JUMO AQUIS 500 RS

Display unit/controller for digital sensors with Modbus protocol
Type 202569

B 202569.0
Operating Manual

JUMO

V7.01/EN/00598864/2022-06-29

WARNING!

A sudden malfunction of the device, or one of the sensors connected to it, could potentially result in dangerous, imprecise dosing! Suitable preventive measures to stop this happening must be in place.

NOTE!

Please read these operating instructions before commissioning the device. Keep the manual in a place which is accessible to all users at all times.

NOTE!

Resetting the contrast of the LCD display:

If the contrast/brightness setting has been adjusted so that the display text is no longer legible, the basic setting can be restored as follows:

* Switch off voltage supply.
* Hold down the keys ▼ and ▲ simultaneously, then switch on the voltage supply.

Reset the language to "English":

If the language has been adjusted so that the display text is no longer comprehensible, use the Administrator password, 7485, to reset the language to "English":

* Press the PGM key for longer than 3 seconds.
* Press the ▼ key once.
* Briefly press the PGM key.
* Enter 7485.
* Briefly press the PGM key.

The required language can then be set in
ADMINISTR. LEVEL > PASSWORD > PARAMETER LEVEL > DISPLAY > LANGUAGE .

Contents

Contents

Contents

1 Typographical conventions

1.1 Warning symbols

DANGER!

This symbol indicates that **personal injury from electrocution** may occur if the appropriate precautionary measures are not taken.

WARNING!

This symbol in connection with the signal word indicates that **personal injury** may occur if the appropriate precautionary measures are not taken.

CAUTION!

This symbol in connection with the signal word indicates that **damage to assets or data loss** will occur if the appropriate precautionary measures are not taken.

1.2 Note symbols

NOTE!

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

abc[1]

Footnote

Footnotes are remarks that **refer to** specific parts of the text. Footnotes consist of two parts:

An identification marking in the text and the footnote text.

The identification markings in the text are arranged as sequential superscript numbers.

✱

Action instructions

This symbol indicates that an **action to be performed** is described.

The individual steps are marked by this asterisk.

Example:

✱ Undo recessed head screws.

2 Description

General information

The device has a total of 1 digital interface, 1 analog temperature input, and 1 binary input. The digital interface is suitable for connecting sensors that have a Modbus-RS485 interface. If the connected sensor does not have an integrated temperature sensor, an RTD temperature probe Pt100, Pt1000, or NTC/PTC (up to 4 kΩ) can be connected to the analog temperature input. The voltage supply for the digital sensor is integrated into the device.

The LCD graphic display allows input signals to be displayed as digits or as a bar graph. Displaying parameters in plain text ensures that operation is easily understandable and safe.

Two optional relay changeover contacts are used to implement simple switching or alarm functions as well as demanding control tasks with P, PI, PD, and PID behavior. Upon request, the device can also be supplied with two analog outputs (0 to 10 V or 0(4) to 20 mA) that can be freely parameterized and scaled.

The device is suitable for tasks such as display, measurement, and control of:

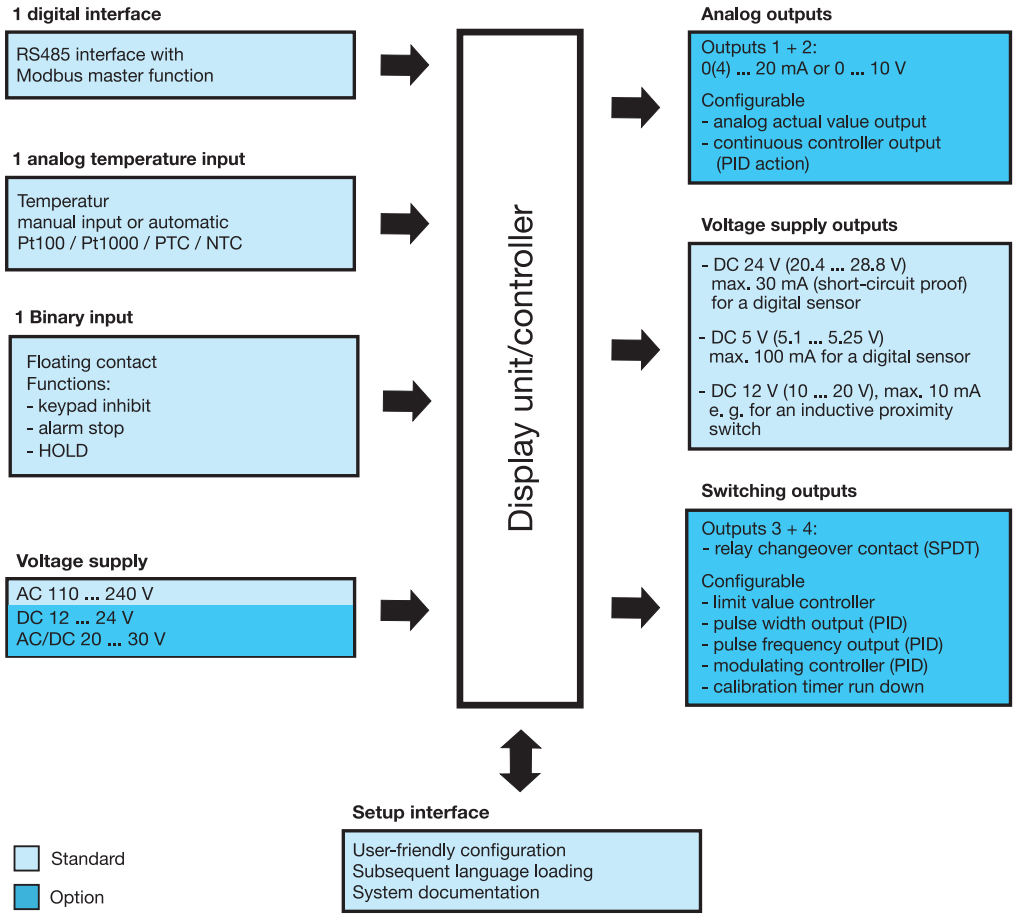
- **Dissolved oxygen** in conjunction with sensors acc. to data sheet 202614 and 202613
- **Free chlorine** in conjunction with sensors acc. to data sheet 202630
- **Total chlorine** in conjunction with sensors acc. to data sheet 202631
- **Chlorine Dioxide** and **Ozone** in conjunction with sensors acc. to data sheet 202634
- **Hydrogen Peroxide** and **Peracetic Acid** in conjunction with sensors acc. to data sheet 202636
- **Turbidity** in conjunction with sensors acc. to data sheet 202670
- **Bromine** in conjunction with sensors acc. to data sheet 202637

Special features

- Display: mg/l, ppm, % SAT, %, ‰, g/l, ppb, µg/l, NTU, FNU, etc.
  Others possible with use of the setup program (option)
- Large LCD graphic display with backlight
- Display can be selected: large digits, bar graph, or trend display
- Integrated calibration routines (depending on sensor): zero point, end value, and 2-point
- Calib. logfile
- Protection type IP67 for surface mounting
  Protection type IP65 for control cabinet mounting
- User languages (possible to switch): English, German, French
- With setup program (option): easy-to-use programming, plant documentation, download of additional user languages

2 Description

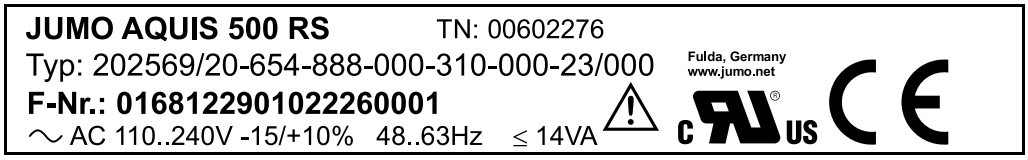
Block diagram



3.1 Nameplate

Position

The nameplate is affixed to the right-hand side of the case.



Contents

The nameplate shows important information. This includes:

Description	Designation on the nameplate	Example
Device type	Typ	202569/20-654-888-000-310-000-23/000
Parts no.	TN	00602276
Fabrication number	F-Nr.	0168122901022260001
Voltage supply		AC 110 to 240 V -15/+10 % 48 to 63 Hz <14 VA

Device (type)

Compare the specifications on the nameplate with your order documents. The supplied device version can be identified using the order code in (See chapter 3.2 "Order details", page 10).

Part no. (PN)

The part no. clearly identifies an article in the catalog. It is important for communication between the customer and the sales department.

Fabrication number (F-Nr.)

Among other things, the fabrication number indicates the production date (year/week) and the hardware version number.

Production date

Example: F-Nr. = 016812290102226**0001**
The figures in question are in positions 12 to 15 (from the left).
In this example, the device was produced in week **26** of 20**22**.

3 Identifying the device

3.2 Order details

(1) Basic type

202569/10 JUMO AQUIS 500 RS for panel mounting
202569/20 JUMO AQUIS 500 RS in surface-mounted case

(2) Input

654 RS485 Modbus master

(3) Output 1 (for main value or continuous controller)

000 No output
888 Analog output 0(4) to 20 mA or 0 to 10 V

(4) Output 2 (for temperature or continuous controller)

000 No output
888 Analog output 0(4) to 20 mA or 0 to 10 V

(5) Output 3

000 No output
310 Relay with changeover contact

(6) Output 4

000 No output
310 Relay with changeover contact

(7) Voltage supply

23 AC 110 to 240 V, -15/+10 %, 48 to 63 Hz
25 AC/DC 20 to 30 V, 48 to 63 Hz
30 DC 12 to 24 V, ±15 %

(8) Extra code

000 Without

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
Order code		-		-		-		-		-		-		/	
Order example	202569/20	-	654	-	888	-	000	-	310	-	000	-	23	/	000

3.3 Accessories (in scope of delivery)

4 × pluggable screw terminal
1 × small insertable jumper
1 × large insertable jumper
1 × mounting clip for cable diameter > 5 mm
2 × mounting clip for cable diameter < 5 mm
1 × mounting clip for cable diameter < 3 mm
2 × lens head screw 3.5 × 6.5
4 × spacing for panel installation
4 × hex nut for panel installation
4 × flat head screw M6 × 10
4 × mount
1 × cable gland M12 × 1.5
1 × flat gasket for cable gland M12 × 1.5
1 × reduction sealing ring M12 × 1.5
2 × cable gland M16 × 1.5
2 × flat gasket for cable gland M16 × 1.5
1 × multiple seal insert for cable gland M16 × 1.5
1 × stranded wire, PVC-insulated
1 × cable cover

3.4 Accessories (optional)

Type	Parts no.
Protective roof for JUMO AQUIS 500[a]	00398161
Pipe mounting kit for JUMO AQUIS 500[b]	00483664
DIN-rail mounting kit for JUMO AQUIS 500[c]	00477842
Support pillar with pedestal base, cantilever arm, and chain	00398163
Holder for suspended fitting	00453191
Rear case wall kit 20256x	00506351
PC setup program	00483602
PC interface cable with USB/TTL converter and two adapters (USB transmitter cable)	00456352

[a] The pipe mounting kit is required for installation of the protective roof.

[b] The JUMO AQUIS 500 can be fitted to a pipe (such as a support pillar or rail) with the pipe mounted kit.

[c] The JUMO AQUIS 500 can be fitted to a DIN-rail of 35 mm × 7.5 mm (acc. to DIN EN 60715 A.1) with the DIN-rail mounting kit.

4 Mounting

4.1 General information

Mounting site

Ensure that the device is easily accessible for later calibration.

It must be mounted securely and with minimum exposure to vibration.

Avoid direct sunlight!

Admissible ambient temperature at installation location: -10 to 55 °C at max. 95 % rel. humidity without condensation.

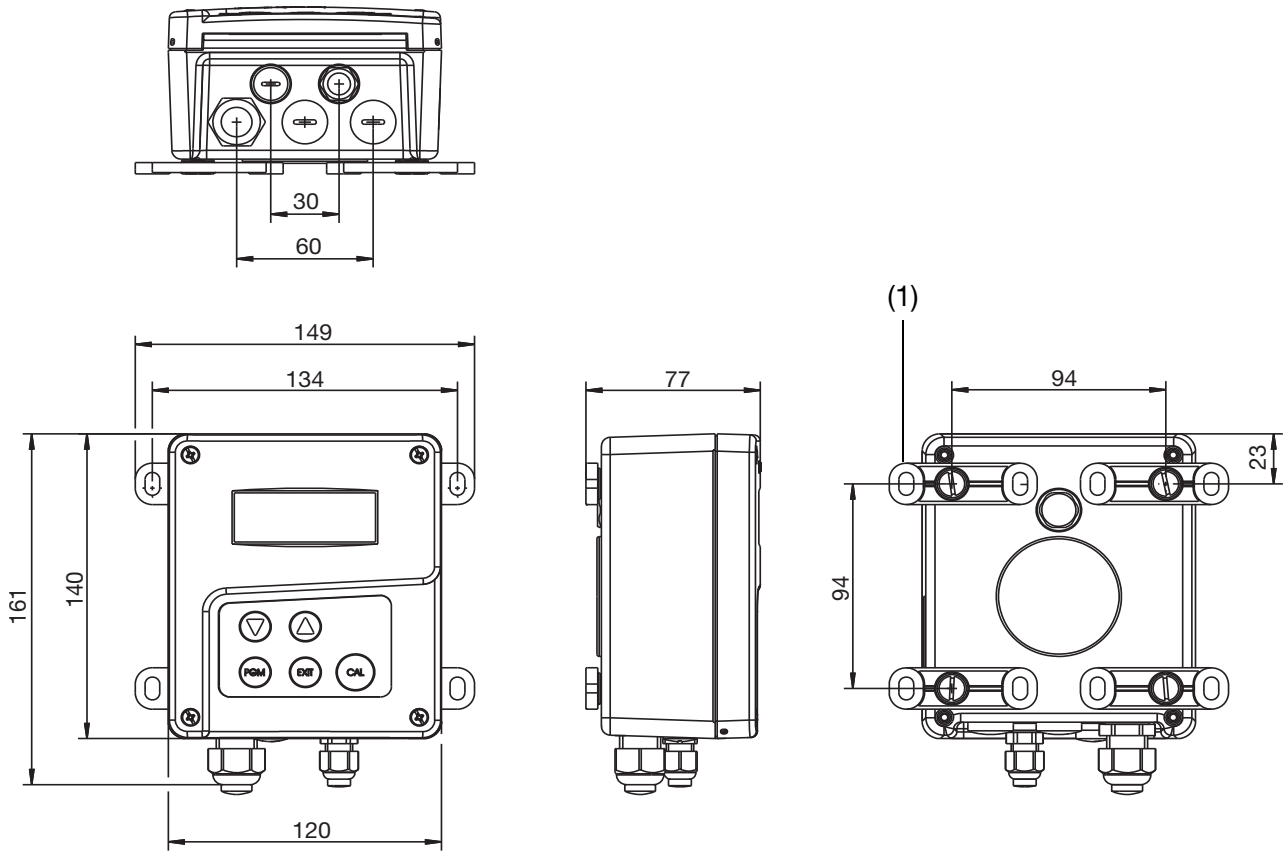
Installation position

The device can be installed in any position.

4.2 Surface mounting

NOTE!

Mounting brackets (1) are included in the scope of delivery.

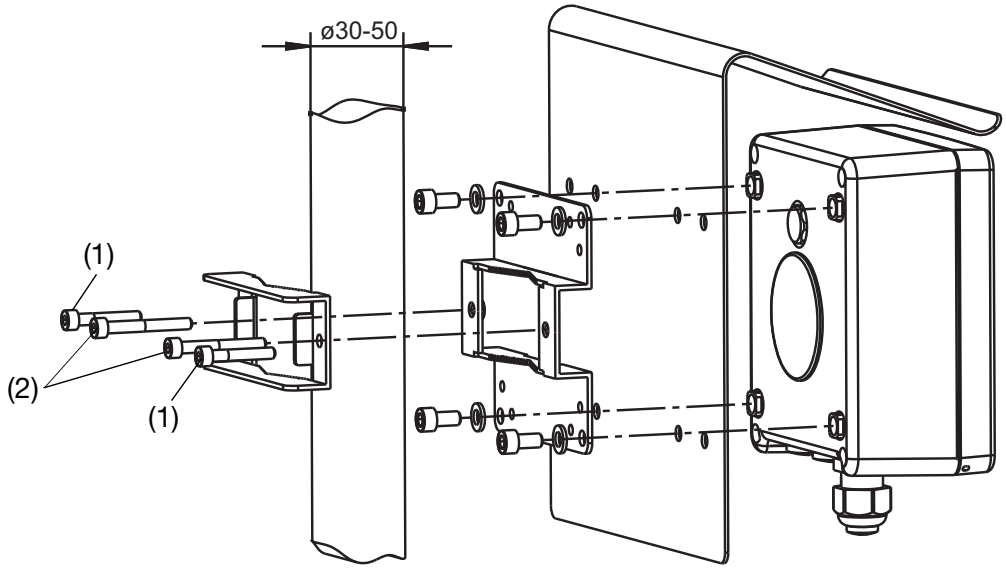


✱ Screw the four mounting brackets (1) onto the case.
The mounting brackets can be rotated in stages of 90°.

✱ Mount the case onto the mounting brackets (with screws, anchors, or similar) on a surface or board.

4.3 Pipe-mounted kit / weather protection canopy

The pipe-mounted kit for the JUMO AQUIS 500 (part no.: 00483664) can be used to mount the device (and, if applicable, the protective roof for the JUMO AQUIS 500, part no.: 00398161) on pipes or rails with a diameter of 30 to 50 mm.



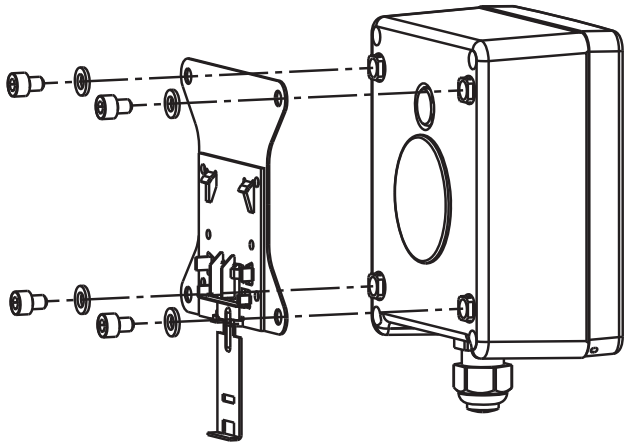
The M5 × 30 screws (1) are for pipe diameters of 30 to 40 mm.

The M5 × 40 screws (2) are for pipe diameters of 40 to 50 mm.

The pipe-mounted kit is also suitable for horizontal pipes.

4.4 DIN-rail mounting kit

The DIN-rail mounting kit for the JUMO AQUIS 500 (part no.: 00477842) can be used to mount the device on a DIN-rail of 35 mm × 7.5 mm acc. to DIN EN 60715 A.1.



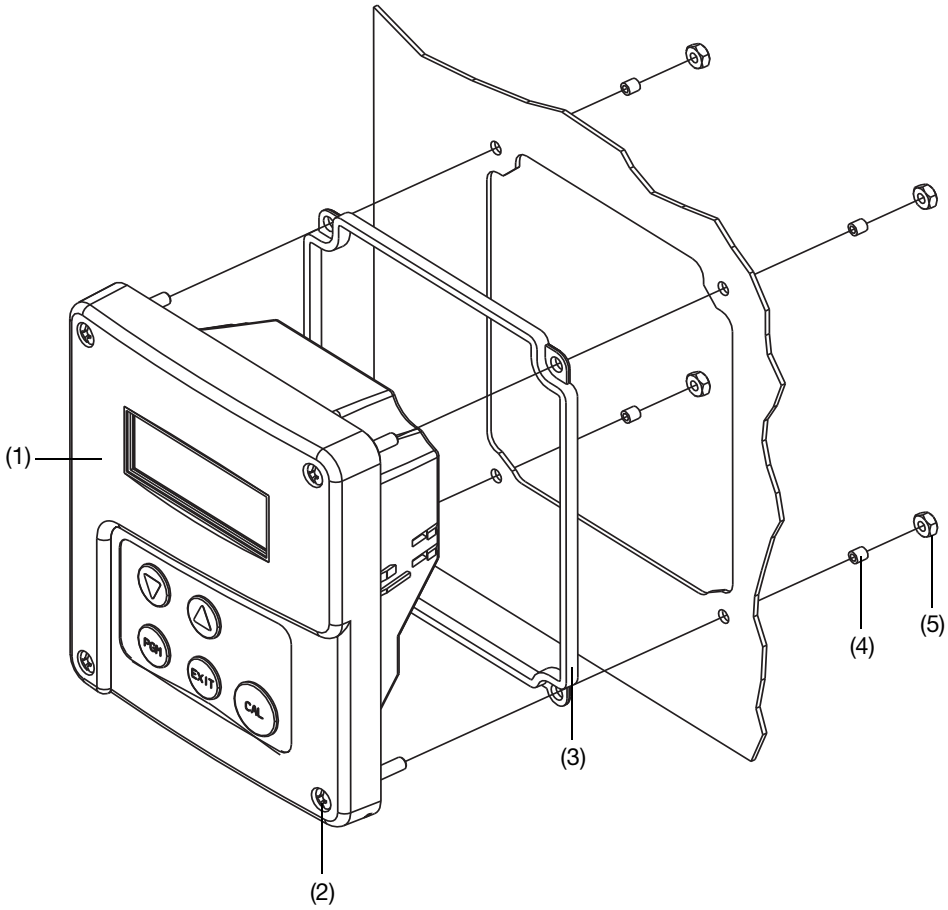
4 Mounting

4.5 Mounting in a panel

NOTE!

For drilling template, see chapter 12.5 "Template for panel cut-out", page 114.

To achieve the specified protection type of IP65, the panel must have the correct thickness.

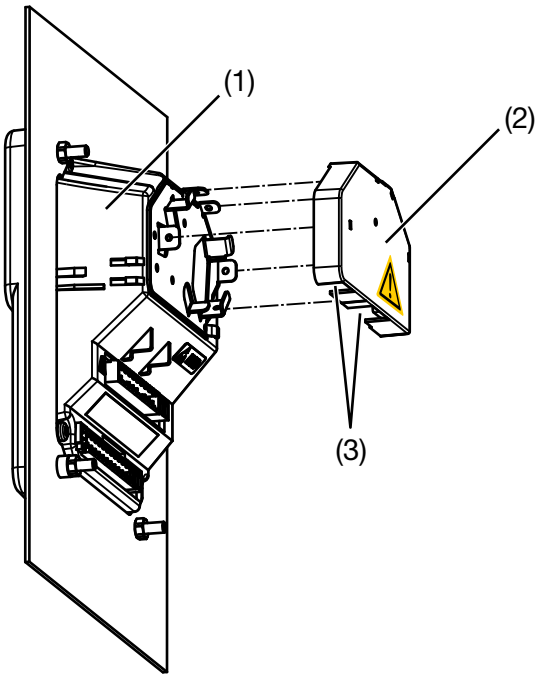


✱ Make the panel cut-out and holes according to the drilling template.

✱ Place the control panel (1) with gasket (2) in the panel cut-out and fasten it with screws (2) spacing rollers (4) and nuts (5).

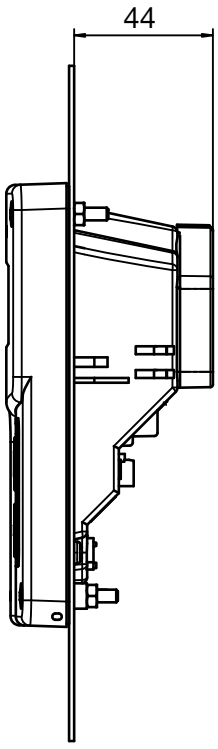
CAUTION!

To guarantee electrical safety, the cable cover must be mounted, see next page!



- Make the electrical connection.
- Break off the required flap(s) (3) from the cable cover (2) so that the cable can be laid in the cable path.
- Attach the cable cover (2) onto the control panel (1).

Depth behind panel



4 Mounting

5.1 Installation notes

DANGER!

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

The choice of cable, the installation and the electrical connection must conform to the requirements of VDE 0100 “Regulations on the Installation of Power Circuits with Nominal Voltages below 1000 V” or the appropriate local regulations. **Only flexible cables and wires shall be used!**

If contact with live parts is possible while working on the device, it must be completely disconnected from the electrical supply.

Load circuits must be fused for the maximum relay current in each case, in order to prevent welding of the relay contacts in the event of a short circuit.

The electromagnetic compatibility conforms to EN 61326.

Run input, output and supply cables separately and not parallel to one another.

Use shielded sensor cables with twisted conductors. Do not run these cables close to current-carrying components or cables. Ground shielding at one end.

Sensor leads should be implemented as uninterrupted cables (not routed via terminal blocks etc.).

Do not connect any additional loads to the supply terminals of the device.

The device is not suitable for use in areas with an explosion hazard (Ex areas).

Apart from faulty installation, incorrect settings on the device may also affect the proper functioning of the subsequent process or lead to damage. Safety devices independent of the device should therefore always be provided and should only be capable of adjustment by specialist personnel.

