

JUMO AQUIS touch S

Modular multichannel measuring device for
liquid analysis with integrated controller and
paperless recorder



Assembly instructions Volume 1(2)



20258100T94Z101K000

V10.00/EN/00602660/2024-04-25

**Caution!**

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

**NOTE!**

Read these installation instructions before starting up the device. Store these installation instructions in a place that is accessible to all users at all times.

1	Safety information	7
1.1	Warning symbols	7
1.2	Note symbols	7
1.3	Intended use	8
1.4	Qualification of personnel	8
2	Acceptance of goods, storage, and transport	9
2.1	Checking the delivery	9
2.2	Important information about storage and transport	9
2.3	Returning goods	9
2.3.1	Accompanying letter for repair	9
2.3.2	Protection against electrostatic discharge (ESD)	10
3	Device description	11
3.1	Brief description	11
3.2	Block diagram	13
3.3	Device setup	14
4	Identifying the device version	15
4.1	Nameplate	15
4.2	Order details	17
4.3	Scope of delivery	20
4.4	Accessories	21
5	Mounting	23
5.1	Notes	23
5.2	Dimensions	24
5.3	Surface mounting	25
5.4	Pipe mounting	28
5.5	Panel mounting	31
6	Electrical connection	33
6.1	Installation notes	33
6.2	Installing and connecting cables	35
6.2.1	Opening the terminal compartment on the device	35

Contents

6.2.2	Installing cables	36
6.2.3	Preparing coaxial cables for pH/redox electrodes	38
6.2.4	Conductor cross-sections for base unit and power supply unit	40
6.2.5	Conductor cross-sections for optional boards	41
6.3	Galvanic isolation	42
6.4	Connection diagram	43
6.4.1	Overview of connections	43
6.4.2	Analog inputs base unit	44
6.4.3	Analog inputs optional boards	46
6.4.4	Analog outputs	55
6.4.5	Binary inputs	56
6.4.6	Digital outputs, power supply unit board	58
6.4.7	Digital outputs, optional boards	59
6.4.8	Mains power connection	60
6.4.9	Voltage supply outputs	60
6.4.10	Interfaces for data and bus communication	62
7	Startup	67
7.1	Initial startup	67
7.2	Basic setup	68
7.2.1	Date and time	68
7.2.2	Basic settings	69
7.3	Digital sensors	70
7.3.1	Initial startup	70
7.3.2	Restarting and replacing	74
7.4	Function test	75
7.4.1	Checking the optional boards	75
7.4.2	Checking sensors and inputs/outputs	75
8	Operation	77
8.1	Operating concept	77
8.1.1	Passwords and user rights	77
8.1.2	Display and control elements	79

Contents

8.1.3	Menu structure	80
8.1.4	Entry of text and numbers	86
8.2	Device menu	88
8.2.1	Log-on/Log-out	91
8.2.2	User levels	92
8.2.3	Functional level	93
8.2.4	Device info	95
8.2.5	Service	96
8.2.6	Calibrating the touchscreen	97
8.2.7	Digital sensors	97
8.3	Alarm/Event list	102
8.3.1	Alarm list	103
8.3.2	Event list	106
8.4	Memory Manager (USB flash drive)	110
9	Retrofitting optional boards	113
9.1	Installing optional boards	113
9.2	Energy balance test	116
9.2.1	Monitoring the internal temperature	117
9.2.2	Installing the JUMO PC setup program	117
9.2.3	Performing the energy balance test	120
9.3	Ci base calibration	123

Contents

1 Safety information

1.1 Warning symbols



DANGER!

This symbol indicates that personal injury from electrocution may occur 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 prevent it.



HOT SURFACE!

This symbol is used if burns can result from touching a hot surface.

1.2 Note symbols



NOTE!

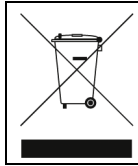
This symbol refers to **important information** about the product, its handling, or additional benefits.



REFERENCE!

This symbol refers to **additional information** in other sections, chapters, or other manuals.

1 Safety information



DISPOSAL!

At the end of its service life, the device and any batteries present do not belong in the trash! Please ensure that they are **disposed of** properly and in an **environmentally friendly** 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. Other uses beyond those defined are not viewed as intended uses.

⇒ Chapter 23 "Technical data", page 425

The device has been manufactured in compliance with applicable standards and directives 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 the technical documentation provided into account

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 intended for technically qualified personnel who have received special training and have the appropriate knowledge in the field of automation technology (measuring and control technology).

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 Acceptance of goods, storage, and transport

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 details
- 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 23 "Technical data", page 425
- 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 letter of transmittal accompanying the product return can be downloaded from the Internet at www.jumo.de under Services > Repair service.

2 Acceptance of goods, storage, and transport

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 modules, or components with a high internal resistance must be handled, packaged, and stored in an environment that protects against ESD. Measures against electrostatic discharge and electrical fields are described in DIN EN 61340-5-1 and DIN EN 61340-5-2 "Protection of electronic devices from electrostatic phenomena".

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

- Pack sensitive components only in an environment providing protection against ESD. Workspaces such as this divert electrostatic charges to ground in a controlled manner and prevent static charges due to friction capacities.
- Use only packaging intended specifically for ESD-sensitive modules/components. These must consist of conductive plastics.

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

3.1 Brief description

Measure

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 measurement. Universal inputs can be used to measure almost any analog measurands using standard signals [0(4) to 20 mA or 0 to 10 V]. The unit can measure and manage up to 25 parameters simultaneously.

Control

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 17

Using the PC setup program, the language library of the unit can be expanded to as many as 15 languages. It is also possible to display languages that use Chinese and Cyrillic characters. As a result, the device is predestined for global use.

Record

A paperless recorder is incorporated to record data. Up to 16 analog measurands and 12 binary signals are recorded and displayed on the screen in their chronological sequence. Storage is tamperproof and facilitates compliance with governmental recording obligations. The data can be extracted via JUMO-PCC software or USB flash drive and evaluated using the PC evaluation software JUMO PCA3000.

3 Device description

Application examples

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

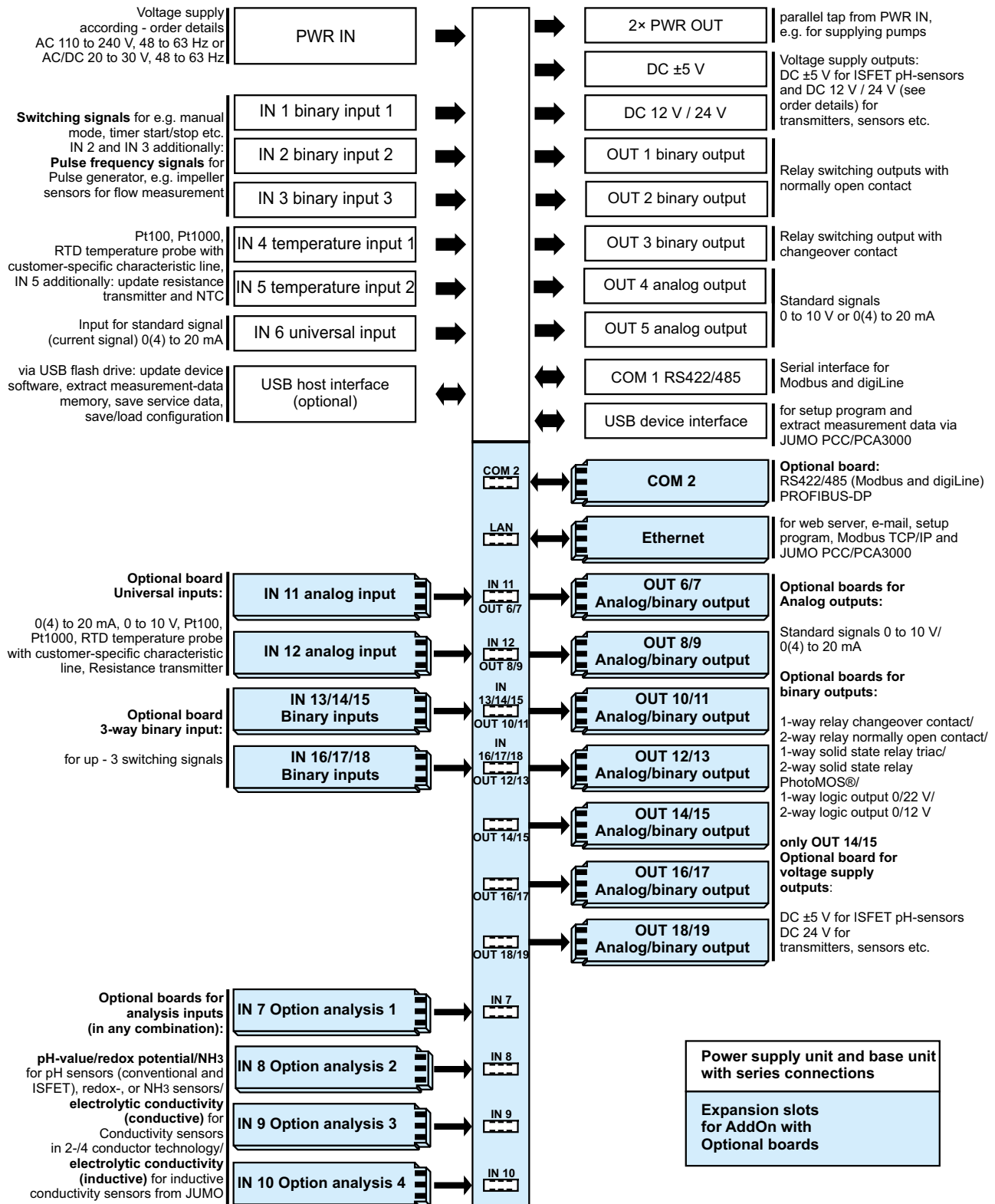
- Municipal and industrial water treatment in wastewater treatment plants
- Process systems
- Drinking and bathing water monitoring
- Pharmaceutical water
- Food and beverage production (CIP/SIP plants)
- Gas scrubbers / air washers
- Cooling tower control
- Ion exchangers
- RO units (reverse osmosis)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

**NOTE!**

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

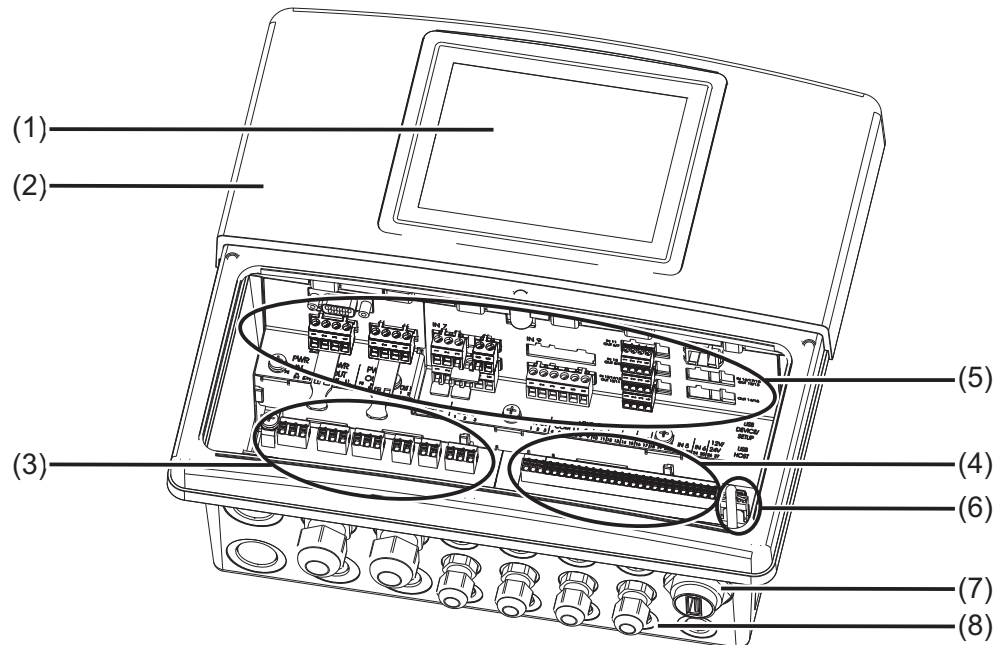
3 Device description

3.2 Block diagram



3 Device description

3.3 Device setup

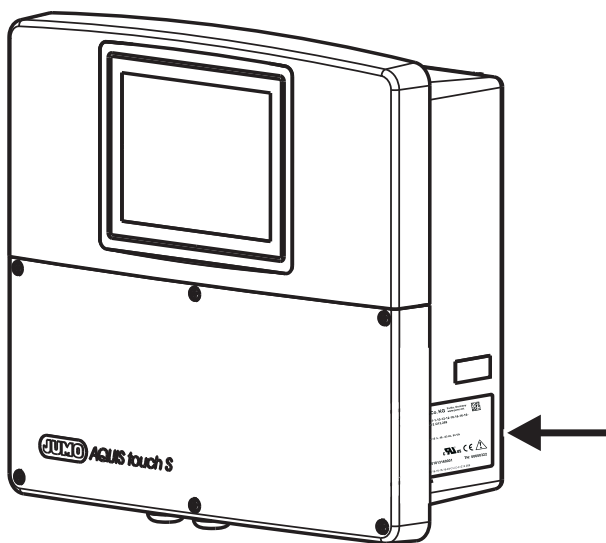


- (1) TFT-touchscreen
- (2) Case (terminal compartment cover opened)
- (3) Connection terminals, power supply unit
- (4) Connection terminals, base unit
- (5) Expansion slots
- (6) USB interfaces (USB device interface and connection for optional USB host socket)
- (7) USB host socket, IP67 (also available, see Extra Code 269 Chapter 4.2 "Order details", page 17)
- (8) Cable fittings

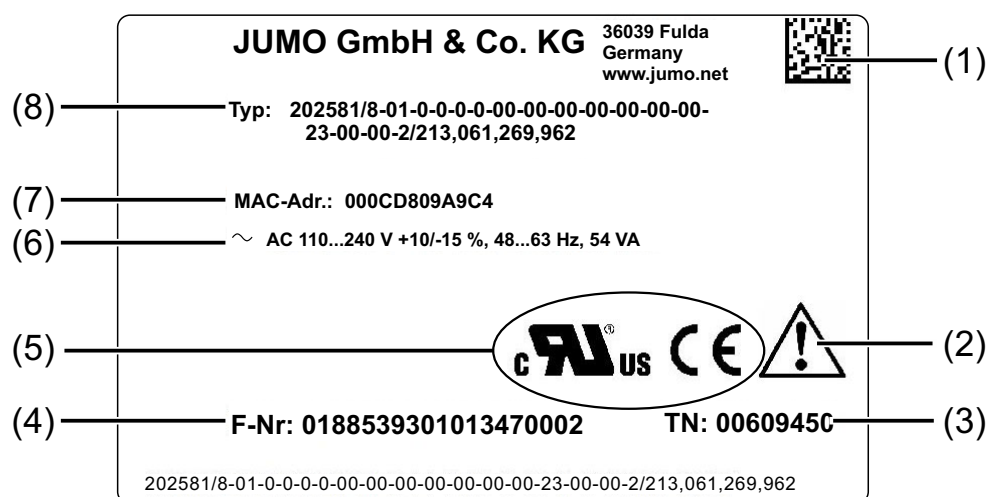
4 Identifying the device version

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 (for service purposes)
- (2) Information symbol (Read documentation!
⇒ Chapter 1.1 "Warning symbols", page 7)
- (3) Part no.
- (4) Fabrication number
- (5) Approval mark
- (6) voltage supply
- (7) MAC address of the Ethernet interface (stored in device and therefore also valid for replaced or retrofitted Ethernet optional boards)
- (8) Order code

It is helpful to become familiar with the technical features of the device prior to

4 Identifying the device version

startup. Compare the type code on the nameplate with the order details.

⇒ "Order details", page 17

In the event of technical questions, please have the information from the nameplate available for the member of our support team.

4 Identifying the device version

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 conductive 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 conductive 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 conductive 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 conductive conductivity measurement (2 and 4-pole)	
3	Ci inductive conductivity measurement	

4 Identifying the device version

(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 relay	
(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 relay	
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 relay	
18	3× digital inputs	

4 Identifying the device version

(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 relay	
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 relay	
(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 relay	
(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) COM 2 interface		COM 2
00	Not used	
54	RS422/485 Modbus RTU	
64	PROFIBUS-DP	
(17) LAN interface		LAN
00	Not used	
08	Ethernet	
(18) Voltage output		
1	DC 12 V	
2	DC 24 V	

4 Identifying the device version

(19) Extra codes	
000	None
213	Recording function
214	Math and logic module
269	USB host socket (IP67)
962	JUMO digiLine protocol activated

^a PhotoMOS® is a registered trademark of Panasonic.

Order code: (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11)
 / - - - - - - - - - - -
 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.

4.3 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
JUMO AQUIS touch S accessories kit, part no. 00597460
Mounting plate for surface mounting, part no. 00597799
Terminal diagram sticker
Installation instructions in 2 volumes

Content of the JUMO AQUIS touch S accessories kit

6× M12 × 1.5 hexagon nut
6× gasket 10.2 × 14.5 × 1 for M12 cable fitting
6× M12 × 1.5 cable fitting
6× sealing plug for cable fitting M12
3× M16 × 1.5 hexagon nut
3× gasket 14.2 × 19.5 × 1 for M16 cable fitting
3× M16 × 1.5 cable fitting
3× plug for M16 cable fitting
26× cable tie 2.5 × 98 PA
3× self-tapping screw 60 × 16 TORX PLUS® ^a 30IP (for panel mounting kit)
1× snap ferrite to suppress interference from the power supply cable to the device

^a TORX PLUS® is a registered trademark of Acument Intellectual Properties, LLC. USA.

4 Identifying the device version

4.4 Accessories

Order code	Type	Part no.
703571 (20258x)/10	Universal input; galvanically isolated	00581159
703571 (20258x)/10	Universal input; galvanically isolated, without DNV approval	00775887
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 and JUMO digiLine ^b	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 (2 GB) ^c	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 ^d	00431884

^a PhotoMOS® is a registered trademark of Panasonic.

^b The accessories required to install a JUMO digiLine bus can be found in the type sheets and operating manual for the JUMO digiLine components (e.g. JUMO digiLine pH/ORP/T type 202705 or JUMO digiLine hub type 203590).

^c The indicated USB flash drive has been tested and is designed for industrial applications. No liability is assumed for flash drives from other manufacturers.

^d Communication and evaluation software for stored recording function measurement data

4 Identifying the device version

5.1 Notes

**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! Explosion hazard.

Mounting site

When determining the mounting site, it is important to ensure that the device specifications are respected. The relevant tables containing details of case specifications can be found in the chapter entitled "Technical Data". The device must not be exposed to any severe shocks or permanent vibrations. Electro-magnetic fields caused by equipment such as motors or transformers must be avoided!

