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# JUMO AQUIS touch P

## Modular Multichannel Measuring Device for Liquid Analysis with Integrated Controller and Paperless Recorder

### Brief description

#### Measuring

The JUMO AQUIS touch P provides a central platform for the display and processing of pH value, redox voltage, electrolytic conductivity, resistance of high-purity water, temperature, quantities of disinfecting agents such as free chlorine, total chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid or even flow rates. Pulse frequency inputs (counters) are available for flow measurement. Universal inputs can be used to measure almost any analog measurands using standard signals [0(4) to 20 mA or 0 to 10 V]. The unit can measure and manage up to 23 parameters simultaneously.

#### Control

Besides numerous simple alarm, limit value or time-controlled switching functions, up to 4 higher-order control loops can be defined in the JUMO AQUIS touch P at the same time. Tried and tested JUMO control algorithms are used for P, PI, PD, and PID control in these applications.

#### Display

A 3.5" TFT color screen with touch function serves to display all parameters as well as operate and setup the device. The plain text operation philosophy virtually eliminates the need for a manual. German, English, and, on request, French are included in the device at the factory as selectable user interface languages (see order details). Using the PC setup program, the language library of the unit can be expanded to as many as 15 languages. It is also possible to display languages that use Chinese and Cyrillic characters. As a result, the device is predestined for global use.

#### Recording

A paperless recorder is integrated for data recording. Up to 8 analog measurands and 6 binary signals are recorded and displayed on the screen in their chronological sequence. Storage is tamper-proof and enables official recording obligations to be fulfilled. The data can be extracted via JUMO-PCC software or USB flash drive and evaluated using the PC evaluation software JUMO PCA3000.

#### Application examples

The modular setup and open structure of the device permits a host of potential applications:

- Municipal and industrial water treatment in wastewater treatment plants
- Process systems
- Drinking and bathing water monitoring
- Pharmaceutical water
- Food and beverage production (CIP/SIP plants)
- Gas scrubbers / air washers
- Cooling tower control
- Ion exchangers
- RO-units (reverse osmosis)
- Power stations and energy plants
- Fish breeding
- Desalination of seawater



**JUMO AQUIS touch P**  
type 202580/...

### Special features

- Up to 2 analysis inputs in any combination for direct connection of sensors for liquid analysis
- Up to 21 further measuring signals can be connected either directly or via interface
- 2 pulse frequency inputs for flow measurement (max. 300 Hz or 10 kHz)
- Up to 10 switching outputs that are configurable as controller, switching, and alarm outputs
- Interfaces: USB host, USB device, Modbus, PROFIBUS-DP, and Ethernet
- Ethernet functions: webserver, alarm alerts via e-mail, setup via PC, extraction of recorded measurement data
- Math and logic functions
- Integrated timers, washtimers, and calibration timers
- Service and operation hours counters
- Process-data recording with tamper-proof storage
- Vibrant TFT color graphics screen with 3.5" diagonal screen sizes, 320 × 240 pixels, and 256 colors
- Intuitive operation via touchscreen
- Configurable user rights
- Freely configurable operation screen
- PC setup program
- Conductivity measurement for natural waters and TDS-measurement
- Switchable conductivity measuring ranges for CIP/SIP-plants in the beverage industry
- Compliance with pharmaceutical industry requirements to USP <645>
- Control panel installation housing according to DIN IEC 61554 (protection class IP20)



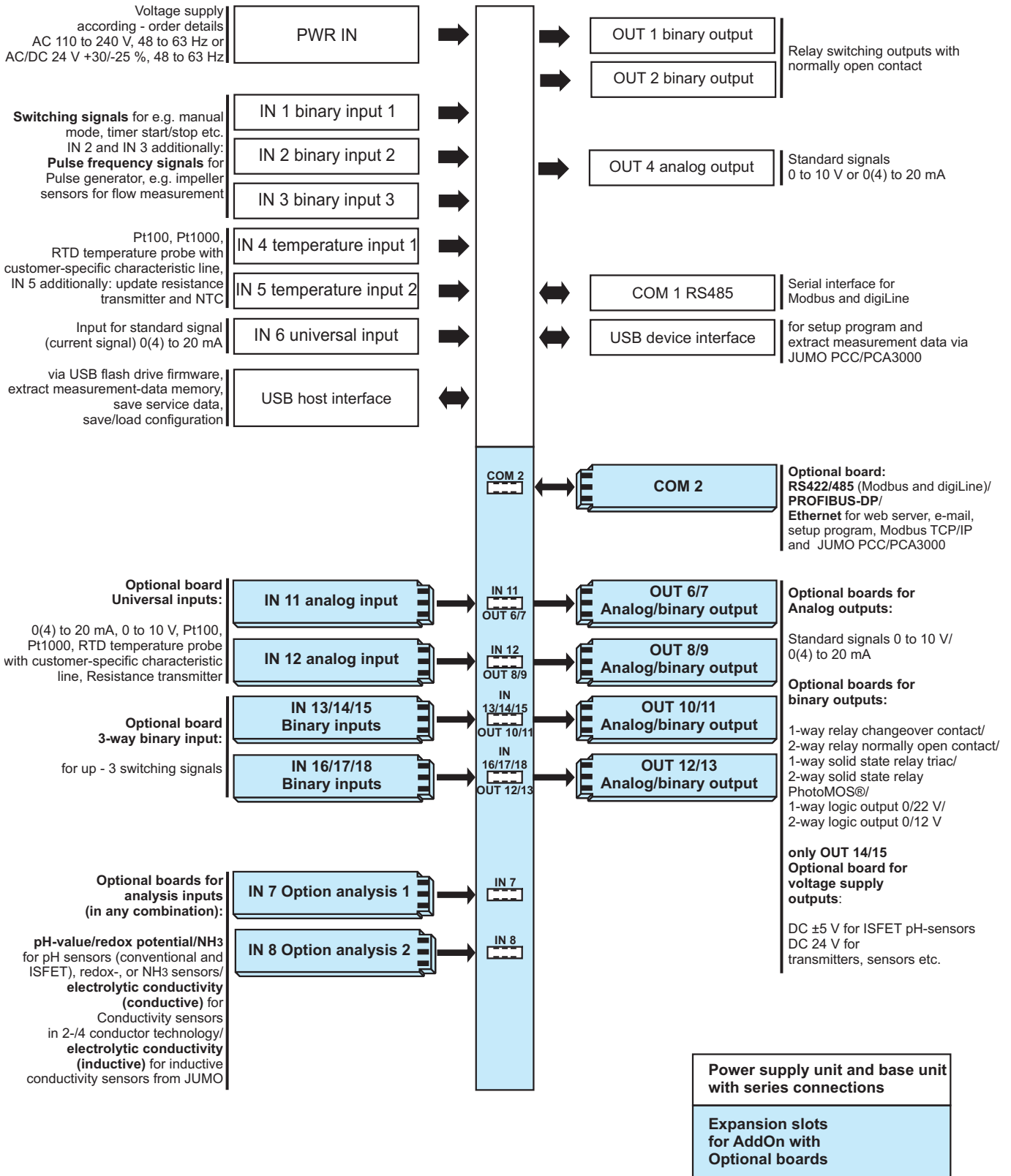
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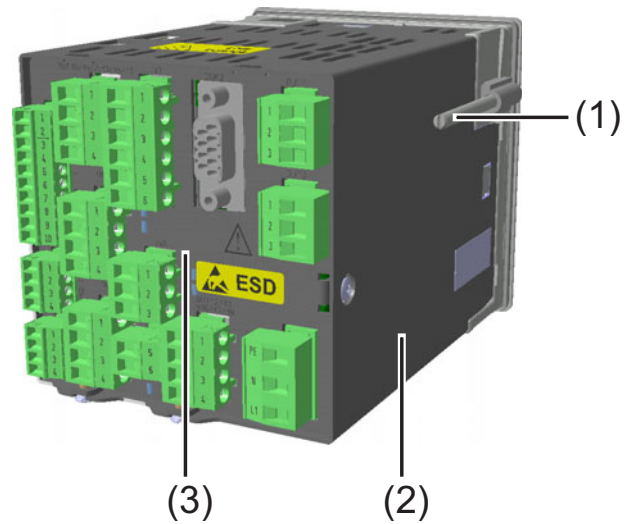
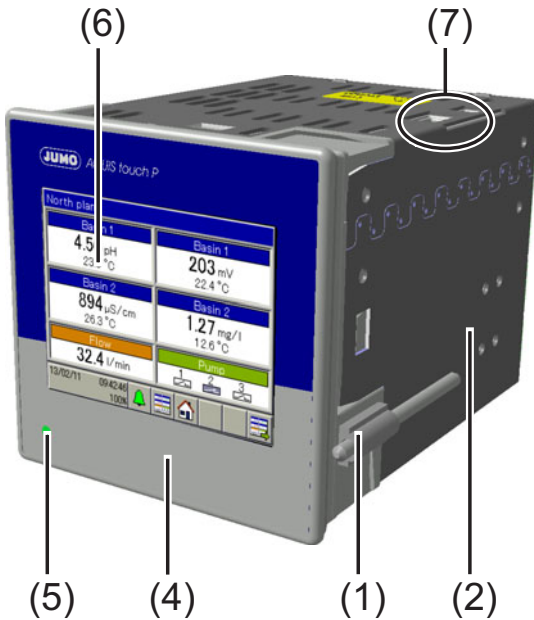


## Block diagram





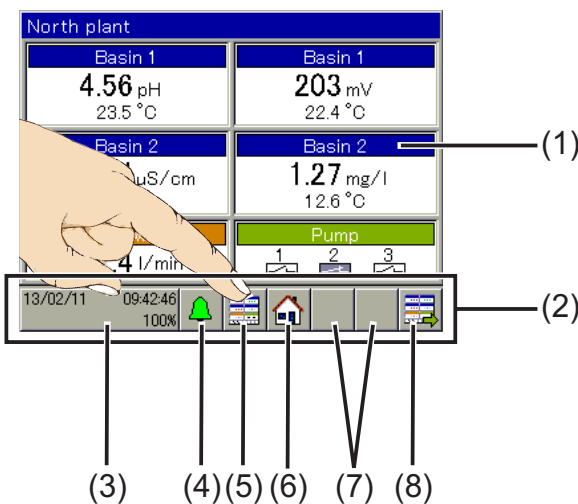
## Device setup



- (1) Mounting elements
- (2) Metal case barrel
- (3) Back panel with connection terminals (base unit and options -- circuit boards)
- (4) Case front

- (5) LED (voltage supply turned on)
- (6) Touchscreen TFT color monitor
- (7) USB interfaces

## Display and control elements



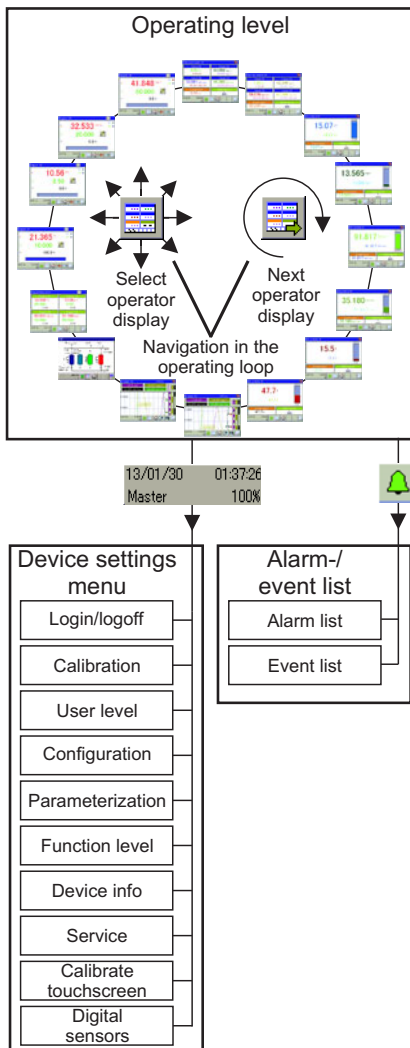
- (1) Touchscreen
- (2) Toolbar with buttons for operation
- (3) "Device settings menu" button with:
  - Display of date, time
  - Logged-in user ("Master" in the example)
  - Remaining memory display in percent for recording function (in the example: 100 %)
- (4) "Alarm/Event List" button
- (5) "Select operator screen" button
- (6) "Home" button (back to main screen)
- (7) Placeholder for context-sensitive buttons (assignment based on operator screen concerned)
- (8) "Next operator screen" button



## Description

### Operating concept

The JUMO AQUIS touch P is operated via the touchscreen. Measured values, operating states and diagrams of the individual functions are displayed and visualized on up to 16 operation screens. The device functions can be controlled using the buttons on the corresponding operation screens. Touching the navigation buttons selects the operator screen to be shown. The operator displays are arranged in an operating loop and can be run in a loop via the "Next operator screen" button and selected using the "Select operator screen" button. The "Device settings menu" button is for configuration and parameterization. A further menu for viewing pending alarms and an event protocol can be opened via the "Alarm/Event list" button.