Conductor cross sections and ferrules

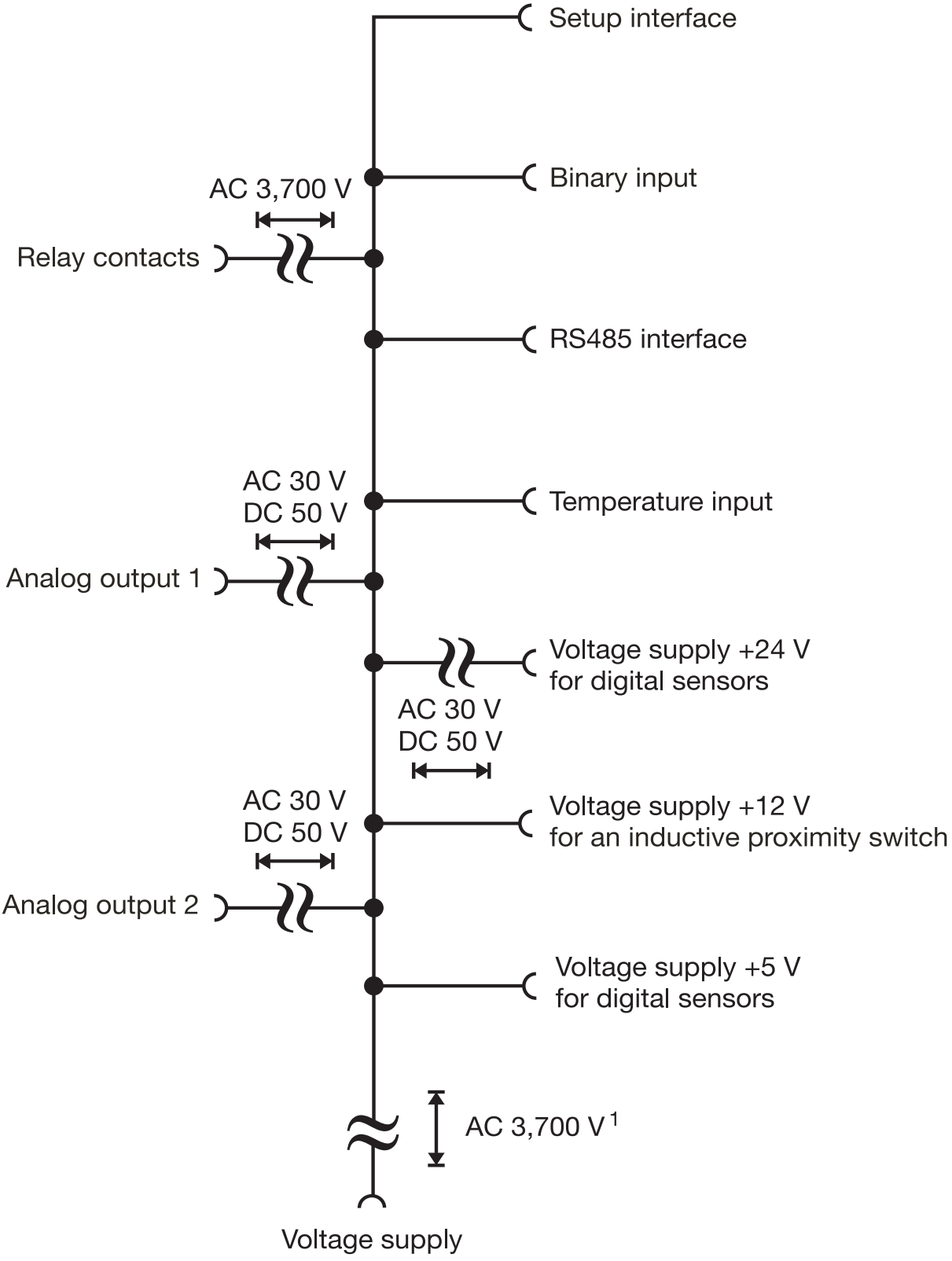
Mounting notes

	Minimum cross section	Maximum cross section	Minimum length of ferrule
without ferrule	0.34 mm^2	2.5 mm^2	10 mm (stripped)
Ferrule without lip	0.25 mm^2	2.5 mm^2	10 mm
Wire ferrule with lip up to 1.5 mm^2	0.25 mm^2	1.5 mm^2	10 mm
Wire ferrule with lip over 1.5 mm^2	1.5 mm^2	2.5 mm^2	12 mm
Twin ferrule with lip	0.25 mm^2	1.5 mm^2	12 mm

CAUTION!

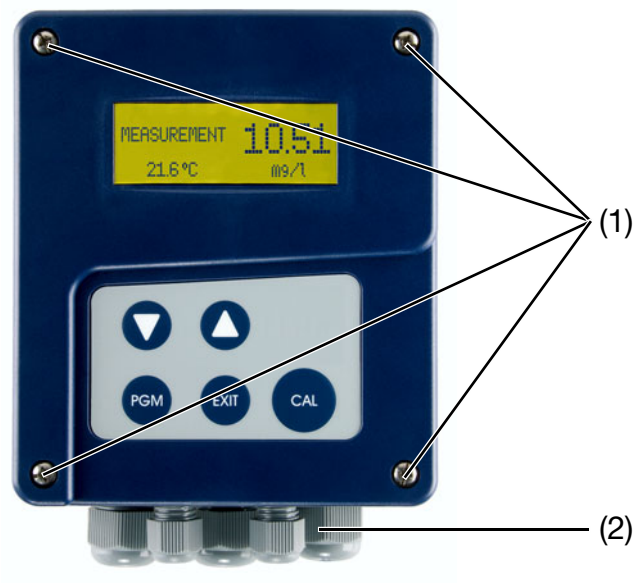
The protection type specified for the device (IP67) can only be achieved if not more than one cable runs into the device through each cable gland.

5.2 Galvanic isolation



[1] not for protective extra-low voltage of voltage supply 30 (DC 12 to 24 V)

5.3 Opening and closing the device



Opening the device

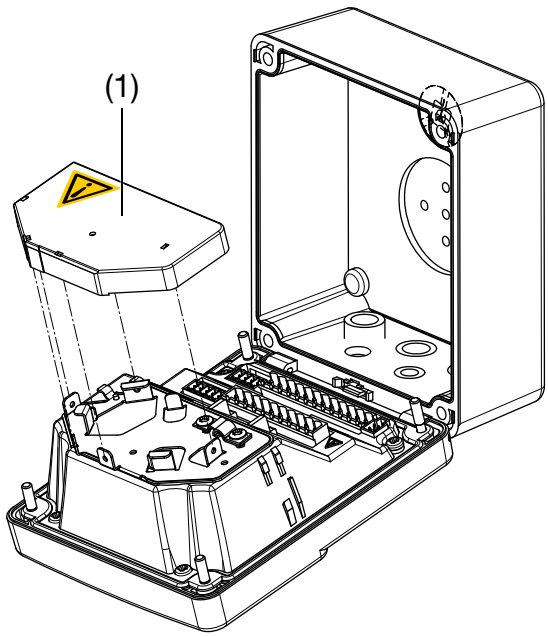
- ✱ Prior to opening, loosen all cable fittings (2) so that the cables are moveable.
- ✱ Push connection cable a little into the case so that enough cable reserve is available for opening.
- ✱ Loosen the 4 front-panel screws (1) of the case lid and pull them out as much as possible.
- ✱ Pull the lid to the front and then fold to the front. The user needs to be able to easily open the lid. Do not use force while opening!

Closing the device

- ✱ When closing the device, pull the connecting cables to the outside while the cable fittings are in a released state and make sure that the lines in the inside of the device run properly. Pay attention to the corresponding sheathing measurement to ensure strain relief and protection type (IP67) of the cable fitting.
- ✱ The user must be able to close the lid with the 4 screws without a high degree of pressure.
- ✱ Tighten cable fittings.

5.4 Connecting the cables

The electrical connection for the surface-mountable housing is easily accessible when the device is folded out.

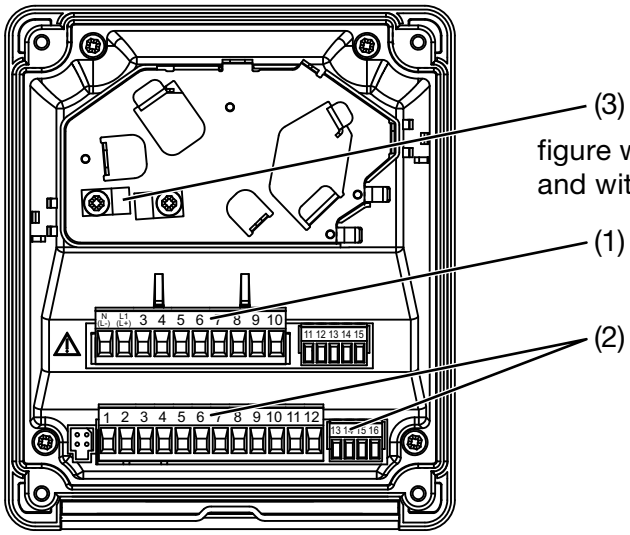


The device contains a guide plate that ensures an optimum cable path. **After laying the cables, the cable cover (1) must be attached until it clicks, like shown above. This is important to ensure the electrical safety!**

To connect the individual core wires, remove pluggable screw terminals from the control panel.

Run the connecting cables through the cable glands.

Interior view

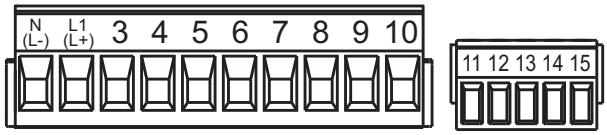


- Lead the connecting cables in through the cable fittings.
- Use the cable clip (3) to clamp the signal cable to the shielding.

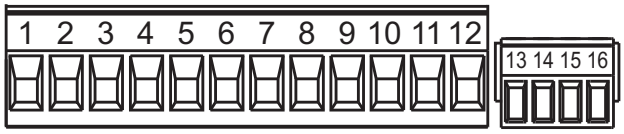
The clip (3) must **only** be attached by a 3.5 x 6.5 pan head screw! If the screw is any longer, dangerous voltage could be directed to the cable shielding!

- Break off the required flap(s) from the cable cover so that the cable can be laid in the cable path. Attach the cable cover.
- Connect the cores as assigned below, and see chapter 5.6 "Pin configuration", page 22.
- Push the plug-in terminals for row 1 (1) and row 2 (2) into the sockets in the device.

5.5 Terminal assignment

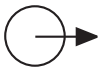
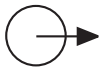
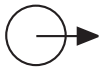
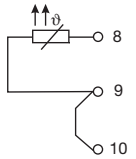


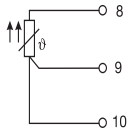
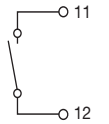
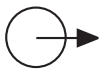
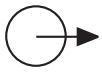
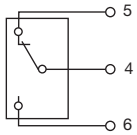
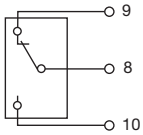
Row 1



Row 2

5.6 Pin configuration

Connection		Terminal	Row
Voltage supply for transmitter/controller			
Voltage supply (23): AC 110 to 240 V; -15/+10 %; 48 to 63 Hz Voltage supply (25): AC/DC 20 to 30 V; 48 to 63 Hz Voltage supply (30): DC 12 to 24 V; +/-15 % (connection only admissible to SELV/PELV circuits)		1 N (L-) 2 L1 (L+)	1
NC		3	
Voltage supply for proximity switch			
DC 12 V (10 to 20 V)		11 + 12 -	1
Voltage supply 24 V for digital sensors type 20263x or type 202614 (connection see chapter "Electrical connection of sensor type 202630 with digital interface and flow monitor", page 54)			
DC 24 V (20.4 to 28.8 V)		14 + 15 -	1
Voltage supply of 5 V for digital sensors type 202613/... and type 202670/... (connection see chapter "Electrical connection of sensor type 202613", page 44 and **see chapter "Electrical connection of sensor type 202670", page 59**)			
DC 5 V (5.1 to 5.25 V)		1 - 2 +	2
Inputs			
NC		5 6	2
Modbus RS485 interface		3 data - 4 data + 7 shielding	
RTD temperature probe in 2-wire circuit		8 9 10	

Connection		Terminal	Row
RTD temperature probe in 3-wire circuit		8 9 10	2
Binary input		11 12	
Outputs			
Analog output 1 0 to 20 mA or 20 to 0 mA or 4 to 20 mA or 20 to 4 mA or 0 to 10 V or 10 to 0 V (galvanically isolated)		13 + 14 -	2
Analog output 2 0 to 20 mA or 20 to 0 mA or 4 to 20 mA or 20 to 4 mA or 0 to 10 V or 10 to 0 V (galvanically isolated)		15 + 16 -	
Switching output K1 (floating)		4 Pole 5 N/C contact 6 N/O contact	1
NC		7	
Switching output K2 (floating)		8 Pole 9 N/C contact 10 N/O contact	

6 Operation

NOTE!

For operation of the device using the optional setup program, see chapter 9 "Setup program", page 89.

This section describes how to operate the device using the keypad.

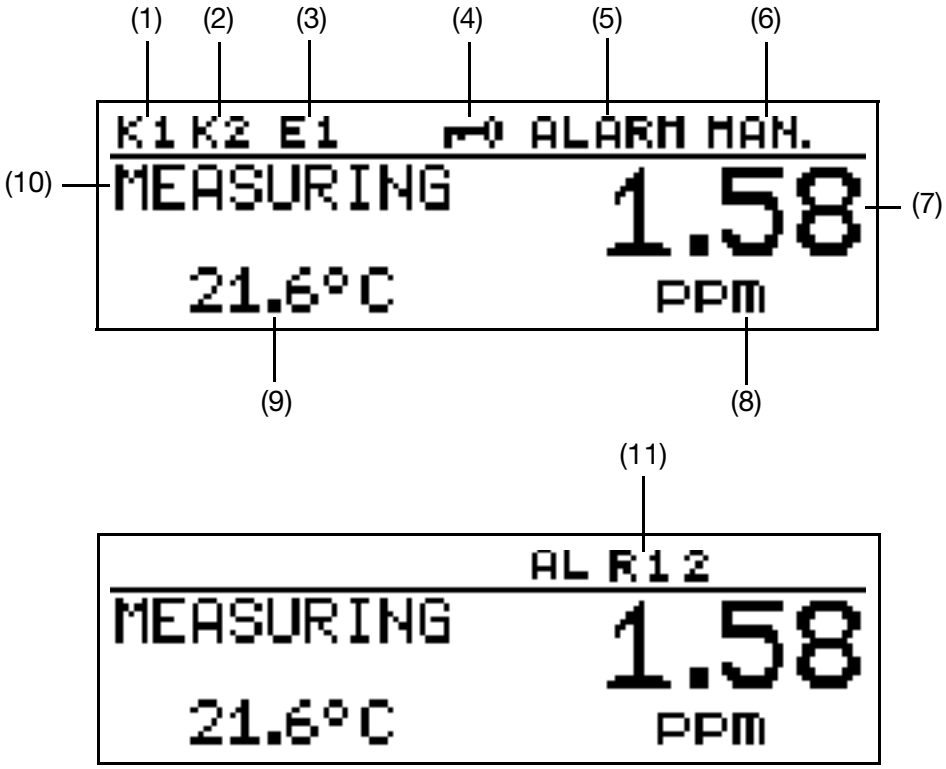
6.1 Control elements

(1)	Display	Background lighting (during operation)
(2)	CAL key	Start calibration
(3)	EXIT key	Cancel entry / exit level
(4)	PGM key	Change level Scroll through selection Confirm selection
(5)	▼ key	Reduce value Scroll through selection
(6)	▲ key	Increase value Scroll through selection

6.2 Display

6.2.1 Measuring mode (normal display)

Example



(1) Relay K1 is active

(2) Relay K2 is active

(3) Binary input 1 is controlled

(4) Keypad is locked

(5) Device status (notes)
- Alarm (e.g. overrange)
- Calib flashing (calibration timer expired)
- Calib (customer calibration active)

(6) Output mode
- Manual (manual mode)
- Hold (hold mode)

(7) Measured value

(8) Unit of measured value

(9) Medium temperature

(10) Device status e.g.
- Measuring (normal)
- Status of calibration

(11) AL R1 = alarm controller 1
AL R2 = alarm controller 2
AL R12 = alarm controller 1 and 2

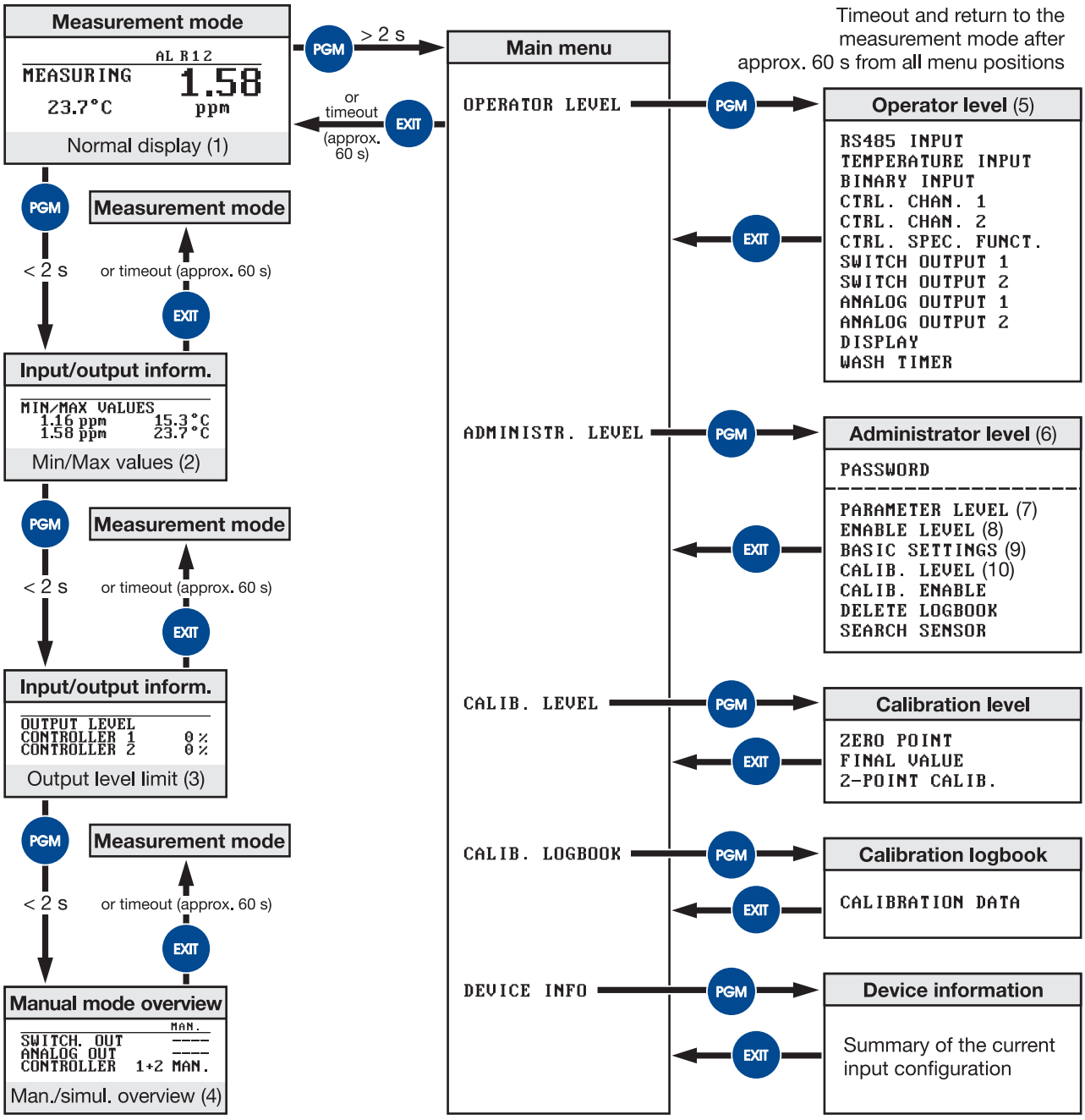
NOTE!

To return to measurement mode (MEASURING):
Press the EXIT key or wait for timeout.

6 Operation

6.3 Operating principle

6.3.1 Operation in levels



(1) see chapter 6.4 "Measurement mode", page 27
(2) see chapter 6.5.1 "Min./max. values", page 27
(3) see chapter 6.5.2 "Output level display", page 28
(4) see chapter 6.10.4 "MANUAL/simulation overview", page 40
(5) see chapter 6.6 "Operator level", page 29
(6) see chapter 6.7 "Administrator level", page 29
(7) see chapter 6.7.2 "Parameter level", page 31
(8) see chapter 6.7.3 "Enable level", page 31
(9) see chapter 6.7.4 "Basic settings", page 34
(10) see chapter 6.7.5 "Calibration level", page 34

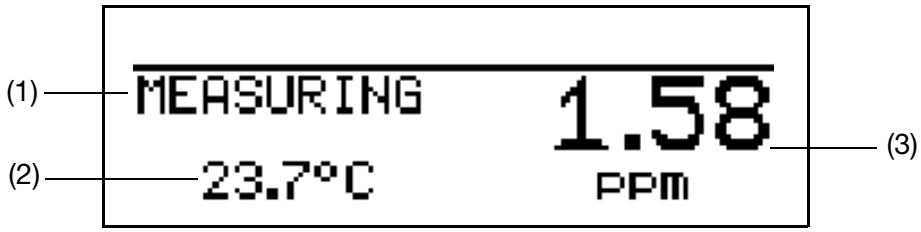
6.4 Measurement mode

6.4.1 Normal display

Display

The following items are displayed in measurement mode:

- Signal of digital interface
- Unit (configurable mg/l, ppm, % Sat., etc.)
- Temperature of medium



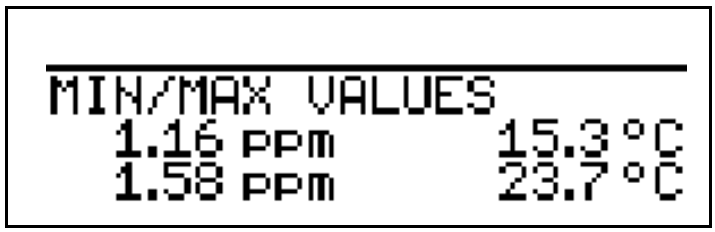
(1) MEASURING -> measurement mode
(2) 23.7 °C -> temperature of medium
(3) 1.58 ppm -> measured value calculated from the digital main input

NOTE!

In measurement mode, the "trend display" or "bar graph" can also be selected – see "MEAS. DISPLAY TYPE", page 106.

6.5 Input/output information

6.5.1 Min./max. values



Activating the display of min./max. values

The device is in measurement mode (normal display).

✱ Press the PGM key for less than 2 seconds.

The minimum and maximum values of the main value (mg/l, ppm, % Sat., etc.) and temperature are displayed.

NOTE!

The extremes of the main measurands and temperature are **not** assigned to each other (e.g. not 1.16 ppm at 15.3 °C).

To return to measurement mode:

✱ Press the EXIT key or wait for timeout.

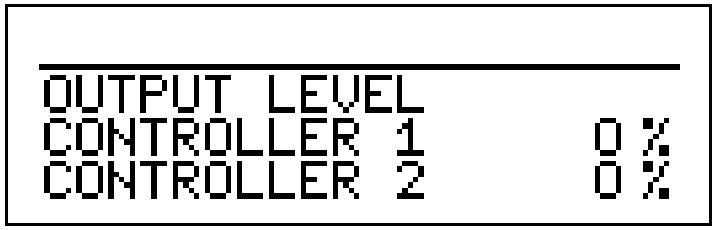
Measurements with overrange are ignored.

Press the PGM button again briefly to go to the "output level" display.

The min./max. value memory can be reset:
OPERATOR LEVEL > DISPLAY > MIN/MAX RESET.

The min. and max. values are deleted when the basic settings are changed and when the voltage supply is lost.

6.5.2 Output level display



The device is in measurement mode (normal display).

✱ Press the PGM key twice for less than 2 seconds.

The output level for the two controller contacts (if present) is displayed.

NOTE!

The output level of an output can only be displayed if the relevant output has been configured:
For example: **ADMINISTRATOR LEVEL > PARAMETER LEVEL > CTRL. CHAN. 1 OR 2**.

To return to the normal display:

✱ Press the EXIT key or wait for timeout.

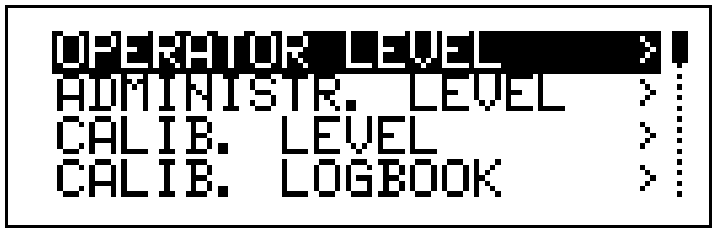
Press the PGM key again to go to the "Manual mode overview".

6.6 Operator level

All parameters that have been approved by the administrator (see chapter 6.7 "Administrator level", page 29) can be edited in this level. All other parameters (indicated by a key) can only be read.

✱ Press the PGM key for more than 2 seconds.

✱ Select "OPERATOR LEVEL".



6.7 Administrator level

- All parameters can be edited in this level.
- This level can also be used to define which parameters a "normal" operator can edit, and which calibrations may be performed.

To access the administrator level:

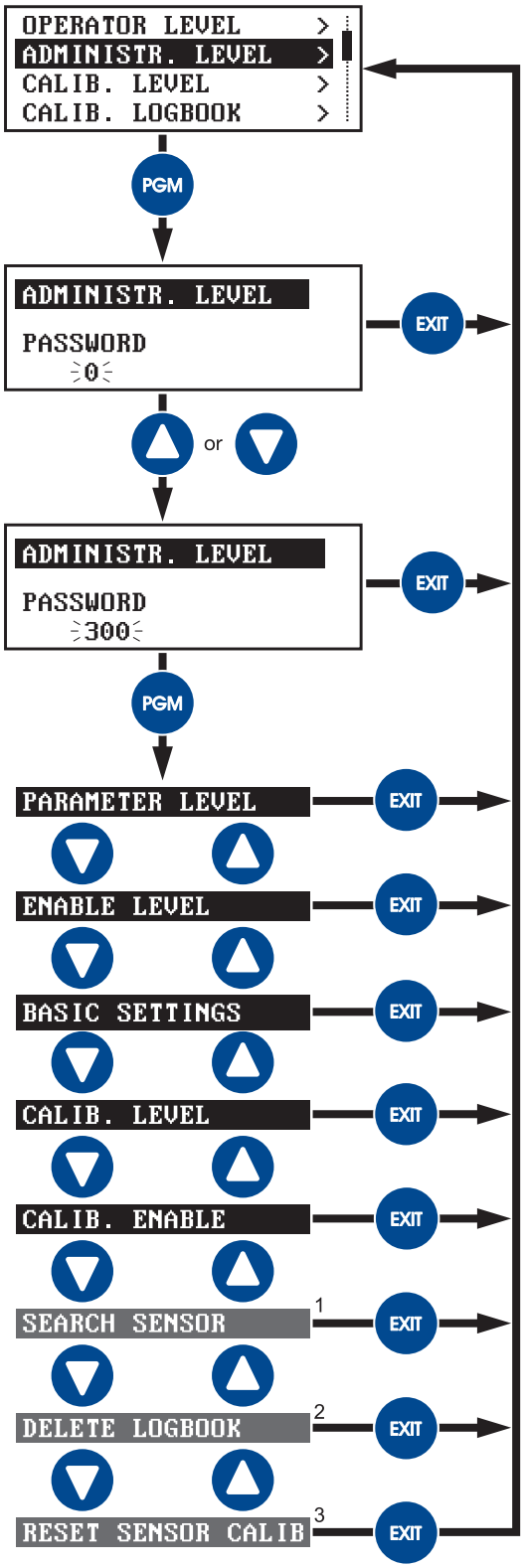
✱ Press the PGM key for more than 2 seconds.

✱ Use the ▽ or △ key to select "ADMINISTR. LEVEL".

✱ Use the ▽ and △ keys to enter the password 300.

✱ Confirm with the PGM key.

6.7.1 Levels of the administrator level



Timeout and return to measurement mode from all menu items after 60 s

[1] Not available for freely configurable sensor..
1 Only available for freely configurable sensor.
[3] Only available for sensors type 202613/... and 202670/...

6.7.2 Parameter level

The same settings can be made here as in the operator level – see chapter 6.6 "Operator level", page 29.
As the operator has administrator rights here, he/she can also change parameters that are locked in the operator level.