Direct heat radiation, in particular sunlight causes, due to protection type 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 23.14 "Housing", page 439

Installation position

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

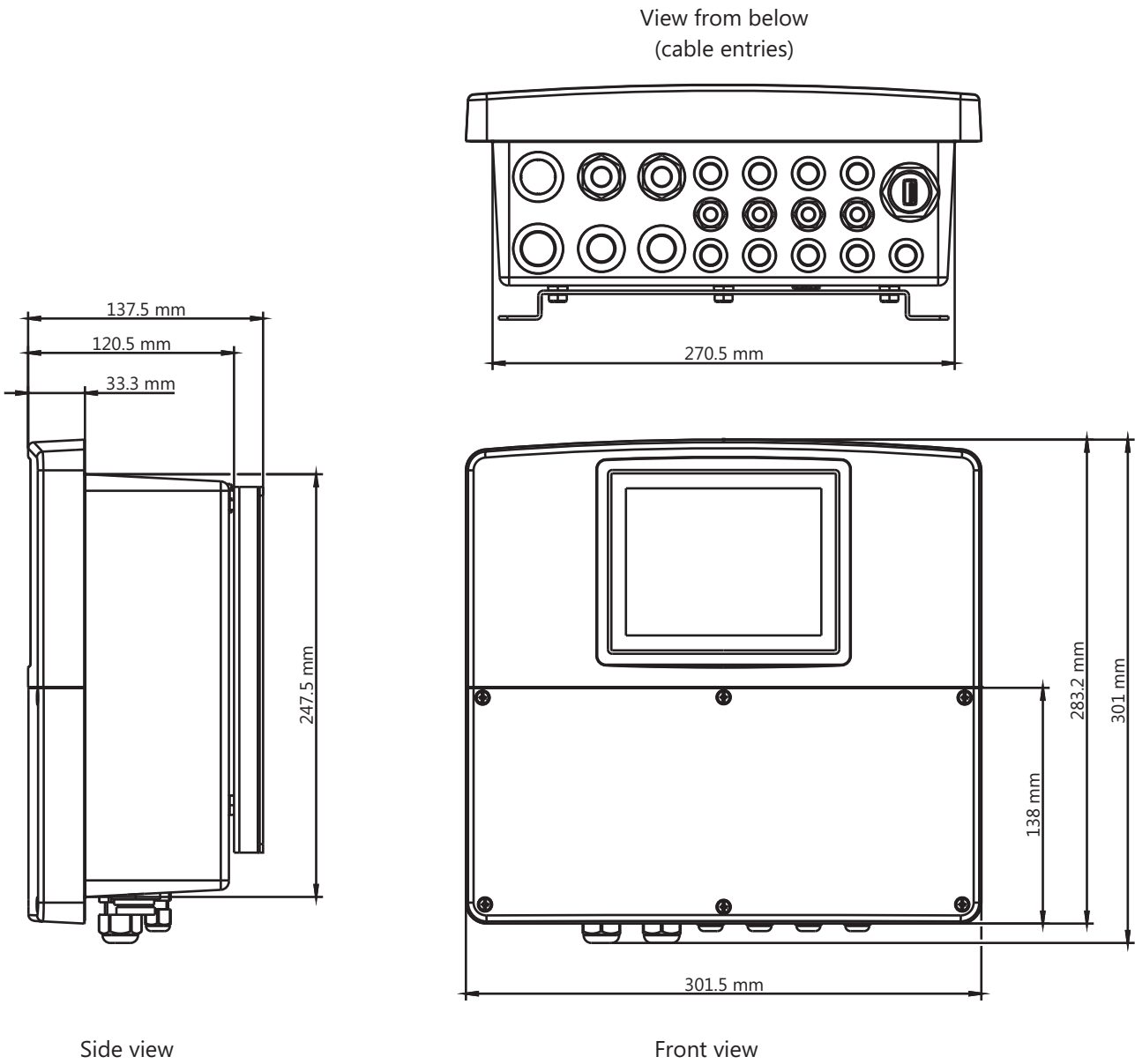
⇒ Chapter 23.14 "Housing", page 439

Space requirement

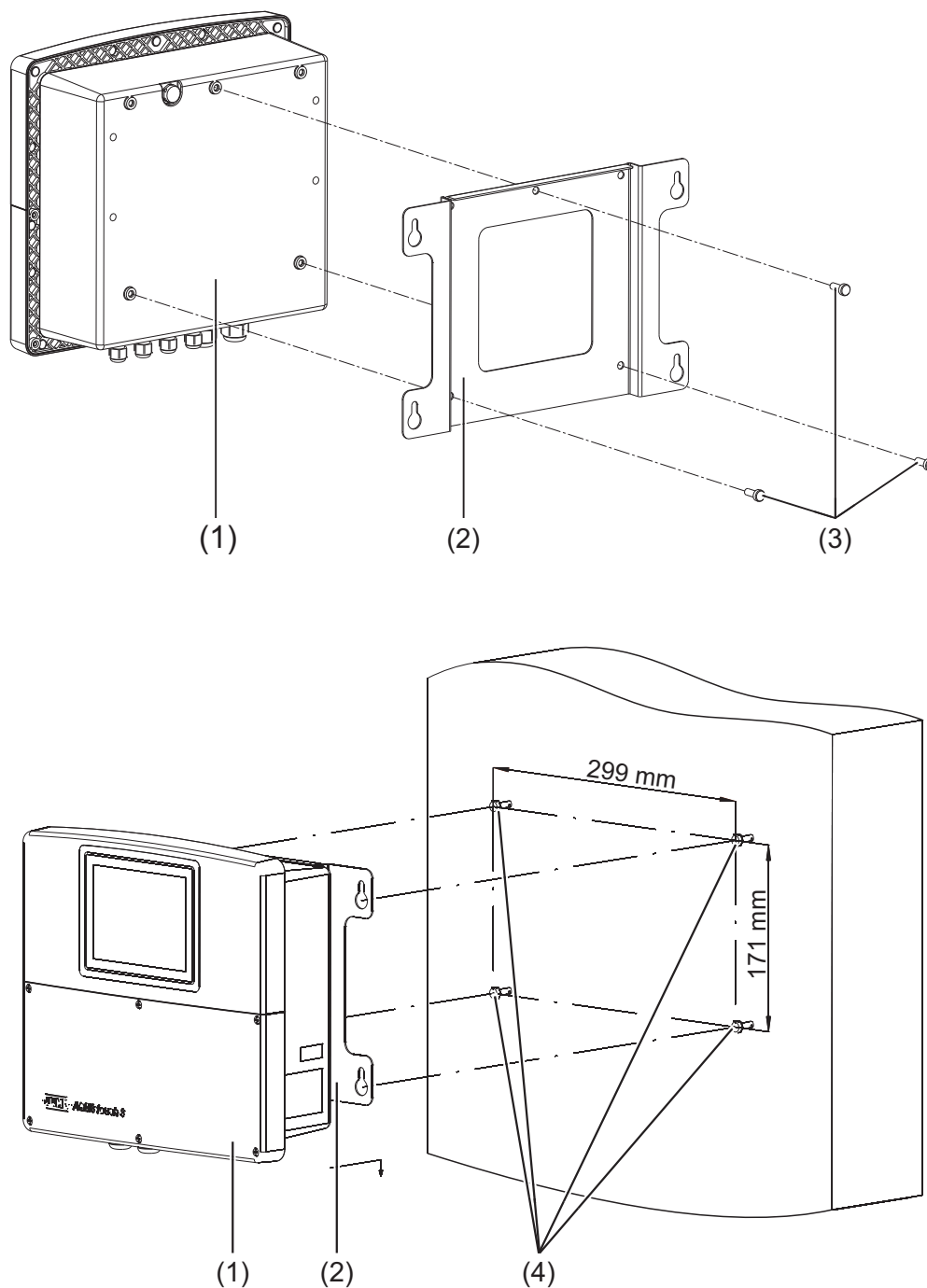
Ensure adequate access to the region around the cable entry points. The minimum bending radius of the cables must be taken into account!

5 Mounting

5.2 Dimensions



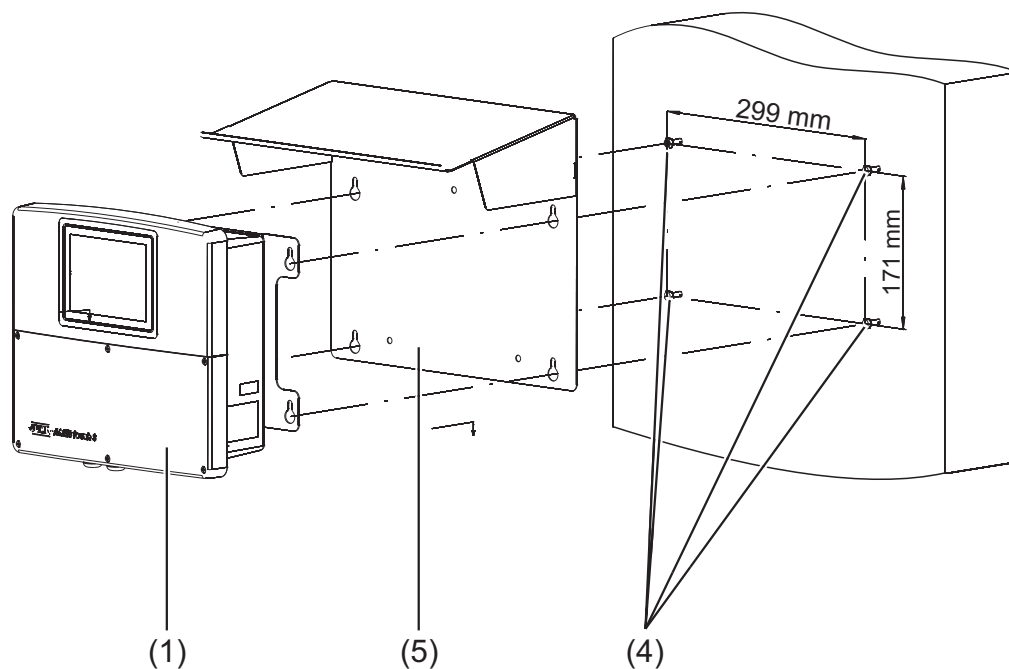
5.3 Surface mounting



- (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)

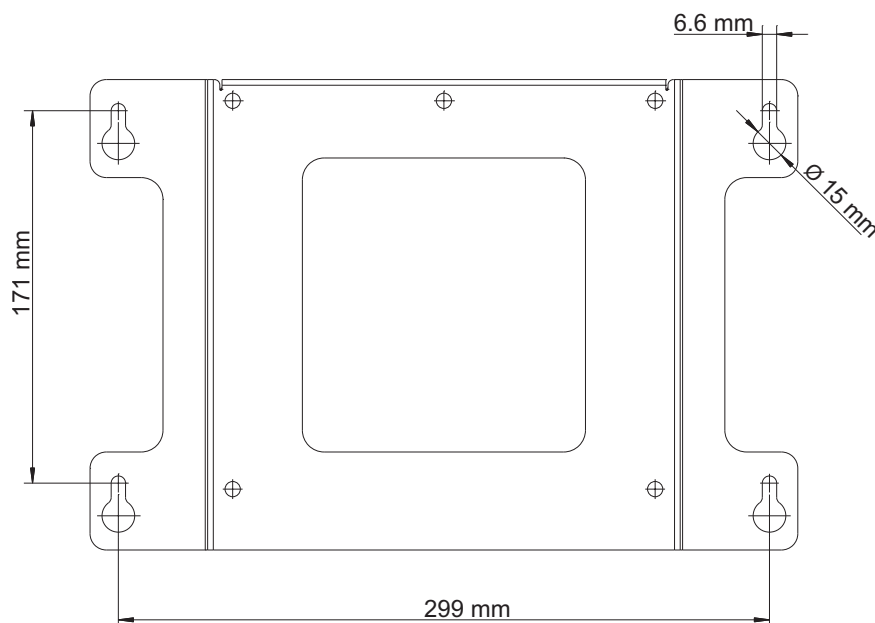
^a TORX PLUS® is a registered trademark of Acument Intellectual Properties, LLC. USA.

5 Mounting



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

Drilling diagram



5 Mounting

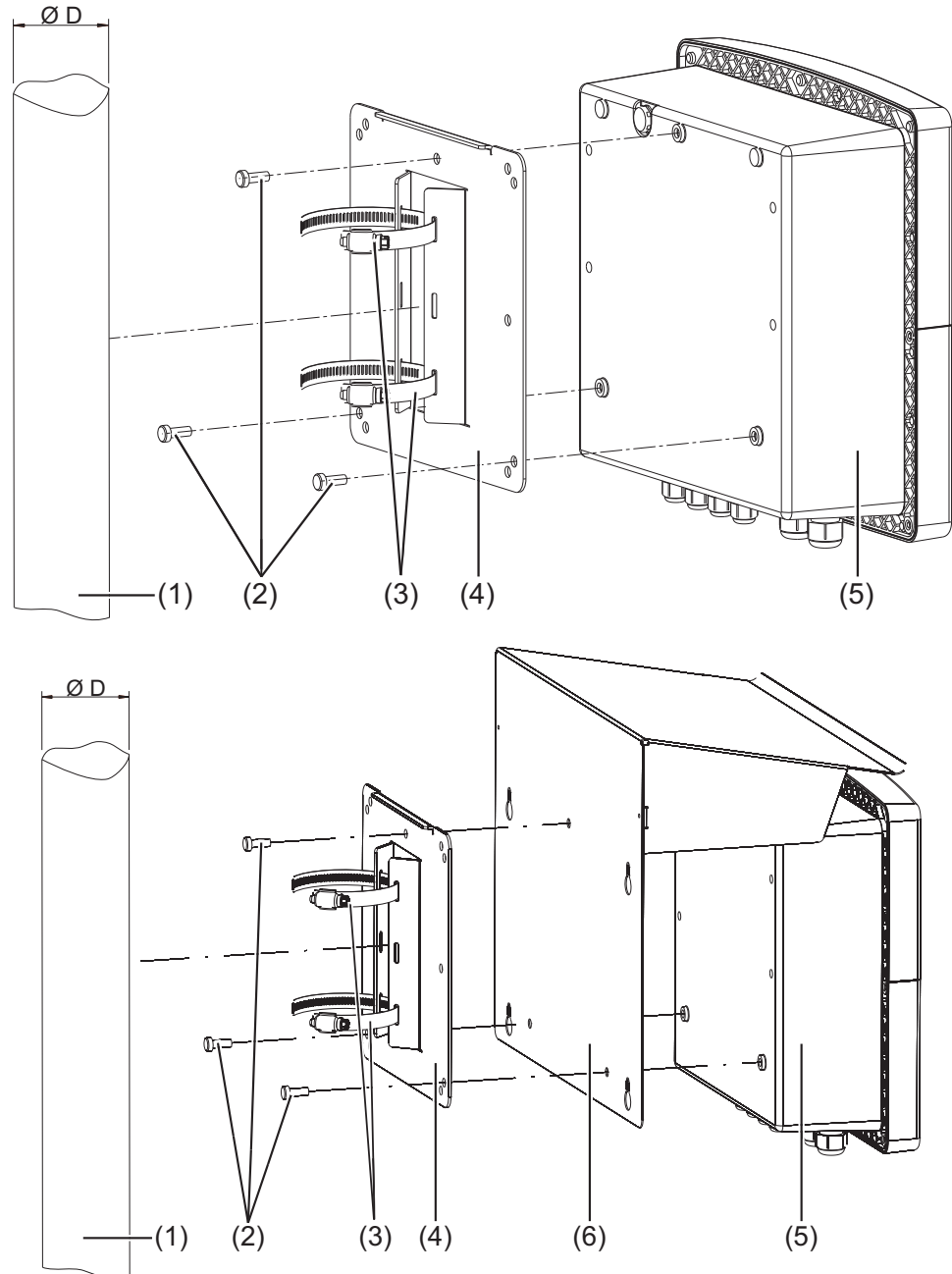
Procedure

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 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 Mounting

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 Properties, LLC.
USA.

5 Mounting

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 mounting

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

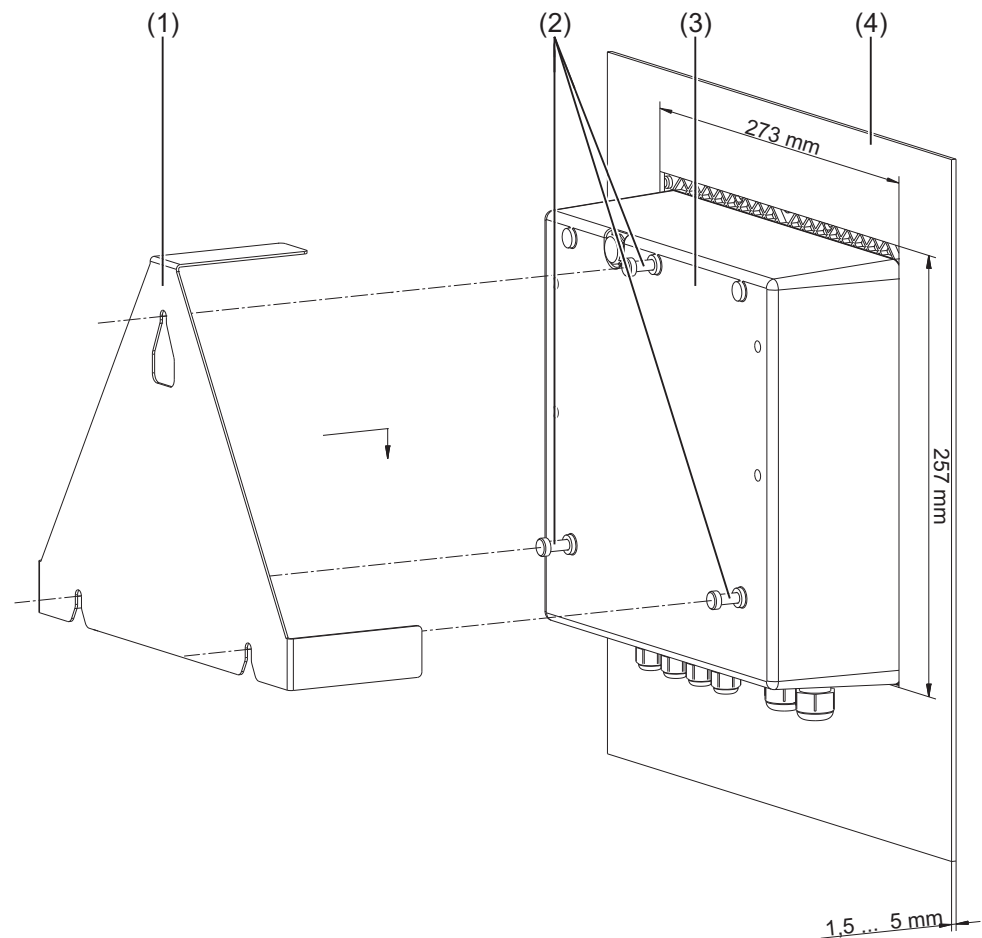
Installation in a control panel provides protection class IP20. When the JUMO AQUIS touch S is installed in the wall of control cabinets, the protection type of the control cabinet no longer applies; instead, the protection class for installation in a control panel applies (IP20).



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 23.14 "Housing", page 439

5 Mounting



- (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 Properties, 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, the requirements of DIN VDE 0100 "Erection of low voltage installations" and the applicable country-specific regulations (e.g. based on IEC 60364) need to be observed.
- 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.
- Route sensor lines and bus lines only as uninterrupted lines (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.

6 Electrical connection

Electrical safety

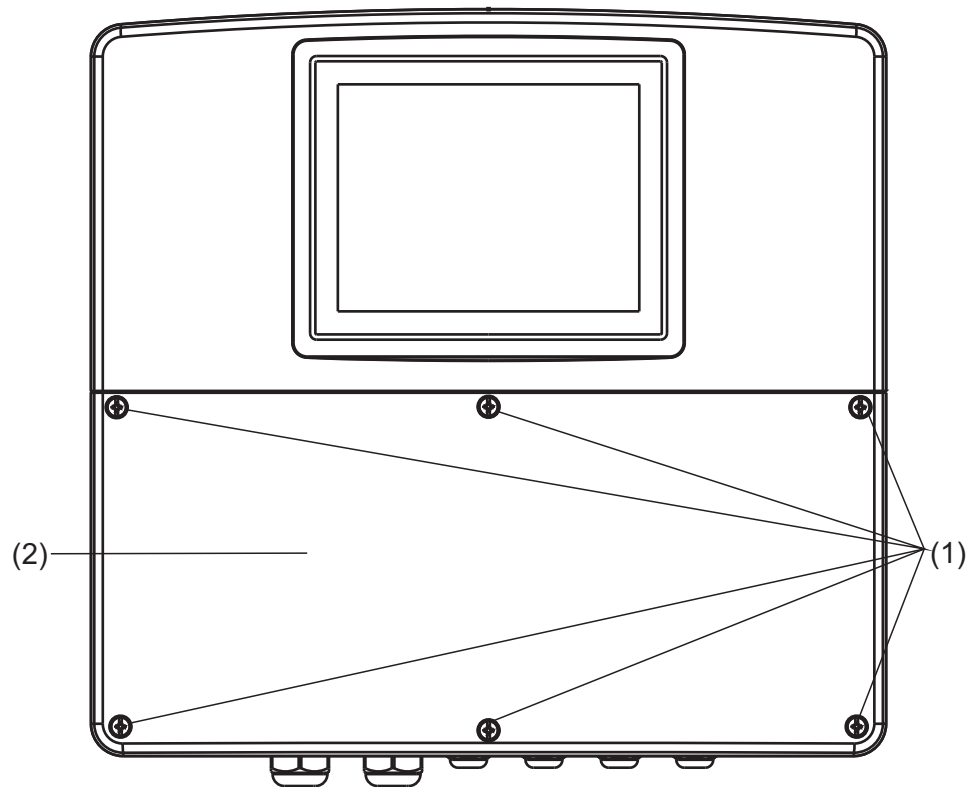
- Disconnect all phases of the power supplied to the device (power grid, outside power supply sources for relays/solid state relays etc.) If current-carrying components could be touched while work is being performed.
- Fuses for power supply circuits should be rated at no more than 10 A (slow-blow).
- 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 areas.
- 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 specifications for galvanic isolation must be taken into account during planning and electrical installation.
⇒ Chapter 6.3 "Galvanic isolation", page 42

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.