- Master: Complete device configuration permitted
- Service: Access for authorized service personnel
- User1/User2: Restricted user rights

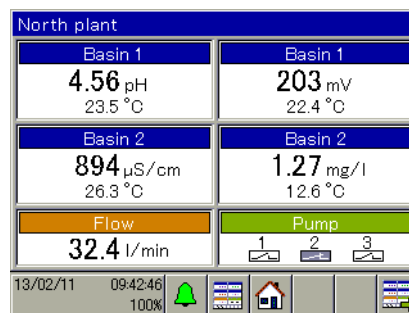
The scope of the user rights, as well as passwords and user names, can be edited via the PC setup program.

### Operating loop/operation screens

The operating loop comprises 2 general screens and 6 detailed screens as standard. Further operation screens are created by configuring controllers and recording groups, thereby provisioning controller screens and diagrams in the operating loop. The individual operation screens can be configured for showing selected measured values or binary signals and for defining headings.

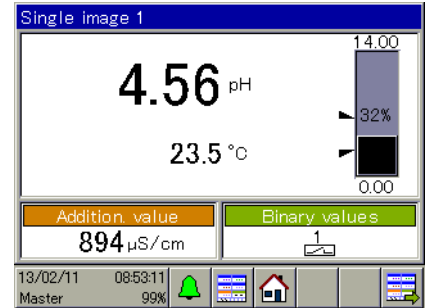
### General screens

The general screens are pooled displays of measured values and binary signal states. For the analog measurands, 2-part screens, or 4-part screens can be configured for displaying 2 or 4 display fields, each with a main and a secondary measured value. One additional value and up to 3 binary values can also be displayed in each general screen. Headings of the display window and the display fields can be renamed. Input signals can be freely assigned to the display fields. One 4-part overview screen displays up to 9 analog and 3 binary signals.



### Detailed screens

The detailed screens are large-scale displays of a main measured value with a secondary measured value. One additional value and 3 binary signals can also be displayed. The main value is visualized by a bar graph. Limit values for alarm functions of the measurement input concerned are displayed by marks on the bar graph.



### Data monitor

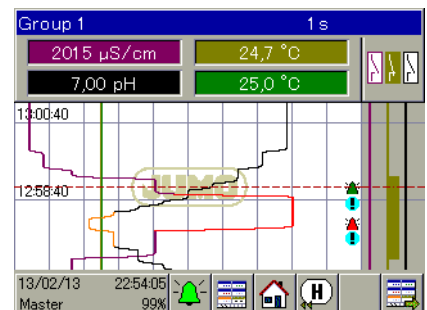
This function is included in the standard version. The data monitor displays measurement data as a line recorder diagram with time stamp. There are 2 groups available. For each activated group, a diagram is displayed in the operating loop as long as the group concerned is configured. 4 analog channels and 3 binary channels can be displayed per group. The measurement data are stored in a ring buffer. The oldest measurement data are overwritten to allow measurement data recording to continue when the ring buffer is full.

### Recording function

This function equates to a conventional paperless recorder and is available as an extra code. It corresponds essentially to an expanded data monitor function with the following additional options:

- Display measurement data history (scroll diagram)
- Data retrieval via USB flash drive or JUMO PCC software

The measurement data histories can be retrieved via JUMO PCC software or alternatively via USB flash drive and can be displayed, evaluated, and archived using the JUMO PCA3000 PC Evaluation Software.



### User rights

The available operating and setting options depend on the user rights of the logged-in user. The device holds 4 user accounts.



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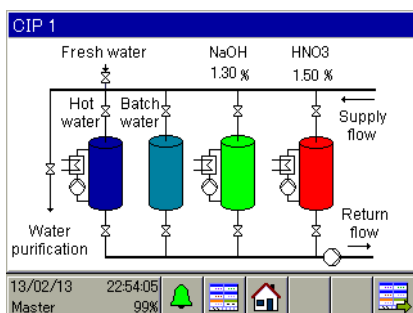
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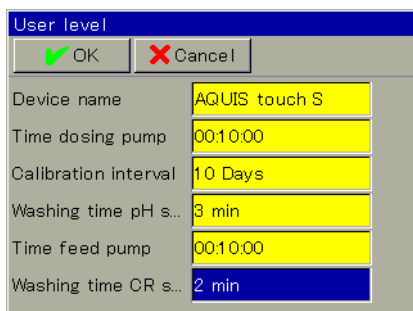
### Process screen

The PC setup program is able to create a customer-specific process screen in which a global overview of the plant process can be displayed. Once created, the process screen is transferred by the PC setup program to the JUMO AQUIS touch P, where it becomes a component of the operating loop. Up to 50 items (screens, digital displays, bar graphs, texts, etc.) can be used in the process screen. Typical for a process screen:



### User level

A user level is a menu which the user can access quickly and simply to define certain parameters and configuration settings. A user-defined block of up to 25 settings can be selected via the PC setup program and stored at user level.

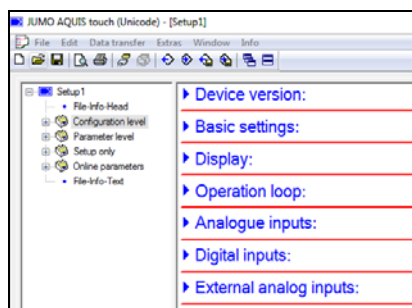


### Functional level

The "Functional level" menu allows internal functions to be used and the status of these functions to be displayed. For example, counters can be reset or a wash operation started manually here.

### PC Setup Program

The PC setup program enables the JUMO AQUIS touch P to be conveniently configured and parameterized using a PC. Data records can be created, edited, transmitted to the device and extracted in this way. The data can be saved and printed.



### analysis inputs

Two expansion slots for analysis inputs can be flexibly equipped with optional boards for measuring pH-value, redox potential, NH<sub>3</sub>, and electrolytic conductivity (conductive/inductive). The conductivity measurement also covers TDS and ultra-pure water applications within its performance range of services.

A compensation for numerous influencing variables (e.g. temperature) can be configured. This makes the JUMO AQUIS touch P the central measuring point for all analysis measurands in one process. The diverse range of connectable electrodes and sensors enable all process-relevant measurands to be recorded in a single device. In addition to analysis measurands, these measurands include physical measurands, such as temperature and flow, and also any measurand capable of being transferred as a pulse frequency signal or standard signal. Alarm functions ensure the monitoring of measured values for overrun and underrun of limit values. The limit values can be defined by the user.

### Analog inputs

In addition to the standard temperature measuring inputs (Pt100, Pt1000, resistance transmitters/WFG, NTC etc.) and the universal input (0(4) to 20 mA) of the base unit, other analog inputs with optional boards can be made available. The optional analog inputs can be used for RTD temperature probes, resistance transmitters/WFG, voltage, and current signal. This makes the JUMO AQUIS touch P an extremely flexible tool for measuring numerous measurands. Here, too, the user can configure alarm functions for monitoring measured values for underrun/overrun.

### Customer-specific linearization

In addition to the standard sensor characteristic curves installed by the factory, customer-specific linearization is available. Any arbitrary sensor characteristic curve can be input using this tool. Programming is carried out using the PC Setup program through a values table (up to 40 value pairs) or by inputting a 4th order polynomial.

### Digital inputs

The signals from 3 standard and up to 6 optional binary inputs (potential-free contacts and logic signals) can be used to trigger various internal functions, switchover of a parameter block or the start of autotuning, for example.

IN 2 and IN 3 enable the frequency of encoders to be measured to perform flow measurements using impeller sensors or monitor the rotational speed of pumps, for instance. There are 2 measuring ranges available, depending on how the measuring principle in the flow function is configured:

- 3 to 300 Hz (periodic time measurement)
- 300 Hz to 10 kHz (pulse counting)

### External inputs

Bus technologies enable a further 8 analog and 8 digital inputs to be employed for signal transmission with bus users.

### Analog outputs

The analog outputs are freely scalable (current, voltage). They can be used to output controller outputs, setpoint values, math results, and the analog input signals (e.g. actual value).

In addition to the standard analog output of the base unit, up to 4 more outputs can be provided with optional boards.

### Binary outputs

Digital outputs are switching and logic outputs. Binary outputs enable the output of alarms, limit value contacts, logic results and controller signals.

There are 2 standard binary outputs already available (OUT 1 to 2 relays). Up to 10 binary outputs can be implemented in the device through optional boards.

The following variants are available as optional boards:

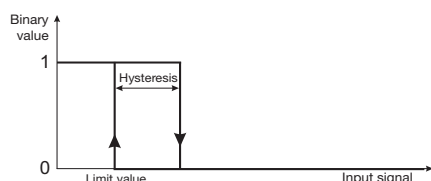
- 1-way output relay (changeover contact)
- 2-way output relay (normally open contact)
- 1-way output solid state relay triac
- 2-way output solid state relay PhotoMOS® (wear-free control, e.g. of dosing pumps)



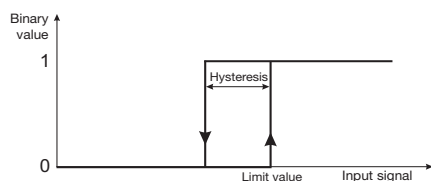
### Limit value monitoring

In addition to the alarm functions of the measuring inputs, there are 8 limit value monitors, each with 4 selectable switching functions (min. alarm, max. alarm, alarm window, inverted alarm window) available. The limit value can be permanently configured. This function enables the monitoring of any analog values. The violation of a limit value can trigger alarms, event list entries, or switching functions. The diagrams below show the limit value functions concerned.

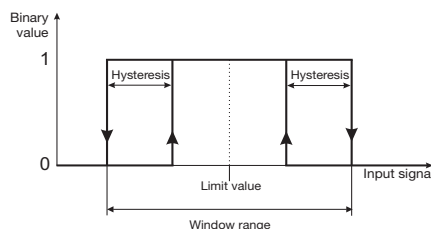
#### Min. alarm



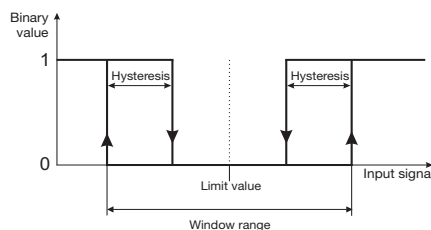
#### Max. alarm



#### Alarm window



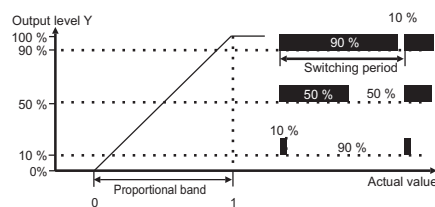
#### Invert alarm window



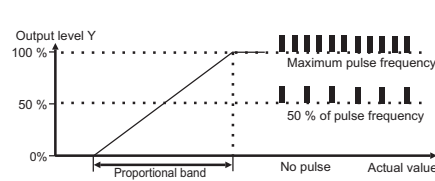
### Controller

Up to 4 PID controllers can be activated at the same time. Each analog input signal (analysis size, temperature, standard signal, etc.) can be freely assigned to one of the controller channels. Ena. variable disturbance, parameter block switchover, and a coarse/fine control response enable especially stable controller behavior. The controller outputs can be configured as continuous output (output level as standard signal), pulse length output (output level as pulse length), or pulse frequency output (output level as pulse frequency).

### Pulse length output

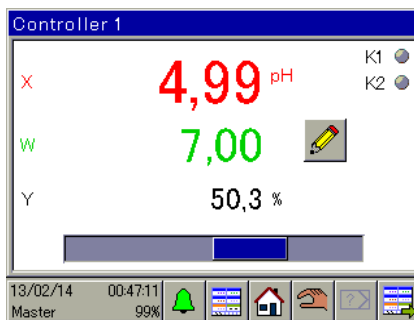


### Pulse frequency output



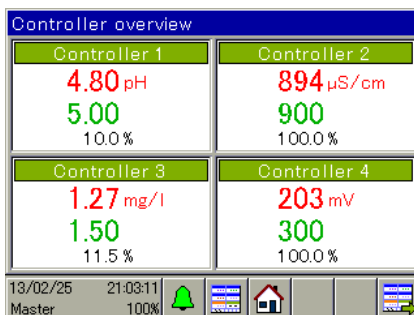
### Controller detailed screens

The controller functions are visualized in detail here. Data such as actual value, setpoint value, and output level are displayed. The controller can be used in this view (manual output ratio, setpoint value input).



### Controller general screen

If at least 2 controller channels are configured, an overview of all controllers with the most important data is displayed in the operating loop.



### Controller parameters

Two parameter blocks can be saved for each of the 4 controller channels. Each parameter block has 25 parameters for adapting the controller to the conditions of the process concerned. Each controller can be toggled between its two parameter blocks to adapt the controller response if certain process condi-

tions change. Parameter blocks can be toggled separately for each controller channel.

### Self-optimization

Self-optimization also allows the user to adjust the controller to match the control path without any prior knowledge about control technology. The way the control path reacts to changes in the actuating variable is evaluated in the process. The step response method is used in the JUMO AQUIS touch P control channels for the purposes of self-optimization.

### Math and logic function

The math and logic module enables analog channels to be associated with one another, and also analog channels to be associated with counters and digital inputs. Numerous operators are available for the formulae. The JUMO PC setup program can be used to create formulae with basic arithmetic operations, root functions, power functions, logarithm functions, angle functions, and many other functions. Operators AND, OR, NOT, XOR, and edge detections are available for logic printouts. The math and logic module can be configured solely via the PC setup program. This function is available as an option.

