JUMO AQUIS touch S

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

Type 202581

Operating manual

b20.2581.0en

V1.00/EN/00596553

CAUTION!
If the device or a sensor connected to it fails abruptly, it is likely that a dangerous overdosage occurres!
For this case, appropriate precautionary measures must be taken.

NOTICE!
Read this operating manual before putting the device into service.
Keep the operating manual at a location that is readily accessible to all users.

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Content

1.1 Warning symbols

DANGER!
This symbol indicates that the risk of personal injury from electrocution exists if the appropriate precautionary measures are not taken.

WARNING!
In conjunction with the signal word "Warning", this symbol indicates that the risk of personal injury or death exists if the appropriate precautionary measures are not taken.

CAUTION!
In conjunction with the signal word "Caution", this symbol indicates that the risk of equipment damage or data loss exists if the appropriate precautionary measures are not taken.

CAUTION!
This symbol indicates that components of the device can be destroyed by electrostatic discharge (ESD = Electro Static Discharge) if the appropriate precautionary measures are not taken. When returning modules, assemblies, or components from the device, use only the ESD packaging provided.

READ THE DOCUMENTATION!
This symbol, which is attached to the device, indicates that the associated documentation for the device must be observed. This is necessary in order to recognize the nature of the potential danger and take the necessary measures to avoid it.

1.2 Indicative symbols

NOTE!
This symbol refers to **important information** about the product, its handling, or additional use.

REFERENCE!
This symbol refers to **additional information** in other sections, chapters, or other instructions.

DISPOSAL!
At the end of its service life, the device and any batteries present do not belong in the trash! Please dispose of them as required by regulations and in an **environmentally sound manner**.

1.3 Intended use

The JUMO AQUIS touch S is designed for measurement, control, and automation tasks in industrial environments as specified in the technical data. Use for any other purpose is considered contrary to the intended use.

⇨ Chapter 20 "Technical data", Page 311

The device has been manufactured in compliance with applicable standards and guidelines as well as applicable safety regulations. Improper use can result in personal injury or property damage.

To avoid risks, the device may be used only as follows:

- For the intended use
- when in good order and condition
- when taking into account the technical documentation provided

Risks resulting from the application may arise, e.g. as the result of missing safety provisions or wrong settings, even when the device is used properly and as intended.

1.4 Qualification of personnel

This document contains the information required to ensure use of the device as intended. It is meant for technically qualified individuals who have been specially trained and have the appropriate know-how in the field of automation technology (measurement and control instrumentation).

Understanding and technically correct observance of the safety instructions and warnings contained in the supplied documentation are prerequisites for safe mounting, installation, and commissioning as well as safety during operation.

Only qualified individuals have the required technical knowledge to interpret and put into practice the safety instructions and warnings used in this documentation in any given situation.

2.1 Checking the delivery

- ensure that the packaging and its contents are undamaged
- check the delivery for completeness against the packing slip and order confirmation
- inform the supplier immediately if there is any damage
- retain damaged parts until the situation has been clarified with the supplier

2.2 Important information about storage and transport

- store the device in a dry, clean environment
- observe the permissible ambient conditions,
  ⇨ Chapter 20 "Technical data", Page 311
- protect the device from shock during transport
- the original packaging offers optimal protection for storage and transport

2.3 Returning goods

- if repairs are needed, return the device in clean condition and in its entirety
- use the original packaging when returning the device

2.3.1 Accompanying letter for repair

Please include the completed accompanying letter for repair when returning goods. Do not forget to state the following:

- Description of the application
- Description of the error that has occurred

The accompanying letter for repair is linked to **www.jumo.de** on the Internet under the heading **Service & Support** as follows:

Product Service ➔ Repair Service ➔ Returning a device

2.3.2 Protection against electrostatic discharge (ESD)

CAUTION!
Electrostatic charges occur in non-ESD-protected environments.
Electrostatic discharge can damage assemblies or components.
For transport purposes, use only the ESD packaging provided.

To prevent damage from ESD, electronic assemblies, or components with a high internal resistance must be handled, packaged, and stored in an environment that protects against ESD. Measures that protect against electrostatic discharge and electric fields are described in DIN EN 61340-5-1 and DIN EN 61340-5-2 "Electrostatics – Part 5-2 – Protection of electronic devices from electrostatic phenomena".

When sending back electronic assemblies or components, please note the following:

- Pack sensitive components only in an environment providing protection against ESD. Such workplaces conduct existing electrostatic charges to ground in a controlled manner and prevent electrostatic charge buildup due to friction.
- Use only packaging intended specifically for ESD-sensitive assemblies/components. These must be made from conductive plastics.

No liability is assumed for damage caused by electrostatic discharge (ESD).

2.4 Disposal

DISPOSAL!
At the end of its service life, the device and any replaced parts do not belong in the trash. These items are made from materials that can be reclaimed through "recycling".

Dispose of the device and the packaging material as required by regulations and in an environmentally sound manner!

The country-specific laws and regulations for handling and disposing of waste must be observed!

Disposing of the packaging material

All packaging material is recyclable.

3.1 Brief description

Trade fairs

The JUMO AQUIS touch S provides a central platform for the display and processing of pH value, Redox voltage, electrolytic conductivity, resistance of high-purity water and temperature as well as 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 rate measurement. Universal inputs can be used to measure almost any analog measurands using standard signals (4 to 20 mA or 0 to 10 V). The unit can measure and manage up to 19 parameters simultaneously.

Controlling

In addition to numerous simple alarm, limit value or timed switching functions, up to 4 higher-level, simultaneous control loops can be defined in the JUMO AQUIS touch S. These make use of the time-tested JUMO control algorithms for P, PI, PD, and PID control.

Display

A 5.5" touch-sensitive color screen is responsible for display of all parameters as well as operation and device settings. The plain text operating philosophy simplifies operation of the device by the user. German, English and, on request, French are included in the device at the factory as selectable user interface languages.

⇨ Chapter 4.2 "Order details", Page 22

Using the PC setup program, the language library of the unit can be expanded to as many as 15 languages. It's also possible to display languages that use Chinese and Cyrillic characters. The device is thus predestined for use around the world.

Recording

A paperless recorder is incorporated to record data. Up to 8 analog quantities and 6 binary signals are registered and displayed on the screen in a time-dependent curve. Storage is tamperproof and facilitates compliance with governmental recording obligations. The data can be read out using the JUMO PCC software or to a USB flash drive for evaluation by the JUMO PCA 3000 PC evaluation software.

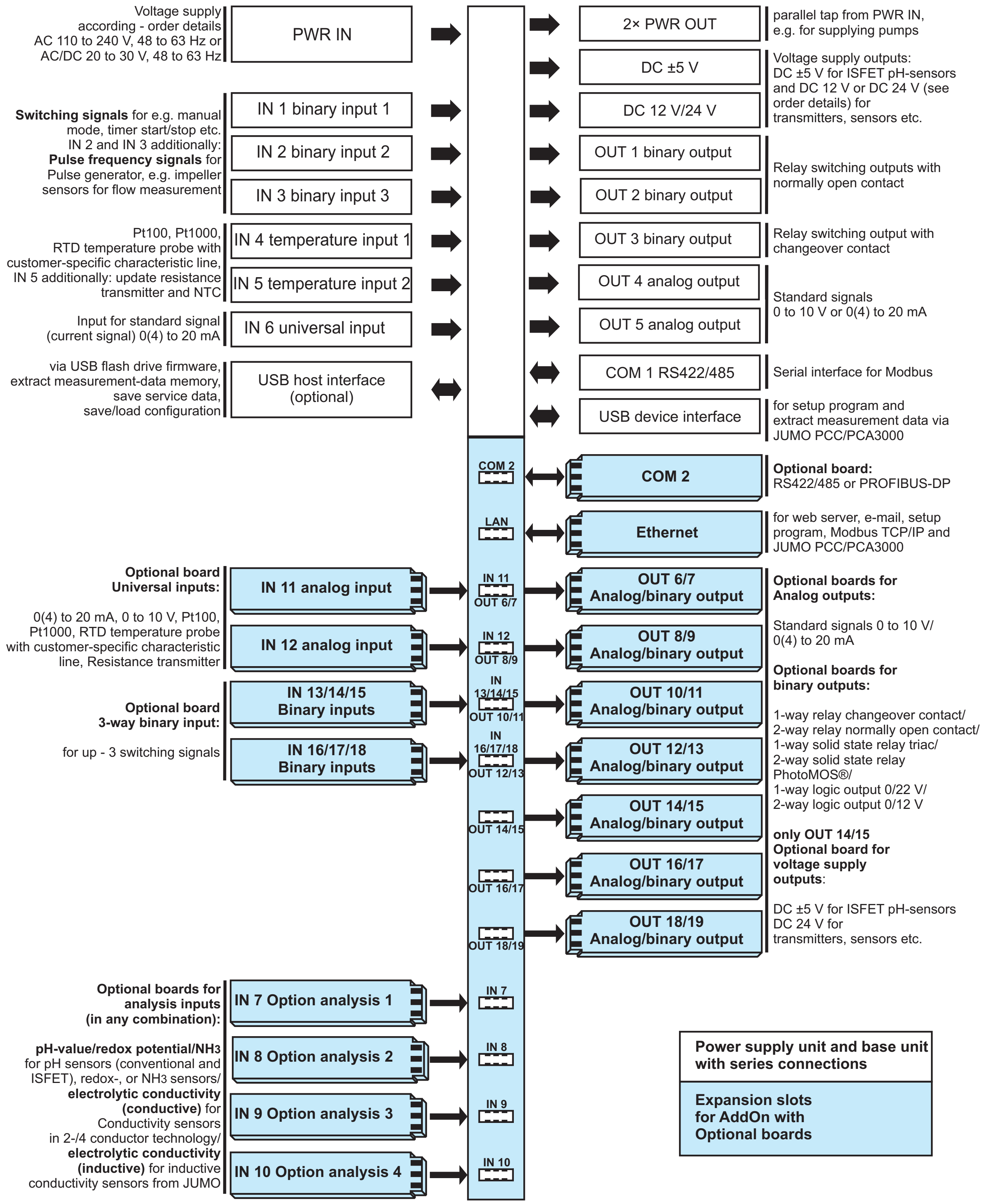
Application examples

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

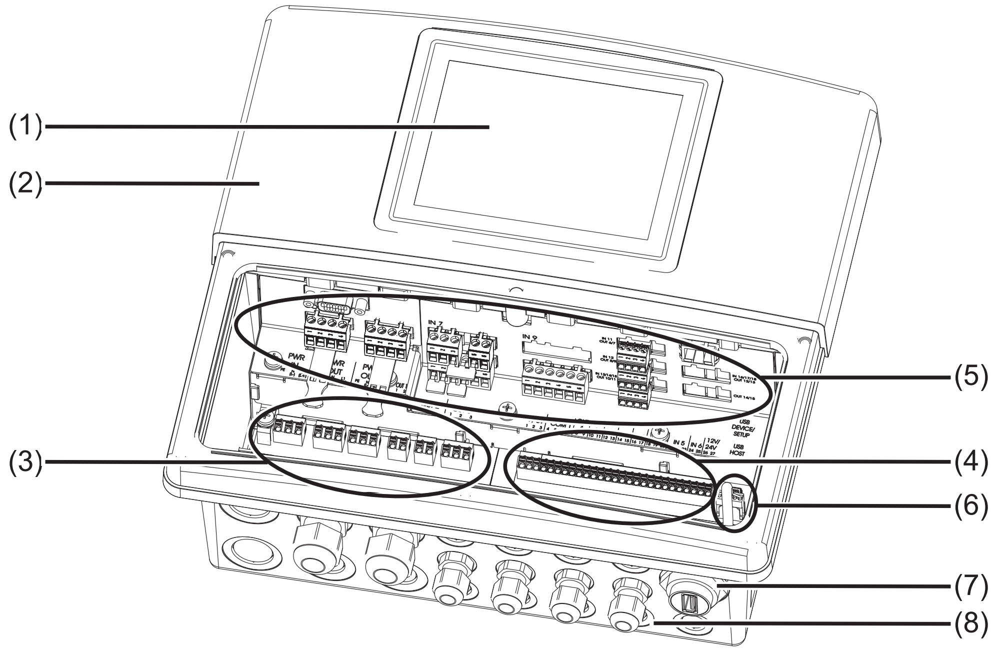
- Municipal and industrial water treatment in wastewater treatment plants
- Process systems
- Drinking and bathing water monitoring
- Pharmaceutical water
- Food and beverage production (CIP/SIP plants)
- Gas scrubbers / air washers
- Cooling tower control
- Ion exchangers
- RO-units (reverse osmosis)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

NOTE!
The device is not suitable for use in a potentially explosive atmosphere.

3.2 Block diagram



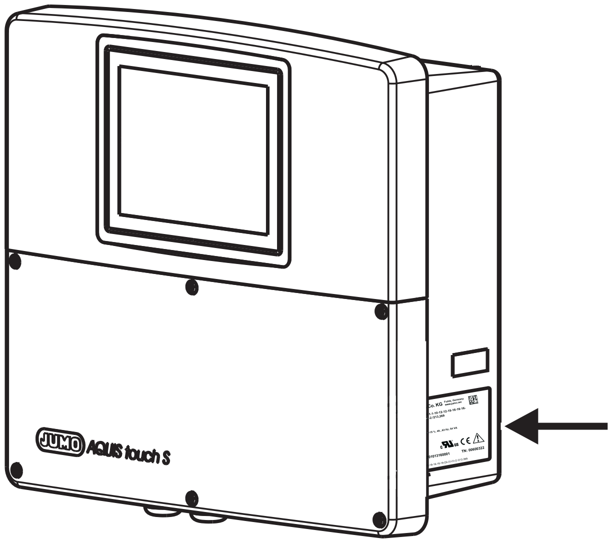
3.3 Device setup



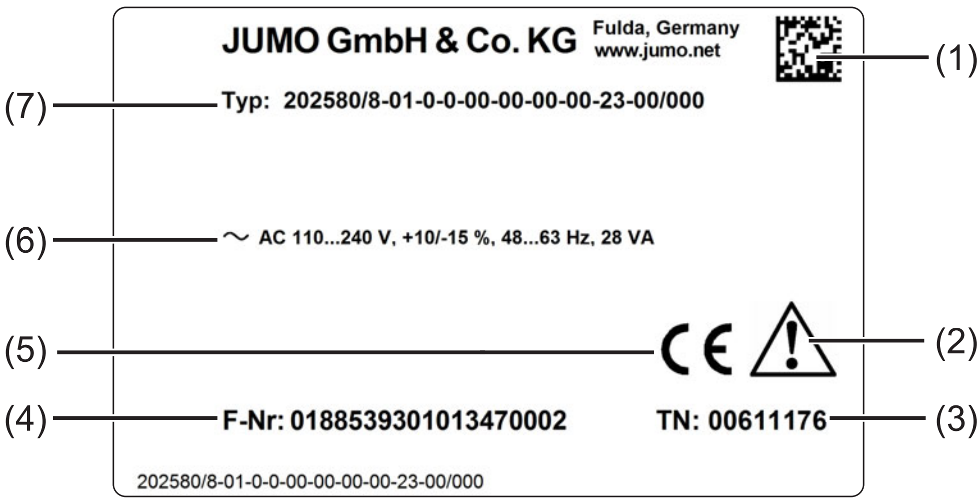
(1) TFT-touchscreen
(2) Case (terminal compartment cover opened)
(3) Connection terminals, power supply unit
(4) Connection terminals, base unit
(5) Expansion slots
(6) USB interfaces (USB device interface and connection for optional USB host socket)
(7) USB host socket, IP67 (also available, see Extra Code 269 Chapter 4.2 "Order details", Page 22)
(8) Cable fittings

4.1 Nameplate

The nameplate on the device enclosure identifies the device version. It is located on the outside of the enclosure on the right.



Example of a nameplate



(1) Data matrix code
(2) Information symbol (Read documentation!
⇨ Chapter 1.1 "Warning symbols", Page 13
(3) Part number
(4) Serial number
(5) Approval mark
(6) Voltage supply
(7) Type key

It is helpful to become familiar with the technical features of the device prior to commissioning. Compare the type code on the nameplate with the order details.
⇨ "Order details", page 22
In the event of technical questions, please have the information from the nameplate available for the customer service representative.

4.2 Order details

NOTE!
In addition to the standard languages of German, English, and French, 13 additional languages (e.g. Russian, Chinese, Italian etc.) are available. Please use the contact information on the back of this manual to contact JUMO in this regard.

			Slot
	(1)	**Basic type**	
202581		JUMO AQUIS touch S	
	(2)	**Version**	
8		Standard with default settings	
9		Customer-specific configuration (specification in plain text)	
	(3)	**Language**	
01		German	
02		English	
03		French	
	(4)	**Analysis input 1**	**IN 7**
0		Not used	
1		pH/Redox/NH_3	
2		CR resistive conductivity measurement (2 and 4-pole)	
3		Ci inductive conductivity measurement	
	(5)	**Analysis input 2**	**IN 8**
0		Not used	
1		pH/Redox/NH_3	
2		CR resistive conductivity measurement (2 and 4-pole)	
3		Ci inductive conductivity measurement	
	(6)	**Analysis input 3**	**IN 9**
0		Not used	
1		pH/Redox/NH_3	
2		CR resistive conductivity measurement (2 and 4-pole)	
3		Ci inductive conductivity measurement	
	(7)	**Analysis input 4**	**IN 10**
0		Not used	
1		pH/Redox/NH_3	
2		CR resistive conductivity measurement (2 and 4-pole)	
3		Ci inductive conductivity measurement	
	(8)	**Input/output 1**	**IN 11, OUT 6/7**
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®[a]	
(9)	**Input/output 2**	**IN 12, OUT 8/9**
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× PhotoMOS®[a] solid-state relays	
(10)	**Input/output 3**	**IN 13/14/15, OUT 10/11**
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× PhotoMOS®[a] solid-state relays	
18	3× digital inputs	
(11)	**Input/output 4**	**IN 16/17/18, OUT 12/13**
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× PhotoMOS®[a] solid-state relays	
18	3× digital inputs	
(12)	**Output 5**	**OUT 14/15**
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× PhotoMOS®[a] solid-state relays	
19		Supply voltage output ±5 V DC, 24 V	
	(13)	**Output 6**	**OUT 16/17**
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× PhotoMOS®[a] solid-state relays	
	(14)	**Output 7**	**OUT 18/19**
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× PhotoMOS®[a] solid-state relays	
	(15)	**Voltage supply**	
23		AC 110 to 240 V +10/-15%; 48 to 63 Hz	
25		AC/DC 20 to 30 V; 48 to 63 Hz	
	(16)	**Interface Com2**	**COM 2**
00		Not used	
54		RS422/485 Modbus RTU	
64		PROFIBUS-DP	
	(17)	**Interface Com3**	**LAN**
00		Not used	
08		Ethernet	
	(18)	**Voltage output**	
1		DC 12 V	
2		DC 24 V	
	(19)	**Extra codes**	
000		None	
213		Recording function	
214		Math and logic module	
269		USB host socket (IP67)	

[a] PhotoMOS® is a registered trademark of Panasonic.

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)		(11)	
Order code:		/		-		-		-		-		-		-		-		-		-		-
Order example:	202581	/	8	-	01	-	1	-	2	-	0	-	0	-	10	-	10	-	13	-	13	-

(12)		(13)		(14)		(15)		(16)		(17)		(18)		(19)		
	-		-		-		-		-		-		/		,	...[a]
11	-	11	-	11	-	23	-	64	-	00	-	1	/	213	,	214

[a] List all desired extra codes separated by commas.

Scope of delivery

JUMO AQUIS touch S according to order details
Mini-DVD with JUMO PC setup program as demo version, Adobe Acrobat Reader, operating manual and data sheet in PDF format, GSD generator and JUMO PCC / PCA 3000 as demo version
Accessories kit JUMO AQUIS touch S part no. 00597460
Mounting plate for surface mounting part no. 00597799
Installation instructions in 2 volumes B 202581.4

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 outputs 0/12 V	00581168
703571 (20258x)/16	Analog output	00581169
703571 (20258x)/17	Digital outputs 2× solid state relay PhotoMOS®[a]	00581171
703571 (20258x)/54	Serial interface RS422/485 for Modbus RTU	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_3	00584264
20258x/18	Digital inputs 3× potential-free contact	00592962
20258x/19	Voltage supply output DC ±5 V, 24 V	00592963
202581/269	USB host socket (IP67)	00608741
	Ethernet RJ-45 connector for self-assembly (4-pole) (PG209791)	00594813
	USB flash drive 2.0 (1 GB)[b]	00505592
	USB cable, A-connector to Mini-B connector, length 3 m	00506252
	Full configuration kit, cable fittings	00597461
	Panel mounting kit	00602403
	Pipe-mounted kit	00602401
	Protective roof kit	00602404
	JUMO PC setup program AQUIS touch S/P, (PG202599)	00594355
	JUMO PCA3000/PCC software package[c]	00431884

[a] PhotoMOS® is a registered trademark of Panasonic.
[b] The USB flash drive indicated has been tested and is designed for industrial applications. No liability is assumed for flash drives from other manufacturers.
[c] Communication and evaluation software for stored recording function measurement data

5.1 Important information

DANGER!
Under no circumstances may the device be installed or removed while under voltage! This poses the risk of electrocution.
Switch-off the entire system beforehand. This work must be performed only by qualified personnel!
The device must never be installed in potentially-explosive areas! There is the risk of an explosion.

Mounting site

When determining the mounting site, it is important to ensure that the device specifications are respected. The relevant tables with device specification data can be found in the chapter entitled "Technical data" . The device must not be exposed to severe oscillations or continuous vibrations. Electromagnetic fields caused by equipment such as motors or transformers must be avoided!
Direct heat radiation, in particular sunlight causes, due to protection rating IP67, the inside of the case to heat up and can damage the device. The customer must ensure that the device is not exposed to direct sunlight.

Climatic conditions

The ambient temperature and the relative humidity at the mounting site must correspond to the technical data.

⇨ Chapter 20 "Technical data", Page 311

Installation position

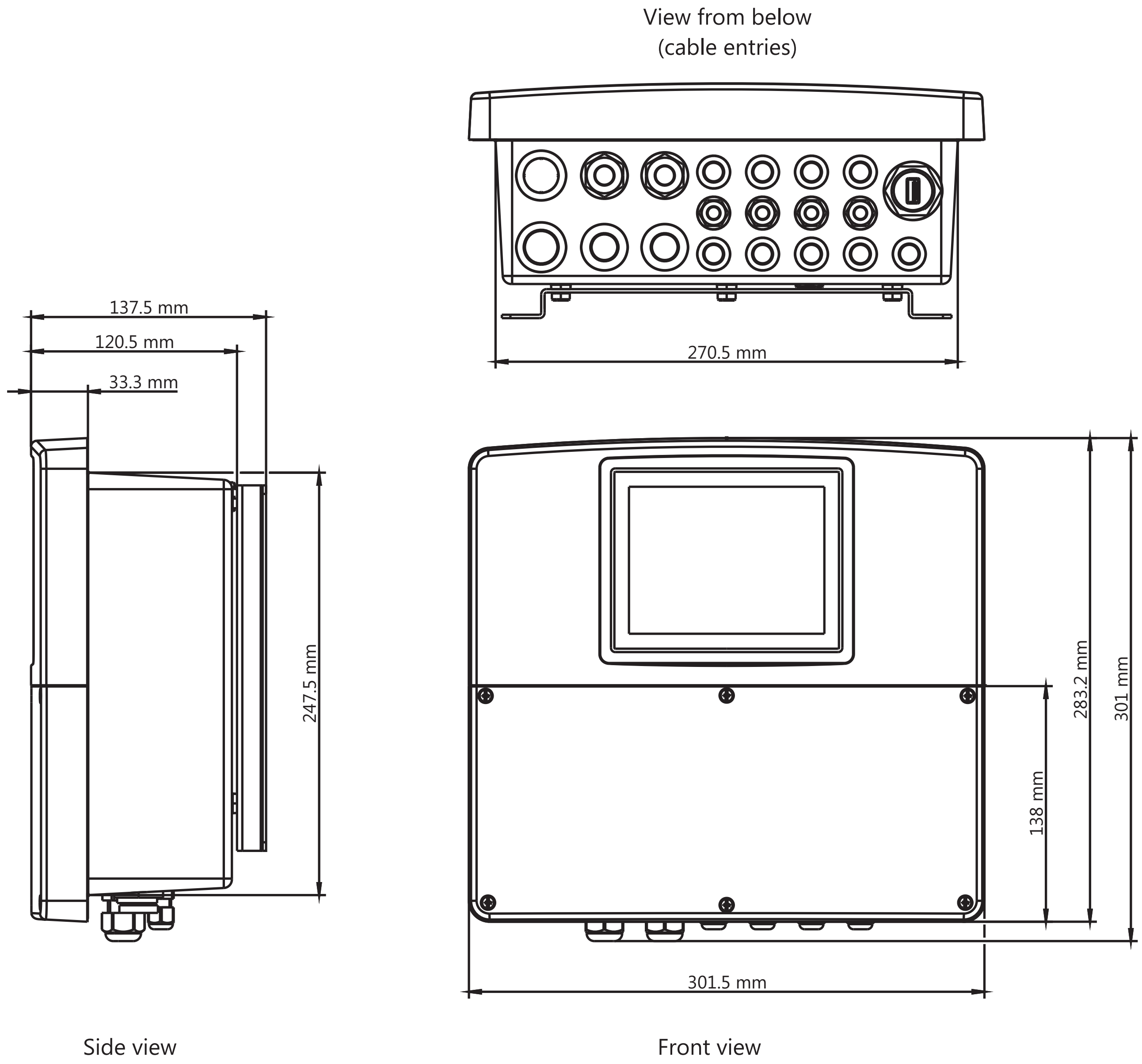
The device can be installed in any position. However, the viewing angle of the TFT touchscreen should be taken into consideration.

⇨ Chapter 20 "Technical data", Page 311

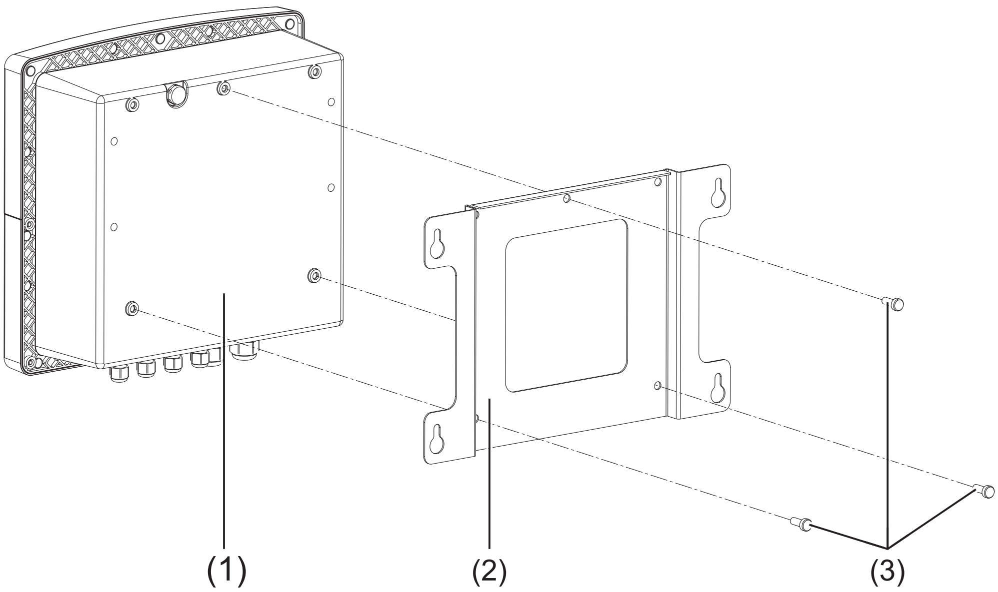
Space requirement

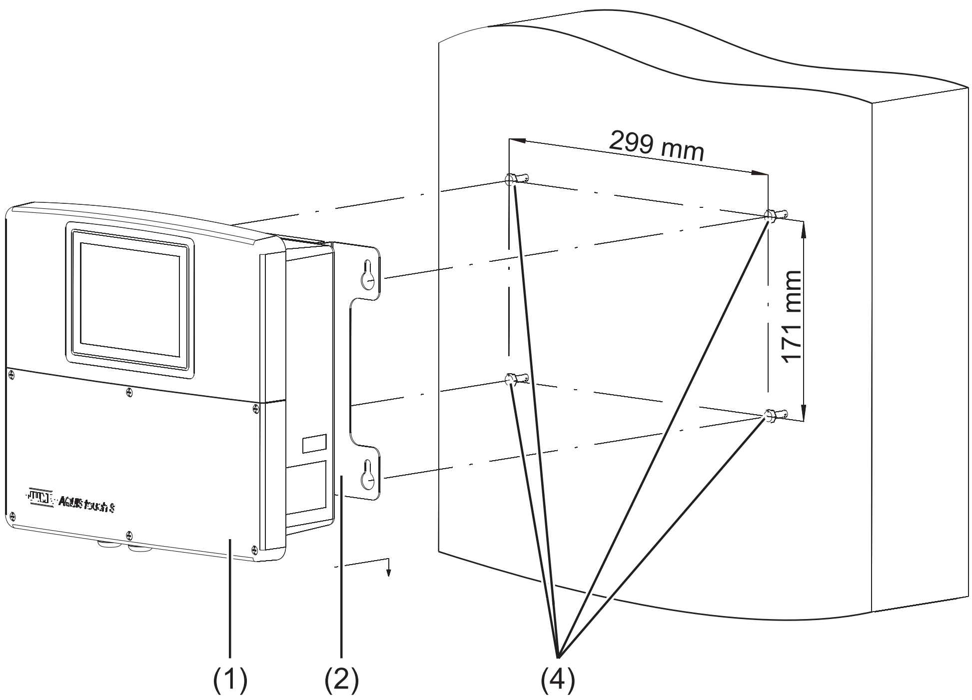
Ensure adequate access to the region around the cable entry points. The minimum bending radius of the cables must be taken into account!

5.2 Dimensions



5.3 Surface mounting

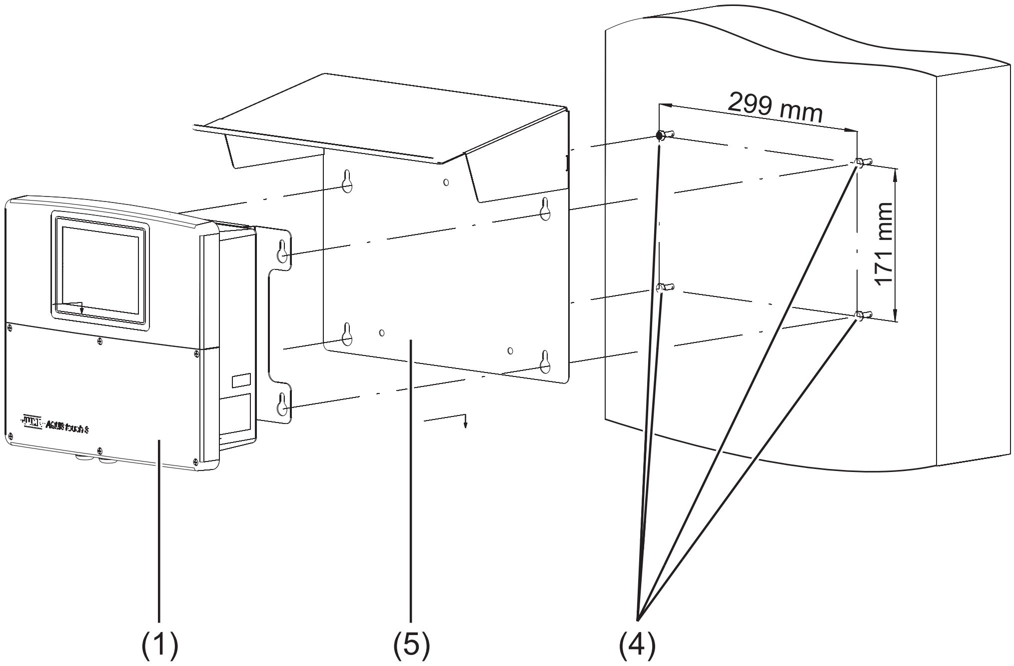




(1) JUMO AQUIS touch S
(2) Mounting plate for surface mounting
(3) Self-tapping screws 60 × 16 TORX PLUS®[a] 30IP (supplied as standard with the JUMO AQUIS touch S)
(4) Fastening screws (hex-headed screws Ø 6 mm)

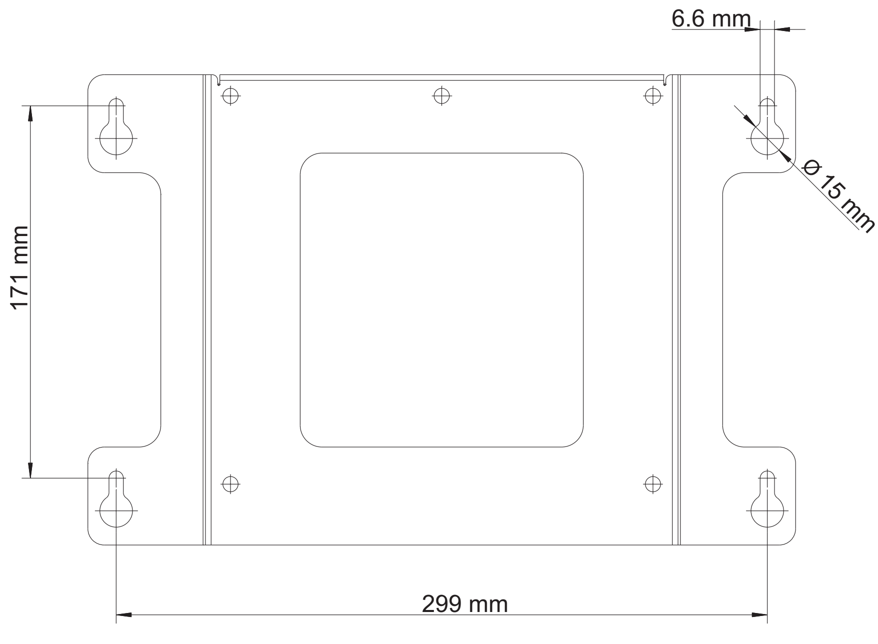
[a] TORX PLUS® is a registered trademark of Acument Intellectual Pro-perties, LLC. USA.

5 Mounting



(1)	JUMO AQUIS touch S
(4)	Fastening screws (hex-headed screws Ø 6 mm)
(5)	Weather protection canopy, stainless steel 1.4301 (part no. 00602404)

Drilling diagram

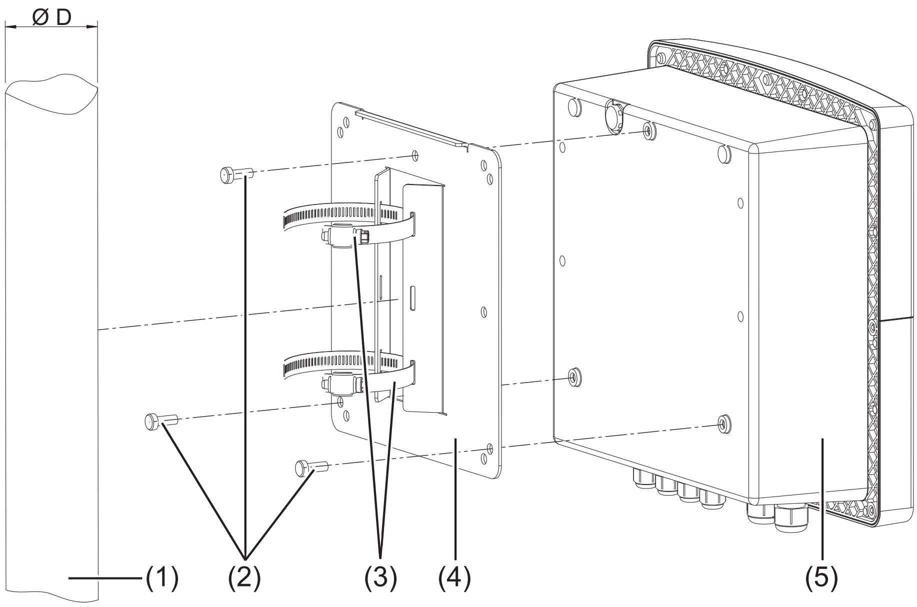


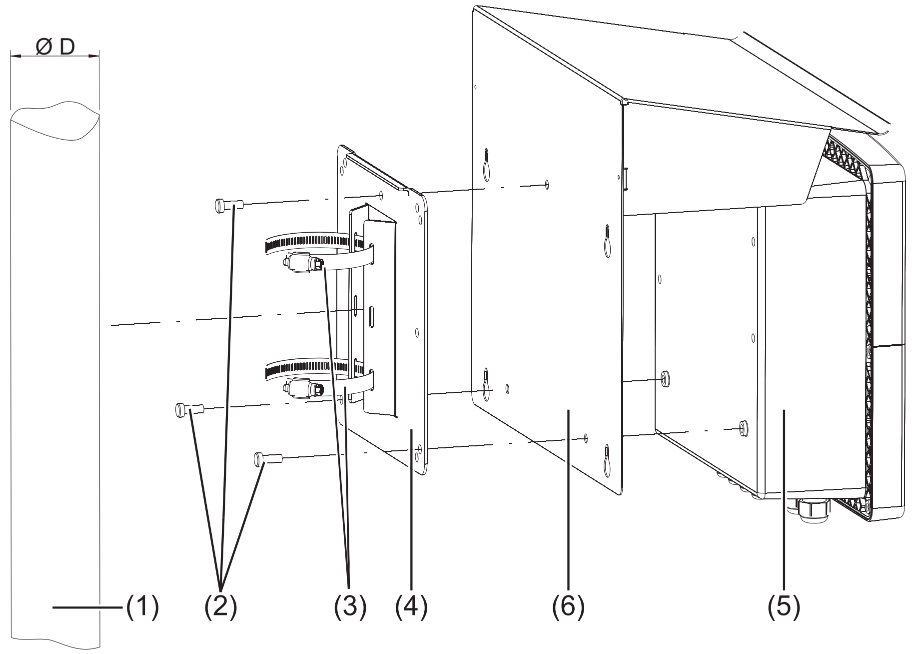
Procedure

Step	Action
1	Use the drilling diagram to mark the mounting holes on the mounting surface. You can also use the mounting plate as a template for this purpose. Leave enough space around the cable entries to permit routing of cables.
2	Use suitable fastening screws (4) in order to ensure that the screw heads are at a distance of about 1 cm from the mounting surface.
3	Using the screws (3), fasten the mounting plate (2) to the the back of the unit (1).
4	Hook the device (1) and where applicable the weather protection canopy (5) with the mounting plate into the screws.
5	Tighten the fastening screws.

5.4 Pipe mounting

The optional pipe mounting kit (part no. 00602401) is needed for pipe mounting. A weather protection canopy (part no. 00602404) is also available.





(1)	Pipe/mast (customer provision) with a diameter of 35 to 55 mm
(2)	Self-tapping screws 60 × 16 TORX PLUS®[a] 30IP (supplied as standard with the JUMO AQUIS touch S)
(3)	Pipe clips from the pipe mounting kit (part no. 00602401)
(4)	Mounting plate for pipe mounting from the pipe mounting kit (part no. 00602401)
(5)	JUMO AQUIS touch S
(6)	Weather protection canopy, stainless steel 1.4301 (part no. 00602404)

[a] TORX PLUS® is a registered trademark of Acument Intellectual Pro-perties, LLC. USA.

Procedure

Step	Action
1	Using the screws (2), fasten the mounting plate (4) and possibly the weather protection canopy (6) to the right side of the unit (5).
2	Insert the two pipe clips (3) through the slots in the mounting straps on the mounting plate (4) as shown in the drawing.
3	Place the device on the pipe/mast (1) such that the pipe clips (3) enclose the pipe; close the pipe clips (3) and tighten them.

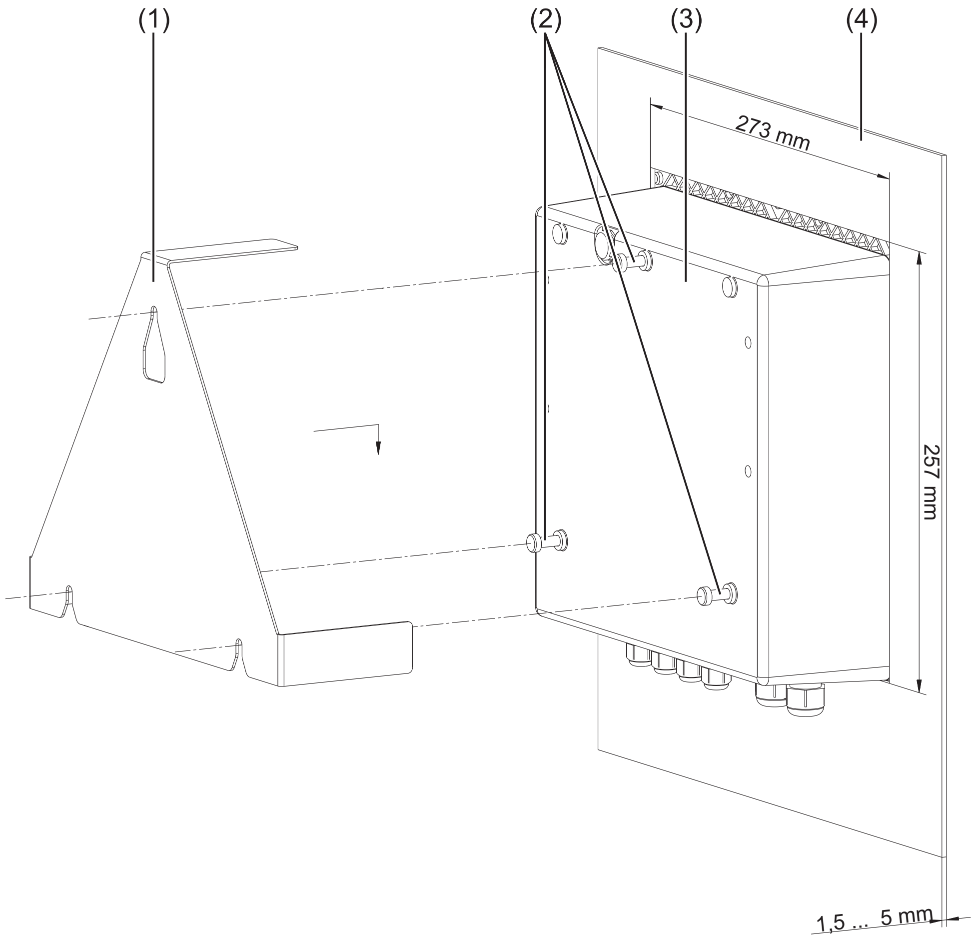
5.5 Panel installation

The optional panel mounting kit (part no. 00602403) is needed for installation in a control panel.

Using this kit, the device can be installed in control panels or machine/equipment panels, for instance, and fastened from behind. When installed in this way, the lines connecting to the device are protected behind the panels.

NOTE!
Installation in a control panel provides protection class IP20. When the JUMO AQUIS touch S is installed in the wall of control cabinets, the protection class of the control cabinet no longer applies; instead, the protection class for installation in a control panel applies (IP20).

CAUTION!
Ensure that the control panel provides adequate support for the device.
The weight values listed in the technical data must be taken into account to ensure adequate mechanical stability for control panel installation.
⇨Chapter 20.14 "Case", Page 325



(1) Fastening bracket, stainless steel 1.4301 from the panel mounting kit (part no. 00602403)

(2) Self-tapping screws 60 × 16 TORX PLUS®[a] 30IP (supplied as standard with the JUMO AQUIS touch S)

(3) JUMO AQUIS touch S

(4) Control panel with cutout 273 mm × 257 mm
Material thickness of panel: 1.5 to 5 mm

[a] TORX PLUS® is a registered trademark of Acument Intellectual Pro-perties, LLC. USA.

Procedure

Step	Action
1	Insert the screws (2) about 2 to 3 threads into the holes provided for this purpose in the back of the device (3).
2	Place the device in the cutout provided for this purpose in the control panel (4) as shown in the drawing.
3	Hook the fastening bracket (1) into the screws (2) inserted into the back of the device (3).
4	Securely tighten the screws (2) in the back of the device.

6.1 Installation notes

DANGER!
Observe the following instructions!

Qualification of personnel

- The electrical connection must only be carried out by qualified personnel.

Electrical wiring

- When selecting the electrical wiring material as well as when installing and connecting the device electrically, comply with the requirements of DIN VDE 0100 "Low-voltage electrical installations" and the applicable country-specific regulations (e. g. based on IEC 60364).
- The input, output, and power supply lines must be separated from one another spatially and not laid in parallel.
- Select suitable cables for sensors and interfaces (shielded and twisted or coaxial cable). These lines must not be installed near live electrical components or current-carrying wiring.
- Sensor lines must be uninterrupted (not connected via terminal blocks or the like).
- Provide shielding in accordance with the connection diagram on the device.
- In a star wiring configuration, grounding wires must be connected to an equipotential grounding busbar and insulation must be intact. Keep lines as short as possible. Ensure proper potential equalization/bonding.

Electrical safety

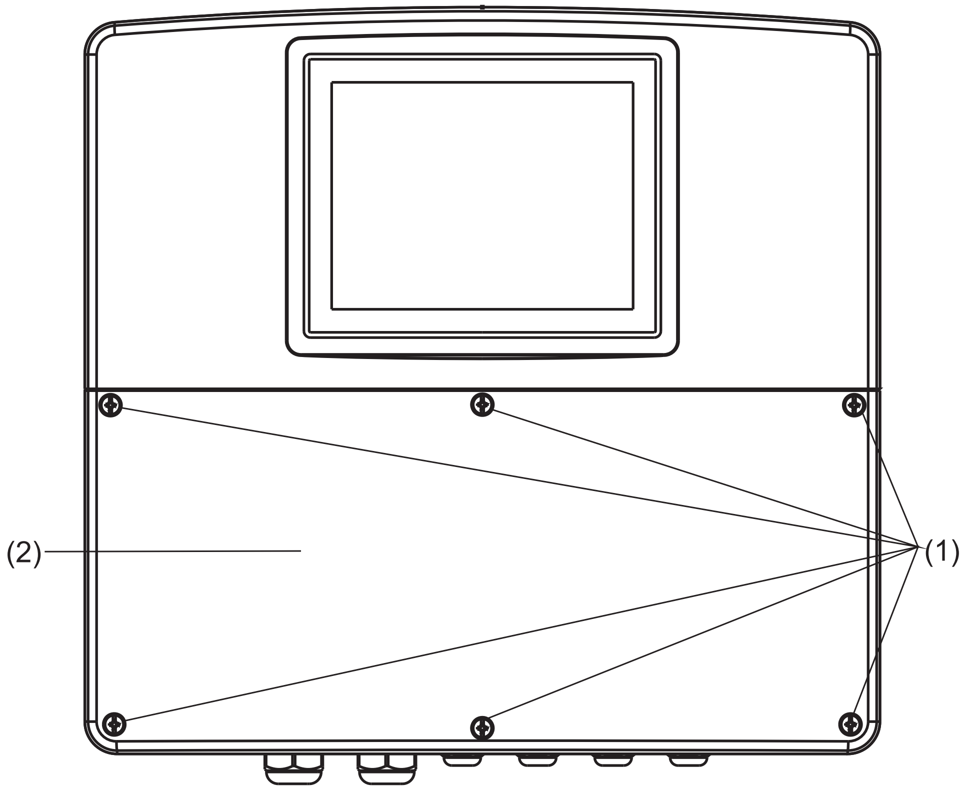
- Disconnect all phases of the power supplied to the device (power grid, outside power supply sources for relays/solid state relays etc.) If current-carrying components could be touched while work is being performed.
- Fuses for power supply circuits should be rated at no more than 10 A (slow-blow).
- To prevent destruction of device outputs in the event of an external short circuit, short-circuit currents in circuits with relay or semiconductor outputs should be limited through use of appropriate fuses.
- The device is not suitable for installation in potentially explosive atmospheres.
- Besides incorrect installation, wrong settings on the device can adversely affect performance of the connected process. For this reason, independently operating safety devices, e.g. pressure relief valves, temperature limiters/monitors, liquid-metering limiters and overflow prevention devices should be provided and adjustment of them restricted only to train technical personnel. Appropriate safety regulations must be observed in this connection.
- Plug-in screw terminal strips should not be unplugged until after the power has been disconnected.

References to other information

- The electromagnetic compatibility conforms to the standards and regulations cited in the technical data.
- The USB interfaces and digital inputs are **not** electrically isolated.
  The information regarding electrical isolation must be observed.
  ⇨ Chapter 6.3 "Galvanic isolation", Page 46

6.2 Installing and connecting cables

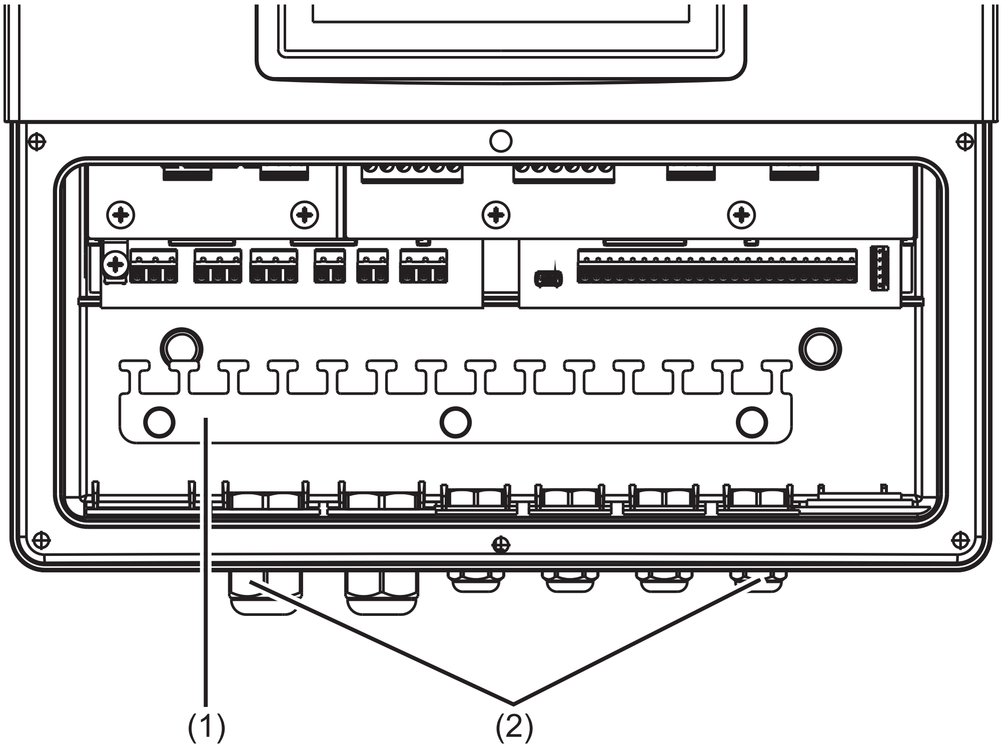
6.2.1 Opening the terminal compartment on the device



Step	Action
1	Loosen the screws on the terminal compartment cover.
2	Remove the terminal compartment cover.

NOTE!
After all work in the terminal compartment has been completed, ensure that the terminal compartment cover is reattached. All 6 screws must be tightened to a torque of 1 Nm. Otherwise, the IP67 protection class is no longer provided.
In the open state, the device has the protection class IP20.

6.2.2 Installing cables



(1) Strain relief strip
(2) IP67 cable fittings

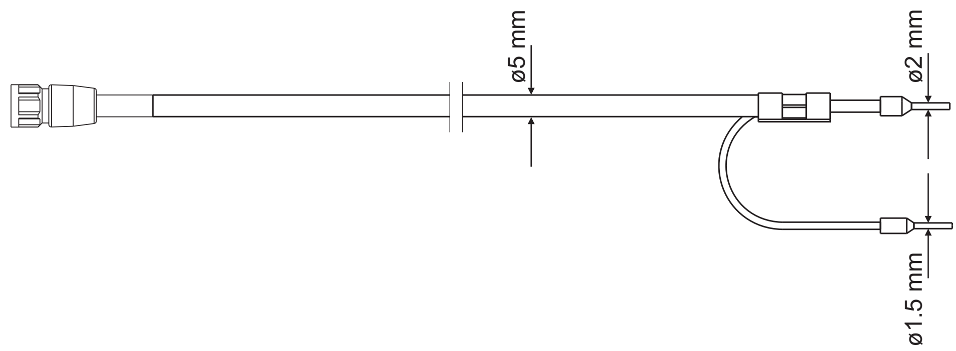
Procedure

Step	Action
1	Insert the provided cable fittings, together with the appropriate seals, into the corresponding cable entry openings in the enclosure and then tighten the glands with the lock nuts.
2	Insert one cable through each cable fitting and then tighten the cable fitting. Ensure that the cable is sealed properly.
3	Seal unneeded cable fittings with the provided plugs and then tighten the cable fittings.
4	**Multi-conductor cables** Strip the sheathing off the cable to a point where the sheathing still reaches the upper edge of the tongue on the strain relief strip (1). When putting together cables, ensure that shielding is properly insulated. **Preparing coaxial cables:** ⇨ Chapter 6.2.3 "Preparing coaxial cables for pH/redox electrodes", Page 42
5	To relieve any strain on the cable, use a cable tie to attach the cable to a free tongue on the strain relief strip (1).
6	Connect the cable in accordance with the connection diagram. ⇨ Chapter 6.4 "Connection diagram", Page 47

NOTE!
Open or improperly sealed cable fittings void the protection type IP67 for the enclosure. Ensure that all cable fittings are sealed and tightened to the correct installation torque.
⇨ Chapter 20.14 "Case", Page 325

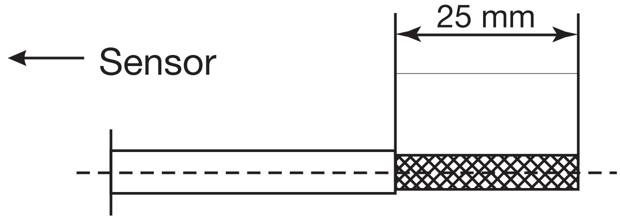
6.2.3 Preparing coaxial cables for pH/redox electrodes

Coaxial cable with Shield-Kon® connector[1]

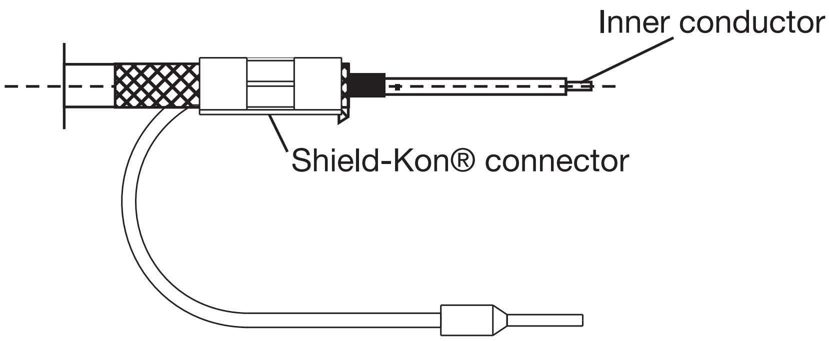


Length	Part number
1.5 m	00085154
5 m	00307298
10 m	00082649

Preparing your own coaxial cable

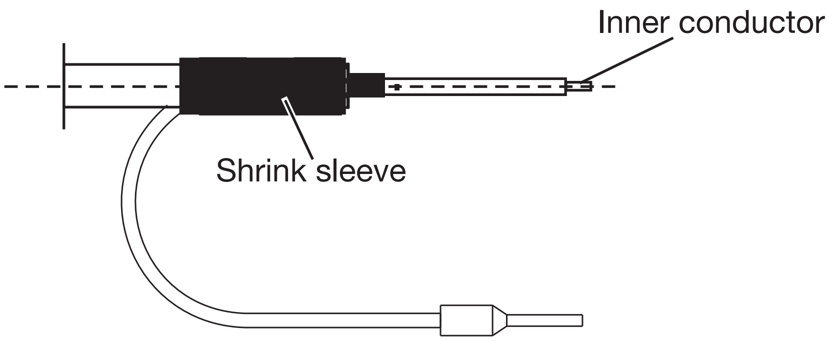


Remove outer sheathing from the cable ➔ Pull back the braided shield



Remove black, semiconducting layer (see image) ➔ Strip insulation off inside conductor ➔ Attach Shield-Kon® connector[1] for shield

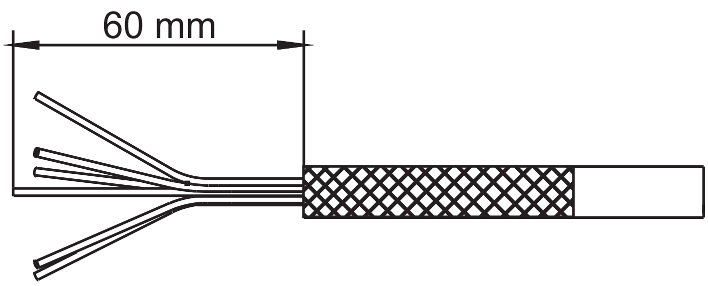
1.Shield-Kon is a registered trademark of THOMAS & BETTS INTERNATIONAL, Inc., Wilmington Del., US.



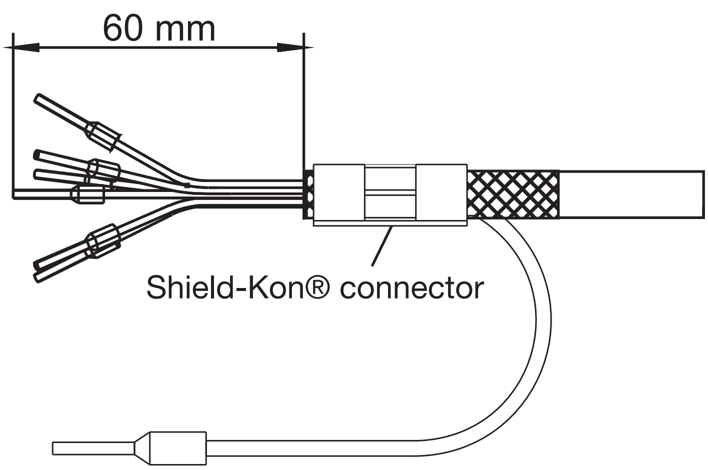
Use shrink tubing to insulate the braided shield

NOTE!
The black, semiconducting layer must not touch with the inside conductor! This would short-circuit the signal from the pH electrode.

Preparing a shielded multiconductor cable



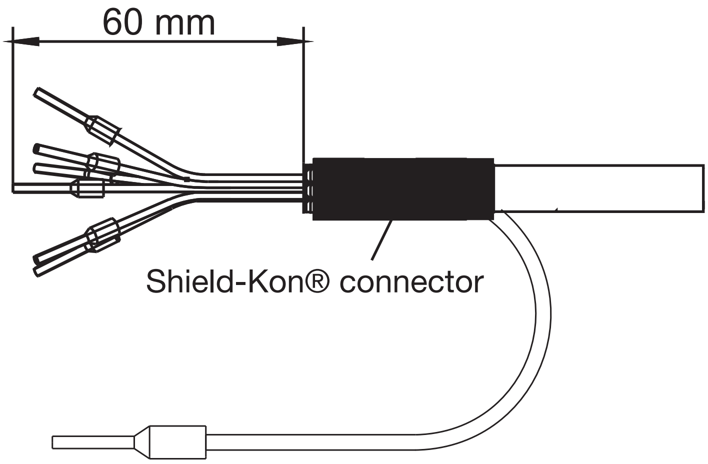
Strip the insulation off the connecting cable and pull back the shield



Attach wire ferrules to the ends of the conductors and a Shield-Kon® connector[1] for shielding

1.Shield-Kon is a registered trademark of THOMAS & BETTS INTERNATIONAL, Inc., Wilmington Del., US.

6 Electrical connection



Use shrink tubing to insulate the shield and Shield-Kon® connector[1]

6.2.4 Conductor cross-sections for base unit and power supply unit

The terminals on the base unit and power supply unit are spring-cage terminals.

Ferrule	**Conductor cross section**		**Length to strip**
	minimal	**maximal**	
without ferrule			
Power supply unit	0.2 mm^2	1 mm^2	8 mm
Base unit	0.2 mm^2	1 mm^2	8 mm
Ferrule without lip			
Power supply unit	0.25 mm^2	0.75 mm^2	8 mm
Base unit	0.25 mm^2	0.75 mm^2	8 mm
with ferrule with lip			
Power supply unit	0.25 mm^2	0.75 mm^2	8 mm
Base unit	0.25 mm^2	0.75 mm^2	8 mm
Rigid			
Power supply unit	0.2 mm^2	1.5 mm^2	8 mm
Base unit	0.2 mm^2	1.5 mm^2	8 mm

1.Shield-Kon is a registered trademark of THOMAS & BETTS INTERNATIONAL, Inc., Wilmington Del., US.

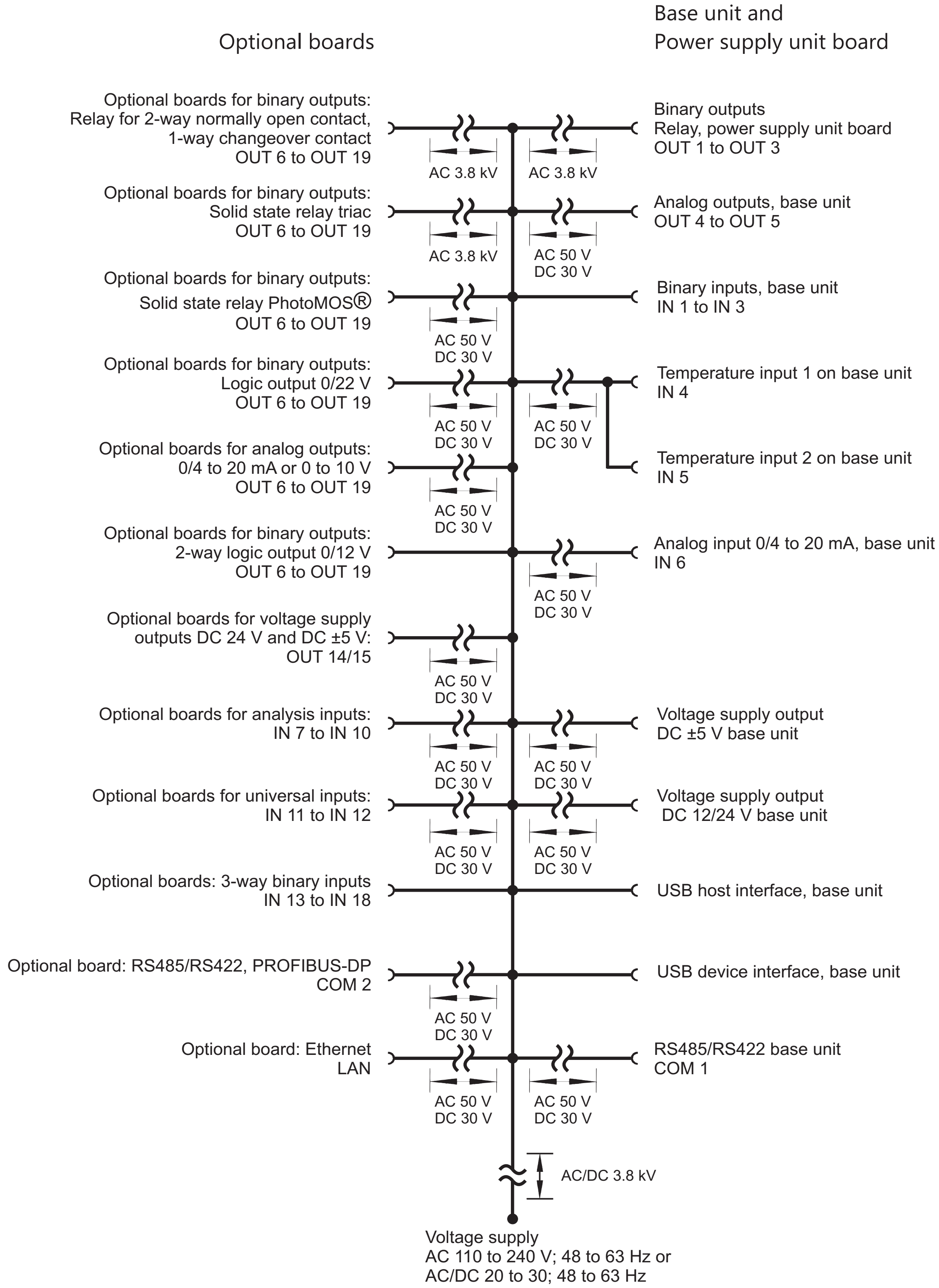
6.2.5 Conductor cross-sections for optional boards

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

Optional boards for	Ferrule	Conductor cross section		Length to strip
		minimal	maximal	
Universal inputs Analog outputs Binary inputs Digital outputs PhotoMOS®[a] Logic outputs Voltage supply output	without ferrule with ferrule with lip Ferrule without lip Rigid	$0.14\ mm^2$ $0.25\ mm^2$ $0.25\ mm^2$ $0.14\ mm^2$	$1.5\ mm^2$ $0.5\ mm^2$ $1.5\ mm^2$ $1.5\ mm^2$	7 mm 7 mm 7 mm 7 mm
Analysis inputs pH/Redox/NH_3 Analysis inputs CR[b] Analysis inputs Ci[c] Digital outputs relay Digital outputs triac	without ferrule with ferrule with lip Ferrule without lip Rigid	$0.2\ mm^2$ $0.25\ mm^2$ $0.25\ mm^2$ $0.2\ mm^2$	$2.5\ mm^2$ $1.5\ mm^2$ $2.5\ mm^2$ $2.5\ mm^2$	7 mm 7 mm 7 mm 7 mm

[a] PhotoMOS® is a registered trademark of Panasonic.
[b] CR analysis inputs = Analysis inputs for resistive conductivity
[c] CR analysis inputs = Analysis inputs for inductive conductivity

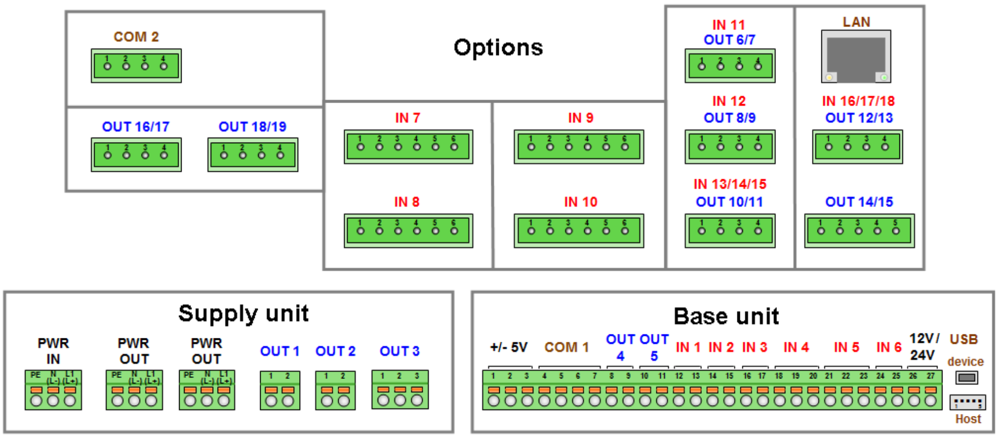
6.3 Galvanic isolation



Note
If sensors that are not electrically isolated are connected to a digital input and supplied by an external power source, potential differences between the internal and external ground can cause problems. Providing the supply voltage from the voltage supply outputs of the JUMO AQUIS touch S is preferable in such cases.