6.7.3 Enable level

In this level, all parameters can be enabled (changes possible) or locked (changes not possible) for editing in the operator level.

To access the enable level:
ADMINISTR. LEVEL > PASSWORD > ENABLE LEVEL.

RS485 INPUT

ZERO POINT
SLOPE
NULL
SPAN
BAUD RATE
PARITY
STOPBITS
DEVICE ADDRESS
ADDR. TEMPERATURE
ADDR. MAIN VALUE
ADDR. UNCOMP. MAIN
UNIT MAIN VALUE
UNIT UNCOMP.
BYTEORDER FLOAT
UNIT
TEMP. COMP. SOURCE
SALINITY
PRESSURE
SAMPLING RATE
FILTER TIME CONST.
CALIB. INTERVAL

TEMPERATURE INPUT

TEMPERATURE SENSOR
UNIT
MAN. TEMPERATURE
FILTER TIME CONST.
OFFSET[1]

BINARY INPUT

FUNCTION
SWITCH-ON DELAY.

[1] The temperature offset setting affects the displayed temperature, the analogue outputs and the limit values. It, however, does not affect the temperature compensation inside the sensor.

CONTROLLER CHANNEL 1 or CONTROLLER CHANNEL 2

CONTROLLER TYPE
SETPOINT
SETPOINT 2
MIN/MAX CONTACT
PROPORTIONAL BAND
RESET TIME
DERIVATIVE TIME
PULSE PERIOD
ACTR.STROKE TIME
HYSTERESIS
MIN. ON TIME
MAX. PULSE FREQ.
OUTPUT LEVEL LIMIT
PULL-IN DELAY
DROP-OUT DELAY
CONTROLLER ALARM
ALARM TOLERANCE
ALARM DELAY
IN HOLD MODE
HOLD OUTPUT LEVEL
ON ERROR
MAX. SETPOINT
MIN. SETPOINT

CONTROLLER SPEC. FUNCT. (controller special function)

I SWITCH-OFF
SEPARATE CNTRLR:
MANUAL MODE

SWITCHING OUTPUT 1 or SWITCHING OUTPUT 2

FUNCTION
SWITCHING POINT
PRE-ALARM
SPACING
HYSTERESIS
SWITCH-ON DELAY.
SWITCH-OFF DELAY.
PULSE TIME
FOR CALIBRATION
IN CASE OF FAULT
IN HOLD MODE
MANUAL MODE
NC / NO CONTACT

ANALOG OUTPUT 1 or ANALOG OUTPUT 2

SIGNAL SELECTOR
SIGNAL TYPE
SCALING START
SCALING END
DURING CALIBRATION
ON ERROR

IN HOLD MODE
SAFETY VALUE
SIMULATION
SIMULATION VALUE

DISPLAY

LANGUAGE
LIGHTING
LCD INVERSE
MEAS. DISPLAY TYPE
LOWER DISPLAY
UPPER DISPLAY
BAR GR. SCALE START
BAR GR. SCALE END
MIN/MAX RESET
OP. TIMEOUT
CONTRAST

WASHTIMER

CLEANING INTERVAL
CLEANING DURATION

6.7.4 Basic settings

To make it easier for users to configure a digital sensor with Modbus protocol and prevent configuration conflicts, the JUMO AQUIS 500 RS has a **basic setup wizard**.

To access the basic settings:
ADMINISTR. LEVEL > PASSWORD > BASIC SETTINGS.

NOTE!

For an overview on the process for the basic setup wizard (flow diagram) see chapter 12.4 "Flow diagram of the basic setting wizard", page 111.

For a detailed description of the configuration of digital sensors on the device using the basic setup wizard see chapter 7.2 "Examples of settings", page 43 ff.

6.7.5 Calibration level

You can start a calibration procedure directly from this menu item.

To access the calibration level:
ADMINISTR. LEVEL > PASSWORD > CALIB. LEVEL.

Depending on the connected sensor, one or more of the following calibration options may be available:

- Zero point
- Final value
- Two-point calibration

6.7.6 Calibration enable

Settings can be made here to define which calibration procedures can or cannot be conducted following the start of calibration in the operating level or using the "CAL" key.

To access the calibration level:
ADMINISTR. LEVEL > PASSWORD > CALIBR. ENABLE.

Depending on the connected sensor, one or more of the following calibration options may be disabled or enabled:

- Zero point
- Final value
- Two-point calibration

6.7.7 Searching for sensors

This function searches for a connected sensor of type 202613, 202614, 20263x or 202670 on the RS485 interface, lists its settings for the values baud rate, parity and device address and saves them in the device after confirmation using the "PGM" key.

The function is helpful atter replacing a sensor. If the new sensor, e.g. is configured on another device address, all other settings, however, are to be retained.

6.7.8 Deleting the logbook[1]

The five most recent calibration procedures are archived in the calibration logbook.

If necessary, the logbook can be deleted following a security prompt.

6.7.9 Resetting the sensor calibrations[2]

In case a calibration procedure yields impermissible values, this function restores the factory calibration of the sensors of type 202613 and 202670. The function does not affect the calibration logbook of the sensors.

6.8 Device info

The current configuration of all important parameters (from the basic settings menu) is listed here.

Example

TEMPERATUR SENSOR	-> MODBUS
SENSOR TYPE	-> 202613
DEVICE ADDRESS	-> 255
SALINITY	-> 10.0 g/kg
PRESSURE	-> 1013 hPa
UNIT	-> % Sat.
SAMPLE RATE	-> 5 sec

[1] Only available for freely configurable sensor.
[2] Only available for sensors type 202613 and 202670.

6.9 Controller functions

Simple switching functions

In the JUMO AQUIS 500, simple switching functions such as alarm contact, limit value monitoring, or calibration timer signaling are configured in the parameter level using the "Switching output 1" or "Switching output 2" parameters.

Higher order control functions

Higher order control functions (P, PI, PD, and PID behavior) are configured in the parameter level using the "Controller 1" or "Controller 2" parameters.

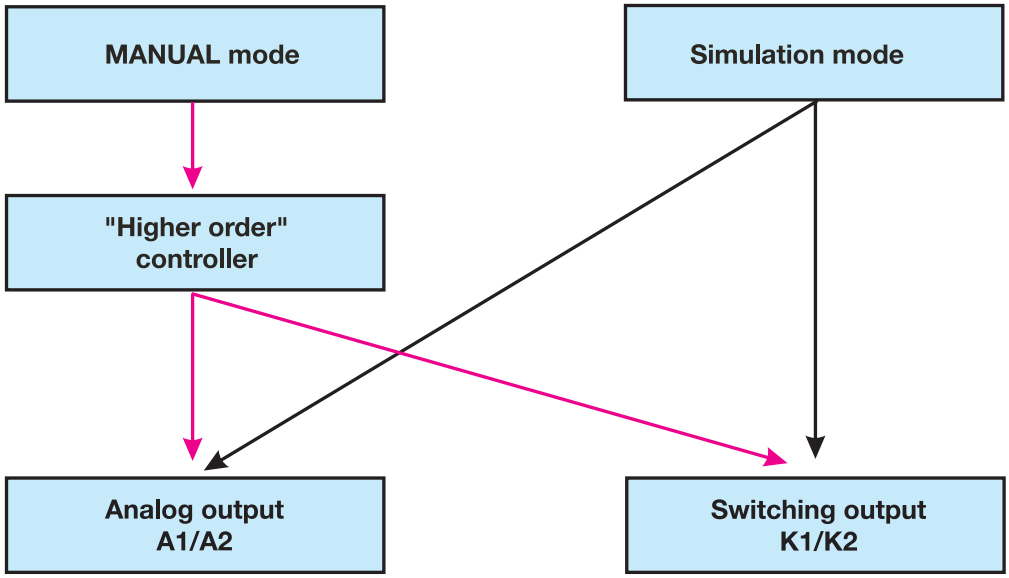
If the limit value, pulse length, pulse frequency, and three-step controller types are used, the switching outputs must be configured; if the continuous controller is used, the analog outputs must be configured.

Example of parameters in the operator level

Switching output 1 or 2	**Explanation**
None	Neither switching nor control function required
Controller 1	The device should use "higher order" control
Controller 2	The device should use "higher order" control
Controller alarm 1 or 2	"Simple" switching function
Controller alarm	"Simple" switching function
⎍ main value	(Alarm function 1) main value
⎎ main value	(Alarm function 2) main value
⎏ main value	(Alarm function 7) main value
⎐ main value	(Alarm function 8) main value
⎍ temperat.	(Alarm function 1) temperature
⎎ temperat.	(Alarm function 2) temperature
⎏ temperat.	(Alarm function 7) temperature
⎐ temperat.	(Alarm function 8) temperature
Sensor error	
Washtimer	
Calib. timer	
Controller channel 1 or 2	
Limit Pulse width Pulse frequency Continuous Modulating	"Higher order" control functions

6.10 MANUAL mode / simulation mode

This function can be used to set the switching outputs and the analog outputs of the device to a defined status manually. The makes dry startup, trouble-shooting, and servicing easier, for example.



Simulation mode accesses switching outputs K1/K2 and analog outputs A1/A2 **directly**. If simulation mode has been selected, MANUAL mode **cannot** be used.

In MANUAL mode, the settings of the "higher order controllers" are taken into account.

6.10.1 MANUAL mode using "higher order control functions"

Higher order switching functions

The JUMO AQUIS 500 is configured to **higher order controller functions** if the following settings are made:

OPERATOR LEVEL > CTRL. CHAN. 1 OR 2 > CONTROLLER TYPE: LIMIT or PULSE WIDTH or PULSE FREQ. or CONTINUOUS or MODULATING

Depending on the configured controller type, manual mode affects the analog outputs and/or switching outputs. For recommended procedure, see chapter 6.10.3 "Simulation of analog outputs using MANUAL mode", page 40.

Selecting manual mode

NOTE!

The MANUAL mode parameter is locked in the device per default, which means that it can **only be activated by an administrator**.
For other operators, the parameter must be enabled first – see chapter 6.7.3 "Enable level", page 31.

✱ **ADMINISTRATOR LEVEL > PASSWORD > PARAMETER LEVEL > CTRL. SPEC. FUNCT. > MANUAL MODE:** set LOCKED or PULSED or SWITCHING.

LOCKED=	No manual mode; the JUMO AQUIS 500 is in control
PULSED	The outputs are active for as long as the ▽ or △ key is pressed
SWITCHING	The outputs become active when the ▽ or △ key is pressed; when the relevant key is pressed again, the corresponding output is deactivated again

Activating manual mode

The device is in measurement mode.

✱ Press the EXIT and △ keys for less than 2 seconds.

"MAN." appears in the status line of the LCD display.

The device outputs then behave according to the pre-settings.

NOTE!

If the EXIT and △ keys are pressed for more than 3 seconds, the device enters HOLD mode.

To exit HOLD mode, press the EXIT and △ keys again for more than 3 seconds.

The JUMO AQUIS 500 is no longer in control. The output level at the output of the controller channel is 0 %.

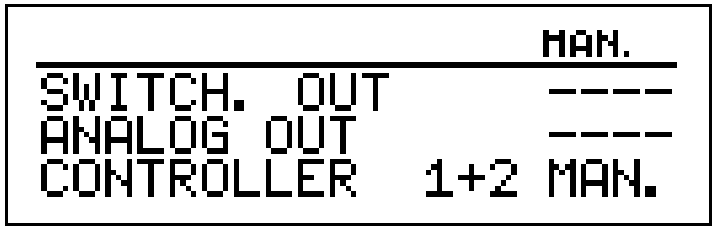
To select controller channel 1, use the △ key; the output level at the output of the controller channel 1 is set to 100 %.

To select controller channel 2, use the ▽ key; the output level at the output of controller channel 2 is set to 100 %.

MANUAL/simulation overview

It is possible to display which outputs or controllers are in MANUAL mode. Requirement: the device is in measurement mode.

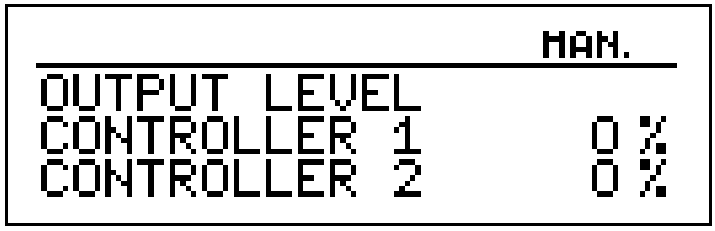
✱ Press the PGM key several times for less than 2 seconds (number varies according to the features and configuration of the device).



Output level of controller channels

It is possible to display the output levels of the controllers in manual mode in the output level overview.
Requirement: the device is in measurement mode.

✱ Press the PGM key several times for less than 2 seconds (number varies according to the features and configuration of the device).



The display changes when the ▲ or ▼ key is pressed.

NOTE!

To return to measurement mode:

✱ Press the PGM key or wait for timeout.

Deactivating manual mode

✱ Press the EXIT key.

The outputs of the device are in control again. The "MAN" text disappears from the status line of the LCD display.

6.10.2 Switching output simulation

Simple switching functions

Switching outputs are configured if the following settings are made:

SWITCH OUTPUT 1 OR 2 > FUNCTION:
⎍ or ⎎ or ⎍ or ⎎ .

Activating simulation

NOTE!

The MANUAL mode parameter in the device is set to "NO SIMULATION" per default. MANUAL mode can only be activated by the operator if this has been enabled in the enable level – see chapter 6.7.3 "Enable level", page 31.

∗ **ADMINISTR. LEVEL > PASSWORD > PARAMETER LEVEL > SWITCH OUTPUT 1 OR 2/MANUAL MODE:** set INACTIVE or ACTIVE.

INACTIVE => Relay K1 or K2 drops out
ACTIVE => Relay K1 or K2 picks up

Deactivating simulation

∗ **ADMINISTR. LEVEL > PASSWORD > PARAMETER LEVEL > SWITCH OUTPUT 1 OR 2/MANUAL MODE:** set NO SIMUL.

No simulation = No MANUAL mode; the JUMO AQUIS 500 is in control.

6.10.3 Simulation of analog outputs using MANUAL mode

Enabling and activating

∗ Select activation for simulation of the actual value output:
ADMINISTR. LEVEL > PASSWORD > PARAMETER LEVEL > ANALOG OUTPUT 1 OR 2 > SIMULATION: OFF or ON.

If "ON" is selected, the output adopts the value of the "SIMULATION VALUE" parameter.

If the device is back in measurement mode, "MAN." appears at the top right of the LCD display in the status line.

Deactivating

∗ **ADMINISTR. LEVEL > PASSWORD > PARAMETER LEVEL > ANALOG OUTPUT 1 OR 2 > SIMULATION >** Off.

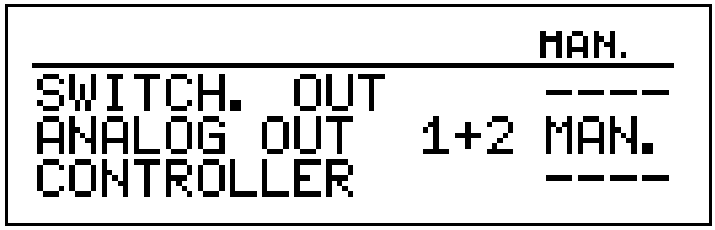
The relevant output of the JUMO AQUIS 500 resumes operation.

If the device is back in measurement mode and no other output or controller is in MANUAL mode, "MAN." disappears from the top right of the LCD display in the status bar.

6.10.4 MANUAL/simulation overview

It is possible to display which outputs or controllers are in MANUAL mode. The device is in "normal display" mode.

∗ Press the PGM key several times for less than 2 seconds (number varies according to the features and configuration of the device).



.

NOTE!

To return to measurement mode:
Press the EXIT key or wait for timeout.

6.11 HOLD mode

In HOLD state, the outputs take the states programmed in the corresponding parameters (controller channel, switching output, analog output).

This function can be used to "hold" the switching outputs and the analog outputs of the device, which means that the current state of the output is maintained even if the measured value changes. The device is not in control.

NOTE!

If MANUAL mode is activated while HOLD mode is active, MANUAL mode has priority and "MAN."is displayed in the status bar.
The EXIT key can be used to exit MANUAL mode.
If HOLD mode is still active (via binary input or keypad), the device returns to HOLD mode.

HOLD mode can be activated using the keypad or via binary input.

When this mode is activated via the binary input, a **delay time of up to 60 s** can be entered in the parameter level of the device. This function, for example, is useful for monitoring the minimum inflow of sensors. It prevents the unwanted activation of HOLD mode, due to small flow disturbances in the measurement medium, e.g. due to air bubbles.

Activating HOLD mode via keypad

✱ Press the EXIT and ▲ keys for more than 3 seconds.

The device outputs behave according to the pre-settings. "HOLD" appears in the status line of the LCD display.

NOTE!

If the EXIT and ▲ keys are pressed for less than 3 seconds, the device enters MANUAL mode.

Deactivating HOLD mode via keypad

✱ Press the EXIT and ▲ keys for more than 3 seconds.

NOTE!

If the EXIT and ▲ keys are pressed for less than 3 seconds, the device enters MANUAL mode.

The device outputs are in control again and the HOLD test disappears.

7 Startup

7.1 Quick introduction

NOTE

The suggestion below can be used to configure the device quickly and reliably.

* Mount the device – See chapter 4 "Mounting", page 12.
* Install the device – See chapter 5 "Installation", page 17 ff.
* Call up the administrator level (**ADMINISTR. LEVEL**).
* Enter the password **300**.
* Call up **PARAMETER LEVEL > DISPLAY > OPERATION TIMEOUT**.
* Set **OPERATION TIMEOUT** to 0 minutes (no timeout).
* Exit parameter level.
* Call up the administrator level (**ADMINISTR. LEVEL**).
* Enter the password 300.
* **SELECT BASIC SETTINGS** and work through all the menu items.
* Answer the question "Reinitialize device?" with "**YES**".
* Configure the necessary parameters.
* Calibrate device for sensor and medium.
* Set **OPERATION TIMEOUT** back to a value between 1 and 10 minutes.

7.2 Examples of settings

Below we show you four typical examples of sensor startup with a digital interface on the JUMO AQUIS 500 RS

For the 20263x series sensors, we will show you on page 48 the startup of the sensor for free chlorine (type 202630). You can use this example for the startup of the other sensors of the 20263x series analogously and **in full for the electrical connection**

7.2.1 Measuring dissolved oxygen in aqueous solutions with the JUMO ecoLine O-DO sensor

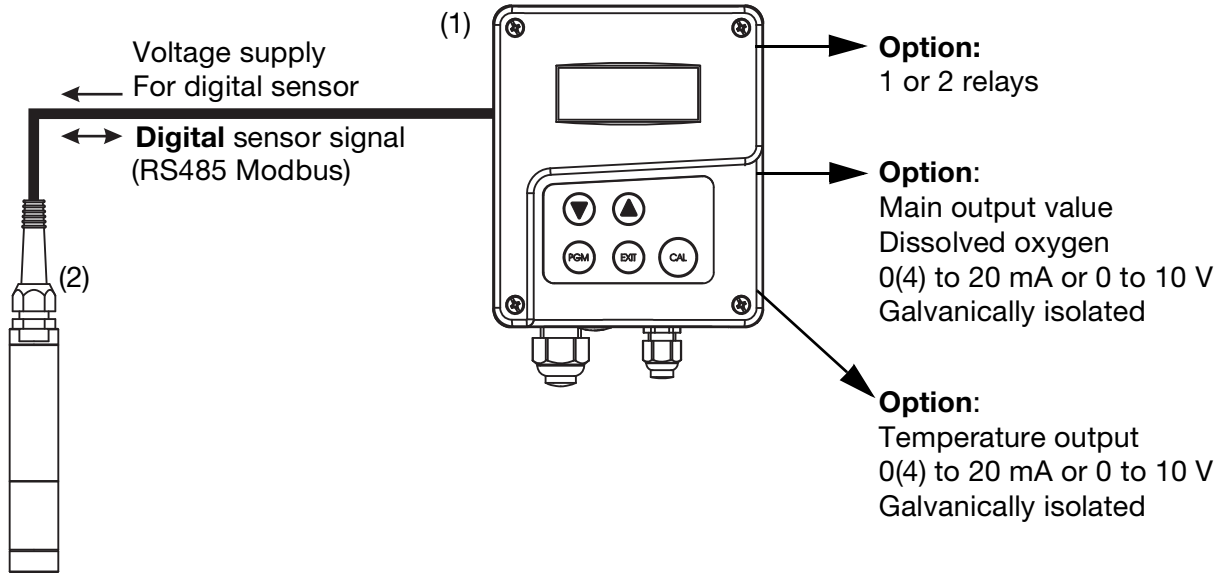
NOTE

Optical sensor with digital interface for dissolved oxygen,
see data sheet 202613.

Task

Measuring range:	0 to 20 mg/l
Output signal:	4 to 20 mA (main value)
4 to 20 mA (temperature)	
Temperature measurement	Inside sensor
Control function:	off

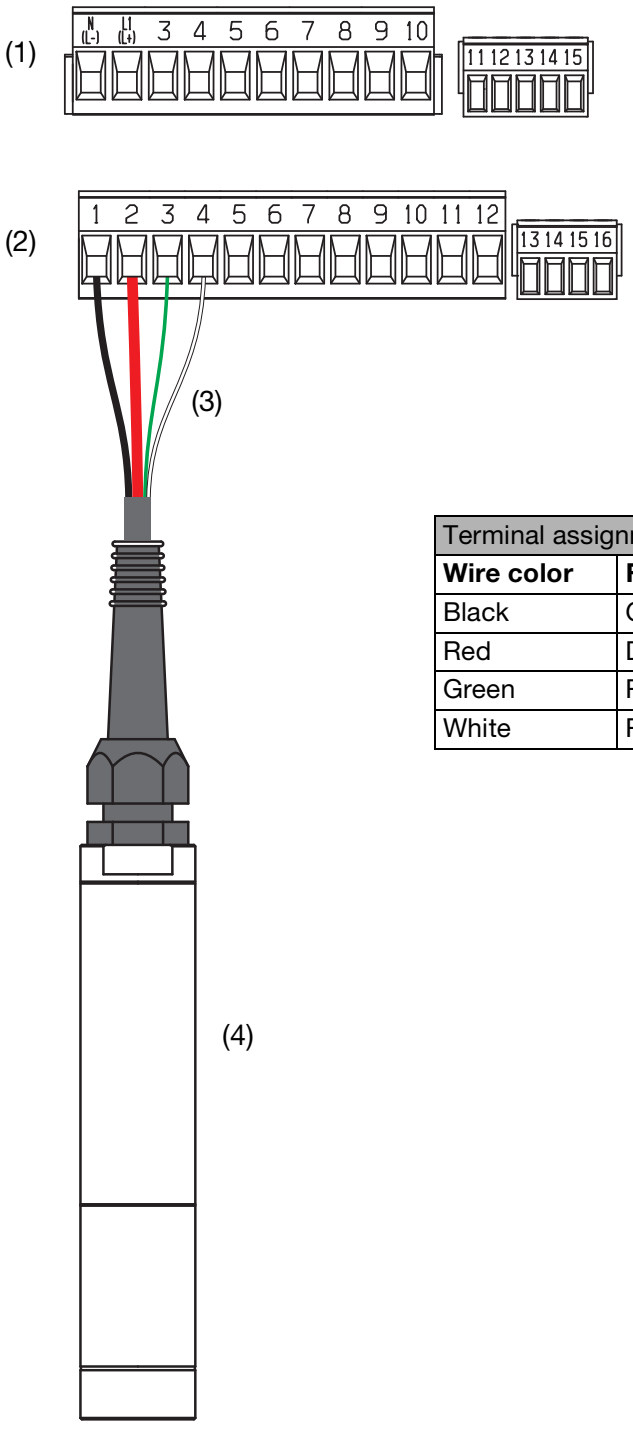
Measurement configuration

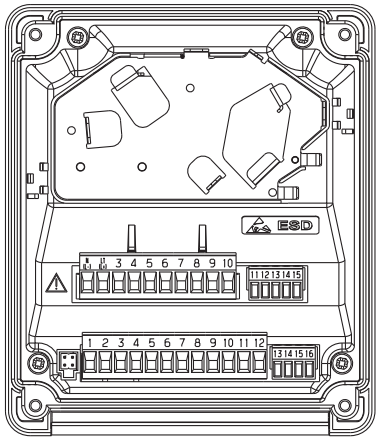


(1) JUMO AQUIS 500 RS
(2) JUMO ecoLine O-DO (sensor for dissolved oxygen), type 202613

7 Startup

Electrical connection of sensor type 202613





Terminal assignment of sensor connecting cable		
Wire color	**Function**	**Connection**
Black	GND	Row 2, terminal 1
Red	DC 5 V +	Row 2, terminal 2
Green	RS485 -	Row 2, terminal 3
White	RS485 +	Row 2, terminal 4

(1) Terminal block 1
(2) Terminal block 2
(3) 4-wire connecting cable (fixed cable on the sensor)
(4) JUMO ecoLine O-DO (sensor for dissolved oxygen), type 202613

"Step-by-step" instructions for sensor startup using automatic sensor configuration

NOTE

If you do not know where the device display is in the menu structure, use the EXIT key to navigate to the next menu level up. Pressing several times will take you back to measurement mode (normal display).

Accessing the administrator level

The device is in measurement mode (normal display).

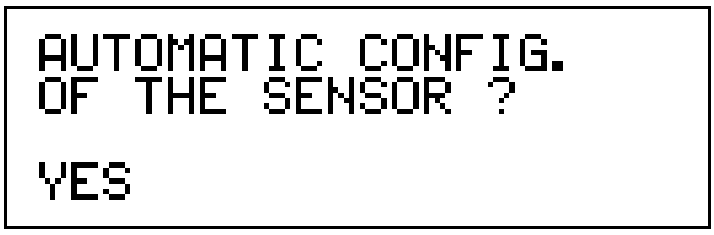
* Press the PGM key for more than 2 seconds.
* Use the ▼ key to select "ADMINISTR. LEVEL".
* Confirm with the PGM key.

Enter password

* Use the ▲ key to set the flashing value on the display under "PASSWORD" to "300" (holding down the key increases the value continuously; pressing the ▼ key decreases the value).
* Confirm with the PGM key.

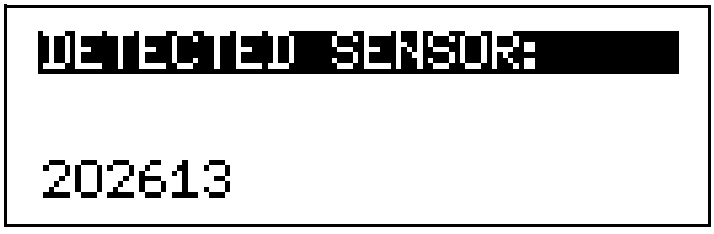
Accessing the basic settings

* Use the ▼ key to select "BASIC SETTINGS".
* Confirm with the PGM key.