### Flow rate

Two flow measurement functions can be configured. Flow rates can be measured on the basis of the pulse signals at IN 2 or IN 3 and/or of an analog input signal. The measured flow can be integrated via the "Total quantity" function. In this way, the liquid volume that has passed over the measuring point is cumulated over a configurable period.

### Counters

Four counters can be used to count activation operations or operating hours of binary functions such as alarms, digital inputs, wash timers etc. This function is intended primarily for monitoring maintenance intervals.

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**Timers**

Ten timer functions are included. They can be configured either as timers or time switches. Configured as a timer, the functions act like a time relay. The timer is controlled for starting, resetting, and stopping via binary signals. A timer can also be stopped, or its start delayed, by the tolerance band function. The tolerance band represents the deviation of a measured value from a predefined reference. If the configured deviation is exceeded, the timer concerned stops. The chronological sequence of the timer signal can be influenced by the settings "Time", "Lead time" and "Stop time" in such a manner that a typical time relay functions (e.g. response delay or fallback delay) can be achieved.

The time switch function corresponds to a week timer. Up to 4 activation and deactivation times can be set for each weekday.

**Washtimer**

Two wash timers are used for the regular cleaning of electrodes. Certain functions are initiated repeatedly at an interval that can be pre-determined. For example, washtimers can control digital outputs for turning on a cleaning process in the system. As high a measurement certainty as possible should be guaranteed through regular cleaning of the sensors.

**Calibration timer**

The calibration timer function reminds the operator to re-calibrate the sensors. Corresponding alarms and event list entries can be individually configured.

**Calibration logbook**

Analog inputs IN 6 to IN 12 are covered by a calibration logbook in which all successfully completed calibration processes are recorded along with the date, time, and numerous other details. An overview of the calibration history on the analysis sensors is therefore available at all times.

**Alarm/Event list**

The alarm list reports currently pending errors. Possible alarm messages include calibration alarms or alarms triggered by input signals. Once the error sources are eliminated, alarms disappear automatically.

The event list stores and reports events, such as the appearance and disappearance of alarms, voltage supply failures, calibrations, etc. However, event list entries can also be configured in the functions of the JUMO AQUIS touch P.

**USB interfaces**

Host and Device interfaces are two different kinds of USB interfaces. A USB memory stick can be connected to the Host interface. This allows measurement data, configuration data and service data to be stored. Also, memory stick configurations can be loaded into the device and device software updates can be carried out. The Device interface, together with a conventional USB cable, operates the PC setup program and fetches measurement data from the optional registration function using the JUMO PCC software. Both USB interfaces are located in the metal case barrel on top of the device.

**Serial interfaces RS422/485**

The JUMO AQUIS touch P has a standard RS485 interface which can be configured for the Modbus RTU protocol (slave) or for operating JUMO digital sensors. A further interface (RS422/485) can be retrofitted as an optional board. Standard interfaces are used to incorporate the device into an automation network via Modbus protocol or for connecting a digiLine bus with up to 6 digital sensors.

**Digital sensors**

One of the serial interfaces (either base unit or optional board) can be used upon activation of the extra code "JUMO digiLine protocol activated" (see order data) for operating digital sensors in a JUMO digiLine bus system. Up to 6 sensors can be operated on a JUMO digiLine bus. The JUMO digiLine protocol supports both sensors with JUMO digiLine electronics and also digital sensors in JUMO 2026xx product groups.

**PROFIBUS-DP interface**

The PROFIBUS-DP interface can be used to integrate the JUMO AQUIS touch P into a fieldbus system operating according to the PROFIBUS-DP standard. An application-specific GSD file, via which the JUMO AQUIS touch P is integrated into the fieldbus system, is generated by means of the project engineering tool supplied (GSD generator; GSD = basic device data).

**Ethernet interface**

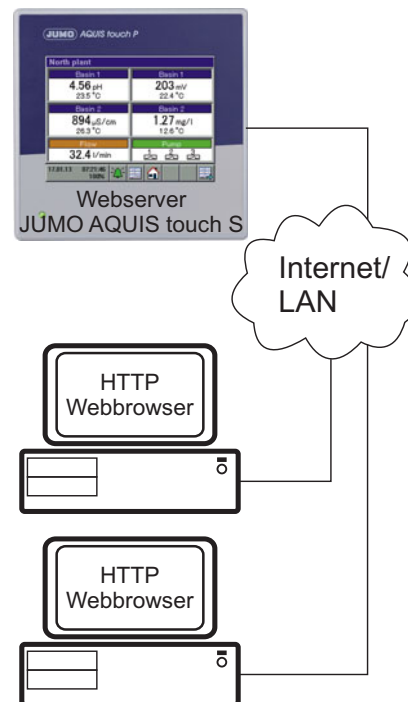
The JUMO AQUIS touch P can be incorporated into a LAN using the optional Ethernet interface. This enables communication between the device and all PCs in the respective LAN. Access to the JUMO programs, the PC setup program and the PCC communication software can be accomplished from these PCs. Furthermore, the Ethernet interface allows the Webserver, e-mail and Modbus TCP/IP functions to be used.

**E-mail/SMS text message**

The JUMO AQUIS touch P can be configured for event-controlled sending of e-mail notifications. For example, this can be used to notify maintenance personnel about alarms (also via forwarding as an SMS in the E-Mail SMS gateway of a mobile phone provider).

**Webserver (online-visualization)**

In the JUMO AQUIS touch P, HTML documents that can be generated using a conventional HTML editor can be stored using the PC setup program. These documents can contain text, graphics and Java Script code. Analog and binary values from the JUMO AQUIS touch P can be displayed using JavaScript. This results in a website that can be called up from a PC via the Internet or LAN using a conventional web browser and displayed. The user can now see on this website a general representation of the system or process together with measured values and operating states. A "standard online visualization" function is stored as default. The prerequisite for observing the online visualization is a PC with an installed Microsoft® Windows® operating system and Silverlight®.



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## Technical data

### Analog inputs base unit

#### Temperature measurement input (IN 4)

Probe-/Signal type	Connection type	Measuring range	Measuring accuracy	Ambient temperature influence
Pt100 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.05 % of MR <sup>a</sup>	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1 % of MR <sup>a</sup>	≤ 50 ppm/K
RTD temperature probes with customer-specific characteristic line <sup>b</sup> up to 400 Ω to 4000 Ω	2-wire/3-wire 2-wire/3-wire	0 to 400 Ω 0 to 4000 Ω	≤ 0.1 % of R <sub>max</sub> <sup>c</sup>	≤ 100 ppm/K
Sensor line resistance	maximal 30 Ω per line with 3-wire circuit			
Lead compensation	Not required for 3-wire circuit. With a 2-wire circuit, lead calibration can be executed at the respective input by means of an measured value correction with the aid of the "Offset" setting.			

<sup>a</sup> MR: measuring range span

<sup>b</sup> Customer-specific linearization can be used to enter a sensor characteristic line.

<sup>c</sup> R<sub>max</sub>: maximal resistance across the measuring range (400 Ω, or 4000 W)

#### Temperature measurement input (IN 5)

Probe-/Signal type	Connection type	Measuring range	Measuring accuracy	Ambient temperature influence
Pt100 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.05 % of MR <sup>a</sup>	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1 % of MR <sup>a</sup>	≤ 50 ppm/K
Resistance transmitter	3-wire	0 to 100 kΩ	0.5 % of R <sub>Tot</sub> <sup>b</sup>	≤ 100 ppm/K
RTD temperature probes with customer-specific characteristic line <sup>c</sup> up to 400 Ω to 4000 Ω to 100 kΩ	2-wire/3-wire 2-wire/3-wire 2-wire/3-wire	0 to 400 Ω 0 to 4000 Ω 0 to 100 kΩ	≤ 0.1 % of R <sub>max</sub> <sup>d</sup>	≤ 100 ppm/K
NTC 8k55	2-wire/3-wire	0 to 150 °C	≤ 0.1 % of R <sub>max</sub> <sup>d</sup>	≤ 100 ppm/K
NTC 22k	2-wire/3-wire	0 to 150 °C		
Sensor line resistance	maximal 30 Ω per line with 3-wire circuit			
Lead compensation	Not required for 3-wire circuit. With a 2-wire circuit, lead calibration can be executed at the respective input by means of an measured value correction with the aid of the "Offset" setting.			

<sup>a</sup> MR: measuring range span

<sup>b</sup> R<sub>Tot</sub>: total resistance of the resistance transmitter/Resistance potentiometer

<sup>c</sup> Customer-specific linearization can be used to enter a sensor characteristic line.

<sup>d</sup> R<sub>max</sub>: maximal resistance across the measuring range (400 Ω, 4000 Ω or 100 kΩ)

#### Universal input (IN 6)

Signal type	Measuring range	Measuring accuracy	Ambient temperature influence
Current signal	0(4) to 20 mA	0.1 % of MR <sup>a</sup>	100 ppm/K

<sup>a</sup> MR: measuring range span

#### Measuring circuit monitoring base unit

Inputs	Underrange/overrange
Temperature input	Yes
Universal input (current signal)	Yes



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**Analog inputs optional boards**

**Universal input (IN 11, IN 12)**

Probe-/Signal type	Connection type	Measuring range	Measuring accuracy	Ambient temperature influence
Pt100 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.05 % of MR <sup>a</sup>	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1 % of MR <sup>a</sup>	≤ 50 ppm/K
Resistance transmitter	3-wire	100 to 4000 Ω	0.5 % of R <sub>Tot</sub> <sup>b</sup>	≤ 100 ppm/K
RTD temperature probes with customer-specific characteristic line <sup>c</sup> up to 400 Ω to 4000 Ω	2-wire/3-wire 2-wire/3-wire	0 to 400 Ω 0 to 4000 Ω	≤ 0.1 % of R <sub>max</sub> <sup>d</sup>	≤ 100 ppm/K
Voltage signal	-	0 to 10 V	0.2 % of MR <sup>a</sup>	100 ppm/K
Current signal	-	0(4) to 20 mA	0.1 % of MR <sup>a</sup>	100 ppm/K
Sensor line resistance <sup>e</sup>	maximal 30 Ω per line with 3-wire circuit			
Lead calibration <sup>e</sup>	Not required for 3-wire circuit. With a 2-wire circuit, lead calibration can be executed at the respective input by means of an measured value correction with the aid of the "Offset" setting.			

- <sup>a</sup> MR: measuring range span
- <sup>b</sup> R<sub>Tot</sub>: total resistance of the resistance transmitter/Resistance potentiometer
- <sup>c</sup> Customer-specific linearization can be used to enter a sensor characteristic line.
- <sup>d</sup> R<sub>max</sub>: maximal resistance across the measuring range (400 Ω or 4000 Ω)
- <sup>e</sup> Specification does not apply for standard signals

**Analysis input: pH/Redox/NH<sub>3</sub>**

Measurand	Measuring range	Temperature compensation	Measuring accuracy	Ambient temperature influence
pH-value (standard electrode)	-2 to 16 pH	-10 to +150 °C	≤ 0.3 % of MR <sup>a</sup>	0.2%/10 K
pH-value (ISFET electrode)	-2 to 16 pH	through electrode <sup>b</sup>		
Redox voltage	-1500 to +1500 mV	None		
NH <sub>3</sub> (ammonia)	0 to 20000 ppm	-10 to +150 °C		

- <sup>a</sup> MR: measuring range span
- <sup>b</sup> ISFET electrodes supply a temperature-compensated pH-measured value.