6.4 Connection diagram

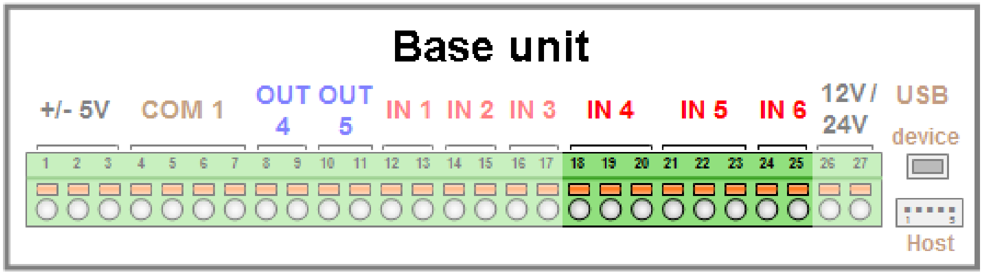
6.4.1 Overview of connections

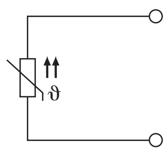
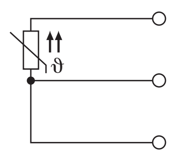
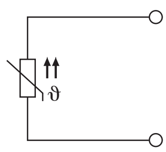
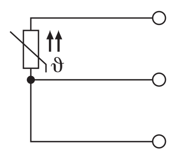
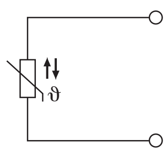
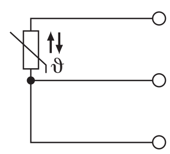
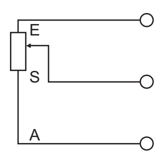
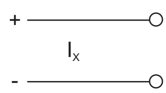


	Module	Connector terminal	Type
Inputs	Base unit	IN 1 to IN 3	Binary inputs
		IN 4 to IN 5	Temperature inputs
		IN 6	Universal input
	Optional boards	IN 7 to IN 10	analysis inputs
		IN 11 to IN 12	Universal inputs
		IN 13 to IN 18	Binary inputs
Outputs	Power supply unit	PWR OUT	Mains voltage lead out
		OUT 1 to 2	Relay outputs normally open contact
		OUT 3	Relay outputs changeover contact
	Base unit	OUT 4 to OUT 5	Analog output
		±5 V	Voltage supply output ±5 V for ISFET sensors
		12/24 V	Voltage supply output DC 12/24 V for external transmitters[a]
	Optional boards	OUT 6 to OUT 19	Analog/digital outputs, OUT 14/15 also for voltage supply output DC ±5 V, 24 V
Interfaces	Base unit	COM 1	RS422/485
		USB device interface	USB device interface
		USB host interface connection[b]	USB host interface connection[b]
	Optional boards	COM 2	PROFIBUS-DP or RS422/485
		LAN	Ethernet

[a] The desired output voltage must be stated on the order (see order details).
[b] Use requires the USB host socket (see Chapter 4.2 "Order details", Page 22, Extra Code 269).

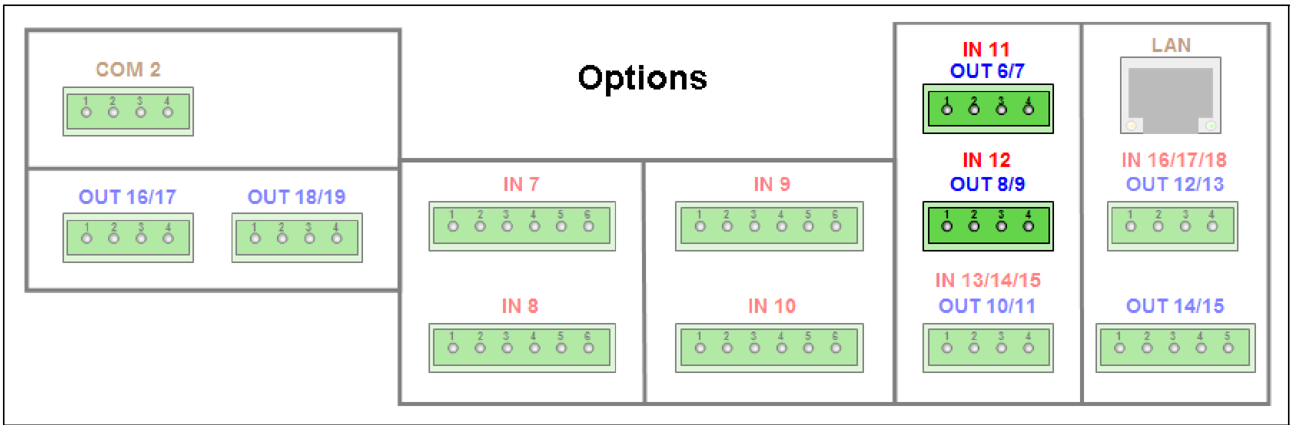
6.4.2 Analog inputs base unit

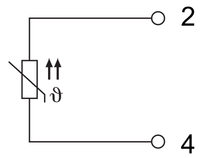
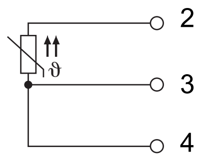
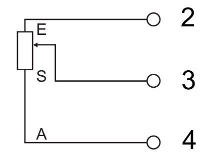
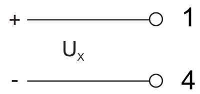
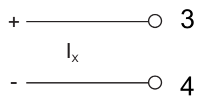


Connector/ terminal	Connection variant	Symbol
IN 4	RTD temperature probe 2-wire circuit Pt100, Pt1000 or customer-specific characteristic line	 18 20
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	 18 19 20
IN 5	RTD temperature probe 2-wire circuit Pt100, Pt1000 or customer-specific characteristic line	 21 23
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	 21 22 23
	NTC 2-wire circuit	 21 23
	NTC 3-wire circuit	 21 22 23
	Resistance potentiometer A = Start E = End S = Slider	 E S A 21 22 23
IN 6	Standard signal Current 0(4) to 20 mA	 + I_x - 24 25

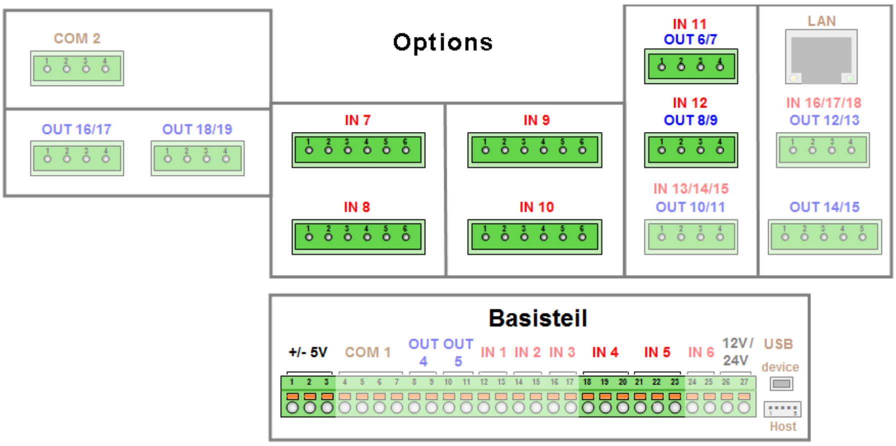
6.4.3 Analog inputs optional boards

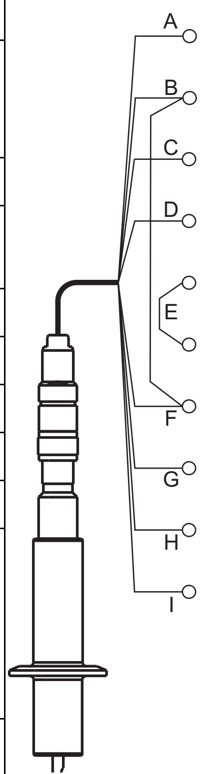
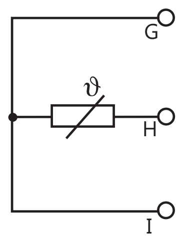
Universal inputs



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 potentiometer A = Start E = End S = Slider	
	Standard signal Voltage 0 to 10 V	
	Standard signal Current 0(4) to +20 mA	

analysis inputs

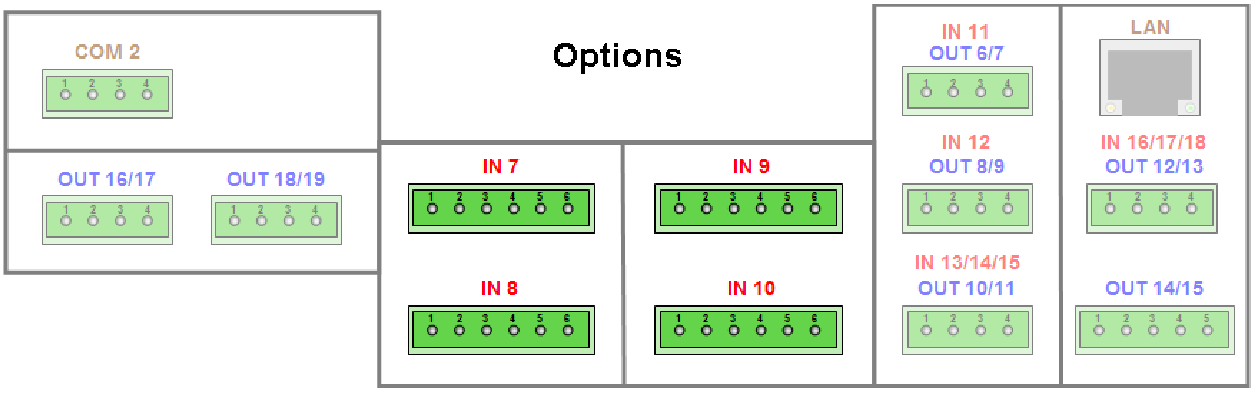


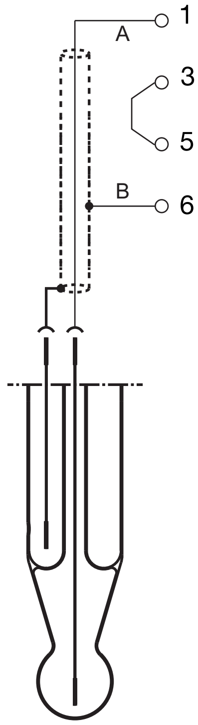
Slot	Option/ connection variant	Wire (color)[a]	Potential	Terminal: DC ±5 V	Terminal: Temperature input	Terminal: Analysis input pH/redox	Symbol
IN 7 IN 8 IN 9 IN 10	ISFET-pH sensor	A (blue)	DC +5 V	1			
		B (black)	GND with jumper to F	2			
		C (green)	DC -5 V	3			
		D (white/ black)	Ion-sensitive gate			1	
		E	Bypass			3	
						5	
		F (yellow)	Reference			6	
		G (white)	Compensation thermometer in 3-wire circuit		Connection [b] 		
		H (red)					
		I (red/black)					
	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.[c]						

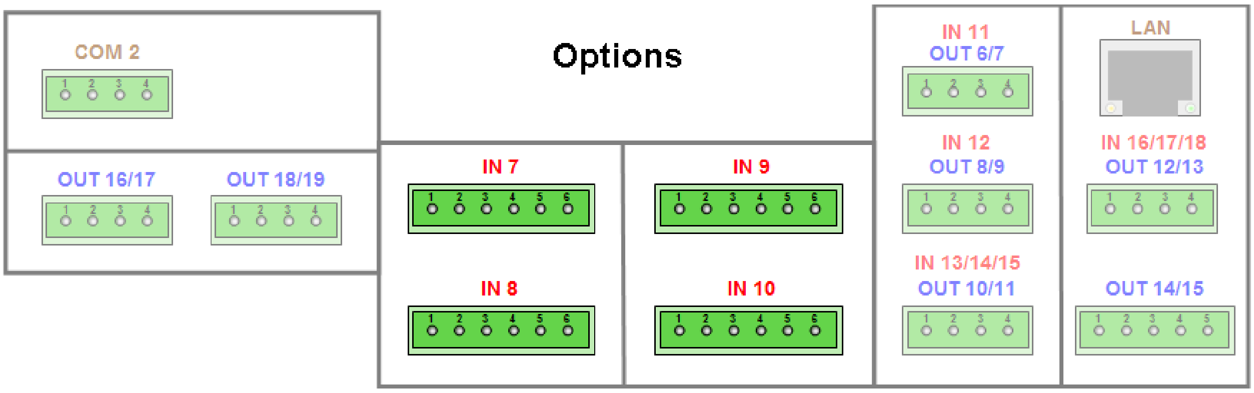
[a] The conductor colors listed refer to JUMO ISFET-pH sensors. The orange-colored conductor is not connected.

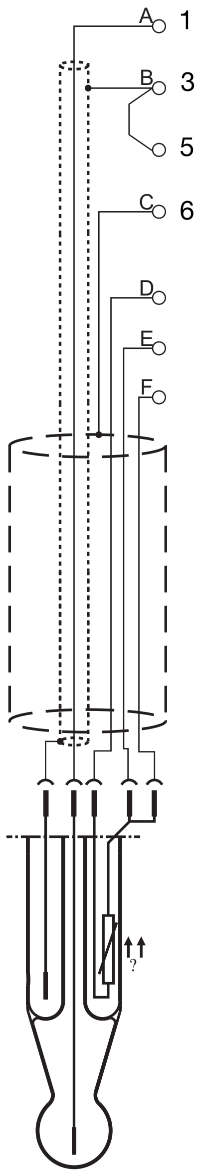
[b] The connection diagram for the analog input concerned must be observed when connecting the temperature probe.

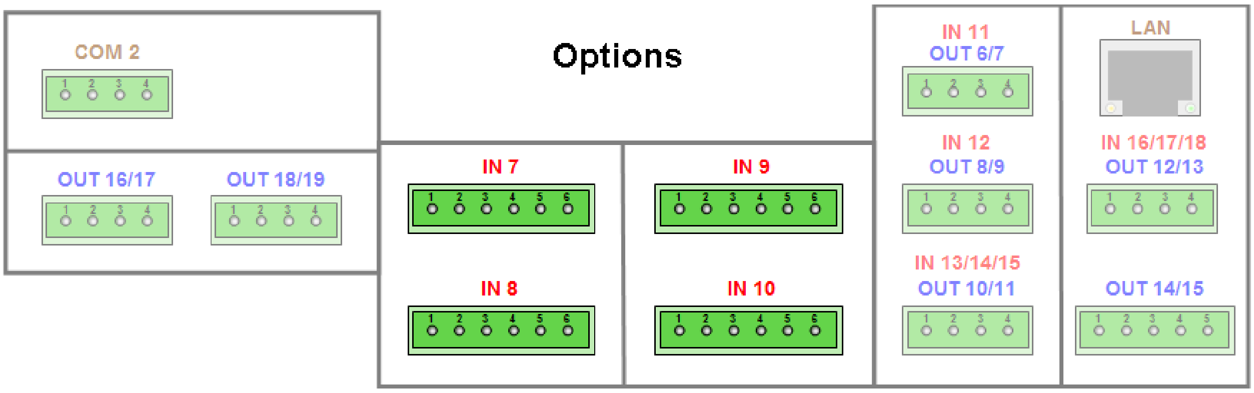
[c] When connecting the temperature probe of JUMO ISFET pH sensors to process connection 615 (NTC 8k55), no customer-specific linearization like that for the JUMO AQUIS 500 pH is needed. Temperature input IN 5 supports connection of 8k55-NTC temperature probes.

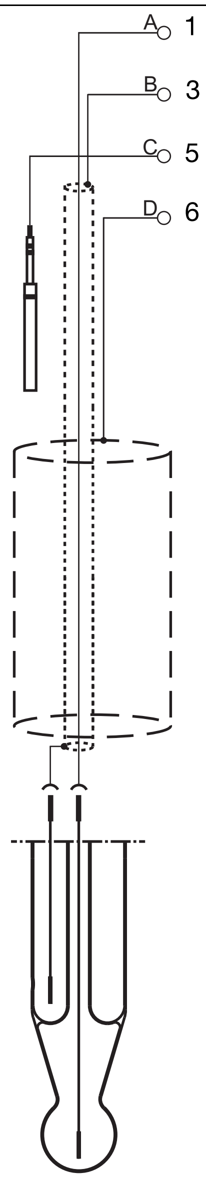


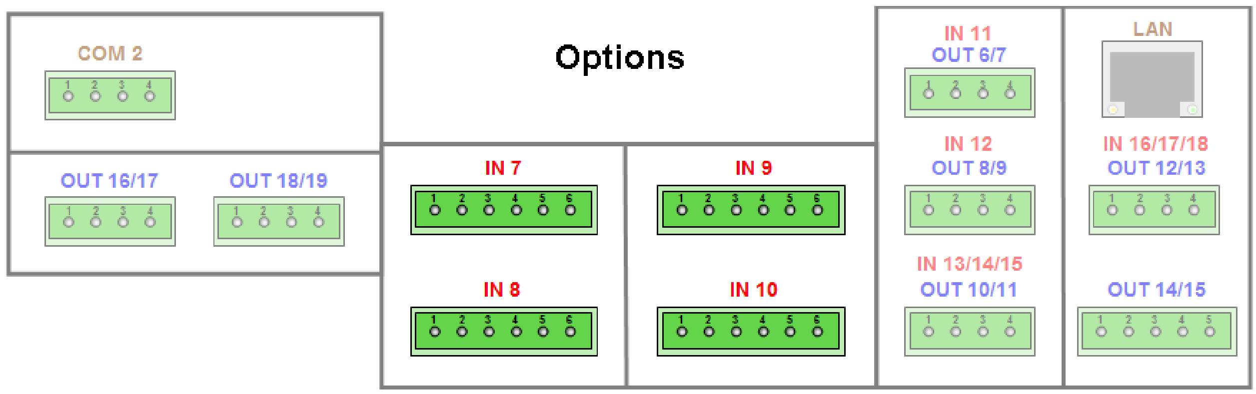
Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	pH/Redox **Asymmetric connection of a combination electrode** Standard connection variant For temperature compensation, a separate temperature sensor can be connected to an analog input. A = Glass/metal electrode B = Reference electrode Terminal 2 is not connected!	

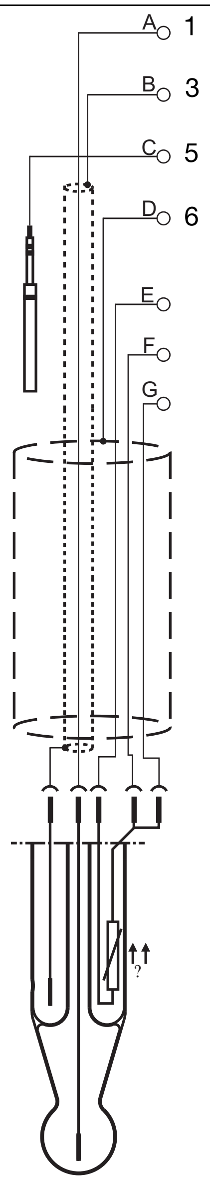


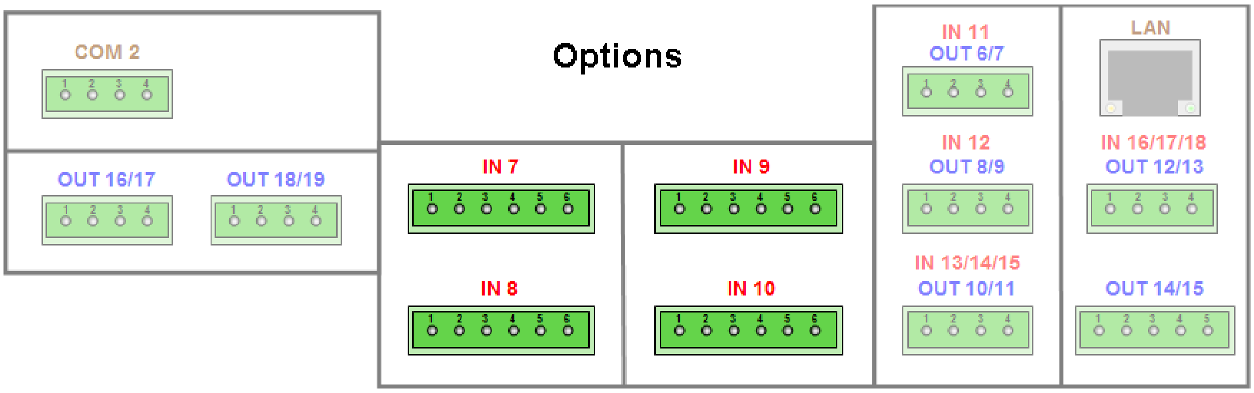
Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	pH/Redox **Asymmetric connection of a combination electrode with integrated RTD temperature probe and VarioPin terminal head** The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input. 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 Terminal 2 is not connected!	

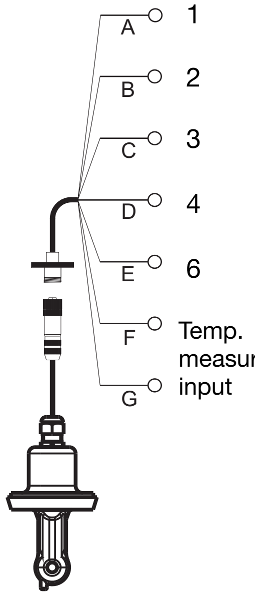
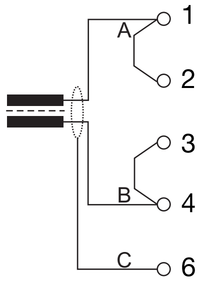
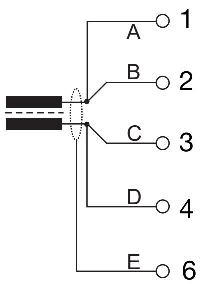


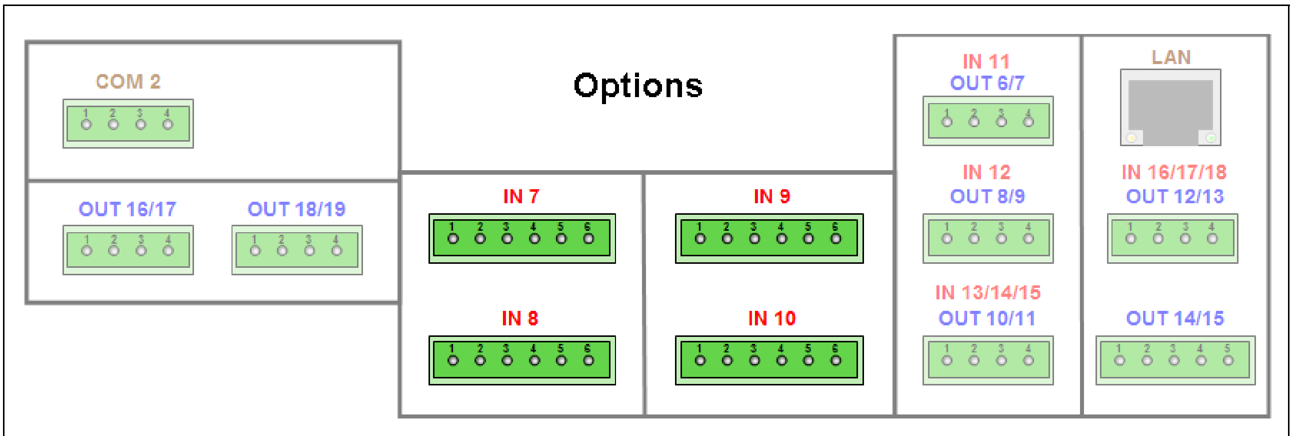
Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	pH/Redox **Symmetric connection of a combination electrode** Symmetric connection is used to reduce interference from stray electromagnetic fields along the sensor cable. A = Glass/metal electrode (core) B = Reference electrode (inner shield) C = Liquid potential (grounding pin, pipe, or container wall at the measuring point) D = Shield (outer shield) Terminal 2 is not connected!	

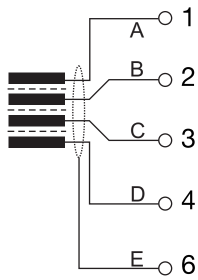


Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	pH/Redox **Symmetric connection of a combination electrode with integrated resistance thermometer and VarioPin plug head** Symmetric connection is used to reduce interference from stray electromagnetic fields along the sensor cable. The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input. 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 Terminal 2 is not connected!	



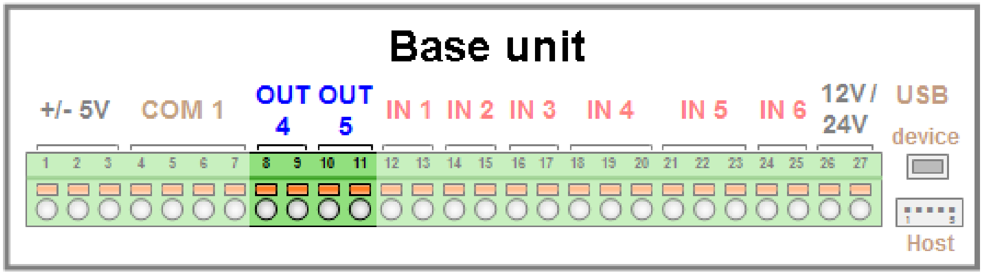
Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	Ci optional board (inductive conductivity measurement) Connection via an M12 plug, Attach connections for compensation thermometer (2-wire cable for socket) to a suitable analog input (2-wire circuit), **The factory-installed wiring must not be changed!** Core colors of the conductor connection of the M12 socket to the screw terminal connection on the optional board: A = Brown B = White C = Pink D = Silver E = Black F = Green (temperature sensor) G = Yellow (temperature sensor)	
	CR optional board (resistive conductivity measurement) 2-electrode system with 2-wire conductor Terminal 1 must be connected to the outer electrode on concentric conductivity sensors. 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	
	CR optional board (resistive conductivity measurement) 2-electrode system with 4-wire conductor (Wiring to minimize the measuring error caused by lead-wire resistance) Terminal 1 must be connected to the outer electrode on concentric conductivity sensors. A/B = Outer electrode C/D = Inner electrode E = Shield	



Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	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	

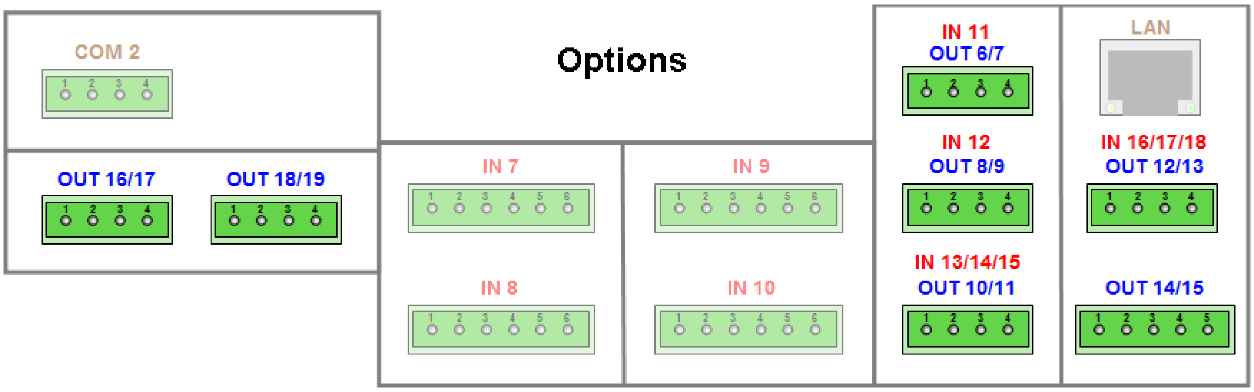
6.4.4 Analog outputs

Base unit



Connector/ terminal	Connection variant	Symbol
OUT 4	Analog output DC 0 to 10 V or DC 0(4) to 20 mA (configurable)	+ 8 U_x I_x - 9
OUT 5	Analog output DC 0 to 10 V or DC 0(4) to 20 mA (configurable)	+ 10 U_x I_x - 11

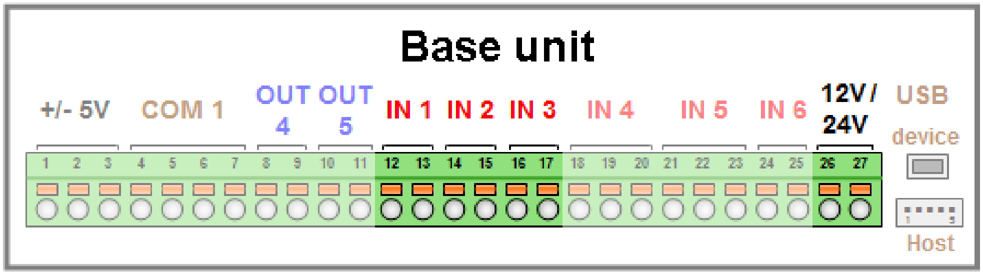
Optional boards

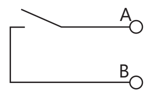
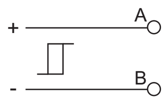
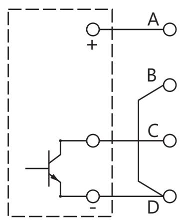


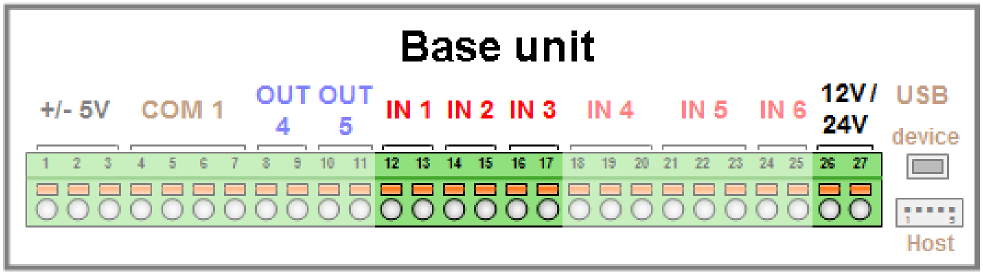
Slot	Option/connection variant	Symbol
OUT 6/7 OUT 8/9 OUT 10/11 OUT 12/13 OUT 14/15 OUT 16/17 OUT 18/19	Analog output DC 0 to 10 V or DC 0(4) to 20 mA (configurable)	+ 1 U_x I_x - 2

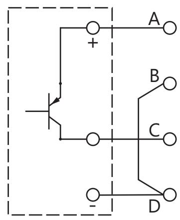
6.4.5 Binary inputs

Base unit



Connector/ terminal	Connection variant	Wire	Potential	Terminal 12 V / 24 V	IN 1	IN 2	IN 3	Symbol
IN 1 to 3	Digital input (potential-free contact)	A	Potential-free contact		12	14	16	
		B			13	15	17	
	In the digital input configuration, the "Contact" option must be set to "Potential-free contact".							
	Digital input (external voltage source)	A	Logic signal +		12	14	16	
		B	Logic signal -		13	15	17	
	In the digital input configuration, the "Contact" option must be set to "Ext. voltage supply".							
	Digital input (NPN transistor switching output)[a]	A[b]	Sensor +	26				
		B[b]	Sensor -	27				
		C	Switching signal (collector)		12	14	16	
		D	Sensor -		13	15	17	
	In the digital input configuration, the "Contact" option must be set to "Potential-free contact".							



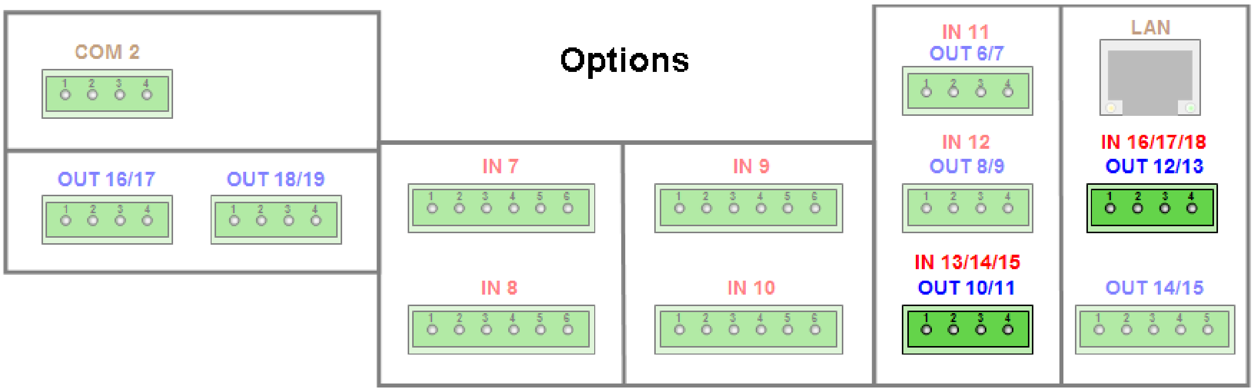
Connector/ terminal	Connection variant	Wire	Potential	Terminal 12 V / 24 V	Terminal IN 1	Terminal IN 2	Terminal IN 3	Symbol
IN 1 to 3	Digital input (PNP transistor switching output)[a]	A[b]	Sensor +	26				
		B[b]	Sensor -	27				
		C	Switching signal (collector)		12	14	16	
		D	Sensor -		13	15	17	
	In the digital input configuration, the "Contact" option must be set to "Ext. voltage supply".							

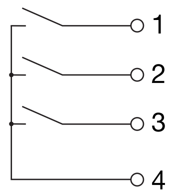
[a] The connection variants for transistor switching outputs (NPN / PNP) are especially important for the flow measurement via impeller sensor (type 406020, part no. 00525530, 00525531) at inputs IN 2 and IN 3 (pulse frequency inputs). However, other sensors with transistor switching output can also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

[b] The voltage supply output on the base unit is available for the DC 24 V or DC 12 V voltage supply to sensors (see order details).

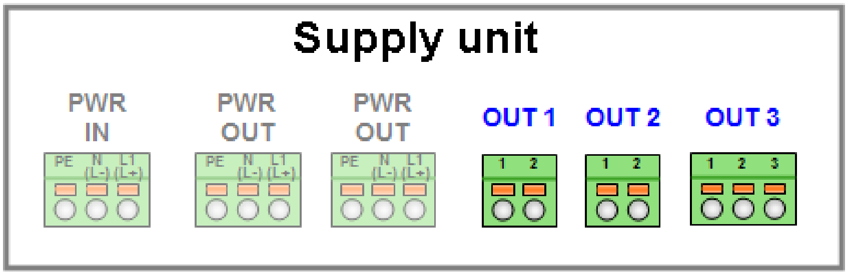
6 Electrical connection

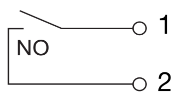
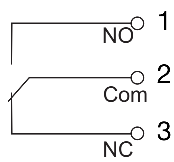
Optional boards



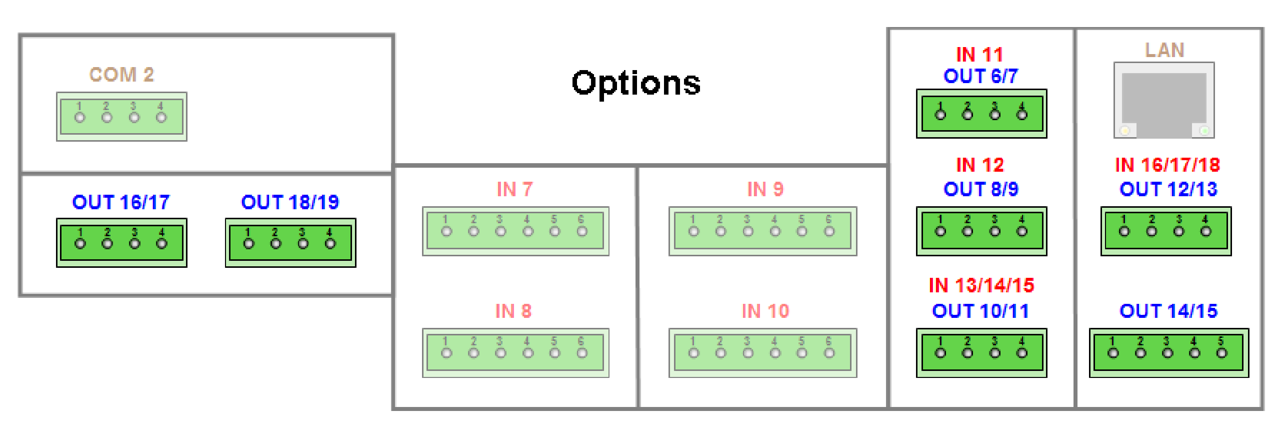
Connector/ terminal	Connection variant	Symbol
IN 13/14/15 IN 16/17/18	3× binary input	

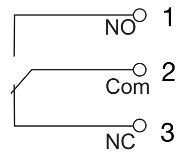
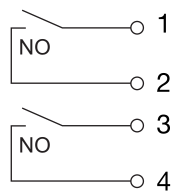
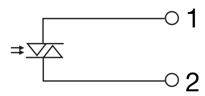
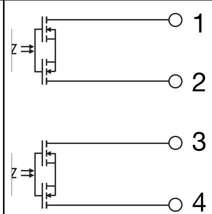
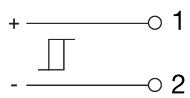
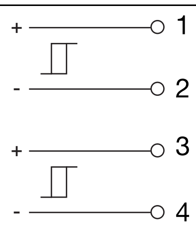
6.4.6 Binary outputs, power supply unit board



Connector/ terminal	Connection variant	Symbol
OUT 1 OUT 2	Relay Normally open contact	
OUT 3	Relay Changeover contact	

6.4.7 Binary outputs, optional boards

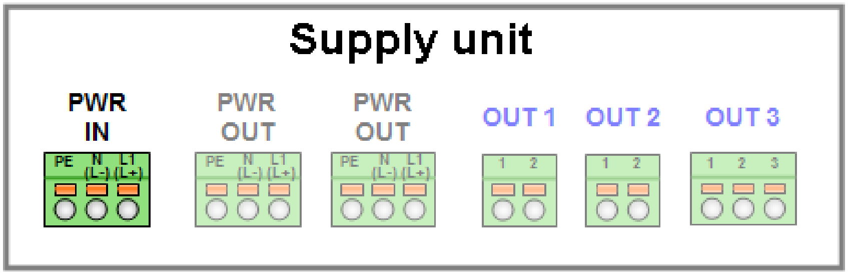


Slot	Option/connection variant	Symbol
OUT 6/7 OUT 8/9 OUT 10/11 OUT 12/13 OUT 14/15 OUT 16/17 OUT 18/19	Relay Changeover contact	
	2× relay Normally open contact	
	Solid state relay triac 230 V/1 A	
	2× solid state relay PhotoMOS®[a] 50 V/200 mA	
	Binary output 0/22 V	
	2× binary output 0/12 V	

[a] PhotoMOS® is a registered trademark of Panasonic.

WARNING!
Combining a mains voltage circuit with a protective low-voltage circuit on the option "dual normally open contacts" is not permissible.

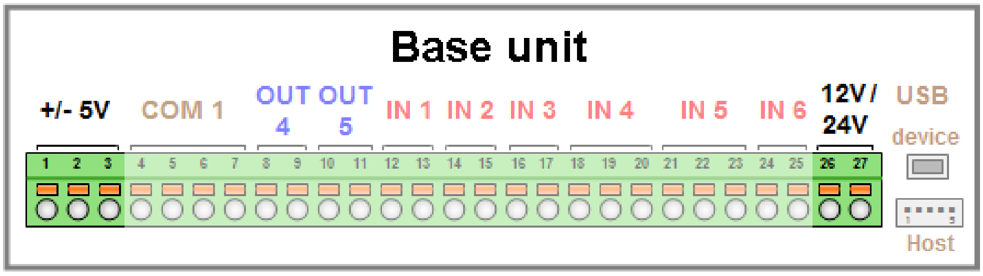
6.4.8 Mains power connection



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

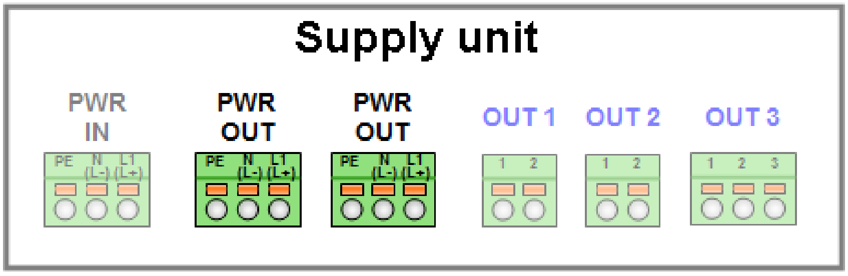
6.4.9 Voltage supply outputs

Base unit



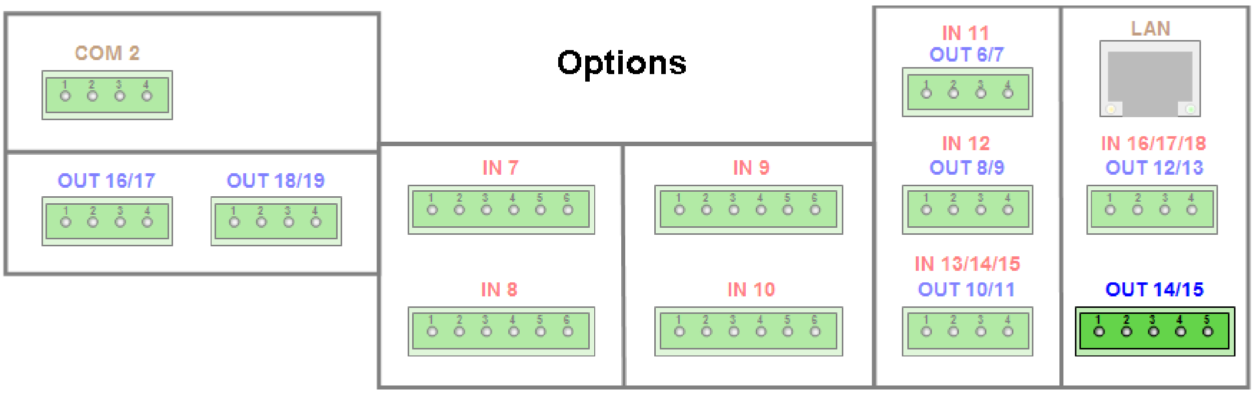
Connector/ terminal	Connection variant	Symbol
DC ±5 V	Voltage supply for ISFET sensors	+ — 1 $U_=$ ⊥ — 2 - — 3
DC 12 V/24 V	Voltage supply for external transmitters 12 V or 24 V (see order details)	+ — 26 $U_=$ - — 27

Power supply unit board



Connector/ terminal	Connection variant	Symbol
PWR OUT	Mains voltage lead out	L1 — L1 N — N PE — PE

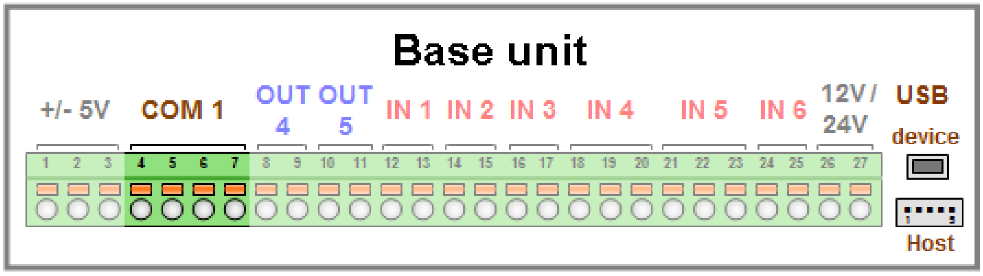
Optional board

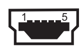


Slot	Connection variant	Symbol
OUT 14/15	Voltage supply DC ±5 V for ISFET sensors	+ — 3 $U_=$ ⊥ — 4 - — 5
	Voltage supply DC 24 V for external transmitters 24 V	+ — 1 $U_=$ - — 2

6.4.10 Interfaces

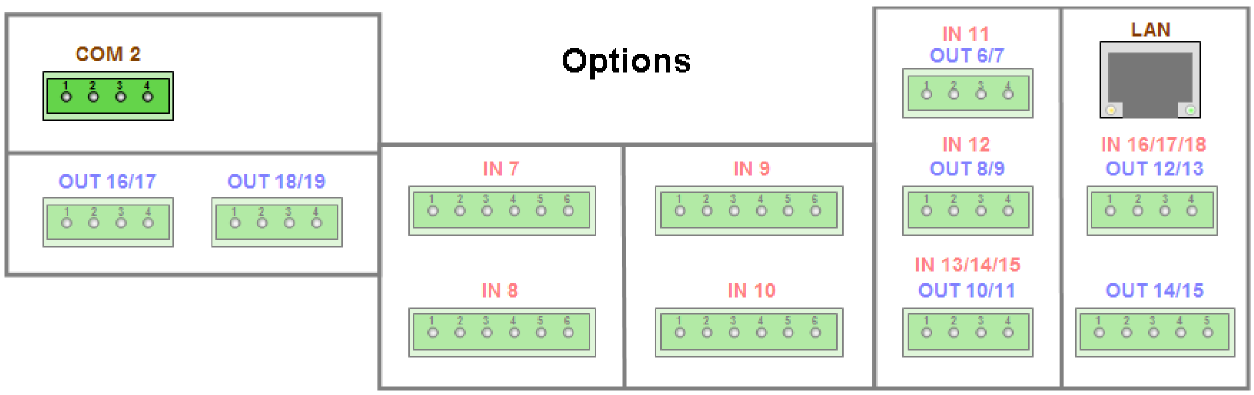
Base unit interfaces

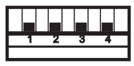
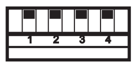
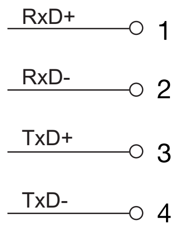
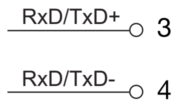
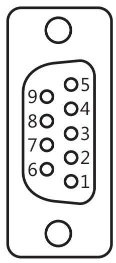
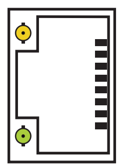


Connector/ terminal	Connection variant	Symbol
COM 1	RS422	RxD+ 4 RxD- 5 TxD+ 6 TxD- 7
	RS485	RxD/TxD+ 6 RxD/TxD- 7
USB device	USB device Type Mini-B (socket)	
USB host	Connection for USB host socket[a] Type A	

[a] Use requires the USB host socket (see Chapter 4.2 "Order details", page 23, Extra Code 269).

Optional board interfaces



Slot	Connection variant	Terminating resistors	Symbol
COM 2	RS422 terminating resistors with DIP switches on optional board configurable	with terminating resistors  without terminating resistors 	
	RS485 terminating resistors with DIP switches on optional board configurable		
	PROFIBUS-DP 3 = RxD/TxD-P 5 = DGND 6 = VP 8 = RxD/TxD-N	—	
LAN	Ethernet Type RJ-45 (socket)	—	

WARNING!

Prior to startup, ensure that the device has been installed and connected properly and
in compliance with the installation instructions. Observe the safety instructions in this description.
⇨ Chapter 1 "Safety information", Page 13

CAUTION!

The touchscreen must not be operated with sharp or pointed objects, as these could damage the protective film and the touchscreen.

7.1 Initial startup

Step	Action
1	Switch on the supply voltage to the device and wait until it has booted up.
2	Select the operating language.
3	Log in as user "Master" or "Service" in order to have access to the configuration in the device menu. ⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84
4	Set the date and time. ⇨ Chapter 9.1 "Date and time", Page 113
5	Make the basic settings for the device. ⇨ Chapter 10.2 "Basic settings", Page 120
6	Configure the analog and digital inputs you wish to use. ⇨ Chapter 10.5 "Analog inputs", Page 125 ⇨ Chapter 10.7 "Digital inputs of base unit and optional boards", Page 137
7	Check the hardware functions of the device. ⇨ Chapter 7.2 "Function test", Page 68
8	Calibrate any analysis sensors connected to the device. ⇨ Chapter 12 "Calibration in general", Page 177
9	The device is now ready for use. You can configure the displays and functions of the device according to your needs.

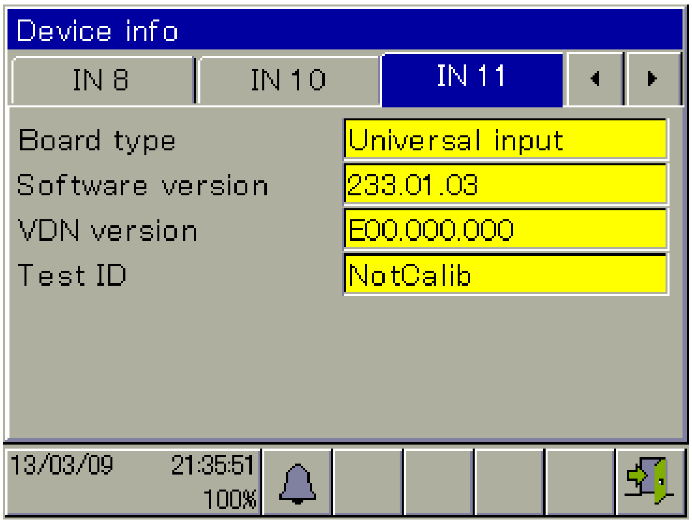
7.2 Function test

Important hardware information is displayed in the "Device Info" menu.
The functionality of the device can be checked from here.

7.2.1 Checking the optional boards

Open the hardware information for the installed optional boards as follows:
Device Menu ➔ Device Info ➔ Slots
A tab with hardware and software information for each correctly installed optional board now appears.

Sample screen: Hardware Information for an optional board "Universal input"



If no tab appears for an optional board, the board was not recognized and there is a hardware problem. In such cases, check whether the optional board concerned was installed correctly.

⇨ Chapter 11.1 "Installing optional boards", Page 165
If this is not successful, contact Technical Support at JUMO. The contact data can be found on the back of these installation instructions.

7.2.2 Checking sensors and inputs/outputs

To check correct operation of all inputs/outputs, you can display the current analog and binary values.

Device Menu ➔ Device Info ➔ Inputs/Outputs

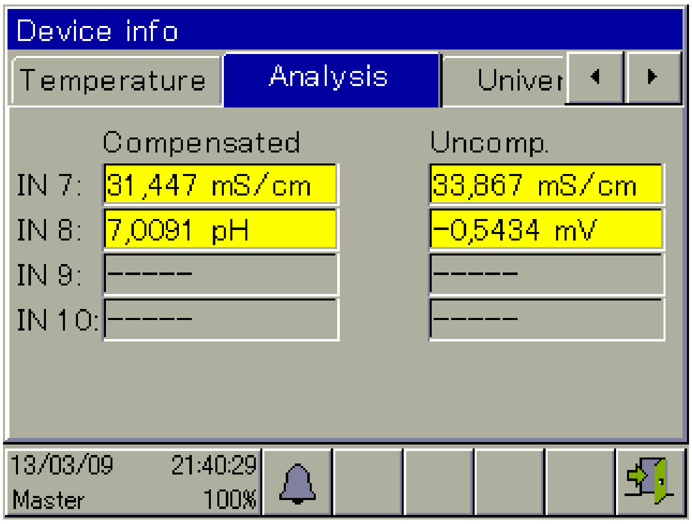
Depending on the type of input, up to 2 columns will be visible in the Device Info screens for inputs.

- **Compensated:** Display value that is calculated from the value measured by the sensor through use of an appropriate compensation method and after taking the corresponding calibration values into account.
  This suppresses incorrect measured values that can be caused by outside factors (e.g. temperature) or sensor wear (e.g. a dirty electrode).
- **Uncompensated:** Value measured by sensor (raw value of the measurement input, e.g. pH measuring chain voltage)
  These sensor values are subject to distortion caused by outside factors.

Display of uncompensated values is used primarily for diagnostic purposes. The compensated values are used for the actual measurement of analysis variables.

The following example considers analysis inputs in the form of a conductivity measurement input and a pH measurement input.
The device calculates the (compensated) values of the process variable from the (uncompensated) raw measurement data.

Sample screen:
IN 7 measures conductivity
IN 8 measures pH-value
IN 9 not used
IN 10 not used



8.1 Operating concept

This chapter explains how to use the functions at the operating level (e.g. controller and data monitor) and access the menu structure for editing device settings. The JUMO AQUIS touch S is operated by means of the touchscreen, using either a finger or stylus with a soft, rounded plastic tip.

CAUTION!
The touchscreen must not be operated with sharp or pointed objects, as these could damage the protective film and the touchscreen.

CAUTION!
Use only a soft cloth to clean the touchscreen. Commercially available cleaners may contain substances that damage the protective film and the display.

NOTE!
Operation depends on the user's rights. Operating and setting options are restricted, depending on the user who is logged in.
The "Master" and "Service" users have access to all menus and functions (factory setting).
⇨ Chapter 8.1.1 "Passwords and user rights", Page 71

8.1.1 Passwords and user rights

The device has 4 users with factory-configured user names, passwords, and user rights. The passwords in the device can be changed.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

The JUMO PC setup program is needed to change user names and user rights.
⇨ "User list", page 259

The following table provides an overview of the factory-set user accounts.

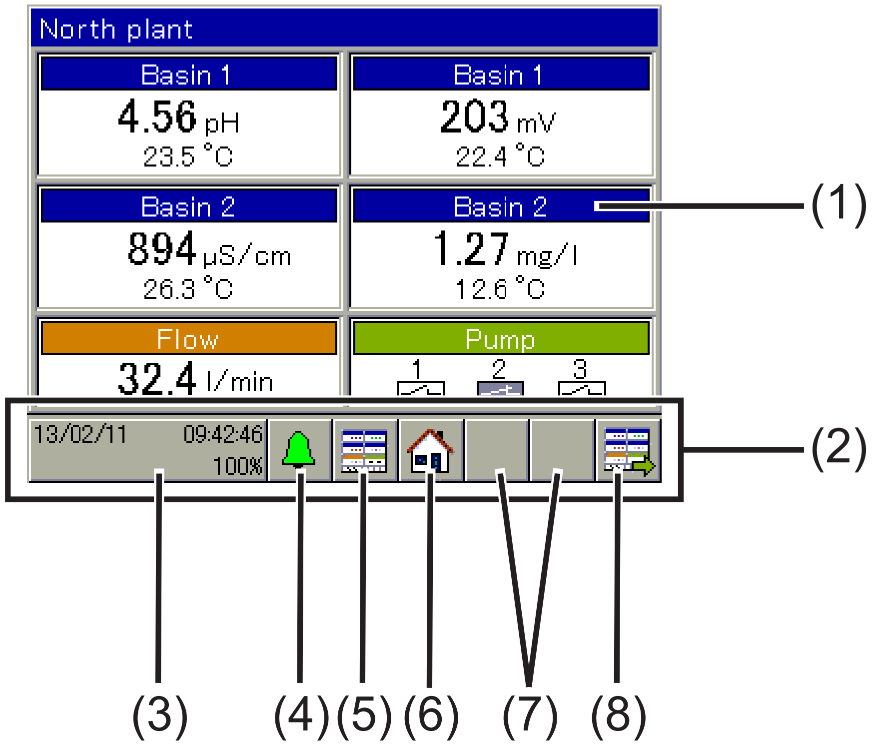
Factory-set passwords

Users	Every-one	User 2	User 1	Service	Master
Factory-set password	-	20	110	3000	9200

Factory-set user rights

Users / User rights	Every-one	User 2	User 1	Service	Master
Display of: • Current measuring values on overview and detailed screens • Configuration data • parameters • Device information	X	X	X	X	X
Display of: • History of measurement data in the recording function • Event and alarm list • Service data **User actions** • Acknowledge alarms • Calibrate • Read out history of measurement data in the recording function • Display and change user level parameters • Read out service data		X	X	X	X
User actions • Operate control functions **Change settings** • Changing the settings at the perimeter level • Set date and time **Configuration** • Initialize calibration			X	X	X
Configuration • Configuration of all functions • Activate extra codes				X	X

8.1.2 Display and control elements



(1) Touchscreen

(2) Toolbar with buttons for operation

(3) "Device menu" button with display of:
- Date and 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 operation screen" button (direct selection of the desired operation screen)

(6) "Home" button (back to main screen)

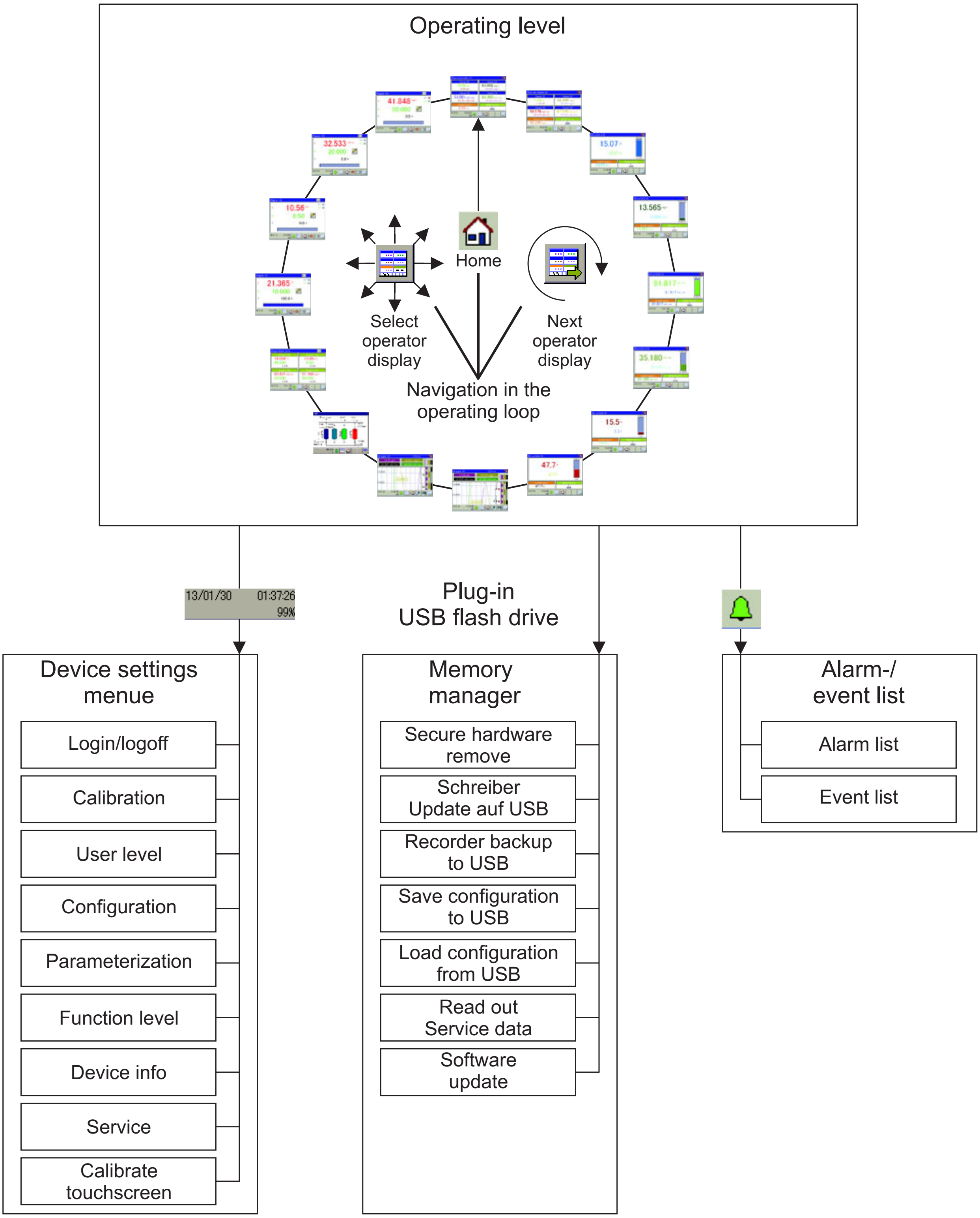
(7) Placeholder for context-sensitive buttons
Assignment depends on the particular operation screen.
Specific buttons are shown in the placeholders on the operation screens for the controller and recording functions.

(8) "Next operation screen" button (for scrolling through operation screens)

8.1.3 Menu structure

At the **operating level,** 3 different navigation buttons are available to select appropriate screens for display and control of device functions.
The **"Device menu"** and **"Alarm/event list"** menu levels are also displayed by means of corresponding buttons. The device menu contains submenus for setting, servicing, and diagnosing the device and its functions.
The **memory manager** opens automatically as soon as a USB flash drive is inserted into the USB host interface. It exchanges data between the device and the flash drive. The USB host socket is required to connect the USB flash drive (see Chapter 4.2 "Order details", Page 22, Extra Code 269).

Overview of the menu structure



NOTE!

The "Recorder Update to USB" and "Recorder Backup to USB" items appear in the "Memory Manager" menu only if the extra "Recording function" is enabled.