* Use the ▼ or ▲ key to respond to "AUTOMATIC CONFIG. OF THE SENSOR" with "YES" (flashing).
* Confirm with the PGM key.

The JUMO AQUIS 500 now scans the Modbus RS485 interface. If it is connected correctly, the following display appears after a short time:



* Confirm with the PGM key.

Implementing the basic settings

- Use the ▲ and ▼ keys to enter the value for "SALINITY" and confirm with the PGM key.
- Enter the values for "AIR PRESSURE", "UNIT" (select "mg/l"), and "SAMPLING RATE" using the ▲ and ▼ keys and confirm each using the PGM key.
- For the "TEMPERATURE SENSOR" request, select "MODBUS" and confirm with the PGM key.

Initializing the device

- Use the ▲ or ▼ key to respond to the next question "REINITIALIZE DEVICE?" with "YES" and confirm with the PGM key.

Accessing the parameter level

Like the "BASIC SETTINGS", the "PARAMETER LEVEL" is a submenu in the administrator level. After successful sensor initialization, the device display will already be in this level, or you can navigate to it as described above.

Final device settings / inspections

RS485 input	Device address:	255
	Salinity:	As entered in "Basic settings"
	Air pressure:	As entered in "Basic settings"
	Sampling rate:	As entered in "Basic settings"
	Filter time constant:	As needed
	Calibration interval:	As needed
	Zero point:	Calibration value
	Slope:	Calibration value
Temperature input	Temperature sensor:	Modbus
	Unit:	°C
	Filter time constant:	2 s
	Offset:	0.0 °C

NOTE

When using the type 202613 sensor, the temperature offset setting affects the displayed temperature, the analog outputs and the limit values. It does not, however, affect the temperature compensation inside the sensor.

Analog output 1	Signal selector:	Main value
	Signal type:	4 to 20 mA
	Scaling start:	0.00 mg/l
	Scale end:	20.00 mg/l
	For calibration:	As required

	In case of fault:	As required
	In hold mode:	As required
	Safety value:	As required
	Simulation:	As required
	Simulation value:	As required
Analog output 2	Signal selector:	Temperature
	Signal type:	4 to 20 mA
	Scaling start:	0 °C
	Scaling end:	50 °C
	For calibration:	As required
	In case of fault:	As required
	In hold mode:	As required
	Safety value:	As required
	Simulation:	As required
	Simulation value:	As required
Display	Language:	As required
	Lighting:	As required
	LCD inversion:	As required
	Measured value display type:	As required
	Display on bottom:	As required
	Display on top:	As required
	Max./min. reset:	As required
	Operation timeout:	As required
	Contrast:	As required

7.2.2 Measuring dissolved oxygen in aqueous solutions with the JUMO digiLine O-DO S10 sensor

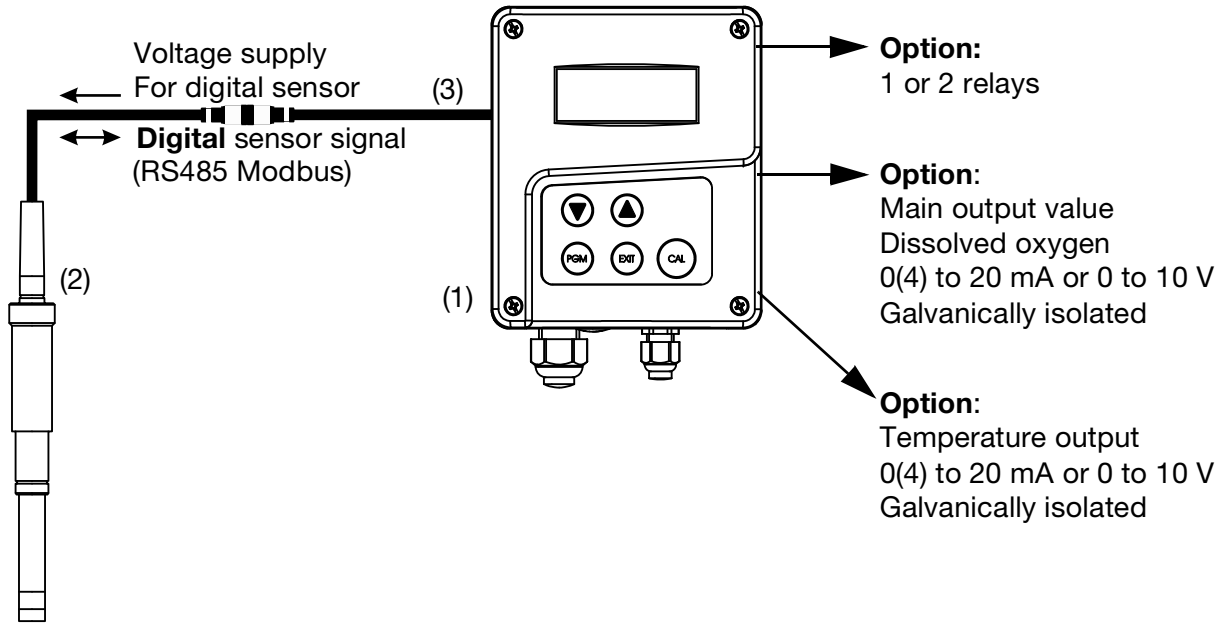
NOTE

Optical sensor with digital interface for dissolved oxygen,
see data sheet 202614.

Task

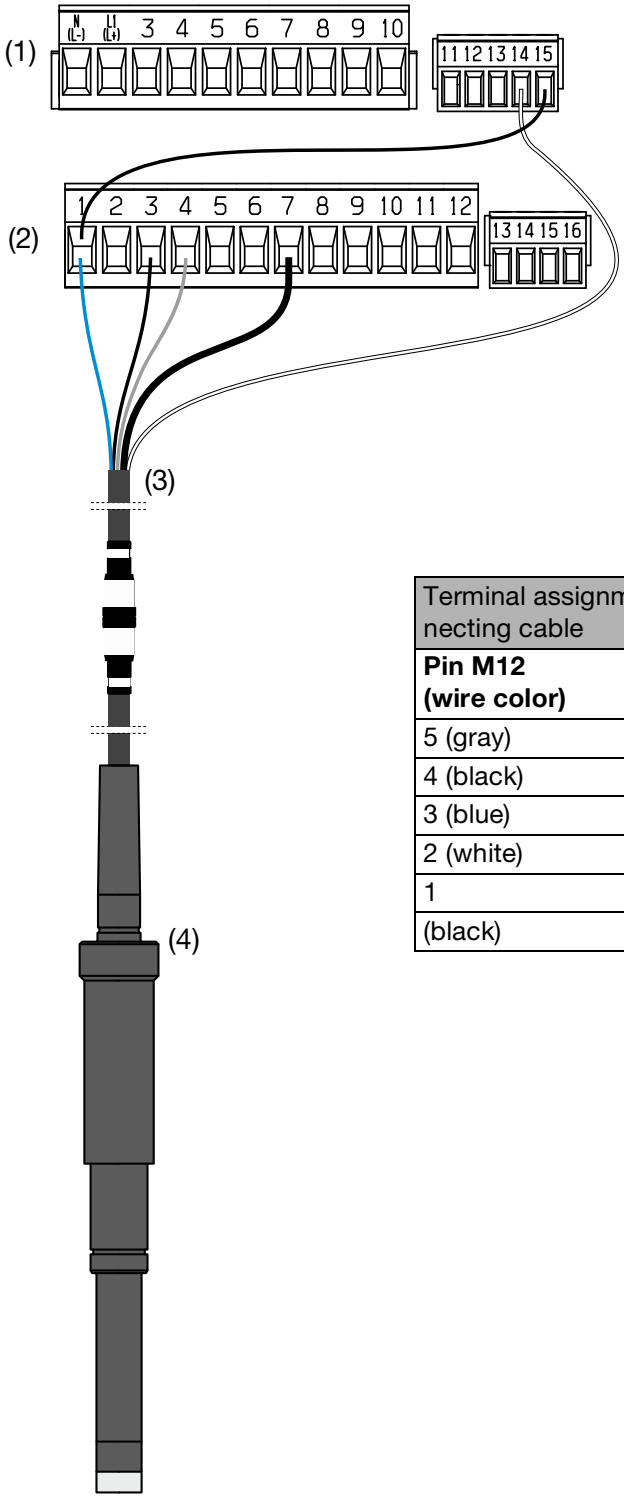
Measuring range:	0 to 20 mg/l
Output signal:	4 to 20 mA (main value)
	4 to 20 mA (temperature)
Temperature measurement	Inside sensor
Control function:	Off

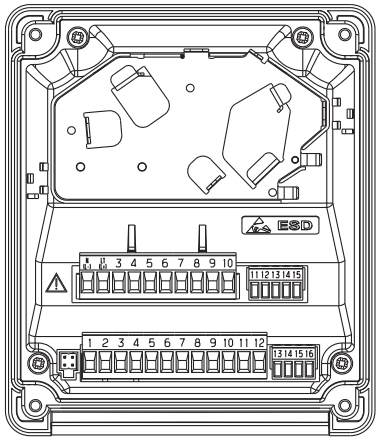
Measurement configuration



(1) JUMO AQUIS 500 RS
(2) JUMO digiLine O-DO (sensor for dissolved oxygen), type 202614
(3) JUMO digiLine master connecting cable for 705001 with exposed wire ends on one side

Electrical connection of sensor type 202614





Terminal assignment of JUMO digiLine master connecting cable		
Pin M12 (wire color)	**Function**	**Connection**
5 (gray)	RS485 +	Row 2, terminal 4
4 (black)	RS485 -	Row 2, terminal 3
3 (blue)	GND	Row 2, terminal 1
2 (white)	+24 V	Row 1, terminal 14
1	not connected	
(black)	Shield	Row 2, terminal 7

(1) Terminal block 1
(2) Terminal block 2
(3) JUMO digiLine master connecting cable for 705001 with exposed wire ends at one end for connection to devices with screw or spring-cage terminals
(4) JUMO digiLine O-DO S10 (sensor for dissolved oxygen), type 202614

7 Startup

"Step-by-step" instructions for sensor startup using automatic sensor configuration

NOTE

If you do not know where the device display is in the menu structure, use the EXIT key to navigate to the next menu level up. Pressing several times will take you back to measurement mode (normal display).

Accessing the administrator level

The device is in measurement mode (normal display).

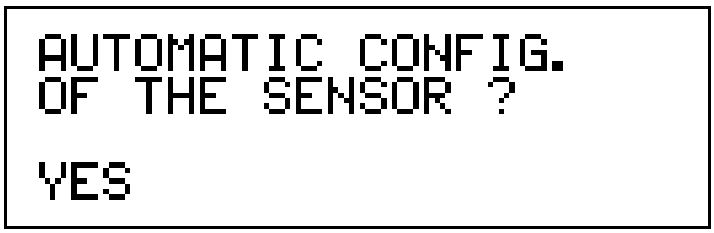
* Press the PGM key for more than 2 seconds.
* Use the ▼ key to select "ADMINISTR. LEVEL".
* Confirm with the PGM key.

Enter password

* Use the ▲ key to set the flashing value on the display under "PASSWORD" to "300" (holding down the key increases the value continuously; pressing the ▼ key decreases the value).
* Confirm with the PGM key.

Accessing the basic settings

* Use the ▼ key to select "BASIC SETTINGS".
* Confirm with the PGM key.



* Use the ▼ or ▲ key to respond to "AUTOMATIC CONFIG. OF THE SENSOR" with "YES" (flashing).
* Confirm with the PGM key.

The JUMO AQUIS 500 now scans the Modbus RS485 interface. If it is connected correctly, the following display appears after a short time:

* Confirm with the PGM key.

Implementing the basic settings

* Use the ▲ and ▼ keys to enter the value for "SALINITY" and confirm with the PGM key.
* Enter the values for "AIR PRESSURE" and "UNIT" (select "mg/l") using the ▲ and ▼ keys and confirm each using the PGM key.
* For the "TEMPERATURE SENSOR" request, select "MODBUS" and confirm with the PGM key.

Initializing the device

* Use the ▲ or ▼ key to respond to the next question "REINITIALIZE DEVICE?" with "YES" and confirm with the PGM key.

Accessing the parameter level

Like the "BASIC SETTINGS", the "PARAMETER LEVEL" is a submenu in the administrator level. After successful sensor initialization, the device display will already be in this level, or you can navigate to it as described above.

Final device settings / inspections

RS485 input	Baud rate:	38400
	Parity:	None
	Stop bits:	2
	Salinity:	As entered in "Basic settings"
	Air pressure:	As entered in "Basic settings"
	Filter time constant:	As required
	Calibration interval:	As required
Temperature input	Temperature sensor:	Modbus
	Unit:	°C
	Filter time constant:	2 s
	Offset:	0.0 °C
Analog output 1	Signal selector:	Main value
	Signal type:	4 to 20 mA
	Scaling start:	0.00 mg/l
	Scale end:	20.00 mg/l
	For calibration:	As required

NOTE

If "Modbus" is selected as the temperature sensor, the offset affects the displayed temperature, the analog outputs and the limit values.

If "Pt100/Pt1000" is selected as the temperature sensor, the offset affects the displayed temperature, the analog outputs, the limit values and the temperature compensation internal to the sensor.

	In case of fault:	As required
	In hold mode:	As required
	Safety value:	As required
	Simulation:	As required
	Simulation value:	As required
Analog output 2	Signal selector:	Temperature
	Signal type:	4 to 20 mA
	Scaling start:	0 °C
	Scaling end:	50 °C
	For calibration:	As required
	In case of fault:	As required
	In hold mode:	As required
	Safety value:	As required
	Simulation:	As required
	Simulation value:	As required
Display	Language:	As required
	Lighting:	As required
	LCD inversion:	As required
	Measured value display type:	As required
	Display on bottom:	As required
	Display on top:	As required
	Max./min. reset:	As required
	Operation timeout:	As required
	Contrast:	As required

7.2.3 Measurement of free chlorine concentration

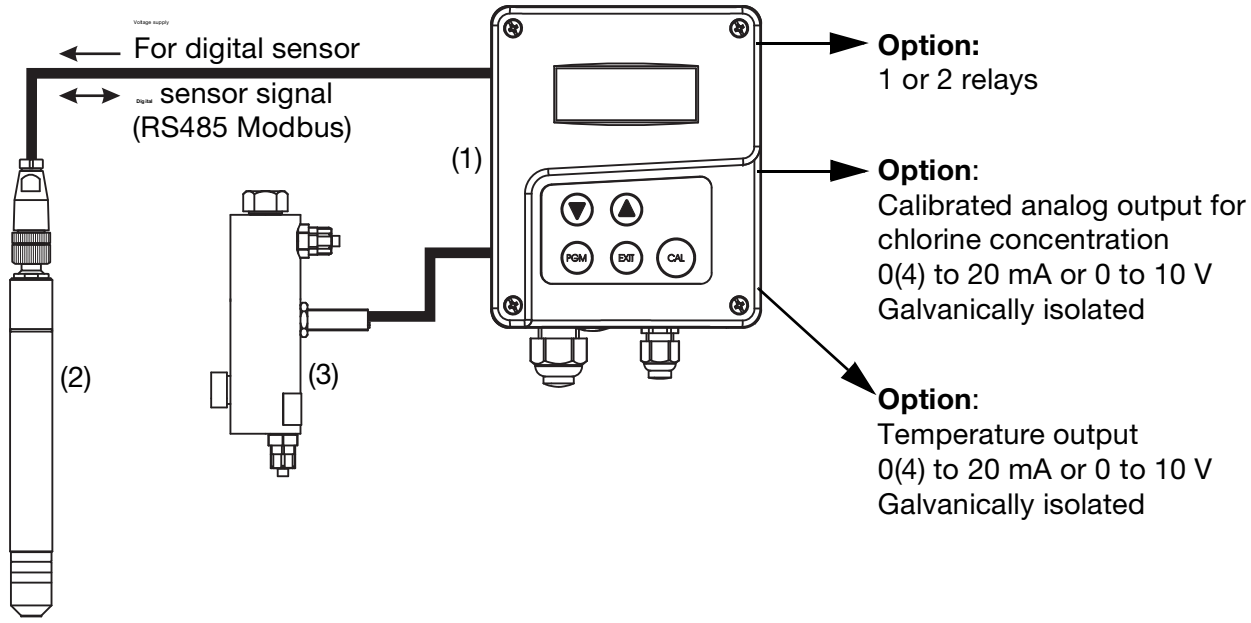
NOTE

Sensor with digital interface for free chlorine, see data sheet 202630 and optional flow monitor, see data sheet 202811.

Task

Measuring range:	0 to 2 ppm
Output signal:	4 to 20 mA (main value)
	4 to 20 mA (temperature)
Temperature measurement	Inside sensor
Control function:	Off

Measurement configuration



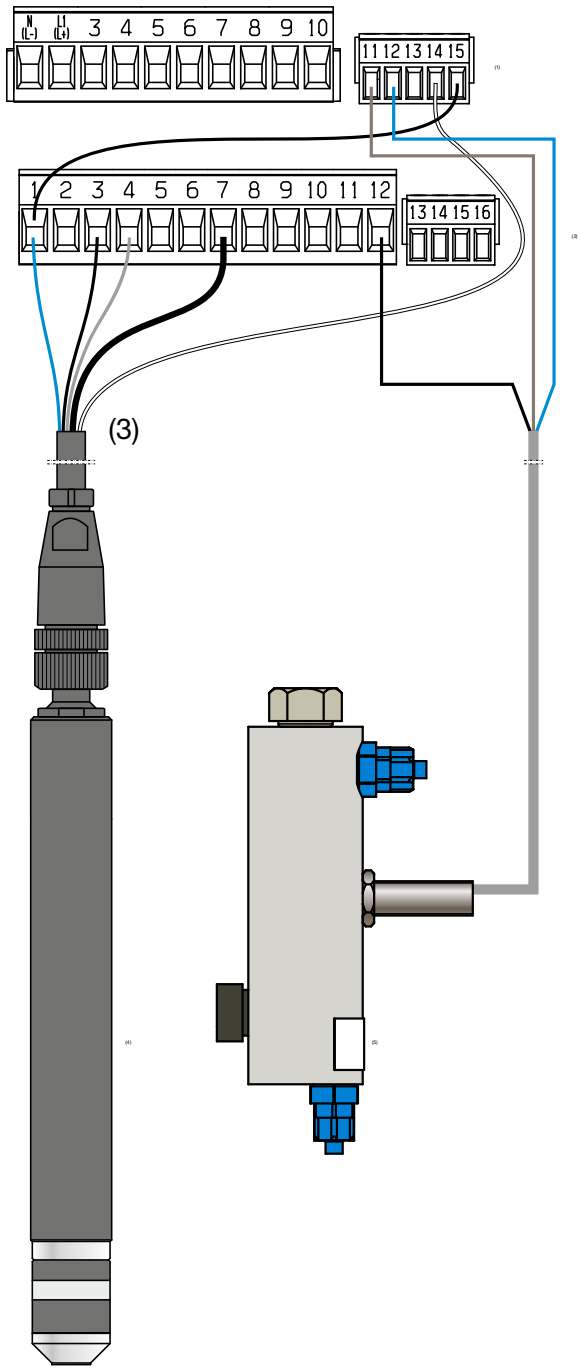
(1) JUMO AQUIS 500 RS

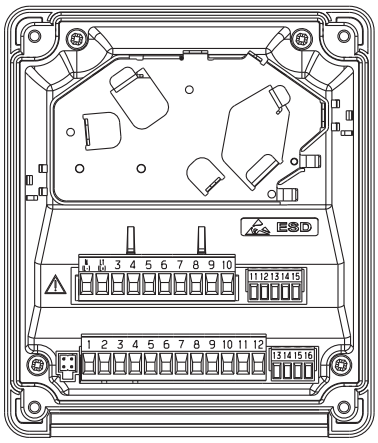
(2) JUMO tecLine Cl2 (sensor for free chlorine), Type 202630/50... or /53...

(3) Individual fitting flow monitor, part no.: 00605507

7 Startup

Electrical connection of sensor type 202630[1] with digital interface and flow monitor





Terminal assignment of JUMO digiLine master connecting cable		
Pin M12 (wire color)	**Function**	**Connection**
5 (gray)	RS485 +	Row 2, terminal 4
4 (black)	RS485 -	Row 2, terminal 3
3 (blue)	GND	Row 2, terminal 1
2 (white)	+24 V	Row 1, terminal 14
1	not connected	
(black)	Shield	Row 2, terminal 7

Terminal assignment for flow monitor		
Wire color	**Function**	**Connection**
Brown	+12 V	Row 1, terminal 11
Black	Contact (NPN normally open contact)	Row 2, terminal 12
Blue	GND	Row 1, terminal 12

(1) Terminal block 1
(2) Terminal block 2
(3) JUMO digiLine master connecting cable for 705001 with exposed wire ends at one end for connection to devices with screw or spring-cage terminals
(4) JUMO tecLine Cl2 (sensor for free chlorine) with digital interface, type 202630/50 or /53...
(5) JUMO individual fitting flow monitor, type 202811/20...

[1] Also applies for the types 202631, 202634, 202636 and 202637 with a digital interface.

"Step-by-step" instructions for sensor startup using automatic sensor configuration

If you do not know where the device display is in the menu structure, use the EXIT key to navigate to the next menu level up. Pressing several times will take you back to measurement mode (normal display).

Accessing the administrator level

The device is in measurement mode (normal display).

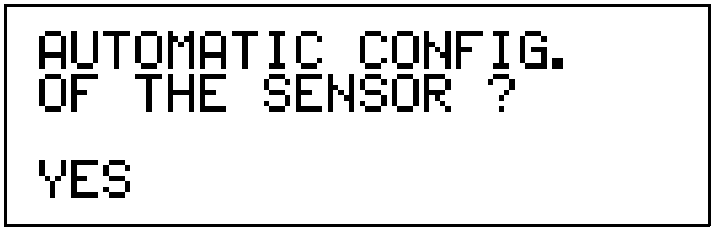
* Press the PGM key for more than 2 seconds.
* Use the ▼ key to select "ADMINISTR. LEVEL".
* Confirm with the PGM key.

Enter password

* Use the ▲ key to set the flashing value on the display under "PASSWORD" to "300" (holding down the key increases the value continuously; pressing the ▼ key decreases the value).
* Confirm with the PGM key.

Accessing the basic settings

* Use the ▼ key to select "BASIC SETTINGS".
* Confirm with the PGM key.



* Use the ▼ or ▲ key to respond to "AUTOMATIC CONFIG. OF THE SENSOR" with "YES" (flashing).
* Confirm with the PGM key.

The AQUIS 500 scans the Modbus-RS485 interface. If it is connected correctly, the following display appears after a short time:

* Confirm with the PGM key.

7 Startup

Implementing the basic settings

- Use the ▲ and ▼ keys to select the value for "UNIT" (for this example "ppm") and confirm with the PGM key.
- Use the ▲ and ▼ keys to select the value for "MAIN DECIMAL POINT" (for this example "X.xxx") and confirm with the PGM key.
- For the "TEMPERATURE SENSOR" request, select "MODBUS" and confirm with the PGM key.

Initializing the device

- Use the ▲ or ▼ key to respond to the next question "REINITIALIZE DEVICE?" with "YES" and confirm with the PGM key.

Accessing the parameter level

Like the "BASIC SETTINGS", the "PARAMETER LEVEL" is a submenu in the administrator level. After successful sensor initialization, the device display will already be in this level, or you can navigate to it as described above.

Final device settings / inspections

Input RS485r	Zero:	Calibration value
	Span:	Calibration value
	Baud rate	38400
	Parity	None
	Measurand	Free chlorine
	Unit	ppm
	Filter time constant:	As required
	Calibration interval	As required
Temperature input	Temperature sensor:	Modbus
	Unit:	°C
	Filter time constant:	As required
	Offset:	0.0 °C
Binary input	Function:	Hold mode
Analog output 1	Signal selector:	Main value
	Signal type:	4 to 20 mA
	Scaling start:	0.00 ppm
	Scaling end:	2.00 ppm
	For calibration:	As required
	In case of fault:	As required
	In hold mode:	As required
	Safety value:	As required
	Simulation:	As required

	Simulation value:	As required
Analog output 2	Signal selector:	Temperature
	Signal type:	4 to 20 mA
	Scaling start:	0 °C
	Scaling end:	50 °C
	For calibration:	As required
	In case of fault:	As required
	In hold mode:	As required
	Safety value:	As required
	Simulation:	As required
	Simulation value:	As required
Display	Language:	As required
	Lighting:	As required
	LCD inversion:	As required
	Measured value display type:	As required
	Display on bottom:	As required
	Display on top:	As required
	Max./min. reset:	As required
	Operation timeout:	As required
	Contrast:	As required

7.2.4 Turbidity measurement

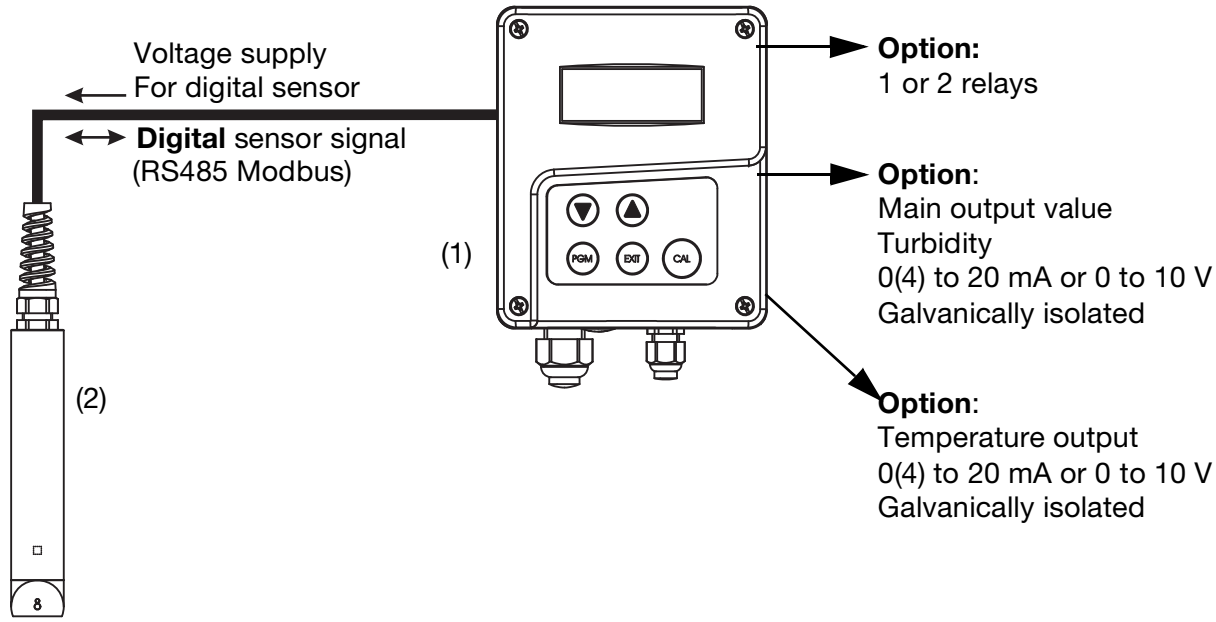
NOTE

Optical sensor with digital interface for turbidity measurement,
see data sheet 202670.