**Analysis input: CR (resistive conductivity)**

Units	Display ranges <sup>a</sup>	Temperature compensation	Cell constant	Measuring range toggling <sup>b</sup>	Measuring accuracy	Ambient temperature influence
μs/cm ms/cm kΩ × cm MΩ × cm	0.0000 to 9.9999 00.000 to 99.999 000.00 to 999.99 0000.0 to 9999.9 00000 to 99999	TC-linear, natural water DIN EN 27888, natural water with expanded range, TDS <sup>c</sup> , ASTM D-1125-95 for neutral (NaCl), acid (HCl) and alkali (NaOH) impurities	0.01 to 10 cm <sup>-1</sup>	Four measuring ranges Configurable	≤ 0.6 % of MB <sup>d</sup> + 0.3 μS × cell constant (K)	0.2%/10 K

- <sup>a</sup> The display range is scalable. The Comma format is freely configurable. An automatic decimal place can also be set.
- <sup>b</sup> Up to 4 different measuring ranges with separate display range limits, units, temperature compensation processes, and alarm functions can be configured. The respective active measuring range is selected via binary signals.
- <sup>c</sup> TDS (Total Dissolved Solids)
- <sup>d</sup> MR: measuring range span

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**Analysis input: Ci (conductivity, inductive)**

Units	Measuring/display ranges <sup>a</sup>	Temperature compensation	Cell constant	Measuring range toggling <sup>b</sup>	Measuring accuracy	Ambient temperature influence
µS/cm mS/cm	0.0000 to 9.9999 00.000 to 99.999 000.00 to 999.99 0000.0 to 9999.9 00000 to 99999	TC-linear, <sup>c</sup> TC-curve, natural water, natural water with expanded temperature range, NaOH 0 to 12 %, NaOH 25 to 50 %, HNO <sub>3</sub> 0 to 25 %, HNO <sub>3</sub> 36 to 82 %, H <sub>2</sub> SO <sub>4</sub> 0 to 28 %, H <sub>2</sub> SO <sub>4</sub> 36 to 85 %, H <sub>2</sub> SO <sub>4</sub> 92 to 99 %, HCl 0 to 18 %, HCl 22 to 44 %	4.00 to 8.00 cm <sup>-1</sup>	Four measuring ranges Configurable	for 0 to 999 µS/cm: 1.5 % of MRE <sup>d</sup>  for 1 to 500 mS/cm: 1 % of MRE <sup>d</sup>  for 500.1 to 2000 mS/cm 1.5 % of MRE <sup>d</sup>	0.1 %/K

- <sup>a</sup> The display range is scalable. The Comma format is freely configurable. An automatic decimal place can also be set.
- <sup>b</sup> Up to 4 different measuring ranges with separate display range limits, units, temperature compensation processes, and alarm functions can be configured. The respective currently active measuring range is selected via binary signals.
- <sup>c</sup> TC: temperature coefficient
- <sup>d</sup> MRE: Measuring range end value

**Temperature compensations**

Compensation type	Compensation range
Linear TC <sup>a</sup>	-50 to +250 °C
TC curve	-50 to +250 °C
TDS	-50 to +250 °C
natural water according to DIN EN 27888	0 to 36 °C
natural water with expanded temperature range <sup>b</sup>	0 to 100 °C
ASTM D-1125-95 (neutral, alkaline, and acidic impurities)	0 to 100 °C
NaOH 0 to 12 %	0 to 90 °C
NaOH 25 to 50 %	10 to 90 °C
HNO <sub>3</sub> 0 to 25 %	0 to 80 °C
HNO <sub>3</sub> 36 to 82 %	-20 to +65 °C
H <sub>2</sub> SO <sub>4</sub> 0 to 28 %	-17 to +104 °C
H <sub>2</sub> SO <sub>4</sub> 36 to 85 %	-17 to +115 °C
H <sub>2</sub> SO <sub>4</sub> 92 to 99 %	-17 to +115 °C
HCl 0 to 18 %	10 to 65 °C
HCl 22 to 44 %	-20 to +65 °C

- <sup>a</sup> TC: temperature coefficient
- <sup>b</sup> The temperature compensation "natural water with expanded temperature range" extends beyond the standardized temperature thresholds of DIN EN 27888.

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**Measuring circuit monitoring, optional boards**

Input/Sensor	Underrange/over-range	Short circuit/sensor break	open circuit	Detection of deposits
pH-value (glass electrode)	Yes	Configurable Impedance measurement <sup>a</sup>	Configurable Impedance measurement <sup>a</sup>	-
pH-value (ISFET)	Yes	No <sup>b</sup>	No <sup>b</sup>	-
Resistive conductivity	Yes	No <sup>b</sup>	Configurable	Only with 4-wire circuit <sup>a</sup>
Inductive conductivity	Yes	No <sup>b</sup>	No <sup>b</sup>	-
Universal input for connection of: voltage/current signal, RTD temperature probe	Yes	No <sup>b</sup>	No <sup>b</sup>	-
Universal input for connection of: resistance transmitter	No <sup>b</sup>	No <sup>b</sup>	No <sup>b</sup>	-

- <sup>a</sup> With impedance monitoring and detection of deposits, the sensor alarm is tripped in case of a fault. Monitoring via impedance measurement can also be activated. The following points should be observed to ensure correct function:
- Impedance measurements are possible only with glass-based sensors.
  - Sensors must be connected directly to an analysis input for pH/Redox/NH<sub>3</sub> on the device.
  - Impedance converters must not be installed in the measuring circuit.
  - The maximal admissible cable length between sensor and device is 10 m.
  - Fluid resistances have a direct impact on the measurement result. It is therefore advisable to activate the impedance measurement in liquids at a minimum conductivity of approx. 100 µS/cm.
- <sup>b</sup> Errors in the measuring circuit (short circuit or line break) lead to display errors (underrange or overrange or inadmissible value).

**Analog outputs of base unit and optional boards**

Signal type	Signal range	Admissible load resistance	Accuracy	Ambient temperature influence
Voltage signal	0 to 10 V	> 500 Ω	≤ 0.25 %	≤ 100 ppm / K
Current signal	0/4 to 20 mA	< 450 Ω	≤ 0.25 %	≤ 100 ppm / K

**Digital inputs base unit**

Description	Input frequency ranges	Min. pulse duration		Signal type	Switching thresholds <sup>a</sup>	
		On	Off		On	Off
IN 1 <sup>b</sup>	≤ 1 Hz	300 ms	300 ms	Configurable as: "Potential-free contact" or "Ext. voltage supply" (maximal 28 V)	> 8 V	< 5 V
IN 2 to 3 <sup>b,c</sup> Switching signal	≤ 1 Hz	30 µs	30 µs		> 1.8 mA	< 1.2 mA
IN 2 to 3 <sup>b,c</sup> Flow	3 to 300 Hz 300 Hz to 10 kHz	30 µs	30 µs			

- <sup>a</sup> This specification is relevant only if "Ext. voltage supply" option is selected from the "Contact" option in the Configuration. Sensors and transmitters should be supplied from voltage supply outputs on the JUMO AQUIS touch P. An externally supplied voltage signal must not have a voltage over 28 V.
- <sup>b</sup> All digital inputs IN 1 to 3 are suitable for connecting proximity switches. Recommended types are: Wachendorff P2C2B1208NO3A2 and Balluff BES M12EG-PSC80F-BP03.
- <sup>c</sup> Digital inputs IN 2 and IN 3 can be used for impeller flow sensors (water meters) or magnetic-inductive flow meters, for example. The input frequency depends on the configured measurement principle in the flow function.

**Digital inputs optional boards**

Max. number of retrofittable digital inputs	Max. pulse frequency	Min. pulse duration		Signal type
		On	Off	
Max. 2 optional boards with 3 digital inputs each	1 Hz	300 ms	300 ms	Potential-free contact

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**Digital outputs, power supply unit board**

Description	Switching output	Ampacity at resistive load	Contact life <sup>a</sup>
OUT 1	Relay, changeover contact	3 A at AC 250 V	150,000 switching cycles
OUT 2	Relay, changeover contact		

<sup>a</sup> The maximal ampacity of the contacts must not be exceeded.

**Digital outputs, optional boards**

Optional card	Switching output	Ampacity under Ohmic load	Contact life <sup>a</sup>	Special features
Relay output 2-way N/O contact	2 normally open contacts <sup>b</sup>	3 A at AC 250 V	150,000 switching cycles	-
Relay output, single Changeover contact	1 changeover contact			-
Solid state relay triac	Switching output with triac (protected by Varistor) <sup>c</sup>	1 A at AC 230 V	Wear-free	-
Solid state relay PhotoMOS®	Switching output with PhotoMOS®	200 mA at DC 50 V and/or AC 35 V	Wear-free	not short-circuit-proof; max. voltage DC 50 V AC 35 V
Logic output 0/12 V	High/low signal	20 mA <sup>d</sup>	Wear-free	-
Logic output 0/22 V	High/low signal	30 mA <sup>d</sup>	Wear-free	-

<sup>a</sup> The maximal ampacity of the contacts must not be exceeded.

<sup>b</sup> Combining a mains voltage circuit with a protective low-voltage circuit on the "dual normally open contact" option is not admissible.

<sup>c</sup> A varistor protects the Triac against excessive voltages, such as can occur during switching processes.

<sup>d</sup> Current limiting via the logic output of the device

**Voltage supply outputs, optional board**

Description	Output voltage	Ampacity	Connection
DC 24 V voltage supply (e.g. for external transmitters) <sup>a</sup>	DC 24 V +17 / -5 %	42 mA	Screw terminals
DC ±5 V voltage supply (e.g. for IS-FET pH-sensors)	DC +5 V +10 / -4 % (between terminals 3 and 4)	150 mA	
	DC -5 V ±15 % (between terminals 5 and 4)	30 mA	

<sup>a</sup> An optional board for voltage supply outputs accommodates all the outputs listed in this table. A maximal of 1 such optional board can be integrated into a device.

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**Interfaces**

**Serial interface RS485 (base unit )**

Protocol	Data formats <sup>a</sup>	Device addresses	Baud rates in baud	Connection
Modbus (slave)	8 - 1 - no parity	1 to 254	9600	Screw terminals
Modbus digital sensors	8 - 1 - odd parity		19200	
	8 - 1 - even parity		38400	

<sup>a</sup> Specification in useful bit - stop bit - parity format. Therefore, the frame always comprises 8 useful bits and 1 stop bit. Only the parity is differentiated.

**Serial Interface RS422/485 (optional board)**

Protocol	Data formats <sup>a</sup>	Device addresses	Baud rates in baud	Connection
Modbus (slave)	8 - 1 - no parity	1 to 254	9600	Screw terminals
Modbus digital sensors	8 - 1 - odd parity		19200	
	8 - 1 - even parity		38400	

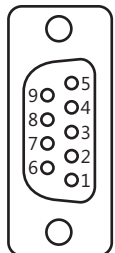
<sup>a</sup> Specification in useful bit - stop bit - parity format. Therefore, the frame always comprises 8 useful bits and 1 stop bit. Only the parity is differentiated.

**Sampling rates for digital sensors**

at baud rate > 9600 baud (possible only for sensors with JUMO digiLine electronics)	500 ms
at baud rate = 9600 baud and more than 2 digital sensors on the bus <sup>a</sup>	1 s

<sup>a</sup> For JUMO ecoLine O-DO sensors, the sample rate can be adjusted (1 to 999 s).

**PROFIBUS-DP (optional board)**

Protocol	Data formats <sup>a</sup>	Device addresses	Baud rates	Connection
DP-V0	Big Endian Little Endian	0 to 127	9.6 kBaud to 12 MBaud	D-sub socket 9-pole 

<sup>a</sup> Big Endian corresponds to the Motorola® data format and Little Endian to Intel® data format.



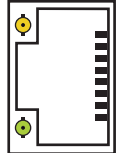
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**Ethernet optional board (10/100Base-T)**

Function	Use	Application protocol/ program	Special features	Connection
Web server	Online-visualization via web browser	HTTP	Editable via HTML Editor	RJ 45 socket 
E-mail/SMS text message <sup>a</sup>	E-mail dispatch via SMTP server Transmission as SMS text message	SMTP	Five e-mail templates can be stored, up to 3 receivers for each e-mail template	
Modbus TCP/IP	Process data exchange with Modbus users <sup>b</sup>	Modbus TCP/IP	TCP Port: 502	
Automatic IP configuration	Network administration <sup>c</sup>	DHCP	-	
Setup via PC	Device settings via PC setup program	JUMO PC setup program (HTTP)	-	
Recording function <sup>d</sup>	Extract, archive, evaluate measurement data	JUMO PCC and PCA 3000	-	

- <sup>a</sup> The e-mail function allows the device, triggered by internal and/or external binary signals, to send hard-programmed messages. This requires the data of an SMTP server (e-mail intermediate server) to be known. The e-mail function can be configured exclusively via the PC setup program.
- <sup>b</sup> Modbus TCP/IP enables Modbus users to communicate via a LAN, provided this is connected to the LAN (e.g. via gateways). To configure Modbus communication you will require the interface description for the JUMO AQUIS touch P.
- <sup>c</sup> Enlist the help of your network administrator or an IT specialist for the IP configuration.
- <sup>d</sup> The recording function stores measurement data in a ring buffer inside the device. Further details appear on Page 16.

**USB interfaces**

Interface	Use	Support	Connection	Version
USB host interface	Extract measurement data memory <sup>a</sup> , Read/write device settings, Save service data <sup>b</sup> Update the firmware	USB flash drive	USB port type A 	USB 2.0
USB device interface	Device setting via PC setup program, Extract, archive, evaluate measurement data	JUMO PC setup program, JUMO PCC/PCA 3000 software	USB port type Mini-B 	

- <sup>a</sup> The recording function stores measurement data in a ring buffer inside the device. Further details appear on Page 16.
- <sup>b</sup> Service data can be stored on a USB flash drive for diagnostic purposes.

