JUMO tecLine Cl2

Sensor for free chlorine
Type 202630

Operating Manual

20263000T90Z001K000

V3.00/EN/00394444

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1.1 Safety information

1.1.1 General Information

This manual contains information that must be observed in the interest of your own safety and to avoid material damage. This information is supported by symbols which are used in this manual as indicated.

Please read this manual before starting up the device. Store this manual in a place that is accessible to all users at all times.

If difficulties occur during startup, please do not intervene in any way that could jeopardize your warranty rights!

1.1.2 Warning symbols

WARNING!

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

NOTICE

This note in connection with the signal word indicates that **material damage or data loss** will occur if the respective precautionary measures are not taken.

1.1.3 Note symbols

NOTE!

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

1.1.4 Intended use

These membrane-covered amperometric sensors are used to determine the concentration of free chlorine in water.

Typical areas of application include the monitoring of swimming pool and drinking water.

The sensors can only be used in media with the qualities of swimming pool or drinking water. Solid materials in the media clog up the membrane and prevent the sensors from working correctly.

1 Introduction

2.1 Areas of application

These membrane-covered amperometric sensors are used to determine the concentration of free chlorine in water.

The sensors for free chlorine can be used to determine the following anorganic chlorination agents: chlorine gas (Cl2), electrolytically generated chlorine, sodium hypochlorite (NaOCl, chlorine bleaching solution), calcium hypochlorite (Ca(OCl)2), or chlorinated lime (Ca(OCl)Cl).

The sensors can only be used in media with the qualities of swimming pool or drinking water. Solid materials in the media clog up the membrane and prevent the sensors from working correctly.

The sensors are not suitable for detecting the absence of chlorine.

2.2 Design

Depending on the type, the sensors have a membrane-covered, amperometric two-electrode measuring system (types 202630/40 and /50) or three-electrode measuring system (types 202630/43 and /53).

The working electrodes (cathodes) are made of gold (Au). The anodes, which in types 202630/40 and / 50 perform the role of a combined reference and counter electrode, are made of silver (Ag) and have a silver halide (AgHal) coating. Types 202630/43 and /53 have separate reference and counter electrodes, the latter of which is made from stainless steel.

For the measuring methods used here, chlorine diffuses through the membrane from the measurement medium and, combined with the electrolytes, triggers an electrical signal at the working electrode. This signal is proportional to the concentration of chlorine and is amplified by the electronics. The measurement signal is independent of the temperature of the media thanks to an integrated temperature compensation.

2.3 Output signal

As the measurement signal of the amperometric sensors is temperature-dependent, an automatic temperature compensation is carried out by an integrated NTC resistor. The recommended temperature range is 0[1] to +45 °C.

In the analog versions, the integrated sensor electronics provide a current signal of 4 to 20 mA, and in the digital versions, they provide a Modbus RTU interface signal.

Calibration is carried out in a downstream device (indicator, controller, recorder, PLC, etc.).

The sensors can be connected directly to any suitable indicators and controllers. They provide the voltage required for supplying the sensors and allow for easy calibration of the measuring systems.

2.4 Suitable indicators/transmitters/controllers

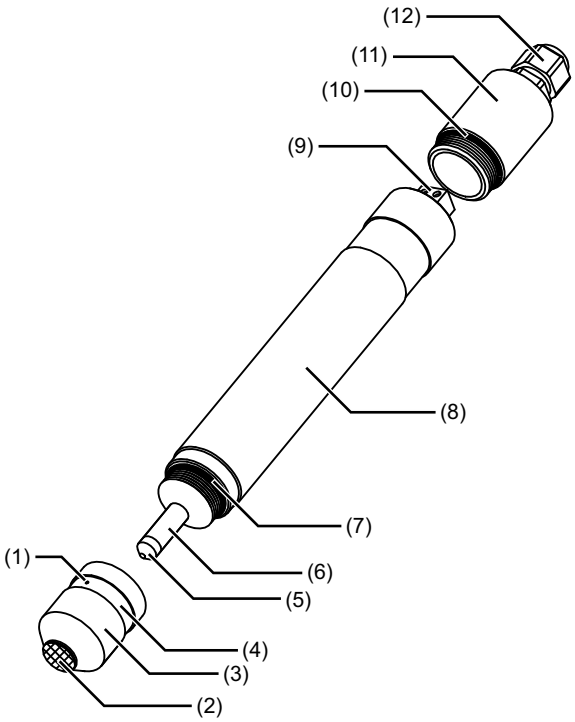
Type	Features	Suitable sensors
JUMO AQUIS 500 AS	1-channel (4 to 20 mA) indicator/controller, additional temperature input, binary input, up to two analog and switching outputs	Types 202630/40 and /43 (Output signal 4 to 20 mA)
JUMO AQUIS 500 RS	1-channel (Modbus RTU) indicator/controller, additional temperature input, binary input, up to two analog and switching outputs	Types 202630/50 and /53 (Digital interface)
JUMO dTRANS AS 02	Modular multi-channel transmitter/controller for standard signals, PROFIBUS-DP, RS422/485, data logger using optional boards	Types 202630/40 and /43 (Output signal 4 to 20 mA)

[1] Prerequisite: no ice crystals in the measuring water.