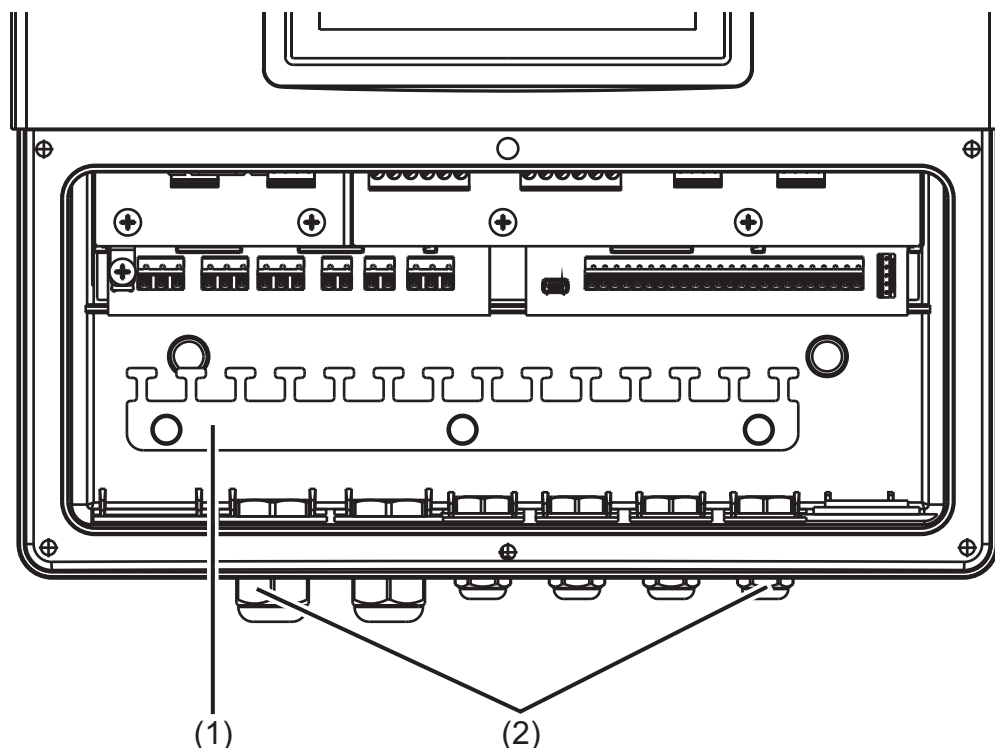


NOTE

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 Electrical connection

6.2.2 Installing cables



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

Process

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	Use the provided sealing plugs to close off unneeded cable fittings and then tighten the cable fittings securely.
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 38
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	Attach the supplied snap ferrite to the power supply cable outside the device housing. Simply press the snap ferrite around the cable until it snaps together.
7	Connect the cable in accordance with the connection diagram. ⇒ Chapter 6.4 "Connection diagram", page 43

**NOTE**

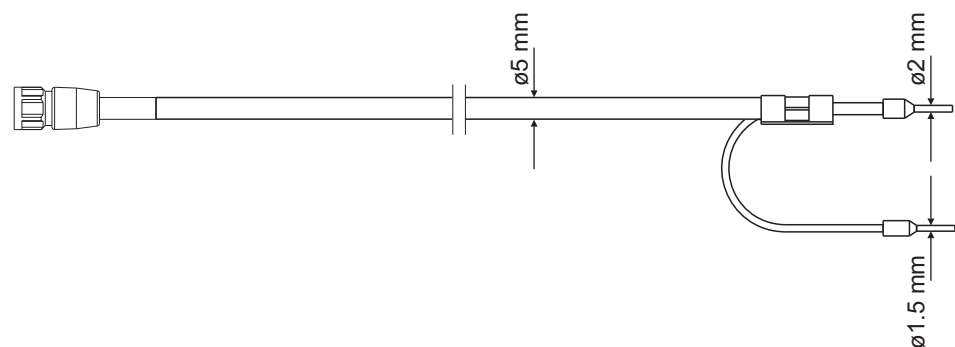
Open or improperly sealed cable fittings void the protection type IP67 for the enclosure. Ensure that all cable fittings are sealed and tightened to the correct installation torque. Unused fittings must be sealed with the plugs from the scope of delivery for the device.

⇒ Chapter 23.14 "Housing", page 439

6 Electrical connection

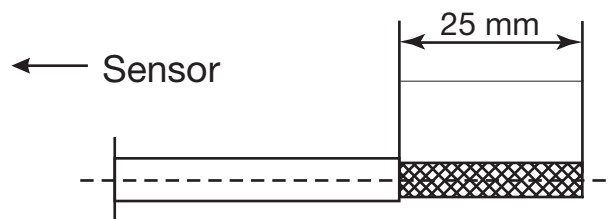
6.2.3 Preparing coaxial cables for pH/redox electrodes

Coaxial cable with Shield-Kon® connector¹

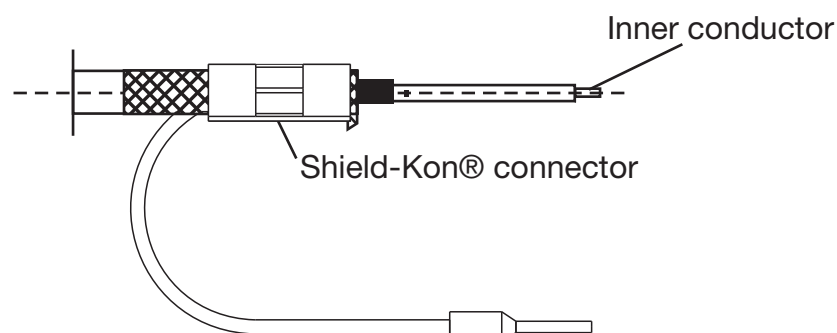


Length	Part no.
1.5 m	00085154
5 m	00307298
10 m	00082649

Preparing your own coaxial cable



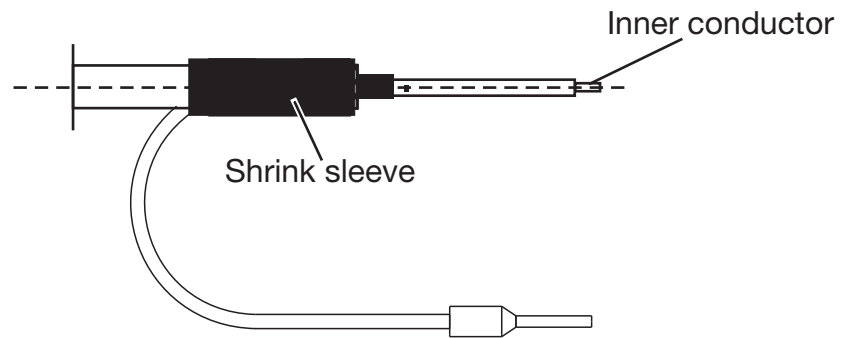
Remove outer sheathing from the cable > Pull back the braided shield



Remove black, semiconducting layer (see image) > Strip insulation off inside conductor > Attach Shield-Kon® connector¹ for shield

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

6 Electrical connection



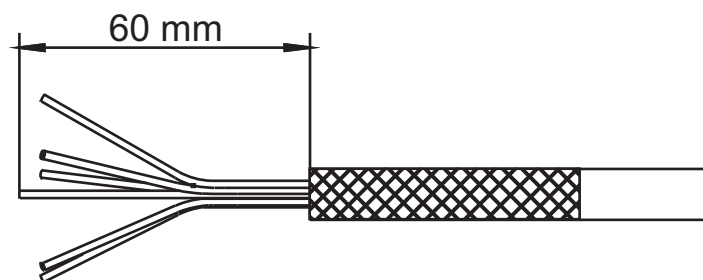
Use shrink tubing to insulate the braided shield



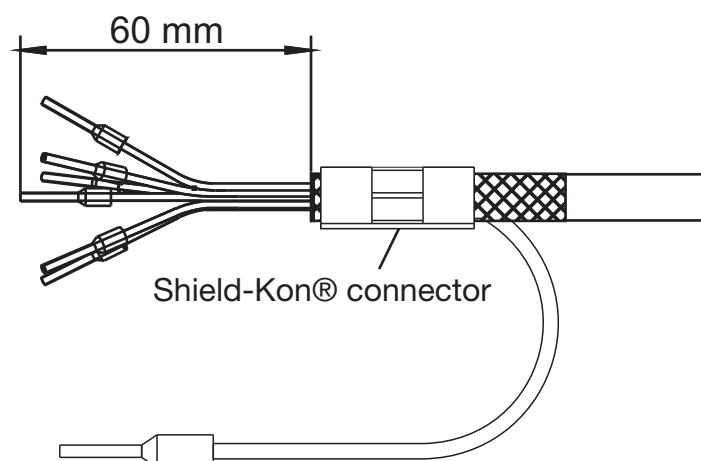
NOTE

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



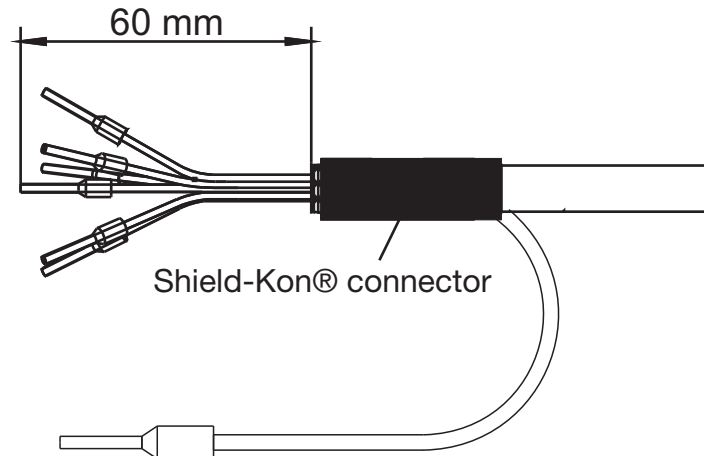
Strip the insulation off the connecting cable and pull back the shield



Attach wire ferrules to the ends of the conductors and a Shield-Kon® connector¹ for shielding

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

6 Electrical connection



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	Maximum	
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 Electrical connection

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	Maximum	
Universal inputs	without ferrule	0.14 mm ²	1.5 mm ²	7 mm
Analog outputs	with ferrule with lip	0.25 mm ²	0.5 mm ²	7 mm
Digital inputs	Ferrule without lip	0.25 mm ²	1.5 mm ²	7 mm
Digital outputs PhotoMOS® ^a	Rigid	0.14 mm ²	1.5 mm ²	7 mm
Logic outputs				
Voltage supply output				
Analysis inputs pH/Redox/NH ₃	without ferrule	0.2 mm ²	2.5 mm ²	7 mm
Analysis inputs CR ^b	with ferrule with lip	0.25 mm ²	1.5 mm ²	7 mm
Analysis inputs Ci ^c	Ferrule without lip	0.25 mm ²	2.5 mm ²	7 mm
Digital outputs relay				
Digital outputs triac	Rigid	0.2 mm ²	2.5 mm ²	7 mm

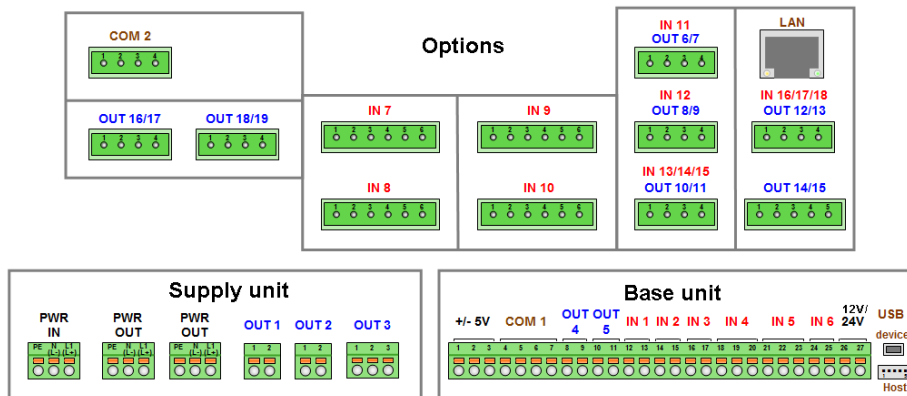
^a PhotoMOS® is a registered trademark of Panasonic.

^b CR analysis inputs = Analysis inputs for resistive conductivity

^c Analysis inputs Ci = Analysis inputs for inductive conductivity

6.4 Connection diagram

6.4.1 Overview of connections



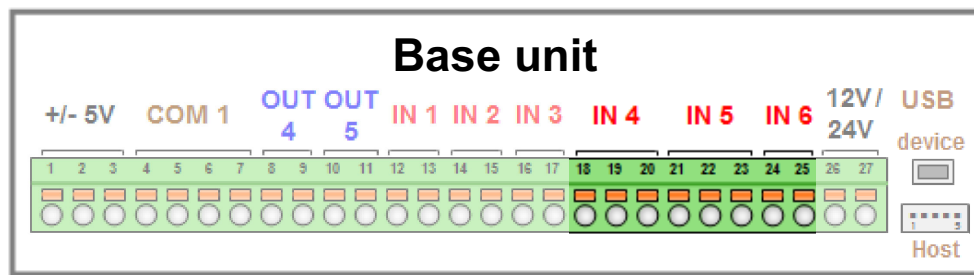
	Module	Connector terminal	Type
Inputs	Base unit	PWR IN	Voltage supply for the device
		IN 1 to IN 3	Digital inputs
		IN 4 to IN 5	Temperature inputs
		IN 6	Universal input
	Option-al boards	IN 7 to IN 10	analysis inputs
		IN 11 to IN 12	Universal inputs
		IN 13 to IN 18	Digital inputs
Outputs	Power supply 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 V / 24 V	Voltage supply output DC 12 V / 24 V (e.g. for external transmitters) ^a
	Option-al 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
	Option-al 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 17, Extra Code 269).

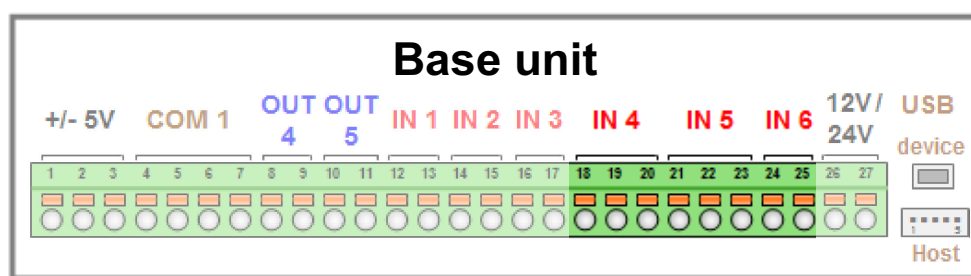
6 Electrical connection

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	
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
IN 5	RTD temperature probe 2-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	NTC 2-wire circuit	
	NTC 3-wire circuit	
	Resistance potentiometer A = Start E = End S = Slider	

6 Electrical connection



Connector/ terminal	Connection variant	Symbol
IN 6	Standard signal Current 0(4) to 20 mA	+ ———— ○ 24 I_x - ———— ○ 25

6 Electrical connection

6.4.3 Analog inputs optional boards

Universal inputs

Options		
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	

6 Electrical connection

pH/Redox/NH₃ analysis inputs

For optional board "analysis pH/Redox/NH₃", 2 versions are currently in circulation. The connection diagram contains the connection terminal layout for both version I and version II. To identify the version of your optional board, compare the connection terminal layout to the following illustrations:



I = First version

II = Revised version

6 Electrical connection

COM 2 OUT 16/17 OUT 18/19 Options IN 7 IN 8 IN 9 IN 10 IN 11 OUT 6/7 IN 12 OUT 8/9 IN 13/14/15 OUT 10/11 LAN IN 16/17/18 OUT 12/13 OUT 14/15 Base unit									
Slot	Option/ connec- tion variant	Wire (color) ^a	Potential	Terminal			Symbol		
				DC ±5 V	Tempera- ture input	Analysis input pH/redox			
						I	II		
IN 7 IN 8 IN 9 IN 10	ISFET-pH sensor	A (blue)	DC +5 V	1					
		B (black)	GND with jump- er to F	2					
		C (green)	DC -5 V	3					
		D (white/ black)	Ion-sensi- tive gate			1	1		
		E	Bypass			3	4		
		F (yellow)	Reference			5	5		
		G (white)	Compensa- tion ther- mometer in 3-wire cir- cuit						
		H (red/ black)							
		I (red)							
The RTD temperature probe can be connected to a temperature input or universal input. ^c									

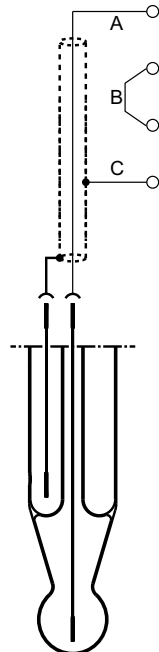
^a The conductor colors listed refer to JUMO ISFET-pH sensors. The orange-colored conductor is not connected.

^b The connection diagram for the selected analog input 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. The IN 5 temperature input supports connection of 8k55-NTC temperature probes.

6 Electrical connection

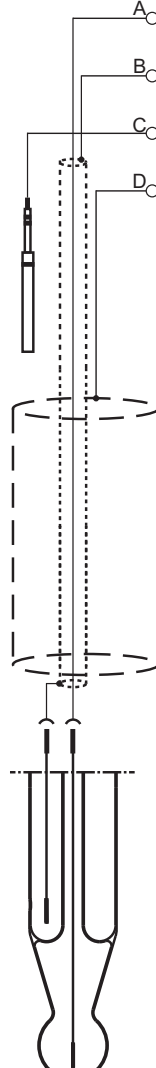
COM 2 1234		Options		IN 11 OUT 6/7 1234		LAN IN 16/17/18 OUT 12/13 1234 OUT 14/15 12345	
OUT 16/17 1234		OUT 18/19 1234		IN 7 12356		IN 9 12356	
		IN 8 12456		IN 10 12456		IN 12 OUT 8/9 1234	
				IN 13/14/15 OUT 10/11 1234			

Slot	Option/connection variant	Wire (color)	Potential	Terminal		Symbol	
				Temperature input	Analysis input pH/redox		
					I		II
IN 7	pH/redox	A (core)	Glass/met-al electrode		1	1	
IN 8	Asymmetric con-nection of a combi-nation electrode (Standard connec-tion variant)	B (jumper)	-		3	4	
IN 9					5	5	
IN 10		C (shield)	Reference electrode		6	6	
For temperature compensation, a separate temperature sensor can be connected to an analog input.							

6 Electrical connection

COM 2 OUT 16/17 OUT 18/19		Options IN 7 1 2 3 5 6 IN 8 1 2 4 5 6 IN 9 1 2 3 5 6 IN 10 1 2 4 5 6		IN 11 OUT 6/7 IN 12 OUT 8/9 IN 13/14/15 OUT 10/11	LAN IN 16/17/18 OUT 12/13 OUT 14/15		
Slot	Option/connection variant	Wire (color)	Potential	Terminal		Symbol	
				Temperature input	Analysis input pH/redox		
					I		II
IN 7 IN 8 IN 9 IN 10	pH/redox	A (core)	Glass/metal electrode		1	1	
	Asymmetric connection of a combination electrode with integrated RTD temperature probe and Vario-Pin terminal head	B (inner shield)	Reference electrode		3	4	
					5	5	
		C (gray)	Pt100/1000	Connection^a			
		D (blue)	Not used				
		E (white)	Pt100/1000				
		F (green)	Pt100/1000				
	S (outer shield)	Shield		6	6		
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. Terminal 2 at the analysis input is not connected!							

6 Electrical connection

COM 2 OUT 16/17 OUT 18/19		Options IN 7 IN 8 IN 9 IN 10		IN 11 OUT 6/7 IN 12 OUT 8/9 IN 13/14/15 OUT 10/11	LAN IN 16/17/18 OUT 12/13 OUT 14/15		
Slot	Option/connection variant	Wire (color)	Potential	Terminal		Symbol	
				Temperature input	Analysis input pH/redox		
					I		II
IN 7 IN 8 IN 9 IN 10	pH/redox Symmetric connection of a combination electrode	A (core)	Glass/metal electrode		1	1	
		B (inner shield)	Reference electrode		3	4	
		C (grounding pin, pipe or tank wall at the measuring point)	Liquid potential		5	5	
		D (outer shield)	Shield		6	6	
Symmetric connection is used to reduce interference from stray electromagnetic fields along the sensor cable.							
Terminal 2 at the analysis input is not connected!							