Task

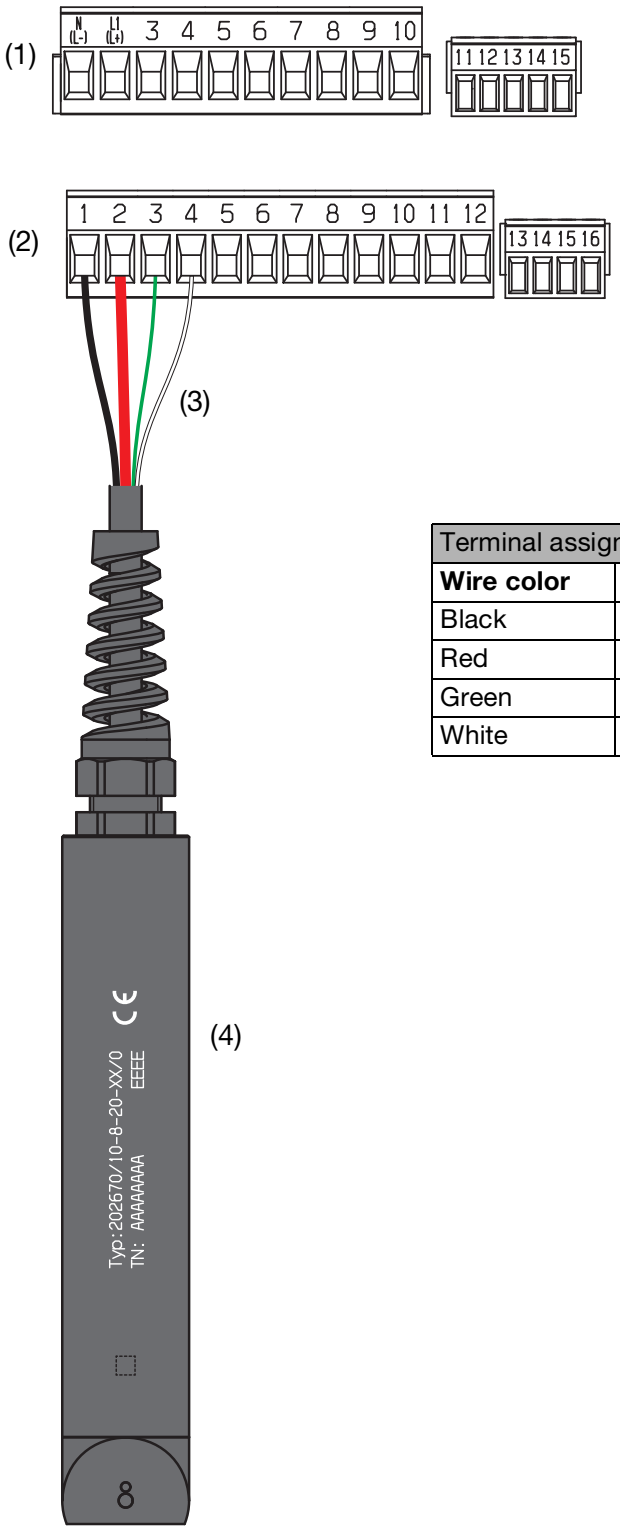
Measuring range:	0 to 200 NTU
Output signal:	4 to 20 mA (main value)
	4 to 20 mA (temperature)
Control function:	Off

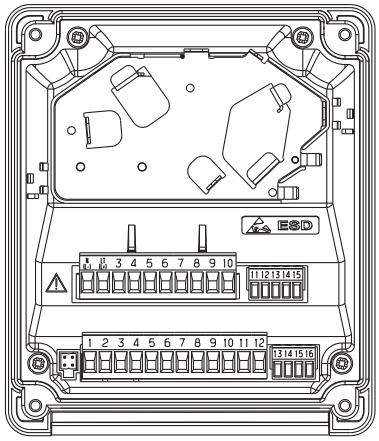
Measurement configuration



(1) JUMO AQUIS 500 RS
(2) JUMO ecoLine NTU (sensor for turbidity measurements), type 202670

Electrical connection of sensor type 202670





Terminal assignment of sensor connecting cable		
Wire color	**Function**	**Connection**
Black	GND	Row 2, terminal 1
Red	DC 5 V +	Row 2, terminal 2
Green	RS485 -	Row 2, terminal 3
White	RS485 +	Row 2, terminal 4

(1) Terminal block 1
(2) Terminal block 2
(3) 4-wire connecting cable (fixed cable on the sensor)
(4) JUMO ecoLine NTU (sensor for turbidity measurements), type 202670

7 Startup

"Step-by-step" instructions for sensor startup using automatic sensor configuration

If you do not know where the device display is in the menu structure, use the EXIT key to navigate to the next menu level up. Pressing several times will take you back to measurement mode (normal display).

Accessing the administrator level

The device is in measurement mode (normal display).

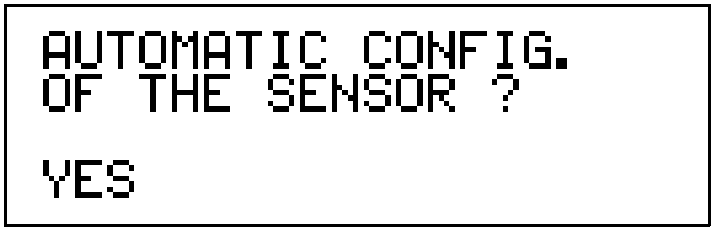
* Press the PGM key for more than 2 seconds.
* Use the ▼ key to select "ADMINISTR. LEVEL".
* Confirm with the PGM key.

Enter password

* Use the ▲ key to set the flashing value on the display under "PASSWORD" to "300" (holding down the key increases the value continuously; pressing the ▼ key decreases the value).
* Confirm with the PGM key.

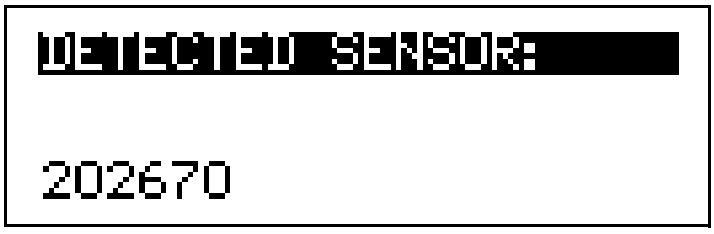
Accessing the basic settings

* Use the ▼ key to select "BASIC SETTINGS".
* Confirm with the PGM key.



* Use the ▼ or ▲ key to respond to "AUTOMATIC CONFIG. OF THE SENSOR" with "YES" (flashing).
* Confirm with the PGM key.

The JUMO AQUIS 500 now scans the Modbus RS485 interface. If it is connected correctly, the following display appears after a short time:



* Confirm with the PGM key.

Implementing the basic settings

- Use the ▲ or ▼ keys to select the measuring range "0 to 200" and confirm with the PGM key.
- Use the ▲ or ▼ keys to select the "NTU" unit for the display and confirm with the PGM key.
- For the "TEMPERATURE SENSOR" request, select "MODBUS" and confirm with the PGM key.

Initializing the device

- Use the ▲ or ▼ key to respond to the next question "REINITIALIZE DEVICE?" with "YES" and confirm with the PGM key.

Accessing the parameter level

Like the "BASIC SETTINGS", the "PARAMETER LEVEL" is a submenu in the administrator level. After successful sensor initialization, the device display will already be in this level, or you can navigate to it as described above.

Final device settings / inspections

RS485 input	Unit:	NTU
	Device address:	255
	Filter time constant:	As required
	Calibration interval:	As required
	Zero point measuring range 1:	Calibration value
	Slope measuring range 1:	Calibration value
	Zero point measuring range 2:	Calibration value
	Slope measuring range 2:	Calibration value
	Zero point measuring range 3:	Calibration value
	Slope measuring range 3:	Calibration value
	Zero point measuring range 4:	Calibration value
	Slope measuring range 4:	Calibration value
Temperature input	Temperature sensor:	Modbus
	Unit:	°C
	Filter time constant:	2 s
	Offset:	0.0 °C
Analog output 1	Signal selector:	Main value
	Signal type:	4 to 20 mA
	Scale start:	0.0 NTU
	Scale end:	200.0 NTU
	For calibration:	As required
	In case of fault:	As required

	In hold mode:	As required
	Safety value:	As required
	Simulation:	As required
	Simulation value:	As required
Display	Language:	As required
	Lighting:	As required
	LCD inversion:	As required
	Measured value display type:	As required
	Display on bottom:	As required
	Display on top:	As required
	Max./min. reset:	As required
	Operation timeout:	As required
	Contrast:	As required

8.1 JUMO ecoLine O-DO (type 202613)

8.1.1 General information

As with all optical sensors, the JUMO ecoLine O-DO is subject to sensor aging and sensor drift during operation. The effects of these factors are compensated for by calibration.

Calibration methods

The JUMO AQUIS 500 RS provides two calibration methods for the JUMO ecoLine O-DO sensor:

- **End value calibration** (typical method), in which the slope of the sensor is calibrated, see chapter 8.1.2 "End value calibration", page 64.
- **Two-point calibration**, in which the zero point and slope of the sensor are calibrated, see chapter 8.1.3 "Two-point calibration", page 66. This calibration method offers the greatest possible level of accuracy and is particularly recommended for measurements of small oxygen concentrations.

Calibration interval

The JUMO ecoLine O-DO sensor is calibrated ex works, meaning that no calibration is required before initial startup. During operation, the sensor should be calibrated at least once a year and should also be cleaned regularly (depending on the extent of contamination by the process medium).

Preparatory work

- Rinse the sensor and membrane with clear water.
- Carefully remove biofilm or sludge with a soft sponge and warm, soapy water.

Never use abrasive agents (e.g. a scouring sponge)!

NOTE

When starting the calibration, the device sets the analog outputs, switching outputs and controllers to the following states by default:

- "Moving" (analog outputs)
- "Inactive" (switching outputs)
- "HOLD mode", output level frozen (controller)

Calibration can basically be initiated as follows:

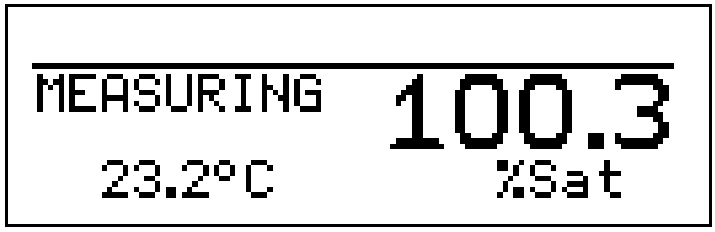
- Press the CAL key if this has been enabled in **ADMINISTR: LEVEL > PASSWORD > CALIB. ENABLE**
- Via **ADMINISTR: LEVEL > PASSWORD > CALIB. LEVEL**
- Via **CALIB. LEVEL in the main menu**, if this has been enabled in **ADMINISTR. LEVEL > PASSWORD > CALIB. ENABLE**

8 Calibrating sensors

8.1.2 End value calibration

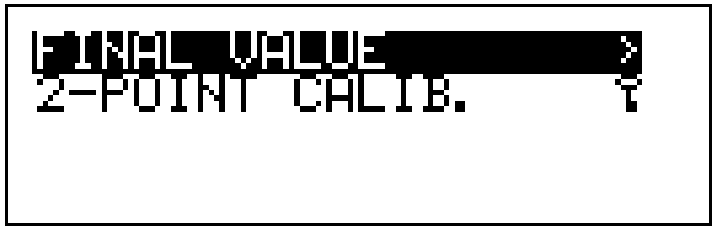
Requirements

- The device is supplied with voltage,
  see chapter 5 "Installation", page 17 et seqq.
- The sensor is connected
- Sensor startup on the device is completed
- Calibration has been enabled, see chapter 6.7 "Administrator level", page 29
- The device is in "Measurement mode"



Selecting calibration methods

✱ Initiate calibration using the CAL key (or via the administrator level).



✱ Select "FINAL VALUE" and start with the PGM key.

CAUTION!

The response of the outputs during calibration depends on their configuration.

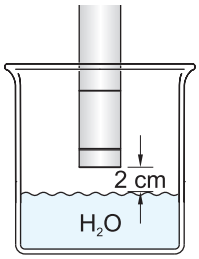
✱ Now remove the calibration sensor from the process.

Calibration for 100% saturation (end value)

✱ Bring the sensor to the defined 100% saturation state by placing it in **water-vapor-saturated air**.

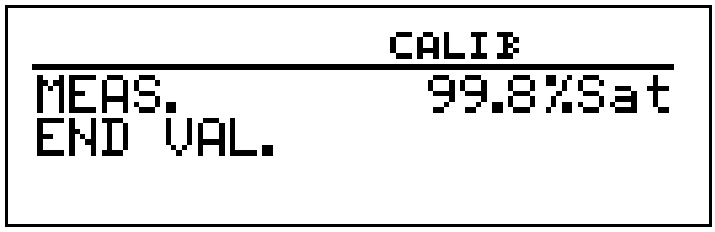
NOTE

Water-vapor-saturated air occurs, for example, directly above the water surface in a half-full glass of water at room temperature.



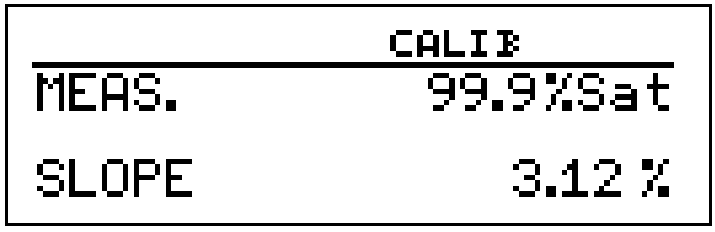
Make sure there are no drops of water on membrane. The sensor must remain dry during measurement. The use of a holding device (e.g. a test tube) is recommended.

✱ Wait until the displayed value is stable at "100.0% Sat." or has stabilized near this value.



✱ Confirm with the PGM key.

The slope determined by the device (deviation from the factory calibration) is displayed along with the corrected measured value, which should be 100.0% Sat. immediately after acknowledgement.



✱ Now reinstall the sensor in the process.

✱ Use the PGM key to apply the calibration or the EXIT key to reject the calibration.

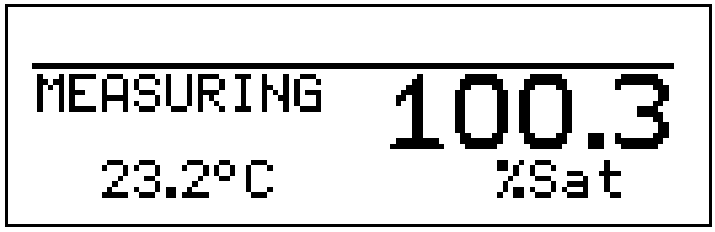
The device returns to measurement mode.

8 Calibrating sensors

8.1.3 Two-point calibration

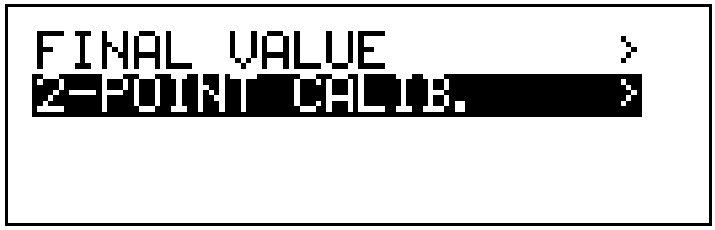
Requirements

- The device is supplied with voltage,
  see chapter 5 "Installation", page 17 et seqq.
- The sensor is connected
- Sensor startup on the device is completed
- Calibration has been enabled, see chapter 6.7 "Administrator level", page 29
- the device is in "Measurement mode".



Selecting calibration methods

✱ Initiate calibration using the CAL key (or via the administrator level).



✱ Select "2-POINT CALIB." and start calibration with the PGM key.

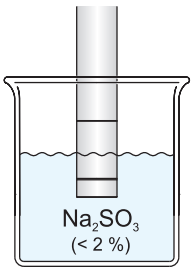
CAUTION!

The response of the outputs during calibration depends on their configuration.

✱ Now remove the calibration sensor from the process.

Calibration for 0% saturation (zero point)

✱ Bring the sensor to the defined 0% saturation state by submerging it in an aqueous **sodium sulfite solution (concentration < 2%)**.



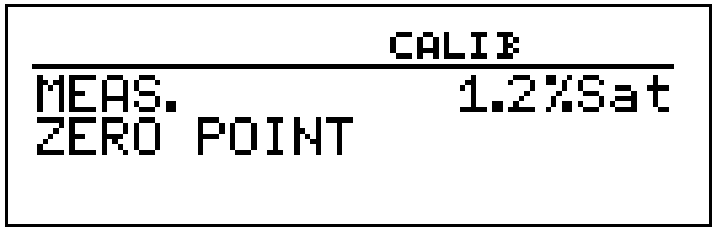
CAUTION!

Do not leave the sensor in contact with the sodium sulfite solution for more than 1 hour.

NOTE

For flawless measurement, there must be no air bubbles on the bottom of the membrane of the submerged sensor.

✱ Wait until the displayed value is stable at "0.00% Sat." or has stabilized near this value.



✱ Confirm with the PGM key; the display switches to "MEAS. END VAL."

Calibration for 100% saturation (end value)

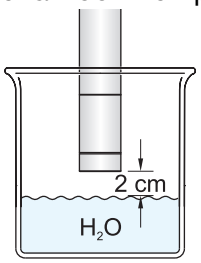
✱ Remove the sensor from the sodium sulfite solution and dry with a paper towel, being careful to only dab the membrane.

✱ Rinse the sensor with clean water and dry with a paper towel, being careful to only dab the membrane.

✱ Next bring the sensor to the second defined state by placing it in water-vapor-saturated air.

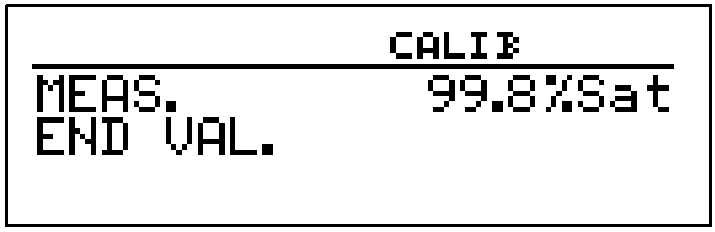
NOTE

Water-vapor-saturated air occurs, for example, directly above the water surface in a half-full glass of water at room temperature.



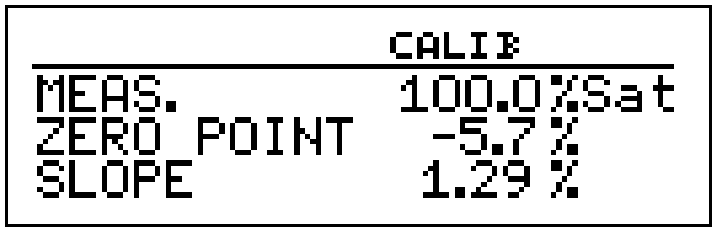
Make sure there are no drops of water on membrane. The sensor must remain dry during measurement. The use of a holding device (e.g. a test tube) is recommended.

✱ Wait until the displayed value is stable at "100.0% Sat." or has stabilized near this value.



✱ Confirm with the PGM key.

The zero point and slope determined by the device (deviation from the factory calibration) are displayed along with the corrected measured value, which should now be 100.0% Sat.



✱ Now reinstall the sensor in the process.

✱ Use the PGM key to apply the calibration or the EXIT key to reject the calibration.

The device returns to measurement mode.

8.1.4 Calibration logbook

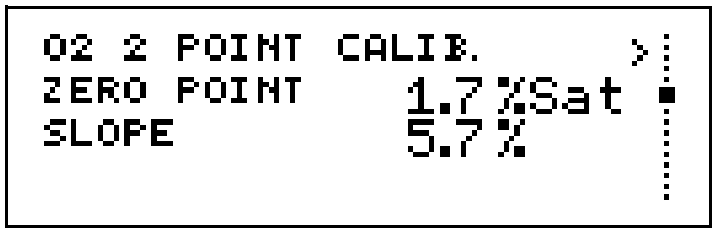
The data records for the last 10 successful calibrations are saved in the connected sensor, are extracted by the JUMO AQUIS 500 RS, and can be viewed in the calibration logbook.

Accessing the calibration logbook

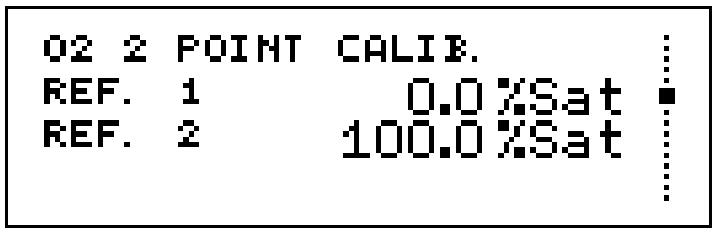
The device is in measurement mode.

* Press the PGM key for more than 2 seconds.
* Use the ▽ key to select the "CALIB. LOGBOOK" entry.
* Confirm with the PGM key.

The data for the last successful calibration are displayed; the example below shows the values for zero point and slope (deviation from the factory calibration) of a 2-point calibration:



As not all of the data for the 2-point calibration fits on one page in the display, you can use the PGM key to access further data from the calibration data record for the 2-point calibration:



Use the ▽ and △ keys to access all other stored calibration data records.

NOTE

Irrespective of the unit selected in the basic settings, calibrations are always conducted in % Sat. The last determined calibration data record is always the top entry in the list.

8 Calibrating sensors

8.2 JUMO digiLine O-DO S10 (type 202614)

8.2.1 General information

As with all optical sensors, the JUMO digiLine O-DO S10 is subject to sensor aging and sensor drift during operation. The effects of these factors are compensated for by calibration.

Calibration methods

The JUMO AQUIS 500 RS provides two calibration methods for the JUMO digiLine O-DO S10 sensor:

- **End value calibration** (typical method), in which the slope of the sensor is calibrated, see chapter 8.2.2 "End value calibration", page 71.
- **Zero point calibration**, in which the supplement to end value calibration is calibrated in addition to the sensor zero point, see chapter 8.2.3 "Zero point calibration", page 74. This calibration method offers the greatest possible accuracy and is particularly recommended for measurements in the range of under 10% oxygen saturation.

Calibration interval

The JUMO digiLine O-DO S10 sensor is calibrated ex works, meaning that no calibration is required before initial startup. During operation, the sensor should be calibrated at least once a year and should also be cleaned regularly (depending on the extent of contamination by the process medium).

Preparatory work

- Rinse the sensor and membrane with clear water.
- Carefully remove biofilm or sludge with a soft sponge and warm, soapy water.

Never use abrasive agents (e.g. a scouring sponge)!

NOTE

When starting the calibration, the device sets the analog outputs, switching outputs and controllers to the following states by default:

- "Moving" (analog outputs)
- "Inactive" (switching outputs)
- "HOLD mode", output level frozen (controller)

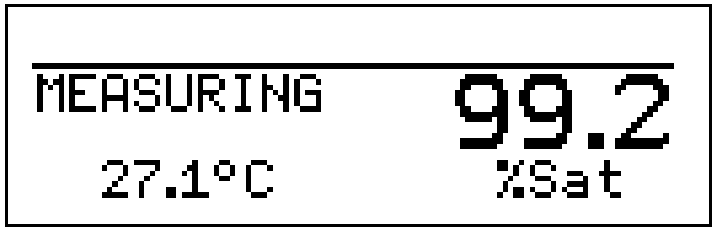
Calibration can basically be initiated as follows:

- Press the CAL key if this has been enabled in **ADMINISTR: LEVEL > PASSWORD > CALIB. ENABLE**
- Via **ADMINISTR: LEVEL > PASSWORD > CALIB. LEVEL**
- Via **CALIB. LEVEL in the main menu**, if this has been enabled in **ADMINISTR. LEVEL > PASSWORD > CALIB. ENABLE**

8.2.2 End value calibration

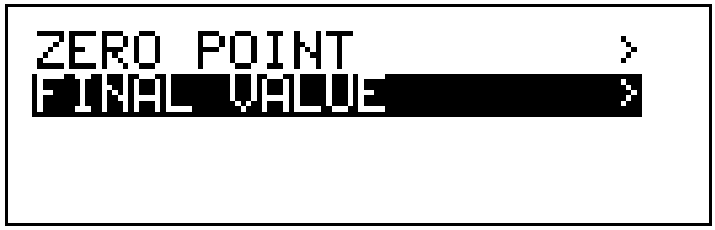
Requirements

- The device is supplied with voltage,
  see chapter 5 "Installation", page 17 et seqq.
- The sensor is connected
- Sensor startup on the device is completed
- Calibration has been enabled, see chapter 6.7 "Administrator level", page 29
- The device is in "Measurement mode"

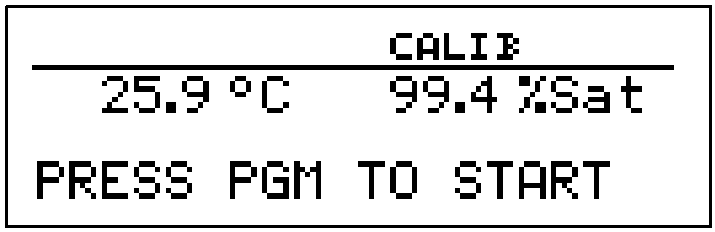


Selecting calibration methods

✱ Initiate calibration using the CAL key (or via the administrator level).



✱ Select "FINAL VALUE" and confirm using the PGM key.



CAUTION!

The response of the outputs during calibration depends on their configuration.

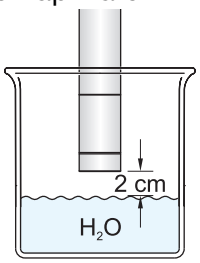
✱ Now remove the calibration sensor from the process.

✱ Bring the sensor to the defined 100% saturation state by placing it in **water-vapor-saturated air**.

8 Calibrating sensors

NOTE

Water-vapor-saturated air occurs, for example, directly above the surface in a half-full sample vessel of tap water.