⇨ Chapter 4.2 "Order details", Page 22

Operation screens in the operation loop

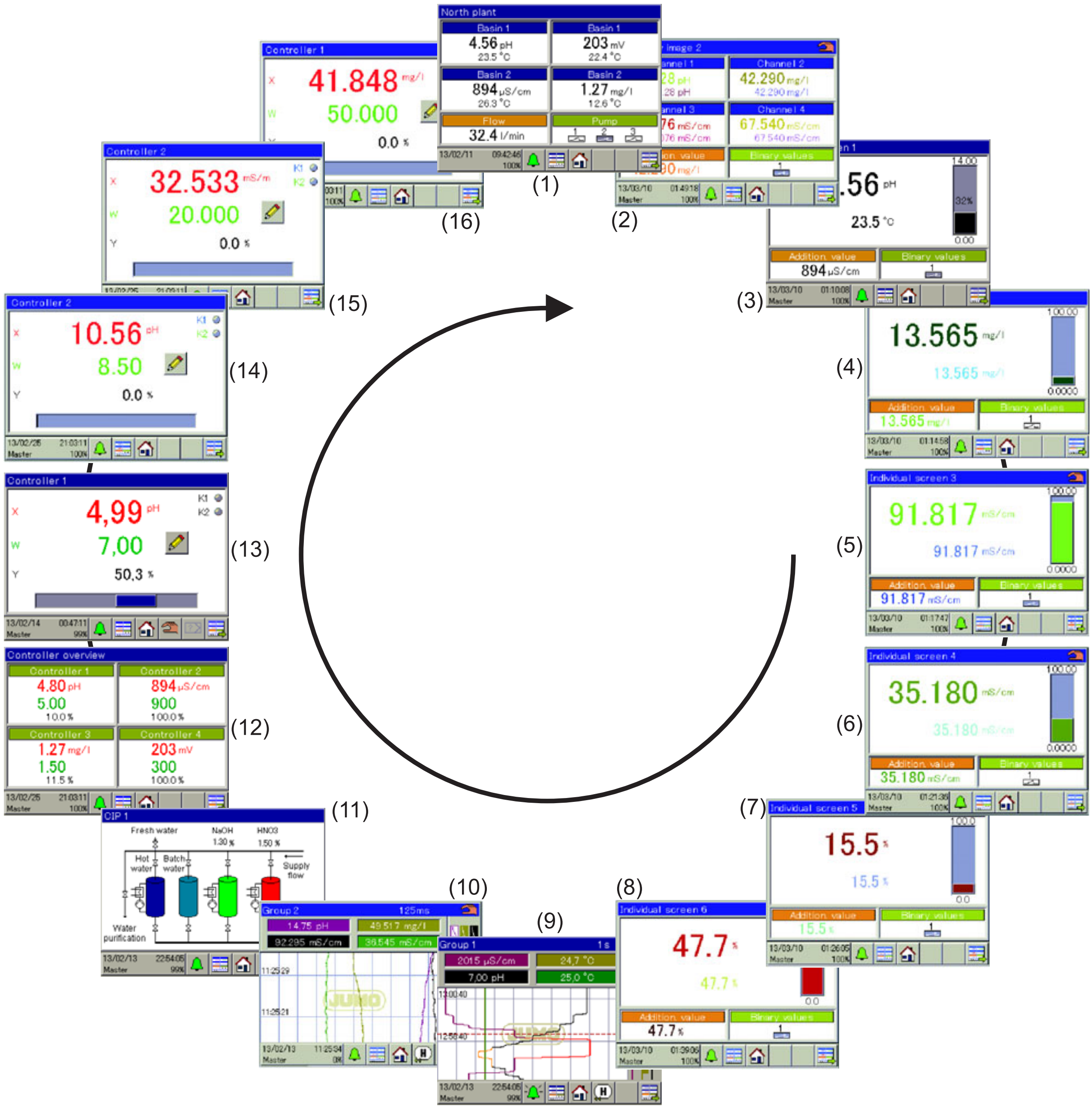


Fig.	Operation screen	Description
(1)	General screen 1	Freely configurable overview display of measuring values and digital signal states The overviews can be configured as a 2-part screen or a 4-part screen. **2-part screen:** Display of 2 primary and 2 secondary measured values per screen, 1 additional measured value and 3 binary values. **4-part screen:** Display of 4 primary and 4 secondary measured values per screen, 1 additional measured value and 3 binary values.
(2)	General screen 2	

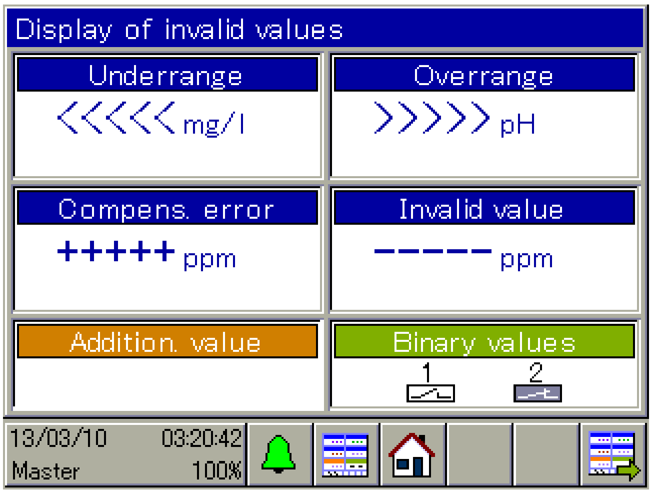
Fig.	Operation screen	Description
(3)	Detailed screen 1	Freely configurable large-section screen Display of 1 main measuring value, 1 second measuring value, 1 additional value and up to 3 binary values, as well as additional visualization of the main measuring value and the alarm limits for an analog input with a bar graph
(4)	Detailed screen 2	
(5)	Detailed screen 3	
(6)	Detailed screen 4	
(7)	Detailed screen 5	
(8)	Detailed screen 6	
(9)	Diagram group 1	Up to 4 analog measuring values and 3 digital functions can be displayed on a configurable recorder screen. Diagrams of disabled groups are not available in the operation loop.
(10)	Diagram group 2	
(11)	Process screen	User-defined visualization screen that is freely configurable by means of an editor in the PC setup program ⇨ Chapter 19.8.10 "Process screens", Page 277 With the aid of static and dynamic graphic and display elements for analog and binary values, it is possible to create a screen that displays the process flow concerned in an especially vivid manner. If no process screen is configured, none is available for the operation loop.
(12)	Controller overview	The active controller channels are visualized here in an overview display. The controller overview becomes available as part of the operating loop only if at least 2 controllers are activated. The current setpoint values, actual values and output levels are displayed for all active controllers. In addition, the operating states of the controllers are displayed (manual mode, hold, self-optimization).
(13)	Controller screen Controller 1	The controllers are visualized in detail on the controller screens. The controller screens are available as part of the operation loop only for the respectively configured channels. The information displayed includes the current setpoint value, actual value and output level. The binary values of switching controller outputs are visualized. In addition, controls for setpoint value entry, manual output level control and self-optimization are available. Access to the operating functions depends on the user rights of the logged-in user.
(14)	Controller screen Controller 2	
(15)	Controller screen Controller 3	
(16)	Controller screen Controller 4	

Display of invalid values

Invalid input signals/measured values or errors in the analog input configuration are detected and shown in the measured value displays as follows:

Type of error	Display
underrange: measuring range underflow	<<<<<
overrange: measuring range overflow	>>>>>
Compensation error: An error occurred when compensating for factors affecting the measurements of the analysis. It is necessary to check the measuring circuits and settings of the compensation signals and the configuration of the analysis measuring input affected.	+++++
Invalid display value Possible errors include: **Incorrect input signal:** An analog input has an incorrect signal or an analog input was selected for which an optional board is not even present. **Error in the formula used by the mathematics module:** The result from a mathematical formula is invalid (e.g. division by zero)	-----
Display overrun: The value to be displayed is outside the limits of -99999 to +99999.	*****

Example of display of invalid values:



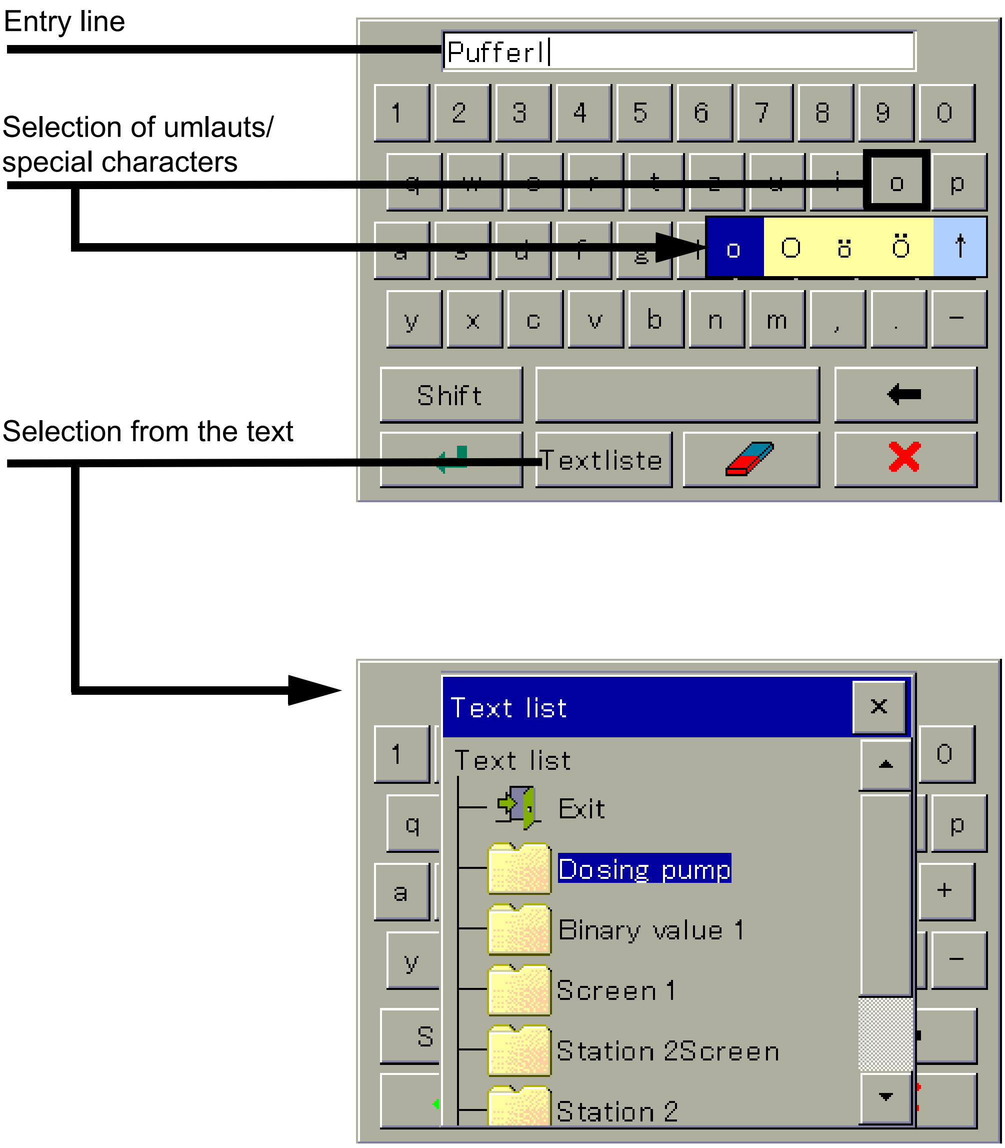
8.1.4 Entry of text and numbers

Dialogs for entry of text or numbers appear automatically when the corresponding entry field is tapped.

Text entry dialog

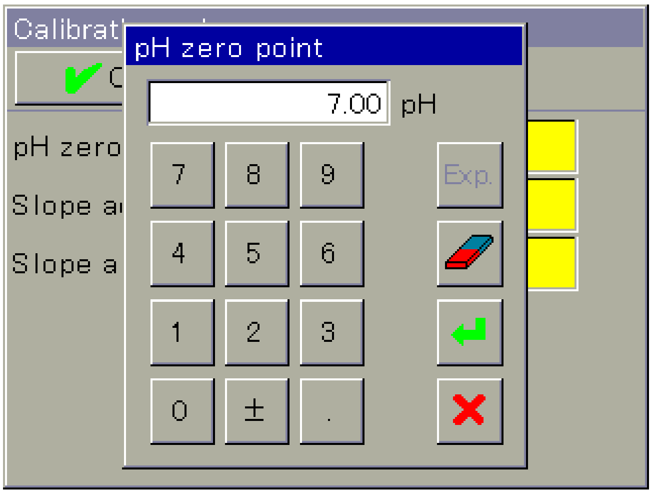
There are 2 special features in addition to conventional entry of characters:

- **Special characters** appear for selection automatically at those buttons that contain special characters.
- **The text list** simplifies entry of frequently used character strings. A history of character strings entered is stored internally in the device. These are then available for selection in the text list and can be copied simply by tapping the line for the entry.

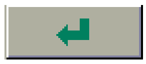
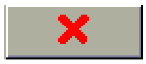
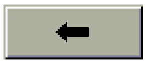
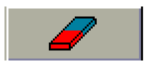
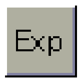


Number entry dialog

This dialog opens if an entry field for numerical values is tapped.
Special feature : The **"Exp" button** permits entry of an exponent as a power of ten.
Procedure:
Enter the numerical base value ➔ Tap "Exp" ➔ Enter the exponent ➔ Confirm the entry



Entry dialog buttons

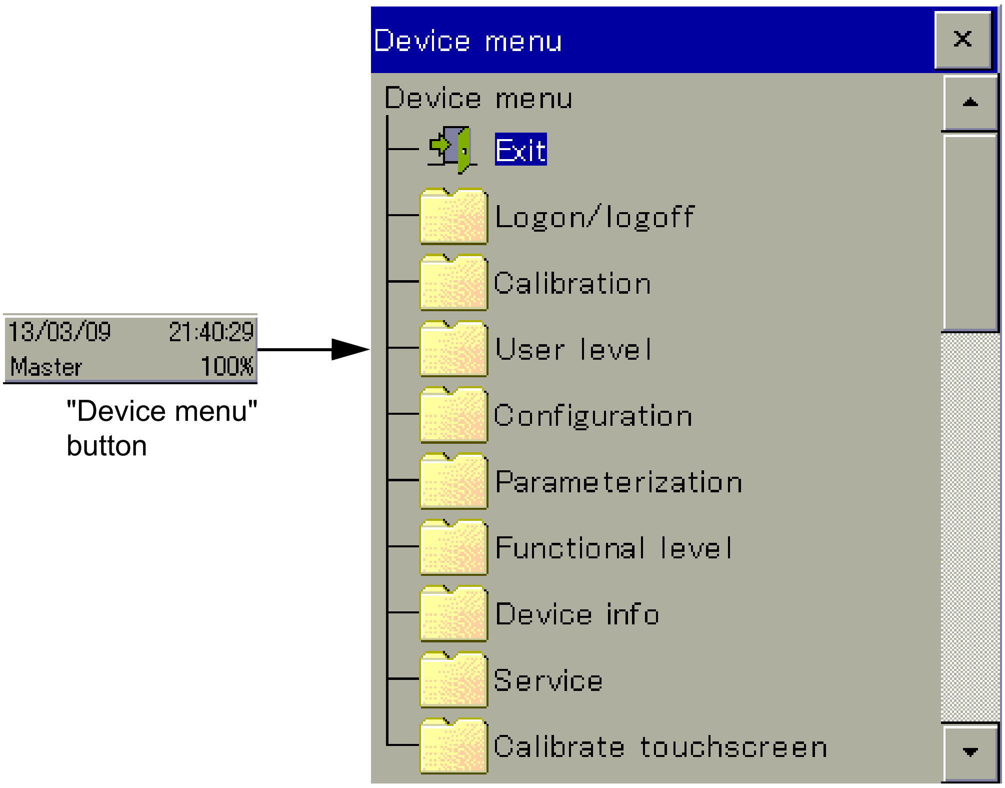
Explanation	Button
Confirm entry (the value entered is accepted and the dialog closed)	
Cancel entry (the value entered is discarded and the dialog closed)	
Delete 1 character	
Delete entry line completely	
Open text list (select from a history of character strings entered)	
Entry of an exponent as a power of ten	

8.2 Device menu

NOTE!
Operation depends on the user's rights. Operating and setting options are restricted, depending on the user who is logged in.
The "Master" and "Service" users have access to all menus and functions (factory setting).
⇨ Chapter 8.1.1 "Passwords and user rights", Page 71

The device menu contains submenus for setting and configuring all device functions.
To open one of the submenus in the device menu, tap the corresponding entry.
The device menu is opened by tapping the "Device menu" button at the operating level.

⇨ Chapter 8.1.2 "Display and control elements", Page 73
⇨ Chapter 8.1.3 "Menu structure", Page 74

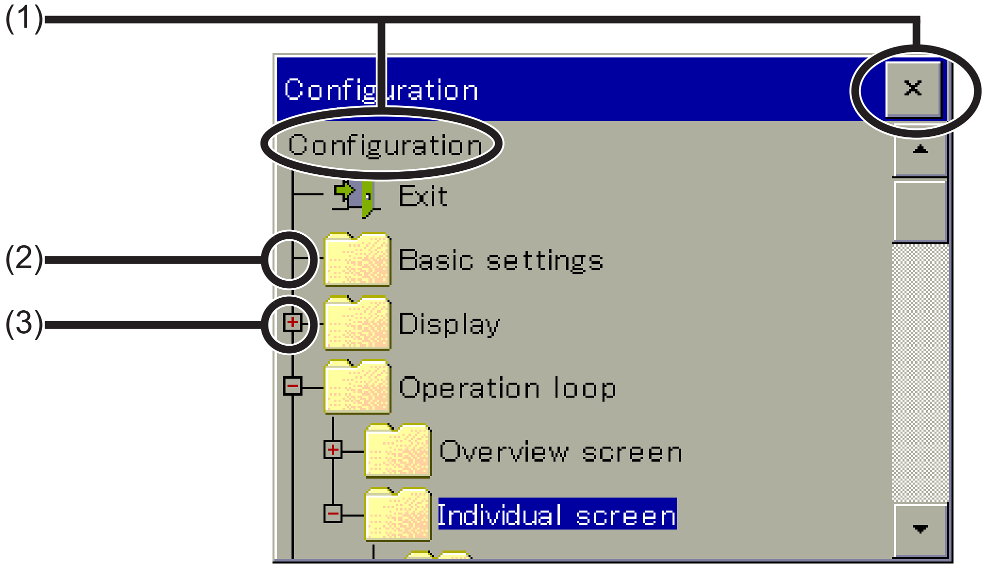


"Device menu" button

Device menu items	Description
Log-on/Log-out	This is where the user logs on and logs out. In addition, passwords can be changed here. ⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84
Calibration	Sensor calibration can be configured and performed here. In addition, current calibration values and the calibration logbook are displayed. ⇨ Chapter 12 "Calibration in general", Page 177

Device menu items	Description
User level	Permits fast and simple access to a selection of up to 25 frequently needed parameters from the parameter level and the configuration level. No user level is configured at the factory. The user level must be configured and loaded into the device with the aid of the JUMO PC setup program. The "User Level" entry does not appear in the device menu as long as no user level is configured. ⇨ Chapter 8.2.2 "User level", Page 85
Configuration	Basic operation of the device inputs and outputs and the device functions is set here. ⇨ Chapter 10 "Configuration", Page 119
Parameterization	Setting the date/time and controller parameter sets, as well as pre-setting controller setpoint values. Fixed numerical values can be defined in the "Manual values" submenu. ⇨ Chapter 9 "Parameterization", Page 113
Functional level	Manual operation of certain functions for testing and diagnostic purposes (e.g. start wash contact or reset counter) ⇨ Chapter 8.2.3 "Functional level", Page 86
Device information	Information about the device hardware and software, viewing of current analog and binary values for all device functions, inputs, and outputs ⇨ Chapter 8.2.4 "Device information", Page 88
Service	Display and readout of service data for diagnostic purposes, saving and loading of a default configuration and performance of the basic Ci base calibration for commissioning of Ci analysis inputs (inductive conductivity) ⇨ Chapter 8.2.5 "Service", Page 89
Calibrate Touchscreen	Calibration of the touchscreen to ensure the reliability and convenience of touch control ⇨ Chapter 8.2.6 "Calibrating the touchscreen", Page 90

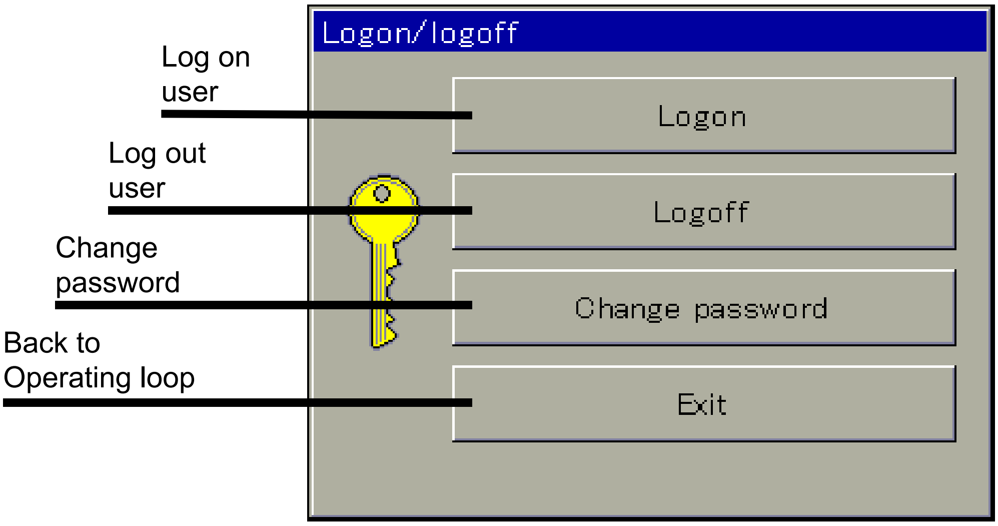
To navigate in submenus, menu items are opened by tapping the folder icons identified with a plus sign. Open menu structures are identified with a minus sign and can be closed again by tapping the folder icon.
Currently open windows can be left either by tapping "Exit" or the "Close window" button. Data are saved automatically when an open window is closed. Settings that were changed in the submenus take effect.



(1) Close window
(2) Closed menu structure (plus sign)
(3) Open menu structure (minus sign)

8.2.1 Log-on/Log-out

To access the "Log-on/Log-out" menu, tap the "Device menu" button and then select the "Log-on/Log-out" menu item. The user can log on/out here and change passwords for the
currently configured user accounts.



An overview of the factory-configured users and their rights can be found in the "User Management" chapter.

⇨ Chapter 8.1.1 "Passwords and user rights", Page 71

After the re-authentication time has elapsed, a logged-on user is logged out automatically. It is then necessary to log on again.
The re-authentication timeout does not take effect if:

- The log-on/log-out dialog is open
- The memory manager is open
- During calibration of analysis sensors
- During calibration of the touchscreen

The re-authentication time is set using the JUMO PC setup program.

⇨ Chapter 19.8.2 "User list", Page 259

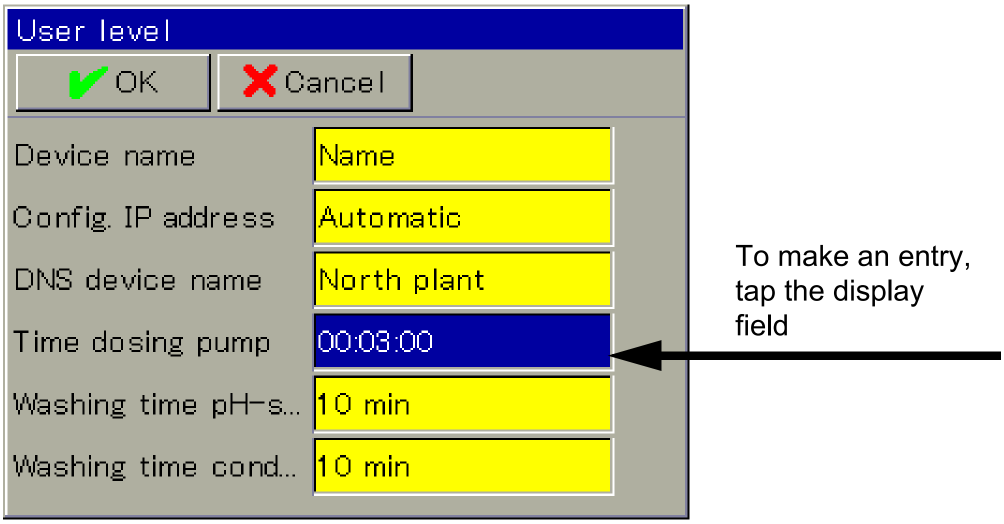
8.2.2 User level

The user level consists of a user-defined list of parameters and configuration settings. You need the JUMO PC setup program to configure the user level.

⇨ Chapter 19.8.5 "User level", Page 270

The user level can be opened from the device menu only if it has been configured beforehand with the aid of the PC setup program. If this has not been done, there is no user level in the device menu.
Opening the user level provides easy and uncomplicated access to the selected parameters and settings. These can be edited from here. The entry dialog is opened by tapping the display field for a desired data point.

View of the user level (example)



NOTE!
Changing the date/time settings and the configuration data that are relevant for recording of measurement data initiates a restart of measurement data recording by the data monitor or recording function. This is also the case if the change is made from the user level. The restart terminates the current recording of measurement data. In the case of the "Data monitor" function, the content of the screen is deleted.

8.2.3 Functional level

The functional level is used primarily for testing and diagnostic purposes. Analog and binary values of the outputs can be controlled manually here. This may be useful, for instance, for checking an individual piece of equipment in a plant. When performing maintenance and repair work, counters for operating hours, switching actions and flow rates can be reset.

WARNING!
When manually controlling equipment in a system, it is absolutely essential to take appropriate measures to prevent personal injury and property damage.

Ensure that only qualified personnel has access to the functional level. The factory settings restrict access to just "Master" and "Service" users.

Functional level menu items:

- **Flow rate:** Display the current flow rate, display and reset the total quantity counter
- **Washtimer:** Manually start the wash process, display the time remaining until the wash process and the current binary value
- **Analog outputs:** Read and manually control the current values of analog outputs
- **Digital outputs:** Read current binary values, manually control digital output outputs
- **Counters:** Reset the counters (operating hours and service counters)

NOTE!
Manual control of analog and digital outputs is possible only if the "Enable menu. mode" option is activated for the specific output in the configuration. In general, actions at the function level can be executed only by the "Master" and "Service" users.

⇨ Chapter 10.6 "Analog outputs of base unit and optional boards", Page 136
⇨ Chapter 10.8 "Digital outputs of base unit and optional boards", Page 138
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

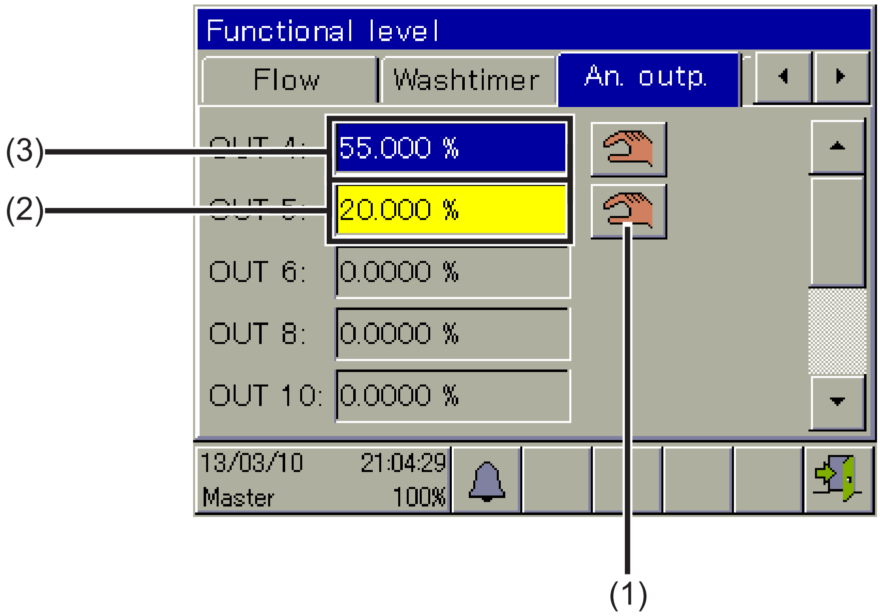
Manual control of analog/digital outputs

Activate the configuration setting "Enable menu mode" for the outputs you wish to control manually. "Manual mode buttons" buttons for manual control for these outputs then appear at the functional level. To adjust output values manually, proceed as follows:

Select Device menu ➔ Functional Level ➔ Analog or Digital Output tab ➔ Tap "Manual mode: button ➔ Tap Output Display field ➔ Entry dialog opens ➔ Enter value ➔ Confirm

An activated manual mode can be recognized by the green background of the particular output value display at the functional level.

View of functional level analog outputs (example)



(1) "Manual mode" button
(2) Yellow background: Manual mode off
(3) Green background: Manual mode active

Once "Manual mode" has been switched off, the output immediately returns to the value assigned in its configuration. The output display is once again yellow.

8.2.4 Device information

For testing and diagnostic purposes, the "Device info" menu provides access to extensive data about the hardware and software of the device, as well as current analog and binary values.

Device Info menu items:

- **General:** Information about the main board, device software and Ethernet configuration
- **Slots:** Overview of populated expansion slots, display of diagnostic and version information for the installed optional boards
- **Inputs/outputs:** Overview of all analog and binary values of the inputs and outputs of the device
- **Functions:** This menu is particularly helpful when checking functions after configuration changes. It contains detailed information about all internal functions (math/logic, flow rate, limit value, timer, washtimer, counter, and controller) via their current status.
- **Ethernet info:** Ethernet communication statistics for diagnosis by trained personnel

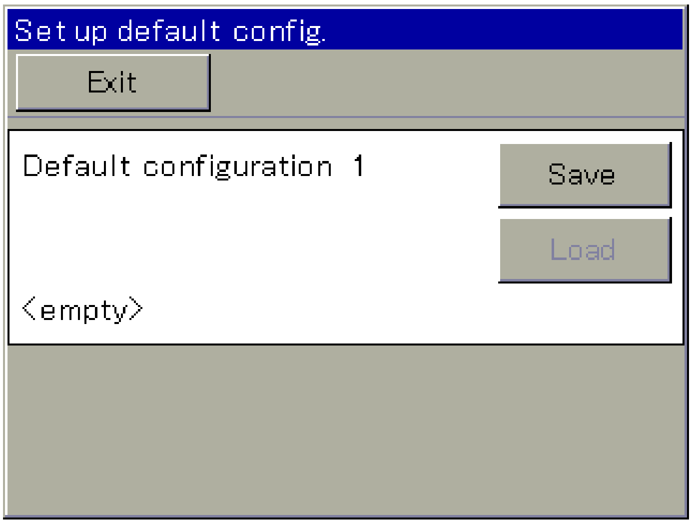
8.2.5 Service

The "Service" menu is used for in-device troubleshooting and diagnostics. It is intended primarily for trained personnel. When troubleshooting together with Service, the operator can access data that the JUMO service technicians need for diagnosis.

NOTE!
The Service menu appears in the Device menu only if a user with corresponding user rights is logged in.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

Service Menu items

- **Default-configuration:** The operator can store the current device configuration in the device's memory. This configuration can be reloaded as the active configuration at any time. This is important, for instance, to return to the initial configuration after configuration changes made for testing purposes.



Configurations can also be saved with the PC setup program or on a USB flash drive with the aid of the Memory Manager.

⇨ Chapter 8.4 "Memory Manager (USB flash drive)", Page 95

- **Debug Window:** The Debug window can be used to check the behavior of the device software in detail. Data are displayed to assist the JUMO service technicians during troubleshooting.
- **Ci base calibration:** The Ci base calibration is required when commissioning an optional board or sensor for inductive conductivity measurements and can be performed here.
  ⇨ Chapter 11.3 "Ci base calibration", Page 172
- **Service data: Status information** that can be evaluated by JUMO service personnel for diagnostic purposes can be read here.
  In addition, the **"Service count."** and **"Internal data"** are displayed. The

service counters record the number of switching operations executed by the digital outputs. The **voltage of the backup battery** and the **board temperature** are shown in the "Internal data".

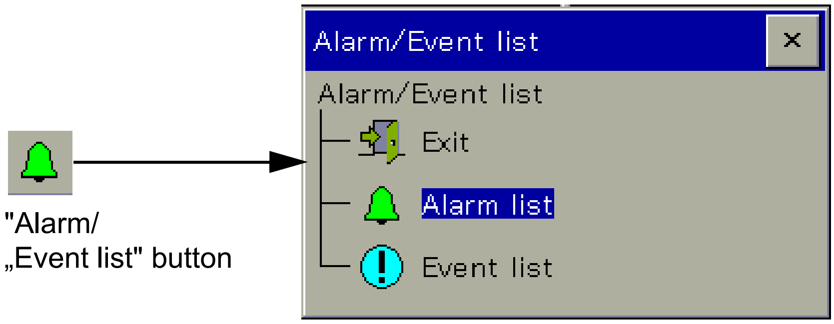
8.2.6 Calibrating the touchscreen

To ensure precise and reliable operation of touchscreen control, you can open the "Calibrate touchscreen" menu.
The device then prompts you tap 4 points on the touchscreen.
Simply follow the instructions on the display.

8.3 Alarm/Event list

The JUMO AQUIS touch S offers the option of configuring alarm functions and event functions in numerous functions. In addition, the electronics of the JUMO AQUIS touch S are self-monitoring and trigger corresponding preprogrammed alarms and events in case the internal device malfunctions.
Alarms and events appear in the lists in chronological order. The respective list is opened from the "Alarm/Event List" menu.
The alarm/event list is opened by tapping the "Alarm/event list" button at the operating level.

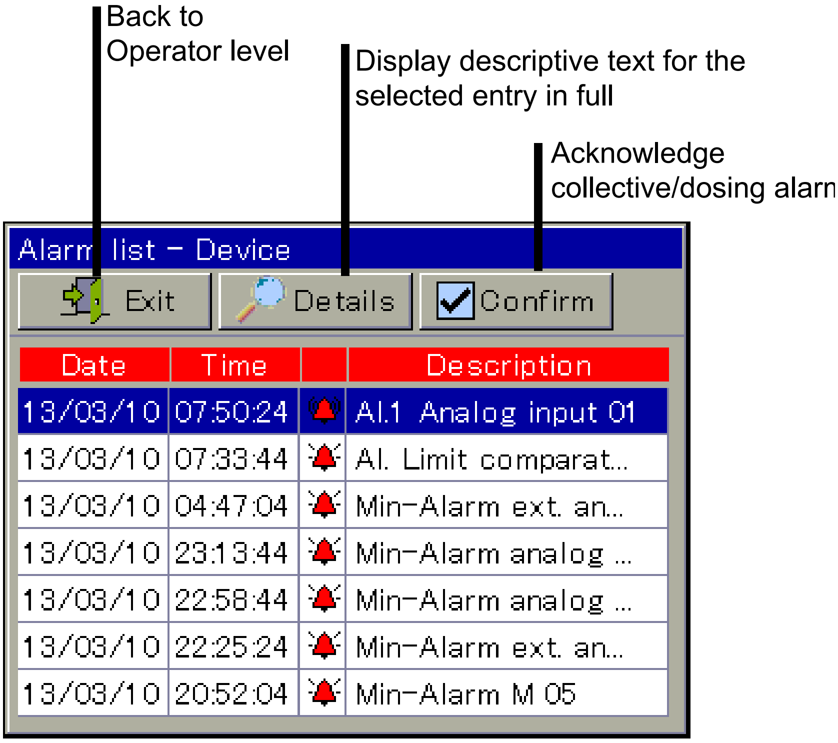
⇨ Chapter 8.1.2 "Display and control elements", Page 73
⇨ Chapter 8.1.3 "Menu structure", Page 74



8.3.1 Alarm list

The alarm list displays the current alarms. Alarms are cleared upon elimination of the alarm condition. Each alarm triggers a "collective alarm". The alarm list view contains buttons for viewing details about alarms and acknowledging collective and dosing alarms.
⇨ "Acknowledging collective/dosing alarms", page 92

Example: Alarm list



Alarms are visualized further by the color of the bell icon on the "Alarm/event list" button, in the "Alarm list" menu item of the "Alarm/event list" menu and in the title bar of the operation screens:

- red bell: at least 1 alarm present
- green bell: no alarms

Visualization of alarms in the title bar can be activated in the configuration. The most recently occurring alarm then flashes red in the title bar of the operation screens.
⇨ Chapter 10.3.1 "General information", Page 121

If the alarm from a measuring input disappears, the color of the respective measuring-value display changes in accordance with the color settings.
⇨ Chapter 10.3.3 "Colors", Page 122

All alarms are available in the binary selector. In this way, digital outputs or other internal functions of the device can be controlled via alarms.

Acknowledging collective/dosing alarms

The **collective alarm** combines all alarms in the alarm list. It simplifies signaling of one or several active alarms with external indicating devices or to control rooms. The digital signal for the collective alarm is available in the binary selector in 2 versions:

- **Collective alarm:** Is triggered by the occurrence of any alarm and disappears only after all alarms in the alarm list have been cleared.
- **Collective alarm ack.:** Is triggered by the occurrence of any alarm and disappears when the alarm is acknowledged.

Selection of a collective alarm when configuring device functions and digital outputs:
Binary selection ➔ Alarm and internal -signals ➔
Collective alarm/Collective alarm ack.

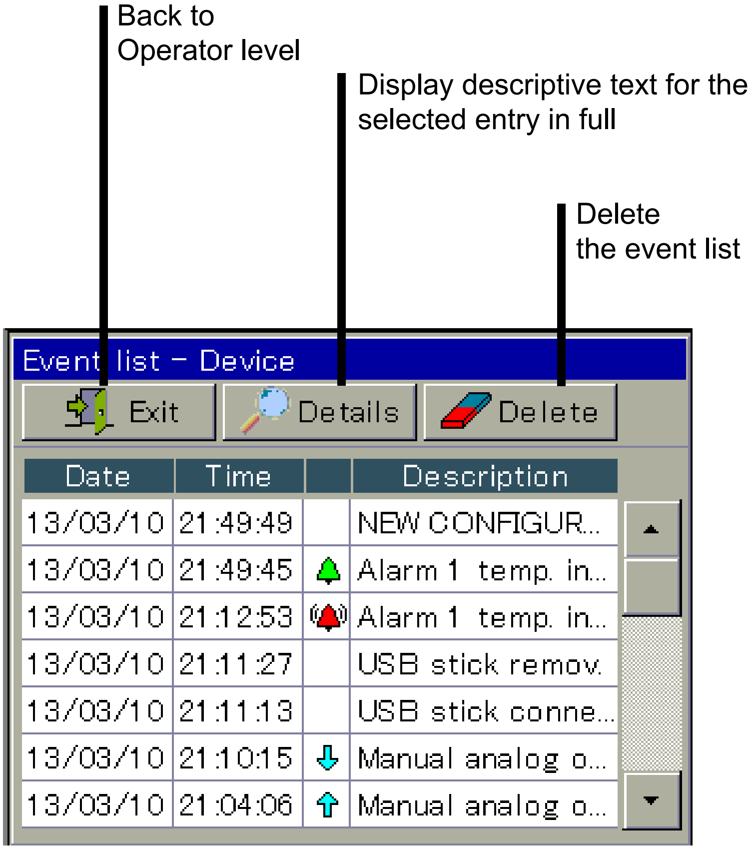
Dosing alarms are triggered by the controllers if the absolute value of the control deviation is larger than the "alarm tolerance". An "alarm delay" can be set for each dosing alarm. Dosing alarms and acknowledgment of them must be activated in the controller configuration. The "alarm tolerance" and "alarm delay" settings are made in the controller parameters.
⇨Chapter 10.11.1 "Configuration of the controllers", Page 144
⇨Chapter 9.2 "Parameter Sets (Controller parameter)", Page 114

Selection of a dosing alarm when configuring internal functions and digital outputs:
Binary selector ➔ Controller ➔ Dosing Alarm Controller 1 to 4

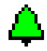
Collective and dosing alarms can be acknowledged with the "Confirm" button.

8.3.2 Event list

A number of situations that are essential for tracking and diagnostic purposes are logged in the event list. The entries are identified with corresponding icons on the basis of the type of event. In addition, events are logged with an icon in the data monitor/recording function.
Detailed information on the data monitor/recording function
⇨ Chapter 8.6 "Operation of the data monitor/recording function", Page 104

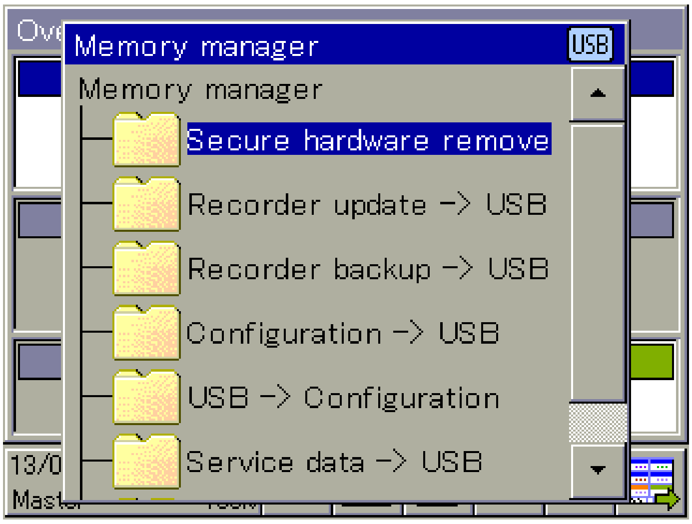


The following table provides an overview of the possible entries in the event list.

Events	Symbol
Power on	
Power off	
Alarm occurred	
Alarm cleared	
• Configured event (condition occurred) • Calibration start • Timer start • Wash contact start • Controller manual mode on • Controller self-optimization started	
• Configured event (condition ended) • Calibration stop/cancel • Timer stop • Wash contact stop • Controller manual mode off • Controller self-optimization ended	
Comment entered	
• Switch daylight saving time • No connection to an input module • Configuration change • Reset counter • Reset flow rate measurement • Confirm collective alarm	No symbol

8.4 Memory Manager (USB flash drive)

NOTE!
The USB host socket is required to connect the USB flash drive (see Chapter 4.2 "Order details", page 23, Extra Code 269).



Data are transferred between the JUMO AQUIS touch S and a USB flash drive via the memory manager. To open the memory manager, close all windows and insert the USB flash drive into the USB host interface. The memory manager will then open automatically. You require the relevant user rights for access to the menu options "USB->Configure devices and "Software update". The factory settings authorize the "Master" and "Service" users for this.

⇨ Chapter 8.1.1 "Passwords and user rights", Page 71

Memory Manager menu items:

- **Safely remove hardware:** To prevent hardware damage or loss of data, it is necessary to select this menu item before removing and inserted USB flash drive. Please follow the instructions on the device's display.
- **Recorder Update -> USB:** Use this function for **regular retrieval of recorder data** and **continuous archiving** of measured-data histories.
  Measurement data that have not yet been retrieved are stored on the flash drive together with their configuration data.
  The measurement data are stored in DAT files and the configuration data in SET files. This data can be opened and evaluated with the aid of the JUMO PCA3000 evaluation software. Data that has been read out is marked internally as retrieved and the available memory display is reset to 100%.

CAUTION!
Ensure that recorder updates are performed in a timely manner!
When the ring memory is full (display of remaining memory in device reads 0%), measurement data in the ring memory is lost (starting with the oldest).

- **Recorder Backup -> USB:** This function is used to **back up** the recorder data to **prevent data loss**.
  All measurement data in the ring memory (also data already retrieved) are transmitted to the flash memory together with their configuration data.
  The measurement data are stored in DAT files and the configuration data in SET files. These files can be opened and evaluated with the aid of the JUMO PCA3000 evaluation software.
  In contrast to Recorder Update, there is no internal marking of recorder data and no resetting of the available memory display.

NOTE!
The "Recorder Update" and "Recorder Backup" functions are available only if the extra code "Recording" is enabled.

NOTE!
A measuring data recording session is closed by changing configuration data that are relevant to the data monitor or registration function (e.g. scaling or description of an analog channel). The measurement data accumulated since the beginning of the current recording session are stored in the device in a file with the extension "DAT" together with an additional file with the extension "SET". A new recording session begins as soon as the new configuration goes into effect. One DAT file and one SET file are created for each recording session when recorder data are retrieved via Update or Backup.

- **Device Config. -> USB:** The complete, current configuration of the device is transmitted to the flash drive and saved in a file with the name "KONF304.SET". If the flash drive already contains a configuration file, a security prompt appears asking whether you are sure you want to overwrite this file. Pressing the "OK" button saves the current configuration to the flash drive and overwrites the previous file.

- **USB -> Device config.:** A configuration that is saved on the flash drive is loaded into the device and activated as the current configuration. Only the currently active configuration is overwritten. The previous default configuration is retained. If desired, the current configuration can be saved as the default configuration.
  ⇨ Chapter "Service Menu items", Page 89

NOTE!
A check of version compatibility is performed when transferring device configurations from the USB flash memory to the device. If the device setup on the USB flash drive is incompatible with the version of the device software, the transfer is terminated. The second term of the device version number must be greater than or equal to the second term of the device version number used to create the device setup file. Examples of combinations of version levels:

Device software version used to create the configuration = 304.**02**.xx, device software version of the destination device = 304.**02**.xx,
The versions are compatible

Device software version used to create the configuration = 304.**01**.xx, device software version of the destination device = 304.**02**.xx,
The versions are not compatible

Device software version used to create the configuration = 304.**02**.xx, device software version of the destination device = 304.**01**.xx,
The versions are not compatible

- **Service data -> USB:** A data record with service-relevant information about the device is transmitted to the flash drive and saved in a file with the name "DEBUG304.SET". The information can be used by JUMO Service for diagnostic purposes.
- **Software Update:** The device software can be updated with the aid of a USB flash drive. To do so, an appropriate update file must have been saved on the flash drive in advance; this file can be obtained from JUMO Service.

CAUTION!
It is strongly recommended that the configuration and recorder data be backed up prior to performing a software update.

8.5 Operating the controllers

NOTE!
Since the automatic control mode is of prime importance in the case of controllers,
correct configuration of the individual controller and its parameterization (adjustment of the control response) are very important for achieving good process
value stability.
Before commissioning a controller channel, ensure that all settings in the configuration and the parameterization are
correct.
⇨ "Operating the controllers", page 98
⇨ Chapter 9.2 "Parameter Sets (Controller parameter)", Page 114

NOTE!
In most cases, the parameterization are made automatically with the aid of self-optimization. In exceptional cases, however, it may be necessary to determine
the controller parameters experimentally or to calculate them and then enter them into the controller's parameter sets manually.

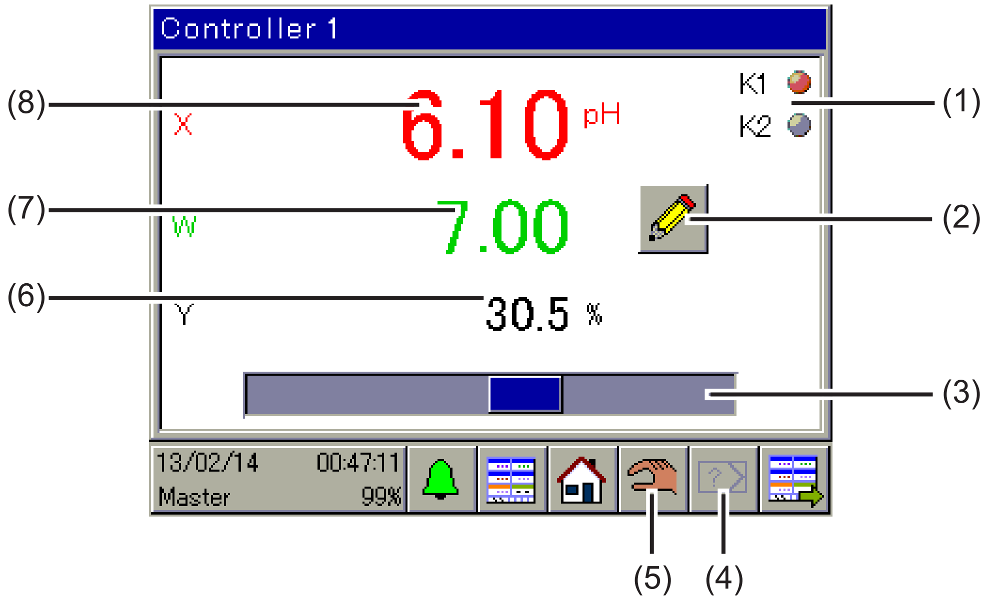
How to operate the 4 different operating modes (automatic mode, manual mode, hold mode and self-optimization) is described in the following 4 subchapters.

8.5.1 Automatic control mode

The automatic control mode is the normal operating mode used by the controller to
maintain the actual value of a process variable at the specified setpoint. The controller evaluates the control deviation and controls the output such that the actual value of the process approaches the setpoint. Changes to the current setpoint can be made in the controller operation screen or in the "parameterization". Two setpoints are stored for each controller in the parameterization. Setpoint 1 is active by default. Setpoint 2 can be activated instead of Setpoint 1 in each controller by means of "Setpoint selection". Setpoints can also be specified by external sources and transmitted to the controllers in the JUMO AQUIS touch S via analog inputs. "Setpoint selection" and the configuration of external setpoints are set in the "Setpoint configuration".

⇨ Chapter 9.3 "Setpoint values", Page 117
⇨ Chapter 10.12 "Setpoint value configuration", Page 151

On the operation screen of each controller, it is possible to change the current controller setpoint value, switch to the "Manual mode" or start "Self-optimization".



(1) Display of the digital controller output signals as indicator lights
(2) "Manual entry" button for changing the current setpoint value
A change to the currently active setpoint value is transferred to the controller parameters. When external setpoint values are used, this button is hidden.
(3) Bar graph to display the current output level
(4) Start/cancel "self-optimization" button
Self-optimization is used to determine the optimal controller parameters automatically.
(5) "Manual mode" on/off button
When manual mode is activated, the output level assumes a preconfigured
value and can then be changed manually.
⇨ Chapter 8.5.2 "Controller in the manual mode", Page 101
(6) Numerical display of the current output level
(7) Display of the current setpoint value
(8) Display of the current actual value

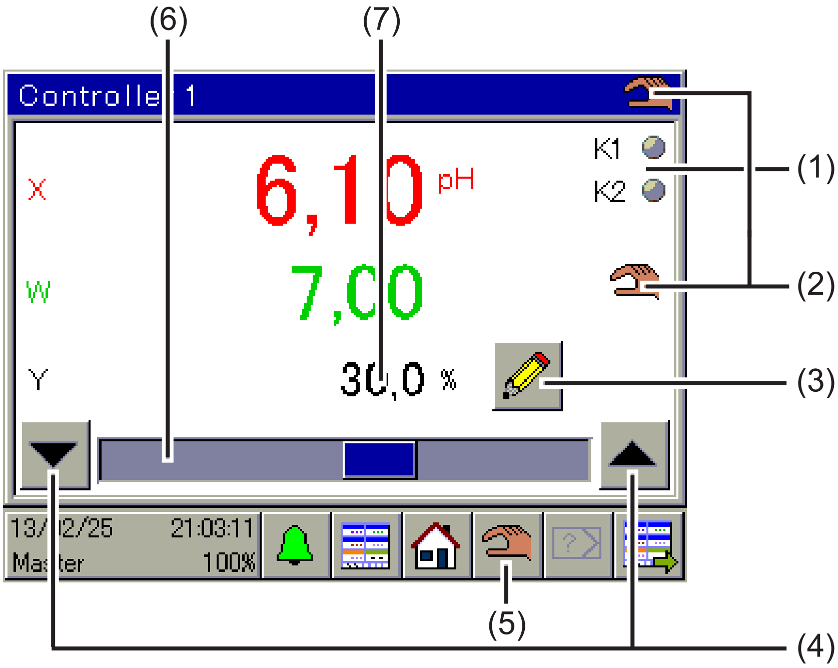
8.5.2 Controller in the manual mode

In manual mode, the user can manually control the controller outputs. The controller outputs can be controlled in two ways:

- **Entry of a numerical value:** Using the "Manual entry" button, the user can open a dialog to enter a fixed numerical value for the output.
- **Jogging mode:** Pressing and holding the arrow buttons sets the output to ±100% or the corresponding digital controller output to "on" depending on the controller configuration. After the button is released, the output level returns to 0% or the corresponding digital controller output level back to "off". This function is used to operate actuators (e.g. solenoid valves, dosing pumps or motorized positioners) manually. To protect the actuators, the output does not change abruptly when the button is pressed, but rather in a continuous manner.

It is also possible to specify a manual output level in the configuration in order to ensure that a "safety output level" is generated when changing to the manual mode.
The manual output level is preset in the controller configuration.

⇨ Chapter 10.11 "Controller", Page 144



(1) Display of the digital controller output signals as indicator lights
(2) Display of active manual mode
(3) "Manual entry" button for entering the manual output level
(4) "Jogging mode" button for manual control of actuators
- **Down arrow** for output level = -100% or digital controller output off (only for three-point, three-point step controllers and continuous controllers with integral position controller)
- **Up arrow** for output level = +100% or digital controller output on

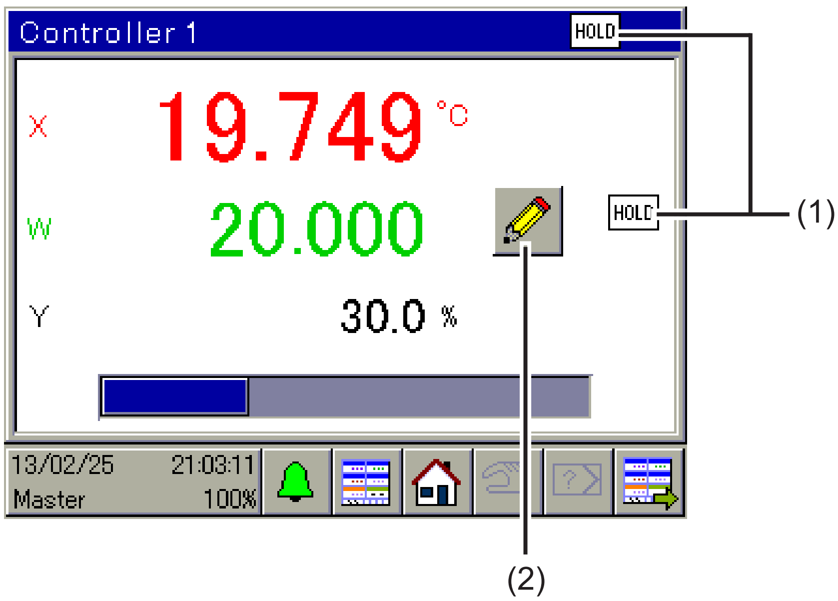
(5) "Manual mode" on/off button
(6) Bar graph to display the current output level
(7) Numerical display of the current output level

8.5.3 Hold mode

The hold mode of a controller is activated in two ways:

- Calibration of the actual-value input
- Hold signal for the individual controller (specified in the controller configuration)

In the hold mode, automatic control is suspended. The controller generates the preconfigured value as output level unless acceptance of the hold output is disabled in the configuration. In this case, the output level is frozen.
Only the setpoint value can be changed in this operating mode. In the hold mode, however, the setpoint value change has no effect. The changed setpoint value takes effect only when the controller returns to the automatic control mode.
The hold mode has priority over the manual mode. If the hold mode is activated while the controller is in the manual mode, the controller changes from manual mode to hold mode and then returns to manual mode when hold mode is deactivated.
The hold output level is preset and the digital signal for activating hold mode is set in the controller configuration.
⇨ Chapter 10.11 "Controller", Page 144



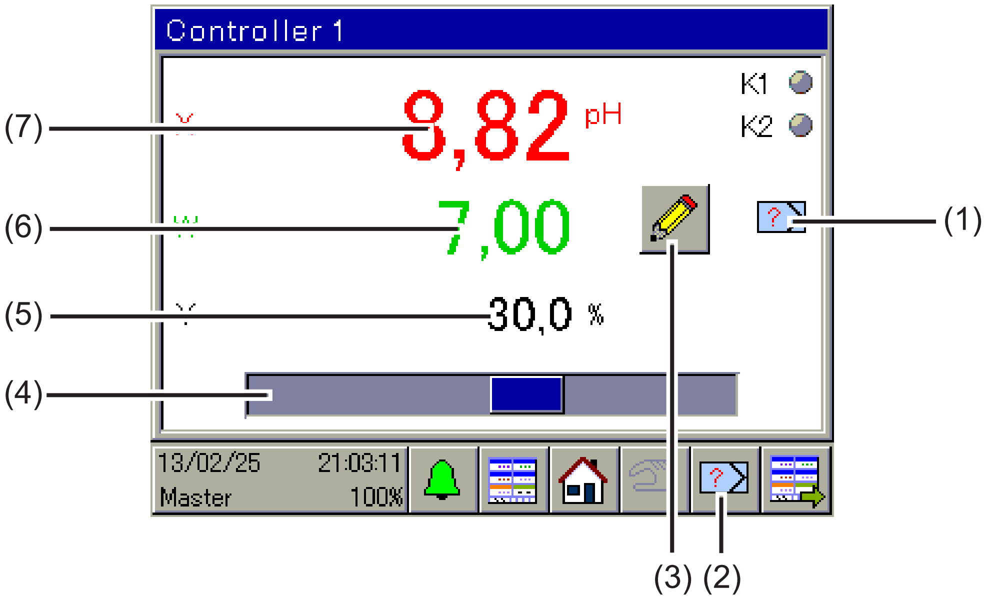
(1) Display of active hold mode
(2) "Manual entry" button for changing the current setpoint. The change to the currently active setpoint is transferred to the controller parameters. The output level, however, remains frozen during hold mode.
When external setpoint values are used, this button is hidden.
To configure external setpoint values:
⇨ Chapter 10.12 "Setpoint value configuration", Page 151

8.5.4 Optimizing controllers

The control response can be optimized by entering known controller parameters manually or automatically by means of "self-optimization". During self-optimization, the individual controller determines the mathematical parameters for a process. The controller changes the output level (step change) and evaluates the response of the actual value in the process (step response). Following successful self-optimization, the controller parameters determined in this way are adopted in the "Parameterization" function

⇨ Chapter 9.2 "Parameter Sets (Controller parameter)", Page 114

WARNING!
During self-optimization, the controller outputs assume unpredictable values! Before starting a self-optimization routine, it is important to ensure that there is no risk of property damage or physical injury due to large deviations between the actual value and the selected setpoint value.



(1) Display of active self-optimization
(2) Start/cancel "self-optimization" button
(3) Button for changing the current setpoint value
Changing the setpoint values during self-optimization is not possible.
(4) Bar graph to display the current output level
(5) Numerical display of the current output level
(6) Display of the current setpoint value
(7) Display of the current actual value

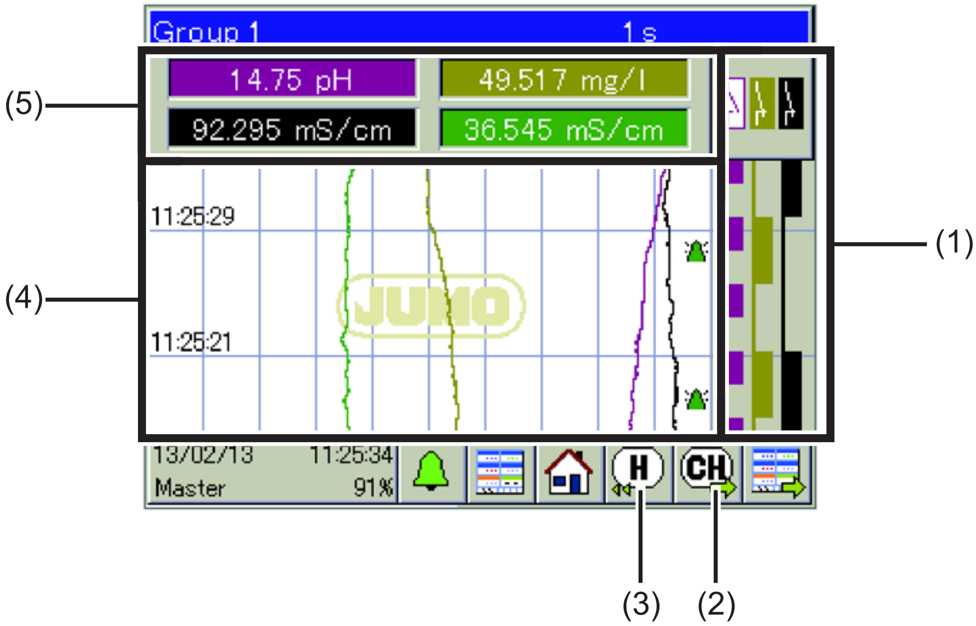
8.6 Operation of the data monitor/recording function

The standard version of the JUMO AQUIS touch S is equipped with a data monitor. It is used to record and view the analog measuring value and signal states of digital functions. Two groups are available, each of which can record up to 4 analog values and 3 binary values and display them in the form of a line recorder diagram. There is a separate diagram for each group in the operation loop.
The recording function represents an Add-On to the data monitor and is available as an extra code.

⇨ Chapter 4.2 "Order details", Page 22

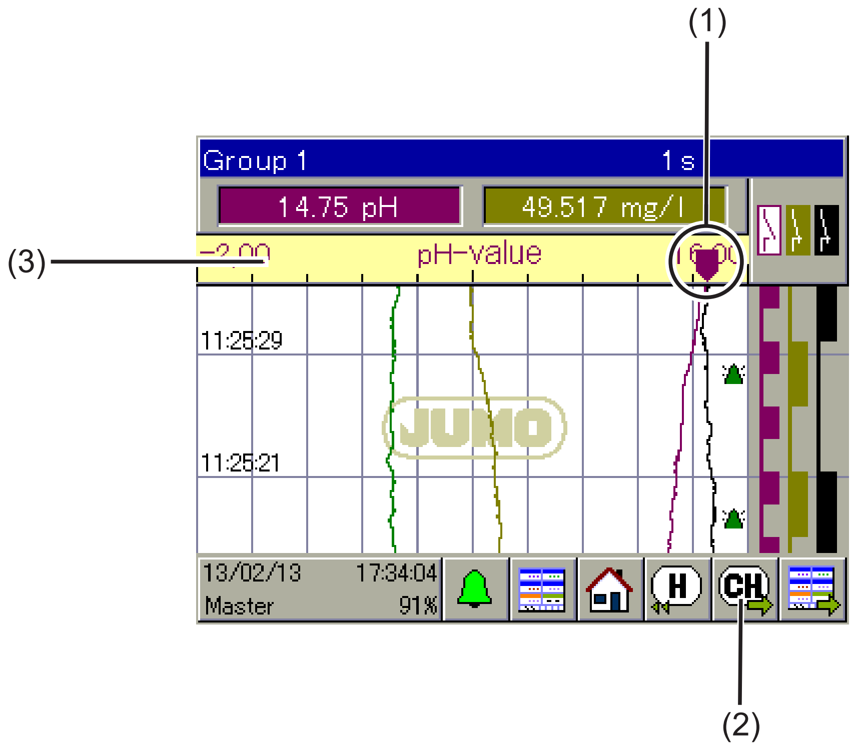
The features of the data monitor and recording function are listed in the following table:

Function / Features	Data monitor	Recording
Measured-data recording Recording of the measuring values from up to 4 analog channels and display of the measuring values in the form of a line recorder diagram	X	X
Digital data recording Recording of the binary values from up to 3 digital channels and display of the digital data in the form of a binary channel diagram	X	X
Displaying events Event list entries are shown as icons in the line recorder diagram	X	X
History function For scrolling the line recorder diagram to the past to view measurement data and events from farther back in time		X
Zoom function The time range is compressed to view measured-data histories over longer periods in one area of the screen		X
Measurement data retrieval for archiving recorded measurement data and evaluating the data via JUMO PCC/PCA3000		X


Group 1
1 s
14.75 pH
49.517 mg/l
92.295 mS/cm
36.545 mS/cm
11:25:29
11:25:21
13/02/13
11:25:34
Master
91%
(1)
(2)
(3)
(4)
(5)

Stylus trace view

The "Next channel" button is used to scroll through the individual stylus trace views
for the channels. For the particular channel selected, the stylus trace view shows the corresponding scale with a stylus. The position of the
stylus corresponds to the current measuring value of the channel.



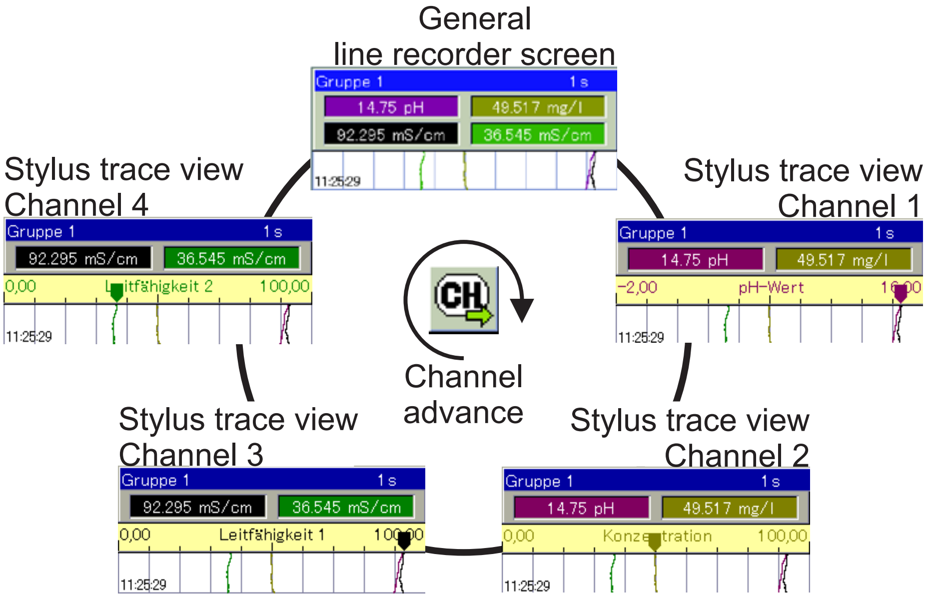
(1) Stylus
The position on the scale corresponds to the current measuring value of the channel.

(2) "Next Channel" button for scrolling through the stylus trace views (graphical representations of a scale with a stylus) for the individual channels 1 to 4

(3) Scale
The beginning and end of the scale correspond to the "display range" in the configuration of the source of the analog value (e. g. analog input or mathematical formula).

Scrolling through the stylus trace views

The sequence of views that appear with repeated tapping of the "Next Channel" button can be seen in the graphic below.

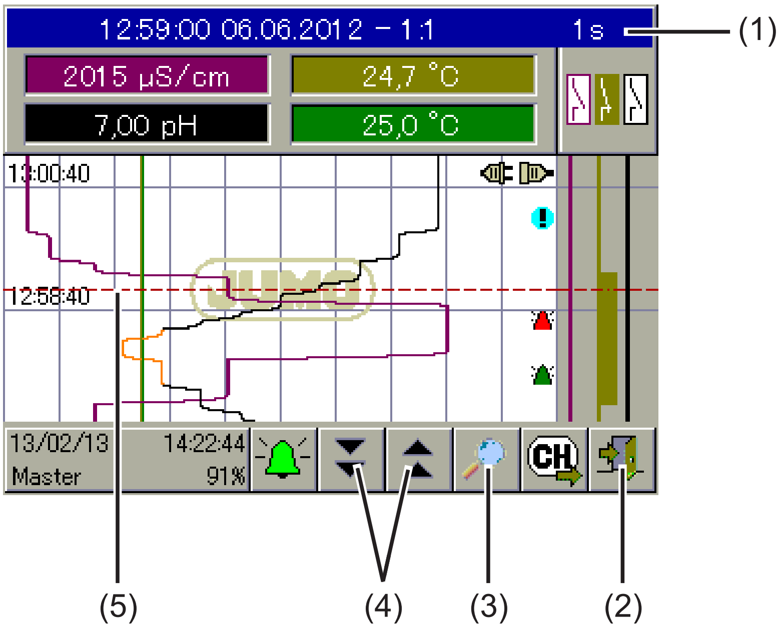


8.6.2 History function

The history function is available only in the recording function. It permits the user to view all recorded data in the ring memory on the device's display. The history is opened by tapping the "History" button on the operation screen for the respective group. The scroll and zoom functions can be used to put the view in the desired form.

- **Scroll:** The diagram can be scrolled forward and backward with the aid of the "Scroll" buttons.
- **Zoom:** The time range in the display can be compressed with the aid of the "Zoom" button. This permits viewing of measurement curves over a longer period of time in a single area of the screen.

The "Exit" button is used to leave the history view; the display then returns to the operation screen for the corresponding group.



(1) Title bar with indication of the cursor position (time and date), Zoom factor and memory cycle time
(2) "Exit" button for leaving the history view
(3) "Zoom" button for compressing the time range in the area of the screen
(4) "Scroll" buttons for scrolling forward and backward in the history
(5) Cursor

8.7 Online visualization

Using a web browser, all operation screens of the operation loop, the alarm/event list, the measurement data history of the recording function and the calibration logbooks can be opened and viewed online. This requires the "Standard online visualization" to set as online visualization in the basic settings.
⇨ Chapter 10.2 "Basic settings", Page 120
A PC with Microsoft® Windows® operating system and Silverlight® installed is required to use this function.

Actions involving the device functions (e.g. setpoint value entry or operating a controller manually) are not possible from a web browser and must take place directly on the device. Device settings can be made only on the device itself or via the JUMO PC setup program. In the online visualization, the "Device menu" button opens only the calibration logbook. In the recording function, the measured-data history can be opened.

Detailed information on the above-mentioned views:
⇨Chapter "Operation screens in the operation loop", Page 76
⇨Chapter 8.3 "Alarm/Event list", Page 90
⇨Chapter 12.3 "Calibration logbook", Page 179

The online visualization can be opened by up to 5 clients simultaneously.

NOTE!

The web server can also be configured and activated as an alternative to online the visualization. When a web server is active, the website of the web server is displayed in the web browser instead of the online visualization.

The website is opened in exactly the same manner as the online visualization, i.e. by entering the IP address or the URL of the device. Up to 5 clients have simultaneous access. The user needs the web server password to open the website.