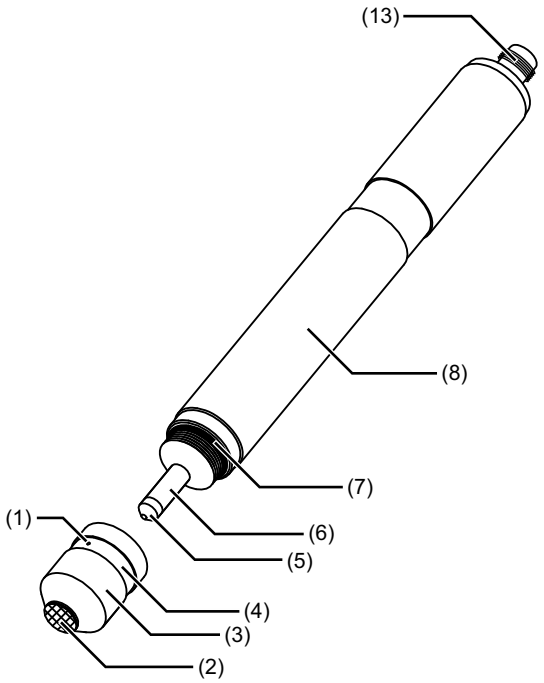
JUMO AQUIS touch S/P	Modular multichannel measuring devices for liquid analysis with integrated controller and paperless recorder, USB host, USB device, Modbus, PROFIBUS-DP and Ethernet using optional boards	All types 202630

2.5 Sensor details

Type 202630/40 (4 to 20 mA version)

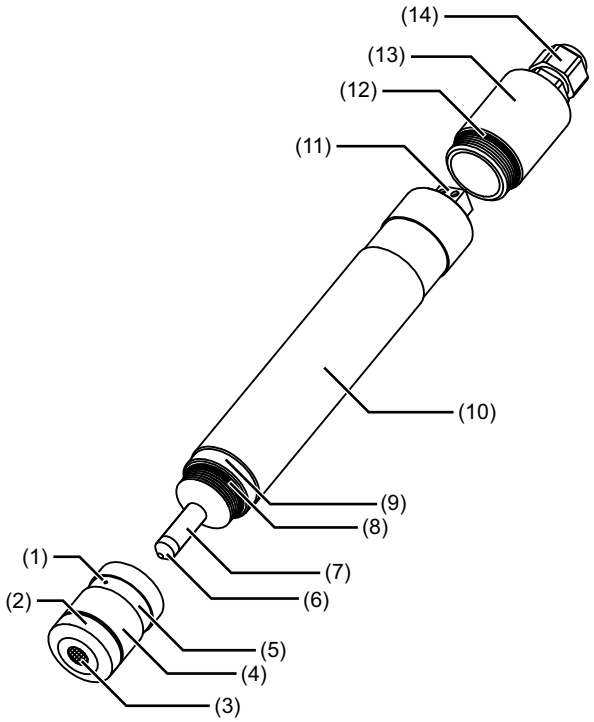


Type 202630/50 (Modbus RTU version)

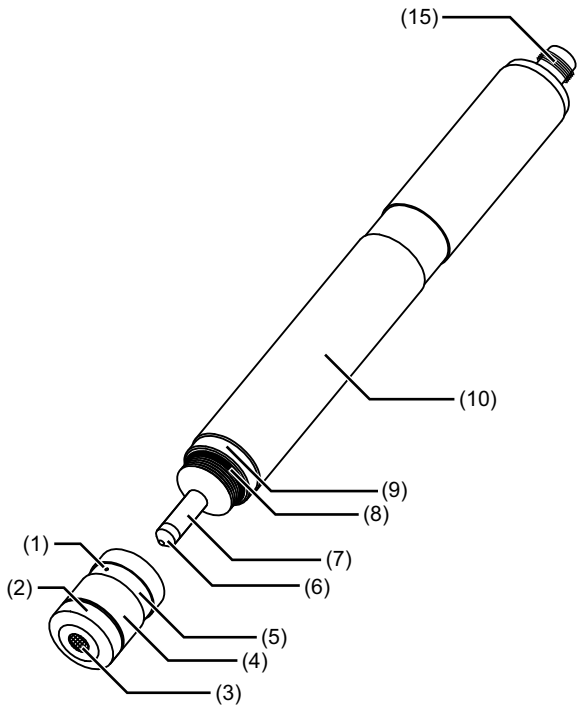


(1) Valve opening
(2) PTFE membrane
(3) Membrane cap
(4) Transparent cover (hose ring)
(5) Measuring electrode
(6) Electrode finger (reference electrode)
(7) O-ring
(8) Electrode shaft with integrated electronics
(9) 2-pin terminal for measuring cable connection
(10) O-ring
(11) Cover
(12) Pg screw connection
(13) M12 flange connector

Type 202630/43 (4 to 20 mA version reduced pH dependence)



Type 202630/53 (Modbus RTU version) reduced pH dependence)



(1) Valve opening
(2) Membrane holder (stainless steel)
(3) Membrane
(4) Membrane cap
(5) Transparent cover (hose ring)
(6) Measuring electrode
(7) Electrode finger (reference electrode)
(8) O-ring
(9) Counter electrode (stainless steel)
(10) Electrode shaft with integrated electronics
(11) 2-pin terminal for measuring cable connection
(12) O-ring
(13) Cover
(14) Pg screw connection
(15) M12 flange connector

2 Description

2.6 Important information for use

2.6.1 Notes for all types

NOTICE

An unsuitable measuring environment may produce incorrect measurement results.

Using the sensors without the use of suitable flow fittings will lead to incorrect measurement results.