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**Electrical data**

Voltage supply (switch-mode)	AC 110 to 240 V +10 / -15 %; 48 to 63 Hz or AC/DC 24 V +30/-25 %; 48 to 63 Hz
electrical safety	According to EN 61010, part 1 overvoltage category III, pollution degree 2
Max. power consumption AC 110 to 240 V AC/DC 24 V	27.9 VA (11.7 W at 230 V) 25.2 VA (14.7 W at DC 24 V)
Data backup	Flash memory
Electrical connection	in back via screw terminals Specifications for conductor cross sections on Page 17
Electromagnetic compatibility (EMC): Interference emission Interference immunity	DIN EN 61326-1 Class A Industrial requirements

**Screen Touchscreen**

Type	TFT-touchscreen
Touchscreen sensors	Resistive (can also be operated wearing gloves)
Display protection	Front/design film for protection against damage and scratches
Size	3.5"
Resolution	320 × 240 pixel
Color depth	256 colors
Viewing angle	Horizontal: ±65° Vertical: -65 to +40°

**Housing**

geographic height for operation	maximum 2000 m above sea level
Case type	Plastic front frame with metal case barrel (for use indoors only)
Materials	Front plastic frame UL 94 V0 Housing barrel made of galvanized sheet metal
Dimensions of the front	96 mm × 96 mm
Control panel cut-out dimensions	92 mm × 92 mm Tolerance = +0.8 mm
Depth behind panel without Ci-conductivity sensor with Ci conductivity sensor	130.9 mm 283.3 mm (including maneuvering space for the sensor cable)
Panel thickness	Max. 5 mm
Minimum distance to other operating equipment	from edge of the panel cut-out horizontal 35 mm, vertical 80 mm
Ambient temperature	-5 up to +50 °C
Storage temperature	-30 to +70 °C
Resistance to climatic conditions	Relative humidity < 85% annual average, no condensation
Operating position	Any (with due consideration for the viewing angle of the screen)
Protection type Case front in panel mounting Metal case barrel	According to DIN EN 60529 IP66 IP20
Weight (fully fitted)	about 1000 g

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**Functions**

**Controller channels**

Number	4
Controller type	Two-state controller Three-state controllers Continuous controller Coarse/fine controller Three-step controller proportional controller with integrated actuator driver
Controller structure	P, PI, PD, PID
Controller outputs	2 outputs per control channel configurable as: pulse length output, pulse frequency output (maximum 240 pulses per minute), continuous output
Disturbance feedforward control	multiplicative and/or additive <sup>a</sup>
Self-optimization	step response method
Sampling rate	250 ms

<sup>a</sup> Ena. variable disturbance permits consideration of influencing variables in the process environment beyond the actual value alone. This keeps the control response stable, even when fluctuations in such ambient conditions occur.

**Recording function**

	Data monitor	Recording function (also available)
Number of groups <sup>a</sup>	2	2
Number of input variables per group	4x analog 3x digital	4x analog 3x digital
Recording/memory cycles	1 to 3600 s	1 to 3600 s
Memory values	Current value Average value Minimum value Maximum value	Current value Average value Minimum value Maximum value
Size of the ring buffer <sup>b</sup>	sufficient for 150 entries <sup>c</sup>	Sufficient for approx. 31 million entries <sup>c</sup>
History function <sup>d</sup>	No	Yes
Archiving/evaluation	No	Yes (via JUMO PCA3000 evaluation software)

<sup>a</sup> A freely configurable set of input variables can be pooled in one group. Each group has its own display screen. The group affiliation is considered for data storage, to enable evaluation via PC.  
<sup>b</sup> The measurement data are stored in a ring buffer. When the ring buffer is full, the recording function begins at the start of the ring buffer by overwriting the measured value history.  
<sup>c</sup> An entry contains 4 analog values and 3 binary values. The sum total of both groups is indicated.  
<sup>d</sup> The history function allows you to scroll through the diagram to past recording times. All measurement data stored in the ring buffer can therefore be viewed on the device.

**Customer-specific linearization**

Number of grid points <sup>a</sup>	up to 40 value pairs
Interpolation <sup>b</sup>	Linear
Formula entry <sup>c</sup>	4th degree polynomial

<sup>a</sup> By entering grid points (value pairs from the customer-specific characteristic curve), it is possible to enter an approximate characteristic curve.  
<sup>b</sup> Linear interpolation means the formation of a slope function through 2 grid points.  
<sup>c</sup> As an alternative to entering grid points, a customer-specific characteristic curve can also be entered as a formula in the form of a polynomial.

**Approvals / approval marks**

Approval mark	Test facility	Certificates / certification numbers	Inspection basis	Valid for
GL - Hardware GL - Software	Germanischer Lloyd	Approval submitted	Environmental Category C EMC 1	Type 202580/...
c UL us	Underwriters Laboratories	E201387	UL 61010-1 (3rd edition), CAN/CSA-C22.2 No. 61010-1 (3rd edition)	Type 202580/...

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## Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection options. For the electrical connection, only use the installation instructions or the operating manual. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are mandatory for mounting, electrical connection, startup, and for safety during operation.

### Instructions for conductor cross sectional areas and ferrules

Ferrule	Conductor cross section		Minimum length of ferrule or stripping
	minimal	Maximum	
without ferrule			
Power supply unit voltage supply	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Power supply unit relay switching outputs	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Base unit	0.14 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
with ferrule without lip			
Power supply unit voltage supply	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Power supply unit relay switching outputs	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Base unit	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
with ferrule with lip			
Power supply unit voltage supply	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Power supply unit relay switching outputs	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Base unit	0.25 mm <sup>2</sup>	0.5 mm <sup>2</sup>	7 mm
Rigid			
Power supply unit voltage supply	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Power supply unit relay switching outputs	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Base unit	0.14 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm

### Conductor cross-sections for optional boards

The terminals on optional boards are plug-in screw terminals.

Optional boards for	Ferrule	Conductor cross section		Length to strip
		minimal	Maximum	
Universal inputs	without ferrule	0.14 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Analog outputs	with ferrule with lip	0.25 mm <sup>2</sup>	0.5 mm <sup>2</sup>	7 mm
Digital inputs	Ferrule without lip	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Digital outputs PhotoMOS®	Rigid	0.14 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Logic outputs				
Voltage supply output				
Analysis input pH/redox/NH <sub>3</sub>	without ferrule	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
CR analysis inputs <sup>a</sup>	with ferrule with lip	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Analysis inputs C <sub>i</sub> <sup>b</sup>	Ferrule without lip	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Digital outputs relay	Rigid	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Digital outputs triac				

<sup>a</sup> CR analysis inputs = Analysis inputs for resistive conductivity

<sup>b</sup> Analysis inputs C<sub>i</sub> = Analysis inputs for inductive conductivity

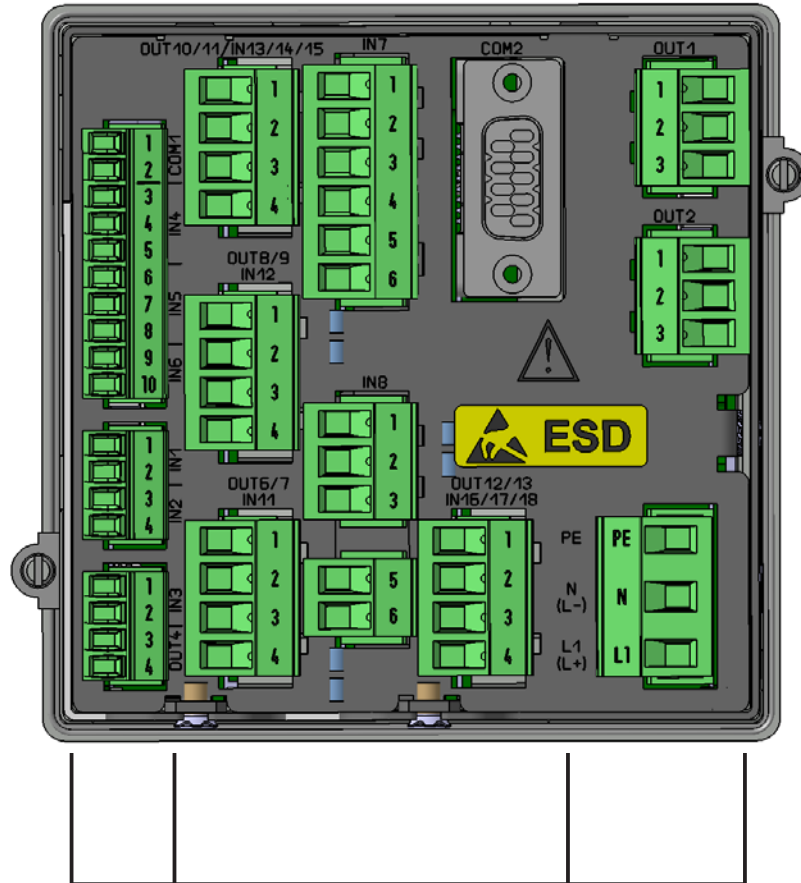
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Overview of connections



Base unit                      Options                      Supply unit

	Module	Connector terminal	Type
Inputs	Base unit	IN 1 to IN 3	Digital inputs
		IN 4 to IN 5	Temperature inputs
		IN 6	Universal input
	Optional boards	IN 7 to IN 8	analysis inputs
	–	IN_9 to IN 10	Not available <sup>a</sup>
	Optional boards	IN 11 to IN 12	Universal inputs
Outputs	Power supply unit	OUT 1 to OUT 2	Binary outputs (relay changer)
		Base unit	OUT 3
	–	OUT 4	Analog output
	–	OUT 5	Not available <sup>a</sup>
	Optional boards	OUT 6 to OUT 13	Analog/binary outputs, OUT 8/9 also for power supply output DC ±5 V, 24 V
Interfaces	Base unit	COM 1	RS485
		USB device interface	USB device interface
		USB host interface	USB host interface
	Optional boards	COM 2	Ethernet, PROFIBUS-DP, or RS422/485

<sup>a</sup> Available only on the AQUIS touch P  
 V3.01/EN/00601344



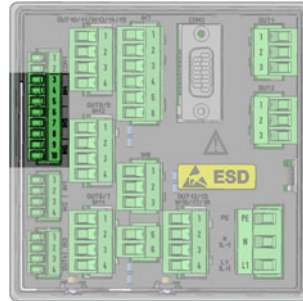
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**Analog inputs base unit**

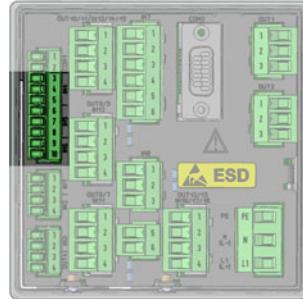


Connector/terminal	Connection variant	Symbol
IN 4	RTD temperature probe 2-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
IN 5	RTD temperature probe 2-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	NTC 2-wire circuit	
	NTC 3-wire circuit	
	Resistance transmitter A = Start E = End S = Slider	

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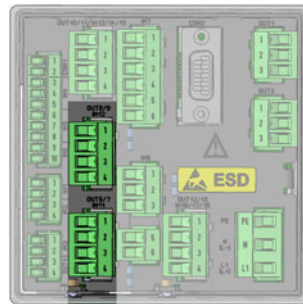
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Connector/terminal	Connection variant	Symbol
IN 6	Standard signal Current 0(4) to 20 mA	

**Analog inputs optional boards**

**Universal inputs**



Slot	Connection variant	Symbol
IN 11 IN 12	RTD temperature probe 2-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	Resistance transmitter A = Start E = End S = Slider	
	Standard signal Voltage 0 to 10 V	
	Standard signal Current 0(4) to 20 mA	

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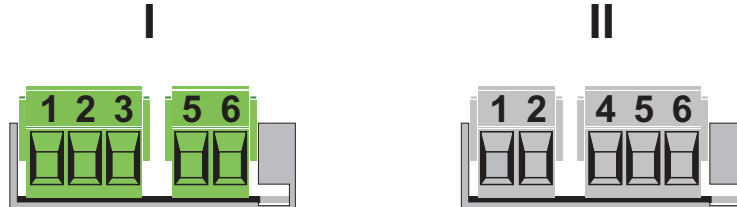
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**pH/Redox/NH3 analysis inputs**

For optional board "analysis pH/Redox/NH3", 2 versions are currently in circulation. The connection diagram takes into consideration the connection terminal layout of both Version I and of Version II. To identify the version of your optional board, compare the connection terminal layout with the following figures:

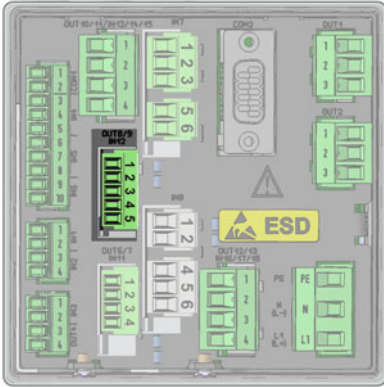


I = First version  
II = Revised version

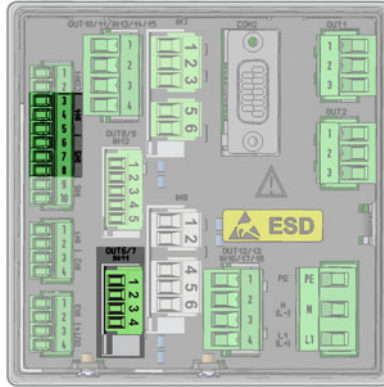
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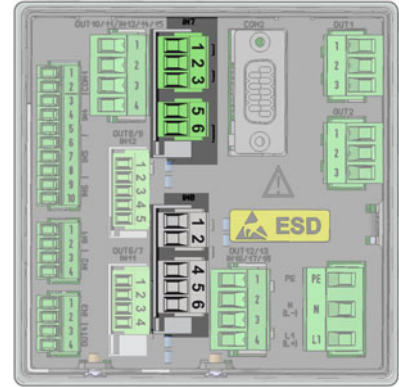
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DC ±5 V:  
OUT 8/9



Temperature inputs:  
IN 4/5/11



pH analysis inputs:  
IN 7/8

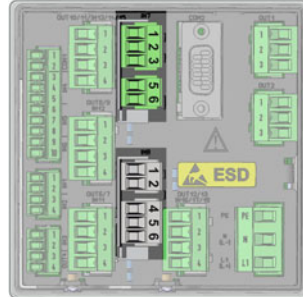
Slot	Option/connection variant	Wire (color) <sup>a</sup>	Potential	Terminal			Symbol		
				DC ±5 V <sup>b</sup>	Temperature input	Analysis input pH/redox			
						I		II	
IN 7 IN 8	ISFET-pH sensor	A (blue)	DC +5 V	3					
		B (black)	GND with jumper to F	4					
		C (green)	DC -5 V	5					
		D (white/black)	Ion-sensitive gate			1		1	
		E	Bypass			3		4	
		F (yellow)	Reference			5		5	
		G (white)	Compensation thermometer in 3-wire circuit						
		H (red)							
		I (red/black)							
<p>The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input.<sup>d</sup>          The connection terminal numbers are provided on the connection diagram for the selected analog input.</p>									

<sup>a</sup> The conductor colors listed refer to JUMO ISFET-pH sensors. The orange-colored conductor is not connected.  
<sup>b</sup> The optional board "Voltage supply output DC ±5 V, 24 V" (part no. 592963) is required for the voltage supply to the JUMO ISFET-pH sensor.  
<sup>c</sup> The connection diagram for the analog input concerned must be observed when connecting the temperature probe.  
<sup>d</sup> When connecting the temperature probe of the JUMO ISFET-pH sensor with process connection 615 (NTC 8k55), no customer-specific linearization is required as it is with the JUMO AQUIS 500 pH. The temperature input IN 5 supports the connection of 8k55-NTC temperature sensors.