Operation of the web server visualization depends on the specific layout of the website stored in the device.

⇨ Chapter "Checking the e-mail function", Page 297

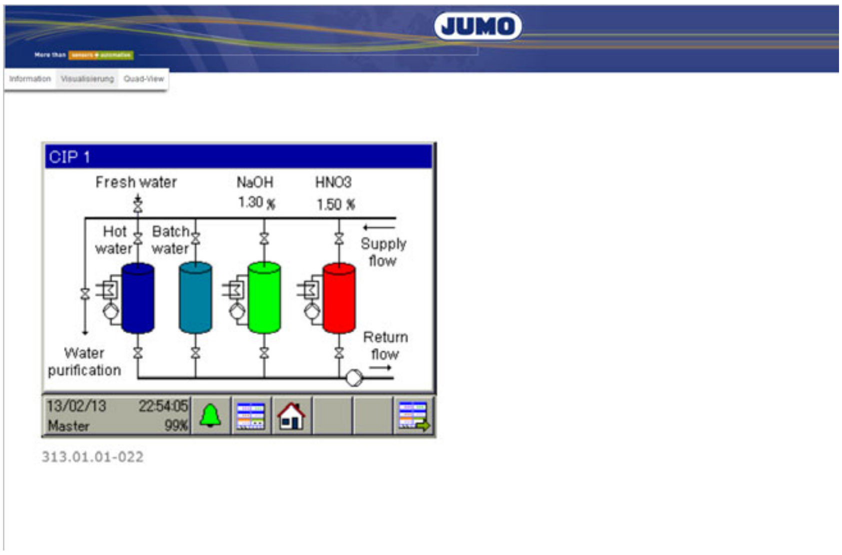
The online visualization is open with a web browser.
Enter either the IP address or the URL of the JUMO AQUIS touch S in the address bar of your web browser.
⇨ Chapter 10.16 "Ethernet", Page 157

When the website opens, it is possible to select between "Visualization" and " Quad View".

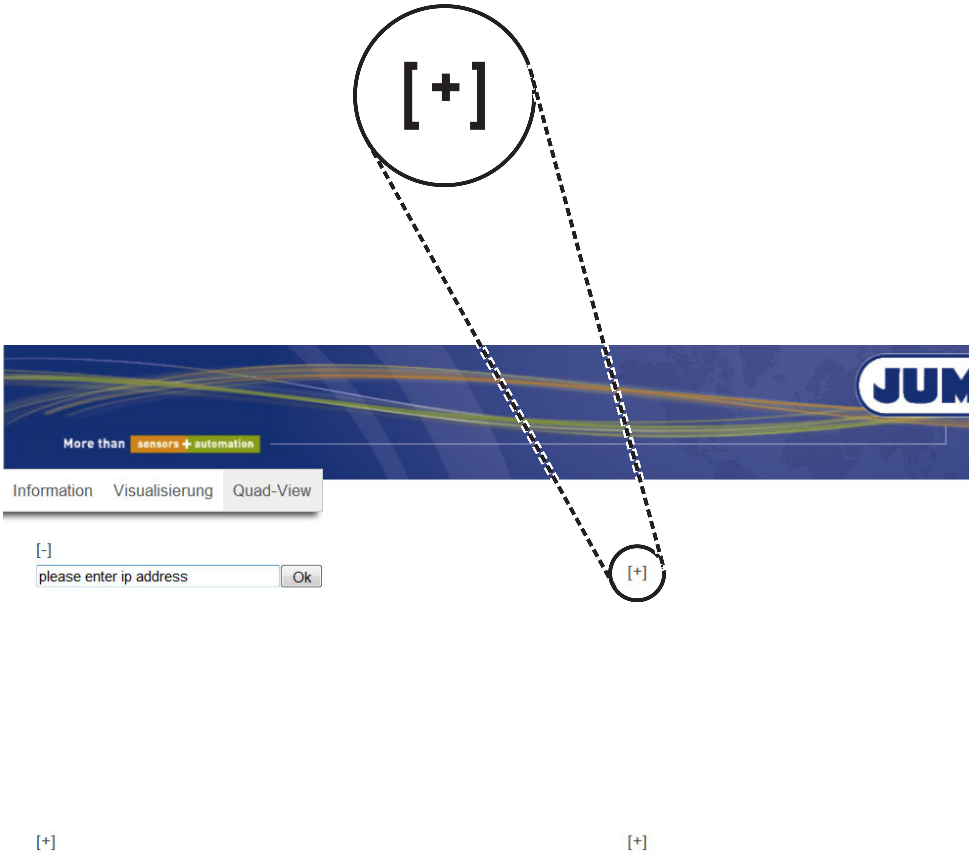
The visualization displays a view identical in appearance to the device. A request for a password appears next. The web server password specified in the web server configuration must be entered here.
⇨ Chapter "Checking the e-mail function", Page 297

As on the device, an operation screen can now be selected from the operation loop.
⇨ Chapter "Operation screens in the operation loop", Page 76

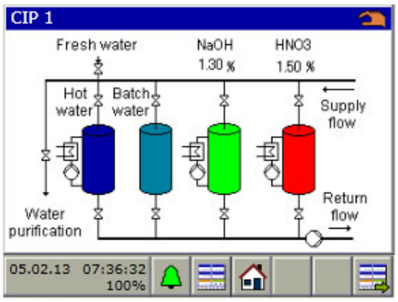
Access to the device menu remains blocked. Only the calibration logbooks are displayed when the "Device menu" button is pressed.
⇨ Chapter 12.3 "Calibration logbook", Page 179



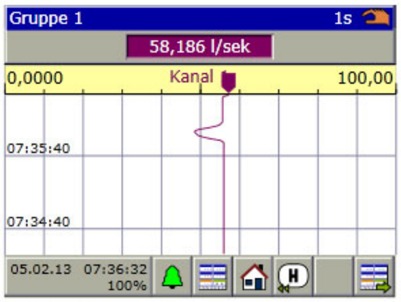
Quad View enables the user to open 4 different and independent views of the device. The open Quad View displays 4 plus signs for this purpose. Clicking on any one opens a request to enter the IP address of the JUMO AQUIS touch S. After the IP address has been entered, the selected view opens and can be controlled exactly as in the "Visualization" view.
Clicking on the minus sign at the upper left above one of the four views resets the Quad View.



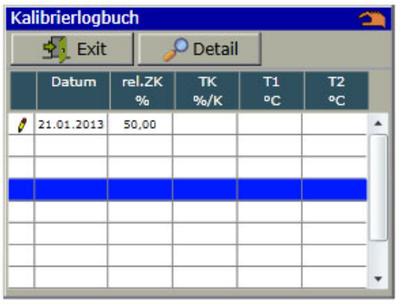
Example of a Quad View:



313.01.01-022



313.01.01-022



313.01.01-022

313.01.01-022

Control variables (parameters) for the device's functions are set here.
These include:

- Date and time
- Controller parameters (two parameter sets per controller)
- Controller setpoint values (two setpoint values per controller)
- manual values (for storing fixed numerical values, e.g. altered equipment data or conversion factors)

9.1 Date and time

The following table explains the parameters for setting the date and time. "Date and time" parameter list

Parameters	Selection/ Value range	Explanation
Current date/time	Date/time entry dialog	Setting the current date and time
Time zone GMT	-720 to +720 min	Difference between local time and GMT
Switch daylight saving time	inactive, automatic	activate/deactivate daylight saving time automatically
Start DST • Switch time Month • Switch time Weekday • Day in month • Switch time	 January to December Monday to Sunday First to fourth, last hh:mm:ss	 Month for switch to daylight saving time Weekday for switch to daylight saving time Number of the selected weekday for switch to daylight saving time in the respective month Time to switch to daylight saving time
End DST • Switch time Month • Switch time Weekday • Day in month • Switch time	 January to December Monday to Sunday First to fourth, last hh:mm:ss	 Month to switch to standard time Weekday to switch to standard time Number of the set weekday for switch to standard time in the month concerned Time to switch to standard time

NOTE!
The date and time are set in the online parameters in the JUMO PC setup program.
⇨ See chapter 19.9.1 "Date and time", page 301

9.2 Parameter Sets (Controller parameter)

The parameters for the controller channels determine the control response of the individual control circuits. For stable control response, these parameters must be matched to the prevailing process conditions. Each controller channel has two parameter sets; the selection is made by means of a digital signal. "Parameter set 1" is active by default. The second set can be activated as an alternative via the digital signal. In this way, it is possible to match each controller channel to the changing process conditions in order to maintain a stable control response.
The best parameter settings can usually be found by the controllers' self-optimization function. This approach, however, works only with linear processes.
⇨ Operating the controllers Page 98

For non-linear processes (control paths), it is advisable to set the parameters manually.

The following table provides an overview of the parameter sets for the controller channels. Depending on the configuration of the particular controller channel, only valid parameters are active for entry. Those not used appear in light gray, but cannot be edited. Duplicate parameters refer to the first and second controller output.

Open: Device menu ➔ Parameterization ➔ Parameter sets ➔ Controller 1 to 4 ➔ Parameter set 1 and 2

Parameter (Formula sym.)	Setting options	Explanation
Proportional range 1 (X_{p1})	0 to 9999.9 (Unit dependent on the actual value input variable) factory setting: 0.0	Spa of control deviation (actual value - setpoint value) in which the output level is proportional to the control deviation. The smaller the proportional band selected, the larger is the output level change with the control deviation. If the proportional band is set to a value of 0, the controller functions automatically as a limit monitor without a PID controller structure.
Proportional range 2 (X_{p2})		
Derivation time 1 (T_{v1})	0 to 9999 s customer: 80.0 s	Affects the derivative component (D-term) of the controller output signal. The purpose of the D-term is to damp the change of the actual value with time, and thereby suppress the hunting tendency. The effect of the D-term increases as the derivation time increases
Rate time 2 (T_{v2})		
Reset time 1 (T_{n1})	0 to 9999 s factory setting: 350.0 s	Affects the integral component (I-term) of the controller channel. The purpose of the I-term is to minimize the remaining control deviation. The action of the I-term decreases with increasing reset time.
Reset time 2 (T_{n2})		

Parameter (Formula sym.)	Setting options	Explanation
Switching period 1 (C_{y1})	0 to 9999 s factory setting: 20.0 s	If an output of a controller channel is configured as a Pulse length output, the period between the switching pulses is fixed. The cycle time should be selected such that, on the one hand, the cyclic controller output signal (e.g. for heating, cooling, feeding etc.) does not cause any disturbing fluctuations of the actual value, while, at the same time, the switching outputs and the equipment being controlled are not stressed unduly.
Switching period 2 (C_{y2})		
Contact distance (X_{sh})	-0 to +999.9 (Unit dependent on the actual value input variable) factory setting: 0.0	Minimum control deviation at which switching controller outputs become active Used to protect switching outputs and the connected equipment when controlled by modulating and continuous controllers with pulse outputs. With very small control deviations, switching of the controller output is suppressed.
Switching hysteresis 1 (X_{d1})	0 to 999.9 (Unit dependent on the actual value input variable) factory setting: 1.0	Switching distance between the output states (on/off) In switching controllers (proportional band = 0) The switching hysteresis should be selected such that the actual value resulting from the switching controller output signal does not vary too much, while, on the other hand, the switching outputs and the equipment being controlled are not stressed unduly.
Switching hysteresis 2 (X_{d2})		
Actuator time (TT)	5 to 3000 s factory setting: 60 s	Time required by an actuator to cover the entire output level range.
Working point (Y0)	-100 to +100% factory setting: 0%	constant value used to correct the controller working point The set value corresponds to the output level when the actual value and setpoint value are identical (control deviation = 0). In control structures without an I-term, serves as manual output level offset to correct remaining control deviations.
max. output level (Y1)	0 to 100% customer: 100%	maximum output level not active, limit monitor response (proportional band = 0)
Min. output level (Y2)	-100 to +100% customer: -100%	minimum output level not active, limit monitor response (proportional band = 0)

Parameter (Formula sym.)	Setting options	Explanation
Min. relay pick-up time 1 (T_{k1})	0 to 60 s customer: 0.0 s	Depending on the Min. relay pick-up time, a lower limit is set for the pulse length or an upper limit is set for the pulse frequency. This limits the switching frequency for switching outputs.
Min. relay pick-up time 2 (T_{k2})		
max. pulse frequency 1	0 to 240 min^{-1} factory setting: 60 min^{-1}	**for continuous controllers with a pulse frequency output :** maximum pulse frequency
max. pulse frequency 2		
Pick-up delay 1	0 to 999.9 s Customer: 0.0 s	Delay of the pick-up edge with limit monitor response (proportional band = 0)
Pick-up delay 2		
Drop-out delay 1	0 to 999.9 s Customer: 0.0 s	Delay of the drop-out edge with limit monitor response (proportional band = 0)
Drop-out delay 2		
Alarm tolerance	0 to 999.9 (Unit dependent on the actual value input variable) factory setting: 0.0	maximum value of the control deviation without triggering an alarm, if this value is exceeded, the controller monitoring function triggers a "Dosing alarm"
Alarm delay	0 to 9999 s factory setting: 0 s	Delay of the dosing alarm allows violation of the alarm tolerance for a limited time.

9.3 Setpoint values

The "Setpoint values" submenu allows two setpoint values for each controller channel to be entered. As with the parameter sets, it is also possible to switch between setpoint values by means of a digital signal. "Setpoint value 1" is active by default.. The second setpoint value can be activated as an alternative via the digital signal. The setpoint value that is currently active can be changed from the corresponding "controller screen".

Open: Device menu ➔ Parameterization ➔ Setpoint values ➔ Setpoint value controller 1 to 4

Setpoint changeover via a digital signal is set in the Setpoint value configuration.
⇨ Setpoint value configuration Page 151
⇨ Operating the controllers Page 98

9.4 Manual values

Up to 16 constant numerical values that are available for device functions can be stored here. The "Manual values" menu provides simple and clearly organized access to stored numerical values in order to change them as necessary.

Open: Device menu ➔ Parameterization ➔ Manual values

For "Manual values", settings such as comma format, unit etc. must be made in the configuration.

⇨ See chapter 10.20 "Manual values (configuration)", page 159

Examples of practical use of "Manual values":

- "Mathematical formula" are used to control a process. These contain process-relevant equipment information (e.g. tank capacities). If the equipment configuration is modified, these data can be changed in the "Manual values" menu and even edited from the user level.

  ⇨ See chapter 8.2.2 "User level", page 85

- Another application example is the storage of constant process values (e. g. the duration of a chemical reaction), the value of which is also known without a measurement. If the process conditions change (e.g. through use of a catalyst), the stored process values can be modified accordingly.

10.1 Important information

WARNING!

After every configuration change, the device restarts functions affected by the changes. Analog and digital outputs can assume undesired states during start-up.

Therefore, configuration changes must never be made while equipment is operating!

CAUTION!

Besides incorrect installation, incorrectly set values on the device can impair performance of the connected process or cause damage. Therefore, always provide safety devices independent of the device and allow only qualified personnel to make settings.

CAUTION!

When changing configuration data that are relevant for the data monitoring and recording function, data recording is terminated and a new recording session begun.

NOTE!

Changes to the configuration settings described in this chapter can be made directly on the device or via the JUMO PC setup program.

NOTE!

Settings in the "Configuration" menu can be changed only if a user with corresponding user rights is logged in.

⇨ Chapter 8.1.1 "Passwords and user rights", Page 71

NOTE!

Changes to the configuration go into effect only after you leave the configuration menu ("Exit" menu item or "Close window" button).

10.2 Basic settings

Open: Device menu ➔ Configuration ➔ Basic Settings

Configuration point	Selection/ setting option	Explanation
Device name	up to 20 text characters	Device ID, e.g. for identification of exported measurement data in the JUMO PCA 3000 evaluation software
Language	German English	Setting the operating language Additional languages can be installed on the device using the setup program. ⇨ Chapter 19.8.3 "Country settings", Page 262
Language select after power on	Yes No	Specifies whether a prompt for selecting the operating language should appear when the device is switched on
Supply frequency	50 Hz 60 Hz	Supply frequency of the electric power grid serving the mounting site The supply frequency must be specified to suppress EMC interference caused by the mains voltage. Setting the correct supply frequency is thus also necessary when supplying the device with direct voltage.
Device temp.	Degrees Celsius Degrees Fahrenheit	Setting the default on the temperature unit for all temperature values in the device
Interface temperature	Degrees Celsius Degrees Fahrenheit	Setting the default on the temperature unit for all temperature values communicated via interfaces
Memory alarm limit	0 to 100%	If the available memory display reaches this value, the memory alarm is triggered.
The following settings can be edited only JUMO PC with the aid of the setup program		
Setup quick info	up to 20 text characters	Brief information text about setup
Setup info	up to 501 text characters	Detailed information text about setup
Version online-visualization	No online-vis. Standard online-vis.	Selection of a saved online-visualization Online-visualization permits remote control of the operation screens via a web browser ⇨ Chapter 8.7 "Online visualization", Page 109 When the webserver is active on the device, the website of the webserver is displayed in the web browser instead of the online-visualization. ⇨ Chapter "Checking the e-mail function", Page 297

10.3 Display

10.3.1 General information

Open: Device menu ➔ Configuration ➔ Display ➔ General

Configuration point	Selection/ setting option	Explanation
Lock touchscreen	Selection from binary selector	Digital signal that blocks operation of the touchscreen (e.g. key switch for locking operation)
Simulation of inputs	Yes No	When this function is activated, alternating on/off signals are simulated automatically at the digital inputs and continuous value changes at the analog inputs This function is used for troubleshooting. Deactivate it during normal operation.
Main screen	Selection of an operation screen from the operation loop	Selection of the operation screen as main screen The main screen appears after the device has been switched on or the "Home" button has been pressed.
Display 1 and 2 general screen	Yes No	Individual operation screens can be shown or hidden in the operation loop here.
Show detailed screen 1 to 6		
Show diagram 1 and 2		
Show process screen		
Show controller overview		
Show controller 1 to 4		
Show alarms	Yes No	Activation or deactivation of alarm visualization in the title bar of the operation screens

10.3.2 Screen

Open: Device menu ➔ Configuration ➔ Display ➔ Screen

Configuration item	Selection/ setting option	Explanation
Activation of screen-saver	inactive time to switch off control signal	Type of screensaver activation
Wait time for screen-saver	10 to 32767 s	**only with activation of the screensaver after wait time:** Time to wait before displaying the screensaver when there is no activity on the device
Signal screensaver	Selection from binary selector	**only with control signal screensaver activation:** Signal for activating the screensaver
Brightness	1 to 10	Display brightness (10 levels)

10.3.3 Colors

Open: Device menu ➔ Configuration ➔ Display ➔ Colors

Configuration point	Selection/ setting option	Explanation
Alarm 1 to 2	Selection from color palette	Color setting for signaling alarms 1 to 2 of the measuring inputs Upon reaching the set alarm values, the measured value displays and bar graphs appear in the set colors.
Recording: Analog channel 1 to 4 Binary channel 1 to 3 Background, analogue Background, binary Color t-stamp diagr Color diag. traces	Selection from color palette	Color setting for the visualization elements of the recorder diagrams
Controller Background Setpoint value Actual value Output level Heating contact Cooling contact	Selection from color palette	Color setting for the visualization elements of the individual controller screens

10.4 Operating loop

10.4.1 General screens

Open: Device menu ➔ Configuration ➔ Operation Loop ➔ General screen ➔ General screen 1 to 2

Configuration point	Selection/ setting option	Explanation
Gener. screen type	2-part screen 4-part screen	Selection of the type of overview screen; **2-part screen:** Display of 2 main values, 2 second values, 1 additional value and 3 binary values; **4-part screen:** Display of 4 main values, 4 second values, 1 additional value and 3 binary values
Screen title	up to 31 text characters	Title of the overview screen
Value title 1 to 2(4)	up to 15 text characters	Titles of the individual main value display fields
Signal main value 1 to 2(4)	Selection from analog selection	Signal source of the analog value for each main value displayed
Color main value 1 to 2(4)	Selection from color palette	Color of the measured value display for each main value
Signal sec. value 1 to 2(4)	Selection from analog selection	Signal source of the analog value for each second value displayed
Color sec. value 1 to 2(4)	Selection from color palette	Color of the measured value display for each second value
Title additional value	up to 15 text characters	Title of the additional value display field
Signal add value	Selection from analog selection	Signal source of the analog value displayed as additional value
Color addit. value	Selection from color palette	Color of the measured value display for the additional value
Title binary value	up to 15 text characters	Title of the binary value display field
Signal binary val. 1 to 3	Selection from binary selector	Signal sources of the binary values visualized in the binary value display field

10.4.2 Detailed screens

Open: Device menu ➔ Configuration ➔ Operation Loop ➔ Individual screen ➔ Individual screen 1 to 6

Configuration point	**Selection/ setting option**	**Explanation**
Screen title	up to 31 text characters	Title of the individual screen
Input signal main value	Selection from analog selection	Signal source of the analog value displayed as the main value and visualized as a bar graph
Color main value	Selection from color palette	Color of the measured value display and the bar graph for the main value
Second value input signal	Selection from analog selection	Signal source of the analog value displayed as the second value
Color sec. value	Selection from color palette	Color of the measured value display for the second value
Title additional value	up to 15 text characters	Title of the additional value display field
Additional value	Selection from analog selection	Signal source of the analog value displayed as additional value
Color addit. value	Selection from color palette	Color of the measured value display for the additional value
Title binary value	up to 15 text characters	Title of the binary value display field
Signal binary val. 1 to 3	Selection from binary selector	Signal sources of the binary values visualized in the binary value display field

10.5 Analog inputs

10.5.1 Base unit temperature inputs

Base unit temperature inputs: IN 4/5

Open: Device menu ➔ Configuration ➔ Analog inputs ➔ Temperature inputs 1 to 2

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation for the input
Signal type	**IN 4/5:** Pt100 Pt1000 400 Ω 4000 Ω	Type of sensor connected For **Pt100, Pt1000 and NTC,** corresponding linearizations are provided. For **400 Ω, 4000 Ω and 100 kΩ,** a customer-specific linearization must be configured. For **resistance potentiometers**[a], a customer-specific linearization can be configured if necessary. ⇨ "Customer-specific linearization", in this table
	IN 5 : 100 kΩ NTC 8k55 NTC 22k Resistance potentiometer[a]	
Connection type	2-wire, 3-wire	**only for signal types Pt100, Pt1000, 400 Ω, 4000 Ω, 100 kΩ and NTC:** Connection variants for the connected resistance thermometer
Customer-specific linearization	Selection of a linearization table	**only for signal types 400 Ω , 4000 Ω, 100kΩ or resistance potentiometers[a]:** Linearization tables contain up to 40 value pairs in any measurement characteristic line. Each value pair assigns a display value (Y-column) to a measuring value (X-column). Up to 8 linearization tables can be stored. To create a linearization table, you need the JUMO PC setup program.
Start of display range	-99999 to +99999[b]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
Display range end	-99999 to +99999[b]	
Decimal place	Auto, Fixed comma format	Decimal points in the display
Offset	-999 to +999[b]	Correction value added to measuring value This value can be used, for instance, to compensate for measurement errors resulting from the resistance of wires.
Filter time constant	0.0 to 25.0 s	Optimization of measuring value updating The higher the value of the filter time const., the slower the measured value is displayed.

Configuration point	Selection/ setting option	Explanation
Ra	0 to 99999 Ω	**only for IN 5:** Resistance value between the slider (S) and start point (A) in a resistance transmitter/potentiometer[a] when the slider is at the start point.
Rs	6 to 99999 Ω	**only for IN 5:** Span of the variable resistance value between the slider (S) and start point (A)
Re	0 to 99999 Ω	**only for IN 5:** Resistance value between the slider (S) and end point (E) in a resistance transmitter/potentiometer[a] when the slider is at the end point.
Alarms 1/2	Analog input alarms are used to monitor measured values in relation to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ Chapter 10.9.2 "Alarms for analog signals", Page 139	

[a] Resistance potentiometer

[b] The temperature unit specified in the basic settings appears in the entry field.
⇨ Chapter 10.2 "Basic settings", Page 120

10.5.2 Universal inputs of base unit and optional boards

Base unit universal input: IN 6
Optional board universal inputs: IN 11/12

Open: Device menu ➔ Configuration ➔ Analog inputs ➔ Universal input 1 to 3 ➔ Configuration

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation for the input
Operating mode	linear scaling, temp. measurement, pH-value measurement, conductivity measurement, free chlorine pH/T-compensated	Type of measuring **linear scaling:** Standard signals (for IN 11/12 and resistance potentiometer[a]) with linear measurement characteristic line or customer-specific linearization For standard signals the scale start point, scale end point and unit must be specified. **Temp. measurement:** Measurement made with a resistance thermometer The type of sensor is selected in the "Signal type" configuration item. The unit for the temperature is specified in the "Basic Settings" menu. ⇨ Chapter 10.2 "Basic settings", Page 120 **pH value, conductivity, and free chlorine:** The values measured by the individual analysis sensors are received in the form of a standard signal. Outside factors affecting the individual analysis process variables are compensated. It is thus necessary to make appropriate compensation settings in the configuration of the universal input.
Signal type	**IN 6/11/12:** 0 to 20 mA 4 to 20 mA 20 to 0 mA 20 to 4 mA **only IN 11/12:** 0 to 10 V 10 to 0 V Pt100 Pt1000 400 Ω 4000 Ω Resistance potentiometer	Type of sensor connected Correct scale settings are required for the **standard signals** ⇨ "Scale start/end" in this table. appropriate linearizations are available for **Pt100, Pt1000 and resistance potentiometer**[a] A customer -specific linearization must be configured for **400 Ω and 4000 Ω** ⇨ "Customer-specific linearization" in this table

Configuration point	Selection/ setting option	Explanation
Connection type	2-wire, 3-wire	**only for signal types Pt100, Pt1000, 400 Ω and 4000 Ω:** Connection variants for the connected resistance thermometer
Customer-specific linearization	Selection of a linearization table	Linearization tables contain up to 40 value pairs in any measurement characteristic line. Each value pair assigns a display value (Y-column) to a measuring value (X-column). Up to 8 linearization tables can be stored. To create a linearization table, you need the JUMO PC setup program.
Unit	up to 5 text characters	Process variable unit not adjustable for pH measurement The temperature unit is specified in the basic settings. ⇨ Chapter 10.2 "Basic settings", Page 120
Scale start	-99999 to +99999[b]	**only for standard signals:** Measured value from sensor (uncomp.) that corresponds to the lower limit of the standard signal range [0 V or 0(4) mA]; Refer to the technical data for the sensor.
Scale end	-99999 to +99999[b]	**only for standard signals:** only for standard signals: Measured value from sensor (uncomp.) that corresponds to the upper limit of the standard signal range [10 V or 20 mA] Refer to the technical data for the sensor.
Start of display range	-99999 to +99999[b]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
Display range end	-99999 to +99999[b]	
Decimal place	Auto Fixed comma format	Decimal points in the display
Offset	-999 to +999[b]	**only for temperature and conductivity measurement:** Correction value added to measuring value
Filter time constant	0.0 to 25.0 s	Optimization of measuring value updating The higher the value of the filter time const., the slower the measured value is displayed.
Ra	0 to 4000 Ω	**only for IN 11/12:** Resistance value between the slider (S) and start point (A) in a resistance thermometer/resistance potentiometer when the slider is at the start point

Configuration point	Selection/ setting option	Explanation
Rs	6 to 4000 Ω	**only for IN 11/12:** Span of the variable resistance value between the slider (S) and start point (A)
Re	0 to 4000 Ω	**only for IN 11/12:** Resistance value between the slider (S) and end point (E) in a resistance thermometer/resistance potentiometer when the slider is at the end point.
Compensation temperature	Selection from analog selection	Analog input of the compensation thermometer for temperature-compensated measurement of pH value, free chlorine or conductivity
Compensation	TC linear, TC-curve, natural water, natural water with expanded temperature range, ASTM neutral, ASTM acid, ASTM alkaline, NaOH 0 to 12%, NaOH 25 to 50%, HNO_3 0 to 25%, HNO_3 36 to 82%, H_2SO_4 0 to 28%, H_2SO_4 36 to 85%, H_2SO_4 92 to 99%, HCL 0 to 18%, HCL 22 to 44%	Type of temperature compensation for conductivity measurement
Reference temp.	15 to 30 °C	**required only for conductivity measurement with "TC linear" or "TC curve" temperature compensation:** Temperature at which the (temperature-compensated) conductivity value displayed was set
Compensation pH value	Selection from analog selection	Analog input of the pH-value sensor for pH-compensated measurement of free chlorine
Alarms 1/2	Analog input alarms are used to monitor measured values in relation to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ Chapter 10.9.2 "Alarms for analog signals", Page 139	
Calibration timers	Calibration timers prompt the user to calibrate sensors on a regular basis. The settings for all analysis inputs and the universal inputs are explained together. ⇨ Chapter 10.10 "Calibration timers", Page 143	

[a] Resistance potentiometer
[b] The unit for the particular sensor value appears in the entry field.

10.5.3 pH/Redox/NH_3 analysis inputs

Open: Device menu ➔ Configuration ➔ Analog inputs ➔ Analysis input 1 to 4 ➔ Configuration

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation for the input
Electrode type	pH standard pH antimony pH ISFET redox ammonia	Type of electrode connected
Redox unit	mV percent	**mV**: unit for the redox potential **percent**: concentration percentage that can be derived from the redox measurement This requires a two-point calibration. ⇨ Chapter 14.2.1 "Calibration methods for Redox sensors", Page 191
Filter time constant	0.0 to 25.0 s	Optimization of measuring value updating The higher the value of the filter time const., the slower the measured value is displayed.
Start of display range	-99999 to +99999[a]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
Display range end	-99999 to +99999[a]	
Compensation temperature	Selection from analog selection	Analog input of the temperature sensor for compensation of the effect of temperature on the pH-value measurement
Glass electrode monitoring	off minimum impedance maximum impedance min./max. impedance	configurable monitoring of pH glass electrodes **without impedance converter** **minimum impedance:** monitoring for soft short/ sensor failure **maximum impedance:** monitoring for aging/pollution/wire break
Reference electrode monitoring	On Off	Activation of reference electrode impedance monitoring A high-impedance symmetrical connection is required.
max. reference impedance	0 to 100 kΩ	upper impedance limit for monitoring a reference electrode
Alarm/Event list	off event alarm	Assignment of sensor failure notification to alarm list or event list
Sensor alarm delay	0 to 999 s	The sensor alarm is suppressed for the set duration of the alarm delay.

Configuration point	Selection/ setting option	Explanation
Text sensor alarm	up to 21 text characters	Text for the alarm/event list in case of sensor error
Alarms 1/2	Analog input alarms are used to monitor measured values in relation to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ Chapter 10.9.2 "Alarms for analog signals", Page 139	
Calibration timers	Calibration timers prompt the user to calibrate sensors on a regular basis. The settings for all analysis inputs and the universal inputs are explained together. ⇨ Chapter 10.10 "Calibration timers", Page 143	

[a] The entry field units depend on the configuration items "Electrode type" and "Redox unit".

NOTE!

The following points must be observed for correct operation of glass electrode monitoring via impedance measurement (see preceding table):

- Impedance measurements are possible only with glass-based sensors.
- Sensors must be connected directly to an analysis input for pH/Redox/NH_3 on the device.
- Impedance converters must not be installed in the measuring circuit.
- The maximum 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.

10.5.4 CR/Ci analysis inputs (conductive/inductive conductivity)

Open: Device menu ➔ Configuration ➔ Analog inputs ➔
Analysis input 1 to 4 ➔ Configuration

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation for the input
Compensation temperature	Selection from analog selection	Analog input of the compensation thermometer for temperature-compensated conductivity measurement
Reference temp.	15 to 30 °C	**required only for conductivity measurement with "TDS", "TC linear" or "TC curve" temperature compensation:** The temperature at which the conductivity value displayed was set
Filter time constant	0.0 to 25.0 s	Optimization of measuring value updating The higher the value of the filter time const., the slower the measured value is displayed.
nominal cell constant	**for CR:** 0.01 to 10 cm^{-1} **for Ci:** 4.00 to 8.00 cm^{-1}	nominal cell constant of the conductivity sensor (can be read from the sensor nameplate)
Cell type	2 electrodes 4 electrodes	For conductivity sensors with 4 electrodes, pollution detection is made available.
Pollution detection	OFF ON	**possible only for conductive conductivity measurement in a 4-wire circuit:** When this function is activated, a sensor alarm is triggered in case of soiling.
Wire break detection	OFF ON	**possible only for conductive conductivity measurement:** When this function is activated, a sensor alarm is triggered in case of a sensor wire break.
Alarm/Event list	off event alarm	**possible only for conductive conductivity measurement:** Assignment of the sensor failure notification to alarm list or event list
Sensor alarm delay	0 to 999 s	**possible only for conductive conductivity measurement:** The sensor alarm is suppressed for the set duration of the alarm delay.
Text sensor alarm	up to 21 text characters	**possible only for conductive conductivity measurement:** Text for the alarm/event list in case of sensor error
Measuring range selection 1	Selection from binary selector	Measuring range switching permits selection of the measuring ranges 1 to 4 by controlling the binary signals. ⇨ Chapter "CR/Ci measuring range switching", Page 133
Measuring range switching 2	Selection from binary selector	

Configuration point	Selection/ setting option	Explanation
Measuring ranges 1 to 4	-	Four ranges each can be configured for conductive/inductive (CR/Ci) conductivity measurements. The settings for all CR-/Ci analysis inputs are explained together. ⇨ "CR/Ci measuring range configuration", page 134
Alarms 1/2 per measuring range 1 to 4	Analog input alarms are used to monitor measured values in relation to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ Chapter 10.9.2 "Alarms for analog signals", Page 139	
Calibration timers	Calibration timers prompt the user to calibrate sensors on a regular basis. The settings for all analysis inputs and the universal inputs are explained together. ⇨ Chapter 10.10 "Calibration timers", Page 143	

10.5.5 CR/Ci measuring ranges

Four configurable measuring ranges are available for each CR/Ci analysis input for measuring electrolytic conductivity. The measuring range is switched by means of 2 selectable digital signals. These signals are specified in the configuration of the individual conductivity measurement inputs.

⇨ Chapter 10.5.4 "CR/Ci analysis inputs (conductive/inductive conductivity)", Page 132

CR/Ci measuring range switching

The following table shows which binary value combinations activate the individual measuring ranges:

Active measuring range	Binary signal Measuring range selection 1	Digital signal Measuring range switching 2
Measuring range 1	0	0
Measuring range 2	1	0
Measuring range 3	0	1
Measuring range 4	1	1

CR/Ci measuring range configuration

Open: Device menu ➔ Configuration ➔ Analog inputs ➔ Analysis input 1 to 4 ➔ Measuring range 1 to 4

Configuration point	Selection/ setting option	Explanation
TDS factor	0.01 to 2.00	**only for conductive conductivity with TDS compensation:** Conversion factor from measured conductivity to display unit (see configuration item "Unit" in this table)
Compensation	**for CR/Ci:** Off, TC linear, natural water, natural water with expanded temperature range	Type of temperature compensation for conductivity measurement
	only for CR: TDS, ASTM neutral, ASTM acid, ASTM alkaline	
	only for Ci: TC curve, NaOH 0 to 12%, NaOH 25 to 50%, HNO3 0 to 25%, HNO3 36 to 82%, H2SO4 0 to 28%, H2SO4 36 to 85%, H2SO4 92 to 99%, HCL 0 to 18%, HCL 22 to 44%	
Unit for calculation	**for CR/Ci:** µS/cm mS/cm	Unit in which the conductivity is displayed
	only for CR: kΩ/cm MΩ/cm	
Unit	up to 5 text characters	**only for conductive conductivity measurement with TDS compensation:** Unit for the process variable to be displayed for TDS measurements or when using customer-specific linearization (e.g. ppm or mg/l)

Configuration point	Selection/ setting option	Explanation
Customer-specific linearization	Selection of a linearization table	Linearization tables contain up to 40 value pairs in any measurement characteristic line. Each value pair assigns a display value (Y-column) to a measuring value (X-column). Up to 8 linearization tables can be stored. To create a linearization table, you need the JUMO PC setup program.
Start of display range	-99999 to +99999[a]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
Display range end	-99999 to +99999[a]	
Decimal place	Auto Fixed comma format	Decimal points in the display
Offset	-99999 to +99999[a]	Correction value added to measuring value
Alarms 1/2 per measuring range 1 to 4	Analog input alarms are used to monitor measured values in relation to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ Chapter 10.9.2 "Alarms for analog signals", Page 139	

[a] The unit set for the conductivity measurement input appears in the entry field.

10.6 Analog outputs of base unit and optional boards

Open: Device menu ➔ Configuration ➔ Analog outputs ➔ Analog output 1 to 9

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation for the output
Signal output value	Selection from analog selection	Analog signal source of the output
Analog signal	0 to 10 V 0 to 20 mA 4 to 20 mA 10 to 0 V 20 to 0 mA 20 to 4 mA	Type of standard signal to be generated
Enable manu. mode	Yes No	The manual mode for the specific output is enabled/locked here. The manual mode permits fixed analog values to be set for the output for testing purposes. ⇨ Chapter 8.2.3 "Functional level", Page 86
Safety value 1 to 4	0 to 10.7 V or 0 to 22 mA	Specification of an analog value that the output assumes at hold, at calibration or at error If an analysis input for conductivity measurement is set as "Signal output value", the safety values 1 to 4 are assigned to conductivity measuring ranges 1 to 4. Pairs with the same number belong together. Otherwise, the safety value 1 applies.
Scale start 1 to 4	-99999 to +99999[a]	Analog value of the analog signal source (see configuration item "Signal output value") that corresponds to the lower limit of the standard signal range generated [0 V or 0(4) mA]
Scale end 1 to 4	-99999 to +99999[a]	Analog value of the analog signal source (see configuration item "Signal output value") that corresponds to the upper limit of the standard signal range generated (10 V or 20 mA)
Digital signal for hold	Selection from binary selector	Digital signal for activating the hold function When the hold function is activated, the analog output assumes the state defined in the "Response at hold" setting.

Configuration point	Selection/ setting option	Explanation
Response at hold	low high NAMUR low NAMUR high hold safety value	Specification of the analog output value when the hold function is activated, during calibration of one of the sensors for the particular output or at error (overrange/underrange) **low:** lower limit of the standard signal value range [0 V or 0(4) mA] **high:** upper limit of the standard signal value range (10V or 20 mA) **NAMUR low:** lower NAMUR limit of the standard signal [0 V or 0(3.4) mA] **NAMUR high:** upper NAMUR limit of the standard signal (10.7 V or 22 mA) **hold:** unchanging analog value **Safety value:** see configuration item "Safety value" in this table
Response at calibration	Moving Frozen Safe value	
Response at error	low high NAMUR low NAMUR high hold safety value	

[a] The unit for the value set for the "Signal output value" appears in the entry field.

10.7 Digital inputs of base unit and optional boards

Open: Device menu ➔ Configuration ➔ Digital inputs ➔ Digital input 1 to 9

Configuration point	Selection/ setting option	Explanation
Description	up to 21 text characters	Designation for the input
Inversion	Yes No	Invert/do not invert state
Contact	**Base unit:** potential-free contact, external voltage source **Optional boards:** potential-free contact	Type of digital signal connected
Alarm	Digital inputs alarms are used to monitor input-side switching signals. The alarm settings for all digital device functions are explained together. ⇨ Chapter 10.9.3 "Digital signal alarms", Page 142	

10.8 Digital outputs of base unit and optional boards

Open: Device menu ➔ Configuration ➔ Digital outputs ➔
Digital output 1 to 17

Configuration point	Selection/ setting option	Explanation
Description	up to 21 text characters	Designation for the output
Signal output value	Selection from binary selector	Digital signal source for the output
Inversion	Yes No	Invert/do not invert state
Enable manu. mode	Yes No	The manual mode for the specific output is enabled/locked here. Manual mode permits fixed binary values (switching states) to be set for the output for testing purposes. ⇨ Chapter 8.2.3 "Functional level", Page 86

10.9 Limit monitoring and alarms

10.9.1 Limit monitoring

Open Limit Monitoring:
Device menu ➔ Configuration ➔ Limit Monitoring ➔
Limit monitoring 1 to 8

Configuration point	Selection/ setting option	Explanation
Description	up to 21 text characters	Designation for the limit monitoring
Input signal	Selection from Analog selector	Signal source of the analog value that is monitored by limit monitoring
Alarms 1/2	Limit monitoring alarms are used to monitor output signals with respect to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ "Alarms for analog signals", page 139	

10.9.2 Alarms for analog signals

Open Limit Monitoring Alarm Configuration:
Device menu ➔ Configuration ➔ Limit Monitoring ➔
Limit monitoring 1 to 8

Open Temperature Inputs Alarm Configuration:
Device menu ➔ Configuration ➔ Analog inputs ➔
Temperature inputs 1 to 2

Open Universal Inputs Alarm Configuration:
Device menu ➔ Configuration ➔ Analog inputs ➔
Universal input 1 to 3 ➔ Configuration

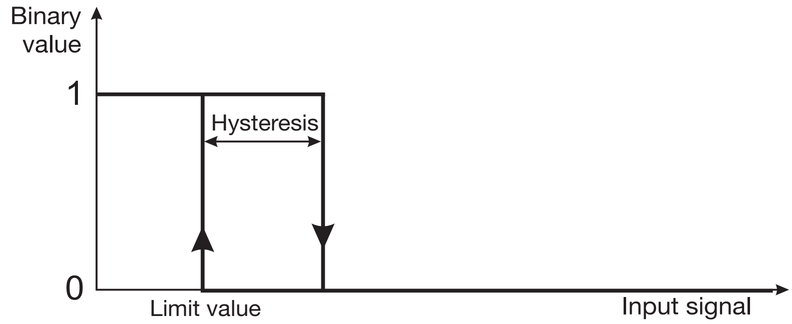
Open pH/Redox/NH_3 Analysis Inputs Alarm Configuration:
Device menu ➔ Configuration ➔ Analog inputs ➔
Analysis input 1 to 4 ➔ Configuration

Open CR / Ci Analysis Inputs Alarm Configuration:
Device menu ➔ Configuration ➔ Analog inputs ➔
Analysis input 1 to 4 ➔ Configuration ➔ Measuring range 1 to 4

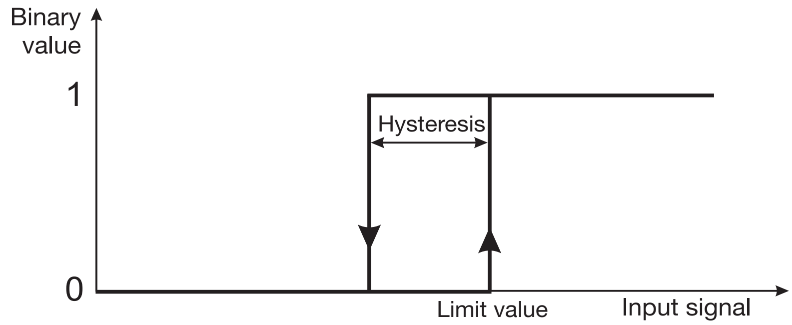
Configuration point	Selection/ setting option	Explanation
Digital signal for hold	Selection from the binary selector	Digital signal for activating the hold function When the hold function is activated, the alarm assumes the state defined in the "Response at hold" setting.

Configuration point	Selection/ setting option	Explanation
Response at hold	inactive active hold	Specification of the alarm state when the hold function is activated, at calibration of the particular input or at error (overrange/underrange) **inactive:** alarm suppressed **active:** alarm forced **hold:** alarm state is maintained regardless of alarm condition changes **normal:** alarm in acc. with alarm condition
Response at calibration	inactive active hold normal	
Response at error	inactive active hold	
Alarm type	inactive minimum alarm maximum alarm alarm window invert alarm window	Four alarm types (comparator functions) can be selected to monitor measured values for violation of limit values. ⇨ Characteristic lines after the table
	only for **CR analysis inputs:** USP Pre-alarm USP purified water Pre-alarm pur. water	Limit value alarms to USP <645> or European Pharmacopoeia (Ph. Eur.) for cleaned water
Alarm/Event list	off event alarm	Assignment of alarm notification to alarm list or event list
Alarm text	up to 21 text characters	Text for the alarm/event list
Limit value	-99999 to +99999	Limit value for the particular alarm type
Hysteresis	0 to 99999	Spacing between switch-on and switch-off points for the alarm types ⇨ Characteristic lines after the table
Window range	0 to 99999	Range of the alarm window ⇨ Characteristic lines after the table
Pulse function	Yes No	Time limit for alarm with the wiper time as maximum alarm duration
Pulse time	0 to 999 s	Duration of alarm with pulse function activated
Alarm delay On	0 to 999 s	Time delay between occurrence of the alarm condition and triggering of the alarm
Alarm delay Off	0 to 999 s	Time delay between ending of the alarm condition and clearing of the alarm

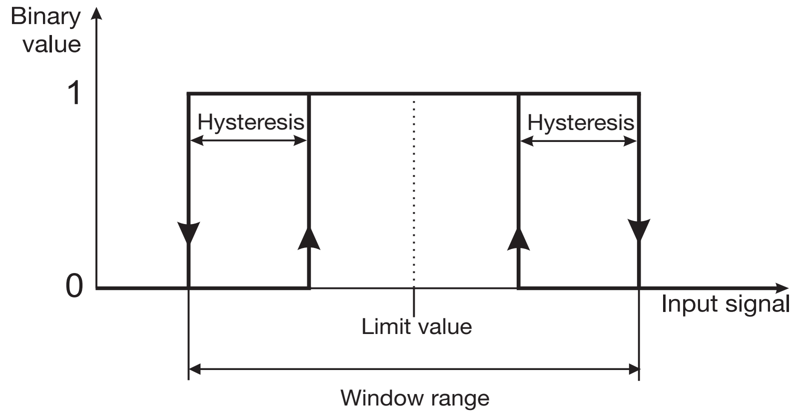
Minimum alarm (On-signal when value drops below lower limit)



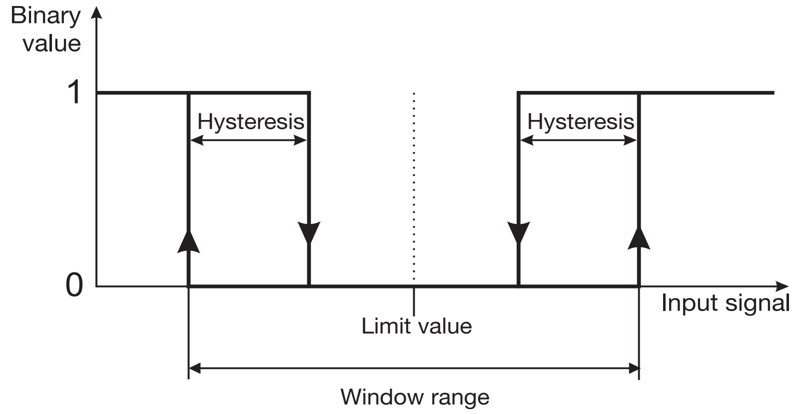
Maximum alarm(On-signal when value exceeds upper limit)



Alarm window (On-signal within a configurable value range



Invert alarm window (On-signal outside a configurable value range)



10.9.3 Digital signal alarms

Open: Device menu ➔ Configuration ➔ Digital inputs ➔ Digital input 1 to 9

Configuration point	Selection/ setting option	Explanation
Digital signal for hold	Selection from the binary selector	Digital signal for activating the hold function When the hold function is activated, the alarm assumes the state defined in the "Response at hold" setting.
Response at hold	inactive active hold normal	Specification of the alarm state when the hold function is activated **inactive:** alarm suppressed **active:** alarm forced **hold:** alarm state is maintained regardless of alarm condition changes **normal:** alarm in acc. with alarm condition
Alarm type	active inactive	Arming or disarming an alarm
Alarm/Event list	off event alarm	Assignment of alarm notification to alarm list or event list
Alarm text	up to 21 text characters	Text for the alarm/event list
Polarity for alarm	high low	Digital input alarm condition
Alarm delay	0 to 999 s	Time delay between occurrence of the alarm condition and triggering of the alarm

10.10 Calibration timers

Every analysis input and universal input has its own calibration timer. Calibration timers signal when sensor calibration is due. Once a particular input has been calibrated successfully, its calibration timer is reset. The signal can be generated, for instance, by digital outputs, external indicator lights or the alarm/event list.

10.10.1 Configuration of the calibration timers

Open Calibration Timer Configuration Universal Inputs:
Device menu ➔ Configuration ➔ Analog inputs ➔
Universal input 1 to 3 ➔ Calibration timer

Open Calibration Timer Configuration Analysis Inputs:
Device menu ➔ Configuration ➔ Analog inputs ➔
Analysis input 1 to 4 ➔ Calibration timer

Configuration point	Selection/ setting option	Explanation
Function	inactive active	Activation/deactivation of the calibration timer for an analog input
Alarm/Event list	off event alarm	Assignment of calibration timer timeout notification to alarm list or event list
Alarm text	21 text characters	Text for the alarm/event list upon timeout of calibration timers
Calibration interval	0 to 99999 days	Time period after resetting the calibration timer through successful calibration until timeout of the calibration timer

10.11 Controller

10.11.1 Configuration of the controllers

Open: Device menu ➔ Configuration ➔ Controller ➔ Controller 1 to 4 ➔ Configuration

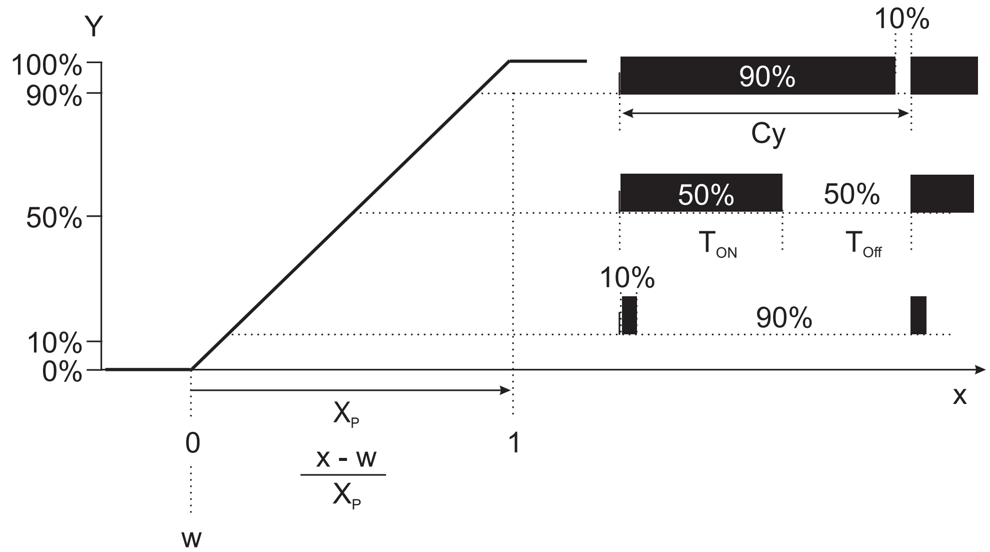
Configuration point	Selection/ setting option	Explanation
Controller type	Two-point controller Three-state controller, Coarse-/fine controller, Modulating controller, continuous controller with integrated position controller, Continuous controller	Selection of controller type
Control direction	Inverse Direct	**invers:** Output level increase with negative control deviation (actual value < setpoint value), Output level decrease with positive control deviation **direct:** Output level increase with positive control the deviation (actual value >setpoint value), Output value decrease with negative control deviation
Output type 1 Output type 2	Pulse length output Pulse frequency output Continuous output	Signal type of controller output signal The output types are explained with the aid of diagrams after this table.
Output contact type 1 to 2	Normally-closed contact Working contact	Contact type (control direction) of the digital controller outputs (K1,K2) Working contact corresponds to a normally-open contact Resting contact corresponds to a normally-closed contact
Manual mode	Enabled Disabled	Enabling of manual mode
Acceptance of manual output 1	Yes No	Acceptance of the preconfigured manual output (for the 1st controller output on coarse-/fine controllers) upon activation of the manual mode
Man. output level 1	-100 to +100%	Preconfigured Man. output level (for the 1st controller output on coarse/fine controllers) Accepted automatically on activation of the "manual mode" if acceptance of the manual output level is set to "Yes". Otherwise, the controller accepts the last output level from the automatic control mode.

Configuration point	Selection/ setting option	Explanation
Acceptance of manual output 2	Yes No	**only for coarse/fine controllers:** Acceptance of the preconfigured manual output for the 2nd controller output upon activation of the manual mode
Man. output level 2	0 to 100%	**only for coarse/fine controllers:** Preconfigured Man. output level for the 2nd controller output Accepted automatically on activation of the "manual mode" if acceptance of the manual output level is set to "Yes". Otherwise, the controller accepts the last output level from the automatic control mode.
Acceptance of hold output level 1	Yes No	Acceptance of the preconfigured hold output (for the 1st controller output on coarse/fine controllers) upon activation of the hold mode
Hold output level 1	-100 to +100%	Preconfigured hold output level (for the 1st controller output on coarse-/fine controllers) Accepted automatically upon activation of the hold mode if acceptance of the hold output level is set to "Yes"; otherwise, the controller accepts the last output level from the automatic control mode.
Acceptance of hold output level 2	Yes No	**only for coarse/fine controllers:** Acceptance of the preconfigured hold output for the 2nd controller output upon activation of the hold mode
Hold output level 2	0 to 100%	**only for coarse/fine controllers:** Preconfigured hold output level for the 2nd controller output Accepted automatically upon activation of the hold mode if acceptance of the hold output level is set to "Yes"; otherwise, the controller assumes the last output level from the automatic control mode.
Self-optimization	Enabled Disabled	Enabling of self-optimization
Alarm monitoring	Inactive Active	Activation/deactivation of alarm monitoring Alarm monitoring provides a continuous plausibility check of the control deviation. A dosing alarm is triggered when the control deviation is greater than the value of the alarm tolerance set in the controller parameters. If "Alarm ack." is activated (see next configuration item), the controller switches to hold mode on a holding alarm.

Configuration point	Selection/ setting option	Explanation
Alarm ack.	Inactive Active	Activation/deactivation of the acknowledgment function Dosing alarms of the respective controller must be acknowledged in the "Alarm list" when "Alarm acknowledgement" is activated. Dosing alarms are not cleared automatically when the control deviation drops to a value that is less than or equal to the alarm tolerance. The alarm tolerance is set in the controller parameters. ⇨ Chapter 9.2 "Parameter Sets (Controller parameter)", Page 114.

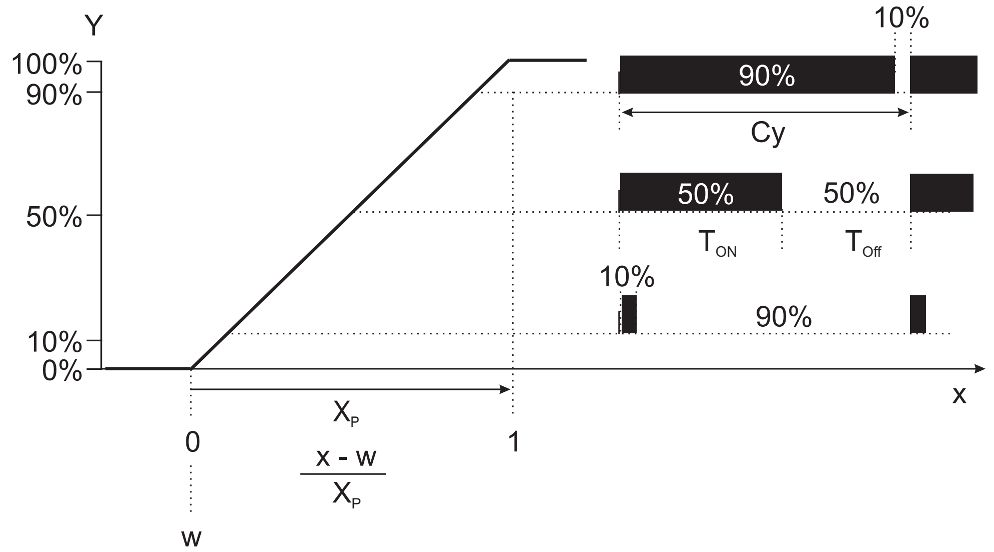
Pulse length output

With a pulse width output, the output level generated by the controller has the form of the pulse/pause ratio of a square-wave signal with a fixed frequency (pulse width modulation). Output of this type of signal from the device uses a digital output.



Pulse frequency output

With a pulse frequency output, the output level generated by the controller has the form of the frequency of a square-wave signal with a fixed pulse/pause ratio. Output of this type of signal from the device uses a digital output.



Continuous output

With a continuous output, the output level generated by the controller is transmitted directly to connected functions. Output of this type of signal from the device uses a analog output. The proportionality between the min/max span of the controller output level and the signal strength is specified by the scaling of the analog output.

For more detailed information on the subject of control technology, you can download the technical article "Control technology - Basic principles and tips for the practitioner" (FAS 525) as a PDF document for free from the JUMO website.

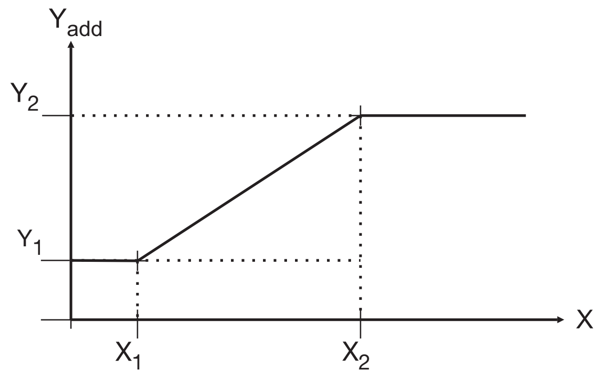
10.11.2 Controller inputs

Open: Device menu ➔ Configuration ➔ Controller ➔ Controller 1 to 4 ➔ Input

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation of the controller input
Actual value	Selection from Analog selector	Selection of the analog signal source for the actual value
Output level feedback	Selection from Analog selector	**only for modulating controllers and continuous controllers with position feedback:** Selection of the analog signal source for the current output level (e.g. universal input with resistance potentiometer or analog input with standard signal) Output level feedback is required on continuous controllers with position feedback.
Parameter selection	Selection from binary selector	Selection of the digital signal source for switching from parameter set 1 to parameter set 2 Two parameter sets are stored for each controller and can be switched via this digital signal. ⇨ Chapter 9.2 "Parameter Sets (Controller parameter)", Page 114
Digital signal for manual	Selection from binary selector	Selection of the digital signal source to switch the controller to manual mode In addition to the button on the respective controller screen, it is also possible to activate manual mode with a digital signal (e.g. key switch for a digital input) binary signal (e.g. key switch)
Digital signal for hold	Selection from binary selector	Selection of the digital signal source to switch the controller to hold mode
Manual text	up to 15 text characters	Text for the alarm/event list upon activation of manual mode
Alarm text	up to 15 text characters	Text for the alarm/event list upon occurrence of a dosing alarm

10.11.3 Disturbance feedforward control

Open: Device menu ➔ Configuration ➔ Controller ➔ Controller 1 to 4 ➔ Disturbance feedforward control

Configuration point	Selection/ setting option	Explanation
additive var. disturb.	Selection from Analog selector	Analog input for the additive variable disturbance The additive output level component Y_{add} added. This is calculated as follows: $Y_{add} = X \times [(Y_2 - Y_1) \div (X_2 - X_1)] + Y_1$  Y_{add}: Additive output level component X: Variable disturbance value X_1: Additive var. disturb. X start value X_2: Additive var. disturb. X end value Y_1: Additive var. disturb. Y start value Y_2: Additive var. disturb. Y end value
Additive var. disturb. X Start value	-99999 to +99999	Smallest value of the variable disturbance
Additive var. disturb. X Final value	-99999 to +99999	Largest value of the variable disturbance
Additive var. disturb. Y Start value	-100 to +100%	Additive output level component with largest variable disturbance value
Additive var. disturb. Y Final value	-100 to +100%	Additive output level component with largest variable disturbance value

Configuration point	Selection/ setting option	Explanation
Multiplicative Disturbance	Selection from Analog selector	Analog input for the multiplicative variable disturbance The ratio of the variable disturbance value at the working point of the variable disturbance is multiplied by the proportional gain of the controller. Changes in the variable disturbance affect the total gain of the controller. $K_{Tot} = K_p \times (X \div A)$ K_{Tot}: Total gain of the controller K_p: Proportional gain X: Variable disturbance value A: Working point
Working point	0 to 99999	Stationary variable disturbance value (variable disturbance value under steady-state, normal operating conditions of the system) If the variable disturbance equals the value of the working point (X = A), the following holds: $K_{Tot} = K_p \times 1$

10.11.4 Self-optimization

Open: Device menu ➔ Configuration ➔ Controller ➔ Controller 1 to 4 ➔ Self-optimization

Configuration point	Selection/ setting option	Explanation
Standby output	-100 to +100%	Output level at start of self-optimization
Output level for step	10 to 100%	Output level issued by the controller as a test signal For automatic parameterization of the controller, the response (step response) of the process (section) is evaluated.
Transfer CY	Yes No	Acceptance of the switching cycle (C_y) for pulse width outputs from self-optimization into the controller parameters

10.12 Setpoint value configuration

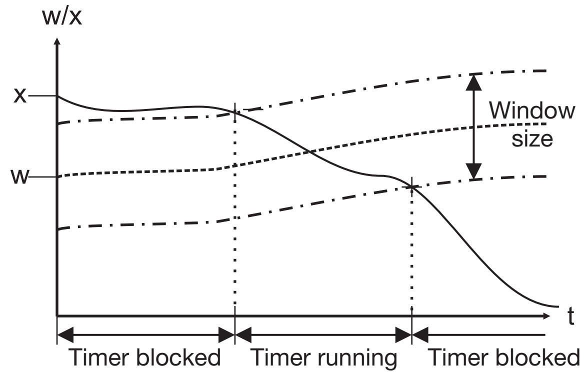
Open: Device menu ➔ Configuration ➔ Setpoint Value Configuration ➔ Setpoint value configuration, controller 1 to 4

Configuration point	Selection/ setting option	Explanation
external Setpoint 1 to 2	Selection from Analog selector	Selection of the analog value as setpoint value source If external setpoint values 1 to 2 are selected, they replace setpoint values 1 to 2 of the controller parameters in the respective controllers. ⇨ Chapter 9.2 "Parameter Sets (Controller parameter)", Page 114 With external setpoint values, the "Manual entry" button on the controller screen is hidden. ⇨ Chapter 8.5.1 "Automatic control mode", Page 99
Signal Setpoint changeover	Selection from binary selector	Digital signal for switching from setpoint value 1 to Setpoint value 2 Binary value = 0 activates (external) setpoint value 1 Binary value = 1 activates (external) setpoint value 2
Start Setpoint value limit	-99999 to +99999	lower limit for setpoint values
End Setpoint value limit	-99999 to +99999	upper limit for setpoint values

10.13 Timers

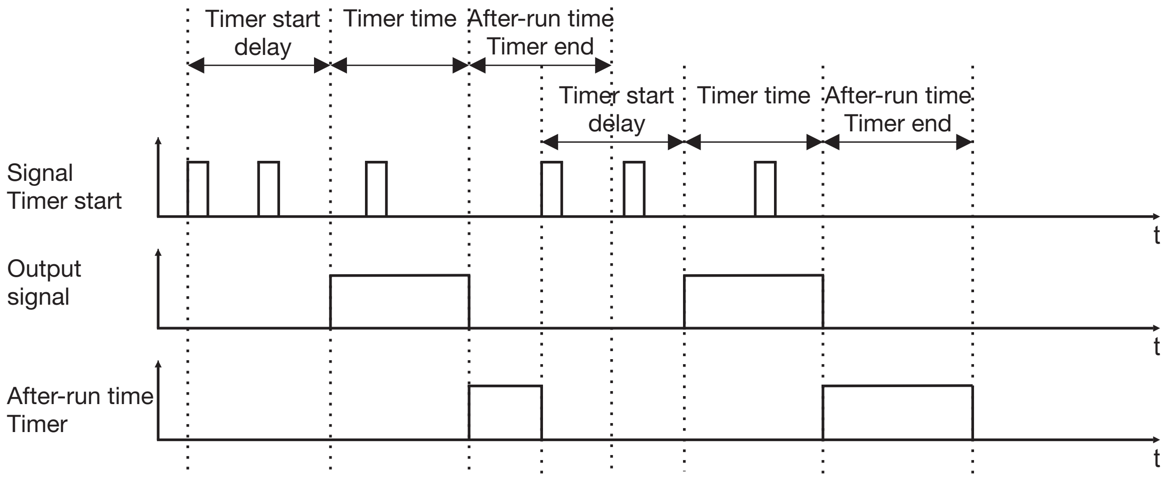
Open timer: Device menu ➔ Configuration ➔ Timer ➔ Timer 1 to 10 ➔ Timer

Configuration point	Selection/ setting option	Explanation
Timer function	Inactive Timers Control timer	Operating principle of the timer **Control timer:** Functions as weekly time switch Settings for a time program during the week ⇨ Chapter 10.13.1 "Control timer", Page 154 **Timer:** Functions as timing element; the chrono-logical progression of the output signal can be flexibly matched to the application via the settings. A detailed timing diagram follows this table.
Description	up to 15 text characters	Timer designation
Response after Power off	Program stop Continue running Restart	Response of the timer upon interruption of the Voltage supply
Timer time	hh:mm:ss	Elapsed time from timer start until the timer generates the set binary value
Lead time Timer start	0 to 9999 s	Delay time before the timer time starts
After-run time timer end	-1 to +9999 s	Time interval after timeout of the timer time Special feature: If the "After-run time after timer end" is set to the value -1, the time interval is infinitely long.
Signal Timer quit signal	Selection from binary selector	**only for "after-run time, timer end" > 0:** Binary signal for resetting the timer during the after-run time after timer end.
Timer start signal	Selection from binary selector	Digital signal to start the timer Retriggering with "Timer start" is possible only If the "Lead time" and the "Timer time" have timed out.
Timer stop signal	Selection from binary selector	Digital signal to reset the timer
Timer hold signal	Selection from binary selector	Interrupts timer operation
Timer restart signal	Selection from binary selector	Digital signal to reset and restart the timer during the "Lead time" or "Timer time"
Output signal	high low	Polarity inversion of the timer output signal **high:** the output signal is not polarity inverted. **low:** the output signal is polarity inverted.