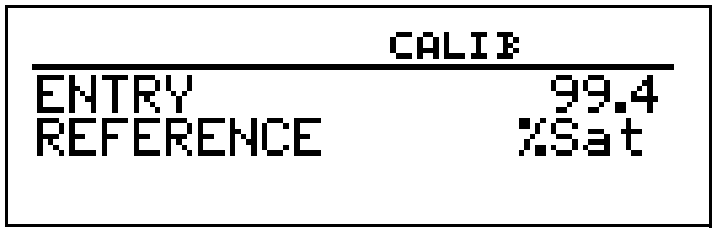
To achieve successful calibration, the following points must be taken into account:

- Both the sample vessel and the water must be clean.
- The water should be left to stand in the sample vessel for at least 30 minutes before calibration, so that an equilibrium is established in the gas exchange between water and ambient air.
- Ideally, a holder should be installed to mount the sensor above the water surface.
- The sensor must be kept dry during the calibration process. Drops of water adhering to the sensor membrane could distort the measurement result.
- The air pressure and, above all, the temperature must remain constant during the calibration.
- Direct sunlight and drafts in the immediate vicinity of the sample vessel should be avoided.
- Wait a few minutes until the measured temperature stops changing. In the event of larger temperature differences between water and air, this can take up to 30 minutes.

Start end value calibration

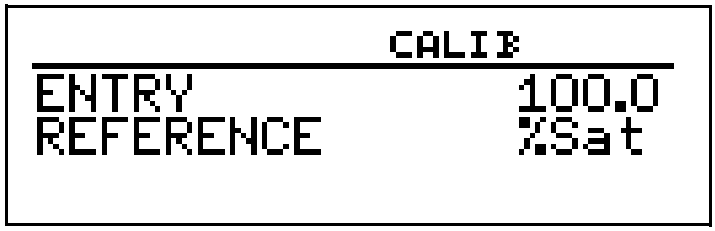
✱ Wait until the displayed value has stabilized.

✱ Start calibration using the PGM key.

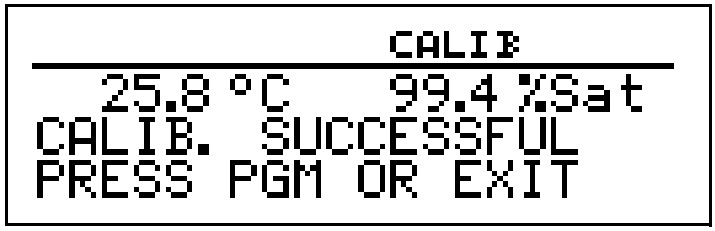


The "ENTRY REFERENCE" display flashes and shows the last determined oxygen saturation value

✱ Using the ▽ and △ keys, change the flashing value to "100.0".



✱ Confirm with the PGM key.



The device confirms successful calibration and displays the current measured oxygen saturation value and the current temperature on the sensor.

✱ Now reinstall the sensor in the process.

✱ Use the PGM key or the EXIT key to complete the calibration process.

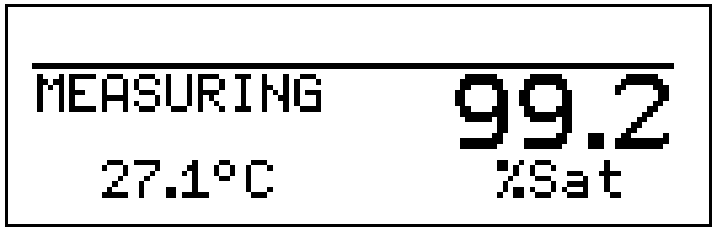
The device returns to measurement mode.

8 Calibrating sensors

8.2.3 Zero point calibration

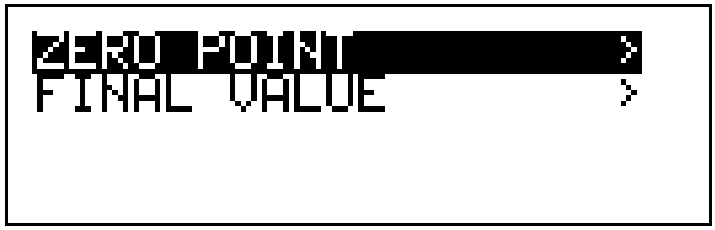
Requirements

- The device is supplied with voltage,
  see chapter 5 "Installation", page 17 et seqq.
- The sensor is connected
- Sensor startup on the device is completed
- Calibration has been enabled, see chapter 6.7 "Administrator level", page 29
- the device is in "Measurement mode".

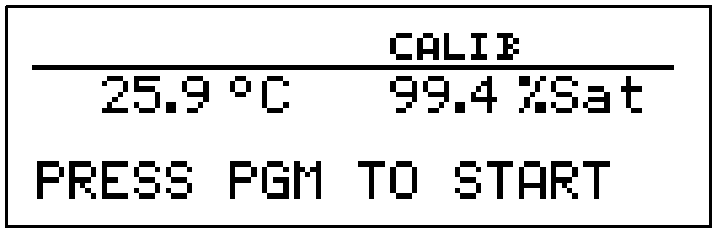


Selecting calibration methods

✱ Initiate calibration using the CAL key (or via the administrator level).



✱ Select "ZERO POINT“ and use the PGM key to confirm.

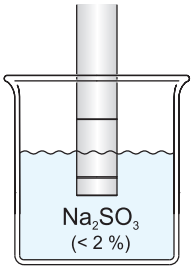


CAUTION!

The response of the outputs during calibration depends on their configuration.

✱ Now remove the calibration sensor from the process.

✱ Bring the sensor to the defined 0% saturation state by submerging it in an aqueous **sodium sulfite solution (concentration < 2%)**.



CAUTION!

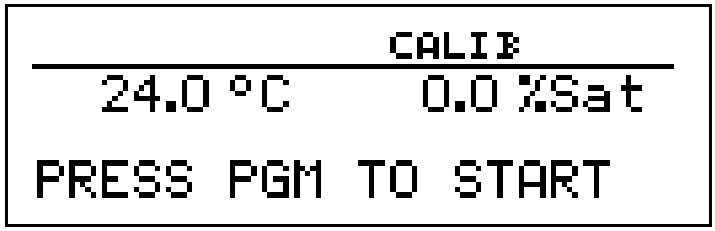
Do not leave the sensor in contact with the sodium sulfite solution for more than 1 hour.

NOTE

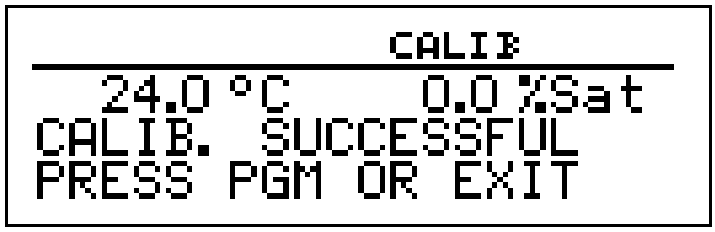
For flawless measurement, there must be no air bubbles on the bottom of the membrane of the submerged sensor.

Start zero point calibration

✱ Wait until the displayed value is stable at "0.0% saturation" or has stabilized near this value. This may take some time



✱ Start calibration using the PGM key.



The device confirms successful calibration and displays the current measured oxygen saturation value and the current temperature on the sensor.

✱ Now reinstall the sensor in the process.

✱ Use the PGM key or the EXIT key to complete the calibration process.

The device returns to measurement mode.

8.2.4 Calibration logbook

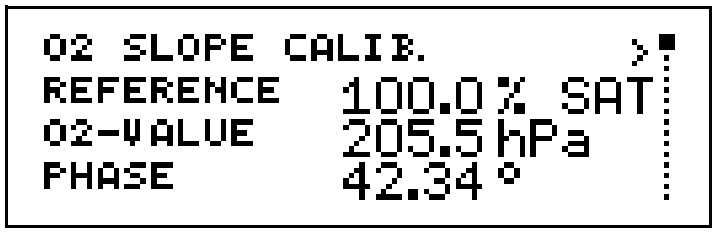
The data records for the last 10 successful calibrations are saved in the connected sensor, are extracted by the JUMO AQUIS 500 RS, and can be viewed in the calibration logbook.

Accessing the calibration logbook

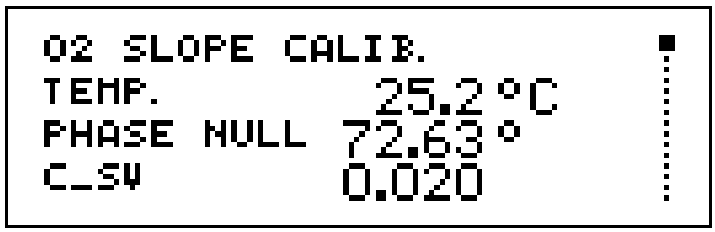
The device is in measurement mode.

* Press the PGM key for more than 2 seconds.
* Use the ▽ key to select the "CALIB. LOGBOOK" entry.
* Confirm with the PGM key.

The data for the last successful calibration is displayed; the example below shows the values for reference value, partial oxygen pressure and phase angle for an end value



Since not all the final value calibration data fit on one page of the display, further calibration data record data for the end value calibration can be accessed by pressing the PGM key:



Use the ▽ and △ keys to access all other stored calibration data records.

NOTE

Irrespective of the unit selected in the basic settings, calibrations are always conducted in % Sat. The last determined calibration data record is always the top entry in the list.

8.3 JUMO tecLine Cl2, TC, ClO2/O3, H2O2/PAA, Br (types 20263x with digital interface)

8.3.1 General information

These sensors for disinfectants require defined and constant flow conditions for measurement. These flow conditions can best be achieved in a suitable fitting. The sensors are therefore not removed from the fitting for calibration.

Calibration methods

The JUMO AQUIS 500 RS offers two calibration methods for the sensors of type JUMO tecLine 20263x:

- **End value calibration** (typical method), in which the slope of the sensor is calibrated, see chapter 8.3.2 "End value calibration", page 79
- **2-point calibration,** in which the zero point and slope of the sensor are calibrated – see, see chapter 8.3.3 "Two-point calibration", page 81

Preparatory work

- Fill the membrane cap with electrolyte for initial startup.

This procedure is described in detail in the operating manual for the sensors.

Calibration interval

The sensors **must** be calibrated:

- For initial startup
- After each replacement of electrolyte
- After each power failure

The sensors **should** be calibrated:

- One day after initial startup
- Weekly during operation, and more frequently if needed

NOTE

When starting the calibration, the device sets the analog outputs, switching outputs and controllers to the following states by default:

- "Moving" (analog outputs)
- "Inactive" (switching outputs)
- "HOLD mode", output level frozen (controller)

8 Calibrating sensors

Calibration can basically be initiated as follows:

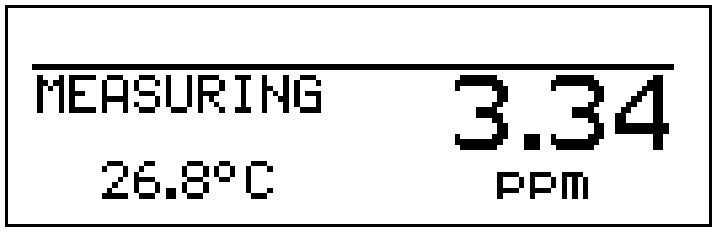
- Press the CAL key if this has been enabled in **ADMINISTR: LEVEL > PASSWORD > CALIB. ENABLE**

- Via **ADMINISTR: LEVEL > PASSWORD > CALIB. LEVEL**
- Via **CALIB. LEVEL in the main menu**, if this has been enabled in **ADMINISTR. LEVEL > PASSWORD > CALIB. ENABLE**

8.3.2 End value calibration[1]

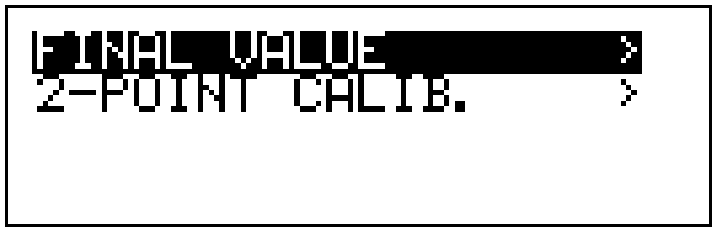
Requirements

- The device is supplied with voltage,
  see chapter 5 "Installation", page 17 et seqq.
- The sensor is connected and has completed a run-in time (2 hours for sensor type 202630/53)
- Sensor startup on the device is completed
- Calibration has been enabled, see chapter 6.7 "Administrator level", page 29
- The device is in "Measurement mode"



Selecting calibration methods

✱ Initiate calibration using the CAL key (or via the administrator level).

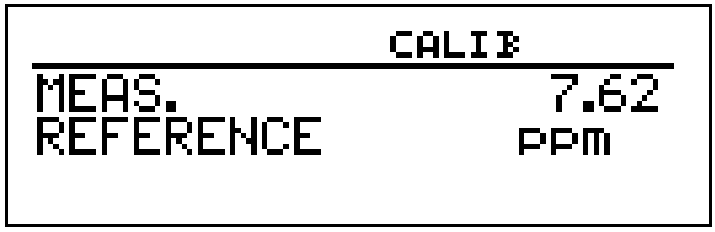


✱ Select "FINAL VALUE" and start with the PGM key.

CAUTION!

The response of the outputs during calibration depends on their configuration.

The device display changes for measurement of the reference value (end value)..

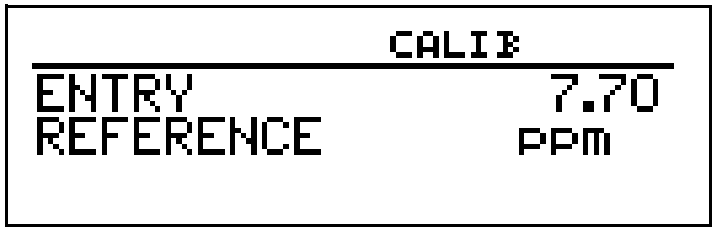


[1] Using the example of the sensor for free chlorine, type 202630/53

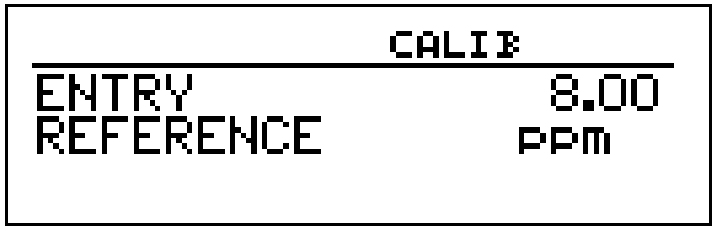
Calibration for the target chlorine concentration (end value)

- ✱ Bring the process to the condition of target chlorine concentration.
- ✱ Determine the chlorine concentration of the process solution using the DPD-1 method.
- ✱ When the value on the device display is stable, confirm with the PGM key.

The device display changes to the input of the reference value previously determined using the DPD-1 method; the input value "flashes".

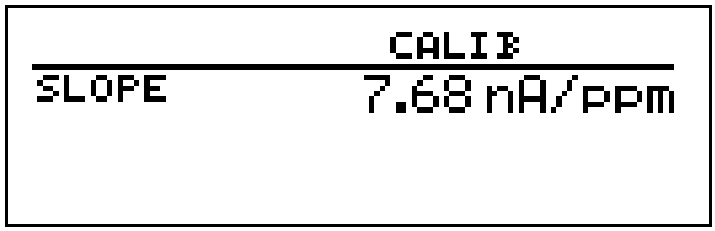


- ✱ Input the determined reference value with the aid of the ▼ and ▲ keys.



- ✱ Confirm with the PGM key.

The value determined by the device for the slope is displayed.



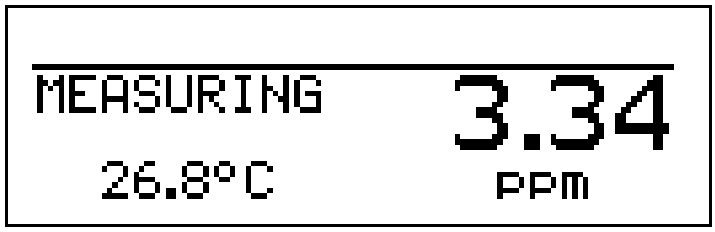
- ✱ Use the PGM key to apply the calibration or the EXIT key to reject the calibration.

The device returns to measurement mode.

8.3.3 Two-point calibration[1]

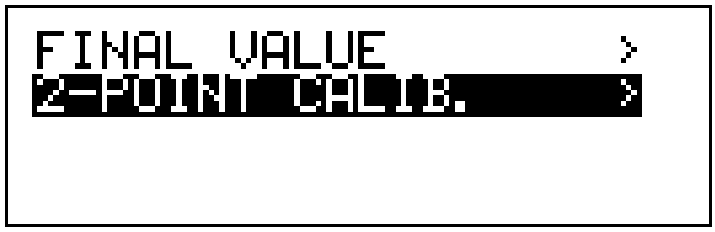
Prerequisite

- The device is supplied with voltage,
  see chapter 5 "Installation", page 17 et seqq.
- The sensor is connected and has completed a run-in time (2 hours for sensor type 202630/53)
- Sensor startup on the device is completed
- Calibration has been enabled, see chapter 6.7 "Administrator level", page 29
- the device is in "Measurement mode".



Selecting calibration methods

✱ Initiate calibration using the CAL key (or via the administrator level).



✱ Select "2-POINT CALIB." and start calibration with the PGM key.

CAUTION!

The response of the outputs during calibration depends on their configuration.

The device display changes to measurement of the zero point.

[1] Using the example of the sensor for free chlorine, type 202630/53

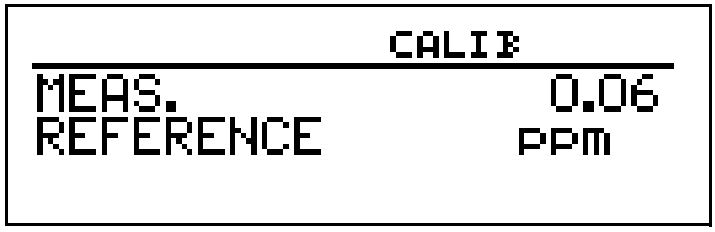
8 Calibrating sensors

Calibrating the zero point

✱ Make the process water chlorine-free.

✱ When the value for device display is near the zero point, confirm with the PGM key.

The device display changes for measurement of the reference value.



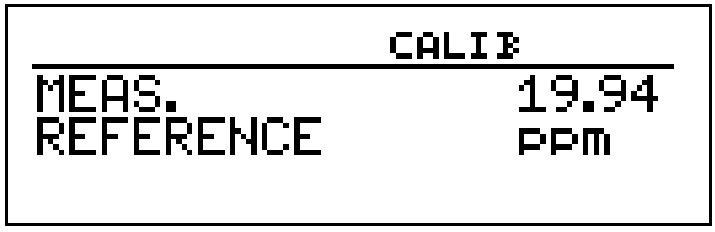
Reference value calibration

✱ Bring the process to the condition of target chlorine concentration.

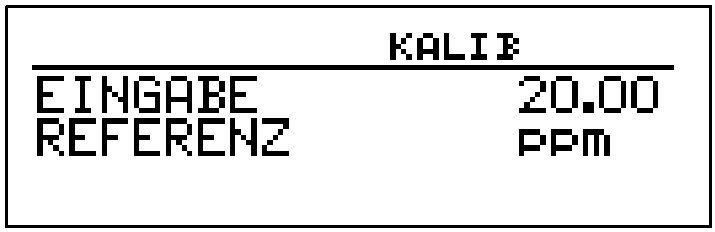
✱ Determine the chlorine concentration of the process solution using the DPD-1 method.

✱ When the value on the device display is stable, confirm with the PGM key.

The device display changes to the input of the reference value previously determined using the DPD-1 method; the input value "flashes".

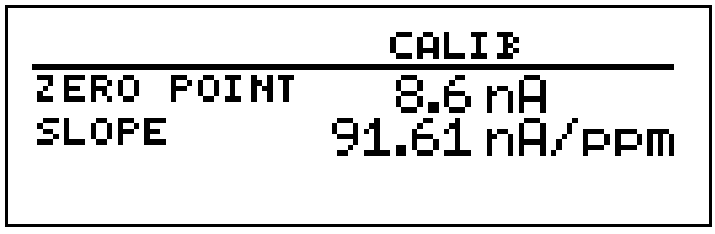


✱ Input the determined reference value with the aid of the ▽ and △ keys.



✱ Confirm with the PGM key.

The values determined by the device for zero point and slope are displayed.



* Use the PGM key to apply the calibration or the EXIT key to reject the calibration.

The device returns to measurement mode.

8.3.4 Calibration logbook

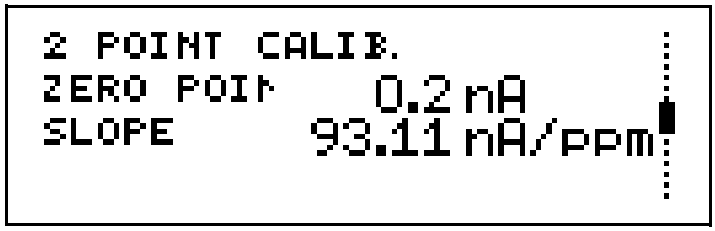
The data records for the last 5 successful calibrations are saved in the connected sensor, are extracted by the JUMO AQUIS 500 RS, and can be viewed in the calibration logbook.

Accessing the calibration logbook

The device is in measurement mode.

* Press the PGM key for more than 2 seconds.
* Use the ▽ key to select the "CALIB. LOGBOOK" entry.
* Confirm with the PGM key.

The data for the last successful calibration is displayed; the example shows the values for zero point and slope:



Use the ▽ and △ keys to access all other stored calibration data records.

NOTE

When displaying the calibration data in the calibration logbook, the sensor does not distinguish between end-value and 2-point calibration. The last determined calibration data record is always the top entry in the list.

8 Calibrating sensors

8.4 JUMO ecoLine NTU (type 202670)

8.4.1 General information

As with all optical sensors, the JUMO ecoLine NTU is subject to sensor aging and sensor drift during operation. The effects of these factors are compensated for by calibration.

Calibration methods

For the JUMO ecoLine NTU sensor, the JUMO AQUIS 500 RS offers the **2-point calibration method for each of the 4 measuring ranges** of the sensor.

NOTE

If the JUMO ecoLine NTU sensor is to be operated in the automatic measuring range switchover mode, **all 4 measuring ranges** must be calibrated.

Calibration interval

The sensor is calibrated ex works, meaning that no calibration is required before initial startup. During operation, the sensor should be calibrated in the event of deviating measured values and should also be cleaned regularly (depending on the degree of contamination by the process medium).

Preparatory work

- Rinse the sensor with clear water.
- Carefully remove any biofilm or sludge that has remained on the sensor optics with a soft sponge and warm, soapy water.
- Remove calcium deposits by submersing the sensors in a diluted hydrochloric acid solution (concentration max. 5%) for several minutes.

Never use abrasive agents (e.g. a scouring sponge)!

NOTE

When starting the calibration, the device sets the analog outputs, switching outputs and controllers to the following states by default:

- "Moving" (analog outputs)
- "Inactive" (switching outputs)
- "HOLD mode", output level frozen (controller)

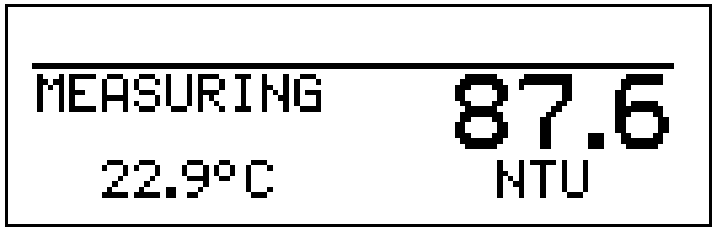
Calibration can basically be initiated as follows:

- Press the CAL key if this has been enabled in **ADMINISTR: LEVEL > PASSWORD > CALIB. ENABLE**
- Via **ADMINISTR: LEVEL > PASSWORD > CALIB. LEVEL**
- Via **CALIB. LEVEL in the main menu**, if this has been enabled in **ADMINISTR. LEVEL > PASSWORD > CALIB. ENABLE**

8.4.2 Two-point calibration

Prerequisite

- The device must be supplied with voltage (see chapter 5 "Installation", page 17 et seqq.).
- The sensor must be connected.
- Sensor startup on the device must be completed.
- Calibration must be enabled (see chapter 6.7 "Administrator level", page 29).
- The transmitter must be in "Measurement mode".



Selecting calibration methods

✱ Initiate calibration using the CAL key (or via the administrator level).

✱ Select "2-POINT CALIB." and start calibration with the PGM key.

Selecting the measuring range

✱ Select the measuring range to be calibrated (0 to 200 in the following example) using the ▼ and ▲ keys.

✱ Start calibrating the zero point using the PGM key.

CAUTION!

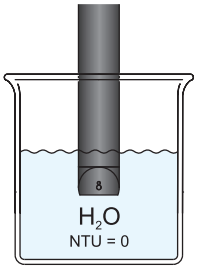
The response of the outputs during calibration depends on their configuration.

✱ Now remove the calibration sensor from the process.

8 Calibrating sensors

Calibrating the zero point

✱ Bring the sensor to the defined state 0 NTU by submersing it in distilled water. To avoid measurement errors, the distance to the vessel wall must not be below the minimum distance of 20 mm.

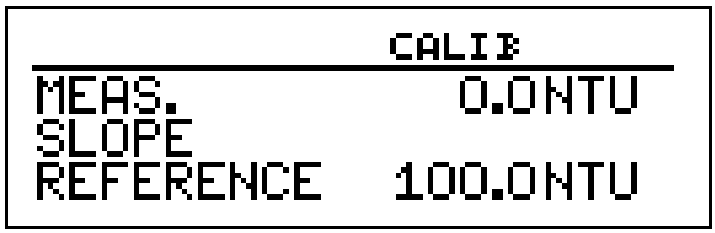


NOTE

For flawless measurements, make sure that there are no air bubbles on the optics of the submerged sensor. In addition, it must be ensured that the sensor is protected against ambient light, above all sunlight, during the measurements.

✱ Wait until the displayed value is stable at "0 NTU" or has stabilized near this value.

✱ Confirm with the PGM key; the display switches to "MEAS. SLOPE".



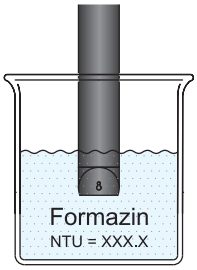
Calibrating the slope

To calibrate the slope, a formazine reference solution as per ISO 7027 is created with the known turbidity value according to the following table:

Measuring range	Reference solution
0 to 50 NTU	≈ 40 NTU
0 to 200 NTU	≈ 100 NTU
0 to 1000 NTU	≈ 500 NTU
0 to 4000 NTU	≈ 2000 NTU

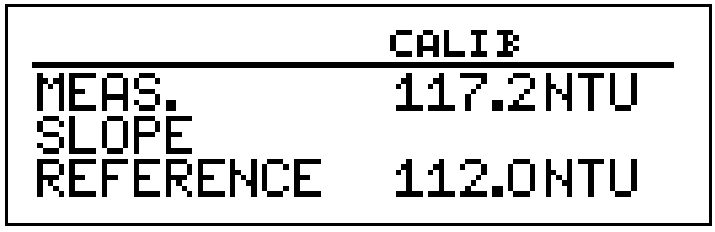
✱ Remove the sensor from the distilled water and submerse it in the for-

mazine reference solution with the known turbidity value. To avoid measurement errors, the distance to the vessel wall must not be below the minimum distance of 20 mm.