▶ In order to ensure error-free measurements, the sensors must be installed in suitable flow fittings, see chapter 4.2 "Combination fitting (type 202811/10)", page 21 or chapter 4.3 "Flow fitting for membrane-covered sensors (type 202811/30)", page 24.

NOTICE

Unsuitable measurement media may produce incorrect measurement results.

Using the sensors to measure contaminated media may lead to incorrect measurement results.

▶ In order to ensure error-free measurements, the measurement media must have the qualities of swimming pool or drinking water and must not contain any solids.

NOTICE

Harmful substances may lead to incorrect measurement results and cause damage to the membrane caps.

Using the sensors to measure media containing hydrophobic substances may lead to incorrect measurement results. Hydrophobic substances can damage the membrane caps.

▶ In order to ensure error-free measurements, the measurement media must not contain hydrophobic substances (e.g. oil or grease).

NOTICE

Incorrect handling may cause damage to the membrane caps.

Screwing an unfilled membrane cap fully onto the sensor before startup may cause mechanical damage to the membrane. In addition, screwing on a filled membrane cap without placing the sensor into the measurement media can cause salt or gel residues to be deposited.

▶ Screwing on the membrane cap without then starting up the sensor should be avoided.

2.6.2 Notes for types 202630/40 and 202630/50

The sensor membranes are made of hydrophobic, microporous PTFE material. These sensors should only be used in water which has the qualities of drinking or swimming pool water. Under no circumstances should the water contain surfactants (contained in some cleaning agents and disinfectants). Surfactants destroy the hydrophobic properties of the membrane. It can therefore no longer be guaranteed that the sensors will work correctly.

After calibration, the pH value must be kept constant ($\Delta pH \leq 0.05$). The sensors for free chlorine (types 202630/43 and 202630/53) have reduced pH-dependence and therefore offer an alternative where there are fluctuations in pH ($\Delta pH > 0.05$).

NOTICE

Irritating substances may produce incorrect measurement results.

Using the sensors to measure media containing surfactants may lead to incorrect measurement results.

▶ In order to ensure error-free measurements, the measurement media must not contain surfactants (surface-active substances e.g. from detergents, cleaning agents or disinfectants).

NOTICE

The membranes may be damaged by high pressure.

Operating the sensors with increased pressure may cause the membranes to rip.

▶ The sensors should be operated under as little pressure as possible, with the measurement media able to flow freely. If this is not possible, the sensors can be operated under a **constant** pressure of up to 1 bar (relative pressure) or 2 bar (absolute pressure). Fluctuations in pressure must be avoided.

2.6.3 Notes for types 202630/43 and 202630/53 (reduced pH-dependence)

In particular cases, it must be checked if the presence of surfactants will cause a significant reduction in the service life of sensors with hydrophilic membranes; however, in these cases the media must also have qualities similar to drinking or swimming pool water.

The measurement is not pH-dependent within the range of pH 5 to 7.

As there must be an electrical connection between the counter electrode and the measurement medium, the measurement medium must have a minimum conductivity of approx. 10 µS/cm. This means that the sensors are not suitable for use in highly-purified water, or similar.

NOTICE

The membranes may be damaged by high pressure.

Operating the sensors with increased pressure may cause the membranes to rip.

▶ The sensors should be operated under as little pressure as possible, with the measurement media able to flow freely. If this is not possible, the sensors can be operated under a **constant** pressure of up to 3 bar (relative pressure) or 4 bar (absolute pressure). Fluctuations in pressure must be avoided.

2.6.4 Notes for types 202630/40 and 202630/43 (output signal 4 to 20 mA)

- The slope of these sensors can vary depending on the manufacture and application by between 65 % and 150 % of the nominal slope. To determine the appropriate measuring range or appropriate sensor, it is therefore recommended that the concentration to be measured be multiplied by a factor of 1.5.

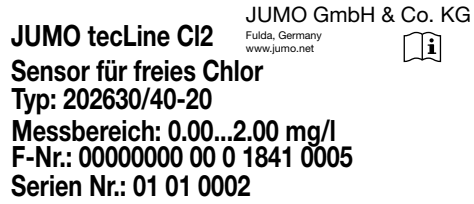
  Example: concentration to be measured 1.6 ppm × factor 1.5 = 2.4 ppm => recommended sensor with measuring range 5 ppm

2 Description

3.1 Nameplate

Position

The nameplate is glued to the top of the sensor.



Contents

The nameplate contains important information. This includes:

Description	Designation on the nameplate	Example
Device type	Type	202630/40-20
Fabrication number	F-No.	00000000001841000500

Device type (Typ)

Compare the specifications on the nameplate with your order documents. The supplied device version can be identified using the order code in chapter 3.2 "Order details", page 15.

Fabrication number (F no.)

The fabrication number provides information such as the **production date** (year/week). The production date relates to the characters in positions 12 to 15 (from the left).

For example: F-No. = 000000000001**841**0005. The device was produced in the **41**st week of 20**18**.