6 Electrical connection

Options							
COM 2 OUT 16/17 OUT 18/19		IN 7 IN 8 IN 9 IN 10		IN 11 OUT 6/7 IN 12 OUT 8/9 IN 13/14/15 OUT 10/11	LAN IN 16/17/18 OUT 12/13 OUT 14/15		
Slot	Option/connection variant	Wire (color)	Potential	Terminal		Symbol	
				Temperature input	Analysis input pH/redox		
					I	II	
IN 7 IN 8 IN 9 IN 10	pH/redox	A (core)	Glass/metal electrode		1	1	
	Symmetric connection of a combination electrode with integrated RTD temperature probe and Vario-Pin terminal head	B (inner shield)	Reference electrode		3	4	
		C (gray)	Pt100/1000	Connection^a			
		D (blue)	Not used				
		E (white)	Pt100/1000				
		F (green)	Pt100/1000				
		G (grounding pin, pipe or tank wall at the measuring point)	Liquid potential		5	5	
	S (outer shield)	Shield		6	6		
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. Terminal 2 at the analysis input is not connected!							

^a The connection diagram for the selected analog input must be observed when connecting the temperature probe.

6 Electrical connection

Electrolytic conductivity analysis inputs

Options		
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)	

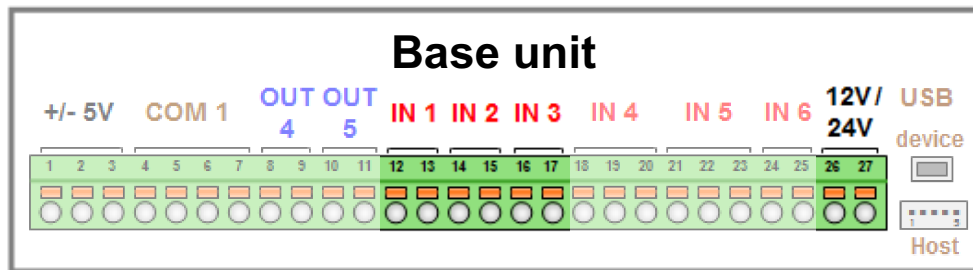
6 Electrical connection

Options		
Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	CR optional board (conductive 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 (conductive conductivity measurement) 2-electrode system with 4-wire conductor (Wiring to minimize the measuring error caused by line resistance) Terminal 1 must be connected to the outer electrode on concentric conductivity sensors. A/B = Outer electrode C/D = Inner electrode E = Shield	
	CR optional board (conductive 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 Electrical connection

6.4.5 Binary inputs

Base unit



Conne- ctor/ terminal	Connection variant	Wire	Potential	Terminal				Symbol
				12 V / 24 V	IN 1	IN 2	IN 3	
IN 1 to 3	Digital input (potential-free contact)	A	Potential- free con- tact		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 sig- nal +		12	14	16	
		B	Logic sig- nal -		13	15	17	
	In the digital input configuration, the "Contact" option must be set to "Ext. voltage supply".							
	Digital input (NPN transistor switch- ing output) ^a	A	Switching signal (collector)		12	14	16	
		B	Sensor -		13	15	17	
		C ^b	Sensor +	26				
		D ^b	Sensor -	27				
	In the digital input configuration, the "Contact" option must be set to "Potential-free contact".							
IN 1 to 3	Digital input (PNP transistor switch- ing output) ^a	A	Switching signal (collector)		12	14	16	
		B	Sensor -		13	15	17	
		C ^b	Sensor +	26				
		D ^b	Sensor -	27				
	In the digital input configuration, the "Contact" option must be set to "Ext. voltage supply".							

6 Electrical connection

- ^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 12 V / 24 V voltage supply to sensors.

6 Electrical connection

Optional boards

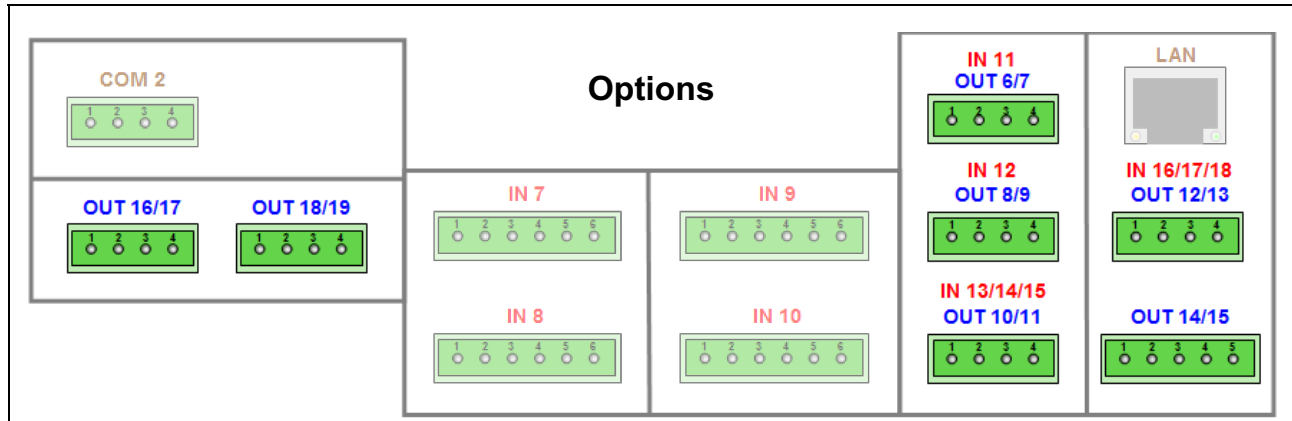
COM 2 1 2 3 4 OUT 16/17 1 2 3 4 OUT 18/19 1 2 3 4 Options IN 7 1 2 3 4 5 6 IN 8 1 2 3 4 5 6 IN 9 1 2 3 4 5 6 IN 10 1 2 3 4 5 6 IN 11 OUT 6/7 1 2 3 4 IN 12 OUT 8/9 1 2 3 4 IN 13/14/15 OUT 10/11 1 2 3 4 LAN IN 16/17/18 OUT 12/13 1 2 3 4 OUT 14/15 1 2 3 4 5		
Connector/ terminal	Connection variant	Symbol
IN 13/14/15 IN 16/17/18	3× binary input (potential-free contact)	

6.4.6 Digital outputs, power supply unit board

Supply unit PWR IN PE N L1 (L-) (L+) PWR OUT PE N L1 (L-) (L+) PWR OUT PE N L1 (L-) (L+) OUT 1 1 2 OUT 2 1 2 OUT 3 1 2 3		
Connector/ terminal	Connection variant	Symbol
OUT 1 OUT 2	Relay Normally open contact	
OUT 3	Relay Changeover contact	

6 Electrical connection

6.4.7 Digital outputs, optional boards



6 Electrical connection

6.4.8 Mains power connection

Supply unit PWR IN PE N L1 (L-) (L+) PWR OUT PE N L1 (L-) (L+) PWR OUT PE N L1 (L-) (L+) OUT1 1 2 OUT2 1 2 OUT3 1 2 3		
Connector/ terminal	Connection variant	Symbol
PWR IN	Mains power input	L1 ————○ L1 N ————○ N PE ————○ PE

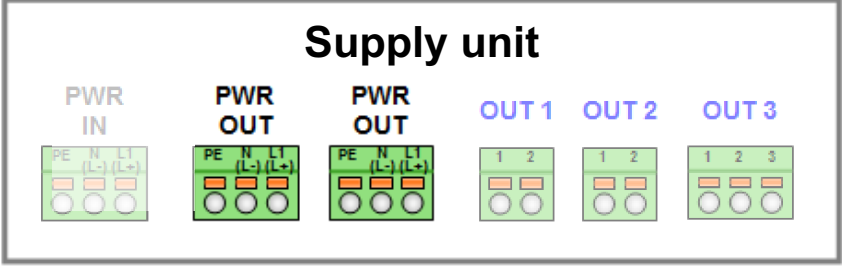
6.4.9 Voltage supply outputs

Base unit

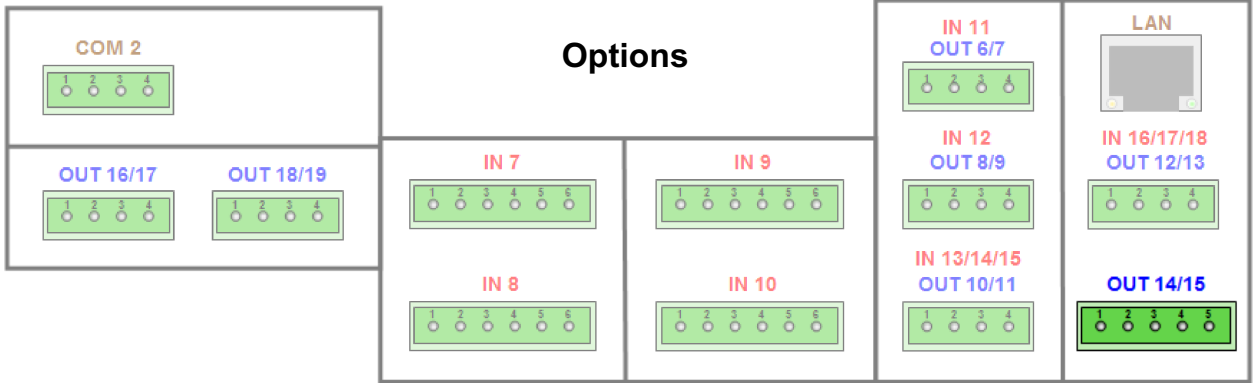
Base unit +/- 5V COM 1 OUT 4 OUT 5 IN 1 IN 2 IN 3 IN 4 IN 5 IN 6 12V/24V USB device Host		
Connector/ terminal	Connection variant	Symbol
DC ±5 V	Voltage supply (e.g. for ISFET sensors or JUMO digiLine)	+ ————○ 1 U₌ ⊥ ————○ 2 - ————○ 3
DC 12 V / 24 V	Voltage supply (e.g. for external transmitters)	+ ————○ 26 U₌ - ————○ 27

6 Electrical connection

Power supply unit board

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

Optional board

Options 		
Slot	Connection variant	Symbol
OUT 14/15	Voltage supply DC 24 V for external transmitters 24 V	+ ———— ○ 1 U ₌ - ———— ○ 2
	DC ±5 V voltage supply (e.g. for ISFET sensors or JUMO digiLine)	+ ———— ○ 3 U ₌ ⊥ ———— ○ 4 - ———— ○ 5

6 Electrical connection

6.4.10 Interfaces for data and bus communication

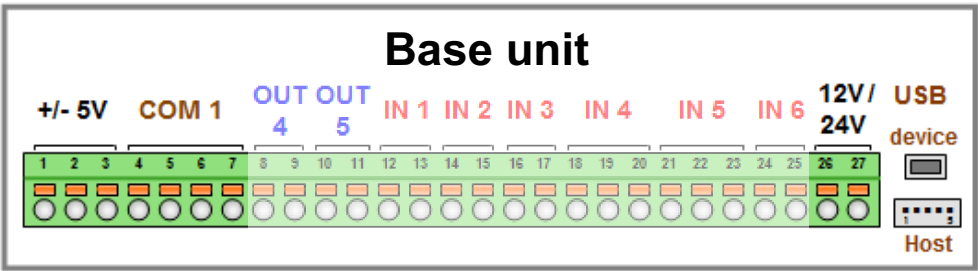


NOTE

When installing the bus cabling for digital sensors, heed the information regarding line length and number of sensors in the Annex.

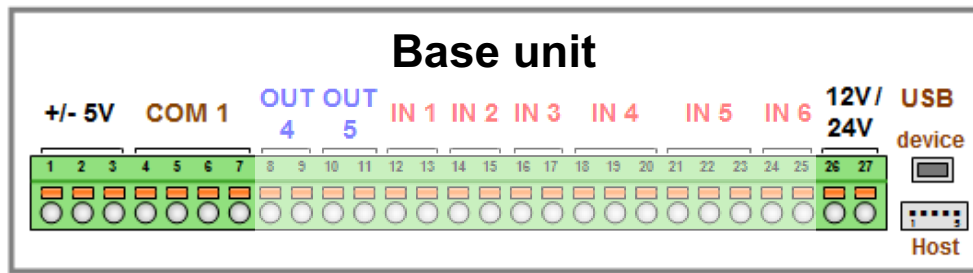
⇒ Chapter 24.2 "Planning the cabling for digital sensors", page 449

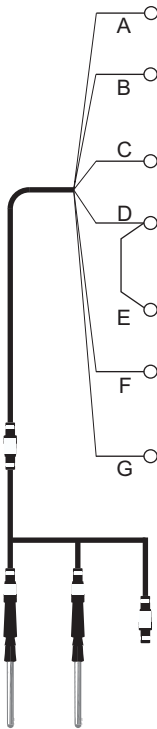
Interfaces for data and bus communication - Base unit



Conne- tor/ terminal	Connection variant	Wire (color)	Potential	Terminal			Symbol
				DC ±5 V	DC 24 V	COM 1	
COM 1	RS422	RxD+	RxD+	-	-	4	RxD+ ○
		RxD-	RxD-	-	-	5	RxD- ○
		TxD+	TxD+	-	-	6	TxD+ ○
		TxD-	TxD-	-	-	7	TxD- ○
	RS-485	RxD/TxD+	RxD/TxD+	-	-	6	RxD/TxD+ ○
		RxD/TxD-	RxD/TxD-	-	-	7	RxD/TxD- ○

6 Electrical connection



Conne- tor/ terminal	Connection variant	Wire (color)	Potential	Terminal			Symbol
				DC ±5 V	DC 24 V	COM 1	
COM 1	Digital sensors (Connection to the JUMO M12 master connect- ing cable)	A (gray)	RxD/TxD+	-	-	6	
		B (black)	RxD/TxD-	-	-	7	
		C (brown)	+5 V	1	-	-	
		D (blue)	GND	2	-	-	
		E (blue)	GND	-	27	-	
		F (white)	+24 V	-	26	-	
		G (black with ca- ble lug for con- necting to the grounding)	Shield	Connection screw on cover plate of option- al board in connec- tion area			
	For connection of a JUMO digiLine bus line to operate digital sensors, JUMO offers 5-wire M12 digiLine Master connecting cable. A total of up to 6 digital sensors (JUMO ecoLine/tecLine or sensors with JUMO digiLine electronics) can be operated over a JUMO digiLine bus. The voltage supplies of DC 5 V and DC 24 V for the sensors on the bus are provided by the voltage supply outputs on the device (base unit or optional board) ^a . ⇒ Chapter 6.4.9 "Voltage supply outputs", page 60						
USB de- vice	USB device Type Mini-B (socket)	-	-	-	-	-	
USB host	Connection for USB host sock- et ^b Type A	-	-	-	-	-	

^a If appropriate, use a JUMO digiLine hub bus distributor for digital sensors (PG 203590). See also chapter 24.2 „Planning the cabling for digital sensors“.

^b Use requires the USB host socket (see Chapter 4.2 "Order details", page 25, Extra Code 269).

6 Electrical connection

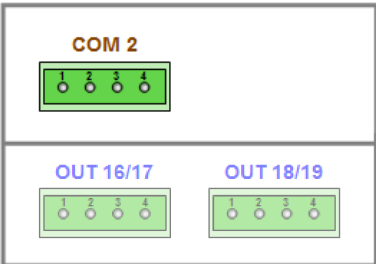
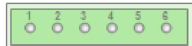
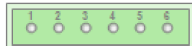
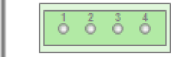
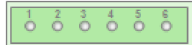
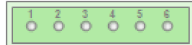
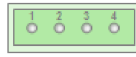
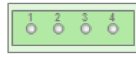
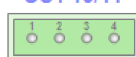
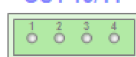
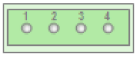
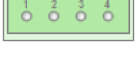
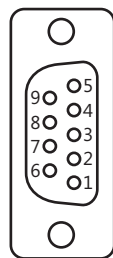
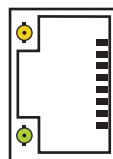
Interfaces for data and bus communication - Optional boards

Options							
Slot	Option/con- nection variant	Wire/pin (color)	Potential	Terminal			Symbol
				DC ±5 V	DC 24 V	COM 2	
COM 2	RS422 terminating re- sistors with DIP switches on optional board configurable	RxD+	RxD+	-	-	1	RxD+ ○
		RxD-	RxD-	-	-	2	RxD- ○
		TxD+	TxD+	-	-	3	TxD+ ○
		TxD-	TxD-	-	-	4	TxD- ○
	RS485 terminating re- sistors with DIP switches on optional board configurable	RxD/TxD+	RxD/TxD+	-	-	3	RxD/TxD+ ○
		RxD/TxD-	RxD/TxD-	-	-	4	RxD/TxD- ○

6 Electrical connection

Options							
COM 2 OUT 16/17 OUT 18/19		IN 7 IN 8		IN 9 IN 10		IN 11 OUT 6/7 IN 12 OUT 8/9 IN 13/14/15 OUT 10/11 LAN IN 16/17/18 OUT 12/13 OUT 14/15	
Slot	Option/con- nection variant	Wire/pin (color)	Potential	Terminal			Symbol
				DC ±5 V	DC 24 V	COM 2	
COM 2	Digital sensors	A (gray)	RxD/TxD+	-	-	3	
		B (black)	RxD/TxD-	-	-	4	
	Connection to optional board: RS422/485 seri- al interface with JUMO M12 master connect- ing cable	C (brown)	+5 V	1	-	-	
		D (blue)	GND	2	-	-	
		E (blue)	GND	-	27	-	
		F (white)	+24 V	-	26	-	
		G (black with cable lug for connecting to the grounding)	Shield	Connection screw on cover plate of optional board in connection area			
	For connection of a JUMO digiLine bus line, JUMO offers 5-wire M12 digiLine master connecting cable. Up to 6 digital sensors (JUMO ecoLine/tecLine or sensors with JUMO digiLine electronics) can be operated over a JUMO digiLine bus. The voltage supplies of DC 5 V and DC 24 V for the sensors on the bus are provided by the voltage supply outputs on the device (base unit or optional board) ^a . ⇒ Chapter 6.4.9 "Voltage supply outputs", page 60						
Located on the front of the serial interface RS422/485 optional board are DIP switches for setting the terminating resistors:							
with terminating resistors							
without terminating resistors							

6 Electrical connection

Options							
							
							
							
							
							
Slot	Option/con- nection variant	Wire/pin (color)	Potential	Terminal			Symbol
				DC ±5 V	DC 24 V	COM 2	
COM 2	PROFIBUS-DP 3 = RxD/TxD-P 5 = DGND 6 = VP 8 = RxD/TxD-N	3	RxD/TxD-P	-	-	-	
		5	DGND	-	-	-	
		6	VP	-	-	-	
		8	RxD/TxD-N	-	-	-	
LAN	Ethernet Type RJ 45 (socket)	-	-	-	-	-	

^a If appropriate, use a JUMO digiLine hub bus distributor for digital sensors (PG 203590). See also chapter 24.2 „Planning the cabling for digital sensors“.



NOTE

Only 1 serial interface per device can be used for JUMO digiLine (see Chapter 10.21 "Serial interfaces", page 222).

A maximum of 6 sensors can be connected to the selected interface.

**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 7

**CAUTION!**

A buffer battery is built into the device. Its purpose is to maintain data when the device is switched off or if the voltage supply is interrupted. If the battery approaches the end of its operating life (approximately 7 years) then a battery prealarm will indicate that status. When the battery is empty a battery alarm will indicate that status. The battery must be exchanged before it is empty. The battery must be exchanged by the JUMO Service department! In this case, send in the device!

**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 91
4	Make all the settings required for a basic setup. ⇒ Chapter 7.2 "Basic setup", page 68
5	Configure the analog and digital inputs you wish to use. ⇒ Chapter 10.5 "Analog inputs", page 147 ⇒ Chapter 10.7 "Digital inputs of base unit and optional boards", page 162
6	Check the hardware functions of the device. ⇒ Chapter 7.4 "Function test", page 75
7	Calibrate the analysis sensors connected to the device if necessary. ⇒ Chapter 12 "Calibration in general", page 245
8	The device is now ready for use. You can configure the displays and functions of the device according to your needs.