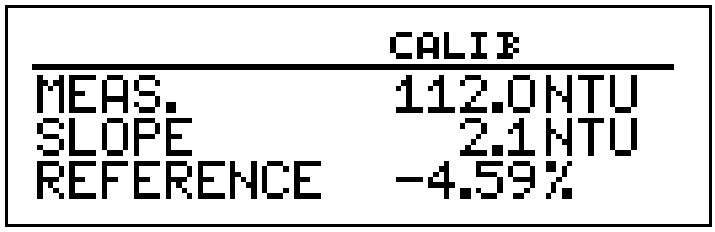
The device suggests the reference value "100.0 NTU" (flashing) for the calibration of the measuring range (0 to 200 NTU) selected in this example.

* Set the exact reference value (in this example 112.0 NTU) using the ▼ and ▲ keys.



* Wait until the measured value (MEASUREMENT) has stabilized.
* Confirm with the PGM key.

The values determined for the zero point comparison and the slope deviation from the factory calibration along with the corrected measured value are displayed:



* Now reinstall the sensor in the process.
* Use the PGM key to apply the calibration or the EXIT key to reject the calibration.

The device returns to measurement mode.

NOTE

The calibration process can be interrupted at any time (e.g. in the event of fault messages from the device) with the EXIT key and then restarted

8.4.3 Calibration logbook

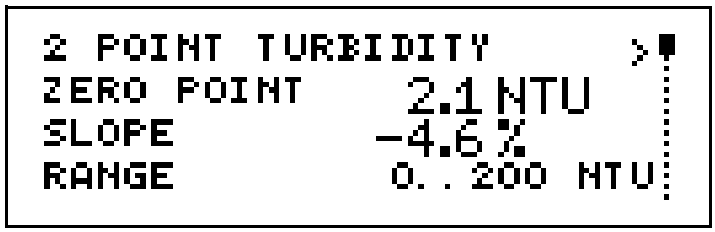
The data records for the last 10 successful calibrations are saved in the connected sensor, are extracted by the JUMO AQUIS 500 RS, and can be viewed in the calibration logbook.

Accessing the calibration logbook

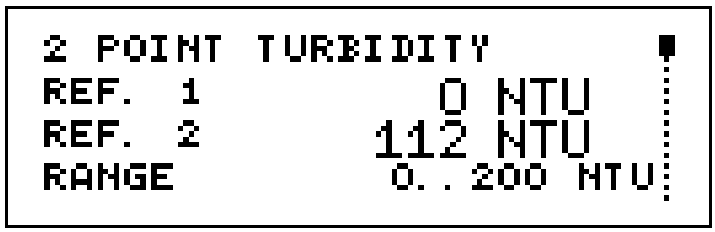
The device is in measurement mode.

* Press the PGM key for more than 2 seconds.
* Use the ▽ key to select the "CALIB. LOGBOOK" entry.
* Confirm with the PGM key.

The data for the last successful calibration is displayed; the example shows the values for zero point and slope (deviation from the factory calibration) and the selected measuring range of the 2-point calibration:



As not all of the data for the 2-point calibration fits on one page in the display, you can use the PGM key to access further data from the calibration data record for the 2-point calibration:



Use the ▽ and △ keys to access all other stored calibration data records.

NOTE

Irrespective of the unit selected in the basic settings, calibrations are always conducted in NTU. The last determined calibration data record is always the top entry in the list.

9.1 Function

Configurable parameters

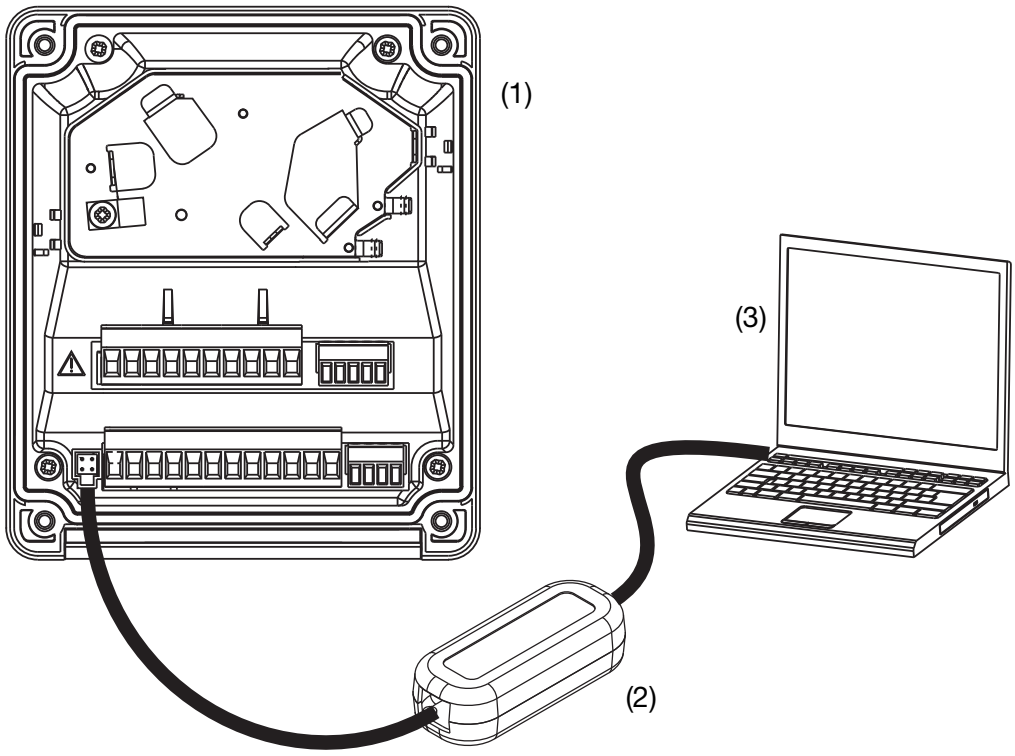
The optionally available setup program (part no.: 00483602) and optionally available PC interface cable with USB/TTL converter (part no.: 00456352) can be used for convenient adjustment of the transmitter to the requirements:

- Setting the measuring range
- Setting the behavior of outputs in the event of an overrange
- Setting the functions of the switching outputs K1 and K2
- Setting the functions of the binary input E1
- Setting the controller functions
- Setting the password
- Setting a customer-specific characteristic line
- etc.

NOTE!

Data transfer from or to the transmitter can only take place if it is supplied with voltage – See chapter 5 "Installation", page 17 ff.

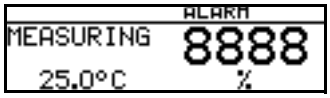
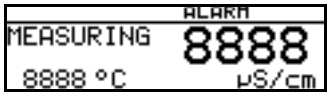
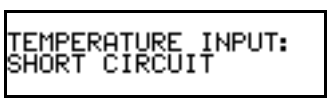
Connection



(1) JUMO AQUIS 500 RS
(2) PC interface cable with USB/TTL converter, part no.: 00456352
(3) PC or notebook

10 Remedying errors and malfunctions

10.1 General error messages

Problem/error message	Possible cause	Measure
No measured value display or current output	No voltage supply	Check voltage supply
Measured value display 0000 or current output 4 mA	Sensor not submerged in medium Container level too low	Top-up container
	Flow fitting blocked	Clean flow fitting
	Sensor measurand unsuitable or sensor faulty	Clean sensor Replace sensor
Incorrect or unstable measured value display	Sensor measurand unsuitable	Clean sensor Calibrate sensor Replace sensor
	Sensor not positioned correctly	Select different installation location
	No through-mixing	Ensure homogeneous medium. Ensure sensor has rinsing flow on all sides
	Air bubbles disrupt the measurement	Optimize mounting
Measured value display 8888, Temperature display "ok", flashing 	Overrange	Select suitable measuring range
	Connected sensor faulty	Replace connected sensor
Measured value display 8888, Temperature display 8888 flashing 	Temperature overrange or underrange	The temperature of the medium must be within the admissible range. Replace sensor
	Temperature probe short circuit or open circuit	Replace sensor or cable
	Line break	Replace sensor or cable
	No sensor connected	Connect sensor Configure sensor on device
	Short circuit - Cable - Sensor - Terminals	Check cables and connections. Replace sensor.
	Temperature too high	Keep within admissible range

Error message	Possible cause	Measure
TEMPERATURE INPUT: UNDERRANGE	Temperature too low	Keep within admissible range
MAIN VAR. INPUT: UNDERRANGE	Input signal too low	Check configuration
MAIN VAR. INPUT: OUT OF RANGE	Concentration outside of admissible range	Check concentration
MAIN VAR. INPUT: OVERRANGE	Input signal too high	Check configuration
COMPENSATION RANGE LEFT	Temperature is above or below the compensation range	Check temperature
PARAMETER LOCKED	Parameter is not enabled	Enable parameter in the enable level
WRONG PASSWORD	Password incorrect	Correct password read-out using the setup program
KEYS LOCKED	Key lock was activated via the binary input	Revoke binary input control
MODBUS ERROR	Modbus communication to sensor impaired	Check for disconnected/broken/ short-circuited cables
		Check for incorrect baud rates or parity settings
		Check for incorrectly configured sensor address
WRONG SENSOR FOUND	A sensor other than the configured sensor was found on the bus (e.g. type 202670 rather than type 202613)	Connect suitable sensor type or configure suitable sensor type on the device[1]
WARNING / ERROR MODBUS SENSOR	The sensor of type 202613 or 202670 has indicated a fault to the JUMO AQUIS 500; the sensor is not operating within its specified measuring range	Performing calibration

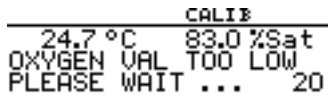
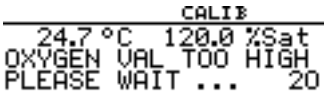
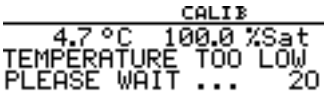
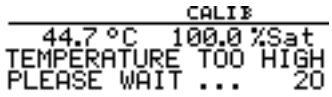
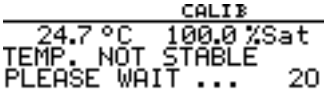
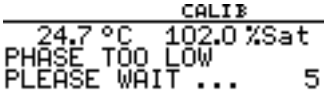
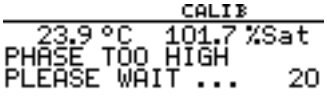
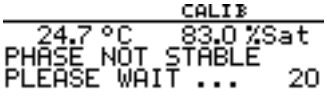
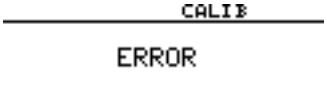
[1] The device is preconfigured ex-works for connecting sensor type 202613. If e.g. a sensor of type 202670 is connected, the device must be configured for this sensor, see chapter 7.2.4 "Turbidity measurement", page 58.

10 Remedying errors and malfunctions

10.2 JUMO digiLine O-DO S10 sensor error messages

10.2.1 Calibration

When an error occurs, the device checks after 30 seconds of waiting time whether the error conditions still exist. If this is the case, a further check is performed after an additional 30 seconds. If the error conditions still exist after a total of 5 intervals of 30 seconds each, the device aborts the calibration process.

Error message	Possible cause	Measure
	Measured oxygen value too low for calibration	Check measurement configuration Repeat calibration
	Measured oxygen value too high for calibration	Check measurement configuration Repeat calibration
	Temperature of the measurement medium < 5 °C	Adhere to admissible temperature range
	Temperature of the measurement medium > 40 °C	Adhere to admissible temperature range
	Measurement medium temperature fluctuation too great for calibration process	Keep temperature stable during calibration
	Entered reference value too high for the actual oxygen content	Check oxygen content Repeat calibration
	Entered reference value too low for the actual oxygen content	Check oxygen content Repeat calibration
	Measured oxygen value fluctuation too great for calibration process	Wait until the measured value has stabilized.
	Device has aborted the calibration process after 5 waiting loops[1].	Check conditions for calibration, see chapter 8 "Calibrating sensors", page 63 Repeat calibration

[1] When an error occurs, the device checks after 30 seconds of waiting time whether the error conditions still exist. If this is the case, a further check is performed after an additional 30 seconds. If the error conditions still exist after a total of 5 intervals of 30 seconds each, the device aborts the calibration process.

11.1 Digital interface

Main input	Display range	Accuracy	Temperature influence	Baud rate
RS485 interface with Modbus master function	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	Depends on the sensor used	Depends on the sensor used	2400 Bd 4800 Bd 9600 Bd 19200 Bd 38400 Bd

11.2 Analog temperature input

Auxiliary input	Measuring range	Accuracy	Temperature influence
Temperature Pt100 (automatic detection)	-50 to +250 °C[a]	± 0,5_K (up to 100 °C) ± 0,8_K (as of 100 °C)	0.05 %/10 K
Temperature Pt1000 (automatic detection)		± 0,5_K (up to 100 °C) ± 1,0_K (as of 100 °C)	
Temperature NTC/PTC	Max. 4 kOhm Input via table with 20 pairs of values via setup program	≤ 0.3 %[b]	0.05 %/10 K

[a] Can be changed to °F.
[b] Depending on the supporting points.

11.3 Sampling interval

Analog temperature input	Digital interface with				
	JUMO ecoLine O-DO	JUMO digiLine O-DO S10	JUMO tecLine 20263x	JUMO ecoLine NTU	freely configurable sensor
500 ms	Adjustable, 1 to 60 s	3 s	500 ms	1 s	Adjustable, 1 to 60 s

11.4 Measuring circuit monitoring

Input	Underrange/ overrange	Short-circuit	Open circuit
Temperature	Yes	Yes	Yes

11.5 Binary input

Activation	Via potential-free contact
Function	Key lock/HOLD/alarm stop

11.6 Controller

Controller type	Limit value controller, pulse length controller, pulse frequency controller, three-step controller, continuous controller
Controller structure	P/PI/PD/PID

11 Technical data

11.7 Analog outputs (maximum 2)

Output type	Signal range	Accuracy	Temperature influence	Admissible load resistance
Current signal	0(4) to 20 mA	≤ 0.25 %	0.08 %/10 K	≤ 500 Ω
Voltage signal	0 to 10 V	≤ 0.25 %	0.08 %/10 K	≥ 500 Ω
The analog outputs behave according the NAMUR NE43 recommendation. They are galvanically isolated: AC 30 V/DC 50 V.				

11.8 Switching outputs (maximum 2 changeover contacts)

Rated load	3 A / AC 250 V (resistive load)
Contact life	> 2 × 10^5 switching operations at rated load

11.9 Voltage supply for sensors

Voltage supply for digital sensors	DC 24 V (20.4 to 28.8 V), max. 30 mA
	DC 5 V (5.1 to 5.25 V), max. 100 mA; max. pulse load 500 mA for 20 ms ED 5 %, not short-circuit proof
Voltage supply for inductive proximity switch[a]	DC 12 V (10 to 20 V), max. 10 mA

[a] for example type EI1808 NPOSS

11.10 Setup interface

Interface for configuration of the device with optional setup program
(for device configuration only)

11.11 Electrical data

voltage supply	AC 110 to 240 V; -15/+10 %; 48 to 63 Hz AC/DC 20 to 30 V, 48 to 63 Hz DC 12 to 24 V; +/-15 % (connection only admissible to SELV/PELV circuits)
Power consumption	approx. 14 VA
Electrical safety	DIN EN 61010, Part 1 Overvoltage category III[a], pollution degree 2
Electrical connection	Screw terminals Conductor cross section max. 2.5 mm^2 (voltage supply, relay outputs, sensor inputs) Conductor cross section max. 1.5 mm^2 (analog outputs, voltage supply for sensors)
Electromagnetic compatibility (EMC)	EN 61326-1
Interference emission	Class B
Interference immunity	Industrial requirements

[a] Not valid for protective extra-low voltage of power supply unit variants DC 12 to 24 V.

11.12 Display

LCD display	120 × 32 pixels
Background lighting	Programmable: • Off • 60 seconds "ON" during operation

11.13 Case

Material	ABS
Cable inlet	Cable glands, max. 3× M16 and 2× M12
Special feature	Ventilation element for prevent of condensation (on IP 67 surface-mounted case version)
Ambient temperature range	-10 to +50 °C (accuracy figures are adhered to in this range)
Operating temperature range	-15 to +65 °C (device functioning)
Storage temperature range	-30 to +70 °C
Resistance to climatic conditions	Rel. humidity ≤ 90 % annual average, no condensation (derived from DIN EN 60721 3-3 3K3)
Protection types acc. to EN 60529	Surface-mounted case: IP67 Panel installation: front IP65, rear IP20
Resistant to vibration	Acc to. DIN EN 60068-2-6
Weight	Approx. 900 g

11.14 Approvals/marks of conformity

Mark of conformity	Testing laboratory	Certificates/certification numbers	Test basis	valid for
c UL us	Underwriters Laboratories	E 201387	UL 61010-1 CAN/CSA C22.2 No. 61010-1	all types

12 Appendix

12.1 Operator level parameters

If a large number of device parameters are to be configured, it is advisable to make a note of all the parameters to be changed in the following table and to work through the parameters in the order specified.

NOTE!

The following list shows the maximum number of changeable parameters.

Depending on the configuration, some parameters may not be visible or editable on your device.

Parameter	Selection/value range **per default**	New setting
RS485 input		
Zero point	-9999 to **0** to +9999	
Slope	50 to **100** to 200 %	
Zero	-999.9 to +999.9 nA	
Span	0.00001 to +999.9 nA/ppm or pA/ppm	
Baud rate	2400 4800 **9600** 19200 38400	
Parity	**None** Odd Even	
Stop bits	1 **2**	
Device address	1 to **255**	
Address temperature	0 to **1** to 65535	
Address main value	0 to **1** to 65535	
Address of uncompensated main value	0 to **1** to 65535	

Parameter	Selection/value range **per default**	New setting
Main value unit (only for freely configurable sensor)	**None** ‰ % %Sat ppb ppm µg/l mg/l g/l µs/cm ms/cm kΩ MΩ nA µA mA mV pH Customer-specific	
Uncompensated main value unit (only for freely configurable sensor)	**None** ‰ % %Sat ppb ppm µg/l mg/l g/l µs/cm ms/cm kΩ MΩ nA µA mA mV pH Customer-specific	
Byte order float (only for freely configurable sensor)	**mixed endian** little endian big endian	
Unit for sensor type 202613 (only via basic setting)	**% Sat** mg/l ppm	
Unit for sensor type 202614 (only via basic setting)	**% Sat** mg/l ppm hPa % vol	

12 Appendix

Parameter	Selection/value range **per default**	New setting
Unit for sensor type 202670/...	**NTU** FNU	
Measurand for sensor type 20263x/...	**Free chlorine** Total chlorine Chlorine dioxide Ozone Hydrogen peroxide Peracetic acid Bromine	
Unit for sensor type 20263x/...	**ppm** mg/l ppb µg/l **%** ‰ g/l	
Temperature compensation source	**Sensor internal** Analog input	
Salinity type 202613	**0** to 100 g/kg	
Salinity type 202614	**0** to 60 mS/cm	
Air pressure	500 to **1013** to 1500 hPa	
Sampling rate	1 to **10** to 60 s	
Filter time constant	0 to **2** to 25 s	
Calibration interval	**0** to 999 days (0 = deactivated)	
Temperature input		
Sensor type	**Modbus** No sensor Pt100/Pt1000 Customer-specific	
Unit	**°C** °F	
Filter time constant	0 to **2** to 25 s	
Manual temperature entry	-50.0 to **+25.0** to +250.0 °C	
Offset	-20.0 to **0.0** to +20.0 °C	
Binary input		
Function	**No function** Key lock Hold mode Alarm stop (only for controller)	
Controller channel 1		
Controller type	**No function** Limit value controller Pulse frequency output Pulse length output Continuous controller Three-step controller	
Setpoint value	Depending on device variant	

Parameter	Selection/value range **per default**	New setting
Second setpoint value (only for three-step controller for controller 1)	Depending on device variant	
Min./max. contact (falling/rising characteristic line)	**Min. contact** Max. contact	
Proportional band	**0** to 9999 (decimal places configurable)	
Reset time	**0** to 9999	
Derivative time	**0** to 9999	
Pulse period	2.5 to **20** to 999.5	
Actuator time (only for three-step controller for controller 1)	15 to **60** to 3000 s	
Hysteresis (of limit value controller)	0 to **200** to 9999 (decimal places configurable)	
Minimum start time	**0.5** to 999.5	
maximum pulse frequency	0 to **60** rpm	
Output level limit	0 to **100** %	
ON-delay	**0.00** to 999.5 s	
OFF-delay	**0.00** to 999.5 s	
Limit value controller monitoring	**OFF** ON	
Alarm tolerance	0 to **1** to measuring range end	
Alarm delay	**0** to 9999 s	
Response at hold	LOW HIGH **FROZEN** SAFE VALUE	
Hold value	**0** to 100 %	
Response in case of error	**0 %** 100% Frozen Hold value	
Min. setpoint limit	**0** to 9999 (decimal places configurable)	
Max. setpoint limit	0 to **9999** (decimal places configurable)	
Controller channel 2		
Controller type	**No function** Limit value controller Pulse frequency output Pulse length output Continuous controller	
Setpoint value	Depending on device variant	
Min./max. contact (falling/rising characteristic line)	Min contact **Max. contact**	
Proportional band	**0** to 9999 (decimal places configurable)	
Reset time	**0** to 9999	
Derivative time	**0** to 9999	

12 Appendix

Parameter	Selection/value range **per default**	New setting
Pulse period	2.5 to **20** to 999.5	
Hysteresis (of limit value controller)	0 to **200** to 9999 (decimal places configurable)	
Minimum start time	**0.5** to 999.5	
maximum pulse frequency	0 to **60** rpm	
Output level limit	0 to **100** %	
ON-delay	**0.00** to 999.5 s	
OFF-delay	**0.00** to 999.5 s	
Limit value controller monitoring	**OFF** ON	
Alarm tolerance	0 to **1** to measuring range end	
Alarm delay	**0** to 9999 s	
Response at hold	0 % 100 % **Frozen** Hold value	
Hold value	**0** to 100 %	
Response in case of error	**0%** 100% Frozen Hold value	
Min. setpoint limit	**0** to 9999 (decimal places configurable)	
Max. setpoint limit	0 to **9999** (decimal places configurable)	
Special controller functions		
Manual mode	**No manual mode admissible** Momentary Permanently	
Isolated controller	**OFF** ON	
I-proportion switch-off	Yes **No**	

Parameter	Selection/value range **per default**	New setting
Switching output 1		
Function	**No function** Controller output 1 Controller output 2 Controller alarm 1 Controller alarm 2 Controller alarm  AF1 main value  AF2 main value  AF7 main value  AF8 main value  AF1 temperature  AF2 temperature  AF7 temperature  AF8 temperature Sensor error Wash timer expired Calibration timer expired	
Switching point	**0** to 9999	
Margin to switching point Window range for AF1 / AF2	0 to 50 % of MR or 0 to 150 °C	
Hysteresis	0 to 100 % of MR or -50 to +250 °C	
switch-on delay	**00:00:00** to 01:00:00 H:M:S	
Switch-off delay	**00:00:00** to 01:00:00 H:M:S	
Pulse time[a]	**00:00:00** to 01:00:00 H:M:S	
For calibration	**Inactive** Active Status retained	
In case of fault	**Inactive** Active Status retained	
In hold mode	**Inactive** Active Status retained	
Manual mode	**No simulation** Inactive Active	

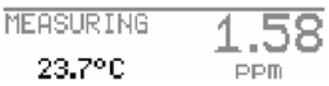
[a] For pulse times greater than 0 seconds, the OFF-delay is automatically deactivated.

Parameter	Selection/value range **per default**	New setting
Switching output 2		
Function	**No function** Controller output 1 Controller output 2 Controller alarm 1 Controller alarm 2 Controller alarm  AF1 main value  AF2 main value  AF7 main value  AF8 main value  AF1 temperature  AF2 temperature  AF7 temperature  AF8 temperature Sensor error Wash timer expired Calibration timer expired	
Switching point	**0** to 9999	
Margin to switching point Window range for AF1 / AF2	0 to 50 % of MR or 0 to 150 °C	
Hysteresis	0 to 100 % of MR or -50 to +250 °C	
switch-on delay	**00:00:00** to 01:00:00 H:M:S	
Switch-off delay	**00:00:00** to 01:00:00 H:M:S	
Pulse time[a]	**00:00:00** to 01:00:00 H:M:S	
For calibration	**Inactive** Active Status retained	
In case of fault	**Inactive** Active Status retained	
In hold mode	**Inactive** Active Status retained	
Manual mode	**No simulation** Inactive Active	

[a] For pulse times greater than 0 seconds, the OFF-delay is automatically deactivated.

Parameter	Selection/value range **per default**	New setting
Analog output 1		
Signal selector	**Actual value for main value / temperature** Continuous controller output 1 Continuous controller output 2	
Signal type	0 to 10 V 0 to 20 mA **4 to 20 mA** 10 to 0 V 20 to 0 mA 20 to 4 mA	
Scaling start of main value	Depending on measurand and measuring range	
Scaling end of main value	Depending on measurand and measuring range	
Response during calibration	**Moving** Frozen Safe value	
Response in case of error	**Low (0 V/0 mA/3.4 mA)** High (10.7 V/22 mA) Frozen Safe value	
Response in hold mode	**Low (0 V/0 mA/3.4 mA)** High (10.7 V/22 mA) Frozen Safe value Moving	
Safety value	**0** to 10.7 V **0** to 22 mA	
Simulation	**OFF** ON	
Simulation value	**0** to 10.7 V **0** to 22 mA	
Analog output 2		
Signal selector	**Actual value for main value / temperature** Continuous controller output 1 Continuous controller output 2	
Signal type	0 to 10 V 0 to 20 mA **4 to 20 mA** 10 to 0 V 20 to 0 mA 20 to 4 mA	
Scaling start of main value	Depending on measurand and measuring range	
Scaling end of main value	Depending on measurand and measuring range	
Response during calibration	**Moving** Frozen Safe value	

12 Appendix

Parameter	Selection/value range **per default**	New setting
Response in case of error	**Low (0 V/0 mA/3.4 mA)** High (10.7 V/22 mA) Frozen Safe value	
Response in hold mode	**Low (0 V/0 mA/3.4 mA)** High (10.7 V/22 mA) Frozen Safe value Moving	
Safety value	**0** to 10.7 V **0** to 22 mA	
Simulation	**OFF** ON	
Simulation value	**0** to 10.7 V **0** to 22 mA	
Display		
Language	**German** English French Customer-specific	
Lighting	**During operation** Off	
LCD inversion	**OFF** ON	
Measured value display type	**Normal** Trend Bar graph	
Display on bottom 	**Temperature** Output level 1 Output level 2 Setpoint value 1 Setpoint value 2 None Compensated Uncompensated	
Display on top 	**Compensated** Uncompensated Temperature Output level 1 Output level 2 Setpoint 1 Setpoint 2 None	
Max./min. reset	**No** Yes	
Operation timeout	0 to **1** to 10 min (the operation timeout is deactivated when the setting is "0")	
Contrast	0 to **8** to 20	

12.2 Parameter explanation

FUNCTION

NO FUNCT.