3.2 Order details

	(1)	Basic type
202630		JUMO tecLine Cl2
		Sensor for free chlorine
	(2)	**Basic type extension**
40		Output signal 4 to 20 mA
43		Output signal 4 bis 20 mA, reduced pH dependence
50		Digital output signal
53		Digital output signal, reduced pH dependence
	(3)	**Measuring range**
10		0 to 0.5 mg/l (ppm)
20		0 to 2 mg/l (ppm)
25		0 to 5 mg/l (ppm)
35		0 to 10 mg/l (ppm)
37		0 to 20 mg/l (ppm)
40		0 to 100 mg/l (ppm)
45		0 to 200 mg/l (ppm)

	(1)		(2)		(3)
Order code		/		-	
Order example	202630	/	40	-	20

3 Identifying the device version

3.3 Scope of delivery

Type 202630/40	Two-wire sensor including membrane cap, electrolyte, special abrasive paper for cathode cleaning and operating manual
Type 202630/43	
Type 202630/50	Modbus RTU sensor including membrane cap, electrolyte, special abrasive paper for cathode cleaning and operating manual
Type 202630/53	

3.4 Accessories

Fittings

Description	**Part no.**
Combination fitting for mounting several electrochemical sensors[a]	00607325
Individual fitting for mounting a membrane-covered sensor	00392611
Mounting bracket for individual fitting	00455706
Flow monitor for monitoring the minimum inflow[b]	00605507

[a] With integrated flow monitor, mini ball valve included.

[b] For monitoring the flow in connection with the individual fitting.

Spare part sets and electrolytes

Description	**Part no.**
Spare part set for 202630/40 and /50 (1x membrane cap, fine abrasive paper)	00392331
Spare part set for 202630/41 and /51 (1x membrane cap, device holder, fine abrasive paper) (until 09/2016)	00402292
Spare part set for 202630/43 and /53 (1x membrane cap, fine abrasive paper) (from 10/2016)	00687804
Special electrolyte (100 ml) for 202630/40 and /50	00438122
Special electrolyte (100 ml) for 202630/41, 202630/43, 202630/51 and 202630/53	00438123

Connecting cables for sensors with a digital interface

Description	**Part no.**
1.5 m connecting cable, 5-pin M12 connector, A-coded on the ferrules	00638333
5 m connecting cable, 5-pin M12 connector, A-coded on the ferrules	00638337
10 m connecting cable, 5-pin M12 connector, A-coded on the ferrules	00638341

Suitable transmitters/controllers

Description	**Part no.**
JUMO AQUIS 500 AS[a], type 202568/20-888-888-888-310-310-23/000 (for further versions, please refer to data sheet 202568) 	00528718
JUMO AQUIS 500 RS[b], type 202569/20-654-888-888-310-310-23/000 (for further versions, please refer to data sheet 202569) 	00602275
JUMO dTRANS AS 02[a], type: 202553/01-8-01-4-0-00-23/000 (for further versions, please refer to data sheet 202553) 	00550842

JUMO AQUIS touch S/P[c]	 	Refer to data sheet 202580/81

[a] For types 202630/40 and 202630/43.
[b] For types 202630/50 and 202630/53.
[c] For all types 202630.

3 Identifying the device version

4.1 Important information

NOTICE

An unsuitable measuring environment may produce incorrect measurement results.

Using the sensors without the use of suitable flow fittings will lead to incorrect measurement results.

▶ In order to ensure error-free measurements, the sensors must be installed in suitable flow fittings, see chapter 4.2 "Combination fitting (type 202811/10)", page 21 or chapter 4.3 "Flow fitting for membrane-covered sensors (type 202811/30)", page 24.

NOTICE

The membranes may be damaged by high pressure.

Operating the sensors with increased pressure may cause the membranes to rip.

▶ The sensors should be operated under as little pressure as possible, with the measurement media able to flow freely. If this is not possible, the sensors can be operated under a **constant** pressure according to the specifications in chapter 10 "Technical data", page 49. Fluctuations in pressure must be avoided.

NOTICE

Air bubbles may lead to incorrect measurement results.

The presence of air bubbles in the measurement medium in front of the membrane may produce incorrect measurement results.

▶ In order to ensure error-free measurements, the measurement media must be free of air bubbles.

NOTICE

Interruptions in the voltage supply may produce incorrect measurement results.

An interruption in the voltage supply (e.g. in interval operation) may produce incorrect measurement results. The sensors require a settling time period to determine the correct measurement.

▶ In order to ensure error-free measurements, the sensors and transmitters must be permanently supplied with voltage, even in interval operation.

NOTICE

Dry electrolytes may produce incorrect measurement results.

If there is no medium to measure when the membrane cap is filled, a build-up of salt (types 202630/40 and 202630/50) or of gel residue (types 202630/43 and 202630/53) on the inside of the membrane may cause incorrect measurement results.

▶ For sensors with electrolyte-filled membrane caps, the sensor fittings should be prevented from draining or dry running.

NOTICE

Deposits on the membrane may lead to incorrect measurement results.

If there is no chlorine in the measurement medium for more than 24 hours, this will lead to incorrect measurement results due to deposits (biofilm) on the membrane.

▶ You should avoid operating the sensors with measurement medium which does not contain chlorine. After operation in a chlorine-free medium, a settling time period is to be expected. The dosing may need to be switched on after a delay.

NOTICE

Irritating substances may produce incorrect measurement results.

Using the sensors to measure media containing oxidants, reducing agents or corrosion protection agents may lead to incorrect measurement results.

▶ Substances such as chlorine dioxide and ozone (for all types) and combined chlorine (only for types 202630/43 and 202630/53) should be prevented from entering the measurement medium due to the cross sensitivities of the sensors.