7 Startup

7.2 Basic setup

This chapter deals with the most important settings for initial startup of the device. The installation instructions discuss the settings for:

- Analog and digital inputs
- Display and visualization of the input signals on overview screens and individual screens
- Analog and digital outputs

You are now able to activate basic functions such as measuring, alerting, and transmitting analog values in the form of a standard signal to other measuring and control systems, both open- and closed-loop.

The complete range of device functions is described in the operating manual. ⇒ JUMO AQUIS touch S operating manual

⇒ See JUMO AQUIS touch S operating manual

7.2.1 Date and time

The date and time settings are made in the "Parameterization" menu.

The following table explains the parameters for setting the date and time.

Parameter	Selection/ setting option	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	Automatic switch from daylight saving time to standard time
Start DST		
• Month	January to December	Month for switch to daylight saving time
• Day of the week	Monday to Sunday	Weekday for switch to daylight saving time
• Day in month	first second third fourth last	Number of the selected weekday for switch to daylight saving time in the respective month
• Time	hh:mm:ss	Time to switch to daylight saving time
End DST		
• Month	January to December	Month to switch to standard time
• Day of the week	Monday to Sunday	Weekday to switch to standard time

Parameter	Selection/ setting option	Explanation
• Day in month	first second third fourth last	Number of the selected weekday for switch to standard time in the respective month
• Time	hh:mm:ss	Time to switch to standard time

7.2.2 Basic settings

The "Basic Settings" menu of the device contains a set of basic device settings that must be made when starting up the device.

Device Menu > Configuration > Basic Settings



NOTE

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

⇒ Unbekannte Quelle des Querverweises

Explanations of the individual configuration items in the "Basic Settings" menu can be found in the chapter on configuration.

⇒ Unbekannte Quelle des Querverweises

7 Startup

7.3 Digital sensors

**NOTE**

For operation of digital sensors, you need the extra code "JUMO digiLine protocol activated" (see Chapter 4.2 "Order details", page 17)

7.3.1 Initial startup

Sensors with JUMO digiLine electronics

**NOTE**

Only one serial interface of the device can be configured for operation of digital sensors. If your device has 2 serial interfaces (base unit and possibly an optional board), select 1 interface for connection of digital sensors and set its protocol to "Modbus digital sensors".

Thanks to plug & play, startup of sensors with JUMO digiLine electronics is very simple. As soon as a JUMO sensor with digiLine electronics is connected to the bus, the JUMO AQUIS touch S detects and links it to an available (not yet linked) and suitably configured input for digital sensors. The status of the link can be checked in the assignment table. If, prior to connection of the sensor, no input for digital sensors was configured with a suitable sensor type, this can also be done after connection of the sensor. Automatic linking of the sensor to the input for digital sensor occurs here as well. If several sensors of the same kind need to be put into operation, they must be put into operation individually in succession or the link must be established manually in the device menu.

For a sensor to be linked automatically to an input for digital sensors, the following conditions must be met:

- An available (unlinked) input for digital sensors must be configured for the sensor type of the sensor being connected. This can be checked by viewing the assignment table. All configured inputs for digital sensors are listed there with configuration information and link status.
- The sensor type listed for the configured input for digital sensors must match the type of sensor being connected.
- If "TAG check" is activated in the configuration of linkable inputs for digital sensors, the "Sensor TAG" must match the "TAG number" in the JUMO digiLine electronics of the sensor.

Viewing the assignment table:

⇒ Chapter 8.2.7 "Digital sensors", page 97

Manual linking:

⇒ Chapter "Procedure for manual linking of digital sensors", page 100

Configuring the inputs for digital sensors:

⇒ Chapter 10.11 "Digital sensors", page 168

The following table describes the startup procedure for an individual JUMO sensor with JUMO digiLine electronics.

Step	Action
1	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 91
2	Ensure that the serial interface being used for operation of digital sensors is configured correctly. The protocol must be set to "Modbus digital sensors".
3	Open the configuration of the digital sensors, select an available output for digital sensors and enter the type information for the sensor being connected. Open the configuration of the digital sensors: Device Menu > Configuration > Digital Sensors 1 to 6 > General
4	Open the assignment table for the digital sensors and check whether an entry exists for the input for digital sensors that was just configured. The line number must match the number of the input for digital sensors and the assignment table entry must show the status "Installation". The status is visualized by symbols in the right column of the assignment table. Open the assignment table: Device Menu > Digital Sensors ⇒ Chapter 8.2.7 "Digital sensors", page 97
5	Connect the sensor with JUMO digiLine electronics to the bus.
6	Check whether the assignment table entry has changed from "Installation" to "linked". If this is not the case after a waiting period of about 10 seconds, linking has failed. In such a case, check the correctness of the configuration and bus cabling (see Chapter 24.1 "Troubleshooting and remedies for digital sensors", page 443). For diagnosis, it is helpful to display more information about the assignment table entry. To display the information, press the "Info" button. This opens a text window in which, among other things, the most recent bus fault is displayed. ⇒ Chapter 8.2.7 "Digital sensors", page 97

7 Startup

Digital JUMO ecoLine and tecLine sensors

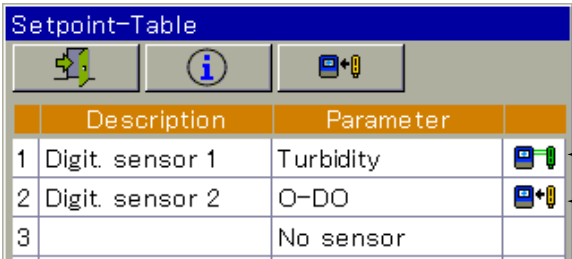
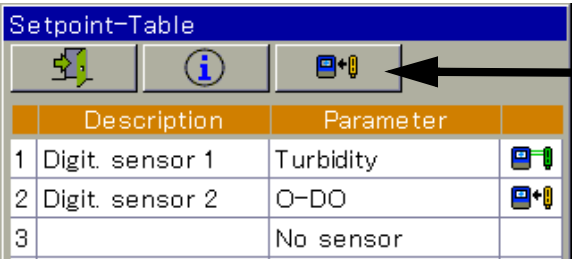
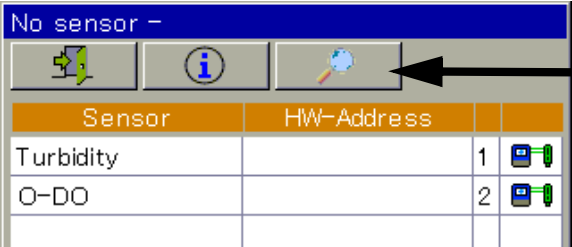


NOTE

Only one serial interface of the device can be configured for operation of digital sensors. If your device has 2 serial interfaces (base unit and possibly an optional board), select 1 interface for connection of digital sensors and set its protocol to "Modbus digital sensors" and the baud rate to "9600".

Digital JUMO ecoLine and tecLine sensors can communicate with the JUMO AQUIS touch S over the JUMO digiLine bus just like sensors with JUMO digiLine electronics. However, they do not support plug & play and must be put into operation in another way. The following table describes the startup procedure for an individual digital JUMO ecoLine or tecLine sensor.

Step	Action
1	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 91
2	Ensure that the serial interface being used for operation of digital sensors is configured correctly. The required settings are: Protocol: Modbus digital sensors Baud rate: • JUMO ecoLine: 9600 • JUMO tecLine: 9600, 19200 or 38400 (automatic) Data format: 8 - 1 - no parity
3	In the configuration, select an available input for digital sensors and enter the type information in the "General" folder of the sensor being connected. Open the menu: Device Menu > Configuration > Digital Sensors > Digital Sensors 1 to 6 > General ⇒ Chapter 7.3 "Digital sensors", page 70
4	Open the assignment table for digital sensors in the device menu. Open the assignment table: Device Menu > Digital Sensors ⇒ Chapter 8.2.7 "Digital sensors", page 97
5	Localize the entry whose number (1 to 6) matches that selected in step 1 and in the configured input for digital sensors.

Step	Action
6	Check whether this entry has the status "Installation". If this is not the case, check the configuration of the selected input for digital sensors. Example of view showing the status of assignment table entries:  ⇒ Chapter 8.2.7 "Digital sensors", page 97
7	Connect the sensor to the JUMO digiLine bus.
8	Highlight the prepared assignment table entry (status "Installation") by tapping it.
9	Open the "Link" submenu and highlight the assignment table entry that was just created by tapping it.  Button for opening the submenu for linking ⇒ Chapter 8.2.7 "Digital sensors", page 97
10	Using the "Scan Button", start a sensor scan and wait until the sensors scan is completed. If the sensor was detected, it will appear in the list of this menu with its status.  Button for opening the manual scan ⇒ Chapter 8.2.7 "Digital sensors", page 97
11	Leave the "Link" submenu by pressing the "Exit" button. This takes you back to the display of the assignment table.

7 Startup

Step	Action
12	Check whether the assignment table entry has changed from "Installation" to "linked". If this is not the case after a waiting period of about 10 seconds, linking has failed. In such a case, check the correctness of the configuration and bus cabling (see Chapter 24.1 "Troubleshooting and remedies for digital sensors", page 443). For diagnosis, it is helpful to display more information about the assignment table entry. To display the information, press the "Info" button. This opens a text window in which, among other things, the most recent bus fault is displayed. ⇒ Chapter 8.2.7 "Digital sensors", page 97

7.3.2 Restarting and replacing

Sensors with JUMO digiLine electronics

A JUMO digiLine electronics assembly that was disconnected from the bus for maintenance and repair is detected again automatically upon reconnection, linked to its original assignment table entry and resumes operation.

When replacing JUMO digiLine electronics assemblies, each electronics assembly must be replaced individually before the next one is disconnected from the bus. In this way, each new JUMO digiLine electronics assembly is linked automatically with the original assignment table entry.

Digital JUMO ecoLine and JUMO tecLine sensors

A digital **JUMO ecoLine or JUMO tecLine sensor** that was disconnected from the bus for maintenance and repair is detected again automatically upon reconnection, linked to its original assignment table entry and resumes operation.

When replacing digital **JUMO ecoLine or JUMO tecLine sensors**, it is necessary to follow the initial startup procedure to put the new digital sensors into operation (see Chapter 7.3.1 "Initial startup", page 70).

7.4 Function test

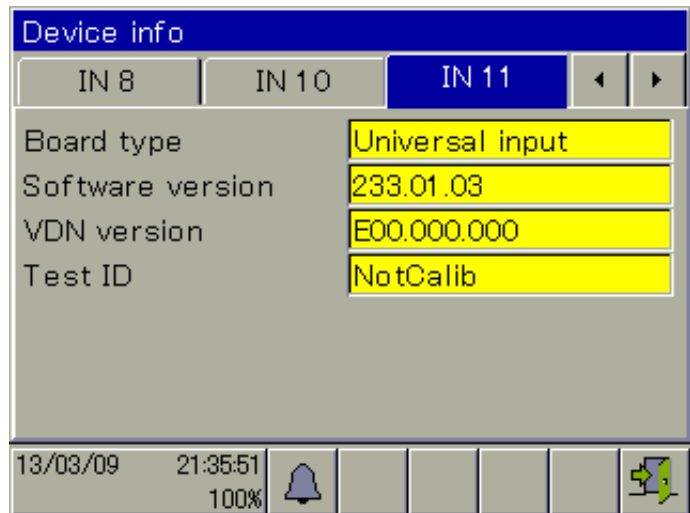
Important hardware information is displayed in the "Device Info" menu.
The functionality of the device can be checked from here.

7.4.1 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 9.1 "Installing optional boards", page 113

If this is not successful, contact Technical Support at JUMO. The contact data can be found on the back of these installation instructions.

7.4.2 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).

7 Startup

- **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

Device info			
Temperature		Analysis	
		Univer	◀ ▶
	Compensated	Uncomp.	
IN 7:	31,447 mS/cm	33,867 mS/cm	
IN 8:	7,0091 pH	-0,5434 mV	
IN 9:	-----	-----	
IN 10:	-----	-----	

13/03/09	21:40:29						
Master	100%						

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 (default setting).

⇒ Chapter 8.1.1 "Passwords and user rights", page 77

8.1.1 Passwords and user rights

The device has 4 users with factory-configured user names, passwords, and user rights. The passwords can be changed in the device.

⇒ Chapter 8.2.1 "Log-on/Log-out", page 91

The JUMO PC setup program is needed to change user names and user rights.

⇒ See JUMO AQUIS touch S operating manual for user management

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

Factory-set passwords

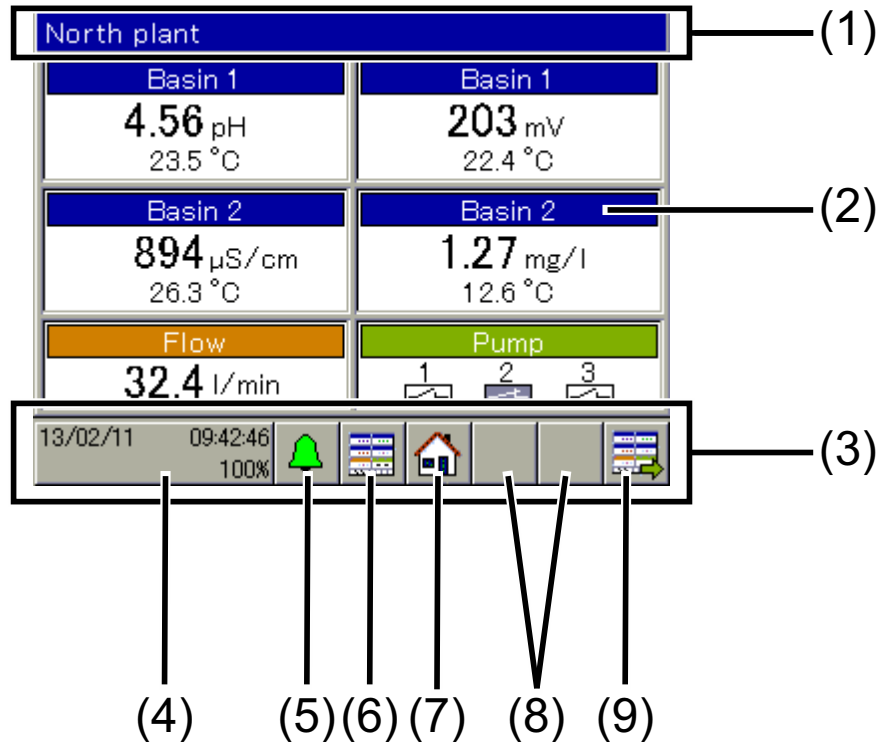
Users	Every-one	User 2	User 1	Service	Master
Factory-set password	-	20	110	3000	9200

8 Operation

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 info	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 - Calibration - Read out history of measurement data in the recording function - Display and change user level parameters - Read out service data - Link digital sensors manually		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) Title bar
- (2) Touchscreen
- (3) Toolbar with buttons for operation
- (4) "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 %)
- (5) "Alarm/Event List" button
- (6) "Select operator screen" button (direct selection of the desired operation screen)
- (7) "Home" button (back to main screen)
- (8) Placeholder for context-sensitive buttons
 Assignment depends on the particular operator screen.
 Specific buttons are shown in the placeholders on the operation screens for the controller and recording functions.
 ⇒ See JUMO AQUIS touch S operating manual, chapter on controller and recording function
- (9) "Next operation screen" button (for scrolling through operator screens)

8 Operation

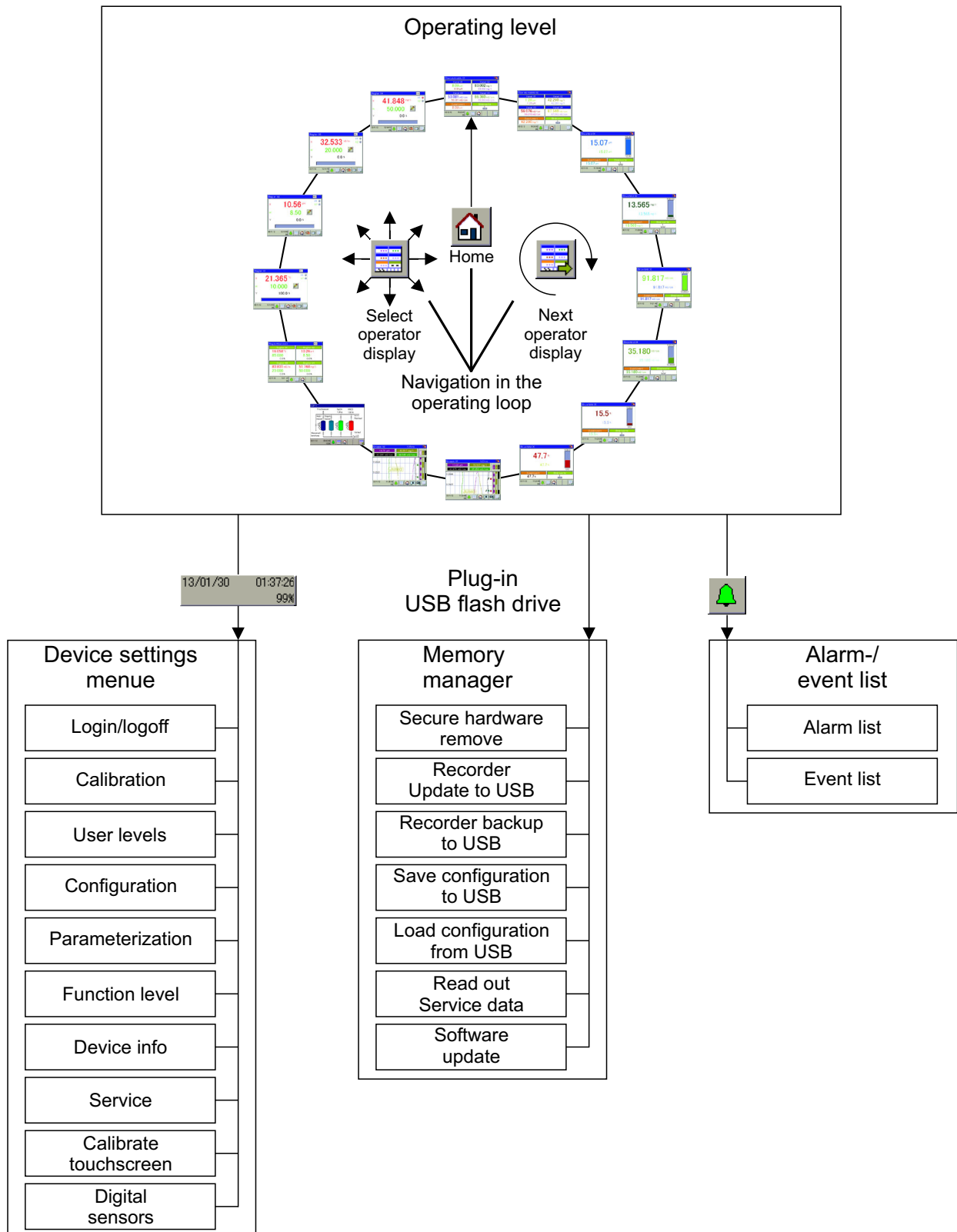
8.1.3 Menu structure

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 17, Extra Code 269).