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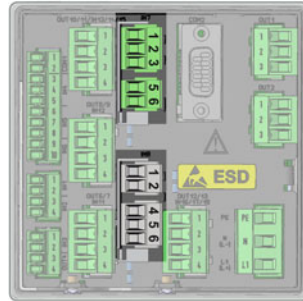
Slot	Option/connection variant	Symbol
IN 7 IN 8	<p>pH/Redox  <b>Asymmetric connection of a combination electrode</b>            Standard connection variant            For temperature compensation, a separate temperature sensor can be connected to an analog input.</p> <p>A = Glass/metal electrode            B = Reference electrode</p> <p>Terminal 2 is not connected!</p>	



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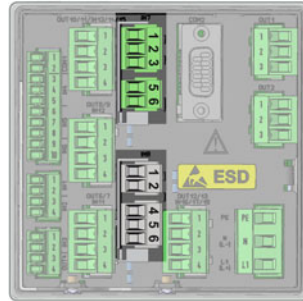


Slot	Option/connection variant	Symbol
IN 7 IN 8	<p>pH/Redox</p> <p><b>Asymmetric connection of a combination electrode with integrated RTD temperature probe and VarioPin terminal head</b></p> <p>The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input.</p> <p>A = Glass/metal electrode (core)            B = Reference electrode (inner shield)            C = Shield (outer shield)            D = RTD temperature probe            E = RTD temperature probe            F = RTD temperature probe</p> <p>Terminal 2 is not connected!</p>	

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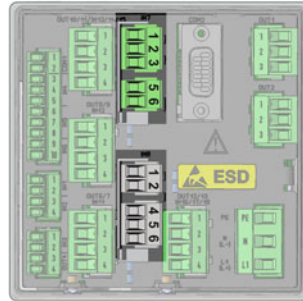


Slot	Option/connection variant	Symbol
IN 7 IN 8	<p>pH/Redox</p> <p><b>Symmetric connection of a combination electrode</b></p> <p>Symmetric connection is used to reduce interference from stray electromagnetic fields along the sensor cable.</p> <p>A = Glass/metal electrode (core)            B = Reference electrode (inner shield)            C = Liquid potential (grounding pin, pipe, or container wall at the measuring point)            D = Shield (outer shield)</p> <p>Terminal 2 is not connected!</p>	

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Slot	Option/connection variant	Symbol
IN 7 IN 8	<p>pH/Redox</p> <p><b>Symmetric connection of a combination electrode with integrated RTD temperature probe and VarioPin terminal head</b></p> <p>Symmetric connection is used to reduce interference from stray electromagnetic fields along the sensor cable.</p> <p>The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input.</p> <p>A = Glass/metal electrode (core)            B = Reference electrode (inner shield)            C = Liquid potential (grounding pin, pipe, or container wall at the measuring point)            D = Shield (outer shield)            E = RTD temperature probe            F = RTD temperature probe            G = RTD temperature probe</p> <p>Terminal 2 is not connected!</p>	

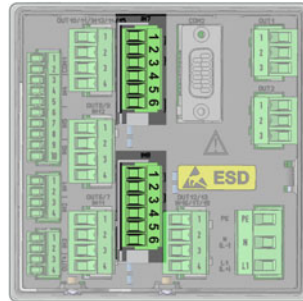
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**Analysis inputs for electrolytic conductivity**

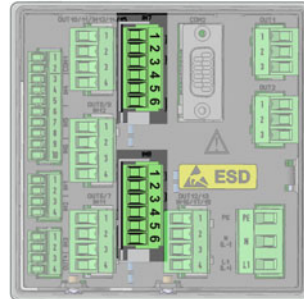


Slot	Option/connection variant	Symbol
IN 7 IN 8	<p>Ci optional board (inductive conductivity measurement)            Connection via M12 connector,            connect compensation thermometer connections            (2-core cable of connection socket) to a            suitable analog input (2-wire circuit),  <b>The factory-installed wiring must not be changed!</b></p>	
	<p>CR optional board (resistive conductivity measurement)            2-electrode system with 2-wire conductor            with concentric conductivity sensors, terminal 1 must be connected to the outer electrode.</p> <p>A = Outer electrode (core color for JUMO types with fixed cable: White)            B = Inner electrode (core color for JUMO types with fixed cable: Brown)            C = Shield</p>	

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Slot	Option/connection variant	Symbol
IN 7 IN 8	CR optional board (resistive conductivity measurement) 2-electrode system with 4-wire conductor (Wiring to minimize the measuring error caused by lead-wire resistance)  with concentric conductivity sensors, terminal 1 must be connected to the outer electrode.  A/B = external electrode C/D = Inner electrode E = shield	
	CR optional board (resistive conductivity measurement) 4-electrode system  A = Outer electrode 1 (I hi) (core color of CR-4P cable for JUMO types: Red) B = Inner electrode 1 (U hi) (core color of CR-4P cable for JUMO types: Gray) C = Inner electrode 2 (U lo) (core color of CR-4P cable for JUMO types: Pink) D = Outer electrode 2 (I lo) (core color of CR-4P cable for JUMO types: Blue) E = Shield	



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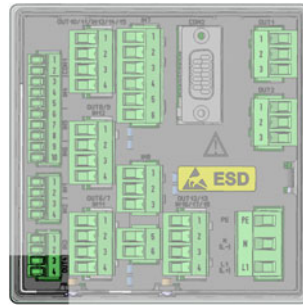
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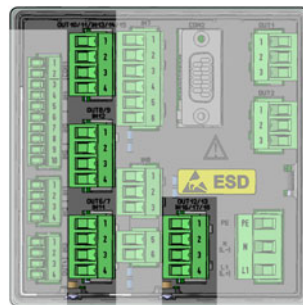
**Analog outputs**

**Base unit**



Connector/terminal	Connection variant	Symbol
OUT 4	analog output DC 0 to 10 V or DC 0(4) to 20 mA (configurable)	$\begin{array}{l} + \text{---} \text{---} \text{---} \text{---} \text{---} \circ 3 \\ U_x \\ - \text{---} \text{---} \text{---} \text{---} \text{---} \circ 4 \\ I_x \end{array}$

**Optional boards**



Slot	Option/connection variant	Symbol
OUT 6/7 OUT 8/9 OUT 10/11 OUT 12/13	analog output DC 0 to 10 V or DC 0(4) to 20 mA (configurable)	$\begin{array}{l} + \text{---} \text{---} \text{---} \text{---} \text{---} \circ 1 \\ U_x \\ - \text{---} \text{---} \text{---} \text{---} \text{---} \circ 2 \\ I_x \end{array}$

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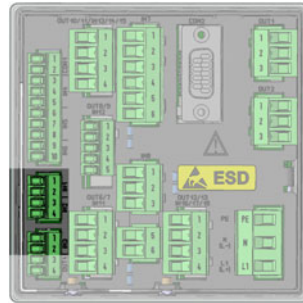
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**Binary inputs**

**Base unit**



Connector/ terminal	Connection variant	Wire	Potential	Terminal			Symbol	
				DC 24 V OUT 8/9 <sup>a</sup>	IN 1	IN 2		IN 3
IN 1 to 3	Digital input (potential-free contact)	A	Potential-free contact		1	3	1	
		W			2	4	2	
In the digital input configuration, the "Contact" option must be set to "Potential-free contact".								
	Digital input (logic signal)	A	Sensor +		1	3	1	
		W	Sensor -		2	4	2	
In the digital input configuration, the "Contact" option must be set to "Ext. voltage supply".								
	Digital input (NPN transistor switching output) <sup>b</sup>	A	Switching signal (collector)		1	3	1	
		W	Sensor -		2	4	2	
		C	Sensor +	1				
		D	Sensor -	2				
In the configuration of the binary input, the point "contact" must be set to "potential-free contact".								
	Digital input (PNP transistor switching output) <sup>b</sup>	A	Switching signal (collector)		1	3	1	
		W	Sensor -		2	4	2	
		C	Sensor +	1				
		D	Sensor -	2				
In the digital input configuration, the "Contact" option must be set to "Ext. voltage supply".								

<sup>a</sup> To provide power to the sensors at DC 24 V, the optional board for power supply voltage (Part No. 00592963) must be installed in the device.

<sup>b</sup> The connection variants for transistor switching outputs (NPN / PNP) are especially important for the flow measurement via impeller sensor (type 406020, parts no. 00525530, 00525531) at inputs IN 2 and IN 3 (pulse frequency inputs). However, alternative sensors with transistor switching output can also be connected.

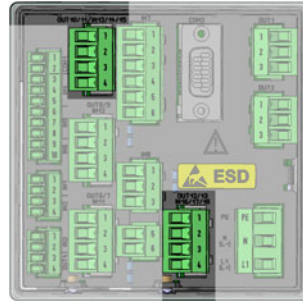
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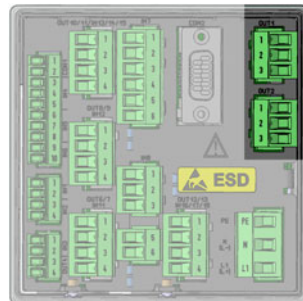
**Optional boards**



Connector/terminal	Connection variant	Symbol
IN 13/14/15 IN 16/17/18	3× binary input (potential-free contact)	

**Digital outputs**

**Power supply unit board**



Connector/terminal	Connection variant	Symbol
OUT 1 OUT 2	Relay Changeover contact	

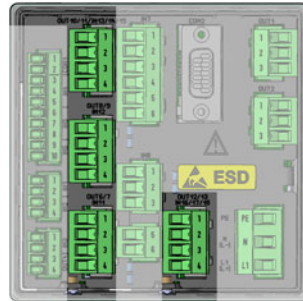
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**Optional boards**



Slot	Option/connection variant	Symbol
OUT 6/7 OUT 8/9 OUT 10/11 OUT 12/13	Relay Changeover contact	
	2x relay N/O contact <sup>a</sup>	
	Solid state relay triac 230 V/1 A	
	2x solid state relay PhotoMOS® 50 V/200 mA	
	Digital output 0/22 V	
	2x binary output 0/12 V	

<sup>a</sup> Combining a mains voltage circuit with a protective low-voltage circuit on a 2-way normally open contact option is not admissible.