Configuration point	Selection/ setting option	Explanation
Signal Tolerance band x	Selection from Analog selector	Selection of an analog signal the deviation of which from the "Tolerance band w signal" is to be monitored The timer starts and continues running only if the amount of deviation is not greater than the set window range. If the deviation is greater than the window range, running timers are interrupted and timer start for timers that have not yet started is prevented. 
Signal Tolerance band w	Selection from Analog selector	Selection of the analog signal from which the "Tolerance band x signal" may not deviate by more than the "Window range" in order for the timer to run
Window range	0 to 99999[a]	maximum amount of deviation |x - w|
Enable wash event	Yes No	Activation/deactivation of event list entries with On-signal from "Timer start signal"
Event list text	up to 21 text characters	Text for the event list with On-signal from "Timer start signal"

[a] The unit for the window range is obtained from the "Tolerance band x signal" parameter in this table.

Timing diagram



10.13.1 Control timer

Timer settings for a timed program during the week
Prerequisite: The "Timer function" must be configured as a "Control timer".
⇨ Chapter 10.13 "Timers", Page 152

Up to 4 Switch-on and Switch-off times can be specified separately for each weekday.
Open Switching Time Settings: Device menu ➔ Configuration ➔ Timers ➔ Timer 1 to 10 ➔ Time switch ➔ Monday to Sunday

Configuration point	Selection/ setting option	Explanation
Switch-on times 1 to 4	hh:mm:ss	When the time passes the On-time, the control timer sets the binary value = 1 (switched on).
Switch-off times 1 to 4	hh:mm:ss	When the time passes the Switch-off time, the control timer sets the binary value = 0 (switched off).

10.14 Washtimer

Open: Device menu ➔ Configuration ➔ Wash timer ➔ Wash timer 1 to 2

Configuration point	**Selection/ setting option**	**Explanation**
Washtimer (active)	Yes No	Activation/deactivation of the washtimer Washtimers are used to clean analysis sensors regularly and can actuate external equipment for cleaning sensors via digital outputs.
Description	up to 15 text characters	Timer designation
Time interval	0 to 999 h	Cycle for automatically repeated sensor cleaning
Washing time	0 to 999 min	Duration of sensor cleaning
Hold time after washing	0 to 999 s	After-run time of the washtimer hold signal upon timeout of the washing time The washtimer hold signal provides an On-signal for the duration of the washing time plus the hold time. The hold signal is intended primarily to activate the hold mode for controllers and analog outputs. These functions are held in a safe mode until the washed analysis sensor provides stable measured values once again.
Signal for interval restart	Yes No	Activation/deactivation of event list entries during sensor cleaning
Event list text	up to 21 text characters	Text for the event list during sensor cleaning

10.15 Counters

Open: Device menu ➔ Configuration ➔ Counter ➔ Counter 1 to 4

Configuration point	Selection/ setting option	Explanation
Function	Inactive Service count. Operation hours counter	Counter operation mode **Service count.:** The positive edges (switch-on operations) of a digital signal are counted (E.g. for checking the wear status of relays) **Operation hours counter:** The On-time of a digital signal is measured and the number of completed operating hours displayed.
Description	up to 15 text characters	Counter designation
Input signal	Selection from the binary selector	Digital signal, the switch-on operations or operating hours of which are to be counted
Alarm type	If a counter has reached its limit value, appropriate notifications can be configured for the alarm/event list. The alarm settings for all digital device functions are explained together. ⇨ Chapter 10.9.3 "Digital signal alarms", Page 142	
Alarm/event list		
Alarm text		
Service count. limit value	0 to 99999	Alarm threshold for number of positive edges (activations)
Operating hours counter limit value	0 to 99999 h	Alarm threshold for the number of operating hours

10.16 Ethernet

The Ethernet settings must be requested from the administrator of the network in which the device is installed.

Open: Device menu ➔ Configuration ➔ Ethernet

Configuration point	Selection/ setting option	Explanation
Assign IP address	Manual Automatic	**manual:** If no DHCP server is installed or a dedicated IP configuration is desired and the IP address configuration is known (e.g. from the network administrator), the data can be entered manually. **automatic:** A DHCP server is installed in the network. During power-up and booting, the JUMO AQUIS touch S receives the IP configuration from the DHCP server; the IP configuration takes place automatically.
Manual IP address	Valid IP address[a]	IP configuration of the Ethernet optional board Manual entry of known configuration data or automatic configuration by the DHCP server (see configuration item "IP address assignment")
Subnet mask	Valid subnet mask[a]	
Standard gateway	Valid IP address[a]	
DNS server	Valid IP address[a]	
Transfer rate	Automatic 10 Mbit/s half duplex 10 Mbit/s full duplex 100 Mbit/s half duplex 100 Mbit/s full duplex	Transmission speed (bit rate) and duplex mode of the Ethernet optional board This setting must match the setting of the switch or router port to which the JUMO AQUIS touch S is connected.

[a] To enter an IP configuration manually for the JUMO AQUIS touch S, a valid available IP address in the network must be known. Please contact your network administrator in this regard.

NOTE!
The Ethernet settings are entered in the online parameters in the JUMO PC setup program.
The IP configuration of the device can also be changed from the PC if the PC and device are connected via Ethernet. In this case, changing the IP address or subnet mask can interrupt the PC-device connection.
⇨ See chapter 19.9.3 "Ethernet", page 302

10.17 Serial interfaces

The serial interface settings of all participating devices on a bus must match.

Open: Device menu ➔ Configuration ➔ Serial Interfaces ➔ Serial interfaces 1 to 2

Configuration point	**Selection/ setting option**	**Explanation**
Protocol	Modbus slave	Communication protocol
Baud rate	9600 19200 38400	Transmission speed (symbol rate) of the serial interface
Data format	8 - 1 - no parity 8 - 1 - odd parity 8 - 1 - even parity	Format of the data word Useful bit – stop bit – parity bit
Minimum response time	0 to 500 ms	Minimum time from receiving a query to sending a response This parameter is used to adjust the response speed of the device to slower bus users.
Device address	1 to 254	Unambiguous specification of a bus participant

10.18 Formula

Mathematical formula are created with the JUMO PC setup program and loaded to the device. Following this, the configuration of a mathematical formula can also be edited directly on the device.

Open: Device menu ➔ Configuration ➔ Mathematical Formula ➔ Formula 1 to 8

Configuration point	**Selection/ setting option**	**Explanation**
Description	up to 15 text characters	Formula designation
Temperature	None Relative Absolute	For automatic conversion of temperature units, it is necessary to know whether the calculated result is an **absolute temperature** (temperature value on the Celsius scale) or a **relative temperature** (temperature difference in °C). If the result of the calculation not a temperature, **"none"** must be set here.
Unit	up to 5 text characters	**Entry of the unit for temperatures inactive:** Unit for the output value of the mathematical formula (calculation result)
Start Display range	-99999 to +99999[a]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
End Display range	-99999 to +99999[a]	

Configuration point	Selection/ setting option	Explanation
Response at error	No output Substitute value	Control of value output for error (E.g. division by zero). The value in the configuration item "Value for error" serves as substitute value.
Value for error	-99999 to +99999[a]	Safety value for the output of a mathematical formula for error

[a] The unit set for the particular mathematical formula appears in the entry field.

10.19 Logic formula

Logic formula are created with the JUMO PC setup program and loaded to the device. Following this, the configuration of a logic formula can also be edited directly on the device.

Open: Device menu ➔ Configuration ➔ Logic formula ➔ Formula 1 to 30

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Logic formula designation
Alarm type	Corresponding notifications for the alarm/event list can be configured for logic formulas . The alarm settings for all digital device functions are explained together. ⇨ Chapter 10.9.3 "Digital signal alarms", Page 142	
Alarm/Event list		
Alarm text		
Alarm delay		
Digital signal for hold		
Response at hold		

10.20 Manual values (configuration)

Open: Device menu ➔ Configuration ➔ Manual values (config.) ➔ Manual value (config.) 1 to 16

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation of the manual value
Temperature	None Relative Absolute	For automatic conversion of temperature units, it is necessary to know whether the manual value is an **absolute temperature** (temperature value on the Celsius scale) or a **relative temperature** (temperature difference in °C). If the manual value not a temperature, **"none"** must be set here.
Unit	up to 5 text characters	**Entry of the unit for temperatures inactive:** Unit for the manual value
Decimal place	Auto Fixed comma format	Decimal points in the display

Configuration point	Selection/ setting option	Explanation
Start Display range	-99999 to +99999[a]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
End Display range	-99999 to +99999[a]	

[a] The unit set for the particular manual value appears in the entry field.

10.21 External analog inputs

Open: Device menu ➔ Configuration ➔ External Analog Inputs ➔ External analog inputs 1 to 8

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation of the external analog input
Temperature	None Relative Absolute	For automatic conversion of temperature units, it is necessary to know whether the analog value received via the external analog input is an **absolute temperature** (temperature value on the Celsius or Fahrenheit scale) or a **relative temperature** (temperature difference). If this analog value is not a temperature, **"none"** must be entered here.
Unit	up to 5 text characters	Unit for the analog value received via the external analog input
Decimal place	Auto Fixed comma format	Decimal points in the display
Start Display range	-99999 to +99999[a]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
End Display range	-99999 to +99999[a]	
Hold value	No Yes	Nonvolatile storage of the last analog value received when the device restarts
Alarms 1/2	Alarms for external analog inputs are used to monitor analog values received via the individual external analog inputs in relation to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ Chapter 10.9.2 "Alarms for analog signals", Page 139	

[a] The unit set for the particular manual value appears in the entry field.

10.22 External digital inputs

Open: Device menu ➔ Configuration ➔ External Digital Inputs r External digital inputs 1 to 8

Configuration point	Selection/ setting option	Explanation
Description	up to 15 text characters	Designation of the external digital input
Hold value	No Yes	Nonvolatile storage of the last analog value received when the device restarts
Alarm	Alarms for external digital inputs are used to monitor input-side digital signals. The alarm settings for all digital device functions are explained together. ⇨ Chapter 10.9.3 "Digital signal alarms", Page 142	

10.23 Flow

Open: Device menu ➔ Configuration ➔ Flow-through ➔ Flow-through 1 to 2

Configuration point	Selection/ setting option	Explanation
Eingangsart	Inactive Digital input 2 Digital input 3 Analog input	Selection of the signal source for the flow-through measurement **Digital input 1/2:** Pulse frequency signals via Digital inputs **Analog input:** An analog signal is specified in the configuration item "Analog signal".
Description	up to 15 text characters	Designation of the flow-through function
Analog signal	Selection from Analog selector	**only for "Analog input" as "Eingangsart":** Selection of the analog signal source as flow-through signal
Measuring principle	Period measurement 3 to 300 Hz Pulse counting 300 Hz to 10 kHz	**only for "Digital input 2/3" as "Eingangsart":** Measurement method for determining the flow-through Pulse frequency signals are provided by paddle wheel sensors, for instance.
Time base	0 to 9999 s	**only for "Pulse counting" as "Measuring principle":** Duration of a counting segment The pulses counted within a counting segment divided by the time base yields the pulse frequency value. With a setting of 0 s, the time base is 250 ms.

Configuration point	Selection/ setting option	Explanation
K-Faktor	0 to 99999 l^{-1}	Ratio of the pulse count to flow rate (pulses per liter) The K-factor can be obtained from the documentation for the fitting in which the flow-through sensor (e.g. paddle wheel sensor) is installed. If the flow-through signal is transmitted as a standard signal or via an interface (external analog inputs), be aware that the K-factor affects analog values as well. For reliable handling of the flow-through as an analog signal, it is recommended that the flow value be generated as a standard signal and the K-Faktor set to a value of 1.
Unit	l / s l / min l / h m^3 / s m^3 / min m^3 / h gal / s gal / min gal / h customer-specific	Unit for the flow-through value **Customer-specific unit:** In the individual measured display, the flow rate value in liters per second is multiplied by the factor from the "Conversion factor" setting and the unit displayed on the basis of the " Unit description" setting.
Conversion factor (flow rate)	-99999 to +99999	only for "customer-specific" as "Unit": Conversion factor from the unit "l / s" for the flow rate to the customer-specific unit
Unit description (flow rate)	up to 5 text characters	**only for "customer-specific" as "Unit":** Entry of an arbitrary customer-specific unit for the flow rate
Decimal place (flow rate)	Auto, Fixed comma format	Decimal points in the display
Start Display range (flow rate)	-99999 to +99999[a]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
End Display range (flow rate)	-99999 to +99999[a]	

Configuration point	Selection/ setting option	Explanation
Total quantity	Off hourly daily weekly monthly annually unlimited	**only available with flow rate measurement activated:** Activation of the flow-through quantity counter The setting establishes the automatic reset cycle. In addition, the flow-through quantity counters can be reset manually at the functional level or via a digital signal (reset input). The last counter state is saved during resetting and is available in the analog selection as " Total quantity - Periods 1/2".
Reset input	Selection from binary selector	**only for "unlimited" as "Total quantity":** Digital signal for resetting the current counter state
Conversion factor (flow-through quantity)	-99999 to +99999	**only for "customer-specific" as "Unit":** Conversion factor from the unit "l" for the flow-through quantity to the customer-specific unit
Unit designation (flow-through quantity)	up to 5 text characters	**only for "customer-specific" as "Unit":** Entry of an arbitrary customer-specific unit for the flow-through quantity
Decimal place (flow-through quantity)	Auto, Fixed comma format	Decimal points in the display
Start Display range (flow-through quantity)	-99999 to +99999[b]	Upper/lower limit for labeling the scale when displaying measuring values, e.g. in recorder diagrams and bar graphs
End Display range (flow-through quantity)	-99999 to +99999[b]	
Alarms 1/2	Flow-through function alarms are used to monitor flow values in relation to adjustable limit values. The alarm settings for all analog device functions are explained together. ⇨ Chapter 10.9.2 "Alarms for analog signals", Page 139	

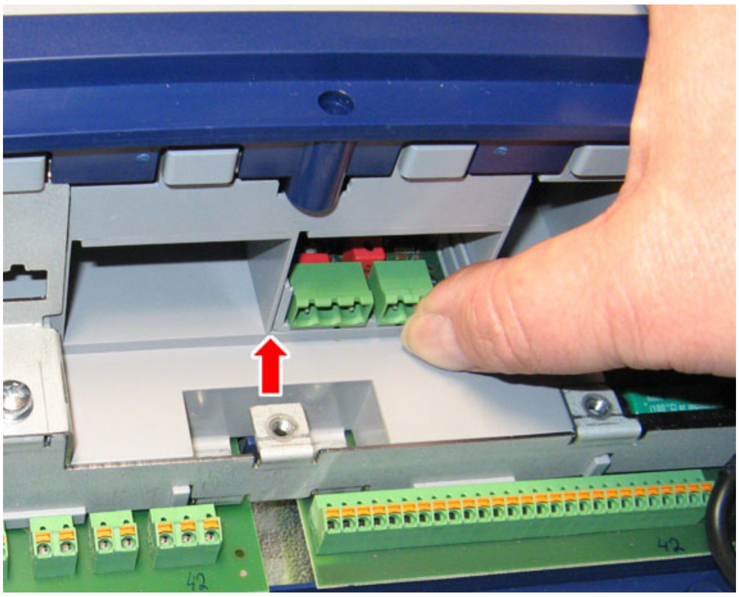
[a] The unit set for the particular flow-through function appears in the entry field.
[b] The unit set as the flow-through quantity for the particular flow function appears in the entry field.

11.1 Installing optional boards

	DANGER! Installation and removal of optional boards must be performed only by qualified personnel. To ensure electrical safety, country-specific regulations must be observed.

The following step-by-step table explains in detail the procedure for retrofitting optional boards:

Step	Action
1	Before changing or expanding the number of optional boards being used, please perform an energy balance test. ⇨ Chapter 11.2 "Energy balance test", Page 168
2	Disconnect all phases of the power being supplied to the device (power grid, outside power supply sources for relays/solid-state relays etc.).
3	Identify the assembly from the part number on the sticker attached to the packaging as well as from the accessories table. ⇨ Chapter "Accessories", Page 26 Using the block diagram, select a suitable slot for the optional board. ⇨ Chapter 3.2 "Block diagram", Page 19
4	Open the terminal compartment on the device. ⇨ Chapter 6.2.1 "Opening the terminal compartment on the device", Page 39
5	Localize the selected slot in the device from the labeling on the cover plate over the optional board slots or the connection diagram. ⇨ Chapter 6.4.1 "Overview of connections", Page 47
6	Unplug all plug-in screw terminals and interface cables that prevent removal of the cover plate.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>7</td><td>Unscrew the 2 screws in the cover plate over the selected optional board slot and remove the cover plate.
</td></tr>
<tr><td>8</td><td>Insert the optional board in the selected slot. Ensure that the board is seated correctly. For better guidance of the board, you can fill empty slots with plastic board frames. The plastic board frame must be flush with the front page of the plastic bodies of the optional board slots (see arrow).
</td></tr>
<tr><td>9</td><td>Fill all empty slots with plastic board frames, reinstall the cover plate and secure it in place with screws.

For "Ci analysis input" optional boards (inductive conductivity), continue at Step 10; otherwise, at Step 15</td></tr>
</table>

Step	Action
10	Install the M12 socket supplied with the optional board in a suitable cable entry opening in the case.
11	Connect the 2-wire temperature sensor cable from the socket to an appropriate analog input (e. g. temperature measurement input). Observe the information regarding the integrated temperature sensor in the conductivity sensor.
13	Insert the plug-in screw terminal for the M12 socket into the Ci optional board. The factory-installed wiring must not be changed.
14	Connect the inductive conductivity sensor to the M12 socket.
15	Reinsert all other plug-in screw terminals and interface cables.
16	Reattach the terminal compartment cover. Tighten all 6 screws in the terminal compartment cover to a torque of 1 Nm.
17	Now, reconnect the power supply and check whether the new hardware has been recognized. ⇨ Chapter 7.2.1 "Checking the optional boards", Page 68
18	Only for Ci optional boards (inductive conductivity): Perform a Ci base calibration. ⇨ Chapter "Performing the Ci base calibration", Page 173
19	Only for optional boards for analysis inputs: Calibrate the analysis inputs. ⇨ Chapter 12 "Calibration in general", Page 177

11.2 Energy balance test

Depending on the number and type optional boards selected, a varying amount of heat is generated in the device as a result of the heat generated by the electronic assemblies. This heat can be cooled and removed from the hermetically sealed IP67 case to only a limited degree.

Using the **JUMO PC setup program**, a prediction of the maximum possible heating of the device electronics can be made before installing option boards. You only need to indicate which configuration of option boards you are planning and the maximum ambient temperature to which the device will be exposed during operation.

This energy balance calculation assumes a worst-case scenario. The maximum possible amount of heat generated by the individual optional boards is assumed; the maximum ambient temperature assumed can be set to either 40 °C or 50 °C. If the planned complement of optional boards exceeds the energy balance limit, this configuration should be used continuously only if the worst-case (ambient temperature always 40 or 50 °C and all optional boards at max. load simultaneously) can occur for only a limited period of time. This must be decided by the system planner.

Comparable practical example: a car's engine should not be operated continuously in the "red" RPM range. Nevertheless, this is possible for a brief period of time. Increased wear, however, must be expected.

A demo version of the JUMO PC setup program is provided on the CD included with the JUMO AQUIS touch S. Alternatively, you can also download the software from the JUMO home page free of charge.

Tips for avoiding increased heat buildup:

- Install the device in an environment with moderate temperatures
- Prevent exposure to direct sunlight, as this can result in an extremely high temperature rise in the device
- Reduce the complement of optional boards to only what is necessary
- Instead of analog current/voltage outputs, it is better to use digital interfaces (Ethernet, RS422/485 etc.) for transmitting measured values to PLCs/control systems
- Reduce the brightness of the liquid crystal display to only what is necessary
- Use the screensaver

11.2.1 Monitoring the internal temperature

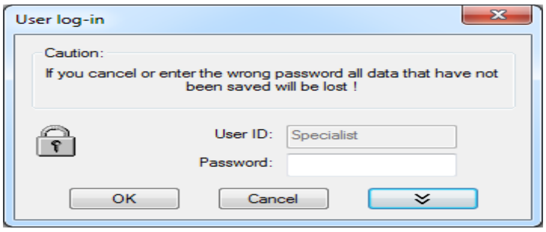
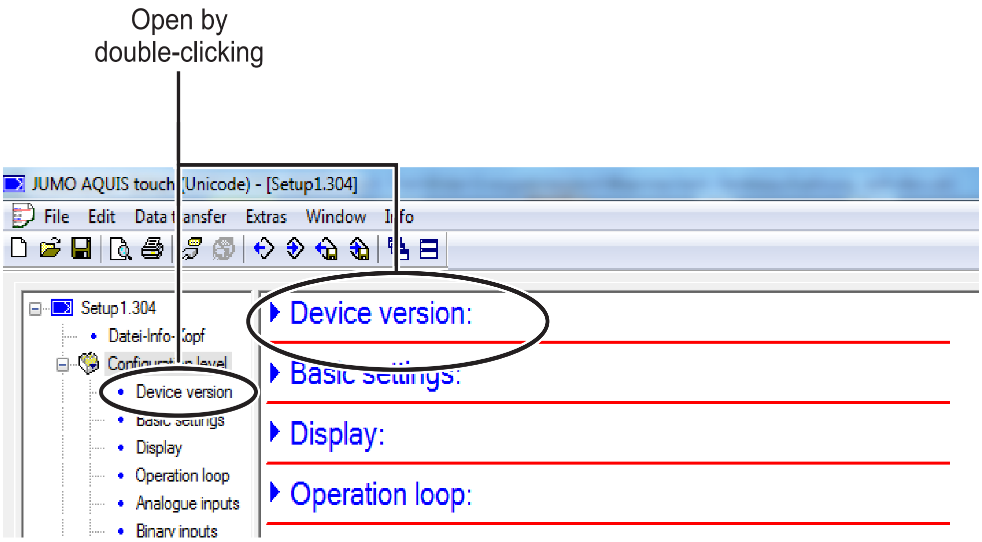
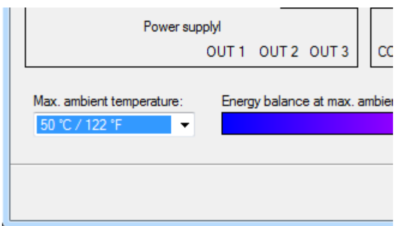
The temperature inside the device can be monitored in the Device Info menu. To do so requires corresponding user rights. The factory settings authorize the "Master" and "Service" users for this.

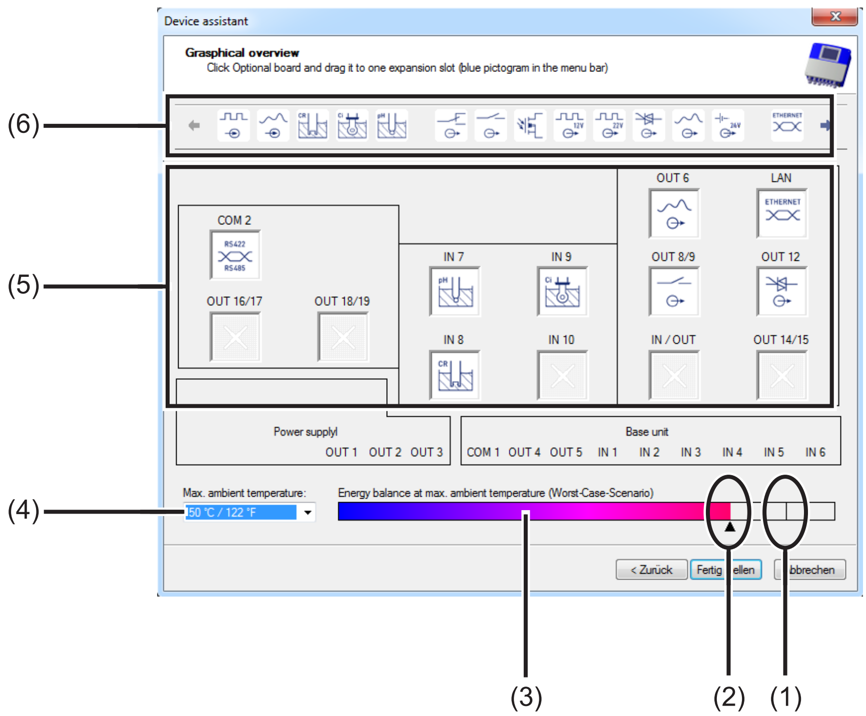
Open the board temperature display:
Device menu ➔ Service ➔ Service Data ➔ "Internal Data" tab

If the inside of the device becomes overheated, the "Internal temperature too high" alarm is triggered. The signal for this alarm is accessible in the binary selection and can be used to send a signal from the device to external indicating instruments or control rooms.

Selecting the "Internal temperature too high" alarm during configuration of binary outputs and internal functions:
Binary selection ➔ Alarm and Internal Signals ➔ Internal temp. too high

11.2.2 Performing the energy balance test

Step	Action
1	Launch the JUMO PC setup program from the Windows® Start menu[a].
2	If you are using the demo version of the JUMO PC setup program, enter "Demo" as user ID and confirm by pressing "OK". 
3	Open the "Device Version" menu item by double-clicking on it. 
4	In the "Hardware Selection" window, activate the "User-Defined Settings" option and click on "Next".
5	In the "Specification of Device Characteristics" window, click on "Next".
6	In the "Configuration of Optional Plug-in Cards" window, set the ambient temperature acc. to the prevailing conditions at the planned installation site. For temperatures up to 40 °C or 104 °F, select "40 °C / 104 °F". For temperatures in the range of 40 to 50 °C or 104 to 122 °F, select "50 °C / 122 °F". 

Step	Action
7	Here, you can now easily insert in, reposition to and remove the desired optional boards (6) from the corresponding slots (5) symbolically via drag and drop. To remove optional boards from slots, simply pull the slot icons out of their slots via drag and drop and release once they are outside the slot. The "Energy Balance" bar graph (3) displays the heating to be expected inside the case. All heat generated by the base and power supply unit and the optional boards is taken into account along with the effect of the preset ambient temperature (4). The small vertical line in this display (1) represents the limit that may not be exceeded. If this limit is exceeded, the color of the pointer in the bar graph (2) changes from black to red. 
8	Installation of the planned complement of optional boards poses no concerns if the energy balance limit has **not** been exceeded.

[a] Microsoft, Windows XP, Windows Vista, and Windows 7 are registered trademarks of Microsoft Corporation.

11.3 Ci base calibration

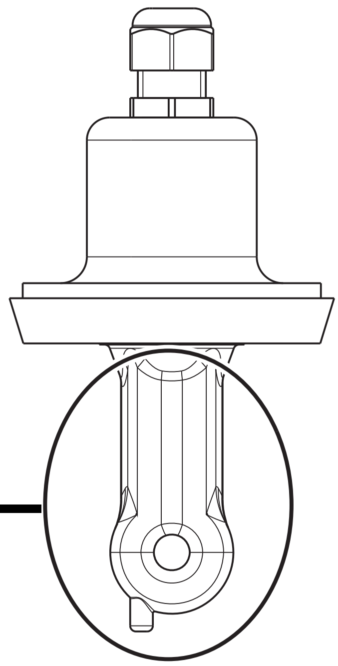
Analysis inputs for inductive conductivity sensors must undergo a Ci base calibration during commissioning. A Ci base calibration must be performed when:

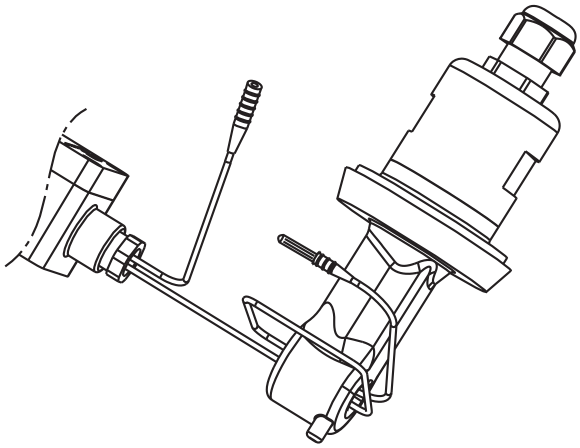
- A new sensor or a new Ci optional board is being installed for the first time
- The sensor or a Ci optional board was replaced
- A Ci optional board was repositioned to a different optional board slot
- Data loss occurred as the result of failure of the backup battery while the power was switched off
- Device software was updated

After the basic calibration has been performed, the measurement input can be calibrated. Following successful calibration, the measurement input is ready for use.

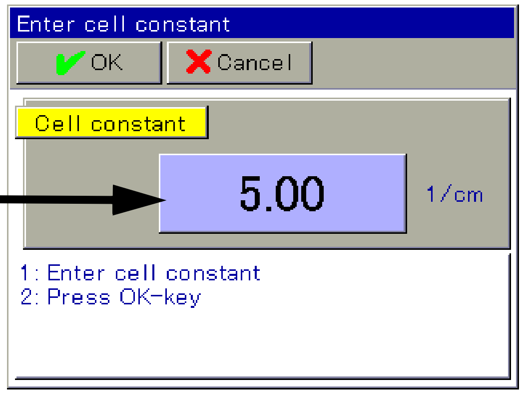
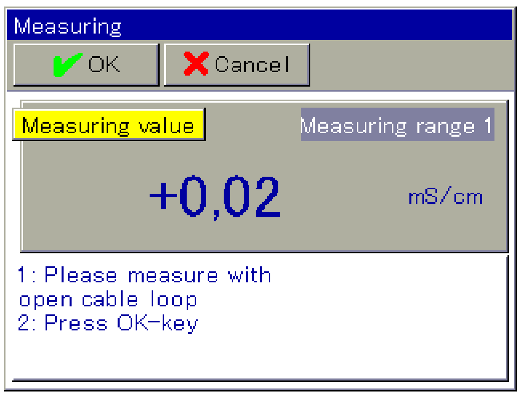
NOTE!
For the Ci base calibration, you need the JUMO Type 202711/21 calibration adapter for inductive conductivity sensors (TN 00543395).

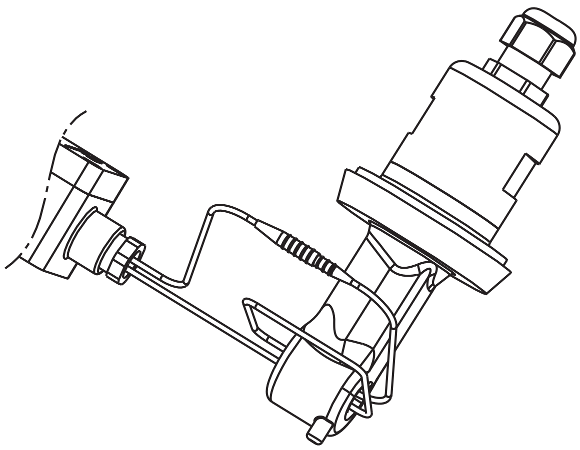
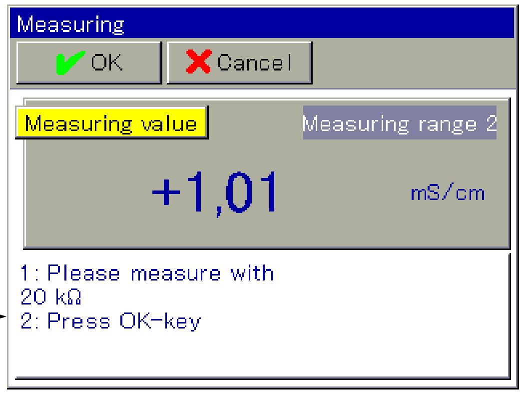
Performing the Ci base calibration

Step	Action
1	Ensure that you have user rights for calibration settings. The factory settings authorize the "Master" and "Service" users for this. ⇨ Chapter 8.1.1 "Passwords and user rights", Page 71
2	Ensure that the electronics of the JUMO AQUIS touch S have reached operating temperature. You can view the board temperature at: Device menu ➔ Service ➔ Service Data ➔ "Internal Data" tab Ensure that the ambient temperature specified for the device corresponds to the conditions for the normal operating mode. Wait until the board temperature has reached an approximately constant value.
3	Place the sensor such that the sensor body is suspended freely in air. Observe the following rules during the entire calibration: • Keep all objects away from the sensor body • Do not touch the sensor body • Do not allow the sensor body to lie flat on a surface 

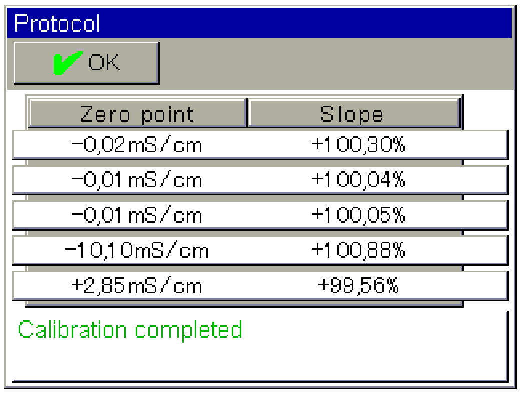
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>Place the wire of the calibration sensor with 2 windings through the opening in the Ci sensor without connecting the ends of the wires.
</td></tr>
<tr><td>5</td><td>Start the Ci base calibration

Device menu ➔ Service ➔ Ci-base calibration IN 7 to 10</td></tr>
<tr><td>6</td><td>Enter the cell constant for the sensor and confirm by pressing "OK".

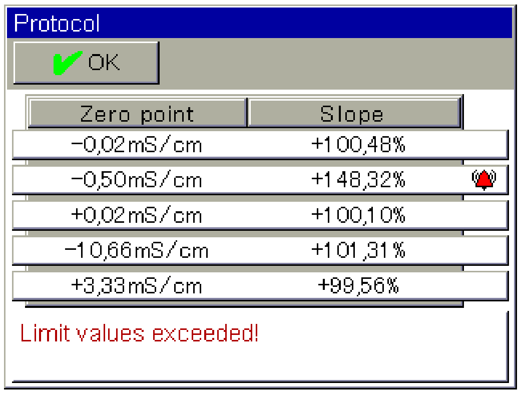
Tap button to
enter field
</td></tr>
<tr><td>7</td><td>The device now performs a measuring with the open cable loop of the calibration adapter open. Wait until the measured value displayed stabilizes and then confirm by pressing "OK".
</td></tr>
</table>

Step	Action
8	Connect the ends of the wires forming the conductor loop of the calibration adapter. 
9	Set the calibration adapter to the resistance value shown in the instruction text in the display (in the example: 20kW). Once the measured value displayed has stabilized, confirm by pressing "OK". Follow the instructions 
10	Now follow the instructions on the display. You will be requested to set certain resistance values on the calibration adapter one at a time and then to confirm each measuring by pressing "OK". All resistance value set on the calibration adapter are measured for the end of one measuring range and the beginning of the following measuring range. Each resistance value will thus be confirmed 2 times. Only the last measuring will be confirmed 1 time.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>11</td><td>
Once all measurings have been confirmed, a summary of the calibration data acquired appears. Confirm by pressing "OK".
If the Ci base calibration fails, the procedure is canceled without acceptance of the calibration data.
Protocol after successful Ci base calibration



Protocol after failed Ci base calibration



</td></tr>
<tr><td>12</td><td>Accept the calibration data acquired by pressing "Yes"; discard the data by pressing "No".</td></tr>
</table>

12 Calibration in general

12.1 Important information

WARNING!
During the calibration, the relays and analog output signals assume the configured states!

12.2 General information

The actual electrical characteristics of analysis sensors always deviate somewhat from the nominal specifications. The reasons for this include:

- Like every measuring instrument, analysis sensors always have a certain uncertainty of measurement that results from manufacturing tolerances.
- During use, analysis sensors are exposed to chemical processes. Deposits and wear phenomena caused by these processes result in changes of the electrical characteristics of sensors.

To optimize the accuracy of measurements, analysis sensors must be calibrated. Calibrations are required:

- during installation or when changing a sensor
- regularly at time intervals that must be specified by the user
- if implausible measured values are displayed
- if process conditions change, e. g. as the result of equipment modification

Calibration timers can be configured to provide a regular reminder of when calibrations are due.
⇨ Chapter 10.10 "Calibration timers", Page 143

Each successfully completed calibration is recorded in the calibration logbook.
⇨ Chapter 12.3 "Calibration logbook", Page 179

12.2.1 General procedure for calibration

True calibration (calibrating with routines)

After opening one of the calibration routines in the device, the user is guided through a process with measurements and entries. In the course of this process, the calibration values are determined and saved automatically.
Suitable calibration routines are available for every type of analysis sensor. The individual calibration routines for the various sensor types are described in separate chapters.

⇨ Chapter 13 "Calibrating a pH measuring chain", Page 183 to Chapter 17 "Calibrating Ci conductivity sensors", Page 205

Execution of calibration routines requires that the following prerequisites be met:

- You must be logged in as a user with the right to perform calibrations. Factory-preset users have all of these rights.
  ⇨ "Passwords and user rights", page 71
- You must ensure that the calibration default settings for the individual analysis inputs and, possibly, the universal inputs are set correctly. The explanations of the calibration default settings can be found in the chapters on calibration of the various analysis sensors.
- In the case of Ci analysis inputs, it should be noted that the optional boards must undergo a basic calibration during the initial commissioning. If this has not yet been performed, it is necessary to do so prior to any other calibration.

⇨ Chapter 11.3 "Ci base calibration", Page 172

Manual entry of calibration values

NOTE!
Incorrectly entered calibration values result in incorrect measured values. Correct measurements are essential for control systems and limit monitoring.

If calibration values are known, they can also be entered manually. This may be the case with temperature-compensated conductivity measurements, for instance, when the temperature coefficient of a liquid is known. Known calibration values are entered manually under:

Device menu ➔ Calibration ➔ Select Analog Input ➔ Calibration Values

12.3 Calibration logbook

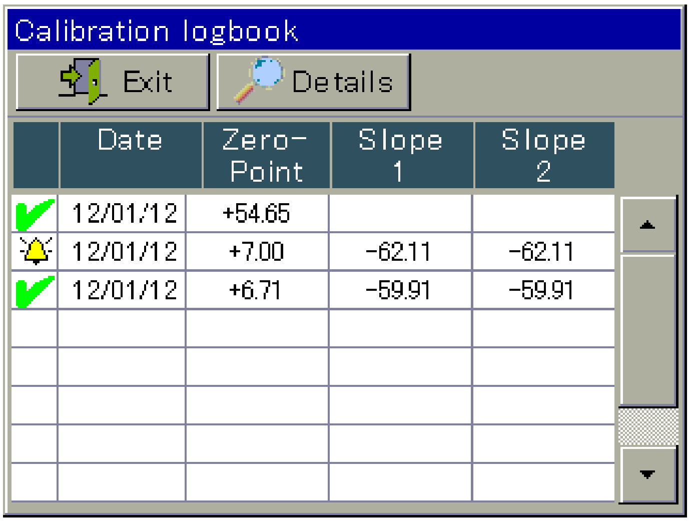
A separate logbook is maintained for each analysis and universal input.

The last 10 **successful** calibrations of the input concerned are saved in the calibration logbook. Canceled or failed calibrations (calibrations outside the permissible limits) are not saved in the logbook, but rather noted in the event list. Manual changes of calibration values on the device are also documented. The following data are retained in the logbook:

- Heading with description of the measuring input and calibration method
- Date and time
- Measurand
- Calibration assessment (assessment of the calibration values determined during the true calibration)
- Calibration values determined or entered
- Reference values used
- Calibration mode (true calibration/manual entry of calibration values)

Since this information does not yet fit in a screen line, the logbook entries are listed in abbreviated form with the date and calibration results for the time being. More exact information can be accessed for every entry via the detail view.

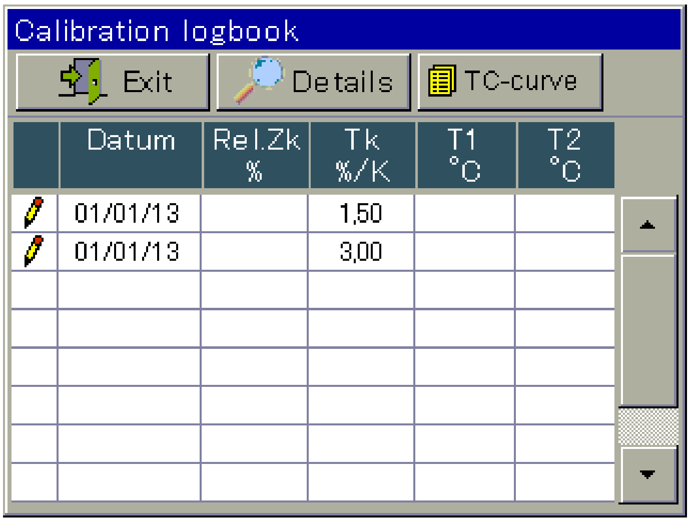
Example of a calibration logbook



Calibration assessment symbols

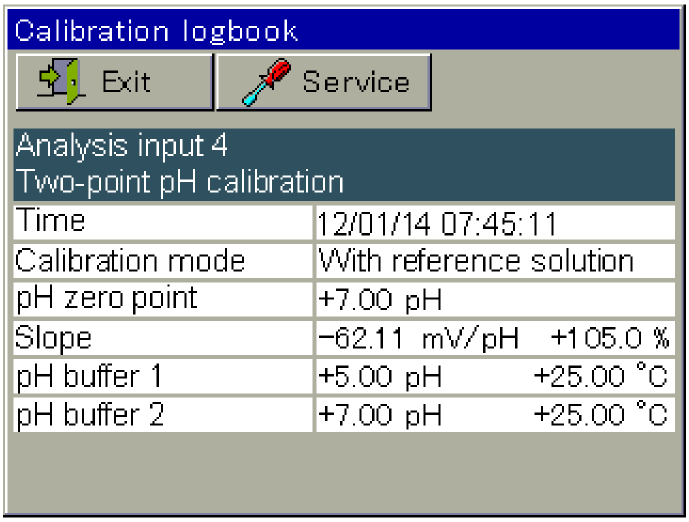
	Calibration values are valid: Sensor is OK
	The calibration values determined are critical. It is recommended that the sensor be cleaned.
	Manual value input

For Ci analysis inputs (inductive conductivity) and universal inputs that have been configured as a conductivity measuring input, a "TC curve" button is also displayed. Tapping this button opens a list with the temperature coefficients determined from the last "TC curve calibration".



Example of a detail view of a logbook entry

The calibration logbook provides an overview of the calibrations performed. Tapping the "Details" button opens the selected logbook entry in the detail view. The detail view displays a table with all calibration values from a calibration procedure. The "Service" button is used for diagnostic purposes by trained personnel or JUMO Service.



Assessment criteria

pH calibrations
(glass electrodes and ISFET connected to analysis measuring inputs as well as standard signals connected to universal inputs)

Calibration value [unit]	—												—
Zero point [pH]	...	<	5	≤	...	<	6 to 8	<	...	≤	9	<	...
Slope [%]	...	<	75	≤	...	<	89.6 to 103.1	<	...	≤	110	<	...

pH calibrations (antimony electrodes connected to analysis measuring inputs)

Calibration value [unit]	—				—
Zero point [pH]	...	<	-2 to +2	<	...
Slope [%]	...	<	10 to 110	<	...

Redox zero-point calibration

Calibration value [unit]	—												—
Zero point [mV]	...	<	-200	≤	...	<	-120 to +120	<	...	≤	+200	<	...

NOTE!
There is no assessment of the calibration values in the case of a redox 2-point calibration.

Ammonia calibration

Calibration value [unit]	—												—
Zero point [mV]	...	<	-612	≤	...	<	-312 to +588	<	...	≤	+888	<	...

Calibration of conductivity sensors
(analysis measuring inputs and standard signals connected to universal inputs)

Calibration value [unit]	—												—
Rel. cell constant (CR) [%]	...	<	50	≤	...	<	75 to 125	<	...	≤	150	<	...
Rel. cell constant (Ci) [%]	...	<	80	≤	...	<	90 to 110	<	...	≤	120	<	...

Calibration value [unit]	—				—
Temperature coefficient (CR) [%/K]	...	<	0 to 8	<	...
Temperature coefficient (Ci) [%/K]	...	<	0 to 5.5	<	...

NOTE!
No assessment of the calibration values is performed for universal inputs in the "linear scaling" operation mode.

13.1 Important information

WARNING!
During the calibration, the relays and analog output signals assume the configured states!

13.2 General information

The calibration of pH electrodes is based on measurements in Buffer solutions with a defined pH-value. The pH values of the Buffer solutions used are specified either via entry of fixed values into the calibration default settings, entered during the calibration or recognized automatically by "automatic buffer recognition" during the calibration process. For "automatic buffer recognition", a Buffer set table must be selected in the calibration default settings. In this case, the Buffer solutions used must be listed in the provided Buffer set table. Since pH value measurement of liquids is temperature-dependent, the temperature of the Buffer solution must be sensed in order to compensate for its effect on the result of the measurement. This requires either manual entry or measurement with the aid of a Temperature sensor.

13.2.1 Calibration methods for pH sensors

Zero-point calibration

This calibration method is used to determine the pH zero point on the measurement characteristic curve. The Slope is retained.

A Buffer solution with a defined pH-value is needed as a reference.

Two-point Calibration

By measuring 2 different Buffer solutions with defined pH-values, the pH zero point and pH slope of the measuring chain are established.

The pH-values of the Buffer solutions must be at least 2 pH apart. This calibration method is recommended for most applications.

Three-point calibration

With Three-point calibration, the pH zero point as well as the pH slope in the acidic region and the pH slope in the alkaline region are established.

This method requires 3 Buffer solutions with defined pH-values as references. One of these must be acidic, one neutral and one alkaline. The pH values of the Buffer solution must be at least 2 pH apart from one another. This calibration method is recommended for applications with more demanding accuracy requirements when performing measurements in both the alkaline and acidic regions.

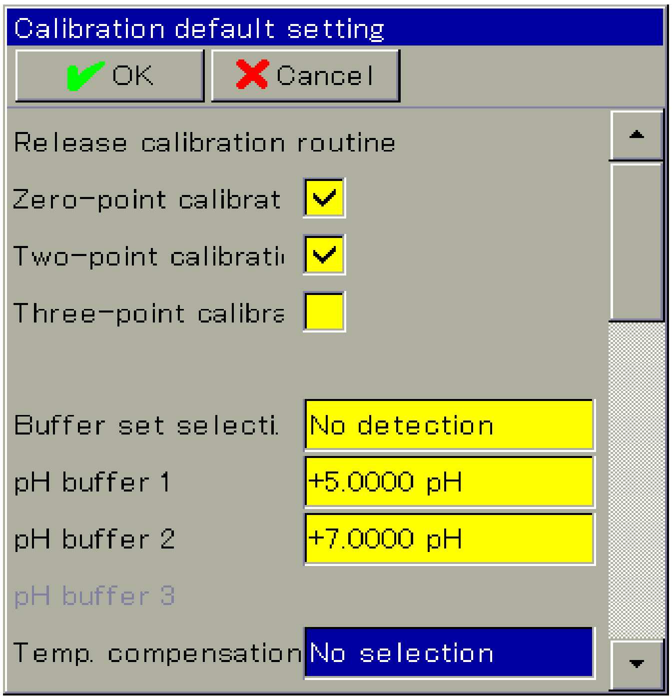
13.2.2 Calibration default settings for pH sensors

Before you can perform a calibration, you must first enter the necessary calibration default settings. The possible settings for the pH Calibration are described in the following.

Open the calibration default settings:
Device menu ➔ Calibration ➔ Select Analysis Input for pH/redox/NH_3 ➔ Calibration Presets

NOTE!
The "Calibration default settings" menu appears in the Device menu only if a user with corresponding user rights is logged in.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

Sample screen:
pH calibration default settings



pH calibration default settings

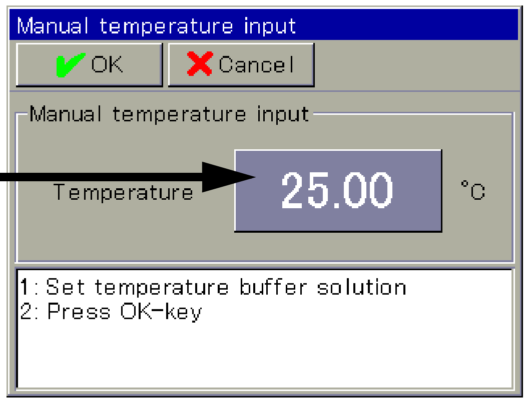
The calibration default settings enable the calibration routines to be accessed in the particular calibration menu.
Calibration routines that are not enabled are not visible in the calibration menu.
Additional calibration default settings are explained in the following table.

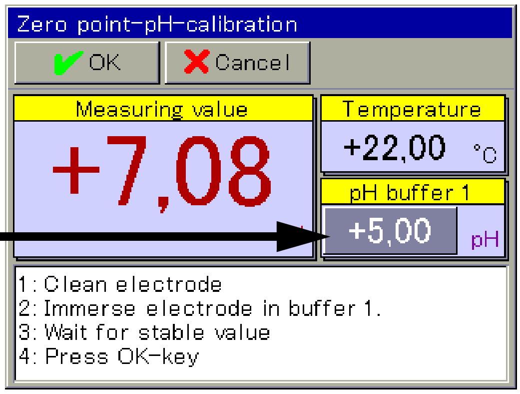
Parameters	Possible settings	Explanation
Buffer set selection	Buffer set 1 to 3 factory-preset: • **Buffer set 1:** Reference Buffer solutions for calibrating pH measuring instruments acc. to DIN 19266 • **Buffer set 2:** Technical Buffer solutions, preferably for calibrating and adjusting technical pH measuring instruments acc. to DIN 19267	Buffer set tables contain pH values for selected buffer solutions as a function of temperature. These tables can be prepared/edited using commercially available standard solutions (DIN 19266, NIST; otherwise, technical buffer solutions etc.) or on the basis of customer-specific information. With their aid, buffer solutions can be recognized automatically when calibrating. The pH value data for the buffer solutions used must be contained in the buffer set table selected. When a Buffer set is selected, this activates automatic buffer recognition and the entry fields for the settings "pH buffer 1 to 3" are hidden. You need the JUMO PC setup program to edit Buffer set tables.
Buffer 1 pH-value	-2 to +16 pH	manual entry of the pH-values of the Buffer solutions being used for the calibration Depending on the selected Calibration routine, the corresponding entry fields for "pH buffer 1 to 3" are displayed. The pH-values of the Buffer solutions used must be at least 2 pH apart.
Buffer 2 pH-value	-2 to +16 pH	
Buffer 3 pH-value	-2 to +16 pH	
Temperature compensation	Selection from Analog selection	Temperature input for automatic sensing of the test/sample solution temperature during the calibration

13.3 pH Calibration routines

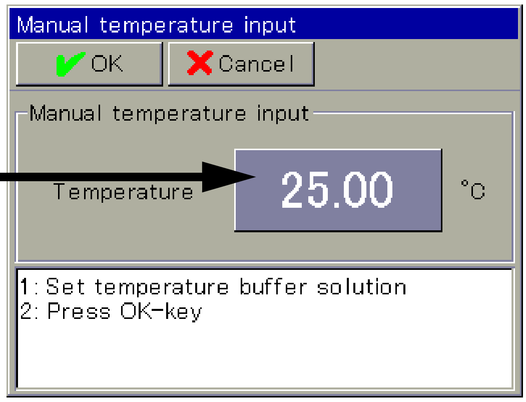
NOTE!
You must be logged in with corresponding user rights to perform calibrations.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

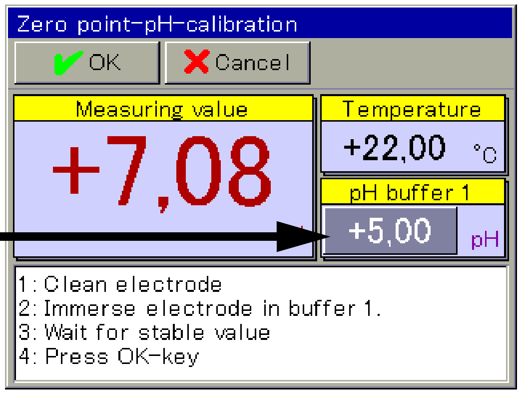
13.3.1 Zero-point calibration

Step	Action
1	Start the Zero-point calibration. Device menu ➔ Calibration ➔ Select analysis input for pH/redox/ NH_3 ➔ Open zero-point calibration
2	If temperature compensation was not specified in the calibration default settings, enter the temperature of the Buffer solution here manually. If temperature compensation was specified, the temperature of the buffer solution is determined automatically. tap button to en- ter temperature 
3	Clean the pH electrode and immerse it in the Buffer solution.

Step	Action
4	**Entry of the pH-value of the Buffer solution** • **without buffer recognition:** Check whether the "pH buffer 1" matches the pH-value of the Buffer solution used. If a Buffer set table was not specified, the "Buffer 1 pH" value is taken from the calibration default settings. It is still possible to change this manually here. tap button to enter pH-value of the Buffer field  • **with buffer recognition:** A prerequisite here is that a Buffer set table has been selected in the Buffer set table and the pH-value of the Buffer solution used is contained in this Buffer set table. If these prerequisites are satisfied, the pH value of the Buffer solution is determined automatically during the calibration.
5	Wait until the measured value displayed stabilizes and then confirm the result of the measurement by pressing "OK"
6	A Protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
7	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

13.3.2 Two-point and Three-point calibration

Step	Action
1	Start the desired Calibration routine. Device menu ➔ Calibration ➔ Analysis input Select analysis input for pH/redox/NH_3 ➔ Open two-point or three-point calibration
2	If temperature compensation was not specified in the calibration default settings, enter the temperatures of the Buffer solution here manually. If temperature compensation was specified, the temperature of the buffer solution is determined automatically. To enter the temperature, tap the button 
3	Clean the pH electrode and immerse it in one of the Buffer solutions. For a Two-point calibration, you need 2 Buffer solutions. For a Three-point calibration, you need 3 Buffer solutions (acidic, neutral, and alkaline).

Step	Action
4	**Entry of the pH-value of the Buffer solution** • **without buffer recognition:** Check whether the "pH buffer 1" matches the pH-value of the Buffer solution used. If a Buffer set table was not specified, the "Buffer 1 pH" value is taken from the calibration default settings. It is still possible to change this manually here. tap button to enter pH-value of the buffer field  • **with buffer recognition:** A prerequisite here is that a Buffer set table has been selected in the Buffer set table and the pH-value of the Buffer solution used is contained in this Buffer set table. If these prerequisites are satisfied, the pH value of the Buffer solution is determined automatically during the calibration.
5	Wait until the measured value displayed stabilizes and then confirm the result of the measurement by pressing "OK".
6	For each additional calibration point, repeat steps 3 to 5 with the required Buffer solutions.
7	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
8	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

14.1 Important information

WARNING!
During the calibration, the relays and analog output signals assume the configured states!

14.2 General information

The calibration of Redox sensors is based on measurements in test solutions with a defined Redox potential.

14.2.1 Calibration methods for Redox sensors

Zero-point calibration

This calibration method is used to determine the Redox zero point.

A test solution with a defined Redox potential is needed as a reference.

"mV" must be set as the Redox unit in the configuration of the Redox measuring input.

⇨ Chapter 10.5.3 "pH/Redox/NH3 analysis inputs", Page 130

Two-point Calibration

This calibration is used to establish an application-specific measurement characteristic curve where Redox potentials are represented as a percentage of concentration values. The Redox potentials of 2 solutions are measured. Concentration values in percent are then assigned to the measured values by the user.

Two process-typical sample solutions are needed as calibration solutions as a reference.
"Percent" must be set as the Redox unit in the configuration of the Redox measuring input.
⇨ Chapter 10.5.3 "pH/Redox/NH3 analysis inputs", Page 130

Example: In a detoxification plant, the toxicity of a liquid is to be measured on the basis of the Redox potential. The calibration requires 2 solutions:

- the concentration of the highly toxic solution is given as 80% by the user, for instance
- the concentration of the detoxified solution is given as 10% by the user, for instance

Using the redox potential, the toxicity can now be measured and displayed in percent.

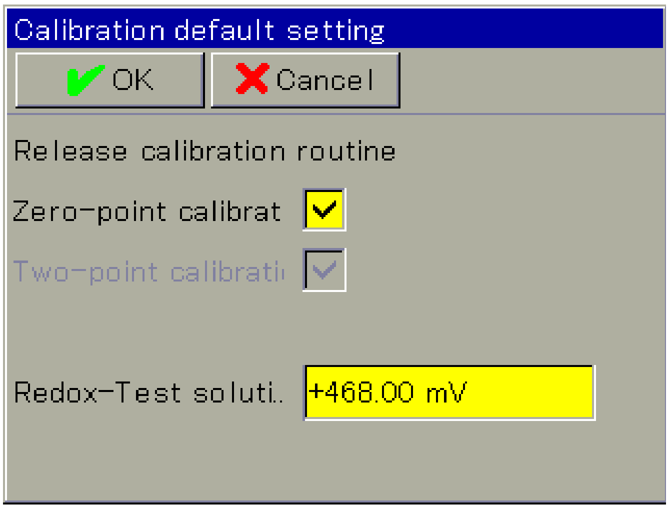
14.2.2 Calibration default settings for Redox sensors

Before you can perform a calibration, you must first enter the necessary calibration default settings. The possible settings for the Redox calibration are described in the following.

Open the calibration default settings:
Device menu ➔ Calibration ➔ Select Analysis Input for pH/Redox/ NH_3 ➔ Calibration default settings

NOTE!
The "Calibration default settings" menu appears in the Device menu only if a user with corresponding user rights is logged in.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

Sample screen:
Redox calibration default settings
(zero-point calibration)



Redox calibration default settings

The calibration default settings enable the calibration routines to be accessed in the particular calibration menu.
Calibration routines that are not enabled are not visible in the calibration menu.
Additional calibration default settings are explained in the following table.

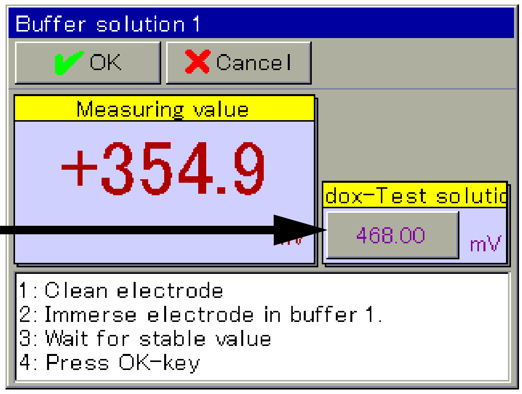
Parameters	Possible settings	Explanation
Redox test solution	-1500 to +1500 mV	Manual entry of the Redox potential of the test solution being used for calibration

NOTE!
Remember that the configuration of the Redox measuring input must be set to the Redox unit "mV" for the zero-point calibration and to "Percent" for the two-point calibration.
⇨ Chapter 10.5.3 "pH/Redox/NH3 analysis inputs", Page 130

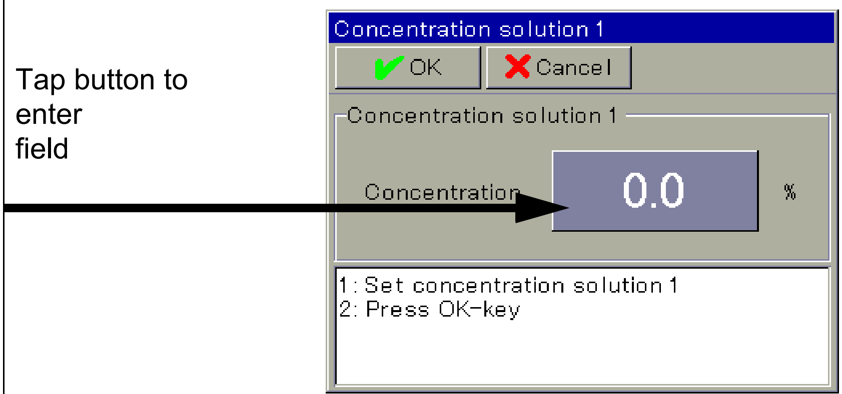
14.3 Redox calibration routines

NOTE!
You must be logged in with corresponding user rights to perform calibrations.
⇨Chapter 8.2.1 "Log-on/Log-out", Page 84

14.3.1 Zero-point calibration

Step	Action
1	Ensure that • the calibration default settings are correct, • "mV" is set as the Redox unit in the configuration of the Redox measuring input. ⇨Chapter 14.2.2 "Calibration default settings for Redox sensors", Page 192. ⇨Chapter 10.5.3 "pH/Redox/NH3 analysis inputs", Page 130
2	Start the Zero-point calibration. Device menu ➔ Calibration ➔ Select Analysis Input for pH/Redox/ NH_3 ➔ Zero-Point Calibration
3	Check that the "Redox test solution" value displayed matches the Redox value of the test solution. The "Redox test solution" value is taken from the calibration default settings. It is still possible to change this manually here. Tap button to change the Redox value of the test solution manually 
4	Clean the Redox electrode and immerse it in the test solution. Wait until the measuring value displayed stabilizes and then confirm the result of the measurement by pressing "OK".
5	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
6	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

14.3.2 Two-point Calibration

Step	Action
1	Ensure that • the calibration default settings are correct • "Percent" is set as the Redox unit in the configuration of the Redox measuring input. ⇨ Chapter 14.2.2 "Calibration default settings for Redox sensors", Page 192. ⇨ Chapter 10.5.3 "pH/Redox/NH3 analysis inputs", Page 130
2	Start the 2-point calibration. Device menu ➔ Calibration ➔ Select Analysis Input for pH/Redox/ NH_3 ➔ Two-point calibration
3	Enter the concentration value of the first reference solution in percent. Confirm by pressing "OK". Tap button to enter field 
4	Clean the Redox electrode and immerse it in the first test solution. Wait until the measured value displayed stabilizes and then confirm the result of the measurement by pressing "OK".
5	As in step 3, enter the concentration value of the second solution in percent. Confirm by pressing "OK".
6	Clean the Redox electrode and immerse it in the second test solution. Wait until the measured value displayed stabilizes and then confirm the result of the measurement by pressing "OK".
7	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
8	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

15 Calibrating ammonia sensors

15.1 Important information

WARNING!
During the calibration, the relays and analog output signals assume the configured states!

15.2 General information

The calibration of ammonia sensors is based on measurements in ammonia-free test solutions.

15.2.1 Calibration methods for ammonia sensors

Zero-point calibration

This calibration method is used to determine the ammonia zero point.

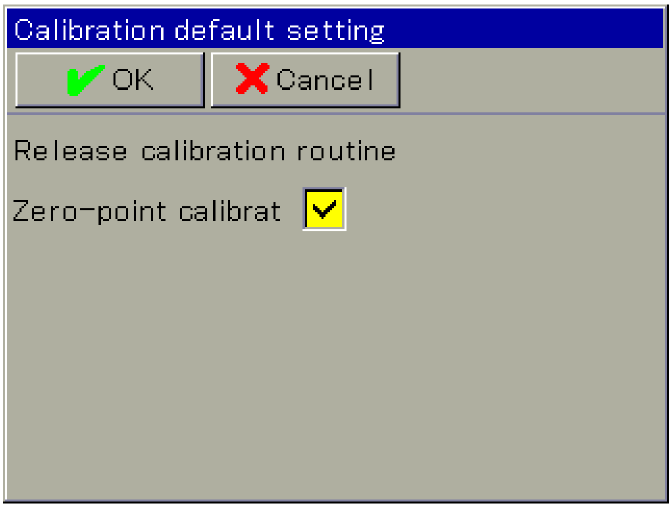
An ammonia-free test solution (e.g. water) is needed as a reference.

15.2.2 Calibration default settings for ammonia sensors

In the ammonia sensor calibration default settings, the zero-point calibration is enabled and preconfigured as the only available calibration routine.

Open the calibration default settings:
Device menu ➔ Calibration ➔ Select Analysis Input for pH/Redox/NH_3 ➔ Calibration default settings

Sample screen:
Ammonia calibration default settings



15.3 Ammonia calibration routines

NOTE!
You must be logged in with corresponding user rights to perform calibrations.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

15.3.1 Zero-point calibration

Step	Action
1	Start the Zero-point calibration. Device menu ➔ Calibration ➔ Select Analysis Input for pH/Redox/ NH_3 ➔ Zero-Point Calibration
2	Clean the ammonia electrode and immerse it in the ammonia-free test solution. Wait until the measured value displayed stabilizes and then confirm it by pressing "OK".
3	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
4	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

16.1 Important information

WARNING!
During the calibration, the relays and analog output signals assume the configured states!

16.2 General information

The calibration of CR sensors is based on measurements in test solutions with a defined electrolytic conductivity. Since the electrolytic conductivity of liquids is temperature dependent, the temperature of the test solution must be sensed. This requires either manual entry or measurement with the aid of a temperature sensor.

16.2.1 Calibration methods for CR conductivity sensors (conductive)

Rel. cell constant

The deviation from the nominal cell constant of a CR sensor is described by the relative cell constant. The rel. cell constant is determined by making a measurement in a test solution with a defined conductivity.

Temperature coefficient

The temperature coefficient is a measure of the temperature dependence of the electrolytic conductivity of a liquid. It is used to compensate for the effect of temperature when measuring the electrolytic conductivity. When performing a temperature-compensated conductivity measurement, the conductivity value measured is always indicated with reference to the fixed reference temperature. With the aid of the temperature coefficient, the value of the electrolytic conductivity displayed at the reference temperature is calculated from the current measured values of conductivity and temperature of the liquid.
Reference temp. is set in the configuration of the individual CR analysis input.
⇨ Chapter 10.5.4 "CR/Ci analysis inputs (conductive/inductive conductivity)", Page 132
The temperature coefficient is determined from 2 measurements in a test solution at different temperatures (reference and operation temp.).