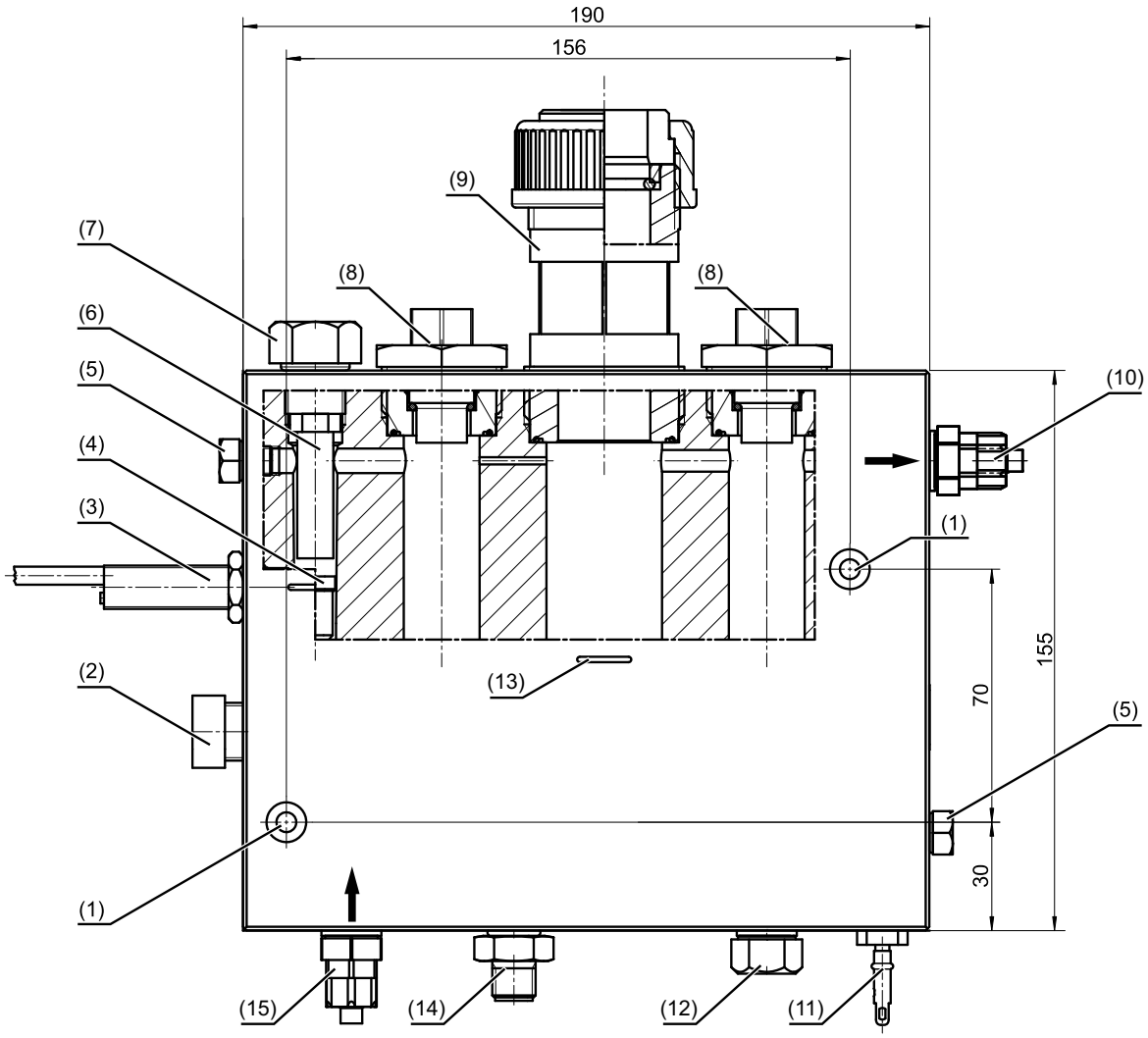
NOTE!

If no chlorine is dosed over a long period of time, the sensors must be disconnected from the transmitter/ controller and stored correctly; please refer to chapter 4.3 "Flow fitting for membrane-covered sensors (type 202811/30)", page 24.

4.2 Combination fitting (type 202811/10)

4.2.1 Mounting the combination fitting

The combination fitting can be mounted on a wall or an installation panel with the mounting holes (1) using two commercially available M5 cylinder head screws (dia. 5.5 mm, countersink according to DIN 974-1: dia. 11 mm, 5 mm deep, not included in the scope of delivery).