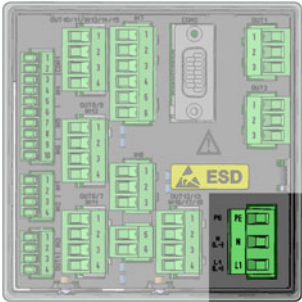
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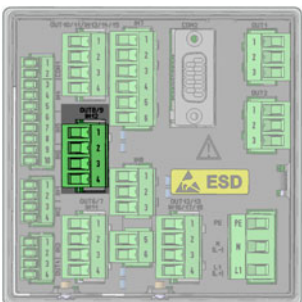


**Mains power connection**

		
Connector/terminal	Connection variant	Symbol
PWR IN	Mains power input	L1 ————○ L1  N ————○ N  PE ————○ PE

**Voltage supply outputs**

**Optional board**

		
Slot	Connection variant	Symbol
OUT 8/9	Voltage supply DC 24 V for external transmitters 24 V	+ ————○ 1 $U_{\pm}$ - ————○ 2
	Voltage supply DC $\pm 5$ V (e. g. ISFET sensors or digiLine)	+ ————○ 3 $U_{\pm}$ ⊥ ————○ 4 - ————○ 5

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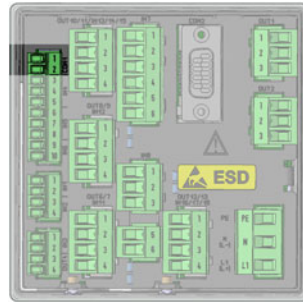
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**Interfaces**

**Base unit**





Connector/terminal	Connection variant	Symbol
COM 1	RS485	
	<p>Digital sensors</p> <p>For connection of a digiLine bus line to operate digital sensors, JUMO offers 5-wire M12 digiLine Master connecting cable. A total of up to 6 sensors with digiLine electronics and digital sensors from the product groups 2026xx can be operated over a digiLine bus. The voltage supplies of DC 5 V and DC 24 V for the sensors on the bus are provided by the voltage supply outputs on the device (optional board). When installing the bus cabling, heed the information regarding line length and number of sensors in the Annex of the operating manual for the JUMO AQUIS touch P.</p> <p>⇒ Chapter "Voltage supply outputs", page 33</p> <p>Connecting the M12 digiLine connecting cable:          A = Gray          B = Black          C = Brown          D = Blue          E = Blue (preassembled bridge for connecting the GND terminals for 5 and 24 V)          F = White          G = Shield (black with cable lug for connecting to the grounding)</p> <p>Note: Only 1 serial interface for digiLine can be used per device.</p>	

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USB device	USB device Type Mini-B (socket)	
USB host	USB host Type A (socket)	



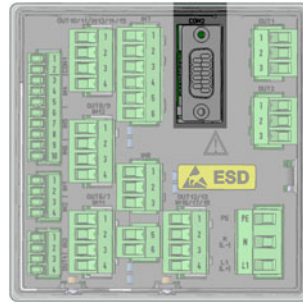
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**Optional boards**

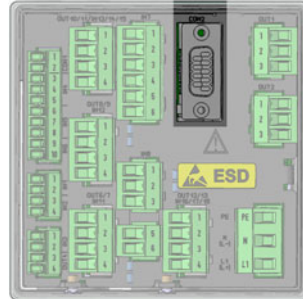


Slot	Connection variant	Terminating resistors	Symbol
COM 2	RS422	with terminating resistors	
	<p>The terminating resistors with DIP switches on optional boards Configurable</p>	without terminating resistors	
	<p>RS485</p> <p>The terminating resistors with DIP switches on optional boards Configurable</p>		
	<p>Digital sensors</p> <p>Connection to optional board: RS422/485 serial interface</p> <p>For connecting a digiLine bus line, 5-wire M12 digiLine Master connecting cable. The voltage supplies of DC 5 V and DC 24 V for the sensors on the bus are provided by the voltage supply outputs on the device (optional board). When installing the bus cabling, heed the information regarding line length and number of sensors in the Annex of the operating manual for the JUMO AQUIS touch P.</p> <p>⇒ Chapter "Voltage supply outputs", page 33</p> <p>Connecting the M12 digiLine connecting cable:          A = Gray          B = Black          C = Brown          D = Blue          E = Blue (preassembled jumper for connection of the GND terminals for 5 and 24 V)          F = White          G = Shield (black with cable lug for connecting to the grounding)</p>		

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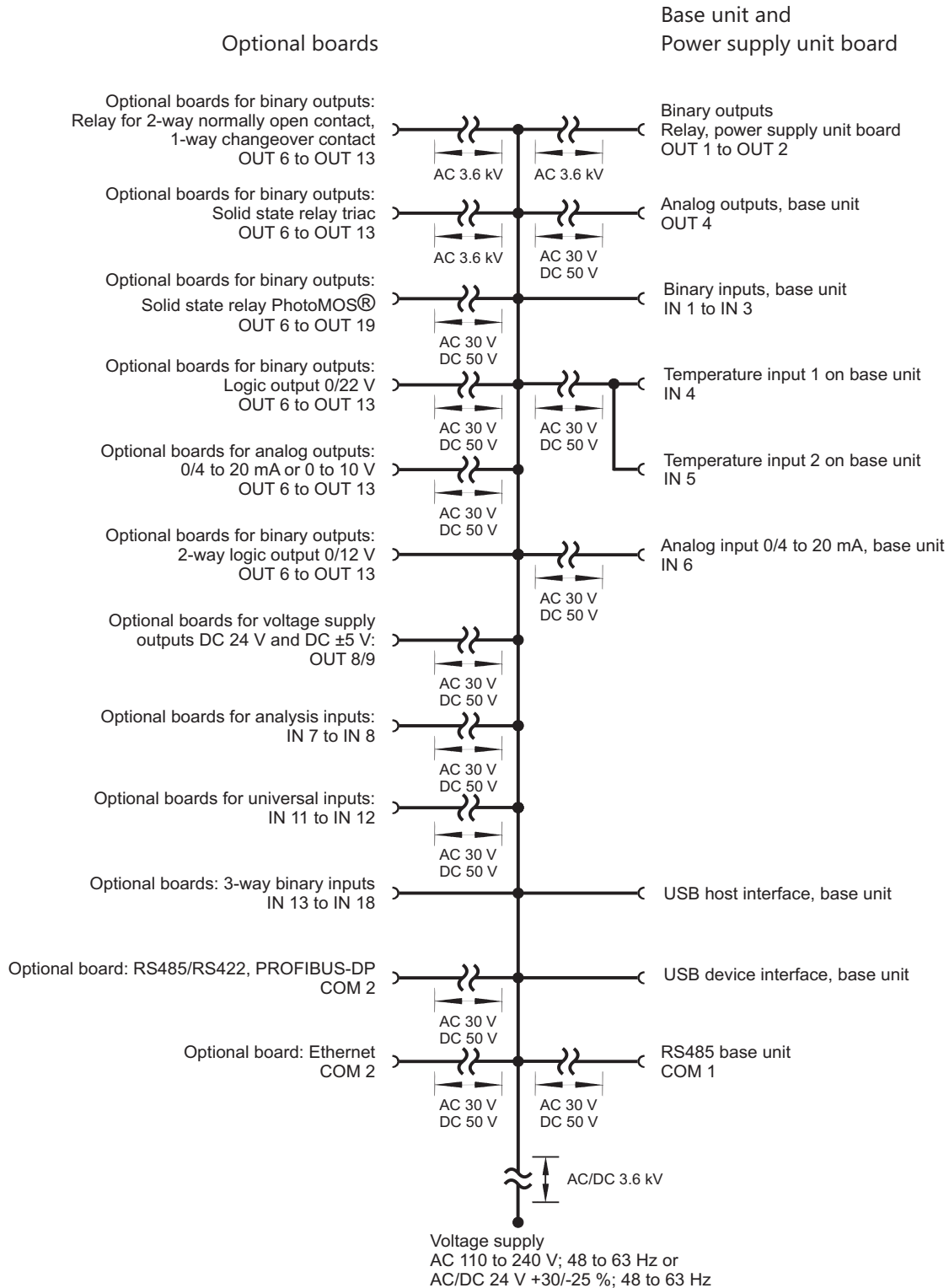
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Slot	Connection variant	Terminating resistors	Symbol
COM 2	PROFIBUS-DP 3 = RxD/TxD-P 5 = DGND 6 = VP 8 = RxD/TxD-N	-	
	Ethernet Type RJ 45 (socket)	-	



## Galvanic isolation



### Warning:

When sensors are operated at a digital input without galvanic separation, in the process being powered by an external power source, potential differences between the internal and external ground can lead to problems. Thus, it is preferable to take power from the power outputs of the JUMO AQUIS touch P.

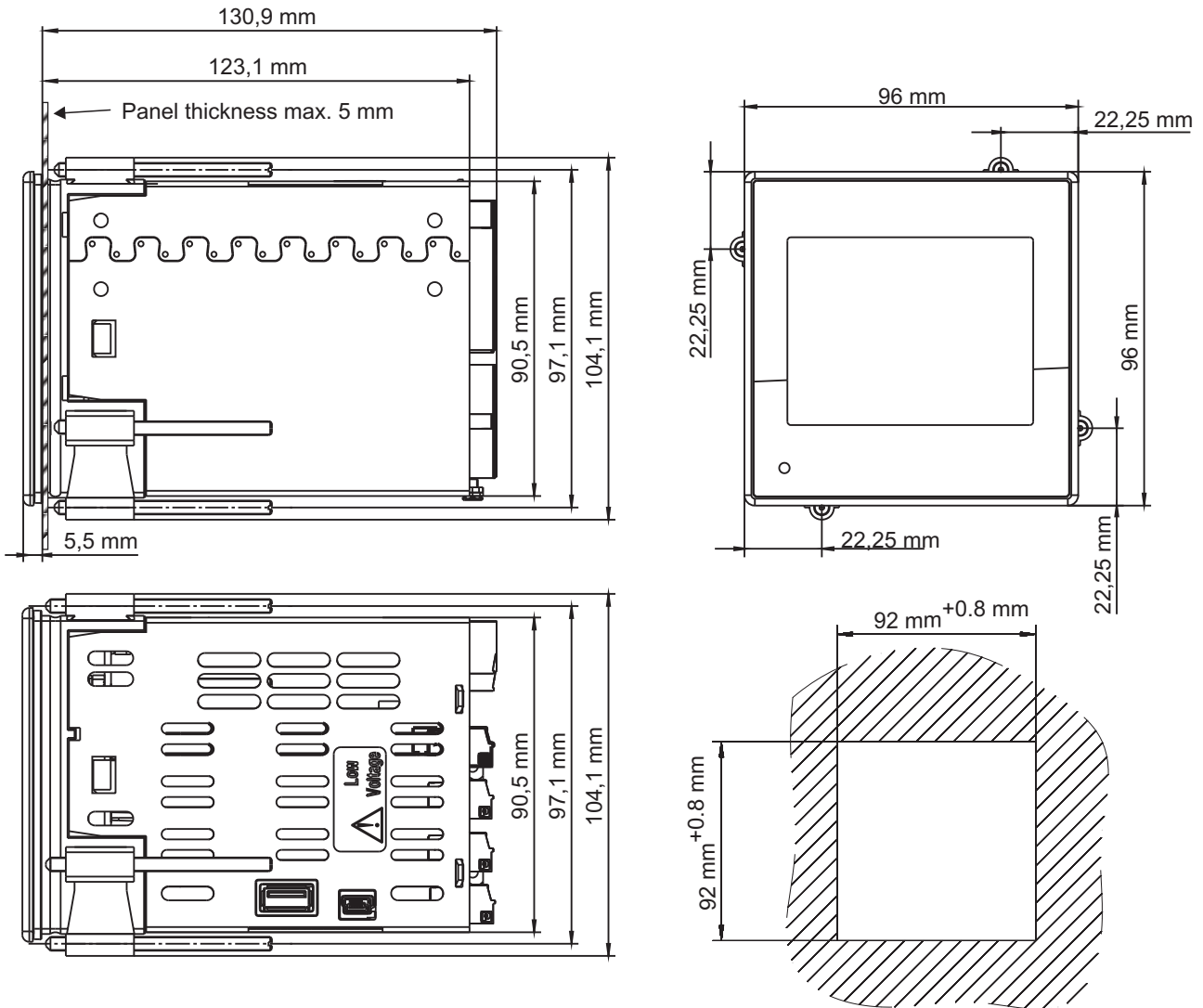
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## Dimensions



### Distances

For sufficient ventilation, the following installation distances to adjacent resources must be adhered to:

- horizontal 35 mm
- vertical 80 mm

When inserting the device, sufficient space for maneuvering the connecting cables must be left behind the case. A Ci-conductivity sensor is connected via a M12 connector adapter. This increases the space requirement with regard to installed depth (see following dimensional drawing).

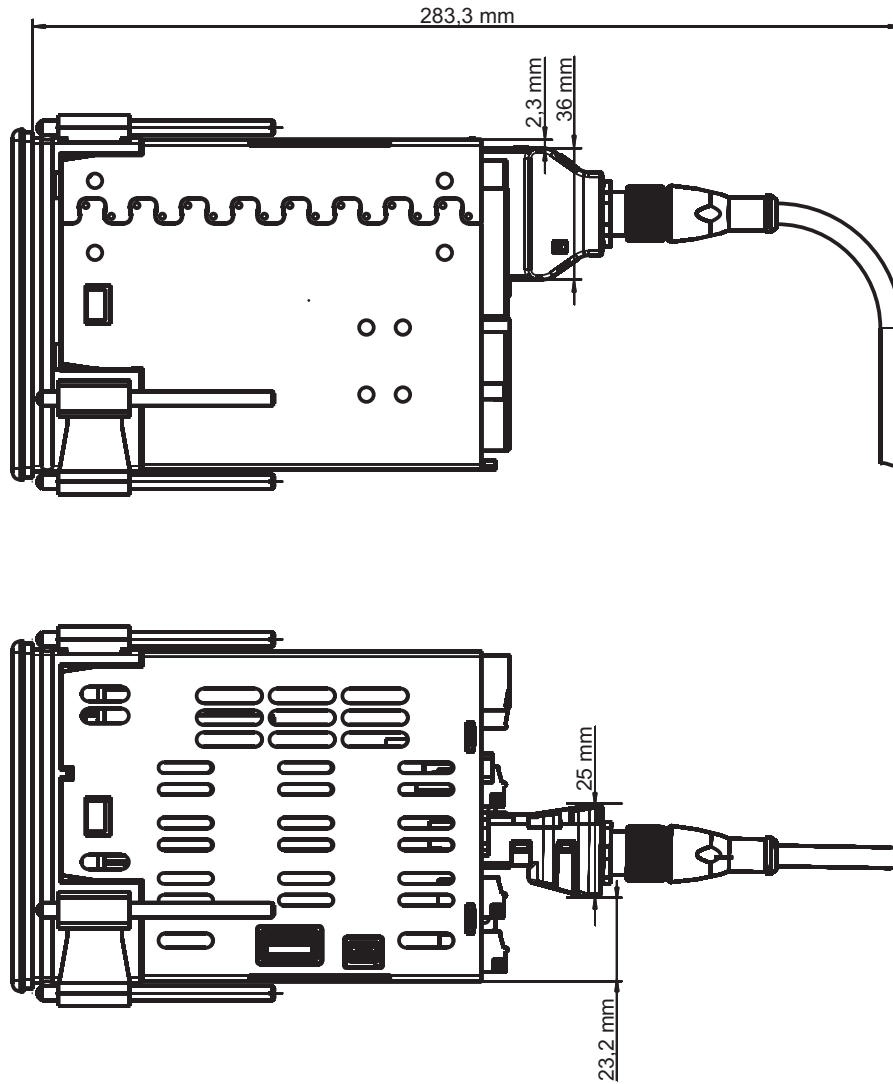
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Mounting depth with Ci-conductivity sensor