NOTE!
If the temperature coefficient of a sample solution is known, it can be entered directly.
⇨ Chapter 12.2.1 "General procedure for calibration", Page 177

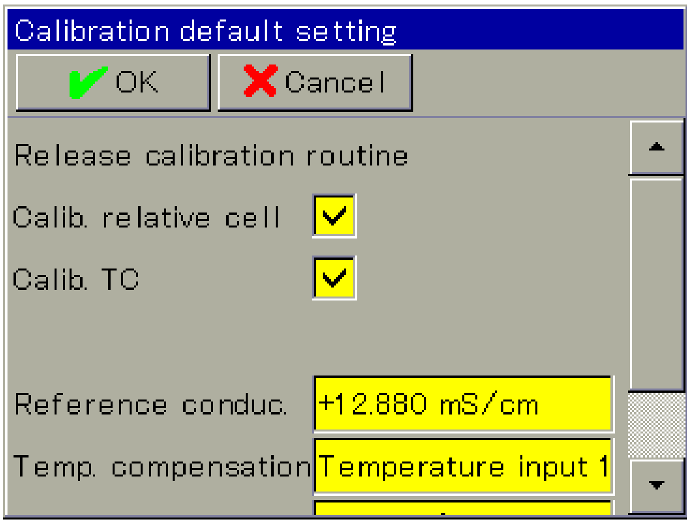
16.2.2 Calibration presets for CR conductivity sensors

Before you can perform a calibration, you must first enter the necessary calibration default settings. The possible settings for the CR calibration are described in the following.

Open the calibration default settings:
Device menu ➔ Calibration ➔ Select CR Analysis Input ➔
Calibration Presets

NOTE!
The "Calibration default settings" menu appears in the Device menu only if a user with corresponding user rights is logged in.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

Sample screen:
CR calibration presets



The calibration default settings enable the calibration routines to be accessed in the particular calibration menu.
Calibration routines that are not enabled are not visible in the calibration menu.
Additional calibration default settings are explained in the following table.

Calibration presets for calibrating the relative cell constant

Parameters	Setting options	Explanation
Reference conductivity	0 to 9999 mS/cm	Conductivity of the reference solution

Calibration presets for calibrating the temperature coefficient

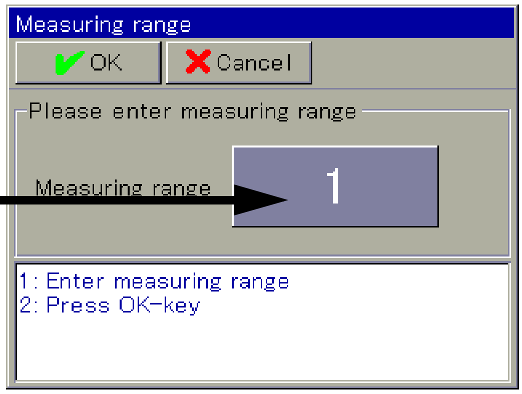
Parameters	Setting options	Explanation
Temperature compensation	Selection from analog selection	Temperature input for automatic sensing of the test/ sample solution temperature during the calibration
Reference temperature	-50 to +150 C	The conductivities of a sample solution at reference temperature and working temperature are captured during the calibration process. This yields 2 value pairs (temperature/conductivity). These value pairs provide the basis for calculating the temperature coefficient. The operation temp. must differ from the reference temperature by at least 5 °C.
Operation temp.	-50 to +150 C	

16.3 CR calibration routines

NOTE!
Conductivity measuring inputs can be configured with measuring range change-over. Accordingly, calibrations must be performed for all "accessible measuring ranges".

NOTE!
You must be logged in with corresponding user rights to perform calibrations.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

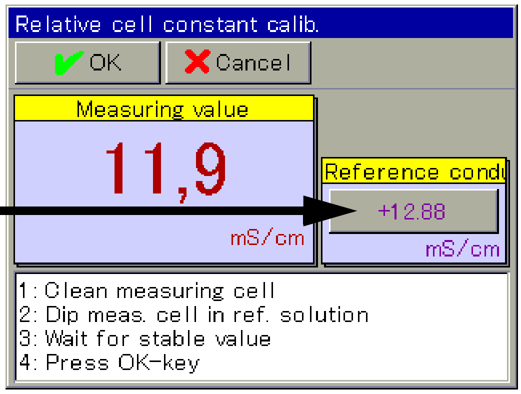
16.3.1 Calibrating the relative cell constant

Step	Action
1	Start calibration of the relative cell constant. Device menu ➔ Calibration ➔ Select CR Analysis Input ➔ Rel. cell constant Calibration For CR optional boards, continue with step 2; for universal inputs set to the "conductivity measurement" operation mode, continue with step 3
2	Enter one of the measuring ranges 1 to 4.. Confirm the entry by pressing "OK" The calibration values determined apply only to the selected measuring range. Tap button to enter measuring range 

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>3</td><td>Ensure that

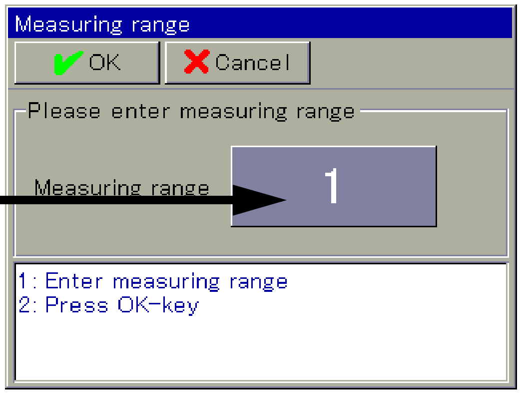
the sensor has been cleaned and is immersed in the test solution,
the set reference conductivity matches the conductivity value of the test solution.

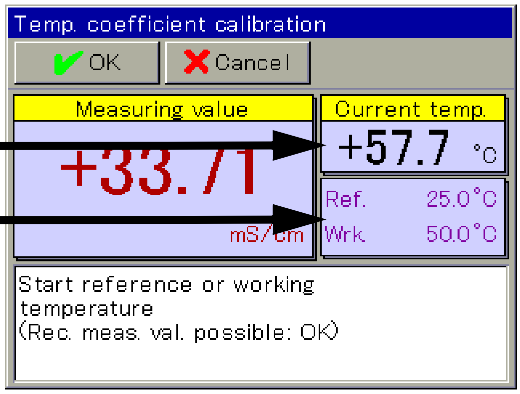
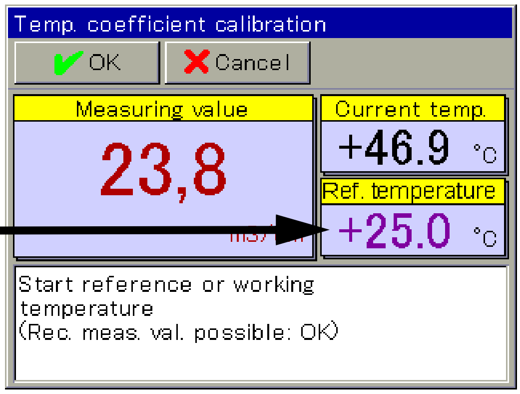
Wait until the measured value displayed stabilizes and then confirm the result of the measurement by pressing "OK".

The preset reference conductivity can be changed here manually if necessary.


tap button to change reference field</td></tr>
<tr><td>4</td><td>A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK".
Failed calibrations are canceled at this point and discarded.</td></tr>
<tr><td>5</td><td>Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook.
Press "No" to discard the results.</td></tr>
</table>

16.3.2 Calibrating the temperature coefficient

Step	Action
1	Start calibration of the temperature coefficient. Device menu ➔ Calibration ➔ Select CR Analysis Input ➔ TC Calibration
2	Clean the sensor and immerse it in the sample solution. Ensure that the rel. cell constant is calibrated correctly (if necessary, make a trial measurement with a test solution). For CR optional boards, continue with step 3; for universal inputs set to the "conductivity measurement" operation mode, continue with step 4
3	Enter one of the measuring ranges 1 to 4.. Confirm the entry by pressing "OK" The calibration values determined apply only to the selected measuring range. tap button to enter measuring field 

Step	Action
4	• **with temperature sensing** A prerequisite is that temperature compensation was specified in the calibration the presets. Bring the temperature of the sample solution to the requested values of the reference and operation temperatures in succession. The order does not matter. Acquisition of the individual values takes place automatically. current actual value of temperature requested Temperature val-  Display after acquisition of first value remaining requested temperature value  • **without temperature sensing** If temperature compensation was not specified in the calibration presets, you must control acquisition of the value manually. Bring the temperature of the sample solution first to the value of the reference temperature and confirm by pressing "OK". Then proceed in the same manner for the operation temperature.
5	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
6	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

17.1 Important information

WARNING!
During the calibration, the relays and analog output signals assume the configured states!

17.2 General information

The calibration of Ci sensors is based on measurements in test solutions with a defined electrolytic conductivity. Since the electrolytic conductivity of liquids is temperature dependent, the temperature of the test solution must be sensed. This requires either manual entry or measurement with the aid of a temperature sensor.

17.2.1 Calibration methods for Ci conductivity sensors (inductive)

Rel. cell constant

The deviation from the nominal cell constant of a Ci sensor is described by the relative cell constant. The rel. cell constant is determined by making a measurement in a test solution with a defined conductivity.

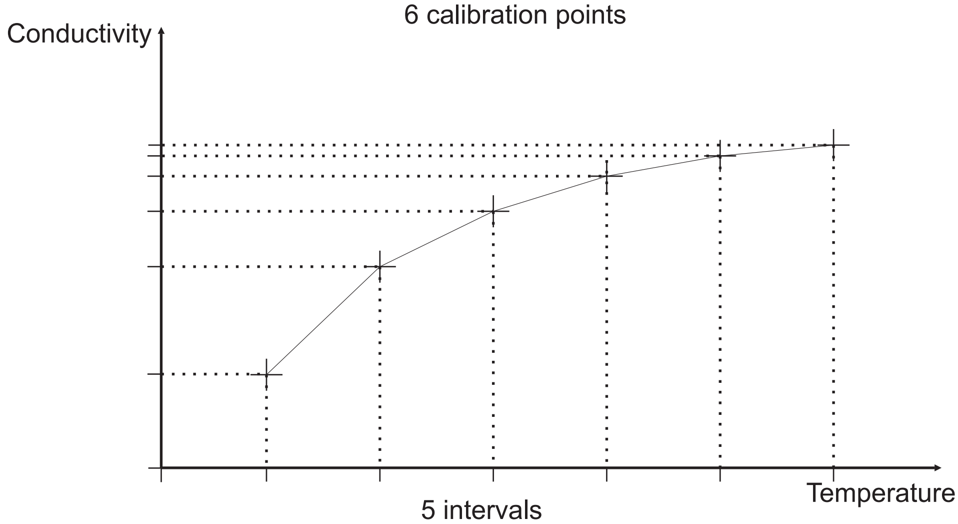
Temperature coefficient

The temperature coefficient is a measure of the temperature dependence of the electrolytic conductivity of a liquid. It is used to compensate for the effect of temperature when measuring the electrolytic conductivity. When performing a temperature-compensated conductivity measurement, the conductivity value measured is always indicated with reference to the fixed reference temperature. With the aid of the temperature coefficient, the value of the electrolytic conductivity displayed at the reference temperature is calculated from the current measured values of conductivity and temperature of the liquid.
Reference temperature is set in the configuration of the individual Ci analysis input.
⇨ Chapter 10.5.4 "CR/Ci analysis inputs (conductive/inductive conductivity)", Page 132
The temperature coefficient is determined from 2 measurements in a test solution at different temperatures (reference and operation temp.).

NOTE!
If the temperature coefficient of a sample solution is known, it can be entered directly.
⇨ Chapter 12.2.1 "General procedure for calibration", Page 177

TC curve (for nonlinear temperature coefficients)

If the conductivity of a liquid whose temperature coefficient changes with temperature has to be measured, this method can determine 5 temperature coefficients for 5 temperature intervals. In this way, it is possible to determine a good approximation of the temperature coefficient curve. While the operator brings the sample solution to the temperature values requested by the device, the device determines the temperature coefficient for each interval. This requires installation of a temperature sensor that the device can use to sense the temperature of the sample solution.



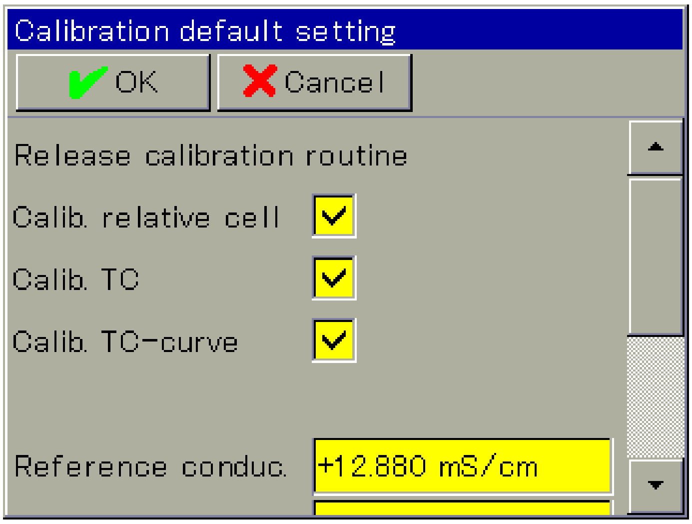
17.2.2 Calibration presets for Ci conductivity sensors

Before you can perform a calibration, you must first enter the necessary calibration default settings. The possible settings for the Ci calibration are described in the following.

Open the calibration default settings:
Device menu ➔ Calibration ➔ Select Ci Analysis Input or Universal Input ➔ Calibration Presets

NOTE!
The "Calibration default settings" menu appears in the Device menu only if a user with corresponding user rights is logged in.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

Sample screen:
Ci calibration presets



The calibration default settings enable the calibration routines to be accessed in the particular calibration menu.
Calibration routines that are not enabled are not visible in the calibration menu.
Additional calibration default settings are explained in the following table.

Calibration presets for calibrating the relative cell constant

Parameters	Setting options	Explanation
Reference conductivity	0 to 9999 mS/cm	Conductivity of the reference solution

Calibration presets for calibrating the temperature coefficient

Parameters	Setting options	Explanation
Temperature compensation	Selection from analog selection	Temperature input for automatic sensing of the test/ sample solution temperature during the calibration
Reference temperature	-50 to +150 C	The conductivities of a sample solution at reference temperature and working temperature are captured during the calibration process. This yields 2 value pairs (temperature/conductivity). These value pairs provide the basis for calculating the temperature coefficient. The operation temp. must differ from the reference temperature by at least 5 °C.
Operation temp.	-50 to +150 C	

Calibration presets for calibrating the TC curve

Parameters	Setting options	Explanation
Temperature compensation	Selection from analog selection	Temperature input for automatic sensing of the test/ sample solution temperature during the calibration
Starting temperature	-50 to +250 °C	The starting and final temperatures of the range for which a temperature coefficient curve is to be determined. The starting temperature must be at least 20 °C lower than the final temperature. The reference temperature of the measurement input must be between the starting temperature and final temperature and differ from them by at least 2 °C.
Final temperature	-50 to +250 °C	

NOTE!
Calibration of the TC curve is possible only with automatic temperature sensing.

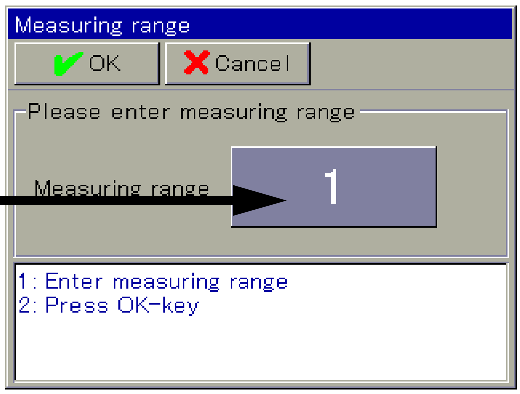
17.3 Ci calibration routines

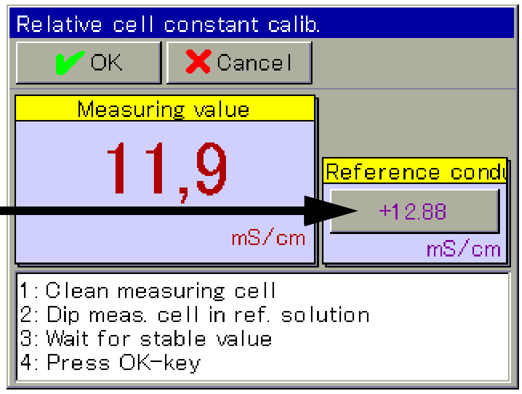
NOTE!
Conductivity measuring inputs can be configured with measuring range changeover. Accordingly, calibrations must be performed for all "accessible measuring ranges".

NOTE!
You must be logged in with corresponding user rights to perform calibrations.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

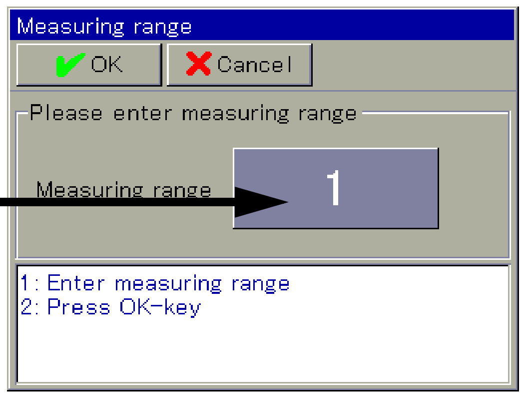
NOTE!
Analysis inputs for inductive conductivity measurements (Ci) must undergo a basic Ci calibration in the course of commissioning. Subsequent calibration is not possible without this initial basic Ci calibration.
⇨ Chapter 11.3 "Ci base calibration", Page 172

17.3.1 Calibrating the relative cell constant

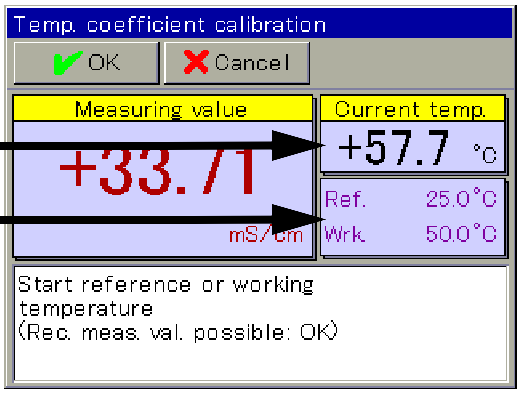
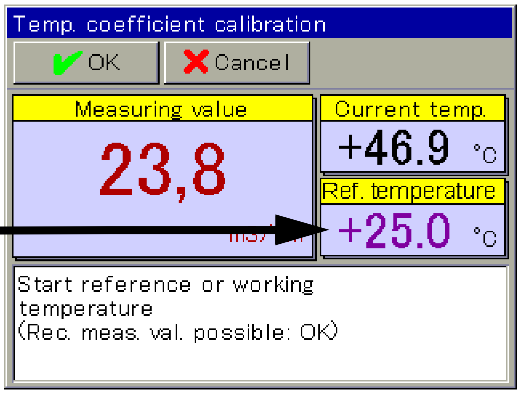
Step	Action
1	Start calibration of the relative cell constant. Device menu ➔ Calibration ➔ Select Ci analysis input or universal input ➔ Relative time constant calibration with Ci optional board, proceed with Step 2; for universal inputs set to the "conductivity measurement" operating mode, continue with step 3;
2	Enter one of the measuring ranges 1 to 4.. Confirm the entry by pressing "OK" The calibration values determined apply only to the selected measuring range. tap button to enter measuring field 

Step	Action
3	Ensure that • the sensor has been cleaned and is immersed in the test solution, • the set reference conductivity matches the conductivity value of the test solution. Wait until the measured value displayed stabilizes and then confirm the result of the measurement by pressing "OK". The preset reference conductivity can be changed here manually if necessary. tap button to change reference field 
4	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
5	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

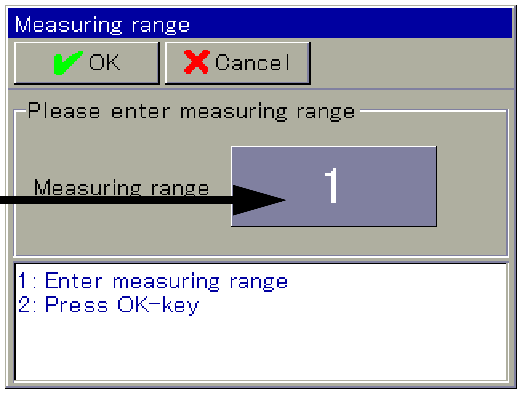
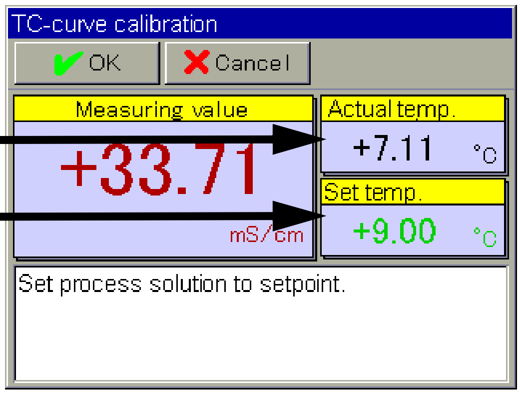
17.3.2 Calibrating the temperature coefficient

Step	Action
1	Start calibration of the temperature coefficient. Device menu ➔ Calibration ➔ Select Ci analysis input or universal input ➔ TC calibration
2	Clean the sensor and immerse it in the sample solution. Ensure that the rel. cell constant is calibrated correctly (if necessary, make a trial measurement with a test solution). for Ci optional boards, continue with step 3; for universal inputs set to the "conductivity measurement" operating mode, continue with step 4
3	Enter one of the measuring ranges 1 to 4.. Confirm the entry by pressing "OK" The calibration values determined apply only to the selected measuring range. tap button to enter measuring field 

17 Calibrating Ci conductivity sensors

Step	Action
4	• **with temperature sensing** A prerequisite is that temperature compensation was specified in the calibration the presets. Bring the temperature of the sample solution to the requested values of the reference and operation temperatures in succession. The order does not matter. Acquisition of the individual values takes place automatically. current actual value of temperature requested Temperature val-  Display after acquisition of first value remaining requested temperature value  • **without temperature sensing** If temperature compensation was not specified in the calibration presets, you must control acquisition of the value manually. Bring the temperature of the sample solution first to the value of the reference temperature and confirm by pressing "OK". Then proceed in the same manner for the operation temperature.
5	A Protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
6	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

17.3.3 Calibrating the TC curve

Step	Action
1	Start the desired calibration of the TC curve. Device menu ➔ Calibration ➔ Analysis input 1 to 4 (Ci) or universal input 1 to 3 ➔ TC curve
2	Clean the sensor and immerse it in the sample solution. Ensure that the rel. cell constant is calibrated correctly (if necessary, make a trial measurement with a test solution). for Ci optional boards, continue with step 3; for universal inputs set to the "conductivity measurement" operating mode, continue with step 4
3	Enter one of the measuring ranges 1 to 4.. Confirm the entry by pressing "OK" The calibration values determined apply only to the selected measuring range. tap button to enter measuring field 
4	Ring the temperature of the sample solution to the requested setpoints in succession. Six temperatures are requested. current actual value of temperature requested Temperature val- 
5	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
6	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

18.1 Important information

WARNING!
During the calibration, the relays and analog output signals assume the configured states!

18.2 General information

18.2.1 Calibration methods for universal inputs

Universal inputs can be configured with various operation modes for a number of different process variables (see table below).
Detailed information on the possible configurations:
⇨ Chapter 10.5.2 "Universal inputs of base unit and optional boards", Page 127

Appropriate calibration routines for each operation mode of a universal input can be enabled in the calibration default settings.
The following table lists the availability of calibration routines for the individual operation modes.

Universal input Operation modes / **Calibration rou-**	linear scaling	Temp. measurement	pH value measurement	Conductivity measurement	free chlorine, pH/T-compensated
Zero-point calibration	X		X		
Slope calibration	X				X
Two-point Calibration	X		X		
Rel. cell constant				X	
Temperature coefficient				X	
TC curve				X	

Zero-point calibration

This calibration method is used to determine the zero point on the measurement characteristic curve. The Slope is retained.

A test solution with a defined value of the respective measurand is needed as a reference.

Slope calibration

This calibration method is used to determine the slope of the measurement characteristic curve. The zero point is retained.

A test solution with a defined value of the respective measurand is needed as a reference.

18 Calibrating universal inputs

Two-point Calibration

The zero point and slope of the measuring characteristic curve are determined with the aid of 2 measurings of 2 different reference solutions.

Two test solutions with defined values of the respective measurand are needed as a references.

Calibrating rel. cell constants, temperature coefficients, and TC curves

The calibration routines for conductivity measuring with the universal input correspond to those for the Ci calibration.

⇨ Chapter 17 "Calibrating Ci conductivity sensors", Page 205

18.2.2 Universal inputs calibration default settings

Which calibration default settings are available depends on the configuration settings of the universal input.

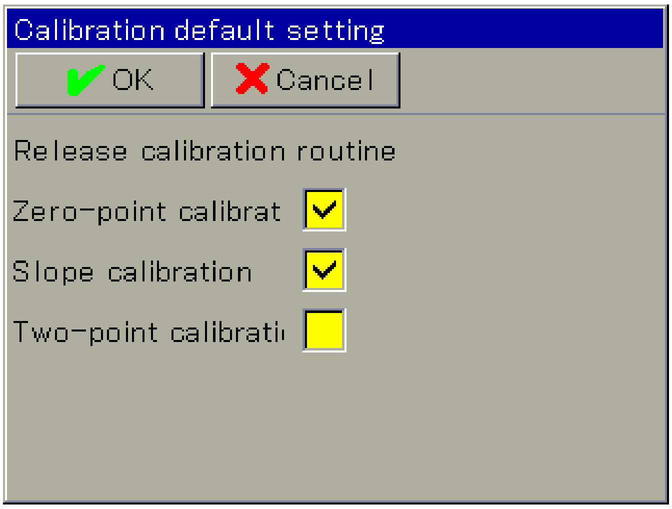
Open the calibration default settings:
Device menu ➔ Calibration ➔ Select Universal Input ➔
Calibration default settings

Calibration default settings for the individual operation modes

- **linear scaling**

The calibration default settings enable the calibration routines to be accessed in the particular calibration menu.
Calibration routines that are not enabled are not visible in the calibration menu.
The "linear scaling" operation mode permits adjustment of the zero point, slope, and two-point calibration.

Sample screen:
Universal input calibration default settings in the "linear scaling" operation mode



- **pH value measurement**

The calibration default settings correspond to those for the zero-point and two-point calibration for pH/redox/NH_3 analysis inputs.

⇨ "pH calibration default settings", page 185

- **Conductivity measurement**

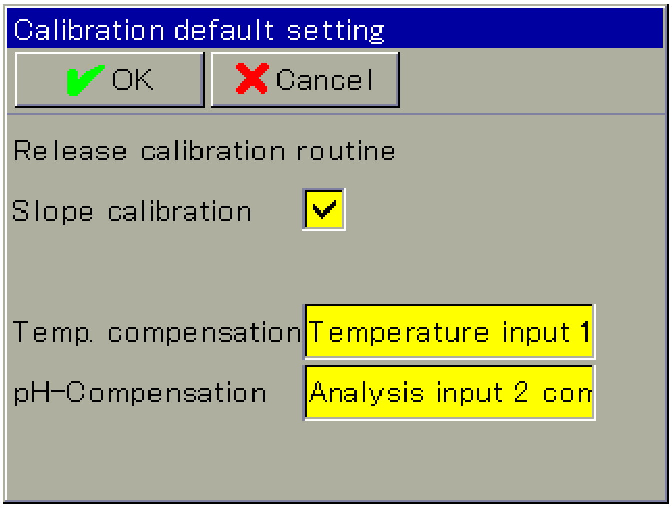
The calibration default settings correspond to those for the Ci calibration.

⇨ Chapter 17.2.2 "Calibration presets for Ci conductivity sensors", Page 206

- **free chlorine, pH/Temp.-compensated**

In the universal inputs calibration default settings for the "free chlorine, pH/T-compensated" operation mode, the slope calibration is enabled and preconfigured as the only available calibration routine.

Sample screen:
Universal input calibration default settings in the "free chlorine, pH/T-compensated" operation mode



Additional calibration default settings for calibration of chlorine sensors are explained in the following table.

Parameters	Possible settings	Explanation
Temperature compensation	Selection from Analog selection	Temperature input for automatic sensing of the test/sample solution temperature during the calibration
pH compensation source	Selection from Analog selection	pH measuring input for automatic sensing of the test/sample solution pH value during the calibration

NOTE!
The "Calibration default settings" menu appears in the Device menu only if a user with corresponding user rights is logged in.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

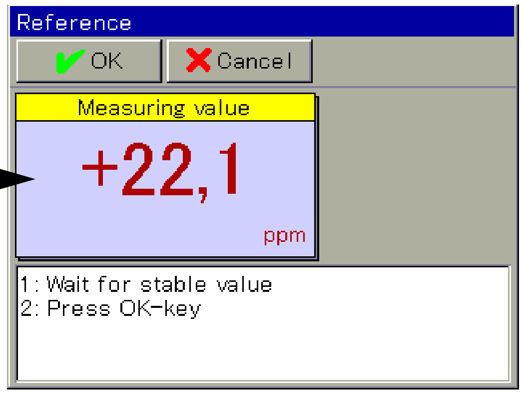
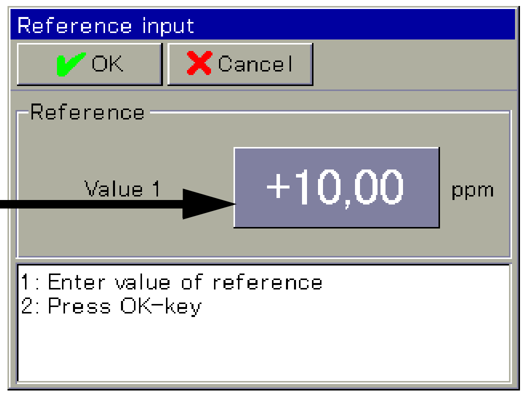
18.3 Universal input calibration routines

This chapter explains the universal inputs calibration routines for the "linear scaling" and "free chlorine, pH/T-compensated" operation modes.
The explanations in the corresponding calibration chapters for the "pH value measurement" and "Conductivity measurement" operation modes apply, except that three-point calibration for pH sensors is not available for universal inputs (see Chapter 18.2.1 "Calibration methods for universal inputs", Page 215).

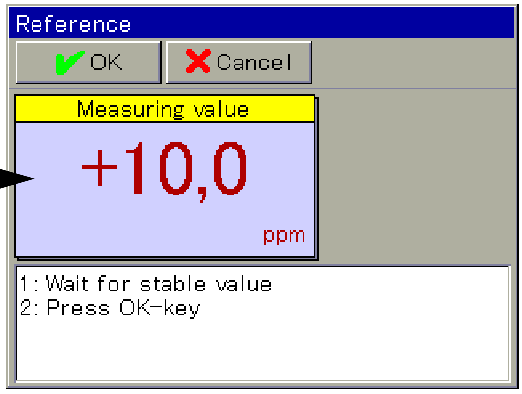
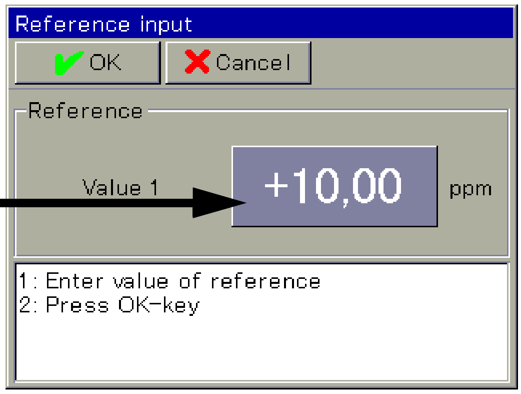
⇨ Chapter 13.3 "pH Calibration routines", Page 186
⇨ Chapter 17.3 "Ci calibration routines", Page 209

NOTE!
You must be logged in with corresponding user rights to perform calibrations.
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

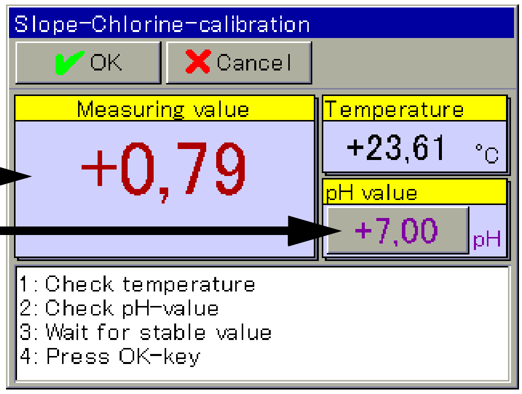
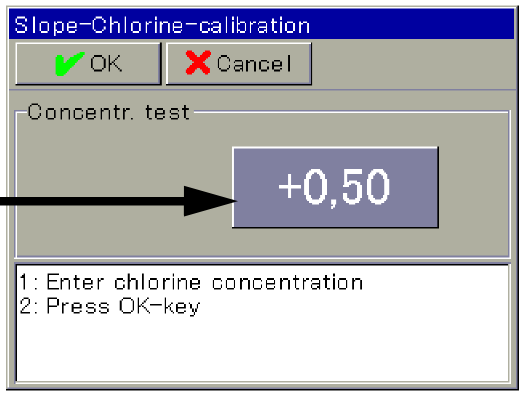
18.3.1 Zero point/slope calibration (linear scaling)

Step	Action
1	Start the desired Calibration routine. Device menu ➔ Calibration ➔ Select Universal Input ➔ Zero-point calibration
2	Clean the sensor and immerse it in the test solution. Wait until the measured value displayed stabilizes and then confirm the result of the measurement by pressing "OK". The measuring value is based on previous calibration values 
3	Enter the reference value of the test solution. Confirm by pressing "OK" Tap button to enter reference value of test solution 
4	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
5	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

18.3.2 Two-point calibration (linear scaling)

Step	Action
1	Start the desired Calibration routine. Device menu ➔ Calibration ➔ Select Universal Input ➔ Two-point calibration
2	Clean the sensor and immerse it in the first test solution. Wait until the measuring value displayed stabilizes and then confirm the result of the measurement by pressing "OK". Measuring value based on previous calibration values 
3	Enter the reference value of the first test solution. Tap button to enter reference value of test solution 
4	Clean the sensor and immerse it in the second reference solution. Wait until the measuring value displayed stabilizes and then confirm the result of the measurement by pressing "OK".
5	As in step 3, enter the reference value of the second test solution. Confirm by pressing "OK".
6	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.
7	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

18.3.3 Slope calibration (free chlorine, pH/Temp.-compensated)

Step	Action
1	Start the slope calibration. Device menu ➔ Calibration ➔ Select Universal Input ➔ Slope Calibration
2	Clean the sensor and immerse it in the test solution.
3	Check the displayed values for the pH value and temperature. Automatic sensing can be configured in the calibration default settings for both measurands independently of one another. With automatic sensing, the particular influencing variable is only displayed and can no longer be changed here. Without automatic sensing, the particular influencing variable must be entered manually here. Wait until the measured value displayed stabilizes and then check the pH value displayed. Then confirm by pressing "OK". Example with temperature sensing and without pH-value sensing Measuring value based on previous calibration values Tap button to enter pH value of test solution 
4	Enter the concentration value of the test solution. Confirm by pressing "OK" Tap button to enter chlorine concentration 
5	A protocol summarizing the calibration values determined then appears. Acknowledge the protocol by pressing "OK". Failed calibrations are canceled at this point and discarded.

Step	Action
6	Press "Yes" to accept the Calibration values determined and enter the Calibration in the Calibration logbook. Press "No" to discard the results.

NOTE!
Data transmission from and to the device requires that the following requirements be satisfied:
- The device must be powered on
- The device must be connected to the PC either via USB or Ethernet (see Chapter 19.7 "Connection to device", Page 246)
- All windows on the user interface of the device must be closed; the device must be at the operating level

Configuration or parameter changes may not be made simultaneously on the device and with the JUMO PC setup program.

19.1 General information

All configuration data and parameterization can be edited offline with the JUMO PC setup program. Entire device configurations can be loaded into the device, exported from the device and saved on a PC/laptop.
In addition, the software is needed for the following tasks:

- Editing of User names and user rights on the device
  ⇨ Chapter 19.8.2 "User list", Page 259
- Saving and deleting languages from the device
  ⇨ Chapter 19.8.3 "Country settings", Page 262

- Creating/editing device settings lists for the User level
  ⇨ Chapter 19.8.5 "User level", Page 270

- Creating/editing formula and logic formula
  ⇨ Chapter 19.8.6 "Formula", Page 271
  ⇨ Chapter 19.8.7 "Logic formula", Page 272

- Creating/editing value tables for customer-specific linearization
  ⇨ Chapter 19.8.8 "Customer-specific linearization", Page 273

- Editing of Buffer set tables for automatic buffer detection when calibrating pH sensors
  ⇨ Chapter 19.8.9 "Buffer set tables", Page 276

- Creating/editing Process screens
  ⇨ Chapter 19.8.10 "Process screens", Page 277

- Configuring the e-mail function
  ⇨ Chapter 19.8.11 "Email", Page 291

- Configuring the Webserver
  ⇨ Chapter "Checking the e-mail function", Page 297

- Viewing calibration logbooks
  ⇨ Chapter 19.8.14 "Calibration logbook", Page 300

19.2 Installing the JUMO PC setup program

Hardware and software requirements

A PC satisfying the following requirements is necessary for installation and operation of the JUMO PC setup program:

- Operating system: Microsoft®[1] Windows XP®[1], Windows Vista®[1] or Windows 7®[1] (32-bit and 64-bit versions)
- Memory: 1 GB
- Available hard disk space: 1 GB
- DVD drive
- USB host interface
- LAN interface (Ethernet)

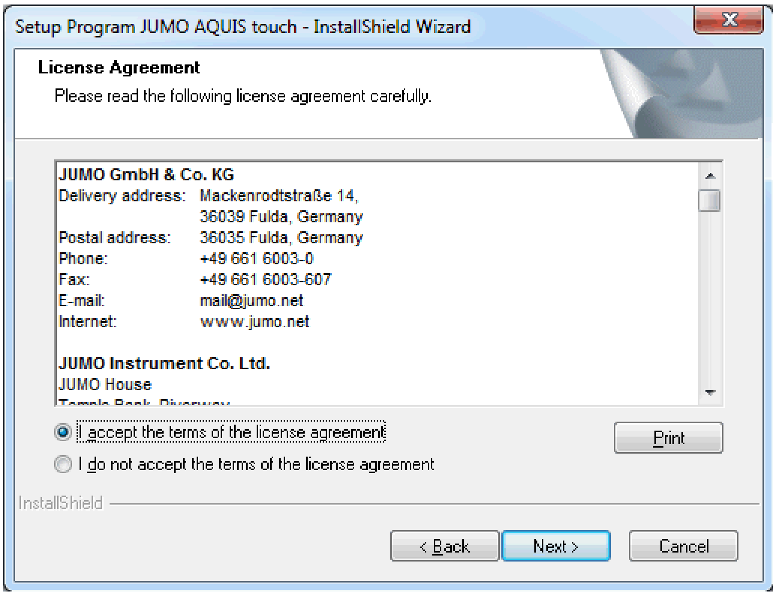
NOTE!
Close all applications on your PC before starting installation of the JUMO PC setup program.

19.2.1 Procedure

Step	Action
1	With the PC running, insert the CD supplied with the device into the drive and close it.
2	After the CD has been inserted, the installation program starts automatically; if this does not happen, proceed as follows: Start the "Launch.exe" file in the main directory of the CD.
3	The installation program guides you through the rest of installation accompanied by on-screen messages.

1.Microsoft, Windows XP, Windows Vista and Windows 7 are registered trademarks of Microsoft Corporation.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>4</td><td>Read and confirm the license agreement. Acceptance of the agreement is a basic requirement for installation of the software.

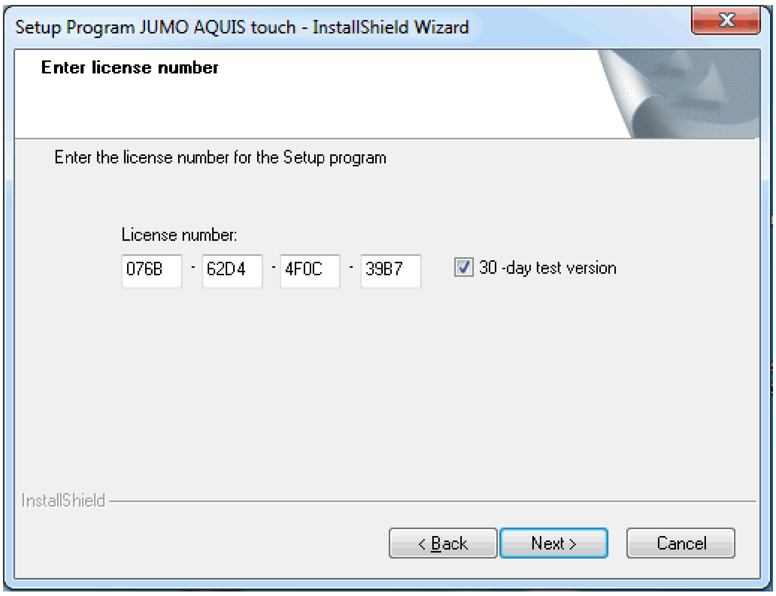

</td></tr>
<tr><td>5</td><td>

- **30-day test version or demo version**

Activate the checkbox for the 30-day test version. The input fields for the license number are filled in automatically.

- **Full version**

Insert the license key that you received from JUMO[a].


</td></tr>
<tr><td>6</td><td>Select the program folder to which the links for starting the software art be copied. The directory for the program files is specified automatically.</td></tr>
<tr><td>7</td><td>Click the "Install" button and wait until the installation has completed.</td></tr>
</table>

[a] To install the full version, you must acquire an appropriate license from JUMO. The contact data can be found on the back of this document.

NOTE!
If the "30-days test version" option is selected during installation, the JUMO PC setup program is fully functional for 30 days. At the end of 30 days, the program switches automatically to a "demo version" where some functions such as data transmission, data storage and printing no longer work. The software license can be activated at a later date.

Program start

Once installation is complete, you can start the PC setup program from the Windows®[1] Start menu.

19.3 Setup program login

The user name and password are not requested following initial installation of the setup program. In the "Extras" menu, the "Renew login / Change password" function can be used to activate this request when the program starts.
⇨ Chapter 19.6.3 "Extras", Page 242

Activation of the login function can be used to distinguish between the users "Specialist" and "Service". The two users have different rights regarding access to functions of the PC setup program.
⇨ Chapter 19.3.1 "Rights in the setup program", Page 229

If the request is active, the user must log in:

1.Microsoft, Windows XP, Windows Vista and Windows 7 are registered trademarks of Microsoft Corporation.

19.3.1 Rights in the setup program

Depending on the version and login, individual users have different rights in the PC setup program.
The differences are summarized in the following table.

Users / User rights	Demo Version	Service	Specialist
New	X	X	X
Open	X	X	X
Save, Save As, Delete		X	X
Delete undocumented parameters			X
Export data to external mass storage (USB flash drive)		X	X
Import data from external mass storage (USB flash drive)		X	X
Print		X	X
Activate program options	X		X
Activate extra codes			X
Edit interface settings		X	X
Edit device settings	X	X	X
Delete device			X
Create new device	X		X
Resetting the user list	X	X	X

19.4 QuickStart agent

Installation

During installation of the PC setup program, an additional program with the description "QuickStart agent" is installed. This program starts automatically and appears as a symbol in the Windows taskbar.
Example:

(1) "Show icons" button
(2) Taskbar
(3) QuickStart agent link

Quick-start of programs

The QuickStart agent monitors removable media on the PC and responds if, for instance, a device or USB flash drive is connected to the PC. It lists all PC programs associated with the device found.
The user can decide which PC program should be started. This is done by highlighting the program in the list and then launching it by pressing the "Start" button. If there is only one program, it starts immediately.
Pressing the "Close" button switches the QuickStart agent to the background.

Adjustments

The "Settings" button can be used to change the following QuickStart agent options:

- National language used by the QuickStart agent
- Selection of programs that can be started by the QuickStart agent
- Autostart of the QuickStart agent when starting the PC

QuickStart agent in the foreground or background

Left- or right-clicking on the icon in the Windows taskbar opens a selection list. Here, the user has the option of bringing the QuickStart agent to the foreground or background by selecting the relevant entry in the list.

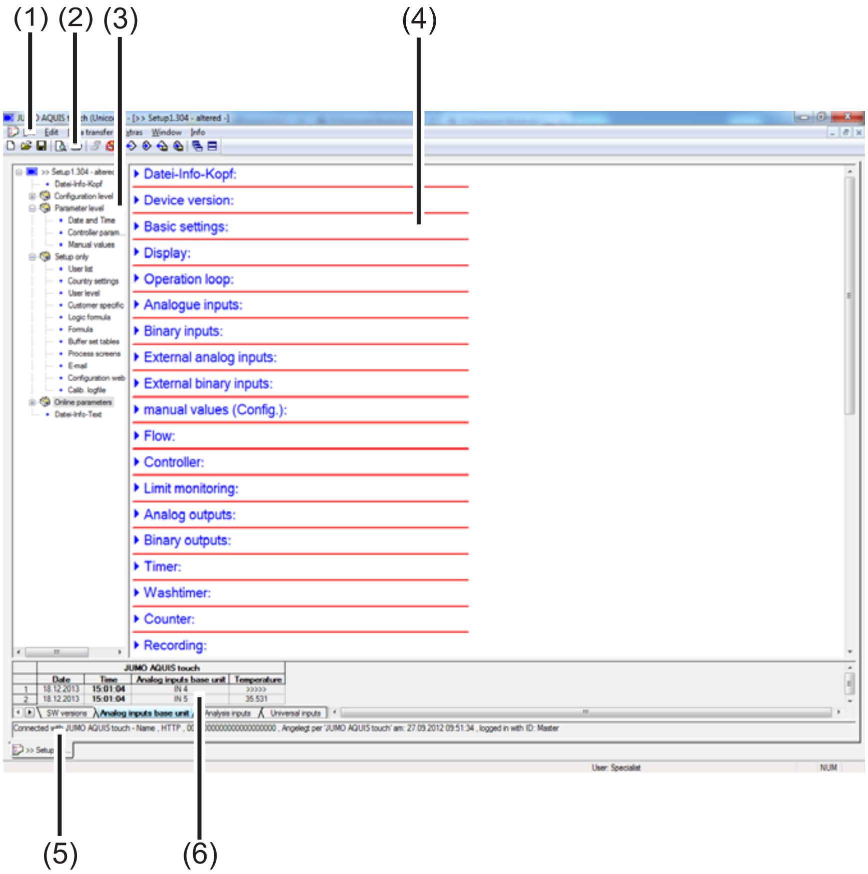
If autostart is inactive, i.e. the symbol does not appear in the taskbar, the QuickStart agent can be started manually from the Windows Start menu. The QuickStart agent is located in the same program group as the JUMO PC setup program.

Ending the QuickStart agent

Selecting the entry "End" closes the QuickStart agent. It can be restarted from the Windows Start menu.

19.5 User interface

19.5.1 Elements of the user interface



(1)	Menu bar	(2)	Toolbar
(3)	Working area – navigation tree	(4)	Working area – display window
(5)	Connection status	(6)	Online data

Menu bar

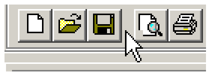
The individual functions of the PC setup program are launched from the menu bar.
⇨ Chapter 19.6 "Menu bar", Page 238

Toolbar

The toolbar contains selected functions from the menu bar. These can be launched by left-clicking on them. Hovering the mouse pointer over one of the icons displays the name of the function after a few seconds.

Moving the toolbar

The user can change the position of the toolbar:

Step	Action
1	Position the mouse pointer between two icon groups 
2	Left-click with the mouse button
3	While holding down the left mouse button, move the toolbar to the desired location
4	Release the left mouse button

Possible positions of the toolbar:

- Along the left or right window border (vertical alignment)
- Below the menu bar (horizontal alignment),
- Along the lower edge above the user information (horizontal alignment)
- Any position (its own window - any alignment by changing the window size)

Closing the toolbar

If the toolbar was moved, it can be closed by clicking the cross at the right upper corner of the toolbar window. To display the toolbar again, it must be activated (set checkmark) in the "Standard Settings" menu under "User Interface".
File ➔ Standard Settings

The toolbar that appears at the location to which it was previously moved.

Working area

The working area consists of the navigation tree (at left) and the display window (at right)
and displays the current settings of a configuration file (setup file).
⇨ Chapter 19.5.3 "Editing the setup file", Page 236

The way the working area is divided can be changed by moving the border between the navigation tree and display window sideways with the aid of the left mouse button.

Connection status

The "Connection status" line indicates whether a connection to a device exists. In addition, some interface data are displayed, e.g. the IP address.
The "Window" menu can be used to show or hide the line.
The height of the line can be changed by moving the border of the online data window with the aid of the left mouse button.

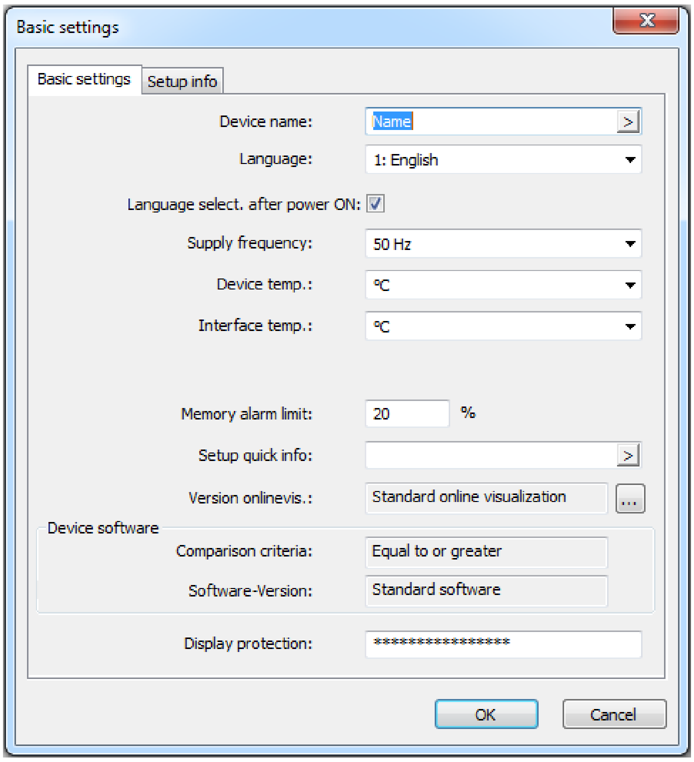
Online data

The "Online data" function displays current process data in the PC setup program.
The "Window" menu can be used to show or hide the online data window.
Window ➔ Online Data

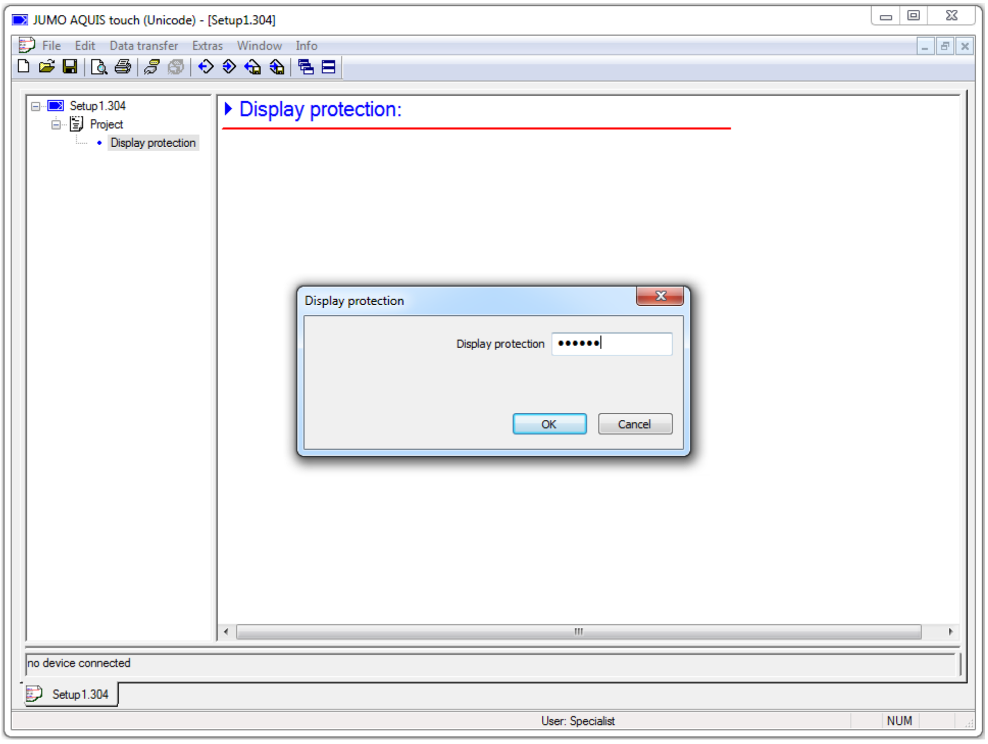
The height of the window can be changed by moving the border of the working area or the "Connection status" line with the aid of the left mouse button.

19.5.2 Display protection

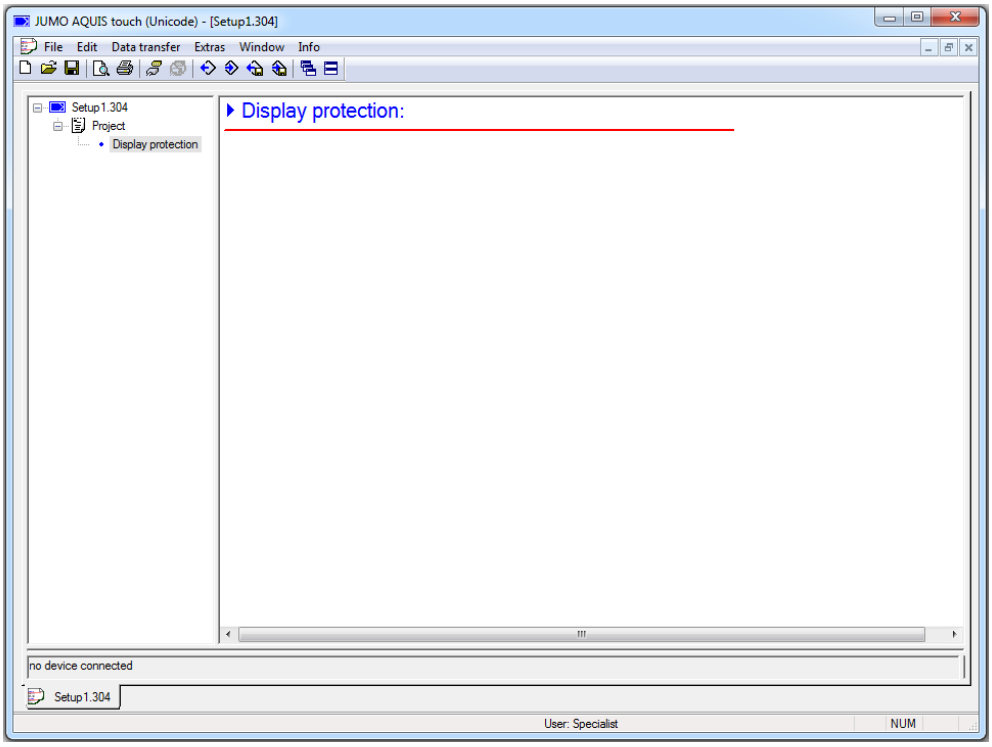
Display protection can be activated in the basic settings of a device setup file. To activate display protection, a password must be entered in the "Display protection" field.



When display protection is activated, all device settings in the PC setup program are concealed the next time the setup file is opened.



To show the device settings in the PC setup program again, double-click the entry "Display protection" in the display window or the navigation tree. Enter the display protection password in the following dialog. After the correct password has been entered, the entire device setup in the PC setup program appears again and can be edited.



19.5.3 Editing the setup file

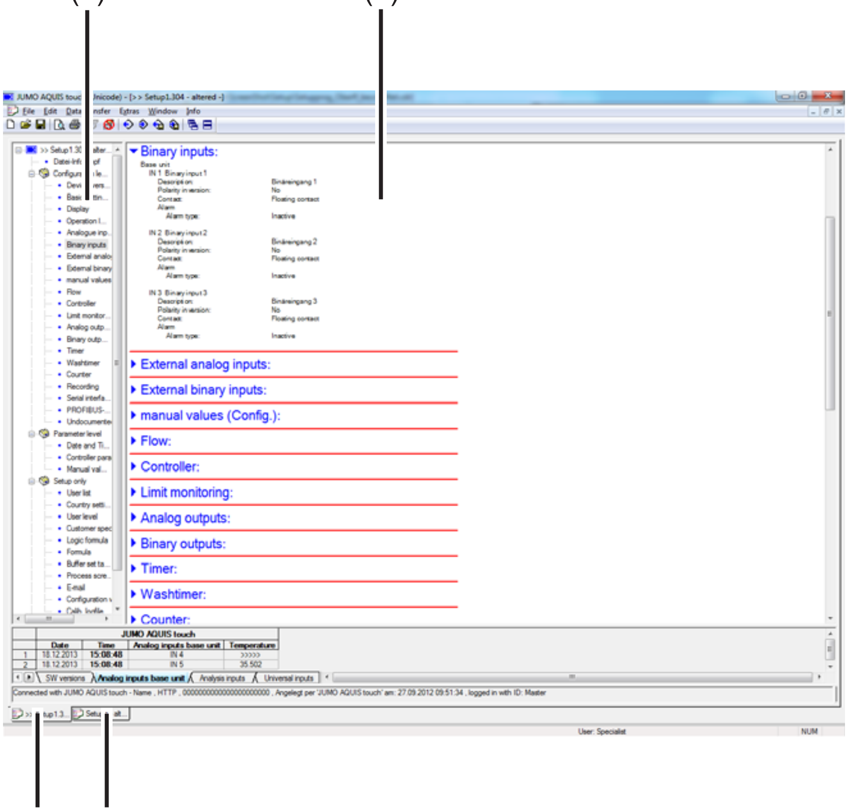
In the "File" menu, create or open an existing setup file.

Create a new file:
File ➔ New

Open an existing file:
File ➔ Open

The working area (navigation tree and display window) shows the menu structure with the individual setting options for the JUMO AQUIS touch S from within the JUMO PC setup program.

(1) (2)



(4) (3)

(1)	Navigation tree (complete menu structure of the PC setup program)	(2)	Display window Pop-up overviews of the submenus with their configuration data
(3)	Active setup window	(4)	Inactive setup window

Navigation tree

Left-clicking (once) on the entry "Project" or on a certain module displays the associated subitems in the display window. Clicking on the ("-") symbol closes a menu, clicking on the ("+") symbol opens a menu. Double-clicking on an entry (e.g. "Hardware configuration") opens a corresponding dialog for editing the individual configuration data. Alternatively, it is possible to access the individual menu levels via the "Edit" menu.

Display window

Double-clicking on an entry in the display window opens a dialog for editing the corresponding configuration data. Clicking once on the right-arrow symbol preceding the entry lists the current settings in the display window. Clicking once on the down-arrow symbol hides the settings again.

Setup window

If several setup windows are open simultaneously, clicking once on the name at the lower edge of the inactive window makes it the active window.

19.6 Menu bar

This chapter describes the functions in the menu bar. The order of the subchapters corresponds to the location of the menus in the menu bar (from left to right).

19.6.1 File menu

New

Creates a new setup file in the working area. After selecting the "New" command, the user can select from the following options:

- **User-Defined Setting**
  Extra codes and optional boards can be selected for the new setup file. This option is used to create a new setup without having a device connected.
- **Automatic Detection**
  The configuration (extra codes and optional boards) of the connected device are written to the new setup file. If desired, the "Read setup file from device" checkbox can also be selected. The current configuration is then written to the new setup file from the device and is available for editing.
  This option is used to edit or create the setup for an existing or new device.

Open ...

Opens an existing setup file and displays the content in the working area.

Save

Saves the settings shown in the work area in a setup file. The file name must only be entered once. When the file is saved again, no prompt for the file name appears.

Save As ...

Saves the settings shown in the work area in a setup file. In contrast to the "Save" function, a prompt for the file name always appears in this case.

Close

Removes the settings shown in the work area from the work area and closes the Setup window. At the same time, the user has the opportunity to save changes that have not yet been saved.

Export as RTF

Saves the current setting as an RTF file on the PC.
This function is useful for documenting a device configuration.

Print ...

Prints the setup settings of the project or module (depending on the item highlighted in the navigation tree). The menus to be printed can be selected beforehand.

Page View ...

The printed result is displayed on the screen. Several pages can be displayed and the size of what is displayed changed.

Printer Setup ...

Permits the printer settings to be changed. When a program starts, the Windows default printer is always used as the active printer.

Standard Settings ...

Permits the standard settings of the setup program to be changed. Many changes become active only after restarting the setup program.

Last Files ...

Displays the file names of the setup files last saved. Clicking once on the file name opens the setup file or displays an already opened setup file as the active window.

End

Ends the setup program. At the same time, the user has the opportunity to save changes that have not yet been saved.

19.6.2 Data Transfer menu

Establish Connection ...

Opens the device connections list. The content of the device connections list is project-dependent. The device connections list contains all devices to which a connection can be established via the setup program. Devices can be added to or removed from the list. The settings for the connection are also made in the device connections list.
⇨ Chapter 19.7.1 "Device connections list", Page 246

Terminate Connection ...

Terminates all connections of the active project, i.e. the selected setup file.

Data Transfer to Device ...

Sends the setup data to the device. An existing connection to the device is a requirement. If there is no connection, the device connections list is opened automatically.

Data Transfer from Device ...

Reads the configuration from the device. An existing connection to the device is a requirement. If there is no connection, the device connections list is opened automatically.

Data Transfer to Ext. Mass Storage ...

Exports the setup file in SET format to external mass storage (USB flash drive). This file can be loaded directly into the device via the USB interface.

Data Transfer from Ext. Mass Storage ...

Imports a setup file in SET format from external mass storage (USB flash drive) into an open setup file. In this way, an SET file that was previously copied from the device to a USB flash drive can be opened for editing with the JUMO PC setup program.

Detailed information on loading and saving SET files via the USB interface on the device:
⇨ Chapter 8.4 "Memory Manager (USB flash drive)", Page 95

19.6.3 Extras

Activation of program options

Activates optional functions of the PC setup program (entry of additional license numbers). Using this function, the PC setup program can also be registered with a valid license number at a later date (30-days test version or full version) if a valid license number was not entered during the installation (demo mode).

Renew login / Change password

Opens a window to activate user login. After the JUMO PC setup program has been installed, prompts for the user name and password do not appear until user login has been activated. The user is initially logged in as "Specialist" with an empty password. This function activates the user and password prompt when the program starts and the current password is changed.

Text library...

Opens a window for editing the text library. The various operating languages for the device are saved in the text library. When a new setup file is generated, the languages are copied to the setup file. If necessary, they can be edited there in the "Country settings" menu. The order of the languages can be changed and also is observed during transfer to the setup file. The first two languages (language 1 and language 2) are transferred to the device and can be selected there. In various submenus, the "Language" button permits editing of the respective language.
⇨ Chapter "Language button", Page 264

Version library

Shows the content of the version library. The list contains the standard versions of the device software and the compatible hardware versions provided by the device manufacturer together with the PC setup program. Additional software versions that were imported subsequently (e.g. customer-specific versions) are also contained.

19.6.4 Windows

Cascaded

Arranges all open setup windows in an overlapping arrangement. Left-clicking on a window brings it to the foreground.

Tiled

Arranges all open setup windows in a tiled arrangement. Left-clicking on a window makes it the active window.

Arrange icons

Arranges the symbols for all minimized setup windows in the lower region of the user interface. This function has an effect only if a symbol was previously moved out of the lower region.

Online data

Alternately shows/hides the online data window. A check mark preceding the menu item indicates that the window is shown.

Connection status

Alternately shows/hides the line for displaying the connection status. A check mark preceding the menu item indicates that the line is shown.

Opened windows

Displays the names of all opened setup files as a list. Clicking on the name in the list makes the associated window the active window. A check mark preceding the name indicates the active window.

19.6.5 Info

Setup info

Displays information about the setup program, incl. the version number. The version number is important, for instance, when contacting the service hotline.

Registered license numbers ...

Shows all registered license numbers and any active options. The license numbers and the information about active options are important, for instance, when contacting the service hotline.

Program folders ...

Shows the various folders (directories) that are being used on the hard drive or in the network by the setup program. Clicking on the button (to the right of the folder path) displays the content of the folder.

Memory info

Displays the memory information. The memory information is provided for diagnostic purposes. It is requested when needed by the device manufacturer's service technician.

19.7 Connection to device

This chapter describes the various ways to establish a connection between the JUMO PC setup program and the device. A connection is possible via:

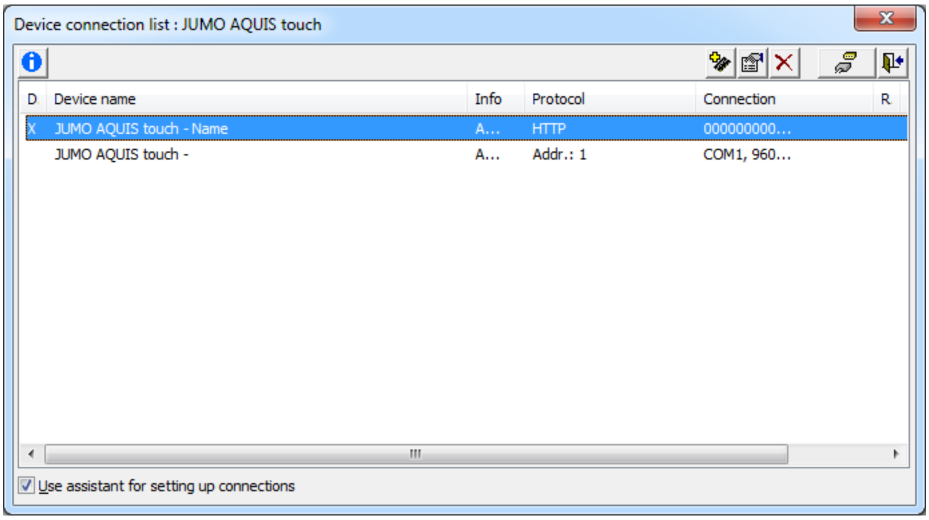
- LAN interface (HTTP or HTTP proxy)
- USB interface

NOTE!
The USB interface is not intended for a permanent connection, since unintentional removal of the USB connector cannot be prevented due to the lack of a captive connection.