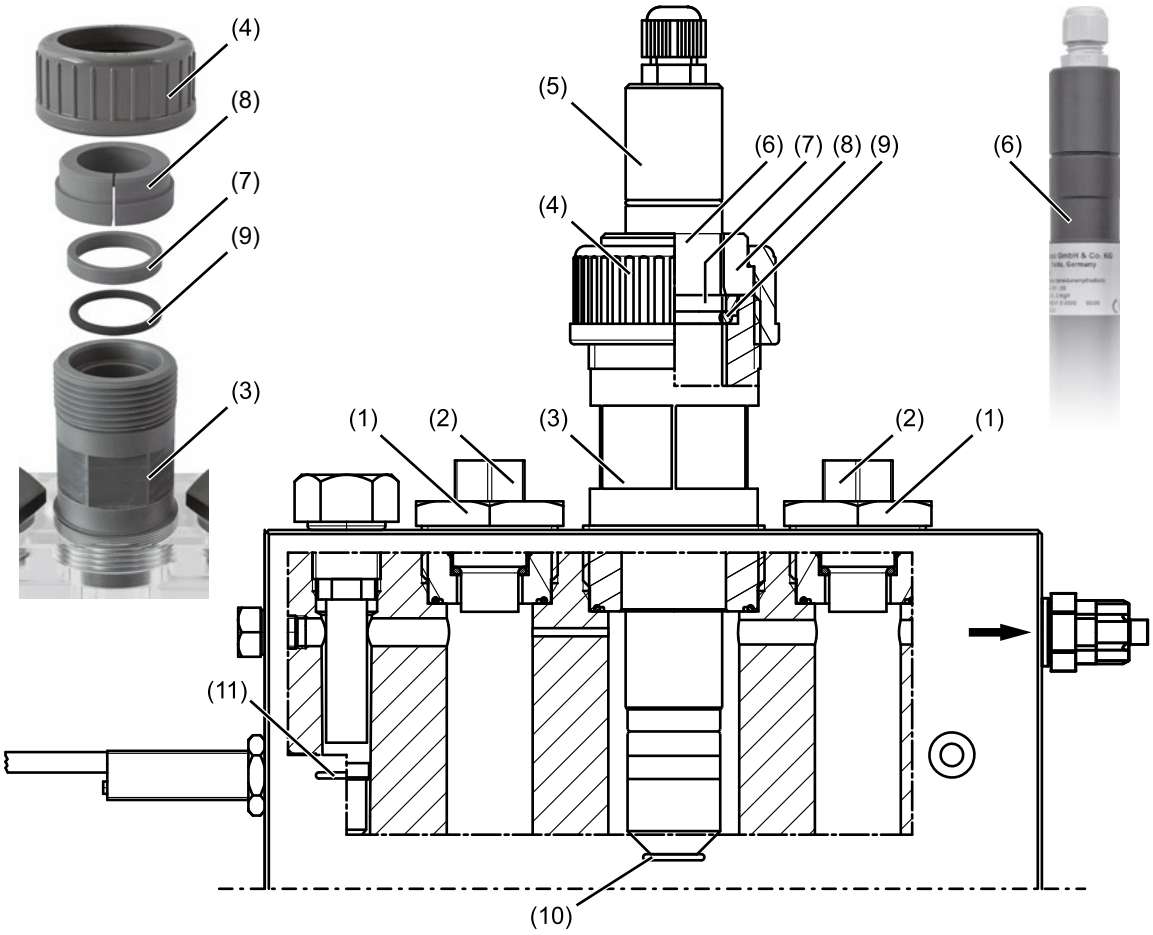
(1) Mounting hole for cylinder head screws M5 (dia. 5.5 mm; countersink: dia. 11 mm, 5 mm deep)
(2) Valve insert for flow control
(3) Inductive proximity sensor[a](flow monitoring), M12 x 1 thread
(4) Floating body for flow monitoring[a]
(5) Sealing screw M8
(6) Extension for M8 sealing screw
(7) Sealing screw G 3/8
(8) Mounting closed with dummy plug for pH/Redox sensor with Pg 13.5 thread
(9) Mounting for membrane-covered sensor with dia. 25 mm
(10) Hose connection for measuring water outflow, connection G 1/4, for hose 6 × 8 (inner dia. 6 mm, outer dia. 8 mm)
(11) M8 ground rod[a]

(12) Sealing screw G 1/4 (opening for optional mini ball valve for sampling)
(13) Indicator for sensor immersion depth
(14) Temperature probe[a]
(15) Hose connection for measuring water inflow, connection to fitting G 1/4, for hose 6 × 8 (inner dia. 6 mm, outer dia. 8 mm)

[a] optionally

4.2.2 Installing the sensor

Overview



(1) Mounting for pH/Redox sensors
(2) Pg 13.5 pressure screw
(3) Mounting for membrane-covered sensor
(4) Union nut
(5) Membrane-covered sensor
(6) Sensor slot
(7) Pressure ring
(8) Stepped collar
(9) O-Ring
(10) Mark for sensor immersion depth
(11) Mark for floating body height

Installation

NOTICE

Leaks due to incorrect installation

Pollutants on the thread of the union nut (4), the pressure ring (7), the stepped collar (8), the O-ring (9), or a hardened O-ring can cause the fitting to leak when the sensor (5) is installed.

▶ When assembling or installing the sensor, make sure that the O-rings and threads are clean and in good working order.