Overview of the menu structure



8 Operation



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 17

Operation screens in the operation loop in the example

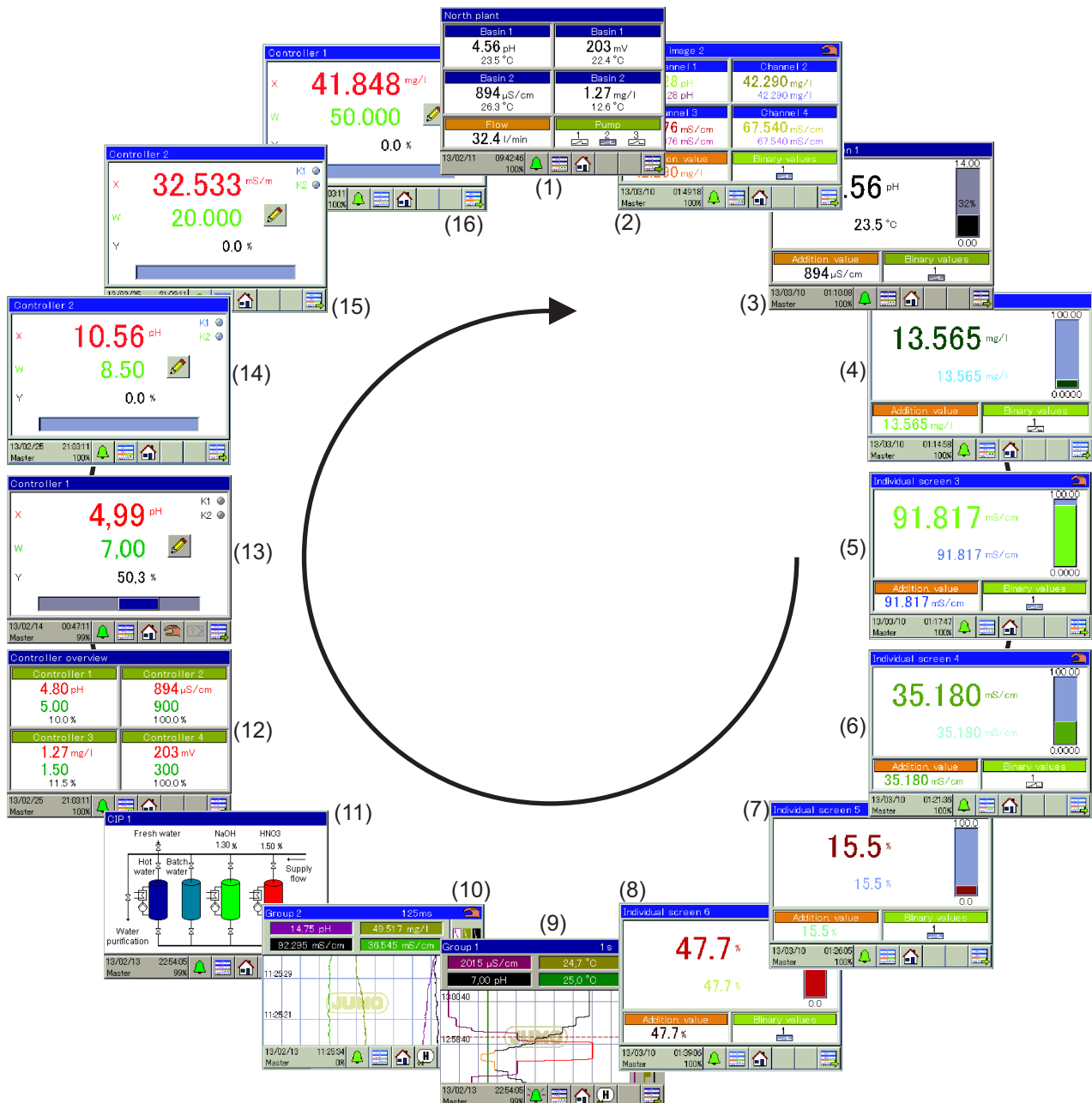


Figure	Operator screen	Description
(1)	General screen 1	User configurable overview display of measuring values and digital signal states
(2)	General screen 2	The overviews can be configured as a 2-part screen or a 4-part screen. 2-part screen: Display of 2 primary and 2 secondary measured values per 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.

8 Operation

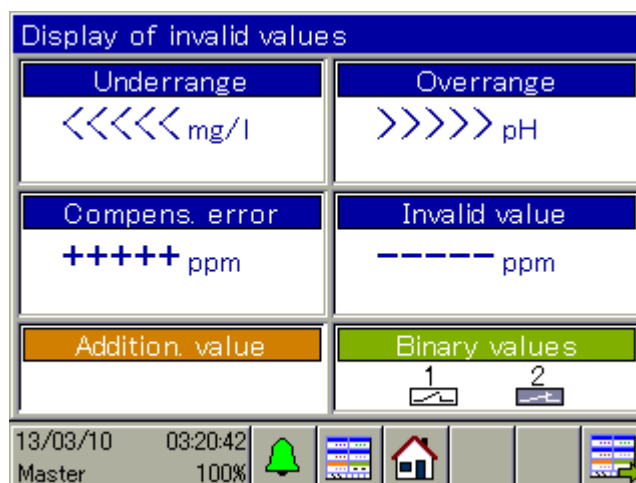
Figure	Operator screen	Description
(3)	Detailed screen 1	User configurable large-section screen Display of 1 main measuring value, 1 second measuring value, 1 additional value and up to 3 binary values, as well as additional visualization of the main measuring value and the alarm limits for an analog 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 measured values and 3 binary functions can be displayed on a configurable recorder screen (group). Up to 4 groups can be set up. Diagrams of disabled groups are not available in the operation loop (here in the figure this applies to groups 3 and 4).
(10)	Diagram group 2	
(11)	Process screens 1 to 8	User-defined visualization screen that is user configurable by means of an editor in the PC setup program ⇒ B202581.0 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 measurement 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. Errors with digital sensors: A digital sensor does not deliver valid values because it either is not correctly linked or a scan is in progress on the JUMO digiLine bus. Error in the formula used by the mathematics module: The result from a mathematical formula is invalid (e.g. division by zero) The extra code "Mathematics and Logic Module" is explained in the operating manual for the JUMO AQUIS touch S. ⇒ JUMO AQUIS touch S operating manual	-----
Display overrun: The value to be displayed is outside the limits of -99999 to 99999.	* * * * *

Example of display of invalid values:



8 Operation

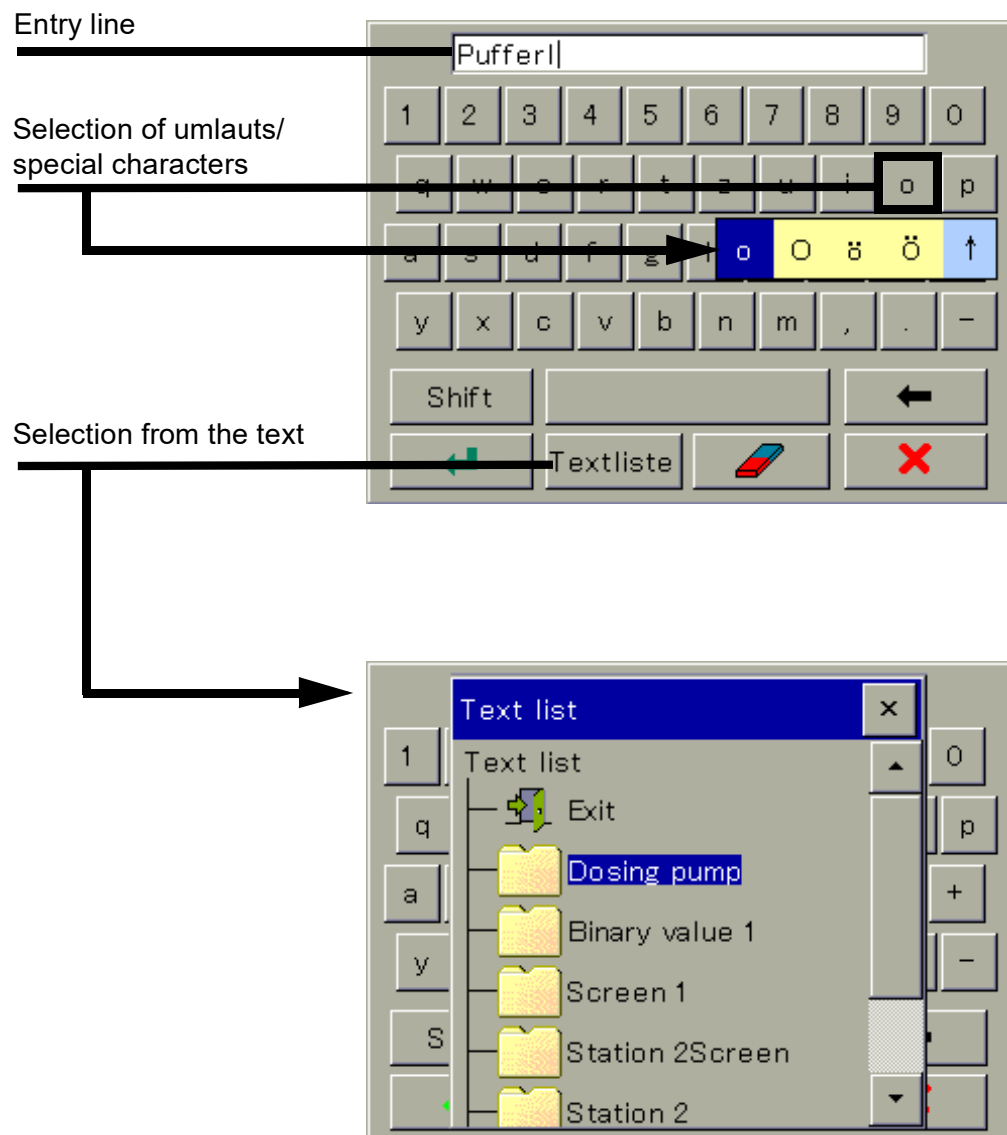
8.1.4 Entry of text and numbers

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.



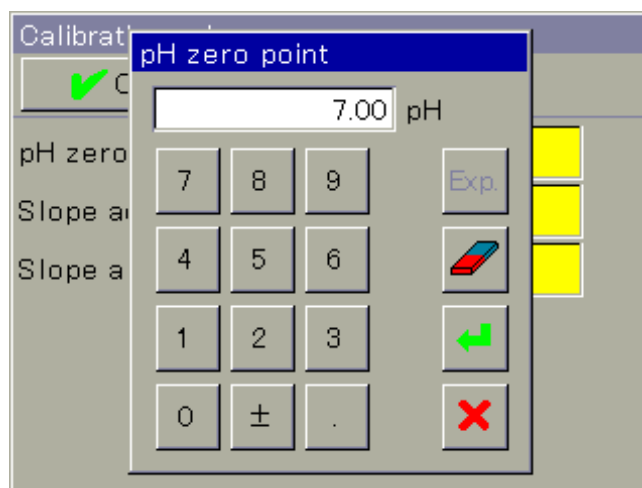
Number entry dialog

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 Operation

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 (default setting).

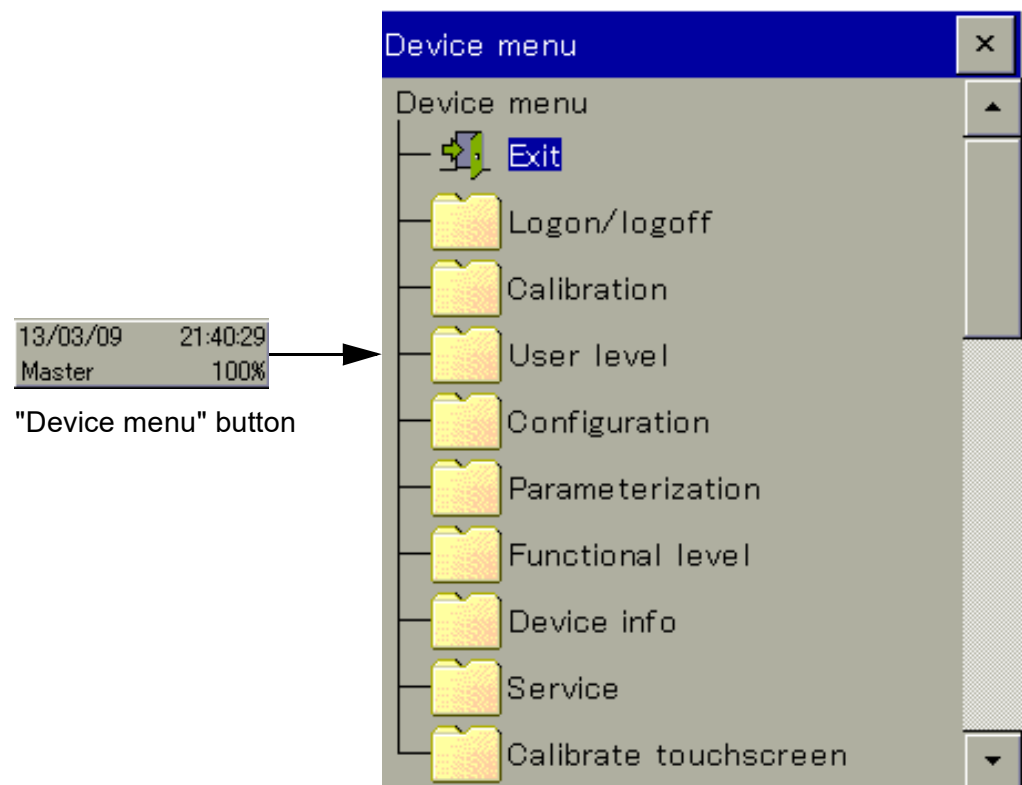
⇒ Chapter 8.1.1 "Passwords and user rights", page 77

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 79

⇒ Chapter 8.1.3 "Menu structure", page 80

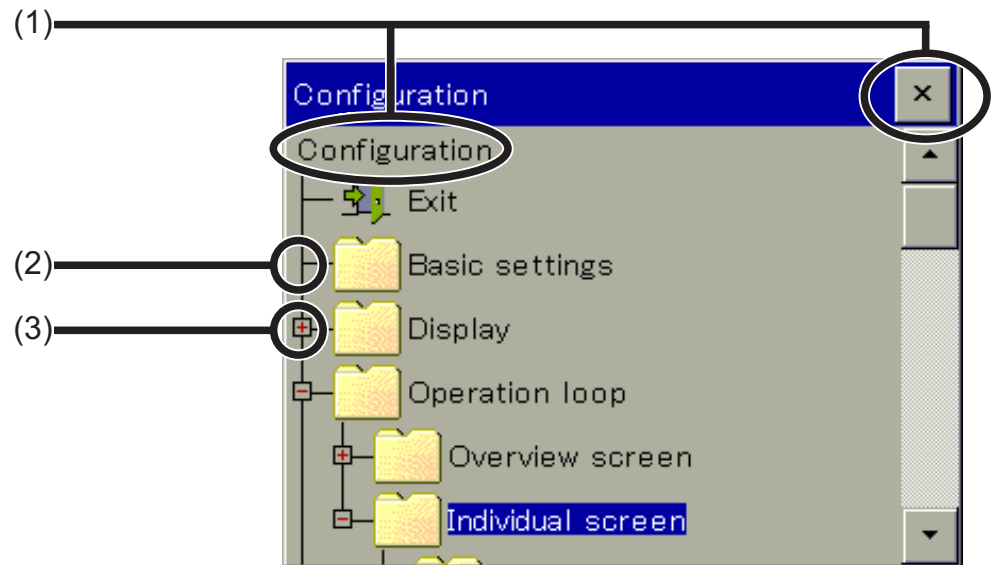


Device menu items	Description
Log-on/Log-out	The user logs on and out here. In addition, passwords can be changed here. ⇒ Chapter 8.2.1 "Log-on/Log-out", page 91
Calibration	Sensor calibration can be configured and performed here. In addition, current calibration values and the calibration log-book are displayed. ⇒ Chapter 12 "Calibration in general", page 245

Device menu items	Description
User levels	User levels permit fast and simple access to a selection of up to 50 frequently needed parameters per user level from the parameter level and the configuration level. Up to 16 user levels can be set up. 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 Levels" entry does not appear in the device menu as long as no user level is configured. ⇒ Chapter 8.2.2 "User levels", page 92
Configuration	Basic operation of the device inputs and outputs and the device functions is set here. ⇒ Chapter 10 "Configuration", page 141
Parameterization	Set date and time ⇒ Unbekannte Quelle des Querverweises The setting of controller parameter sets and controller set-point values is discussed in the operating manual. ⇒ JUMO AQUIS touch S operating manual
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 93
Device info	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 info", page 95
Service	Anzeigen und Auslesen von Servicedaten zu Diagnosezwecken, Speichern und Laden einer Default-Konfiguration, input of the calibration values from the Final Inspection Protocol of the JUMO digiLine O-DO H10/H20, input of the fine adjustment data of the JUMO flowTRANS US W02 dL ? Chapter 8.2.5 "Service", page 96
Calibrate Touchscreen	Calibration of the touchscreen to ensure the reliability and convenience of touch control ⇒ Chapter 8.2.6 "Calibrating the touchscreen", page 97
Digital sensors	Open an overview of all configured digital sensors (Assignment table), check the link status of the sensors and manually link sensors that are not linked ⇒ Chapter 8.2.7 "Digital sensors", page 97

8 Operation

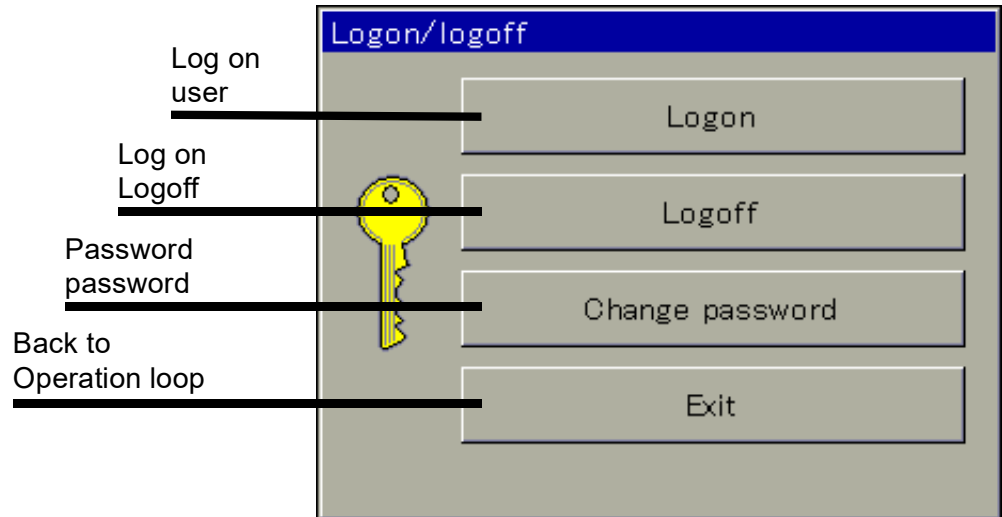
To navigate in submenus, menu items are opened by tapping the folder icons identified with a plus sign. Open menu structures are identified with a minus sign and can be closed again by tapping the folder icon. Currently open windows can be left either by tapping "Exit" or the "Close window" button. Data 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/off 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 77

After the re-authentication time has elapsed, a logged-on user is logged off automatically. It is then necessary to log on again.

The re-authentication timeout does not take effect if:

- The logon/logoff 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 22.8.3 "User list", page 371

8 Operation

8.2.2 User levels

A user level consists of a user-defined list of parameters and configuration settings. Up to 16 such user levels can be set up. You need the JUMO PC setup program to configure the user levels.

⇒ See JUMO AQUIS touch S operating manual, "PC Setup Program" chapter

User levels can be opened from the device menu only if they have 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 a 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 a user level (example)

User level	
Device name	Name
Config. IP address	Automatic
DNS device name	North plant
Time dosing pump	00:03:00
Washing time pH-s...	10 min
Washing time cond...	10 min

To make an entry, tap the display field



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 a 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.

Additional information on the recording function can be found in the operating manual of the JUMO AQUIS touch S.

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:** 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 binary 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 161
- ⇒ Chapter 10.8 "Digital outputs of base unit and optional boards", page 163
- ⇒ Chapter 8.2.1 "Log-on/Log-out", page 91

8 Operation

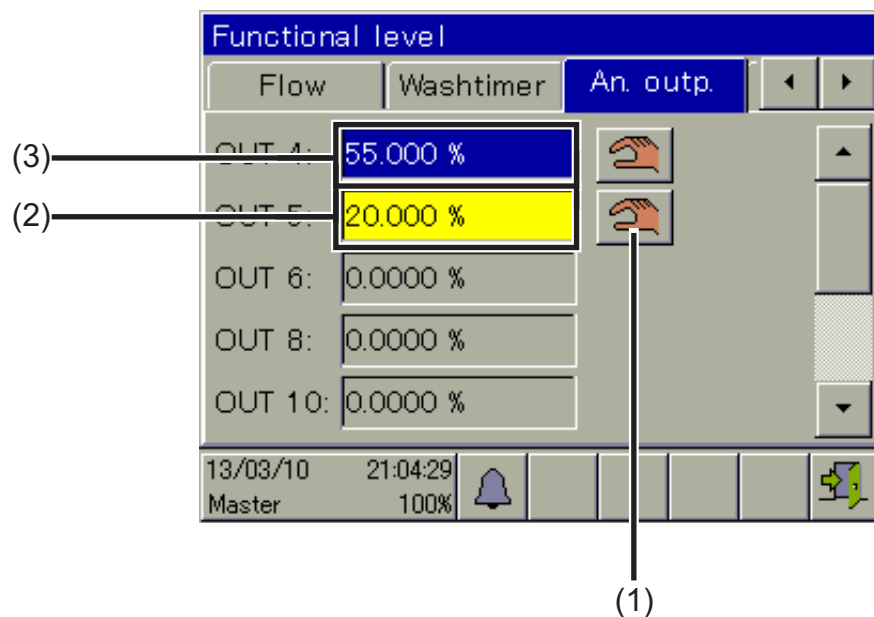
Manual control of analog/digital outputs

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 info

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:** Equipping overview of 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, limit value, timer, washtimer, counter, and controller) via their current status.
- **Ethernet info:** Ethernet communication statistics for diagnosis by trained personnel
- **Digital sensors:** Indication of the connection status of all configured digital sensors 1 to 6 as well as all current values and version information of linked sensors

8 Operation

8.2.5 Service

The "Service" menu is primarily 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.