An existing connection is a requirement for data transfer between the JUMO PC setup program and system. In the menu bar, open:
Data Transfer ➔ Establish Connection ...

19.7.1 Device connections list

The device connections list contains all devices for which a connection has been configured. The user can add connections to new devices, change the properties of existing connections (interface parameters) as well as remove connections.



Connection settings assistant

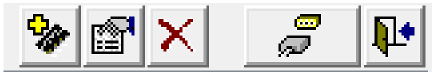
The "Use connection settings assistant" function assists the user with creating a new entry, i.e. a new connection, and with editing existing entries. The assistant is always active after opening the device connections list (check mark set). It is started whenever a new entry is to be added to the device connection list.
⇨ Chapter 19.7.2 "Configuring the connection with the assistant", Page 248
The assistant can be deactivated by removing the check mark. If a new entry is to be added to the device connections list then, the user must select the individual configuration steps on their own. If the device connections list is reopened, the assistant will again be active.
⇨ Chapter 19.7.3 "Configuring the connection without the assistant", Page 255

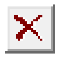
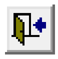
Establishing a connection

If the user wishes to establish a connection (or start date data transfer when there is no connection), the PC setup program opens the device connection list. The user must first highlight the device concerned in the device connection list and then press the "Establish connection" button. If a device should not be connected, the corresponding dialog ("Device connection list" window) should be closed by means of the "Exit" button or by clicking the "X" at the upper right corner of the dialog window.

Toolbar

The user has access to various functions via the toolbar for the device connections list.



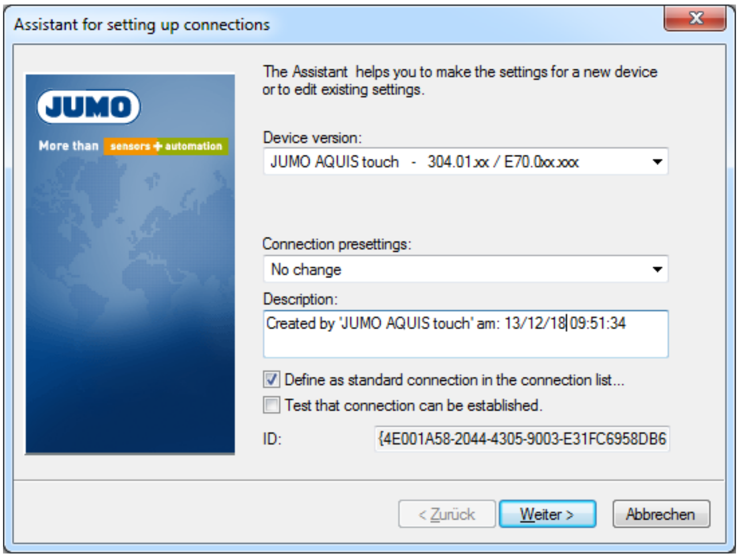
Explanation	Button
New entry Creates a new connection entry	
Edit properties Opens a settings dialog for a connection	
Permanently remove entry Deletes a connection entry permanently	
Establish connection Establishes a connection to the device highlighted in the list	
Exit Closes the device connections list	

19.7.2 Configuring the connection with the assistant

The connection settings assistant assists the user with configuring a new connection. The assistant is always active after opening the device connections list (check mark set). It is started whenever a new entry is to be added to the device connection list.
⇨ Chapter 19.7.1 "Device connections list", Page 246

NOTE!
Configuring a new connection "with the assistant" is the preferred method. It can also be used by a user without expert knowledge.

Setup dialog - Device and type of connection



Adjustments

Setting item	Selection/ setting option	Explanation
Device version	Selection from dropdown list	Device version of the device to be connected ⇨ Chapter 8.2.4 "Device information", Page 88
Connection presets	Setup or ring memory via TCP/IP	LAN interface (HTTP protocol), connection to device in an intranet (or VPN)
	Setup or ring memory[a] via HTTP proxy	LAN interface (HTTP protocol), connection to device via proxy server and Internet
	Connection via USB	USB interface
Description	Text	Description of the connection
Define as default device in the device connection list	Checkboxes	Accesses a default device automatically, other devices must be connected via the device connections list.
Check whether a connection can be established	Checkboxes	With this option active, the program checks whether the selected device can be accessed via the selected interface upon completion of configuration.

[a] Ring buffer = Read out measurement data

After the user clicks on the "Next" button, the assistant opens the next setup dialog.

Setup dialog - Device login

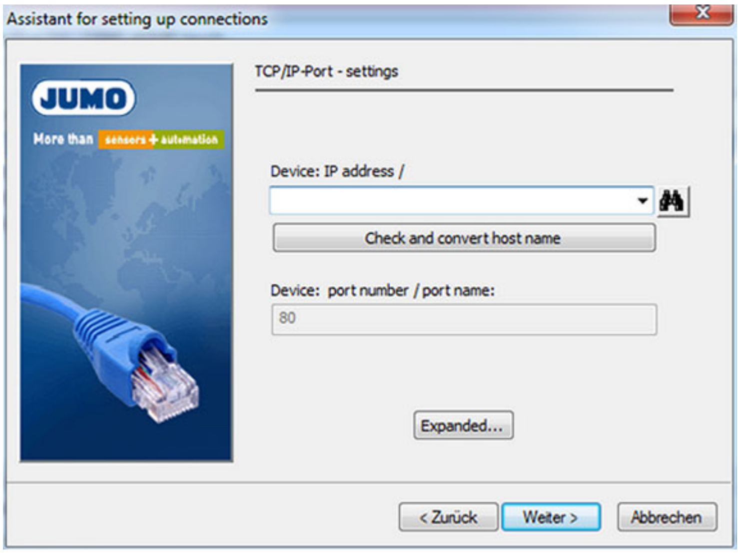
Adjustments

Setting item	Selection/ setting option	Explanation
Do not log in	Checkboxes	Activate option (set checkmark) if connection to the device takes place without login. Without logging in, some functions probably will not be available. The deciding factor is the authorizations that have been defined for a user who has not logged in. ⇨ Chapter 8.1.1 "Passwords and user rights", Page 71
Save ID and password	Checkboxes	Saves the user ID and password for automatic login to the device when establishing a connection the next time
User ID	Text	User name for device login
Device password	Text (is hidden during entry)	Password for device login

After the user clicks on the "Next" button, the assistant opens the next setup dialog.

Setup dialog - TCP/IP port settings

This dialog depends on the selected connection preset. The figure shows the case "Setup or ring buffer via HTTP proxy". Except for the parameters "Proxy" and "Proxy Port", the description applies also for the case "Setup or ring buffer via TCP/IP".



Adjustments

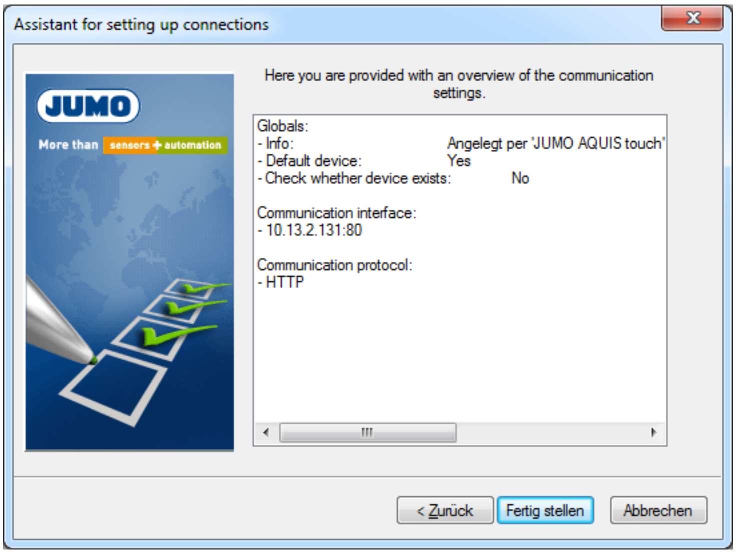
Setting item	Selection/ setting option	Explanation
Device: IP address / Host name	Enter IP address or name. Or click on the "Search" button and select the device from the list by double-clicking on it.	IP address or host name of the device The search function (telescope button) finds all devices on the local network and displays them in a selection list. ⇨ Chapter 19.7.4 "Searching for a device in the network", Page 257
Check and change host name	Open by pressing the button	Button to change the host name into the IP address of the device. All host names registered to an address as well as alternative addresses are displayed when appropriate.
Device: Port number-/ Port name	The port number and port name can be changed only in the expanded settings (see below).	Port number or port description of the device Default port: 80
Extended	Open by pressing the button	Advanced settings for communication These settings should be changed only in unusual circumstances.

After the user clicks on the "Next" button, the assistant opens the next setup dialog.

Setup dialog - Overview of the settings

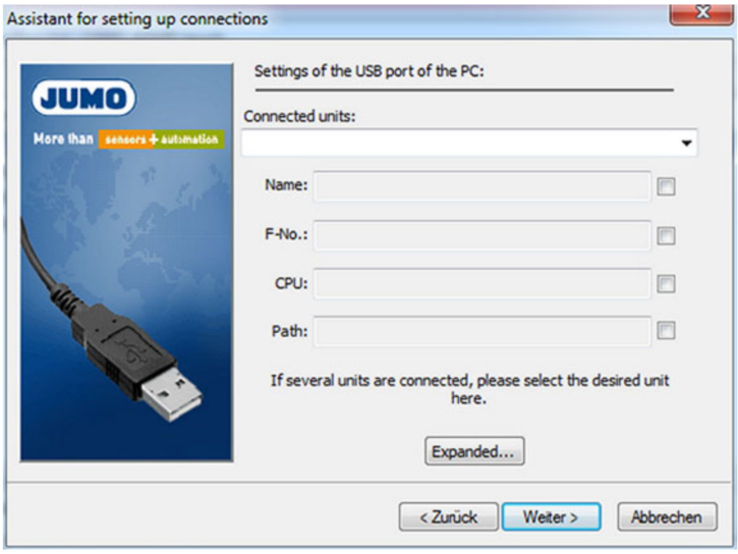
To complete the configuration, the user is presented with an overview of the settings. If the "Connection via USB" connection setting was selected, this overview appears immediately after the "Device Login" dialog, since normally no settings are required for the USB connection or only a device of the same type is connected.
⇨ Chapter "Setup dialog - USB interface settings on the PC", Page 253

An incorrect setting can be corrected by pressing the "Exit" button to reopen the setup dialog concerned and making the correction there. Clicking on the "Finish" button closes the assistant and enters the new connection in the device settings list.



Setup dialog - USB interface settings on the PC

If several devices are connected via a USB interface, one device must be selected here. Furthermore, various test criteria can be activated so that the connection to the device is established only after a successful test.
This dialog depends on the selected connection preset. The figure shows the case "Connection via USB". To access this dialog, it is necessary to click on the "Next" button twice – starting from the "Device Login" dialog – while holding down the "Ctrl" + "Shift" keys.



Adjustments

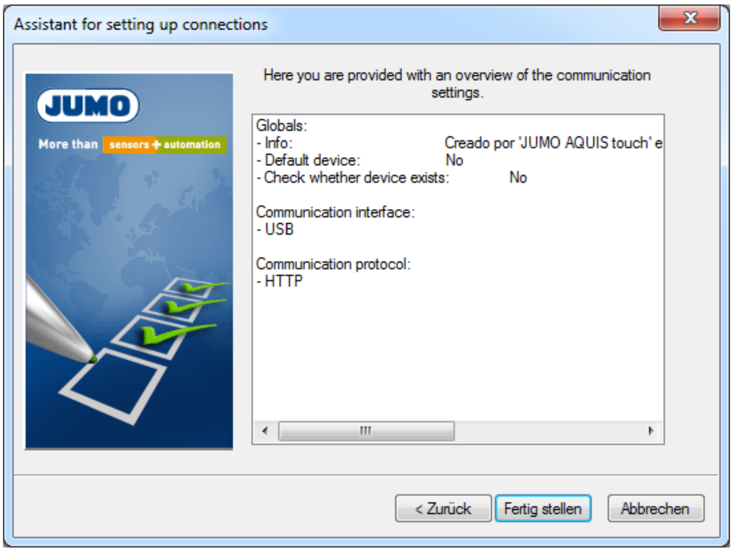
Setting item	Selection/ setting option	Explanation
Connected devices	Selection from dropdown list	Devices connected via the USB interface are displayed.
Name	Text	With checking active, the device is connected only if the device name matches.
Ser. No.	(entry field active only when checkbox activated)	With checking active, the device is connected only if the device serial number matches.
CPU		With checking active, the device is connected only if the serial number of the CPU matches.
Path		With checking active, the device is connected only if the USB path matches.
Extended	Open by pressing the button	Extended settings for communication These settings should be changed only in exceptional situations.

Clicking on the "Finish" button closes the assistant and enters the new connection in the device connections list.

Setup dialog - Overview of the settings

19 PC Setup Program

To complete the configuration, the user is presented with an overview of the settings. An incorrect setting can be corrected by pressing the "Exit" button to re-open the setup dialog concerned and making the correction there.



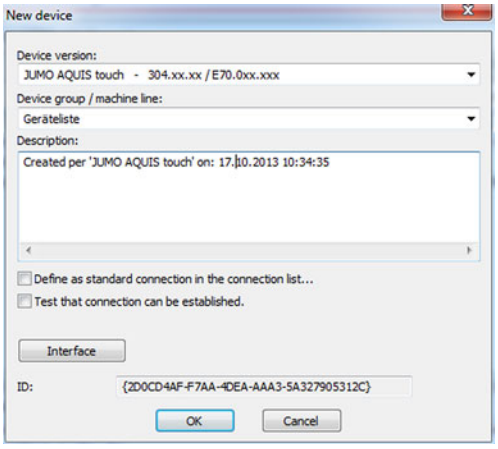
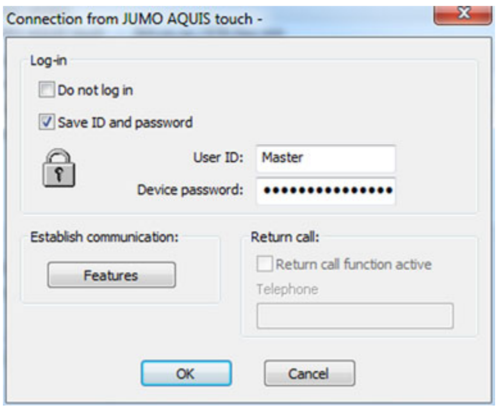
Clicking on the "Finish" button closes the assistant and enters the new connection in the device connections list.

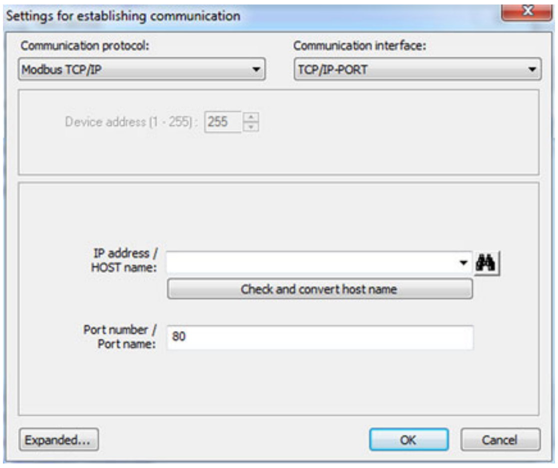
19.7.3 Configuring the connection without the assistant

The assistant can be deactivated in the device connections list (remove the checkmark).
⇨ Chapter 19.7.1 "Device connections list", Page 246

During configuration, the user is not guided to the next step - as with an active assistant - but instead must select the individual steps of the configuration on their own. The following example shows the basic procedure. The parameters in the individual setup dialogs are largely the same as when configuring with an assistant so that a description is not provided here. However, additional protocols and interfaces are available for the settings used to establish communication.

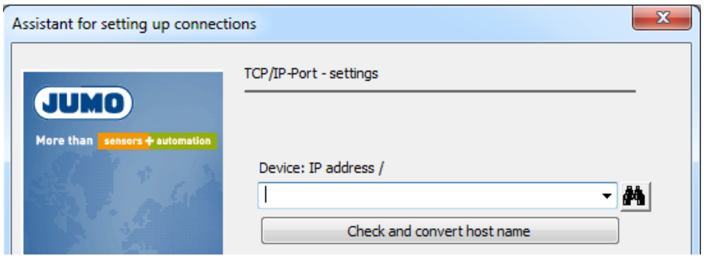
NOTE!
Configuring a new connection "without the assistant" requires expert knowledge and is provided only for service purposes.

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>(1)</td><td>Make the settings for the new device and click
on "Interface

</td></tr>
<tr><td>(2)</td><td>Make the login settings and click
on "Properties"

</td></tr>
</table>

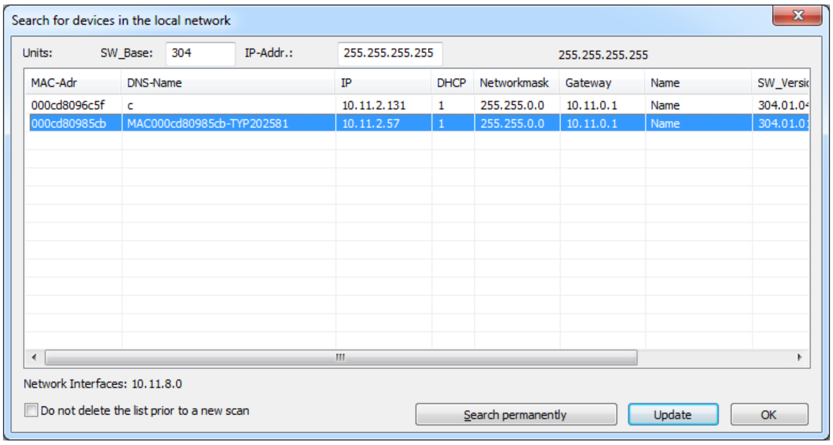
Step	Action
(3)	Make the protocol and interface settings and click on OK. If necessary, click on the "Extended" button beforehand to make additional settings for communication. 
(4)	Close all previously opened setup dialogs (windows) by clicking on the "OK" button. When the last setup dialog closes, the new connection is entered in the device connections list.

19.7.4 Searching for a device in the network

This function assists the user with selecting the IP address or the host name for the device of interest. A "Search" button is located
to the right of the entry field in the dialog for entering the IP address or host name.

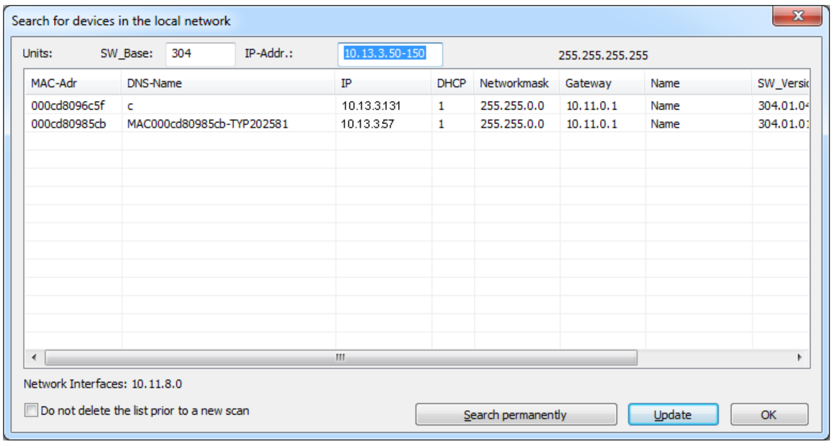


Clicking on this button automatically finds all potentially suitable devices in the local network and displays them in a list.

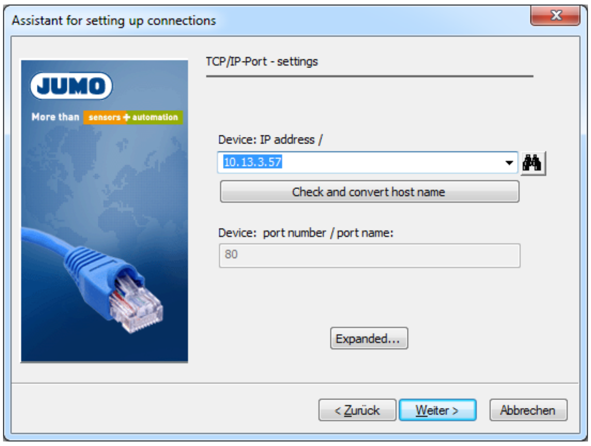


The listed devices are located in the same subnet as the PC from which the search was initiated. Specifying the software version in the "SW Base" field limits its search to specific devices and versions.

If devices have to be found in another sub-network, the address range in which the device is located must be known. This address range must be entered in the "IP-Adr." field. In addition, the first 3 bytes of the IP address must be known; only the last byte can be entered as the range (e. g. 10.13.3.50-150).



The device concerned can be highlighted with the mouse pointer (by clicking on the cell) and accepted by pressing **OK** (or by double-clicking on the cell). This enters the host name (DNS name) in the input field.



You can use the "Check and convert host name" function to establish the IP address and transfer it to the input field (subsequent editing may be necessary in the input field). Depending on the version, there may be an option to select the host name or IP address from a dropdown list.

19.8 Setting up the device with the JUMO PC setup program

19.8.1 Configuring and parameterizing

All parameters at the configuration level and the parameter level can be set both on the device itself and with the JUMO PC setup program.
⇨ Chapter 10 "Configuration", Page 119
⇨ Chapter 9 "Parameterization", Page 113

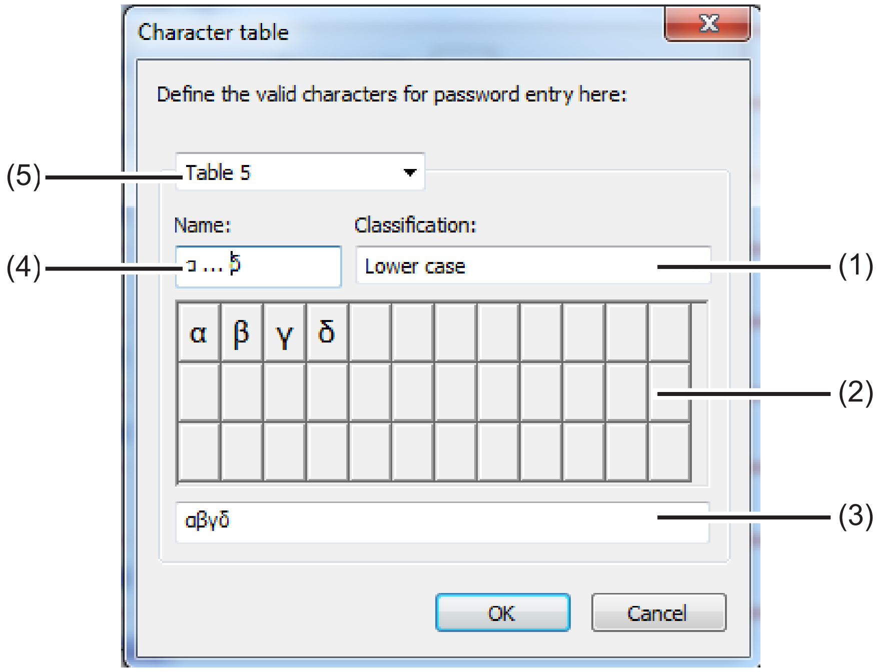
19.8.2 User list

The factory-entered user names, passwords, and user rights (see Chapter 8.1.1 "Passwords and user rights", Page 71) can be changed with the JUMO PC setup program.

Configuration point	Selection/ setting option	Explanation
Password rules	Password rules	The re-authentication time can be set here. This time counts down as soon as possible the user has logged in to the device. Once this time elapses, the logged-in user is logged off automatically. ⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84
Character table	⇨ "Character table for passwords", page 260	Character set available for passwords
Public rights	⇨ "Configuring public Rights", page 261	User rights for users who are not logged in
ID	up to 10 text characters	User name for user login
Description	up to 30 text characters	Name of the user account
Password	up to 10 text characters	Password for user login
Rights	⇨ "Configuring user rights", page 262	User rights for each individual user account

Character table for passwords

Characters for user login can be added or changed in the character tables 5 to 16. Character tables 1 to 4 cannot be changed.



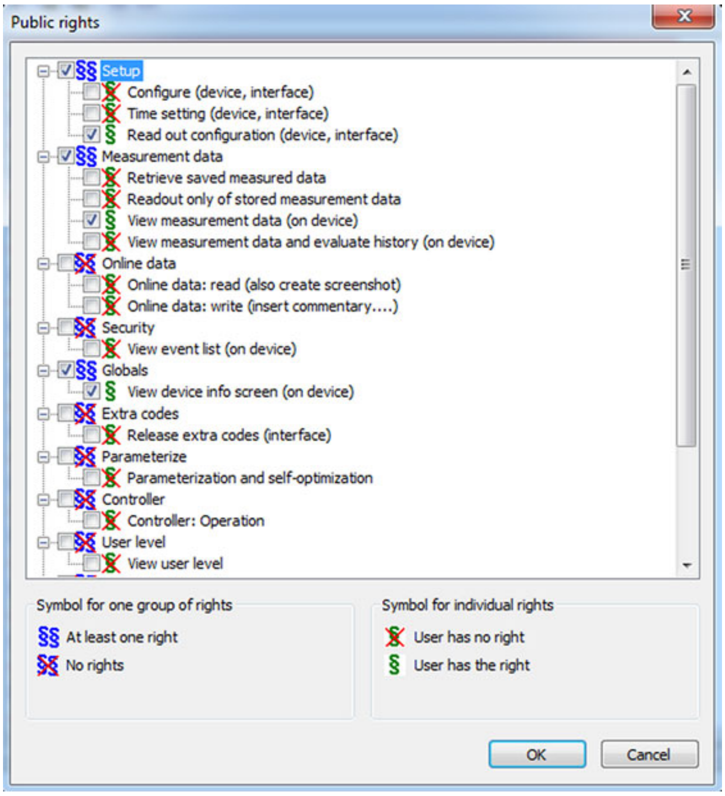
(1) Classification selection field
(2) Visualization of the keyboard layout in the Device menu
(3) Entry field for character set
(4) Header character set for labeling the tab in the device settings menu
(5) Table 1 to 16 selection field
for selecting the character table to be edited

To add password characters, select an editable character table 5 to 16 (5) and enter the desired characters as a string without spaces in the entry field (3). The new or modified character table is available on the device for changing passwords. The
tab label for the virtual keyboard in the device settings menu is entered in the "Header char. set" field.

Configuring public Rights

The access rights for all users who are not logged in are set here.

Open Settings:
Only Setup ➔ User list ➔ Public rights

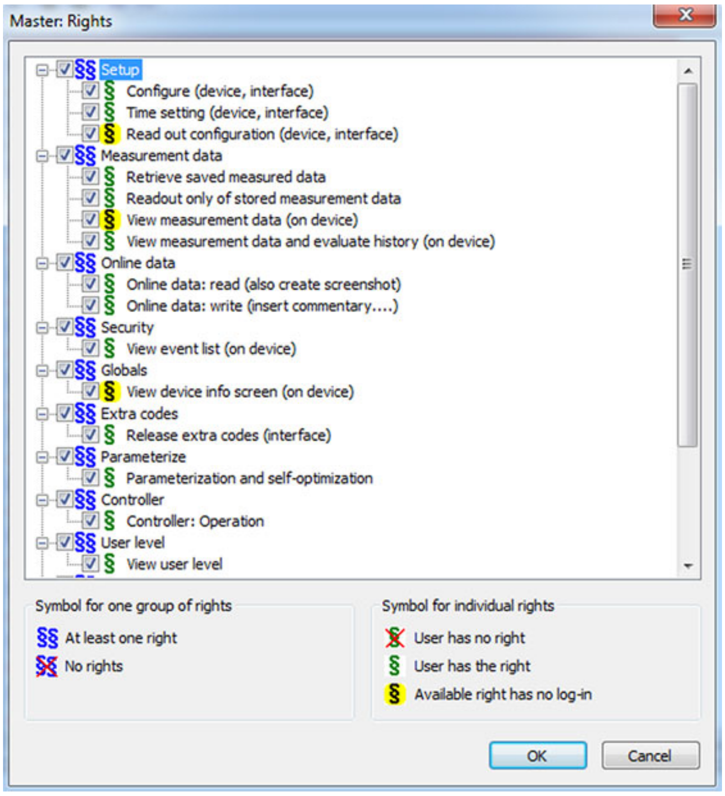


Configuring user rights

The user rights for each individual user account are set here. A corresponding user login is required to exercise the respective user rights.

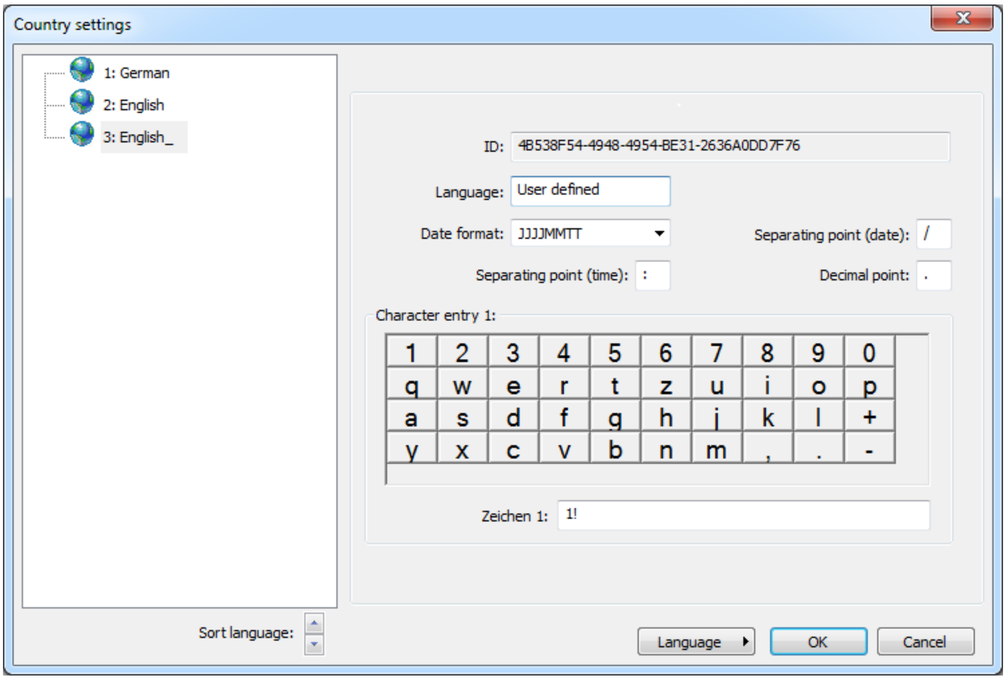
⇨ Chapter 8.1.1 "Passwords and user rights", Page 71
⇨ Chapter 8.2.1 "Log-on/Log-out", Page 84

Open Settings:
Only Setup ➔ User list ➔ Rights



19.8.3 Country settings

The country settings (language and country-specific settings such as date format and decimal point) are taken from the text library by the setup program when creating a setup file. A country setting can be moved to another position in the list ("Sort language"). The country settings in the list are sent to the device and are available there for changing the language.



Setting item	Selection/ setting option	Explanation
Specification	No entry possible Assigned automatically	Internal Specification (only for service purposes to identify the language)
Language	Use factory-set text or enter a different text	Description of the language
Date format	DDMMYYYY MMDDYYYY YYYYMMDD	Display format for the date
Decimal point	The following characters are possible: . ,	e. g. "comma" for German number format or "Point" for American
Separator (date)	The following characters are possible: . , : ; - / \	Separator for configuring the date format
Separator (time)	The following characters are possible: . , : ; - / \	Separator for configuring the time format
Character entry	2 characters 1st standard character (e. g. lower-case letter) 2nd with Shift key (e. g. upper-case letter)	The assignment of characters to the individual keyboard fields of the virtual on-screen keyboard of the device can be changed here if necessary. ⇨ Chapter 19.8.4 "Device character set", Page 268

Language button

Languages can be created, edited, and deleted with the "Language" button. New languages can be created on the basis of already existing languages. Available languages as well as languages from libraries can be selected as a template for new languages in the open setup. It is further possible to import available languages from a saved setup file as the new language. In this way, it is possible to transfer languages from one device to other devices with the aid of a device's setup file

Creating a new language

From an available language in the PC setup program

Step	Action
(1)	Open Country Settings: Only Setup (double-click) ➔ Country Settings (double-click)
(2)	Select and highlight a language as the template
(3)	Copy the selected language: Button "Language“ ➔ New Language ➔ Create
(4)	The new language can now be edited and loaded into the device with the next data transfer.

From an available language in a saved setup file

Step	Action
(1)	Open Country Settings: Only Setup (double-click) ➔ Country Settings (double-click)
(2)	Select setup file for language import: Button "Language“ ➔ New Language ➔ From Set up File
(3)	Select and open desired setup file in Explorer
(4)	Set checkmark in the checkbox for the selected language and ac-cept
(5)	The new language can now still be edited if necessary and loaded into the device with the next data transfer

From a language in the current library (internal library of the JUMO PC setup program)

Step	Action
(1)	Open Country Settings: Only Setup (double-click) ➔ Country Settings (double-click)
(2)	Open the current library: Button "Language“ ➔ New Language ➔ From Current Library
(3)	Set checkmark in the checkbox for the selected language and accept
(4)	The new language can now still be edited if necessary and loaded into the device with the next data transfer

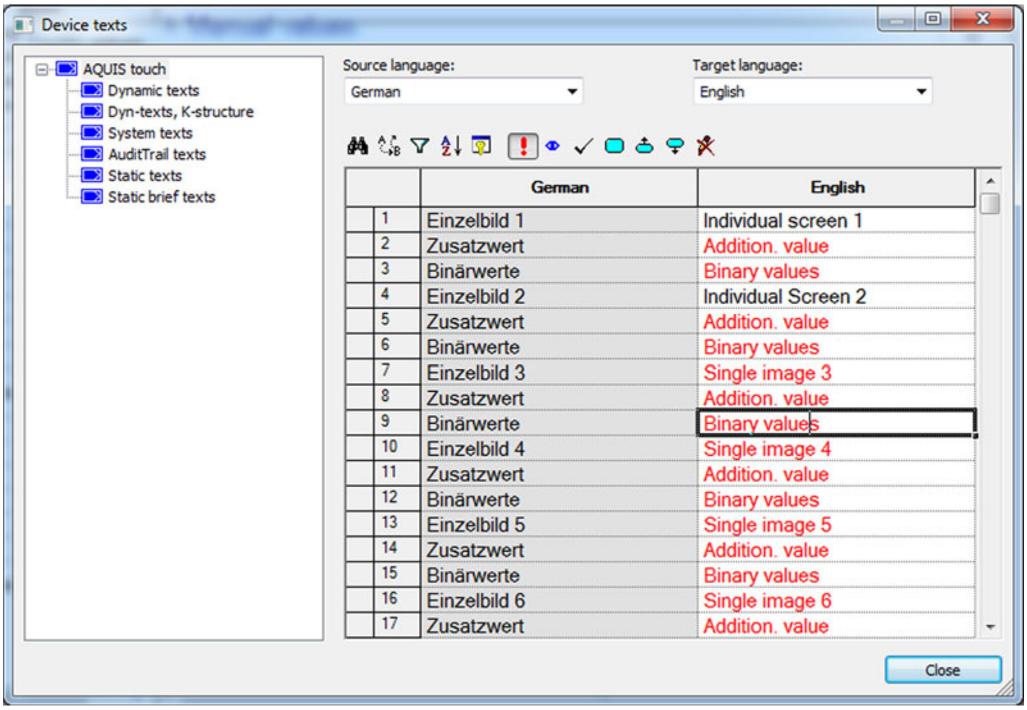
From a language in another library (library file stored on the hard drive)

Step	Action
(1)	Open Country Settings: Only Setup (double-click) ➔ Country Settings (double-click)
(2)	Select the library file: Button "Language“ ➔ New Language ➔ From Another Library
(3)	Select and open desired library file in Explorer
(4)	Set checkmark in the checkbox for the selected language and accept
(5)	The new language can now still be edited if necessary and loaded into the device with the next data transfer

Editing languages

NOTE!
Standard languages cannot be edited.
Only languages created by the user can be edited with the JUMO PC setup program.
⇨ Chapter "Creating a new language", Page 264

The following figure shows the source language text on the left and the target language text on the right. "Source language" dropdown list: Selection of the language in the left column. This language cannot be edited. "Target language" drop-down list: Selection of the language in the right column. Editing possible only in this column.

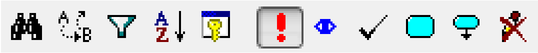


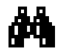
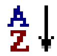
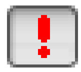
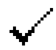
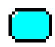
Texts displayed in red characters on a white background have not yet been edited (equivalent to not translated). The other forms of display are listed below in the "Toolbar" section. To change a text, it is only necessary to left-click once in the text field. The selected field is then displayed with a black frame. If the text has been changed, it appears in black characters on a white background upon leaving the field. The text is then considered edited (translated).

NOTE!
Static texts, e. g. the names of parameters that are too long to be displayed on the screen of the device, are automatically shortened in the menus ("..."). However, in the dialog window for setting the parameter concerned, the text is displayed in its full length. Texts should generally be kept as short and clear as possible. Longer texts that appear in the same menu should already differ at the beginning of the text.

Toolbar

The toolbar gives the user access to various functions for editing text.



Explanation	Button
Search text	
Replace text with other text	
Use filter to reduce the number of texts in the list	
Sort texts alphabetically	
Display text ID (instead of Row number)	
Mark text as "not edited closed votes (red text)	
Mark text as "to be checked" (blue text)	
Mark text as "edited" (translated) (black text)	
Bookmark text	
Open next entry with a bookmark	
Write-protect text (gray background)	

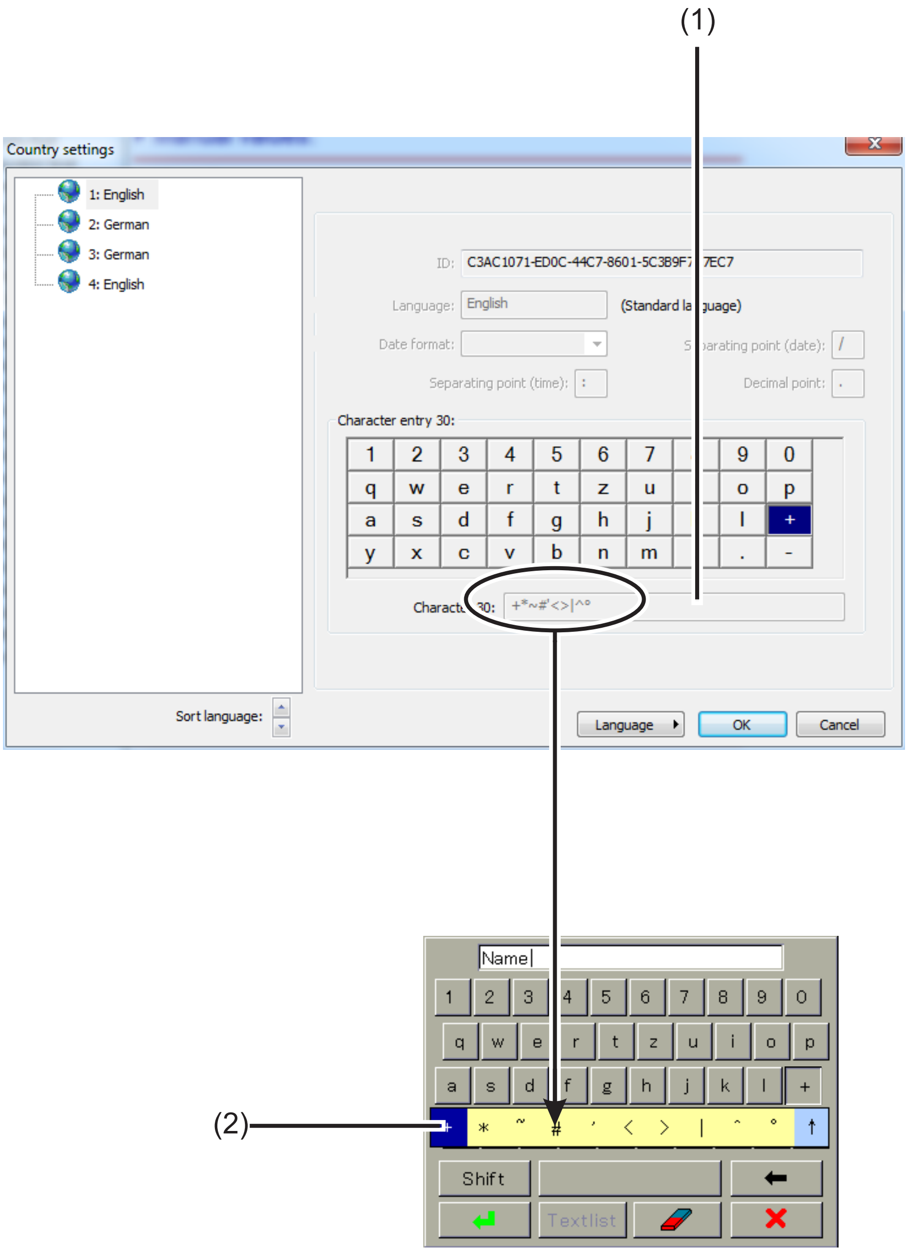
Errors during Text input

Errors that occur during Text input are signaled by a colored background.

Explanation	Background
Too little memory space available. The total number of characters in a text is too large and must be reduced (shorten text).	Blue
The entered text is too long; it does not fit in the window provided.	Yellow
The text entered contains characters that cannot be displayed on the device.	Violet
Errors while editing a placeholder (#). The "#" symbol serves as a placeholder. Text is generated automatically by the device software at the location of the placeholder. Example: "Device ID #1.100". "Device ID" may be changed, "#1.100" **not**.	Brown

19.8.4 Device character set

When creating a new language, it is also possible to specify the characters that appear on the device for text entry (virtual keyboard).



(1) Entry field for character selection
The characters that are entered here are offered for selection by the virtual keyboard on the device later upon pressing the corresponding key.

(2) Selection on the device keyboard
In the example, the key for the plus sign was pressed on the virtual device keyboard.

To edit the character set for the device keyboard, proceed as follows:

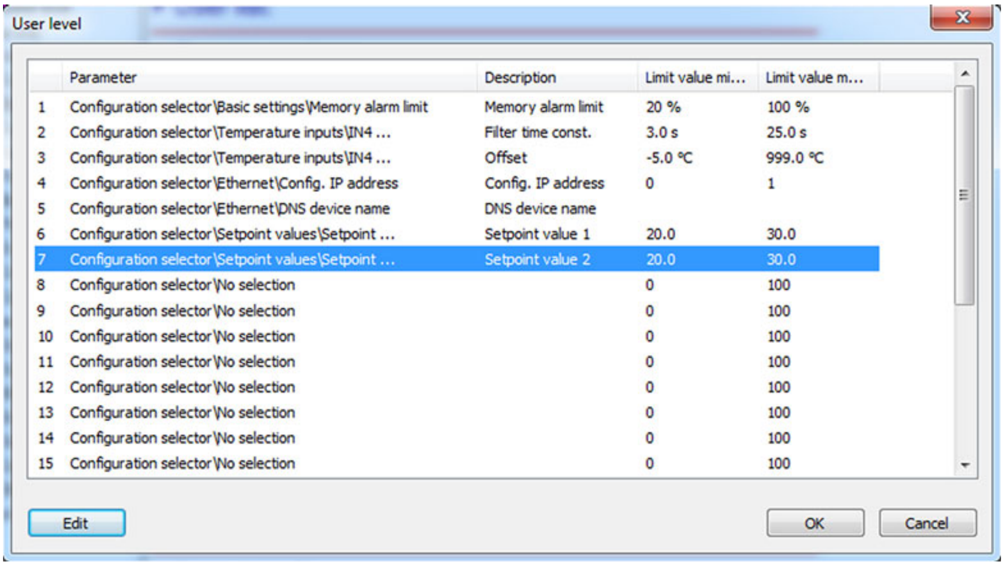
Step	Action
(1)	Left-click the virtual key in the "Character entry" field (example: "+"). The characters assigned to the key appear in the text field. The first character from the left corresponds to the key label.
(2)	Change the key assignment in the text field as necessary (if invalid characters are entered, the background changes to violet).

19.8.5 User level

The user-defined parameter and settings list at the User level of the Device menu are created in this menu.

Explanation of the User level:
⇨ Chapter 8.2.2 "User level", Page 85

Open Settings:
Only Setup ➔ User level

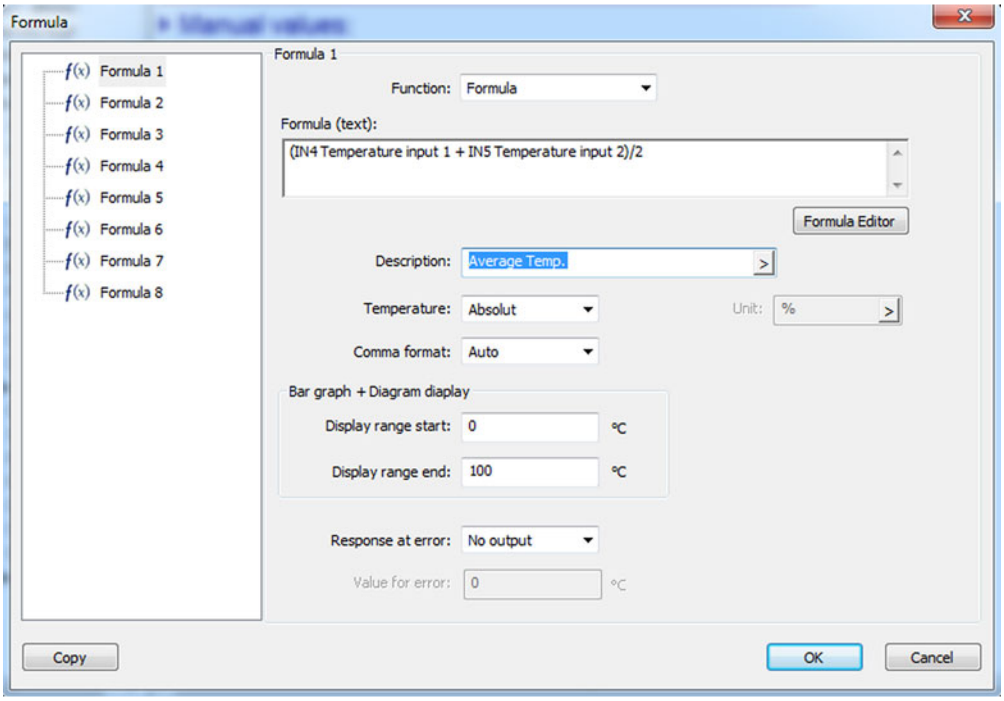


19.8.6 Formula

Formula must be created with the JUMO PC setup program. During data transfer to the device, the formulas are then loaded into the JUMO AQUIS touch S together with the setup. For formula that have already been loaded into the device, the configuration data below the formula entry field can also be set on the device as an alternative.

Explanation of the configuration data for "Formula":
⇨ Chapter 10.18 "Formula", Page 158

Open Settings:
Only Setup ➔ Formula ➔ Formula 1 to 8



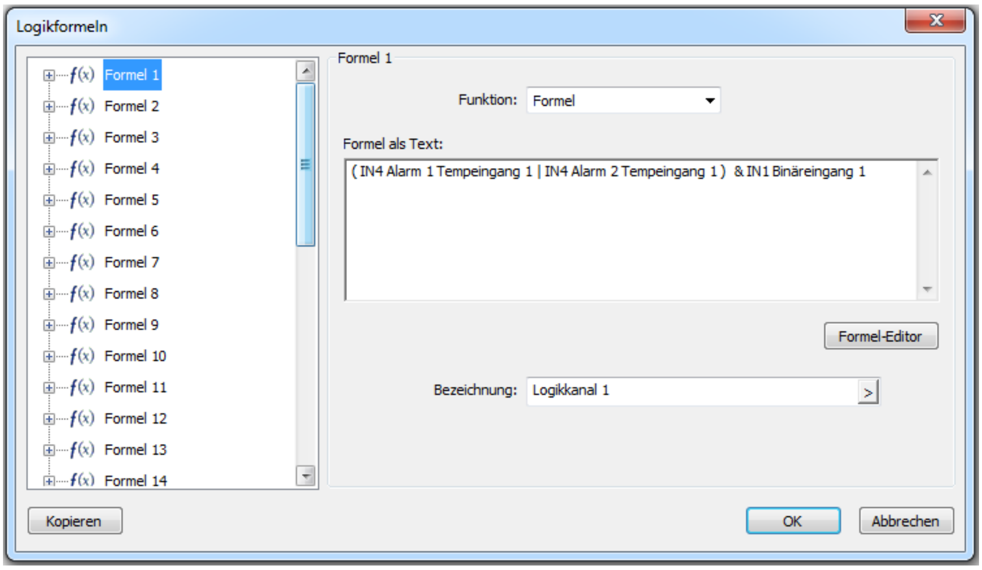
To create formula, open the Formula Editor by pressing the button. With the aid of the Formula Editor, you can select variables from the analog and binary selections as well as available operators in order to add them to the mathematical expression in the text window by pressing the corresponding "Add" button.
If necessary, the formula can also be edited by entering characters with the keyboard.

19.8.7 Logic formula

Logic formula must be created with the JUMO PC setup program. During data transfer to the device, the formulas are then loaded into the JUMO AQUIS touch S together with the setup. For formula that have already been loaded into the device, the description below the formula entry field and the alarm configuration can also be set on the device as an alternative.

Explanation of the configuration data for "Logic formula":
⇨ Chapter 10.19 "Logic formula", Page 159

Open Settings:
Only Setup ➔ Logic formula ➔ Formula 1 to 30



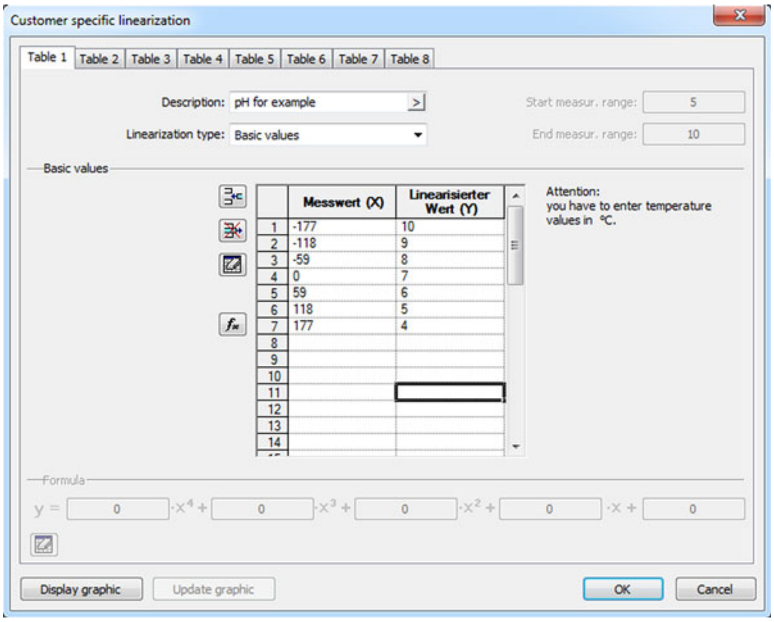
To create formula, open the Formula Editor by pressing the button. With the aid of the Formula Editor, you can select variables from the Binary selection as well as available operators in order to add them to the logic expression in the text window by pressing the corresponding "Add" button.
If necessary, the formula can also be edited by entering characters with the keyboard.

19.8.8 Customer-specific linearization

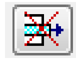
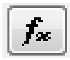
Value tables and formula for customer-specific linearization must be created with the JUMO PC setup program. During data transfer to the device, the linearization is then loaded into the JUMO AQUIS touch S together with the setup. After the linearizations have been loaded into the device, they can be used when configuring the following types of analog inputs:

- Universal inputs with a standard signal (except pH/T-compensated chlorine measurement)
  ⇨ Chapter 10.5.2 "Universal inputs of base unit and optional boards", Page 127
- Temperature inputs for RTD temperature probes with a customer-specific characteristic curve (up to 400 Ω, 4000 Ω or 100 kΩ)
  ⇨ Chapter 10.5.1 "Base unit temperature inputs", Page 125
- Analysis measuring inputs for electrolytic conductivity
  ⇨ Chapter 10.5.5 "CR/Ci measuring ranges", Page 133

Open Settings:
Only Setup ➔ Customer-Specific Linearization ➔ Tabs 1 to 8



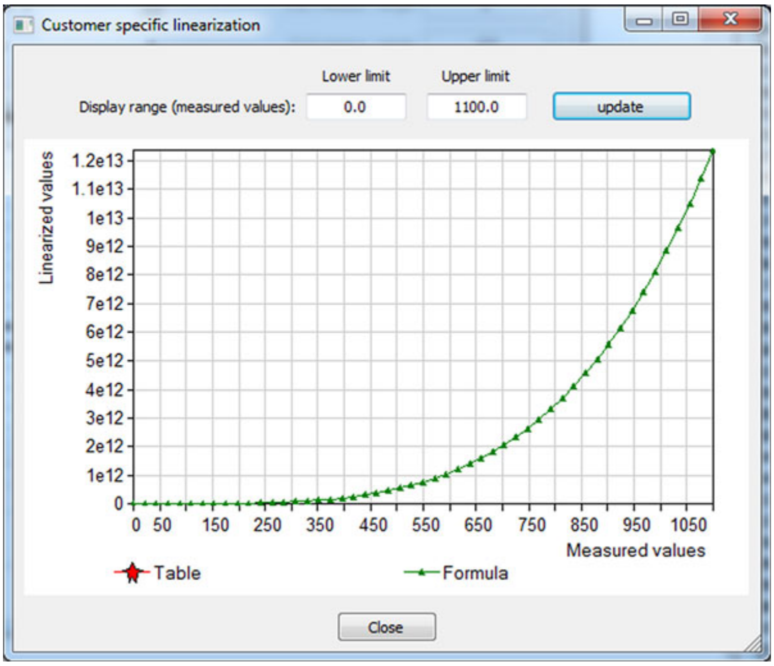
Symbol buttons – Basic values table

"Insert line" Inserts a new line above the highlighted line[a]	
"Delete line" Deletes the highlighted line from the Basic values table[a]	
"Delete table" Delete all entries in the Basic values table	
"Generate formula" Generates an approximation formula from the values in the support point table	

[a] Lines are highlighted by tapping the Row numbers.

Display graphic

The linearization characteristic curve is displayed by tapping the "Display graphic" button. By entering the "Lower limit" and "Upper limit" and then pressing the "Update" button, the display range of the Measuring value axis can be specified.



Settings for customer-specific linearizations 1 to 8

Setting item	**Selection/ setting option**	**Explanation**
Description	up to 15 text characters	Linearization name
Linearization type	Basic values Formula	Way of entering linearization data In order to display a measurement characteristic curve, the customer-specific linearization can be entered as a value table with discrete value pairs or as a formula (fourth-degree polynomial).
Start measur. range End measur. range	-99999 to +99999	**only with "Formula" as "Linearization type":** Value range limits for the Y-column The signal values from the sensor (X-values) are converted by the formula to values of the process variable (Y-values). The Y-values function as measuring values for input at the analog inputs of the AQUIS touch S.
Basic values	Table with discrete value pairs	**only for "Supporting values" as "Linearization type":** Entry of discrete value pairs of a measurement characteristic curve The signal values from the sensor can be entered in the X-column of the values table and the associated values of the process variable in the Y-column. The intervals between two value pairs are calculated internally by linear interpolation. The Y-values function as measured values for input at the analog inputs of the AQUIS touch S.
Formula	Coefficients of a 4th degree polynomial	**only with "Formula" as "Linearization type":** Approximation formula for displaying a measurement characteristic curve Formula are entered as a fourth-degree polynomial and used to convert the signal values from the sensor (X-values) into the corresponding values of the process variable (Y values). The Y-values function as measured values for input at the analog inputs of the AQUIS touch S. The "Generate formula" button can be used to generate an approximation formula on the basis of the Basic values entered in the table.

19.8.9 Buffer set tables

Three buffer set tables are created in the JUMO AQUIS touch S.
Buffer set tables are needed for calibration of pH sensors when using automatic buffer detection.

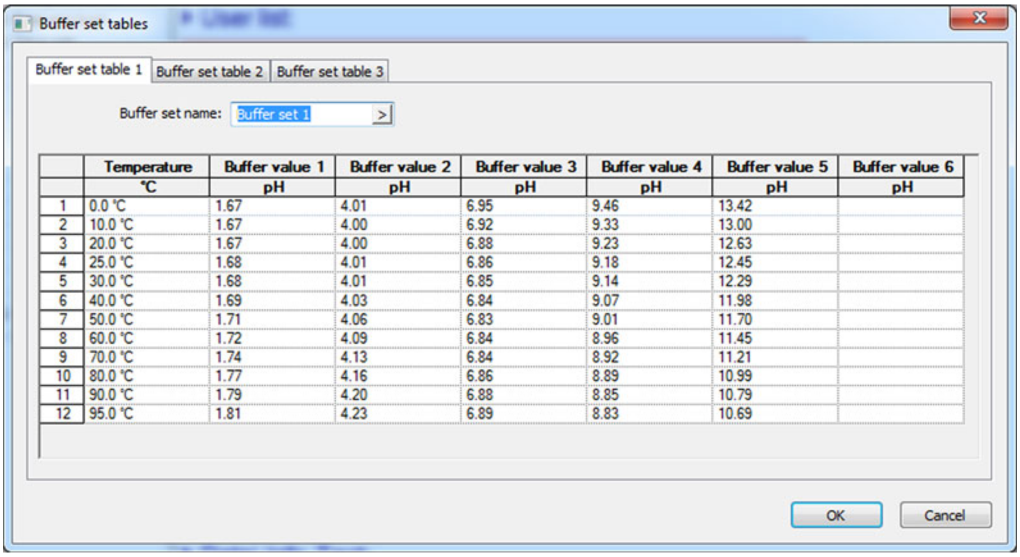
⇨ Chapter 13 "Calibrating a pH measuring chain", Page 183

.
These Buffer set tables can be changed as often as necessary here.

The factory settings for the Buffer set tables are as follows:

- **Buffer set 1:** Reference buffer solutions for calibrating pH measuring instruments acc. to DIN 19266
- **Buffer set 2:** Technical buffer solutions, preferably for calibrating and adjusting technical pH measuring instruments acc. to DIN 19267
- **Buffer set 3:** No data

Open Settings:
Only Setup ➔ Buffer set tables ➔ "Buffer set table 1 to 3" tab



	Temperature	Buffer value 1	Buffer value 2	Buffer value 3	Buffer value 4	Buffer value 5	Buffer value 6
	°C	pH	pH	pH	pH	pH	pH
1	0.0 °C	1.67	4.01	6.95	9.46	13.42	
2	10.0 °C	1.67	4.00	6.92	9.33	13.00	
3	20.0 °C	1.67	4.00	6.88	9.23	12.63	
4	25.0 °C	1.68	4.01	6.86	9.18	12.45	
5	30.0 °C	1.68	4.01	6.85	9.14	12.29	
6	40.0 °C	1.69	4.03	6.84	9.07	11.98	
7	50.0 °C	1.71	4.06	6.83	9.01	11.70	
8	60.0 °C	1.72	4.09	6.84	8.96	11.45	
9	70.0 °C	1.74	4.13	6.84	8.92	11.21	
10	80.0 °C	1.77	4.16	6.86	8.89	10.99	
11	90.0 °C	1.79	4.20	6.88	8.85	10.79	
12	95.0 °C	1.81	4.23	6.89	8.83	10.69	

19.8.10 Process screens

A "Process screen" can be created in the Operation loop of the JUMO AQUIS touch S in order to design a dynamic overview display of a system or a process. The Process screen must be created with the JUMO PC setup program and loaded into the JUMO AQUIS touch S together with the configuration.

Components of the Process screen:

- **Background color:** Selectable color of the background
  ⇨ "Background color", page 281
- **Background:** Any image in bitmap format
  (the dimensions of the Process screen 316 × 182 pixels)
  ⇨ "Background", page 282
- **Objects:** Graphical elements for visualizing the operating state of the equipment in a system (e.g. pumps, valves, heating elements etc.)
  ⇨ "Objects", page 284

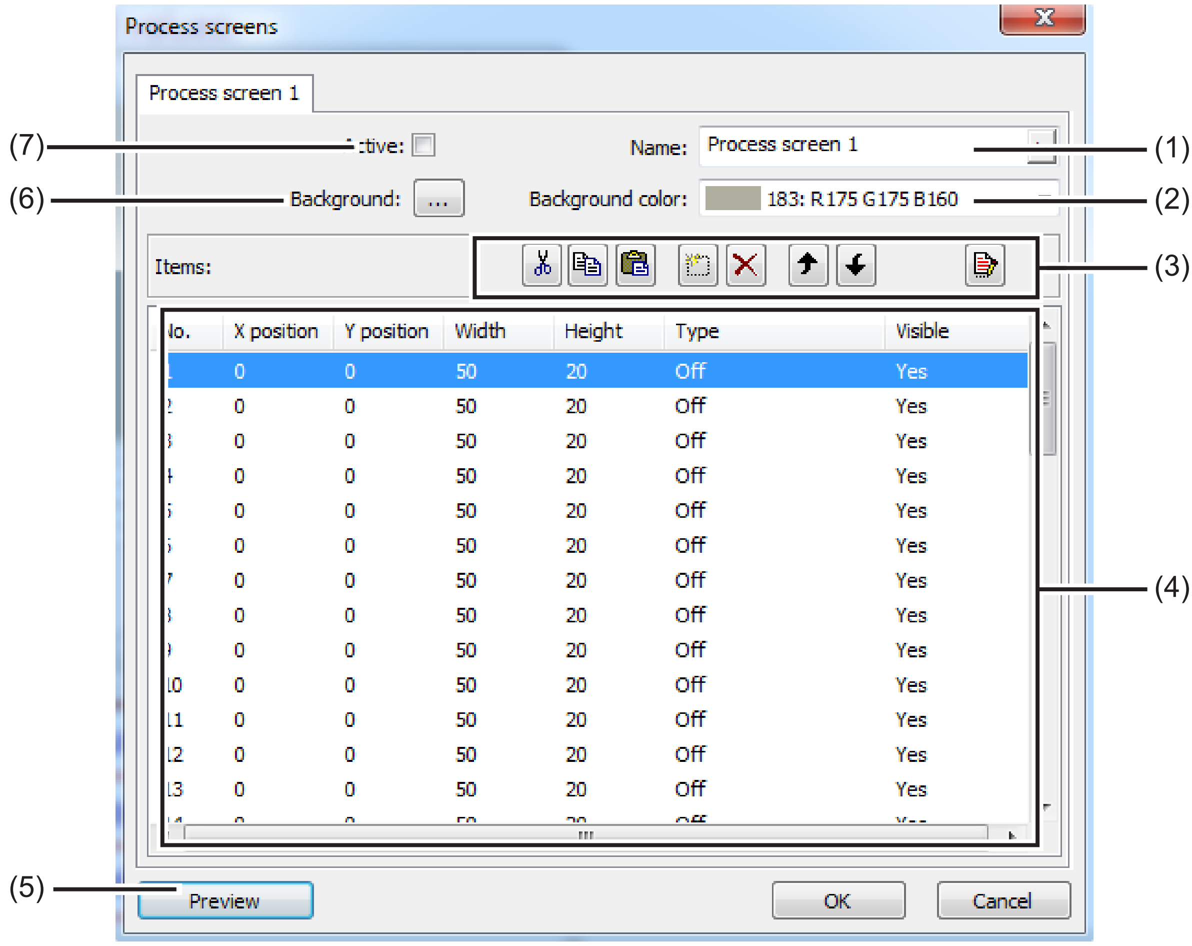
NOTE!
Operation screens can be shown/hidden in the configuration. Check the Process screen setting in the configuration.

Device Menu ➔ Display ➔ General ➔ Display Process screen

Open Settings (Process screen Editor):
Only Setup ➔ Process screens (double-click) ➔ "Process screen 1“ tab

Process screen editor

Process screens for the JUMO AQUIS touch S must be created with the JUMO PC setup program. These are then transferred from the PC to the device together with the setup.



(1) Description of the Process screen (appears in the title bar of the Process screen)

(2) Setting for the background color of the Process screen

(3) Buttons for editing objects in the Process screen
⇨ "Process screen Editor buttons", page 279

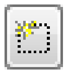
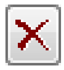
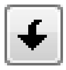
(4) Object list with 50 objects
The list shows all 50 objects. The objects can be configured, formatted, and activated with the editor. Objects shown as "Off" are not active in the Process screen. Objects with higher numbers cover objects with lower numbers in the Process screen.

(5) "Preview" button
Opens the preview window with the concept for the Process screen
⇨ "Preview", page 280

(6) Background
Clicking this button opens a dialog for selecting an image from the image list.
It is also possible to import user-defined images into the image list.
⇨ "Background", page 282

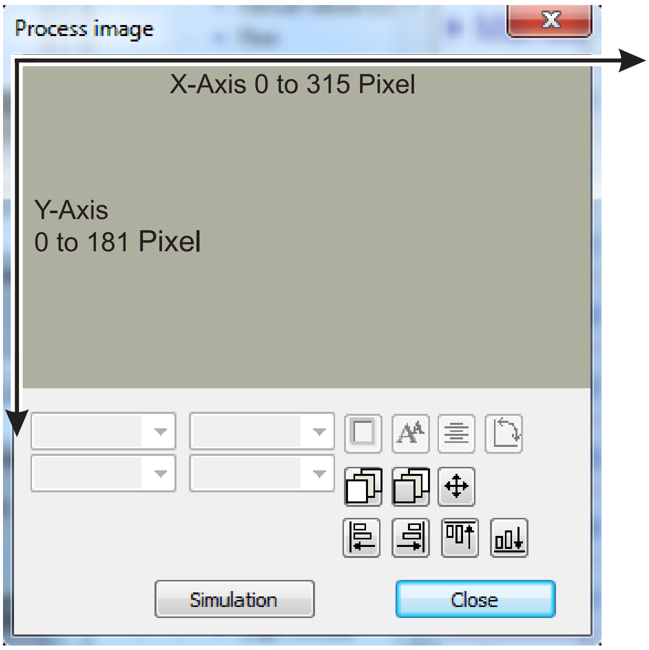
(7) The "Active" option is used to activate and display the screen with the Process screen in the Operation loop.