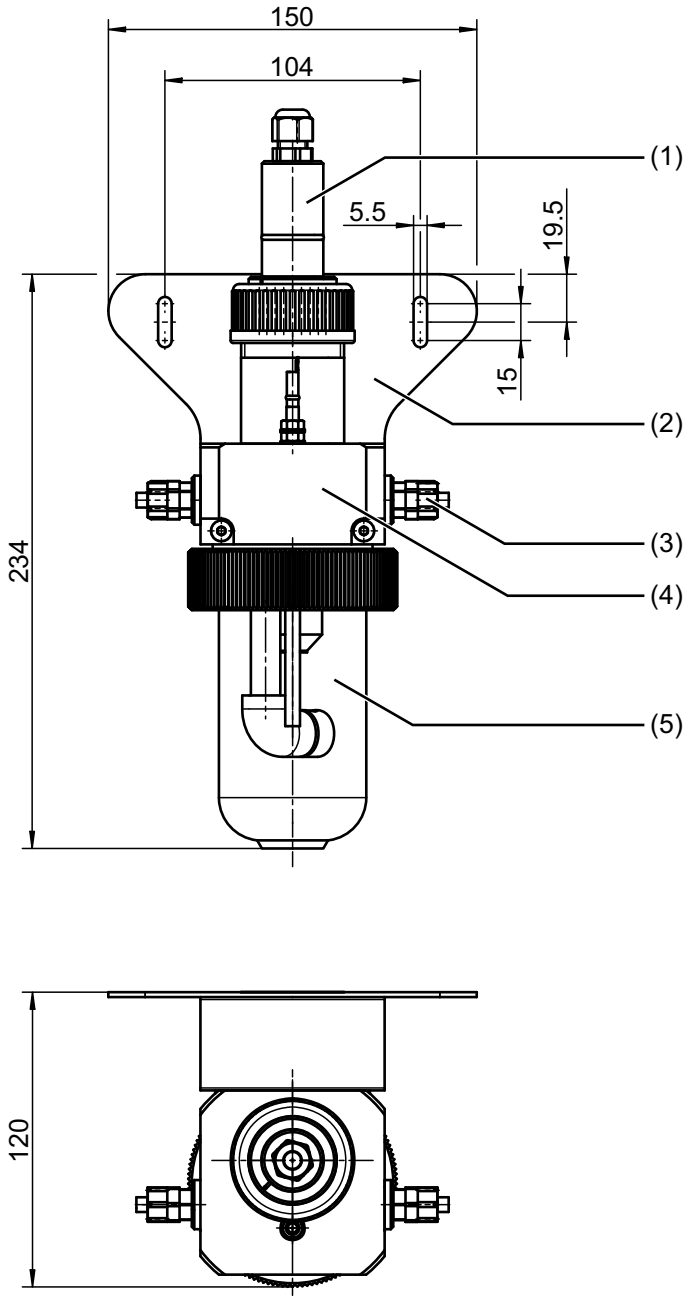
1. Before installing the sensors, make sure that the system is depressurized.
2. Close the shut-off valves in the inflow and outflow of the fitting.
3. Unscrew the union nut (4).
4. Remove the stepped collar (8). The pressure ring (7) and the O-ring (9) remain in the sensor mounting (3).
5. Slide the stepped collar from above onto the sensor (5) until it engages in the sensor slot (6). The step collar should now rotate easily on the sensor housing.
6. Insert the sensor with the mounted stepped collar into the sensor mounting (3) as far as it will go.
7. Screw the union nut (4) back onto the sensor mounting and tighten it hand-tight.

4 Mounting

4.3 Flow fitting for membrane-covered sensors (type 202811/30)

4.3.1 Mounting the fitting

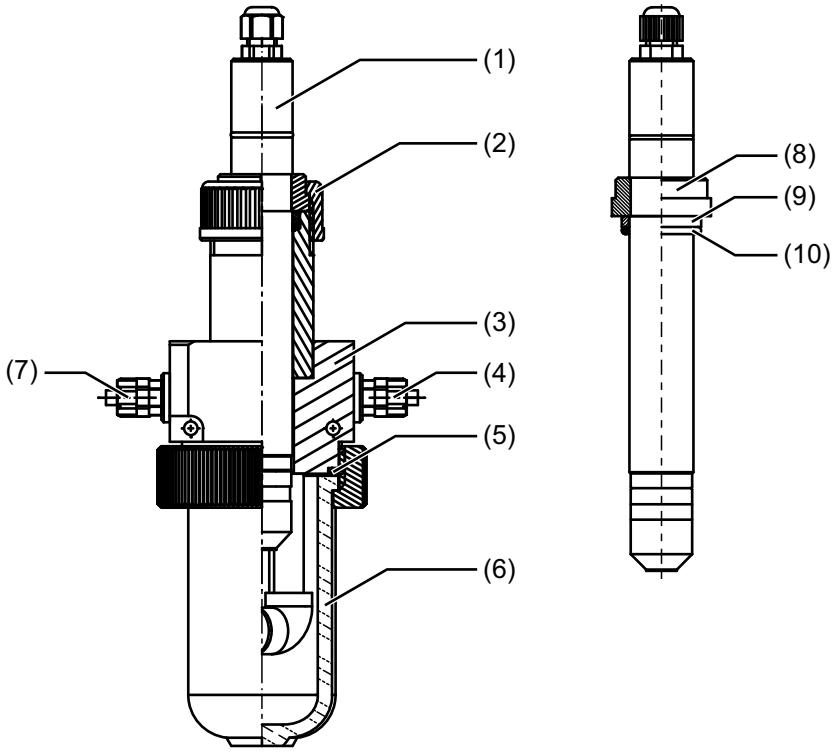
The flow fitting can be mounted to a wall or an installation panel using an optional mounting bracket (part no.: 00455706).



(1) Sensor
(2) Mounting bracket (optional)
(3) Connection G 1/4, for hose Ø 8 mm × 6 mm
(4) Fitting
(5) Removable measuring vessel (inspection glass)

4.3.2 Installing the sensor

Overview



(1) Sensor
(2) Union nut
(3) Fitting housing
(4) G 1/4 A or DN 10 outlet lead
(5) O-ring
(6) Inspection glass
(7) G 1/4 A or DN 10 supply lead
(8) 1-inch stepped collar[a]
(9) Pressure ring[a]
(10) O-ring[a]

[a] Component of the flow fitting

Installation

NOTICE

Incorrect installation may cause leaks.

Pollutants on the thread of the union nut (2) or the O-rings (5, 10), or hardened O-rings can cause the fitting to leak when the sensor (1) is installed.

▶ When assembling or installing the sensor, you must ensure that the O-rings and threads are clean and in good working order.