The "Service" menu is also used to acquire the following data:

- Entering the calibration values from the Final Inspection Protocol when changing a sensor cap for the JUMO digiLine O-DO H10/H20 oxygen sensor.
- Input of the fine adjustment data for the ultrasonic flowmeter JUMO flowTRANS US W02 dL.



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 91

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.

⇒ See JUMO AQUIS touch S operating manual, "PC Setup Program" chapter

⇒ Chapter 8.4 "Memory Manager (USB flash drive)", page 110

- **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.
- **Sensor data 1 to 6:** For each digital sensor that is operating on the device, a menu with the following functions is displayed here, depending on the sensor type
 - Reset the calibration data of the sensor to the factory setting.
 - Enter calibration data from the Final Inspection Protocol after changing the sensor cap (JUMO digiLine O-DO H10/H20).
 - Enter fine adjustment data (JUMO flowTRANS US W02 dL).
- **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 binary outputs. The **voltage of the buffer battery** and the **board temperature** are shown in the "Internal data".



CAUTION!

A buffer battery is built into the device. Its purpose is to maintain data when the device is switched off or if the voltage supply is interrupted. If the battery approaches the end of its operating life (approximately 7 years) then a battery prealarm will indicate that status. When the battery is empty a battery alarm will indicate that status. The battery must be exchanged before it is empty. The battery must be exchanged by the JUMO Service department! In this case, send in the device!

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.

8.2.7 Digital sensors

The assignment table (list of all configured inputs for digital sensors) is displayed here. Up to 6 digital sensors can be connected and operated via the selected serial interface. The link status of the configured sensors is displayed in the form of a symbol in the right column.

Setpoint-Table			
	Description	Parameter	
1	Digit. sensor 1	pH	
2	Digit. sensor 2	pH	
3		No sensor	
4		No sensor	
5		No sensor	
6		No sensor	

8 Operation

Link status symbols for the assignment table entries

Status	Explanation	Symbol
linked	Communication between the sensor electronics and the JUMO AQUIS touch S has been successfully established. The sensor is operating.	
Installation	The device searches for the individual assignment table entry of a linkable sensor. A new sensor can be linked manually or automatically if the following prerequisites are met: • The sensor type must match the settings of the assignment table entry. • The sensor version must be compatible • Operation of bus communication must be assured through correct interface settings (with JUMO digiLine electronics, the interfaces are configured automatically during the scan) Known sensors are identified and assigned and linked with the known entry After successful assignment, the status changes from "Installation" to "linked" following connection of the sensor to the bus. If a sensor cannot be linked, the status remains "Installation". If the status has not changed from "Installation" to "linked" after a waiting period of about 15 seconds, linking of the sensor electronics has failed. A description of the startup procedure for digital sensors can be found in the chapter on startup. ⇒ Chapter 7.3 "Digital sensors", page 70	

In addition to the "Exit" button, this view also has "Info" and "Link" buttons. The following table explains the function of these buttons.

Explanation	Button
The "Info" button opens an overview of important information to more easily identify the individual sensor connected.	
With the "Link" button, you can access the submenu for linking sensors that are not linked. Digital JUMO-ecoLine and JUMO-tecLine sensors must be linked by means of this button during startup. When errors occur during the startup of digital sensors, you usually have the ability here to detect connected digital sensors by means of a bus scan and then to link the detected sensors manually. Help for problems when sensor electronics cannot be detected or linked can be found in the Annex. ⇒ Chapter 24.1 "Troubleshooting and remedies for digital sensors", page 443	

Submenu for linking

In this menu, the bus can be "scanned" for connected sensors. The sensors detected are displayed in a list. Sensors that are not detected cannot be linked here manually. In addition to the "Exit" button, this view also has "info", "Scan" and "Link" buttons. Corresponding user rights are needed to access the "Link" submenu. The default settings authorize the "Master", "User 1", "User 2" and "Service" users for this.

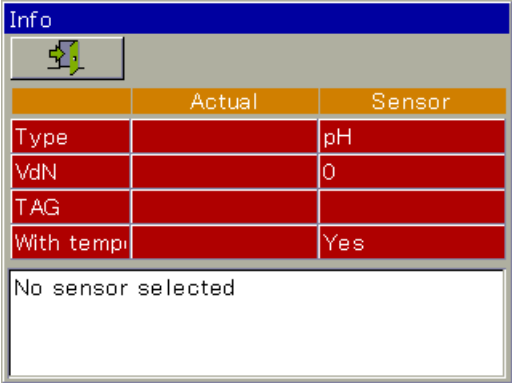
⇒ Chapter 8.1.1 "Passwords and user rights", page 77

The following table explains the function of these buttons.

Explanation	Button
The "Info" button opens an overview of important information to more easily identify the individual sensor connected.	
Pressing the "Scan" button starts the search for sensors connected to the bus. Detected sensors are listed on conclusion of the bus scan. The digital sensors connected do not provide any measurement data for the duration of the scan. Instead of the measured values, the "Invalid display value" symbol appears in the associated measured value displays (see Chapter "Display of invalid values", page 85).	
Detected sensors can be linked manually with the "Link" button in this menu. It appears in this view when one of the detected sensors in the list has been highlighted by a tapping it in this menu. The procedure is described at the end of this table. Help for problems when digital sensors cannot be detected or linked can be found in the Annex. ⇒ Chapter 24.1 "Troubleshooting and remedies for digital sensors", page 443	

8 Operation

Procedure for manual linking of digital sensors

Step	Action
1	In the "Digital Sensors" menu, highlight the assignment table entry to be linked.
2	Open the "Link" submenu by tapping the corresponding button in the "Digital Sensors" menu.
3	Open the "bus scan" by pressing the "Scan" button (magnifying glass).
4	In the list of detected sensors, highlight the one that you wish to link with the previously highlighted assignment table entry. Sensors with JUMO digiLine electronics can be identified by the hardware address on the nameplate of the JUMO digiLine electronics. It is also displayed in the list of detected sensors and in the sensor information ("Info" button).
5	The "Link" button now appears above the table. Press this button to link the selected assignment table entry with the sensor selected from the list of detected sensors.
6	If the link was successful, the previously selected entry now has the status "linked" in the assignment table. If the digital sensor could not be linked, an error message appears. The error message displays a table with information about the selected assignment table entry and the sensor selected from the list of detected sensors. The error message is displayed in the lower area. Example of an error message: No assignment table entry was selected before the "Link" submenu was opened. 

Bus status display

The operating status of the JUMO digiLine bus is visualized in the title bar. The symbols and their meanings are explained in the following table. The symbols and their meanings are explained in the following table.

Green There are no bus errors. All sensors are linked and functioning.	
Red This symbol appears in the title bar when connecting sensor electronics that have not yet been linked with the device. As soon as the sensor electronics are linked, the bus status changes from "Yellow" to "Green". In addition, the status "Red" is also displayed during a bus scan.	
Yellow The "Yellow" status appears in the title bar when digital sensors are not linked, e. g. As the result of defective components in the bus or a faulty configuration (see Chapter 24.1 "Troubleshooting and remedies for digital sensors", page 443). Furthermore, the "Yellow" status is also displayed when digital sensors are booted after a bus scan or after the device is switched on.	

8 Operation

8.3 Alarm/Event list

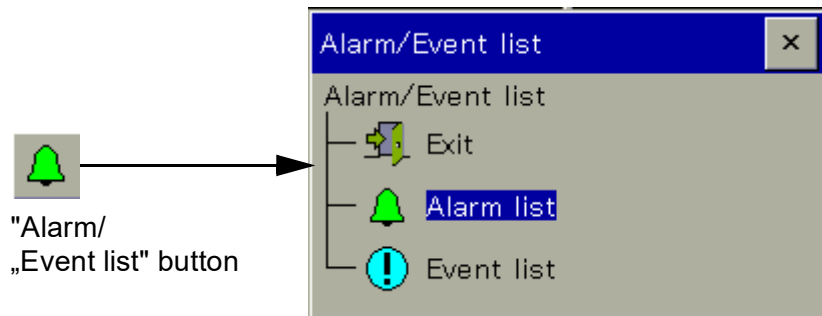
The JUMO AQUIS touch S offers the option of configuring alarm functions and event functions in numerous functions. In addition, the electronics of the JUMO AQUIS touch S are self-monitoring and trigger corresponding preprogrammed alarms and events in case the internal device malfunctions.

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 79

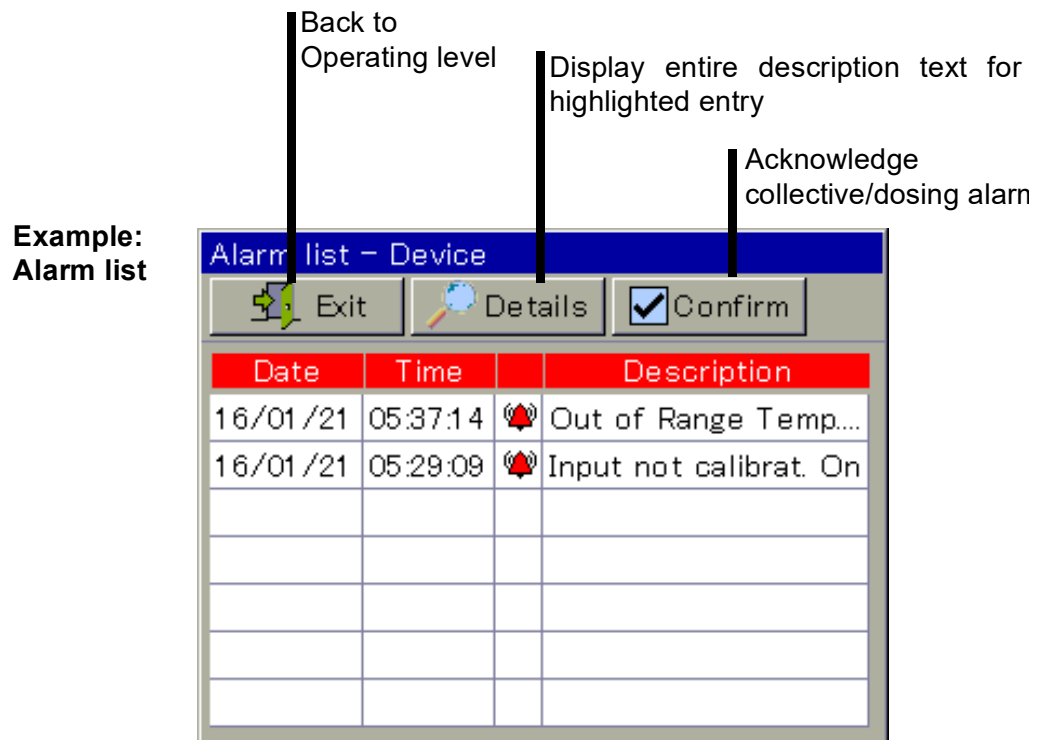
⇒ Chapter 8.1.3 "Menu structure", page 80



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 105



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. The symbols used for visual signaling of alarms are listed in the following table.

Meaning	Symbol
at least 1 alarm present	
Details can be viewed in the "Alarm list" and in the "Event list".	
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 143

If the alarm from a measurement input disappears, the color of the respective measuring-value display changes in accordance with the color settings.

⇒ Chapter 10.3.3 "Colors", page 144

8 Operation

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 binary 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 when the control deviation is greater 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.

⇒ See JUMO AQUIS touch S operating manual

Selection of a dosing alarm when configuring internal functions and digital outputs:

Binary Selection > Controller > Dosing Alarm, Controller 1 to 4

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

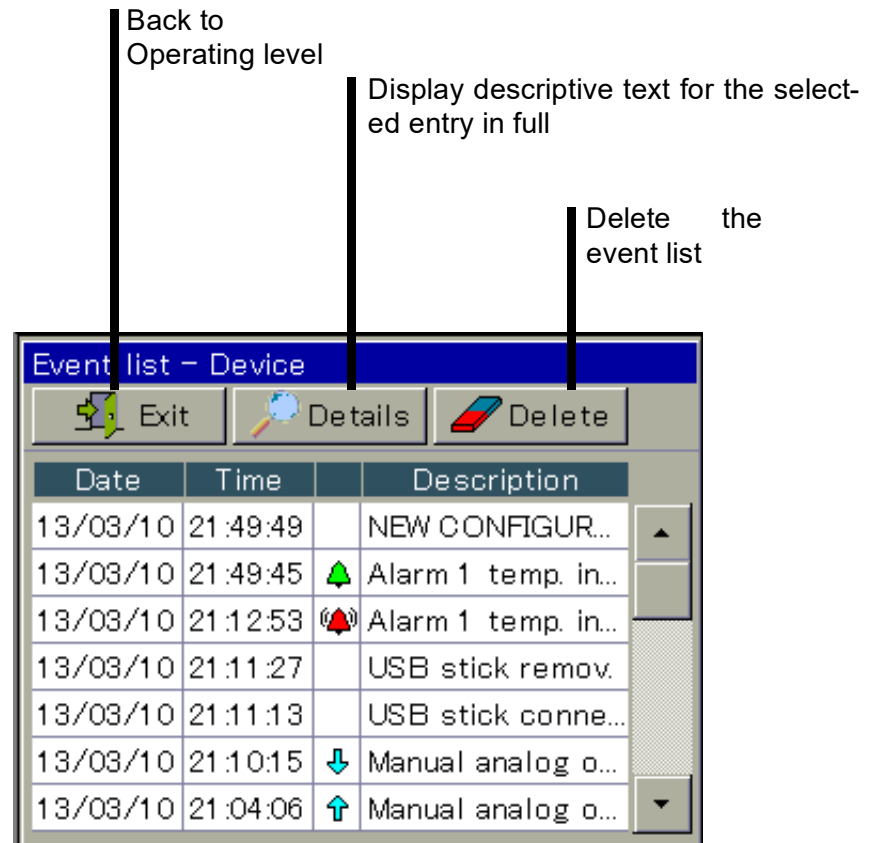
8 Operation

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

⇒ See JUMO AQUIS touch S operating manual



8 Operation

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	
- Switch DST - No connection to an input module - Configuration change - Reset counter - Reset flow rate measurement - Confirm collective alarm - E-mail sent (with indication of the e-mail index 1 to 5) - E-mail error (with indication of the e-mail index 1 to 5^a and error number^b)	No symbol

^a Up to 5 event-controlled e-mail notifications can be set up in the JUMO PC setup program. The notifications are numbered consecutively with an index from 1 to 5. The index corresponds to the tab number on an e-mail template in the JUMO PC setup program. The index corresponds to the tab number on an e-mail template in the JUMO PC setup program.

^b The meaning of each error number is listed in the following table.

8 Operation

Error codes in the event list when sending an e-mail via modem and Ethernet

Error number	Meaning
120	Step error in state automation
121	Invalid response length
122	No CONNECT from modem
123	FCS checksum incorrect
124	Unexpected value or response
125	Conf request not accepted
126	No conf request from opposite end
127	No CHAP request from opposite end
128	Response timeout
129	Unknown modem response
130	Unexpected OK from modem
131	Unexpected CONNECT from modem
132	Unknown frame received
133	Unexpected PROTOCOL from modem
134	Unexpected COMPRESS from modem
135	Invalid PPP packet received
136	Unexpected BUSY from modem
137	Unknown authentication protocol
138	Ignored LCP option
139	Unexpected DELAYED from modem
140	Unexpected NODIALTONE
141	Unknown PPP protocol
142	Unknown PAP code
143	Ignored IPCP option
144	Ignored IPCP code
145	Unknown CHAP code
146	IP checksum incorrect
147	Unknown IP protocol
148	Unknown ICMP type
149	Unknown LCP type
150	Received as client DNS request
151	Unknown DNS error
152	DNS response is split
153	No IP received via DNS
154	Unknown UDP port
155	TCP checksum incorrect
156	Incorrect TCP port
157	Unknown TCP-SYN option
158	TCP port not used
159	Unknown POP3 response
160	Unknown SMTP response
161	Unknown DNS name
162	No MD5 requested for CHAP

163	Authentication error
164	Canceled from opposite end
165	Error creating TCP socket
166	Error binding TCP socket
167	Error during TCP connect
168	Error sending TCP telegram
169	Error closing TCP socket
170	Error during TCP listen
171	Reset during TCP accept
172	Error during TCP accept
173	SMTP server reports syntax error
174	TCP socket is already closed
175	Incorrect frame configuration
176	Already sent from the gateway

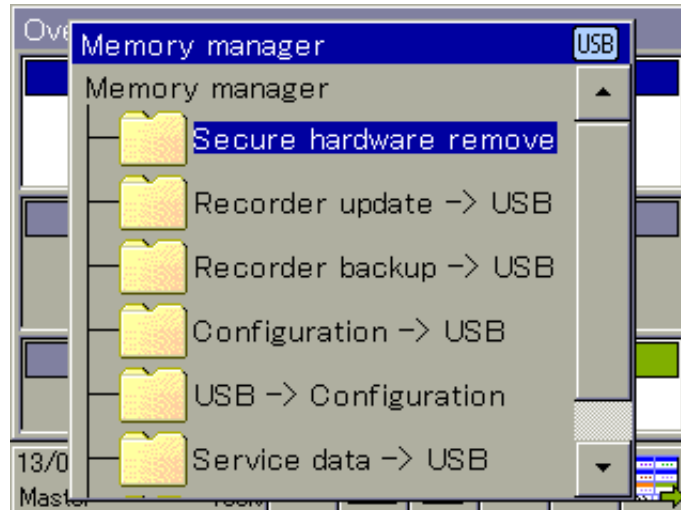
8 Operation

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 77

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. These files can be opened and evaluated with the aid of the JUMO PCA3000 evaluation software. Data that has been extracted is marked internally as retrieved and the available memory display is set 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.

The full description of the recording function can be found in the operating manual.

⇒ See JUMO AQUIS touch S operating manual

- **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.

8 Operation

- **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 96



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 of the destination device, 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 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 device software update.

9 Retrofitting optional boards

9.1 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.



CAUTION!

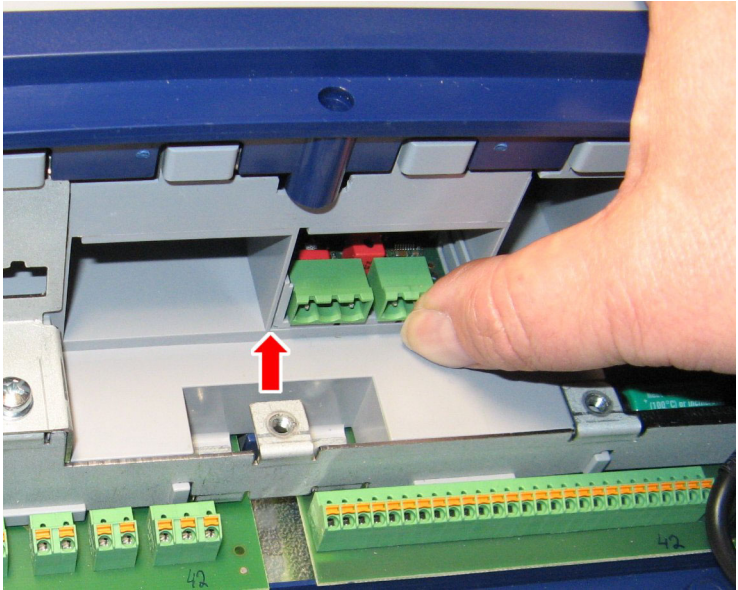
Optional boards must be carefully inserted into the SMK plug connections on the device's motherboard without tilting. Failure to do this can cause the SMK plug connections on the device's motherboard to break off. This applies in particular for the optional board of the COM 2 slot (serial interface RS422/485 and PROFIBUS-DP). In order to avoid damage:

- always use the plastic board frame provided
- Carefully slide the plastic board frame with the optional board into the slot without tilting
- Apply uniform pressure to insert into the SMK plug connection on both sides of the optional board front and do not tilt.