Alarm window AF1 MAIN VALUE

Alarm window AF2 MAIN VALUE

Limit value controller AF7 MAIN VALUE

Limit value controller AF8 MAIN VALUE

Alarm window AF1 TEMPERAT.

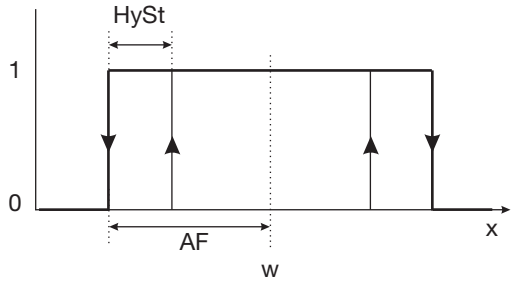
Alarm window AF2 TEMPERAT.

Limit value controller AF7 TEMPERAT.

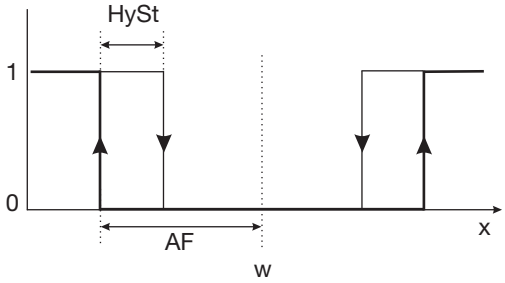
Limit value controller AF8 TEMPERAT

SENSOR ERROR

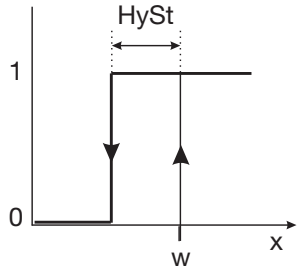
CALIB. TIMER



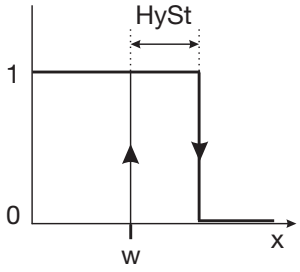
Alarm window AF1



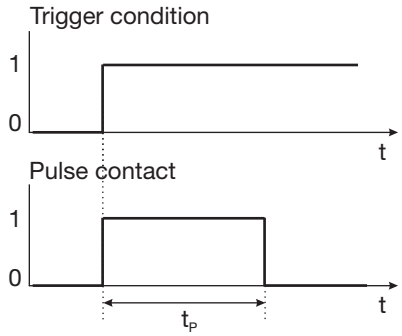
Alarm window AF2



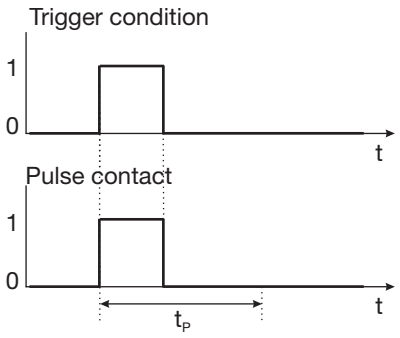
Limit value function AF7



Limit value function AF8



Alarm pulse contact
Trigger condition longer than pulse duration



Alarm pulse contact
Trigger condition shorter than pulse duration

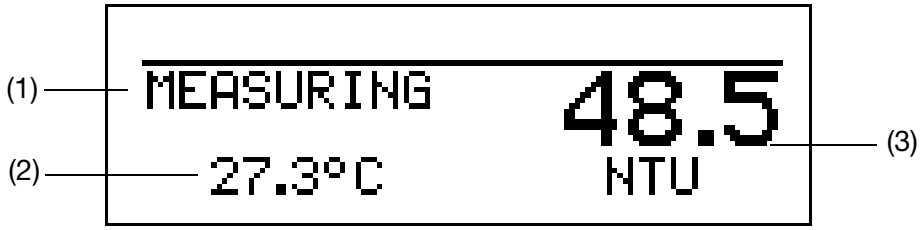
0	Off	t	Time
1	On	t_P	Pulse duration
AF	Spacing	w	Setpoint value / limit value
HySt	Hysteresis	x	Actual value / measured value

MEAS. DISPLAY TYPE

NORMAL
TREND
BAR GRAPH

NORMAL

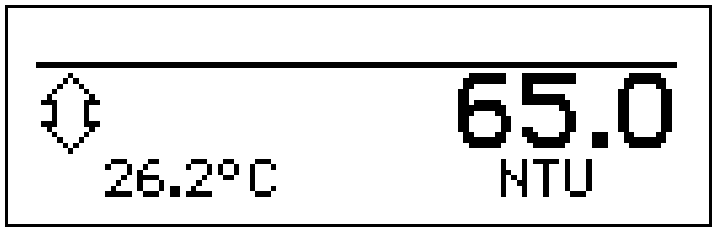
In the normal display, the measured value, measurand, and temperature of the medium are displayed.

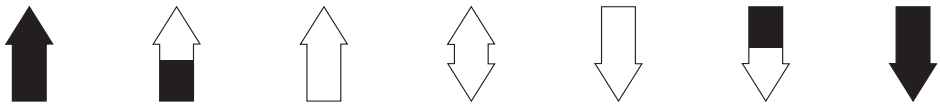


(1) Operation mode
(2) Display on bottom (temperature)
(3) Display on top (measured value of main input)

TREND

The operator can quickly identify in which direction the measured value is changing.





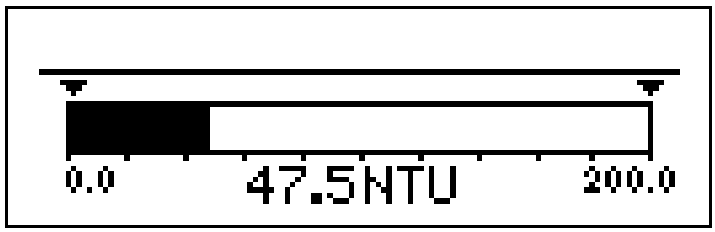
Rising			Stable	Falling		
Sharp	Medium	Slight		Slight	Medium	Sharp

NOTE!

The measured value trend is calculated from the last 10 measured values. At a sampling rate of 10 s, the last 100 seconds are taken into account.

BAR GRAPH

- The measured value for the digital input (main input variable) is shown as a variable bar
- There is no temperature display
- For devices with configured control contact(s), the setpoint values are marked above the bar graph with arrows



Scaling the bar

* Activate the "BAR GRAPH" measured value display type
* Use ▽ to select "BARGR. SCALE START"
* Use PGM to confirm selection
* Use ▽ or △ to enter the lower limit of the range for display
* Use PGM to confirm selection
* Use ▽ to select "BARGR. SCALE END"
* Use ▽ or △ to enter the upper limit of the range for display
* Use PGM to confirm selection

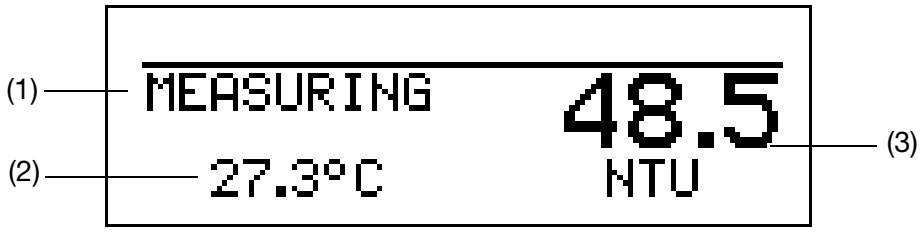
NOTE!

To return to measurement mode:
Press the EXIT key several times or wait for timeout.

DISPLAY ON BOTTOM

NOTE!

The "DISPLAY ON BOTTOM" and "DISPLAY ON TOP" parameters are only available for the "NORMAL" or "TREND" measured value display types, but not for the "BAR GRAPH" measured value display type.



(1) Operation mode
(2) Display on bottom
(3) Display on top

The "bottom" display can be assigned the following values:

This parameter is only available with the "NORMAL" or "TREND" measurement display type.

TEMPERATURE
OUTP. LEVEL 1
OUTP. LEVEL 2
SETPOINT 1
SETPOINT 2
NONE
COMPENSATED
UNCOMPENSATED

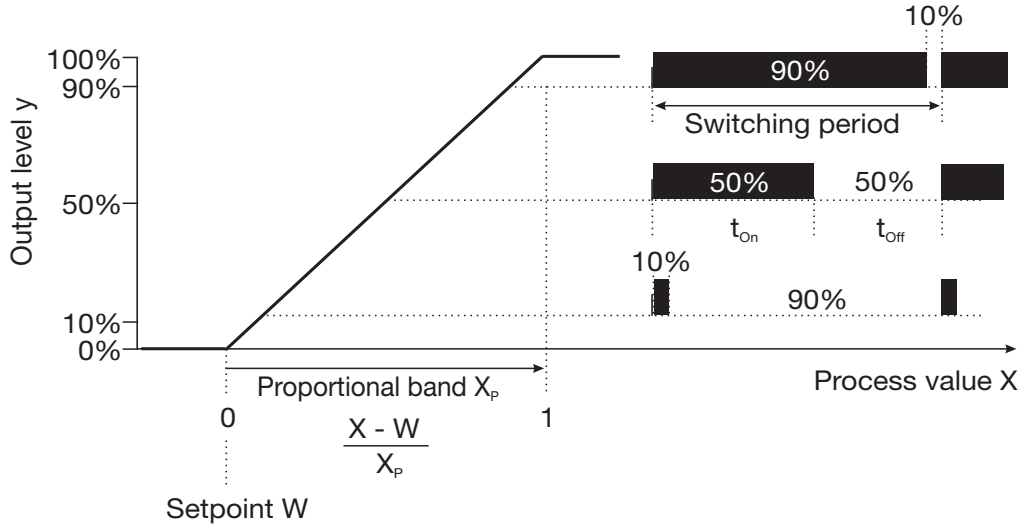
DISPAY ON TOP

The "top" display can be assigned the following values:

COMPENSATED
UNCOMPENSATED
TEMPERATURE
OUTPUT LEVEL 1
OUTPUT LEVEL 2
SETPOINT VALUE 1
SETPOINT VALUE 2
NONE

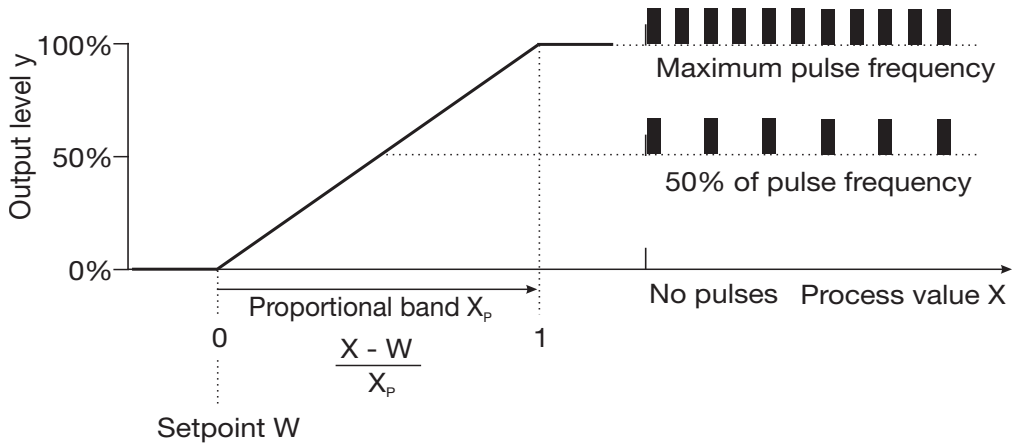
12.3 Term definition

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



If the actual value x exceeds the setpoint value w, the P-controller controls in proportion to the control deviation. When the proportional band is exceeded, the controller operates with an output level of 100 % (100 % cycle ratio).

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



If the actual value x exceeds the setpoint value w, the P-controller controls in proportion to the control deviation. When the proportional band is exceeded, the controller operates with an output level of 100 % (maximum switching frequency).

Calibration timers

The calibration time can (optionally) notify of the need to conduct routine calibration. The calibration timer is activated by entering the number of days after which recalibration should be scheduled (plant or operator-specified).

Customer-specific table

In this mode, you can use the optionally available setup program (no entry can be made on the device) to create a customer-specific characteristic line in the form of a table with up to 20 pairs of resistance/temperature values for the analog temperature input. NTC and PTC characteristic lines are possible; they must be monotonous.

Max./min. value memory

This memory stores the minimum and maximum input values. This information can be used to evaluate whether the connected sensor is designed for the actually occurring values, for example.

The max./min. value memory can be reset: Operator level / Display / MIN/MAX RESET / Yes, see "Operator level parameters", page 96ff.

Special controller functions:

The following functions can be activated in this menu:

- Manual mode (activate controller outputs manually) – see chapter 6.10.4 "MANUAL/simulation overview", page 40
- Isolated controller (see below)
- I-proportion switch-off (see below)

Isolated controller

This function is normally deactivated (default settings or "no" selected).

In the deactivated state, the software prevents two controller outputs from working "against each other". This means that simultaneous dosing of acid and lye is not possible.

If the controllers are isolated ("yes" selected), both controllers are freely configurable.

I-proportion switch-off

This function is normally deactivated (default settings or "no" selected).

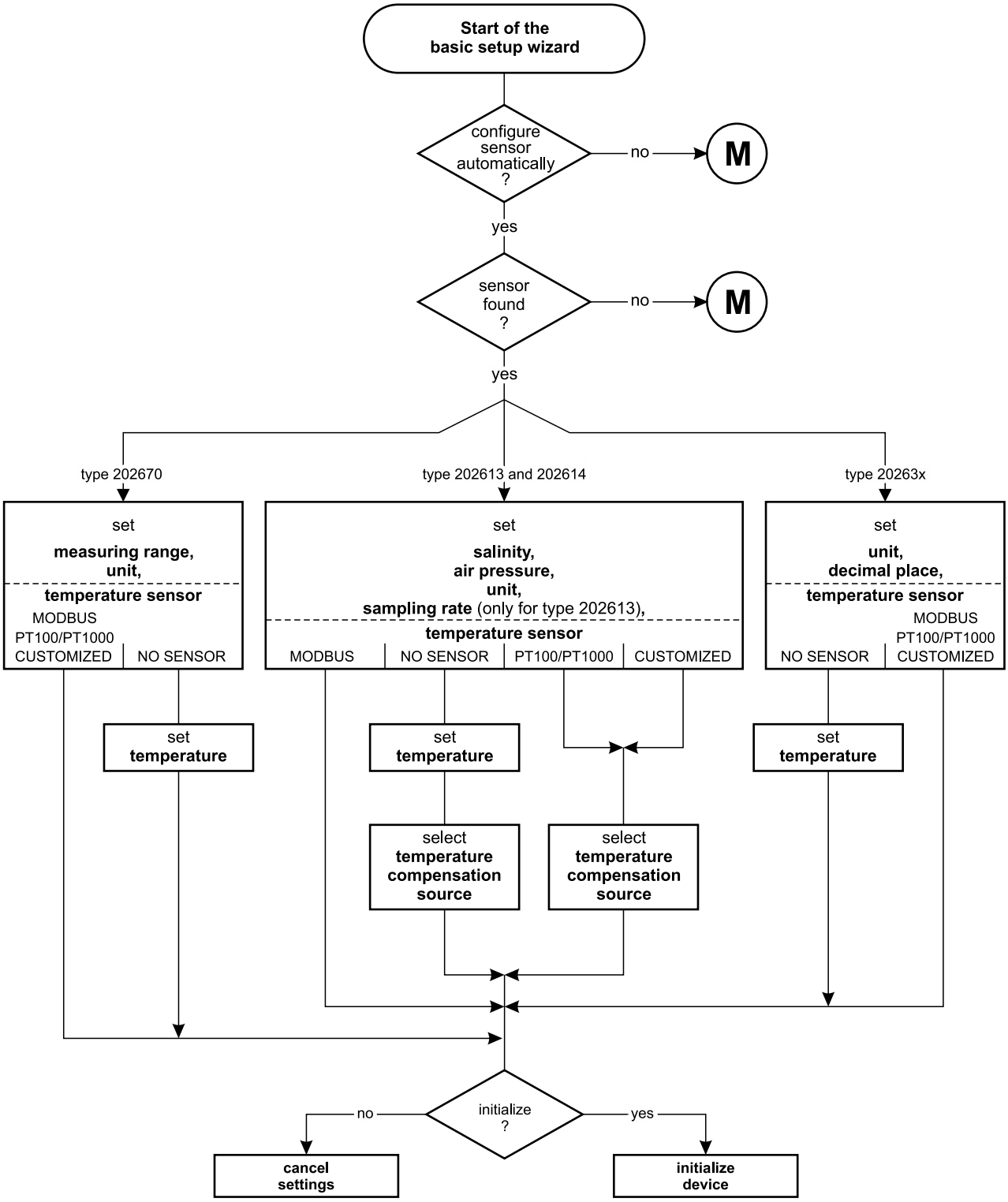
In the deactivated state, the controller operates according to the general controller theory.

If I-proportion switch-off is activated ("yes" selected), the share of the output level to which the I-proportion is attributed is set to zero when the setpoint value is reached.

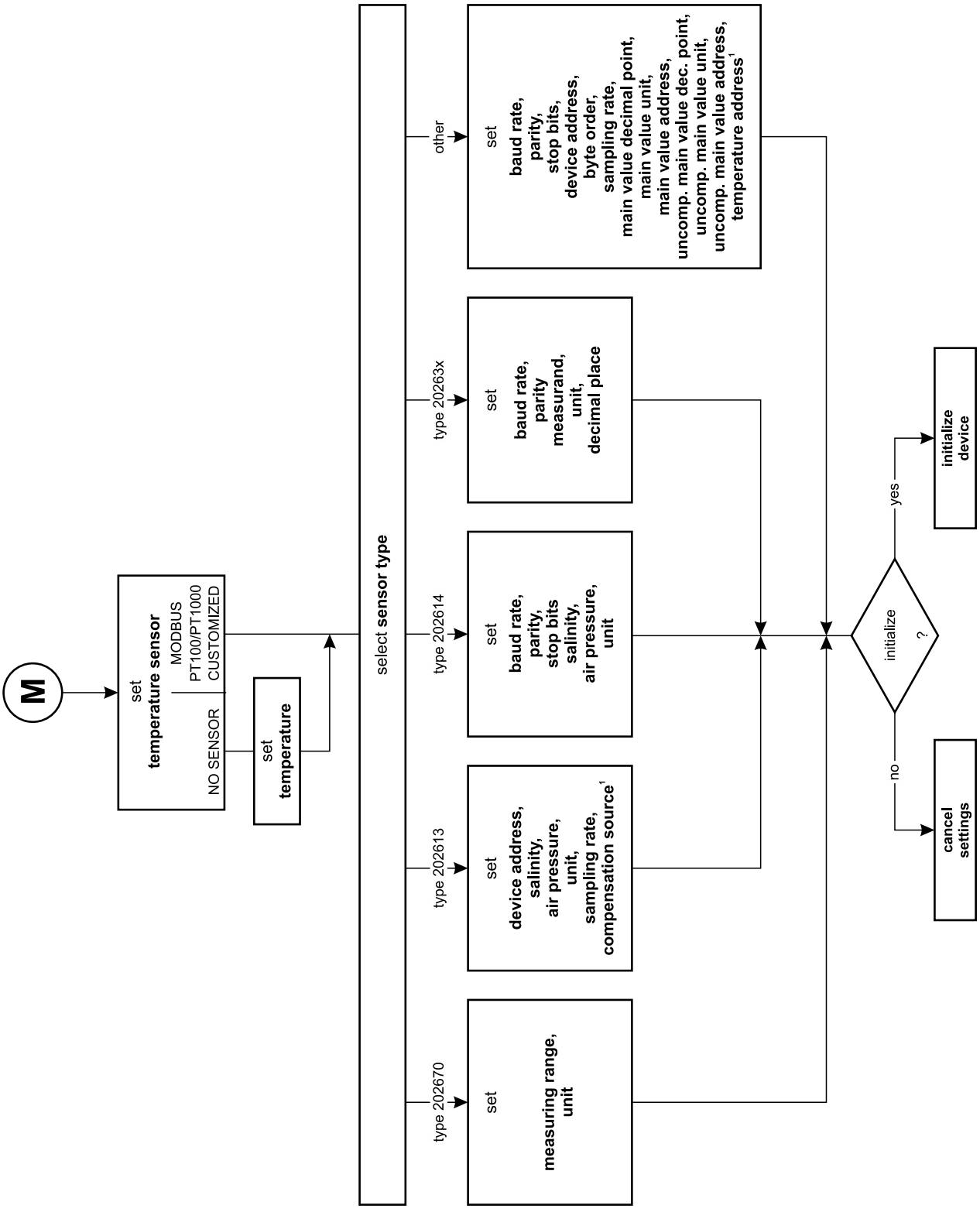
This may beneficial for mutual neutralization (acid and lye dosing possible) in one treatment tank.

12.4 Flow diagram of the basic setting wizard

12.4.1 Automatic configuration of a sensor



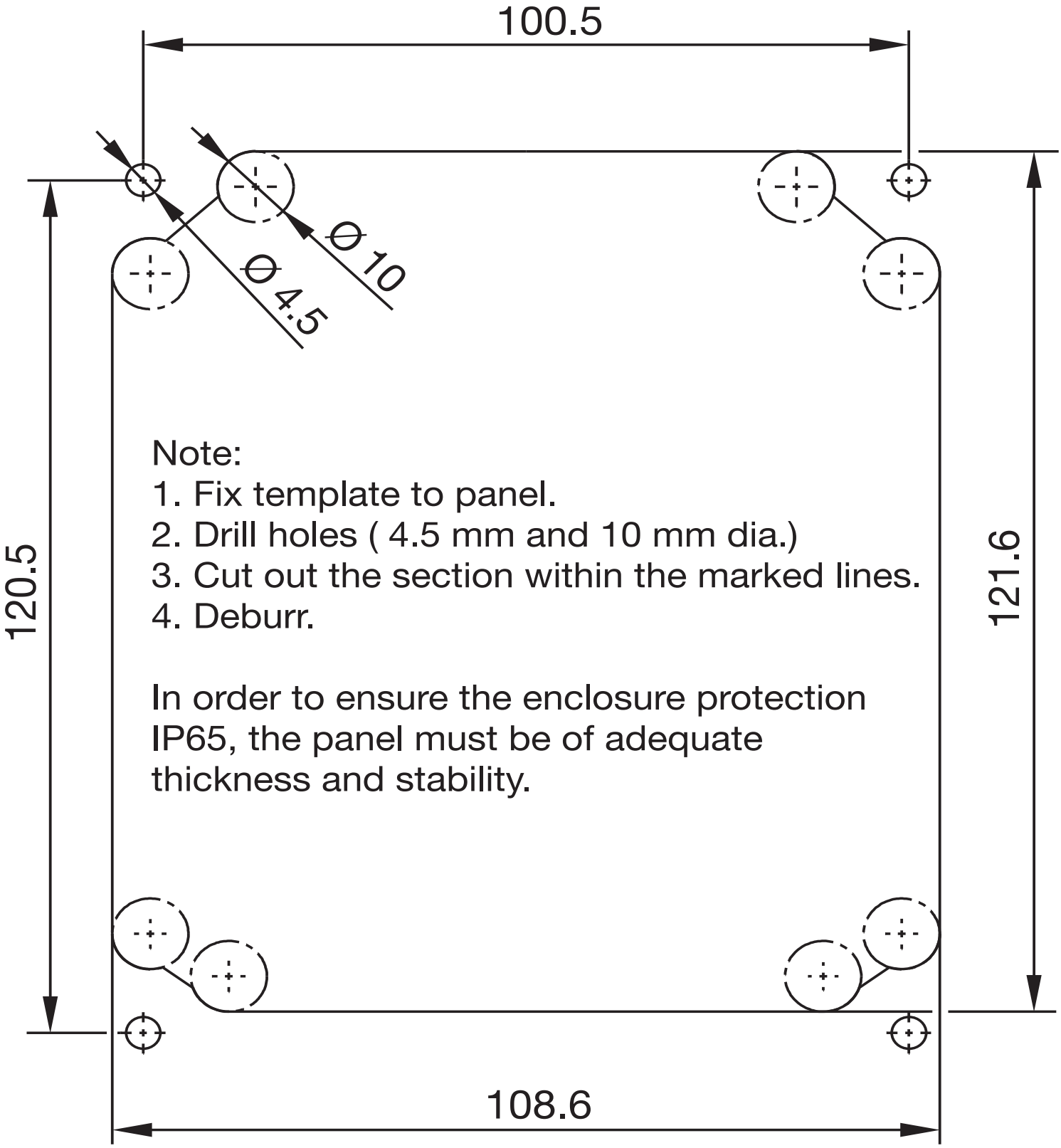
12.4.2 Manual configuration of a sensor



[1] Only for temperature sensor = MODBUS

12 Appendix

12.5 Template for panel cut-out



12 Appendix

13 China RoHS

						
产品组别 Product group: 202569 部件名称 Component Name	产品中有害物质的名称及含量 China EEP Hazardous Substances Information					
	铅 （Pb）	汞 （Hg）	镉 （Cd）	六价铬 （Cr(VI)）	多溴联苯 （PBB）	多溴二苯醚 （PBDE）
外壳 Housing (Gehäuse)	X	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	○	○	○	○	○	○
螺母 Nuts (Mutter)	X	○	○	○	○	○
螺栓 Screw (Schraube)	X	○	○	○	○	○

本表格依据SJ/T 11364的规定编制。
This table is prepared in accordance with the provisions SJ/T 11364.
○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。
Indicate the hazardous substances in all homogeneous materials' for the part is below the limit of the GB/T 26572.

×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。
Indicate the hazardous substances in at least one homogeneous materials' of the part is exceeded the limit of the GB/T 26572.

Note:
This index is not intended to be exhaustive! Please read the operating instructions before starting up the device!

14 Index

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