising quality assurance systems.

Customized sensor technology

- Development of temperature probes, pressure transmitters, conductivity sensors, or pH and redox electrodes according to your requirements
- Numerous test and inspection systems
- Taking over qualification for the application
- Materials management
- Mechanical testing
- Thermal testing

Electronic modules

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

Metal technology

- Tool manufacture
- Stamping and forming systems
- Flexible sheet metal working
- Float production
- Welding, jointing, and assembly systems
- Surface engineering
- Material testing service

Information & Training

Would you like to improve your process quality, or optimize one of your company plants? Then take us up on our offer on the JUMO homepage and participate in the expertise of a globally respected manufacturer. Under the "Services & Support" menu item, for example, you will find a highly diverse range of seminars. Available under the keyword "eLearning" are videos on specific measurement and control system topics. Under "Literature" you can find important information for beginners and practitioners. It goes without saying that you can also download the latest version of the JUMO software as well as technical documentation for old and new products.

Product Service

For competent support right across our product portfolio, our customers have recourse at any time to the efficient sales network we maintain on all five continents. Whether you seek advice, a selection of products, engineering or making optimum use of our products, there is always a team of competent JUMO colleagues somewhere nearby, ready to answer your questions. You can count on us after commissioning, as well. You will get a fast response from our telephone support hotline. If an on-site fault has to be eliminated, our express repair service and our 24-hour spare part service are at your disposal. That is real assurance.

Maintenance & Calibration

Our maintenance service helps you to maintain optimum system and equipment availability. This way you prevent failure and downtime. We will work out a far-sighted maintenance concept together with your company officers, and will happily prepare all the required reports, documentation, and protocols. Because we know how important precise measurement and control results are for your processes we naturally also undertake the professional calibration of your JUMO instruments on site, at your company premises. We then record the result in a calibration certificate as defined by EN 10204.

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