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 9.2 "Energy balance test", page 116
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 4.4 "Accessories", page 21 Using the block diagram, select a suitable slot for the optional board. ⇒ Chapter 3.2 "Block diagram", page 13
4	Open the terminal compartment on the device. ⇒ Chapter 6.2.1 "Opening the terminal compartment on the device", page 35
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 43
6	Unplug all plug-in screw terminals and interface cables that prevent removal of the cover plate.

9 Retrofitting optional boards

Step	Action
7	Unscrew the 2 screws in the cover plate over the selected optional board slot and remove the cover plate. 
8	Insert the optional board into the selected slot straight and without tilting. Apply uniform pressure to insert at the right and left corners of the optional board front and allow it to engage gently into the SMK plug connection. 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). 

9 Retrofitting optional boards

Step	Action
9	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 14
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.
12	Insert the plug-in screw terminal for the M12 socket into the Ci optional board. The factory-installed wiring must not be changed.
13	Connect the inductive conductivity sensor to the M12 socket.
14	Reinsert all other plug-in screw terminals and interface cables.
15	Reattach the terminal compartment cover. Tighten all 6 screws in the terminal compartment cover to a torque of 1 Nm.
16	Now, reconnect the power supply and check whether the new hardware has been recognized. ⇒ Chapter 7.4.1 "Checking the optional boards", page 75
17	Only for Ci optional boards (inductive conductivity): Perform a Ci base calibration. ⇒ Chapter "Performing the Ci base calibration", page 124
18	Only for optional boards for analysis inputs: Calibrate the analysis inputs. ⇒ Chapter 12 "Calibration in general", page 245

9 Retrofitting optional boards

9.2 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 modules. 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 optional boards. You only need to specify which optional 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 equipping 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 equipping 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

9 Retrofitting optional boards

9.2.1 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

9.2.2 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 version)
- Memory: 1 GB
- Available hard disk space: 1 GB
- DVD drive
- USB host interface
- LAN interface (Ethernet)



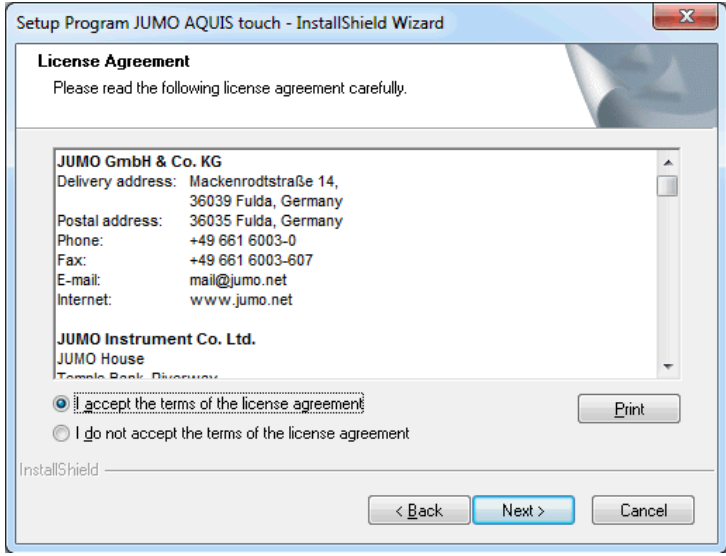
NOTE

If Microsoft®¹ Windows®¹ is already running, all Windows programs must be closed before installing the JUMO PC setup program.

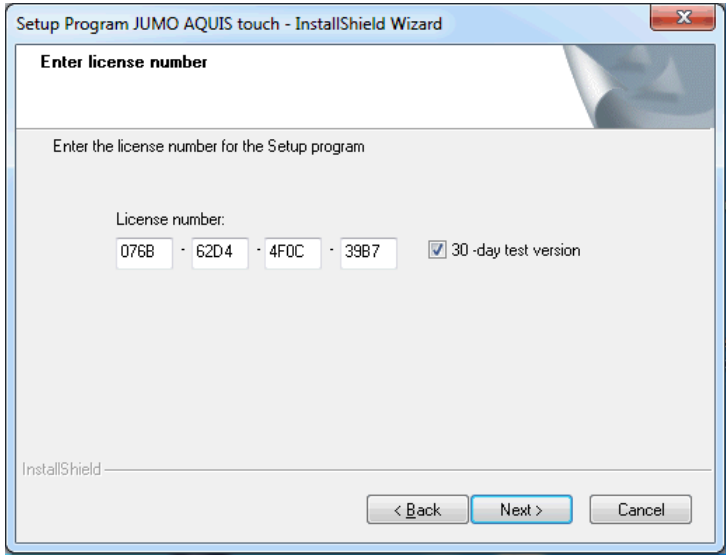
1. Microsoft, Windows XP, Windows Vista and Windows 7 are registered trademarks of the Microsoft Corporation.

9 Retrofitting optional boards

Procedure

Step	Action
1	With the PC running, insert the CD 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 with on-screen prompts.
4	Read and confirm the license agreement. Acceptance of the agreement is a basic requirement for installation of the software. 

9 Retrofitting optional boards

Step	Action
5	• 30-days test version or demo version Activate the check box for the 30-days test version. The entry fields for the license number are filled in automatically. You can perform the energy balance test with the demo version at any time. • Full version Insert the license key that you received from JUMO. 
6	Select the program folder to which the icons for starting the software are to be copied. The directory for the program files is determined automatically.
7	Click the "Install" button and wait until the installation has completed.



NOTE

If the "30-day test version" option is set during installation, the JUMO PC setup program is fully function for 30 days. After 30 days, the program switches automatically to a "demo version" in which some function, e.g. data transmission, data storage and printing are blocked. The software can be licensed at a later date.

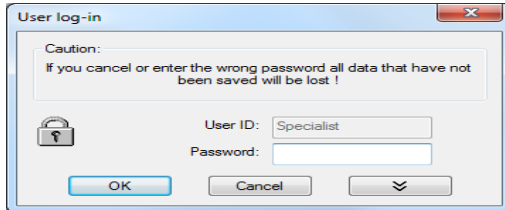
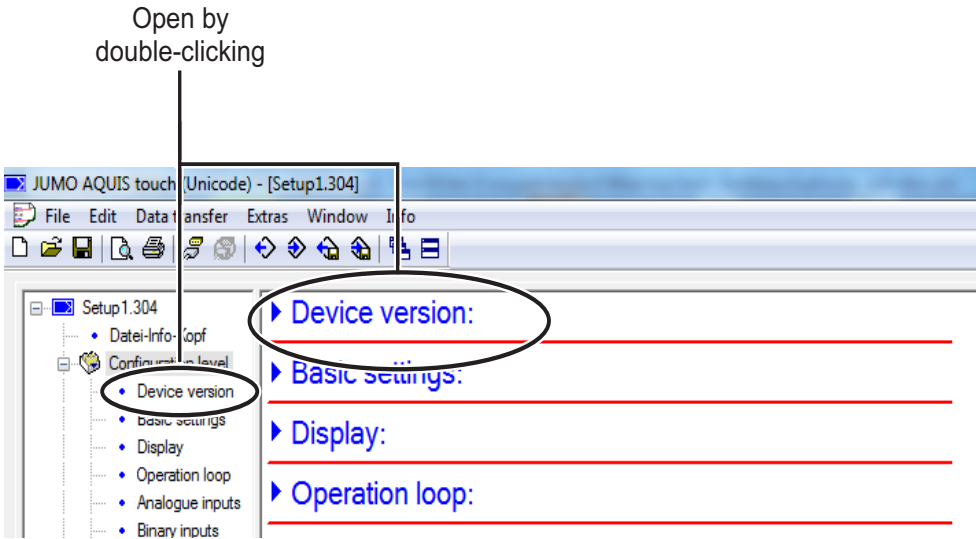
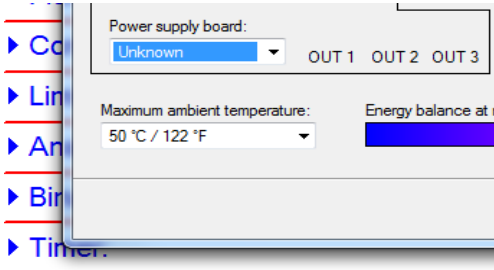
Program start

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

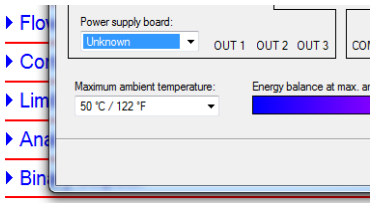
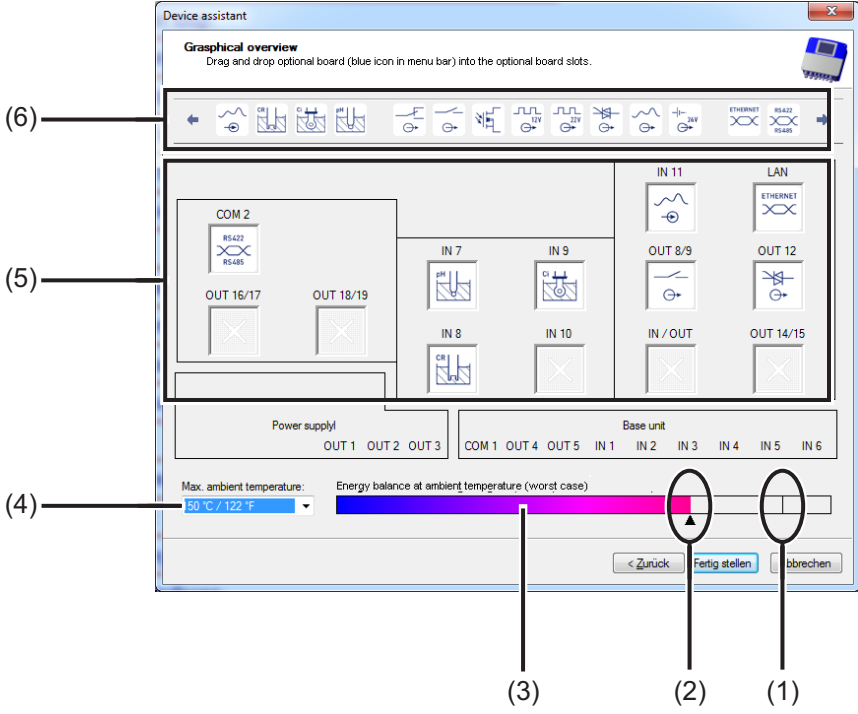
1. Microsoft, Windows XP, Windows Vista and Windows 7 are registered trademarks of the Microsoft Corporation.

9 Retrofitting optional boards

9.2.3 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".  The image shows a 'User log-in' dialog box with a caution message: 'Caution: If you cancel or enter the wrong password all data that have not been saved will be lost!'. It has fields for 'User ID' (containing 'Specialist') and 'Password', and buttons for 'OK', 'Cancel', and a help icon.
3	Open the "Device Version" menu item by double-clicking on it.  The image shows the 'JUMO AQUIS touch' setup window. A tree view on the left shows 'Setup 1.304' expanded, with 'Device version' selected. A callout line points to 'Device version' with the text 'Open by double-clicking'. On the right, a list of menu items is shown: 'Device version:', 'Basic settings:', 'Display:', and 'Operation loop:'. The 'Device version:' item is circled in red.
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 "Power supply unit board" field, set the device voltage supply in acc. with the information on device nameplate.  The image shows a 'Power supply board' configuration window. It has a dropdown menu set to 'Unknown' and buttons for 'OUT 1', 'OUT 2', and 'OUT 3'. Below, there is a 'Maximum ambient temperature' field set to '50 °C / 122 °F' and an 'Energy balance at n' field.

9 Retrofitting optional boards

Step	Action
7	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". 
8	Here, you can now easily insert in, reposition to and remove the desired optional boards (7) from the corresponding slots (6) symbolically via drag and drop. Make sure the setting on the power supply unit board (5) is correct. The supply voltage level must match the information on the device nameplate. 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. 

9 Retrofitting optional boards

Step	Action
9	Installation of the planned complement of optional boards poses no concerns if the energy balance limit has not been exceeded.

^a Microsoft and Windows 7 are registered trademarks of Microsoft Corporation.

9.3 Ci base calibration

Analysis inputs for inductive conductivity sensors must undergo a Ci base calibration during startup. 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 buffer 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).

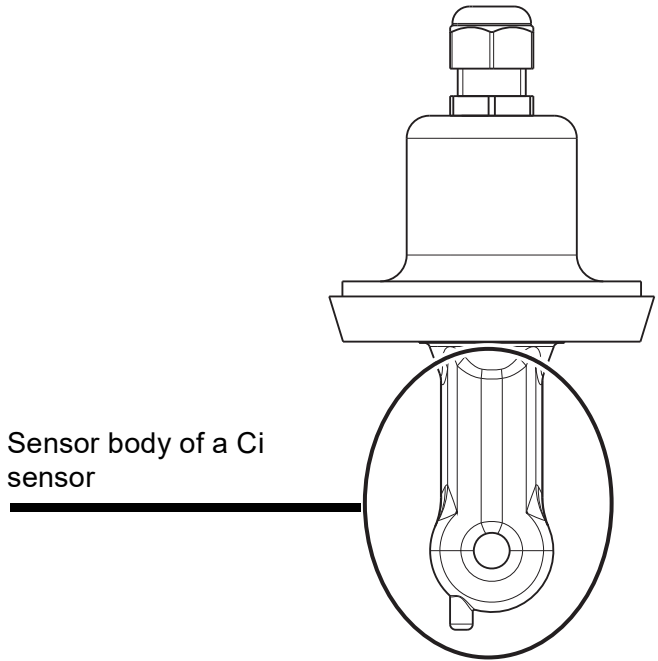


CAUTION!

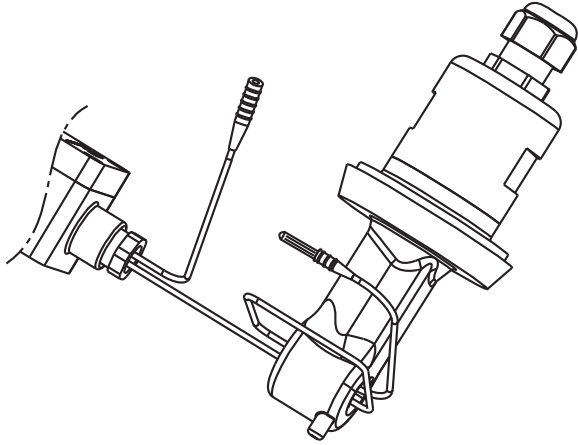
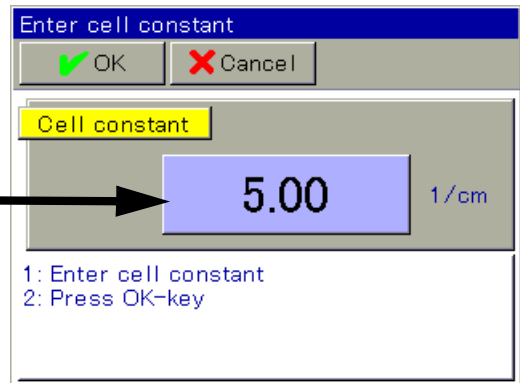
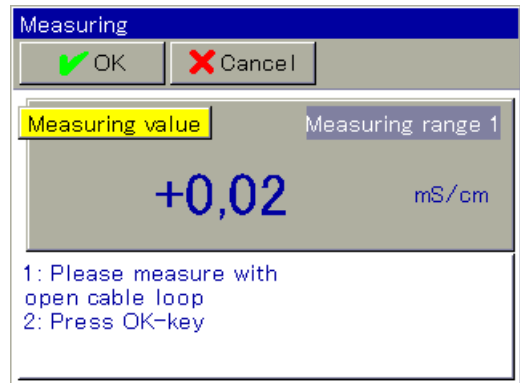
A buffer battery is built into the device. Its purpose is to maintain data when the device is switched off or if the voltage supply is interrupted. If the battery approaches the end of its operating life (approximately 7 years) then a battery prealarm will indicate that status. When the battery is empty a battery alarm will indicate that status. The battery must be exchanged before it is empty. The battery must be exchanged by the JUMO Service department! In this case, send in the device!

9 Retrofitting optional boards

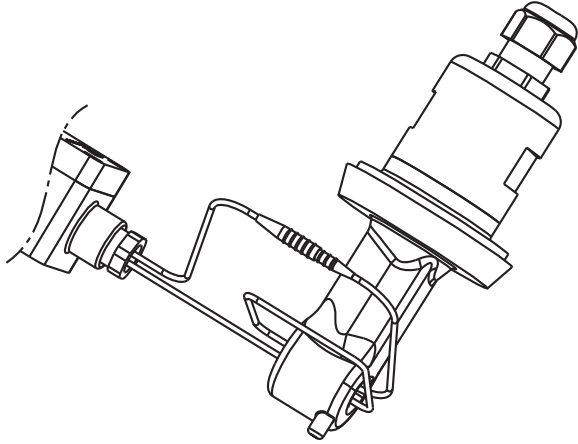
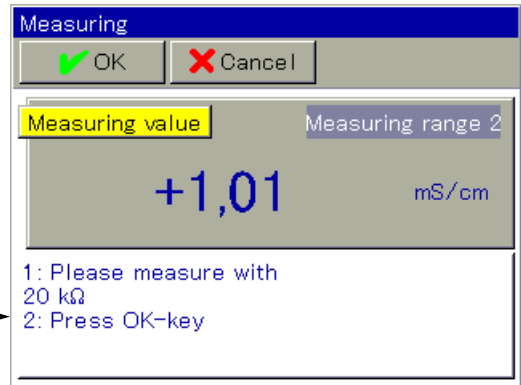
Performing the Ci base calibration

Step	Action
1	Ensure that you have user rights for calibration settings. The default settings authorize the "Master" and "Service" users for this. ⇒ Chapter 8.1.1 "Passwords and user rights", page 77
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  Sensor body of a Ci sensor

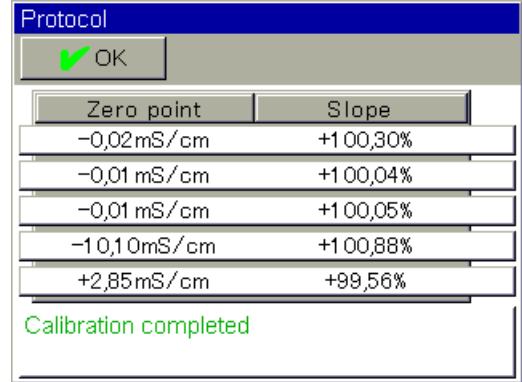
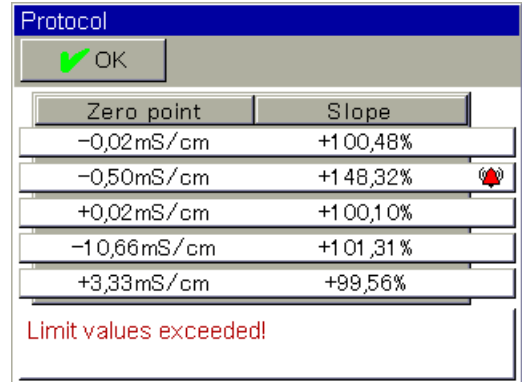
9 Retrofitting optional boards

Step	Action
4	Place the wire of the calibration sensor with 2 windings through the opening in the Ci sensor without connecting the ends of the wires. 
5	Start the Ci base calibration Device menu > Calibration > Select Ci Analysis Input > Ci Base Calibration
6	Enter the cell constant for the sensor and confirm by pressing "OK". Tap button to enter field 
7	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". 

9 Retrofitting optional boards

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: 20 kΩ). Once the measured value displayed has stabilized, confirm by pressing "OK". 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.

9 Retrofitting optional boards

Step	Action
11	Once all measurements 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 
12	Accept the calibration data acquired by pressing "Yes"; discard the data by pressing "No".

9 Retrofitting optional boards



JUMO GmbH & Co. KG

Street address:
Moritz-Juchheim-Straße 1
36039 Fulda, Germany
Delivery address:
Mackenrodtstraße 14
36039 Fulda, Germany
Postal address:
36035 Fulda, Germany
Phone: +49 661 6003-0
Fax: +49 661 6003-607
Email: mail@jumo.net
Internet: www.jumo.net

JUMO UK LTD

JUMO House
Temple Bank, Riverway
Harlow, Essex, CM20 2DY, UK
Phone: +44 1279 63 55 33
Fax: +44 1279 62 50 29
Email: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.

6724 Joy Road
East Syracuse, NY 13057, USA
Phone: +1 315 437 5866
Fax: +1 315 437 5860
Email: info.us@jumo.net
Internet: www.jumousa.com