Process screen Editor buttons

"Cut" Copies the highlighted object to the clipboard and deletes it from the list	
"Copy" Copies the highlighted object to the clipboard	
"Insert" Inserts an object from the clipboard at the highlighted position in the list; the highlighted object and all objects below it are shifted downward	
"New" Inserts a new object at the highlighted position in the list, the highlighted object and all objects below it are shifted downward	
"Remove" Removes the highlighted object from the highlighted position in the list; objects below it are shifted upward	
"Move up" Moves the highlighted object up one position in the list (corresponds to moving to the back in the Process screen)	
"Move down" Moves the highlighted object down one position in the list (corresponds to moving to the front in the Process screen)	
"Edit" Opens a dialog for editing the highlighted object ⇨ Chapter "Objects", Page 284	

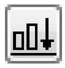
Preview

The "Preview" button in the Process screen Editor opens the preview. The concept for the Process screen can be viewed here. The Process screen is displayed as it will appear later on the device.
Objects can be repositioned via drag and drop. The size of object can be changed by dragging the corners and edges.
Using the buttons in this window, objects can be repositioned, aligned with one another, formatted, and simulated.
The X-position axis runs from left to right; the Y-position axis from top to bottom. The origin of the coordinate system is the top left edge of the Process screen.



Buttons in the preview

"Frame type" Changes the frame format of a framed object	
"Font size" Changes the font size in an object with text	
"Alignment" Changes the alignment of the lettering in objects with text	
"Object type" Changes the orientation of the object (horizontal/vertical)	
"One step forward" Moves an object on the graphic levels one step forward	
"One step back" Moves an object on the graphic levels one step back	

"Move" Opens a window with arrow buttons from moving objects one step at a time Single arrow: Move by 1 pixel Double arrow: Move by 10 pixels	
"Align left" Simultaneously aligns several highlighted objects along the left edge of the object highlighted first[a]	
"Align right" Simultaneously aligns several highlighted objects along the right edge of the object highlighted first[a]	
"Align top" Simultaneously aligns several highlighted objects along the top edge of the object highlighted first[a]	
"Align bottom" Simultaneously aligns several highlighted objects along the bottom edge of the object highlighted first[a]	

[a] Several objects can be highlighted simultaneously by holding down the Shift key and left clicking with the mouse.

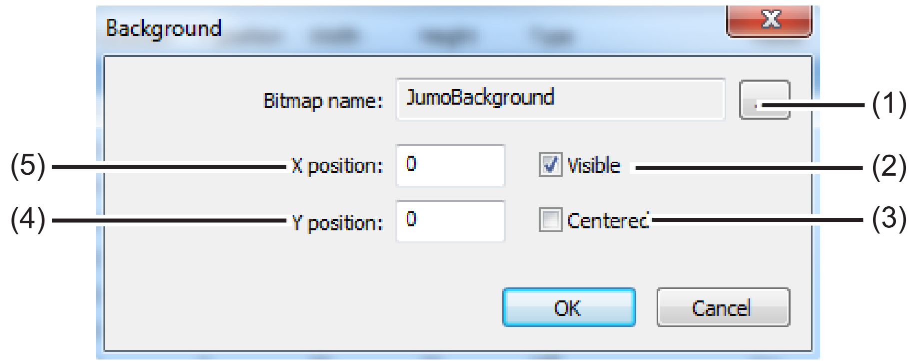
Background color

The background color on the level behind all objects and the background image can be selected in the Process screen Editor.

Background

The next level in front of the background color level is reserved for the background. Any image in the image list can be selected and displayed here in front of the background color level.
User-defined images can be imported into the image list. The images must be created in bitmap format. The dimensions of the Process screen are 316 × 182 pixels.

Open the "Background" dialog:
Only setup ➔ Process screens ➔ "Process screen 1" tab ➔ "Background" button



(1) "Image List" button
This button opens a further dialog that is used to select an image as the background, and to import/export user-defined bitmaps into the image list.

⇨ "Selecting an image as the background", page 282
⇨ "Importing/exporting images", page 283

(2) Show/hide the background in the Process screen to provide a better overview of the objects in the Process screen during editing

(3) Center the background in the Process screen (the "Center" option has higher priority than the coordinate information)

(4) X-coordinate of the top left corner of the background image

(5) Y-coordinate of the top left corner of the background image

Selecting an image as the background

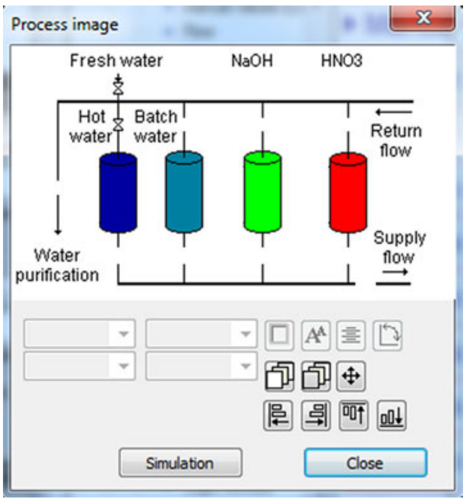
Step	Action
1	Open the image list Only Setup ➔ Process screens ➔ "Process screen 1" tab ➔ "Background" button ➔ "Image List" button
2	Highlight the desired image in the list
3	Confirm by pressing "OK"

Importing/exporting images

Step	Action
1	Open the image list Only Setup ➔ Process screens ➔ "Process screen 1" tab ➔ "Background" button" ➔ "Image List" button
2	**Import:** Highlight an image in the list that you wish to overwrite with the new one and click the "Replace" button. **Export:** Highlight an image in the list that you wish to export and click the "Replace" button.
3	**Import:** In the Explorer window, select the new image file and click on "Open". **Export:** In the Explorer window, select the location where you wish to save the exported image, enter a file name and click on "Save".
4	The import/export process is now complete. You can close all windows that were opened in step 1 by pressing "OK" or "Cancel".

Tip: We recommend that you create an image that contains all static elements of your system representation and then use this as the background. The next step, all dynamic visualization elements are placed at the intended locations in the Process screen in the form of objects (e.g. pictograms for valves and pumps or analog displays).

Example: A Process screen for a CIP system is needed. In the first step, the representation of all static elements (pipes, tanks etc.) is created as a bitmap. The bitmap is imported into the image list and selected as the background. In the next subchapter (Chapter "Objects", Page 284), objects are added to the sample Process screen.



Objects

The object list of the Process screen Editor contains 50 empty objects. Double-clicking on an entry or clicking the "Edit" button in the Process screen Editor opens a dialog for configuring, designing, and formatting the corresponding object in detail. For greater clarity, the size, location in the Process screen, type, and visibility are shown in the list for each object.
The object number in the object list is also the display priority of an object. Objects with higher object numbers cover those with lower object numbers.
The buttons in the Process screen Editor can be used to copy, cut, insert, move, and delete object list entries.
⇨ Chapter "Process screen Editor buttons", Page 279

Object types

Pictograms:
A binary signal has two images associated with it. Depending on the value of the binary signal, one of the two images is displayed.
Example: An indicator light needs to be visualized. The image of a green indicator light is displayed for "TRUE" and a gray image (light off) is displayed for "FALSE".

Configuration item	**Selection/ setting option**	**Explanation**
Visible	Checkmark in the checkbox	Checkmark set: Object is displayed Empty checkbox: Object is hidden
X position	0 to 315 pixels	X-coordinate of the top left corner of the pictogram
Y position	0 to 181 pixels	Y-coordinate of the top left corner of the pictogram
Digital signal	Selection from the binary selector	Binary signal for switching between the two images configured (see the following two lines)
Image Digital signal = TRUE	Selection from the image list	Image displayed when the binary signal = "TRUE" (on-signal)
Image Digital signal = FALSE	Selection from the image list	Image displayed when the binary signal = "FALSE" (Off-signal)

Analog signals:
The numerical value of an analog signal is displayed in the Process screen.

Configuration item	Selection/ setting option	Explanation
Visible	Checkmark in the checkbox	Checkmark set: Object is displayed Empty checkbox: Object is hidden
X position	0 to 315 pixels	X-coordinate of the top left corner of the pictogram
Y position	0 to 181 pixels	Y-coordinate of the top left corner of the pictogram
Width	1 to 316 pixels	Dimensions of the analog display
Height	1 to 182 pixels	
Analog signal	Selection from the analog selector	Analog signal source whose value is to be displayed
Background color	Selection from color palette	Background color of the analog display
Transparent	Checkmark in the checkbox	Hide the background color; only the numeric display is visible
Frame type	None Fine Bold Upper case Lower case	Selection of a frame format
Foreground color	Selection from color palette	Font color of the numeric display
Font size	12/13/15/24/33/37/48/64 pixels	Font size in the numeric display
Alignment	Left align Right align Centered	Character alignment in the numeric display
Object type	horizontal vertical	Orientation of the analog display
Decimal place	Auto, Fixed comma format	Decimal points in the display

Digital signals:
A binary signal has two plain texts associated with it. Depending on the value of the binary signal, one of the two plain texts is displayed.
Example: A manual / automatic selector switch needs to be visualized. Depending on the switch position, either "Manual mode" or "Automatic mode" text is displayed.

Configuration item	Selection/ setting option	Explanation
Visible	Checkmark in the checkbox	Checkmark set: Object is displayed Empty checkbox: Object is hidden
X position	0 to 315 pixels	X-coordinate of the top left corner of the pictogram
Y position	0 to 181 pixels	Y-coordinate of the top left corner of the pictogram
Width	1 to 316 pixels	Dimensions of the analog display
Height	1 to 182 pixels	
Digital signal	Selection from the Binary selection	Binary signal source for the Digital display
Background color	Selection from color palette	Background color of the analog display
Transparent	Checkmark in the checkbox	Hide the background color; only the numeric display is visible
Frame type	None Fine Bold Upper case Lower case	Selection of a frame format
Color (low)	Selection from color palette	Font color for binary value = 0
Text for low	up to 30 text characters	Text for binary value = 0
Color (high)	Selection from color palette	Font color for binary value = 1
Text for high	up to 30 text characters	Text for binary value = 1
Font size	12/13/15/24/33/37/48/ 64 pixels	Font size in the numeric display
Alignment	Left align Right align Centered	Character alignment in the numeric display
Object type	horizontal vertical	Orientation of the analog display

Universal display:
Display of configuration settings, e.g. units or identifiers of an internal analog signal source for the JUMO AQUIS touch S.

Configuration item	Selection/ setting option	Explanation
Visible	Checkmark in the checkbox	Checkmark set: Object is displayed Empty checkbox: Object is hidden
X position	0 to 315 pixels	X-coordinate of the top left corner of the pictogram
Y position	0 to 181 pixels	Y-coordinate of the top left corner of the pictogram
Width	1 to 316 pixels	Dimensions of the analog display
Height	1 to 182 pixels	
Analog signal	Selection from the analog selector	Analog signal source whose value is to be displayed
Background color	Selection from color palette	Background color of the analog display
Transparent	Checkmark in the checkbox	Hide the background color; only the numeric display is visible
Frame type	None Fine Bold Upper case Lower case	Selection of a frame format
Foreground color	Selection from color palette	Font color of the numeric display
Font size	12/13/15/24/33/37/48/ 64 pixels	Font size in the numeric display
Alignment	Left align Right align Centered	Character alignment in the numeric display
Object type	horizontal vertical	Orientation of the analog display
Display type	Description Scale start Scale end Unit Limit value alarm 1 Limit value alarm 2 Window range alarm 1 Window range alarm 2	Selection of the configuration setting for the selected analog signal that is to be displayed

Text:
Plain text for labeling of visualization elements.

Configuration item	Selection/ setting option	Explanation
Visible	Checkmark in the checkbox	Checkmark set: Object is displayed Empty checkbox: Object is hidden
X position	0 to 315 pixels	X-coordinate of the top left corner of the pictogram
Y position	0 to 181 pixels	Y-coordinate of the top left corner of the pictogram
Width	1 to 316 pixels	Dimensions of the analog display
Height	1 to 182 pixels	
Background color	Selection from color palette	Background color of the analog display
Transparent	Checkmark in the checkbox	Hide the background color; only the numeric display is visible
Frame type	None Fine Bold Upper case Lower case	Selection of a frame format
Foreground color	Selection from color palette	Font color of the numeric display
Font size	12/13/15/24/33/37/48/ 64 pixels	Font size in the numeric display
Alignment	Left align Right align Centered	Character alignment in the numeric display
Object type	horizontal vertical	Orientation of the analog display
Text	up to 30 text characters	Plain text for the identification field

Frames and rectangles:
Design elements for emphasizing or delimiting visualization elements of the Process screen. Rectangles are always transparent for objects. Every object is visible at all times regardless of the location of a rectangle in the object list.

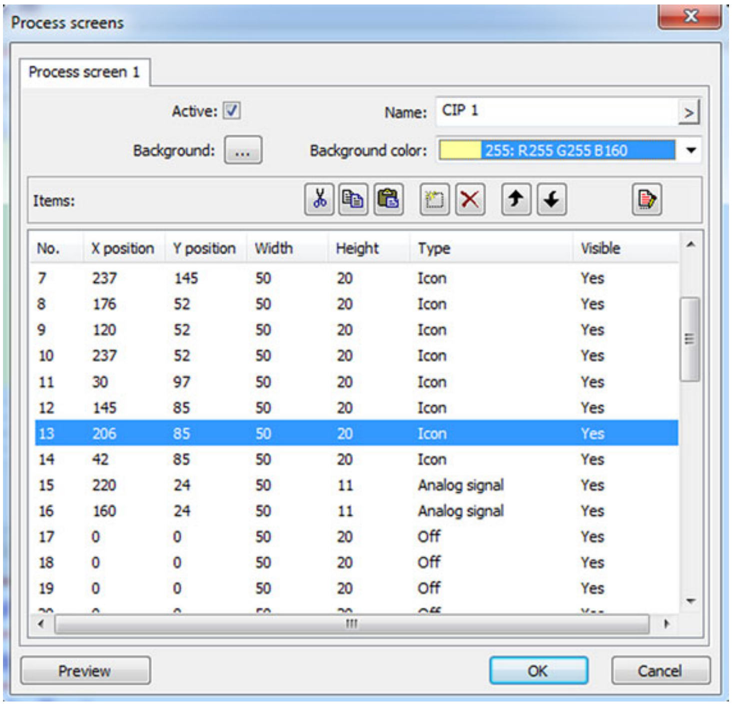
Configuration item	Selection/ setting option	Explanation
Visible	Checkmark in the checkbox	Checkmark set: Object is displayed Empty checkbox: Object is hidden
X position	0 to 315 pixels	X-coordinate of the top left corner of the pictogram
Y position	0 to 181 pixels	Y-coordinate of the top left corner of the pictogram
Width	1 to 316 pixels	Dimensions of the analog display
Height	1 to 182 pixels	

Configuration item	Selection/ setting option	Explanation
Color	Selection from color palette	**For rectangles only:** Fill color of the rectangle (transparent for objects)
Frame type	None Fine Bold Upper case Lower case	Selection of a frame format

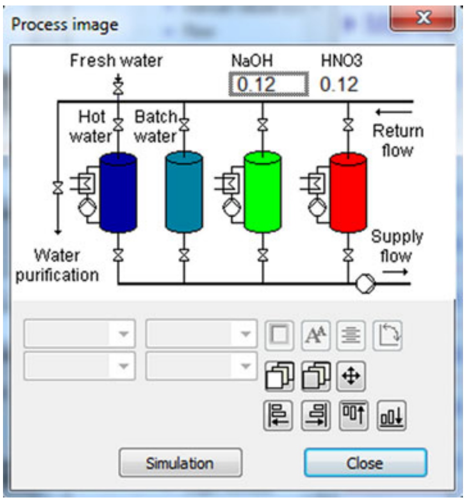
Bar graph:
Vertical or horizontal bar for visualizing analog values.

Configuration item	Selection/ setting option	Explanation
Visible	Checkmark in the checkbox	Checkmark set: Object is displayed Empty checkbox: Object is hidden
X position	0 to 315 pixels	X-coordinate of the top left corner of the picto-gram
Y position	0 to 181 pixels	Y-coordinate of the top left corner of the picto-gram
Width	1 to 316 pixels	Dimensions of the analog display
Height	1 to 182 pixels	
Transparent	Checkmark in the checkbox	Hide the background color; only the bar is visible
Frame type	None Fine Bold Upper case Lower case	Selection of a frame format
Color (off)	Selection from color palette	Background color of the bar graph display
Color (on)	Selection from color palette	Bar color in the bar graph display
Object type	horizontal vertical	Orientation of the bar graph display

Example: Objects now need to be added to the sample Process screen from the previous chapter (Chapter "Background", Page 282). Valves and pumps are represented by pictograms. Two analog displays serve as the process value display.



No.	X position	Y position	Width	Height	Type	Visible
7	237	145	50	20	Icon	Yes
8	176	52	50	20	Icon	Yes
9	120	52	50	20	Icon	Yes
10	237	52	50	20	Icon	Yes
11	30	97	50	20	Icon	Yes
12	145	85	50	20	Icon	Yes
13	206	85	50	20	Icon	Yes
14	42	85	50	20	Icon	Yes
15	220	24	50	11	Analog signal	Yes
16	160	24	50	11	Analog signal	Yes
17	0	0	50	20	Off	Yes
18	0	0	50	20	Off	Yes
19	0	0	50	20	Off	Yes

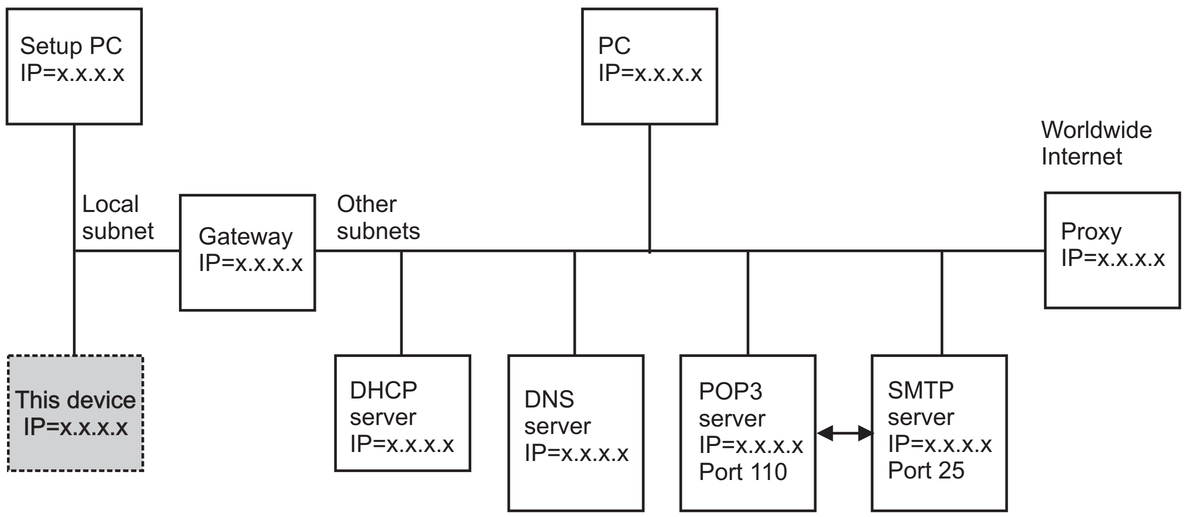


19.8.11 Email

> **NOTE!**
> The prerequisite for the e-mail function to operate is that the settings for the e-mail server and Ethernet are configured correctly. In particular, the DNS server and standard gateway entries must be correct.
>
> ⇨ Chapter "Setting up the e-mail server", Page 294
> ⇨ Chapter 10.16 "Ethernet", Page 157

The JUMO AQUIS touch S can be configured for event-controlled sending of e-mail messages. Up to 5 e-mail templates can be saved in the JUMO AQUIS touch S. Sending of the e-mail is triggered by a rising edge of the binary signal in the "Alarm signal" field.

Typical networking and company networks



Function of individual nodes

Gateway:
Separates local subnets from each other and thus filters the packets. Not all packets are received in every subnet. Packets from outside the local subnet must be addressed to the gateway.

DHCP server:
Can automatically assign IP address, subnet mask and gateway address to other nodes when switching on. These parameters can also be entered manually, a DHCP server is then no longer needed.

DNS server:
Converts symbolic names into IP addresses. Example: The query "www.na-me.de" is answered with "www.name.de has IP=10.12.32.45".

POP3 server:
used to read e-mails received in an e-mail account. The POP3 mail account is accessed by logging in with the user name and password. Successful login also frequently activates the sending authorization of the associated SMTP server.

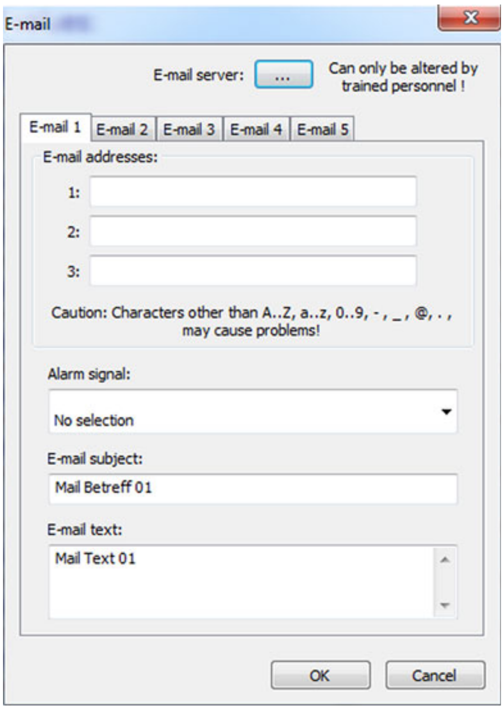
SMTP server:
serves to transmit e-mails. In many networks, the authorization to send e-mails via a mail account must be released by previously logging in at the corresponding POP3 server.
Proxy:
serves as a gateway from the local company network to the worldwide Internet. This is also where the conversion of "local" IP addresses (in the company network being used) into "unique" IP addresses (used on the Internet) takes place. The device software cannot address a proxy! There are, however, also "transparent proxies" that make worldwide IP addresses addressable without a special protocol.

19.8.12 SMS gateway

If present, e-mail messages can be redirected to your mobile phone through the SMS gateway of your wireless service provider. For e-mail forwarding through an SMS gateway, contact your wireless service provider.

Setting up e-mail templates

Open Settings:
Only Setup ➔ E-mail (double-click) ➔ "E-mail 1 to 5" tab



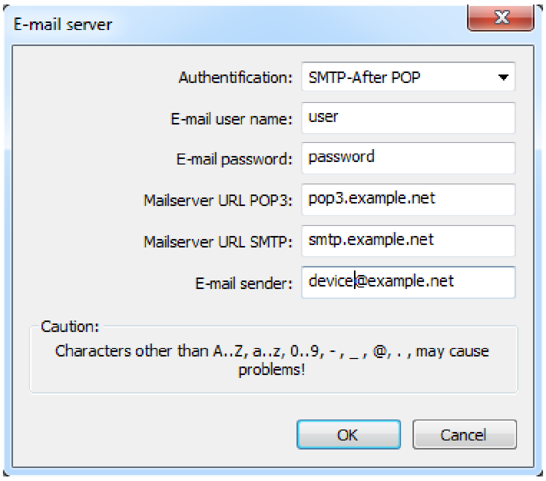
The following table explains the settings for event-controlled sending of e-mails.

Configuration point	Selection/ setting option	Explanation
E-mail addresses 1 to 3	Enter a valid e-mail address	Up to 3 e-mail addresses to each of which a particular e-mail is sent can be entered in each e-mail template. Sending is triggered by the indicated alarm signal.
Alarm signal	Select from the binary selection	A rising flank of the selected alarm signal triggers sending of the particular e-mail to the listed e-mail addresses.
E-mail subject	Input text	Text for the subject line of each e-mail
E-mail text	Input text	Text of each e-mail

Setting up the e-mail server

To send messages, you must provide the information for the e-mail server of your e-mail service provider. Open the server settings window and enter the information here. You can obtain the server settings from your e-mail service provider or network administrator.

Open the dialog for the server settings:
Only Setup ➔ E-mail (double-click) ➔ "E-mail Server" button



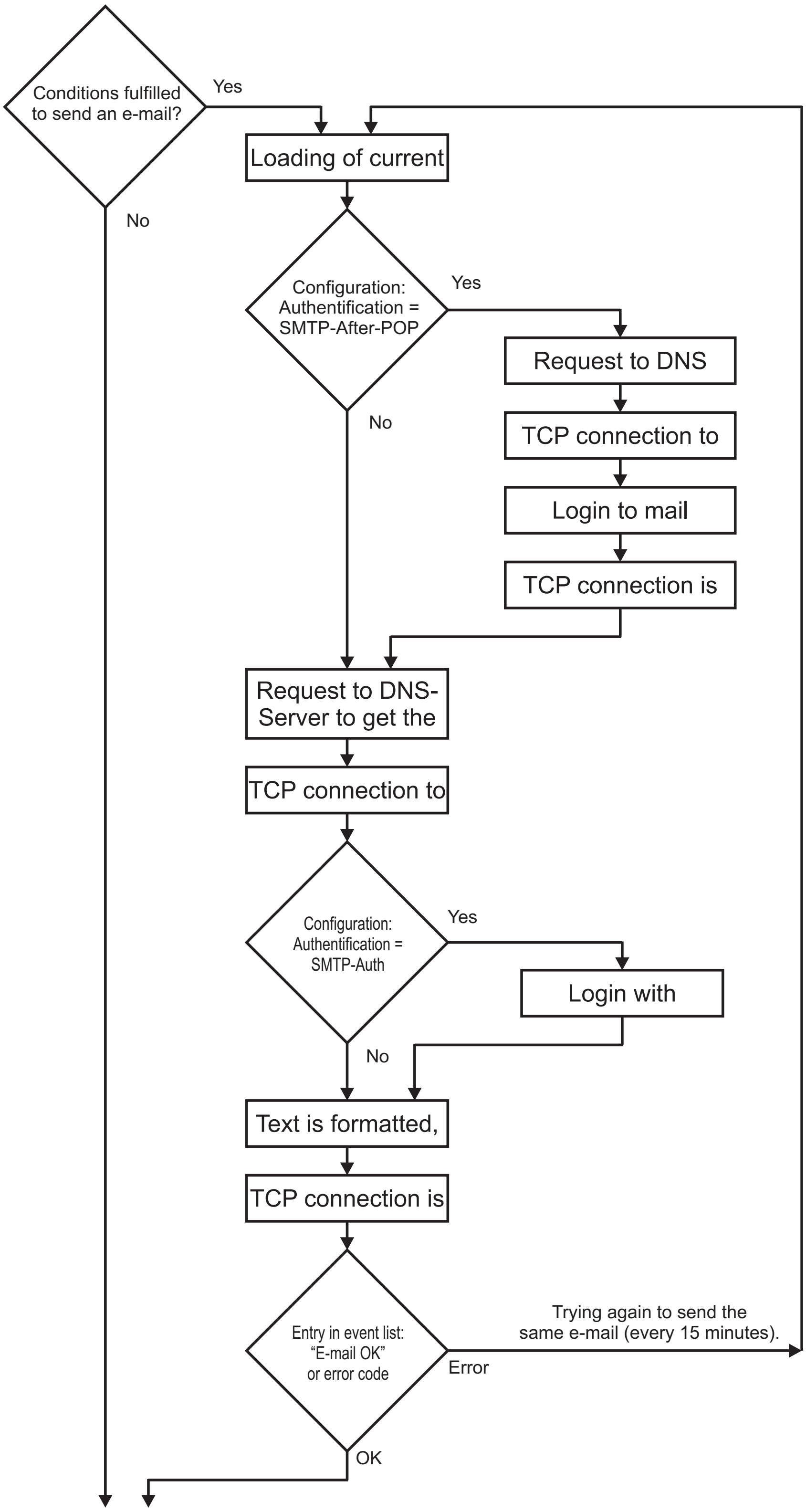
The following table explains the settings for the e-mail server.

Configuration point	Selection/ setting option	Explanation
Authentication	None SMTP-After-POP SMTP-Auth	Authentication process (login) for the e-mail server You receive the configuration data for the e-mail server from the operator of the e-mail service that you use to send e-mail.
E-mail user name	Input text	User name of the e-mail account for the device for authentication (logging on to the e-mail servers)
E-mail password	Input text	Password of the e-mail account for the device for authentication (logging on to the e-mail servers)
Server URL POP3	Input text	URL (Internet address) or IP address of the incoming mail server (POP3 server) e. g. pop.provider.com
Server URL SMTP	Input text	URL (Internet address) or IP address of the outgoing mail server (SMTP server) e. g. smtp.provider.com
E-mail sender	Input text	E-mail address of the e-mail account for the device e. g. Anlage@provider.com

NOTE!
An e-mail server within the company network must be entered (not on the Internet or accessible without proxy addressing)! This mail server should be able to also forward e-mails to the Internet.

Procedure for sending an e-mail over the Internet

To better understand the process of sending an e-mail and correct any errors in the configuration of e-mail servers and Ethernet, a graphical representation of the processes is presented in the following.



Checking the e-mail function

Proper execution of the e-mail sending process can be checked in the event list. When an e-mail is sent successfully, a corresponding entry is made in the event list. Entries are made in the event list even in the case of a fault and can be helpful when diagnosing a problem.

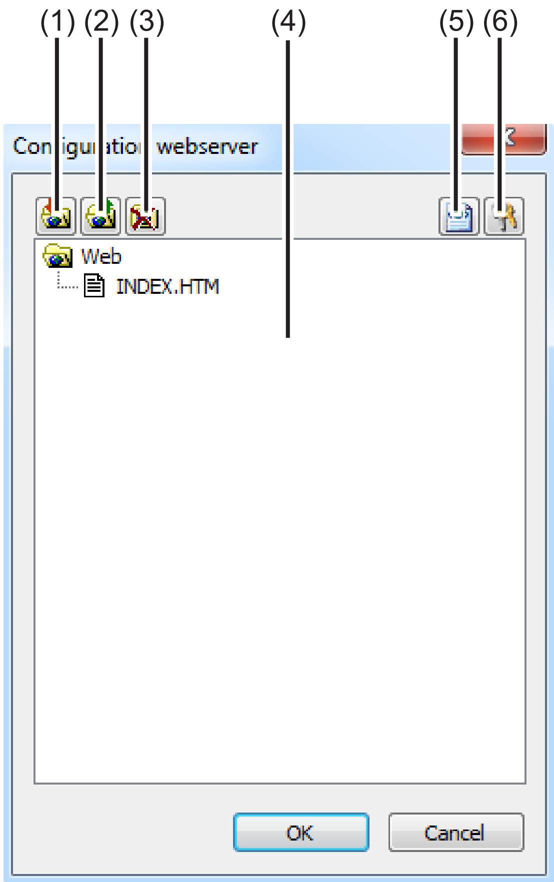
⇨ Chapter 8.3 "Alarm/Event list", Page 90

19.8.13 Web server

As an alternative to online visualization, the webserver can be activated with a customer-specific website. If the webserver is activated, its website automatically replaces the online visualization.
⇨ Chapter 8.7 "Online visualization", Page 109

NOTE!
Creating websites requires the appropriate knowledge about website programming and specifying the webserver In the JUMO AQUIS touch S.

Customer-specific websites can be imported into the configuration of the webserver. To edit an already saved website, it can be exported. Data from the memory of the AQUIS touch S can also be displayed in the web document.
Open Settings:
Only Setup ➔ Configuration Webserver (double-click)



(1) "Import Web" button
(2) "Export Web" button
(3) "Delete Web" button
(4) Window with tree view of the saved website
(5) "HTML Tags" button
Opens a dialog for copying the IDs of internal data from the device memory
These IDs are needed to request the internal data from the web document.
(6) "Security" button
Opens a dialog to configure the webserver password

19.8.14 Calibration logbook

As an alternative, the calibration logbooks for the analysis sensors can also be viewed in the JUMO PC setup program. Data regarding calibrations of analysis sensors are kept in the calibration logbooks.
⇨ "Calibration logbook", page 179

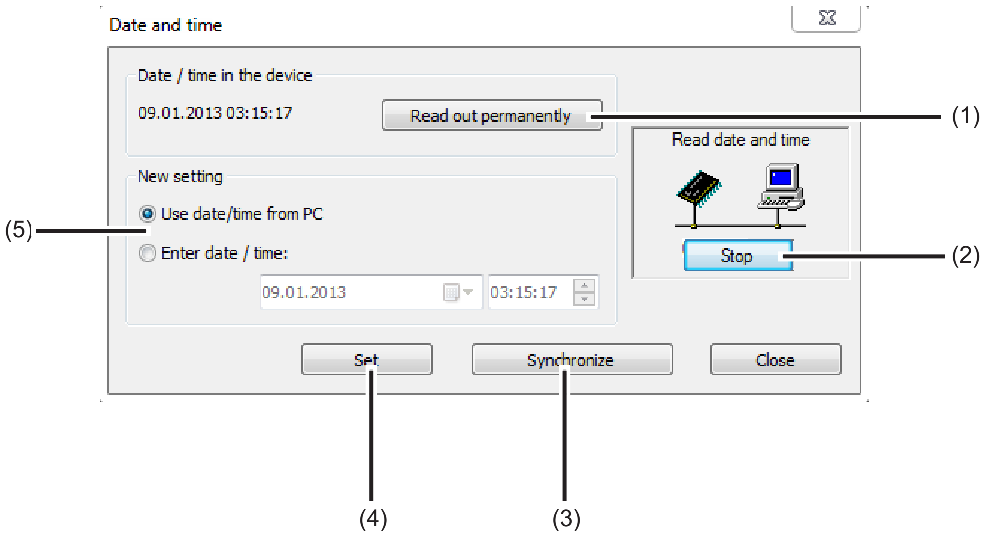
Open:
Only Setup ➔ Calib. logfile (double-click)

19.9 Online parameters

To set online parameters in the device, the software accesses the device memory directly. The device must thus be connected via a USB or Ethernet port to the PC on which the JUMO PC setup program is installed, and a connection between the JUMO PC setup program and device must be established.
⇨ "Configuring and parameterizing", page 259

19.9.1 Date and time

Here, the current date and the current time in the device are obtained from the JUMO PC setup program.
Open Settings:
Online Parameters ➔ Date and Time (double-click)



(1) "Read Continuously" button
Starts continuous synchronization of the date / time in the software with the device

(2) "Stop" button
Stops continuous synchronization of the date / time in the software with the device

(3) "Synchronize" button
Synchronizes the device time with the time set in the PC setup program
The time in the device is matched to the set time as long as the difference is not more than 30 s. This function is used primarily to synchronize the PC time with the device time.

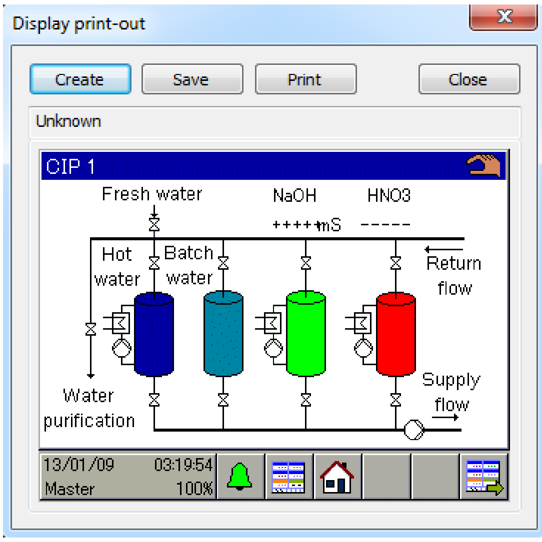
(4) "Set" button
Sets the time in the device to match the setting in the PC setup program

(5) Time setting
The PC time can be used or a time may be entered. The specified time is set in the device by clicking the "Synchronize" or "Set" button.

19.9.2 Screenshot

This function can be used to transfer the current display on the device to the PC.

Screenshots can be printed out or saved on the PC in common image formats, e.g. bitmap, tiff, JPEG etc.
Open:
Online Parameters ➔ Screenshot (double-click)



19.9.3 Ethernet

This menu item in the online parameters permits configuration of the Ethernet interface from the PC setup program.
Open Settings:
Online Parameters ➔ Ethernet (double-click)

The Ethernet settings are explained in the configuration.
⇨ See chapter 10.16 "Ethernet", page 157

NOTE!
The Ethernet settings are entered in the online parameters in the JUMO PC setup program.
The IP configuration of the device can also be changed from the PC if the PC and device are connected via Ethernet. In this case, changing the IP address or subnet mask can interrupt the PC-device connection.

19.9.4 Enabling of extra codes

This function allows the customer to enable extra codes in the device software (recording function, math, and logic module). After purchasing an extra code in the device software, you must generate a code number with the aid of the PC setup program. This is needed by JUMO to generate an individual activation code that you as a customer need to enable the desired device functions. After opening "Enable extra codes", you have 3 options available:

- **Generate code number**
  If you wish to purchase an extra code in the device software, you must generate a device- and option-specific code number and send it to JUMO. After it receives this code number, JUMO provides you with the activation code with which you can enable the desired option.
- **Enter activation code**
  After you have sent the code number for the desired extra code to JUMO, you receive the activation code for this option. Following correct entry of the activation code, this option is available for use in the device.
- **Reset the extra codes**
  All software-based extra codes in your device can be deactivated with this option.

Open "Enable Extra Codes":
Online Parameters ➔ Enable Extra Codes (double-click)

19.9.5 Deleting internal measurement data

Upon executing this function, data are **deleted completely** and **permanently** from the measurement memory of the data monitor and recording function. Following this, recording of measurement data is started anew.

Delete internal measurement data:
Online Parameters ➔ Delete Internal Measurement Data (double-click)

19.9.6 Adjusting / Testing

CAUTION!
When "Adjusting / Testing" is opened, the outputs assume undefined states. For this reason, "Adjusting / Testing" may not be opened during operation of equipment being controlled by the JUMO AQUIS touch s.

Numerous testing functions that are available in similar form in the device settings menu at the "Functional level" or under "Device info" can be found under "Adjusting / Testing". The contents and functions of the individual tabs in the "Adjusting / Testing" window are described in the following.

Hardware / Software

This is used to query the version information for the device software and hardware, e.g. which optional boards are installed.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Hardware / Software tab

Calibration constants

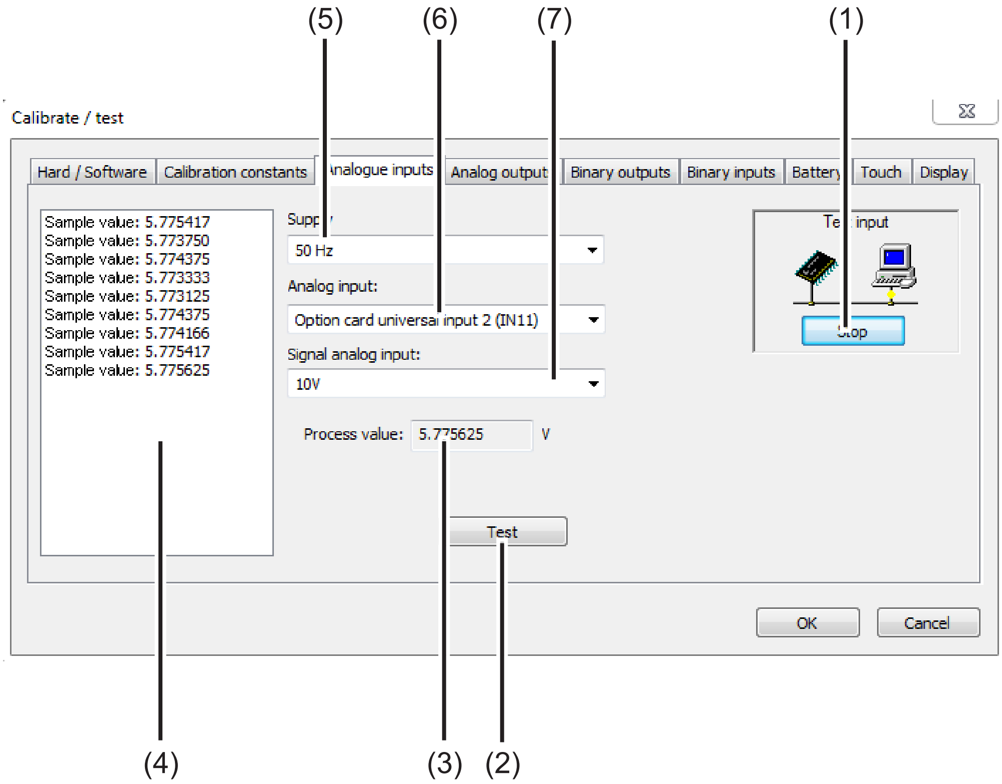
Displays characteristic curve date (e. g calibration values for analysis inputs) for each analog input and output.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Calibration Constants tab

Analog inputs

Proper operation of the analog inputs of the device can be checked here.
In addition to selecting the analog input and signal type, the line frequency of the power supplied to the device must be set in order to test an analog input correctly. Pressing the "Test" button displays a connection diagram for the test signal. Ensure that a valid test signal acc. to the connection diagram is present at the input. Confirming the connection diagram starts the test. The measuring values coming from the analog input concerned can be viewed in the actual-value display and in the measuring value table. To stop the test, press the "Stop" button.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Analog inputs tab

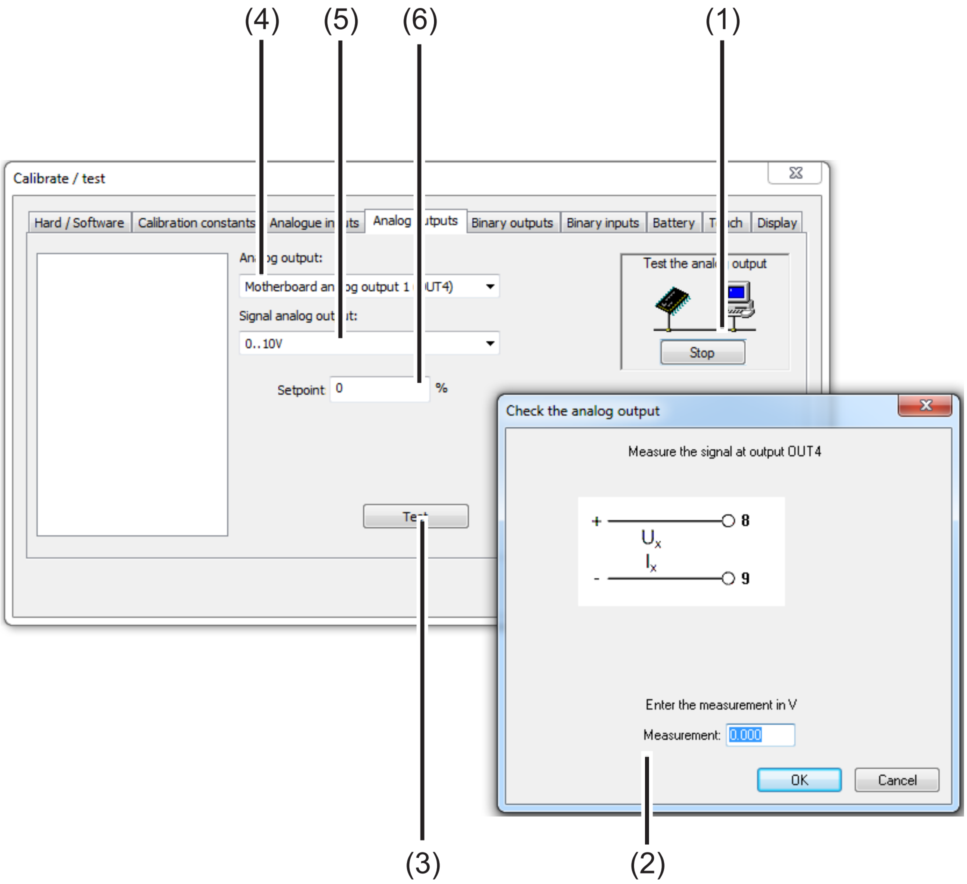


(1)	"Stop" button Stops a test
(2)	"Test" button Starts a test
(3)	Actual-value display Displays the actual analog value at the input
(4)	Measuring value table Lists the measuring values over the course of time
(5)	"Supply frequency" setting
(6)	Selection of the analog input to test
(7)	Selection of the signal type to test

Analog outputs

Proper operation of the analog outputs of the device can be checked here. A desired output value can be specified in the "Setpoint value" field for the selected output and signal type set. Pressing the "Test" button starts the test. During the test, a window for monitoring the output signal is displayed. Here, you can enter the actual output value that you may have obtained with a measuring instrument as a way to check the output signal value. The test is stopped by pressing the "Stop" button.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Analog outputs tab

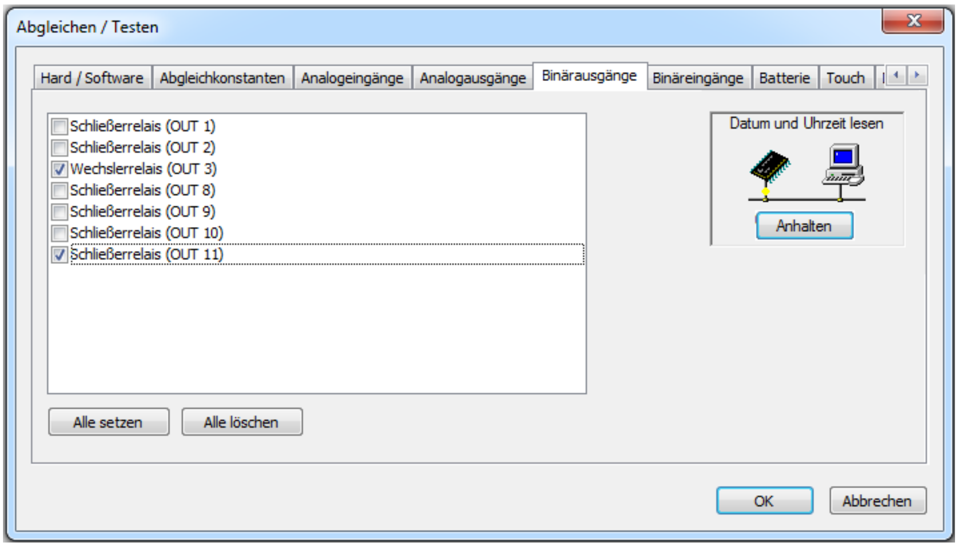


(1)	"Stop" button Stops a test
(2)	Dialog window for checking the measuring value during the test
(3)	"Test" button Starts a test
(4)	Selection of the analog output to test
(5)	Selection of the signal type to test
(6)	Setpoint value Desired output value during the test

Binary outputs

Proper operation of the Digital outputs of the device can be checked here. After setting checkmarks in the option fields, the Digital outputs of the device can be controlled manually via the PC setup program. The "Set All" and "Delete All" buttons allow all Digital outputs to be switched on and off at once.

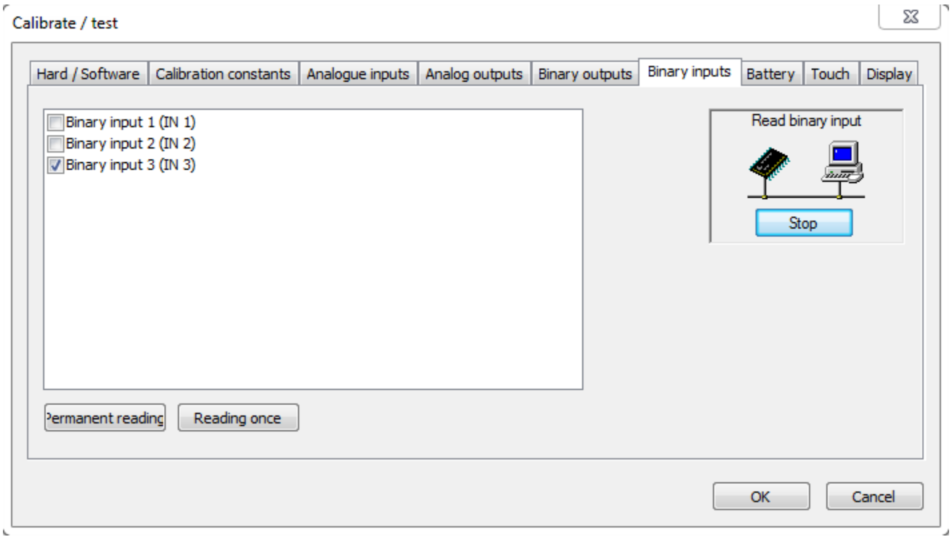
Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Digital outputs tab



Binary inputs

Proper operation of the Digital inputs of the device can be checked here.
The "Read Continuously" button starts a continuous test that can be stopped by pressing the "Stop" button. During this test, the binary values of the device inputs are read continuously and displayed in acc. with the checkmarks in the option fields.
Pressing the "Read Once" button captures and displays the momentary binary values of the inputs.
By clicking on individual binary input entries, the binary value of the entry can be updated selectively.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Digital inputs tab



Battery

The **voltage of the backup battery** and the **circuit board temperature** in the device are displayed in the JUMO PC setup program.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Battery tab

Touch

In this view, touchscreen calibration (see "Calibrating the touchscreen", page 90) can be started from the JUMO PC setup program. In addition, the calibration data for the touchscreen are displayed in detail. These are used to diagnose problems with touch operation together with JUMO Service.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Touch tab

Display

Four different test images can be activated on the device display on this tab. These are used to diagnose display problems together with JUMO Service.

Open:
Online Parameters ➔ Adjusting / Testing (double-click) ➔ Display tab

Various process values

Process data are selected here for display in the online window.
In addition to tabs with standard selections of process data, the online window contains the "Selected Process Data" tab. The process data selected here are displayed on this tab.

NOTE!
Process data from the internal device memory can be displayed in real time in the online window.
⇨ Chapter "Online data", Page 234
A requirement for real-time display of process data is an existing connection between the JUMO PC setup program and the device.

20.1 Analog inputs base unit

20.1.1 Temperature measuring 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[a]	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1% of MR[a]	≤ 50 ppm/K
RTD temperature probe with customer-specific characteristic line[b]				
up to 400 Ω	2-wire/3-wire	0 to 400 Ω	≤ 0.1% of R_{max}[c]	≤ 100 ppm/K
to 4000 Ω	2-wire/3-wire	0 to 4000 Ω	≤ 0.1% of R_{max}[c]	≤ 100 ppm/K
Sensor lead 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.			

[a] MR: measuring range span
[b] Customer-specific linearization can be used to enter a sensor characteristic line.
[c] R_{max}: maximal resistance across the measuring range (400 Ω, or 4000 Ω)

20.1.2 Temperature measuring 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[a]	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1% of MR[a]	≤ 50 ppm/K
Resistance transmitter/ Resistance potentiometer	3-wire	0 to 100 kΩ	0.5% of R_{Tot}[b]	≤ 100 ppm/K
RTD temperature probe with customer-specific characteristic line[c]				
up to 400 Ω	2-wire/3-wire	0 to 400 Ω	≤ 0.1% of R_{max}[d]	≤ 100 ppm/K
to 4000 Ω	2-wire/3-wire	0 to 4000 Ω		
to 100 kΩ	2-wire/3-wire	0 to 100 kΩ		
NTC 8k55	2-wire/3-wire	0 to 150 °C	≤ 0.1% of R_{max}[d]	≤ 100 ppm/K
NTC 22k	2-wire/3-wire	0 to 150 °C		
Sensor lead 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.			

[a] MR: measuring range span
[b] R_{Tot}: total resistance of the resistance transmitter/Resistance potentiometer
[c] Customer-specific linearization can be used to enter a sensor characteristic line.
[d] R_{max}: maximal resistance across the measuring range (400 Ω, 4000 Ω or 100 kW)

20.1.3 Universal input (IN 6)

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

[a] MR: measuring range span

20.1.4 Measuring circuit monitoring base unit

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

20.2 Analog inputs optional boards

20.2.1 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[a]	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1% of MR[a]	≤ 50 ppm/K
Resistance transmitter/ Resistance potentiometer	3-wire	100 to 4000 Ω	0.5% of R_{Tot}[b]	≤ 100 ppm/K
RTD temperature probe with customer-specific characteristic line[c]				
up to 400 Ω	2-wire/3-wire	0 to 400 Ω	≤ 0.1% of R_{max}[d]	≤ 100 ppm/K
to 4000 Ω	2-wire/3-wire	0 to 4000 Ω	≤ 0.1% of R_{max}[d]	≤ 100 ppm/K
Voltage signal	-	0 to 10 V	0.2% of MR[a]	100 ppm/K
Current signal	-	0(4) to 20 mA	0.1% of MR[a]	100 ppm/K
Sensor lead resistance[e]	maximal 30 Ω per line with 3-wire circuit			
Lead calibration[e]	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.			

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

20.2.2 Analysis input: pH/Redox/NH_3

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[a]	0.2%/10 K
pH-value (ISFET electrode)	-2 to +16 pH	through electrode[b]		
Redox voltage	-1500 to +1500 mV	None		
NH_3 (ammonia)	0 to 20000 ppm	-10 to +150 °C		

[a] MR: measuring range span
[b] ISFET electrodes supply a temperature-compensated pH-measured value.

20.2.3 Analysis input: CR (resistive conductivity)

Units	μs/cm ms/cm kΩ × cm MΩ × cm
Display ranges[a]	0.0000 to 9.9999 00.000 to 99.999 000.00 to 999.99 0000.0 to 9999.9 00000 to 99999
Temperature compensation	TC-linear, natural water DIN EN 27888, natural water with expanded range, TDS[b], ASTM D-1125-95 for neutral (NaCl), acidic (HCl) and alkaline (NaOH) impurities
Cell constant	0.01 to 10 cm^{-1}
Measuring range selection[c]	4 configurable measuring ranges
Measuring accuracy	≤ 0.6% of MR[d] +0.3 μS × cell constant (C)
Ambient temperature influence	0.2%/10 K

[a] The display range is scalable. The Comma format is freely configurable. In addition, an automatic Comma format can be set.
[b] TDS (**T**otal **D**issolved **S**olids)
[c] In the Configuration up to 4 different measuring ranges with separate display range limits, units,temperature compensation methods, and alarm functions can be configured. The respective active measuring range is selected via binary signals.
[d] MR: measuring range span

20.2.4 Analysis input: Ci (conductivity, inductive)

Units	µs/cm ms/cm
Measuring/display ranges[a]	0.0000 to 9.9999 00.000 to 99.999 000.00 to 999.99 0000.0 to 9999.9 00000 to 99999
Temperature compensation	TC linear[b] TC curve natural water natural water with expanded temperature range NaOH 0 to 12% NaOH 25 to 50% HNO_3 0 to 25% HNO_3 36 to 82% H_2SO_4 0 to 28% H_2SO_4 36 to 85% H_2SO_4 92 to 99% HCl 0 to 18% HCl 22 to 44%
Cell constant	4.00 to 8.00 cm^{-1}
Measuring range selection[c]	4 configurable measuring ranges
Measuring accuracy	for 0 to 999 µS/cm: 1.5% of the MRE[d] for 1 to 500 mS/cm: 1% of the MBE[d] for 500.1 to 2000 mS/cm: 1.5% of the MBE[d]
Ambient temperature influence	0.1%/K

[a] The display range is scalable. The Comma format is freely configurable. In addition, an automatic Comma format can be set.
[b] TC: temperature coefficient
[c] In the Configuration up to 4 different measuring ranges with separate display range limits, units, temperature compensation methods
and alarm functions
can be configured. The respective currently active measuring range is selected via binary signals.
[d] MRE: Measuring range end value

20.2.5 Temperature compensations

Compensation type	Compensation range
TC linear[a]	-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[b]	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_3 0 to 25%	0 to 80 °C
HNO_3 36 to 82%	-20 to +65 °C
H_2SO_4 0 to 28%	-17 to +104 °C
H_2SO_4 36 to 85%	-17 to +115 °C
H_2SO_4 92 to 99%	-17 to +115 °C
HCl 0 to 18%	10 to 65 °C
HCl 22 to 44%	-20 to +65 °C

[a] TC: temperature coefficient
[b] The temperature compensation "natural water with expanded temperature range" extends beyond the standardized temperature thresholds of DIN EN 27888.

20.2.6 Measuring circuit monitoring, optional boards

Input/Sensor	Underrange/ overrange	Short circuit/ sensor break	Open circuit	Special features
pH-value (glass electrode)	Yes	Configurable Impedance measurement[a]	Configurable Impedance measurement[a]	-
pH-value (ISFET)	Yes	No[b]	No[b]	-
Resistive conductivity	Yes	No[b]	Configurable	Only with 4-wire circuit[a]
Inductive conductivity	Yes	No[b]	No[b]	-
Universal input for connection of: voltage/current signal, RTD temperature probe	Yes	No[b]	No[b]	-
Universal input for connection of: resistance potentiometer	No[b]	No[b]	No[b]	-

[a] 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_3 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.

Liquid resistance has 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.

[b] Errors in the measuring circuit (short circuit or line break) lead to display errors (underrange or overrange or inadmissible value).

20.3 Analog outputs of base unit and optional boards

Signal type	Signal range	Admissible load resistance	Accuracy	Effect of ambient temperature
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

20.4 Binary inputs base unit

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

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

20.5 Binary 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

20.6 Binary outputs, power supply unit board

Description	Switching output	Ampacity at ohmic load	Contact life[a]
OUT 1	Relay, normally open contact	3 A at AC 250 V	150,000 switching cycles
OUT 2	Relay, normally open contact		
OUT 3	Relay changeover contact		

[a] The maximal ampacity of the contacts must not be exceeded.

20.7 Binary outputs, optional boards

Optional card	Switching output	Ampacity at resistive load	Contact life[a]	Special features
Relay output, dual normally open contacts	2 normally open contacts[b]	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)[c]	1 A at AC 230 V	Wear-free	-
PhotoMOS®[e] solid state relay	Switching output with PhotoMOS®[d]	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[e]	Wear-free	-
Logic output 0/22 V	High/low signal	30 mA[e]	Wear-free	-

[a] The maximal ampacity of the contacts must not be exceeded.
[b] Combining a mains voltage circuit with a protective low-voltage circuit on the "dual normally open contact" option is not admissible.
[c] A varistor protects the triac against excessive voltages such as those that can occur during switching.
[d] PhotoMOS® is a registered trademark of Panasonic.
[e] Current limiting via the logic output of the device

20.8 Voltage supply outputs base unit

Description	Output voltage	Ampacity	Connection
DC 12 V/24 V voltage supply[a] (e.g. for external transmitters)	DC 12 V +15 / -25%	25 mA	Spring-cage terminals
	DC 24 V +15 / -25%	42 mA	
±5 V DC voltage supply (e.g. for ISFET pH-sensors)	+5 V DC ±15%	200 mA	
	-5 V DC ±15%	40 mA	

[a] based on order code

20.9 Voltage supply outputs, power supply unit board

Description	Output voltage	Total ampacity[a]	Connection
PWR OUT	AC 110 to 240 V +10/-15%; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz	4 A	Spring-cage terminals

[a] The sum total of the output currents for the two PWR OUT connections must not exceed the total ampacity.

20.10 Voltage supply outputs, optional board

Description	Output voltage	Ampacity	Connection
DC 24 V voltage supply for external transmitters[a]	DC 24 V +15 / -25%	42 mA	Screw terminals
±5 V DC voltage supply (e.g. for ISFET pH-sensors)	+5 V DC ±15% (between terminals 3 and 4)	150 mA	
	-5 V DC ±15% (between terminals 5 and 4)	30 mA	

[a] An optional board for voltage supply outputs accommodates all the outputs listed in this table. A maximum of 1 such optional board can be integrated into a device.

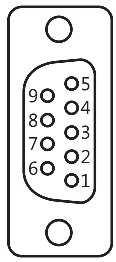
20.11 Interfaces

20.11.1 Serial Interface RS422/485 (base unit and optional board)

Protocol	**Data formats**[a]	**Device addresses**	**Baud rates in baud**	**Connection**
Modbus (slave)	8 - 1 - no parity 8 - 1 - odd parity 8 - 1 - even parity	1 to 254	9600 19200 38400	Base unit: Spring-cage terminals Option: Screw terminals

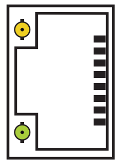
[a] Specification in useful bit - stop bit - parity format. Therefore, the frame always comprises 8 useful bits and 1 stop bit. Only the parity is differentiated.

20.11.2 PROFIBUS-DP (optional board)

Protocol	**Data formats**[a]	**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 

[a] Big Endian corresponds to the Motorola® data format and Little Endian to Intel® data format.

20.11.3 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[a]	E-mail dispatch via SMTP server Transmission as SMS text message	SMTP	5 e-mail templates can be stored, up to 3 recipients for each e-mail template	
Modbus TCP/IP	Process data exchange with Modbus users[b]	Modbus TCP/IP	TCP Port: 502	
Automatic IP-configuration	Network administration[c]	DHCP	-	
Setup via PC	Device settings via PC setup program	JUMO PC setup program (HTTP)	-	
Recording function[d]	Extract, archive, evaluate measurement data	JUMO PCC and PCA 3000	-	

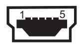
[a] The e-mail function allows the device, when triggered by internal and/or external binary signals, to send hard-programmed messages. This requires the data of an SMTP server (E-mail intermediate server) to be known. The e-mail function can be configured exclusively via the PC setup program.

[b] 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 S.

[c] Enlist the help of your network administrator or an IT specialist for the IP-configuration.

[d] The recording function stores measurement data in a ring buffer inside the device. Further details appear on Page 326.

20.11.4 USB interfaces base unit

Interface	Use	Support	Connection	Version
USB host interface (optional[a])	Extract measurement data memory[b], Read/write device settings, Save Service data[c], 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 	

[a] Use requires the USB host socket (see Chapter 4.2 "Order details", Page 22, Extra Code 269).
[b] The recording function stores measurement data in a ring buffer inside the device.
[c] Service data can be stored on a USB flash drive for diagnostic purposes.

20.12 Electrical data

Voltage supply (switch-mode)	AC 110 to 240 V +10/-15%; 48 to 63 Hz or AC/DC 20 to 30 V; 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 20 to 30 V	 53.7 VA 26.2 VA
Data backup	Flash memory
Electrical connection	Spring-cage terminals and screw terminals Specifications for conductor cross-sections ⇨ Chapter 6.2.4 "Conductor cross-sections for base unit and power supply unit", Page 44
electromagnetic compatibility (EMC): Interference emission Interference immunity	DIN EN 61326-1 Class A Industrial requirements

20.13 Screen Touchscreen

Type	TFT-touchscreen
Touchscreen sensors	Resistive (can also be operated wearing gloves)
Display protection	Plastic film for protection against damage and scratches
Size	5.5"
Resolution	320 × 240 pixel
Color depth	256 colors
Viewing angle	Horizontal: ±70° Vertical: -70 to +50°

20.14 Case

Case type	Surface-mounted case made of plastic (ABS)
Materials	Terminal compartment cover screws: 1.4567 stainless steel Mounting plate: 1.4301 stainless steel
Dimensions	301.5 mm × 283.2 mm × 120.5 mm
Ambient temperature	-5 to +50 °C on device version with voltage supply AC 110 to 240 V -5 to +45 °C on device version with voltage supply AC/DC 20 to 30 V
Storage temperature	-30 to +70 °C
Resistance to climatic conditions	Relative humidity < 92% annual average, no condensation
Operating position	any, with due consideration for the viewing angle of the screen
Protection type Closed case Open case	According to DIN EN 60529 IP67 IP20
Cable inlets Scope of delivery Standard version Full configuration kit (see accessories)	 Cable fittings: 6× M12 × 1.5 3× M16 × 1.5 Cable fittings: 9× M12 × 1.5 2× M16 × 1.5 2× M20 × 1.5
Weight without holder for wall mounting (fully configured)	3390 g
Weight of holder for wall mounting	790 g
Installation torques for cable fittings	0.7 Nm for M12 × 1.5 2 Nm for M16 × 1.5 2.7 Nm for M20 × 1.5

20.15 Functions

20.15.1 Controller channels

Number	4
Controller type	Two-state controllers Three-state controllers Continuous controller Coarse/fine controller Modulating controllers Continuous controller with position controller
Controller structure	P, PI, PD, PID
Controller outputs	For each controller channel, 2 outputs configurable as: pulse length output, pulse frequency output, (maximal 240 pulses per minute), continuous output
Disturbance feedforward control	multiplicative and/or additive[a]
Self-optimization	Step response method
Sampling rate	250 ms

[a] Ena. variable disturbance permits consideration of influencing variables in the process environment beyond the actual value alone. This keeps the controller behavior stable, even when fluctuations in such ambient conditions occur.

20.15.2 Recording function

	Data monitor	**Recording function (also available)**
Number of groups[a]	2	2
Number of input variables per group	4× analog 3× binary	4× analog 3× binary
Recording / Memory rate	1 to 3600 sec.	1 to 3600 sec.
Memory values	Current value Average value Minimum value Maximum value	Current value Average value Minimum value Maximum value
Size of the ring buffer[b]	sufficient for 150 entries[c]	sufficient for approx. 31 million entries[c]
History function[d]	No	Yes
Archiving/evaluation	No	Yes, (with JUMO PCA 3000 evaluation software)

[a] 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.

[b] The measurement data are stored in a ring buffer. When the ring buffer is full, the recording function starts to overwrite the measured-value history at the beginning of the ring buffer.

[c] This information is based on 4 analog values and 3 binary values, and is provided for orientation.
The total is for both groups.

[d] The history function allows the user to scroll the diagram back in the recording time period. All measured data stored in the ring buffer can thus be viewed on the device.

20.15.3 Customer-specific linearization

Number of support points[a]	up to 40 value pairs
Interpolation[b]	Linear
Formula entry[c]	4th degree polynominal

[a] An approximate characteristic line can be entered by inputting support points (value pairs of the customer-specific characteristic line).
[b] Linear interpolation means forming a slope function from 2 support points.
[c] As an alternative to entering support points, a customer-specific characteristic curve can also be entered as a formula in the form of a polynomial.

20.15.4 Approvals/approval marks

Approval mark	Testing agency	Certificates/ inspection numbers	Inspection basis	Valid for
c UL us	Underwriters Laboratories	registered	UL 61010-1 CAN/CSA-C22.2 No. 61010-1	Type 202581/...

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