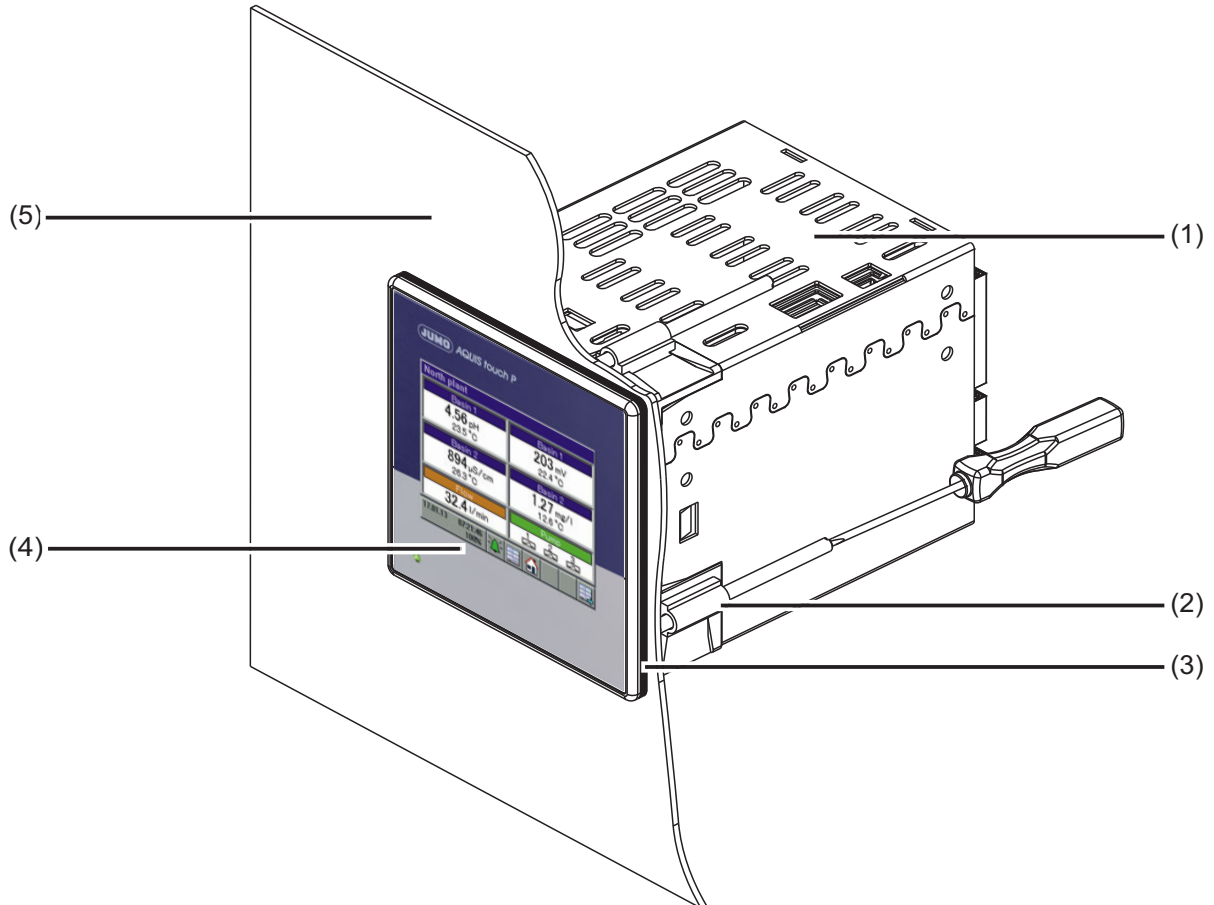
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## Mounting



- (1) Metal case barrel of the JUMO AQUIS touch P
- (2) Mounting elements
- (3) Seal from the scope of delivery for the device
- (4) Case front
- (5) Control panel/control cabinet door

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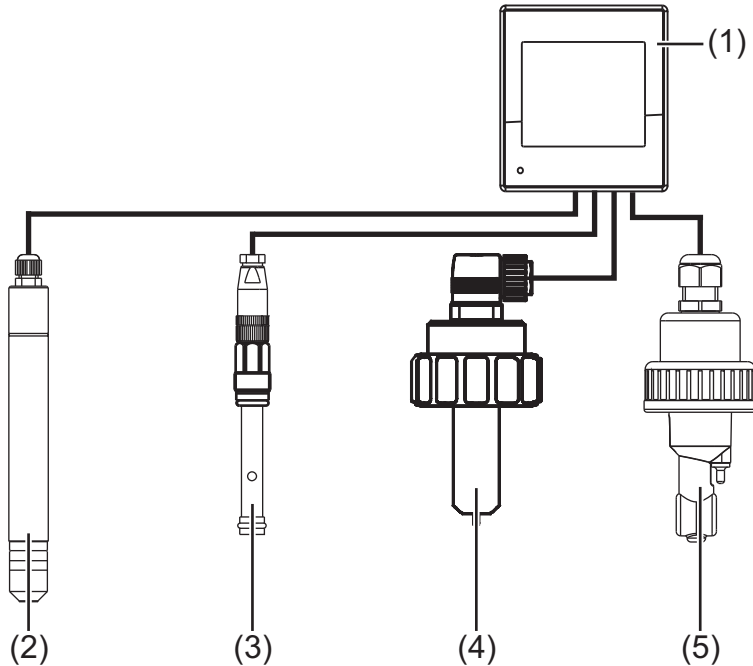
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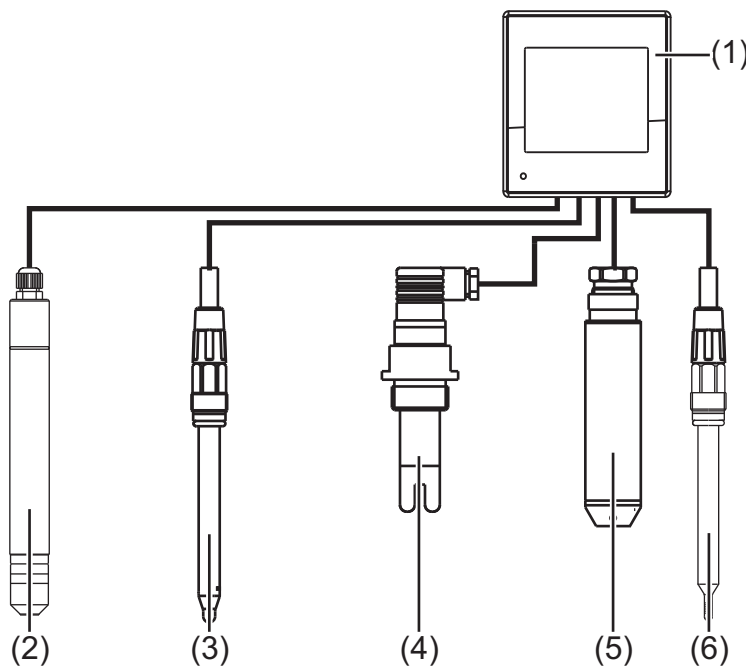
## Application examples

### Cooling tower control



- (1) JUMO AQUIS touch P
- (2) Chlorine electrode (tecLine)
- (3) Flow monitor
- (4) Impeller sensor for flow measurement, Type 406020
- (5) Conductivity sensor (inductive)

### Drinking water monitoring



- (1) JUMO AQUIS touch P
- (2) Chlorine electrode (tecLine)
- (3) pH-single rod measuring chain
- (4) Conductivity sensor (conductive)
- (5) Level probe
- (6) Compensation thermometer, type 201085

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**Order details**

		Slot
<b>(1) Basic type</b>		
202580	JUMO AQUIS touch P	
<b>(2) Version</b>		
8	Standard with default settings	
9	Customer-specific configuration (specification in plain text)	
<b>(3) National language</b>		
01	German	
02	English	
03	French	
<b>(4) Analysis input 1</b>		<b>IN 7</b>
0	Not used	
1	pH/redox/NH <sub>3</sub>	
2	CR resistive conductivity measurement (2 and 4-pole)	
3	Ci inductive conductivity measurement	
<b>(5) Analysis input 2</b>		<b>IN 8</b>
0	Not used	
1	pH/redox/NH <sub>3</sub>	
2	CR resistive conductivity measurement (2 and 4-pole)	
3	Ci inductive conductivity measurement	
<b>(6) Input/output 1</b>		<b>IN 11, OUT 6/7</b>
00	Not used	
10	Universal input	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	analog output	
17	2× solid state relay PhotoMOS®	
<b>(7) Input/output 2</b>		<b>IN 12, OUT 8/9</b>
00	Not used	
10	Universal input	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	analog output	
17	2× solid state relay PhotoMOS®	
19	Power supply output DC ±5 V, 24 V	
<b>(8) Input/output 3</b>		<b>IN 13/14/15, OUT 10/11</b>
00	Not used	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	analog output	
17	2× solid state relay PhotoMOS®	
18	3× digital inputs	



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<b>(9) Input/output 4</b>		<b>IN 16/17/18, OUT 12/13</b>
00	Not used	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	analog output	
17	2× solid state relay PhotoMOS®	
18	3× digital inputs	
<b>(10) Voltage supply</b>		
23	AC 110 to 240 V +10/-15 %; 48 to 63 Hz	
39	AC/DC 24 V +30/-25 %; 48 to 63 Hz	
<b>(11) Interface Com2</b>		<b>COM 2</b>
00	Not used	
08	Ethernet	
54	RS422/485 Modbus RTU	
64	PROFIBUS-DP	
<b>(12) Extra code</b>		
000	Without extra code	
213	Recording function	
214	Math and logic module	
962	JUMO digiLine protocol activated	

Order code:      (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12)  
 /  -  -  -  -  -  -  -  -  -  /  , ...<sup>a</sup>  
 Order example: 202580 / 8 - 01 - 1 - 2 - 10 - 10 - 13 - 13 - 23 - 64 / 213 , 214

<sup>a</sup> List all desired extra codes separated by commas.

## Scope of delivery

JUMO AQUIS touch P according to order details (including 4x fastening elements)
Panel seal
Mini-DVD with JUMO PC setup program as a Demo version, Adobe Acrobat Reader, operating instructions and technical data sheet in PDF format, GSD generator and JUMO PCC / PCA3000 as Demo version
Installation instructions in 2 volumes B 202580.4

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## Accessories

Order code	Type	Part no.
703571 (20258x)/10	Universal input	00581159
703571 (20258x)/213	Activation of the recording function	00581176
703571 (20258x)/214	Activate math and logic module	00581177
703571 (20258x)/11	Binary output relay (changeover contact)	00581160
703571 (20258x)/12	Binary outputs 2× relay (normally open contact)	00581162
703571 (20258x)/13	Solid state relay triac 230 V, 1 A	00581164
703571 (20258x)/14	Logic output 0/22 V	00581165
703571 (20258x)/15	2× logic output 0/12 V	00581168
703571 (20258x)/16	analog output	00581169
703571 (20258x)/17	Digital outputs 2× solid state relay PhotoMOS®	00581171
703571 (20258x)/54	Serial interface RS422/485 for Modbus RTU and digiLine	00581172
703571 (20258x)/64	PROFIBUS-DP	00581173
703571 (20258x)/08	Ethernet	00581174
20258x/3	Analysis input Ci for inductive conductivity	00584265
20258x/2	Analysis input CR for resistive conductivity	00584263
20258x/1	Analysis input pH/Redox/NH <sub>3</sub>	00584264
20258x/18	Digital inputs 3× potential-free contact	00592962
20258x/19	Voltage supply output DC ±5 V, 24 V	00592963
	USB flash drive 2.0 (2 GB) <sup>a</sup>	00505592
	USB cable, A-connector on mini B-connector, length 3 m	00506252
	JUMO PC setup program AQUIS touch P/P, (PG202599)	00594355
	JUMO PCA3000/PCC software package <sup>b</sup>	00431884

<sup>a</sup> The USB flash drive indicated has been tested and is designed for industrial applications. No liability is assumed for other brands.

<sup>b</sup> Communication and evaluation software for stored measurement data of the registration function.

## Notes on the trademark

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Microsoft® is a registered trademark of Microsoft Corp., Redmond Washington, US.

Silverlight® is a registered trademark of Microsoft Corp., Redmond Washington, US.