NOTE!

The inspection glass (6) can be unscrewed from the fitting housing (3) for maintenance purposes.

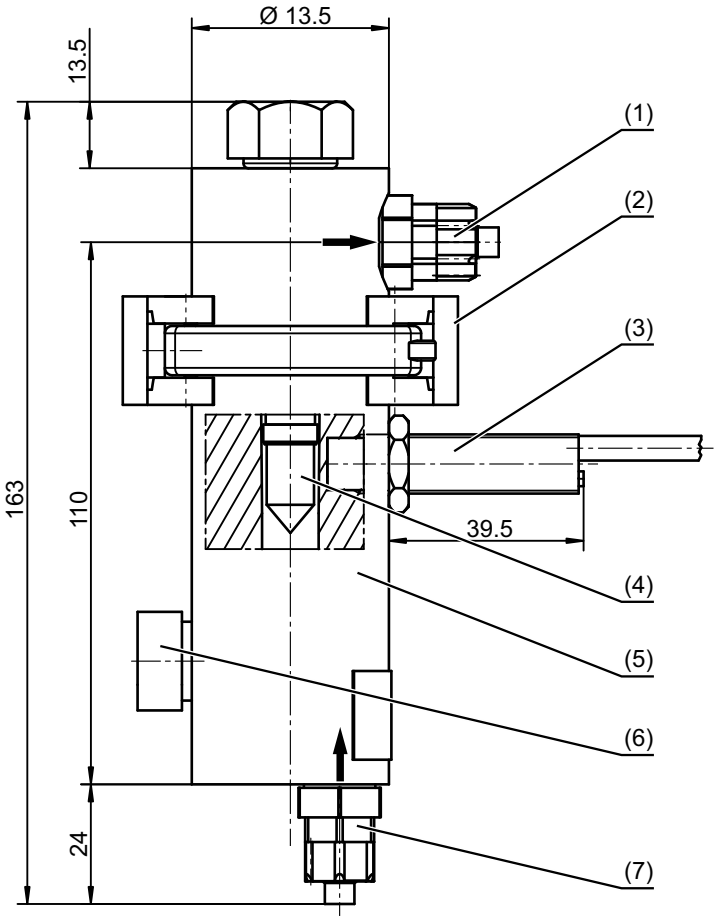
1. First push the O-ring (10), then the pressure ring (9) and then the 1-inch stepped collar (8) onto the sensor (1) (from the Pg screw connection). The stepped collar (8) must snap into the groove.
2. Once the sensor has been prepared in this way, insert it into the flow fitting housing (3) and fix it in place with the union nut (2).

4 Mounting

4.4 Flow monitor for disinfection measurands (type 202811/20)

4.4.1 Mounting the flow monitor

The flow monitor can be mounted to a wall or an installation panel using the **PP-40 pipe clip** (2) included in the scope of delivery.



(1) Hose connection for measuring water outflow, connection G 1/4, for hose 6 × 8 (inner dia. 6 mm, outer dia. 8 mm)

(2) **PP-40 pipe clip**

(3) Inductive proximity sensor, M12 x 1 thread

(4) Floating body

(5) Flow body

(6) Needle valve insert for flow control

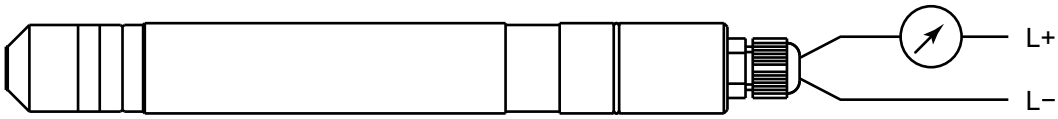
(7) Hose fitting for measuring water inflow, connection G 1/4, for hose 6 × 8 (inner dia. 6 mm, outer dia. 8 mm)

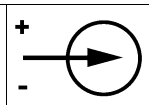
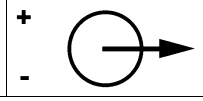
5.1 Sensors with an output signal of 4 to 20 mA (types 202630/40 and /43)

5.1.1 General requirements

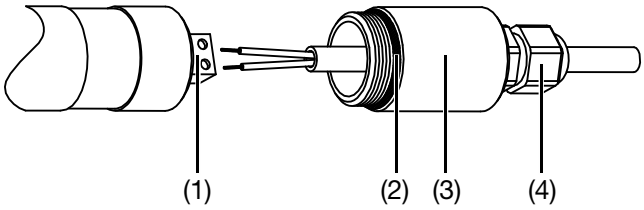
- Cable diameter of approx. 4 mm
- Conductor cross section of 2 x 0.25 mm^2
- Lay the signal lines isolated from cables with a voltage of > 60 V
- Use protected cables with twisted cores
- Keep away from large, electrical plants

5.1.2 Terminal assignment



Function		Screw terminals
Voltage supply DC 12 to 30 V		1 L+ 2 L-
Two-wire output of 4 to 20 mA, load-independent current of 4 to 20 mA in voltage supply		1 L+ 2 L-

5.1.3 Connection



1. Push the cover (3) over the connecting cable.
2. Connect the wires on the terminals (1) in accordance with the terminal assignment.
3. Screw in the cover (3) by hand until the O-ring (2) is sealed.
4. Tighten the Pg screw connection (4).

NOTICE

Potential damage to the sensor

If the steps are not carried out in the correct order before disconnecting the wires, the connection area of the sensors may be damaged.

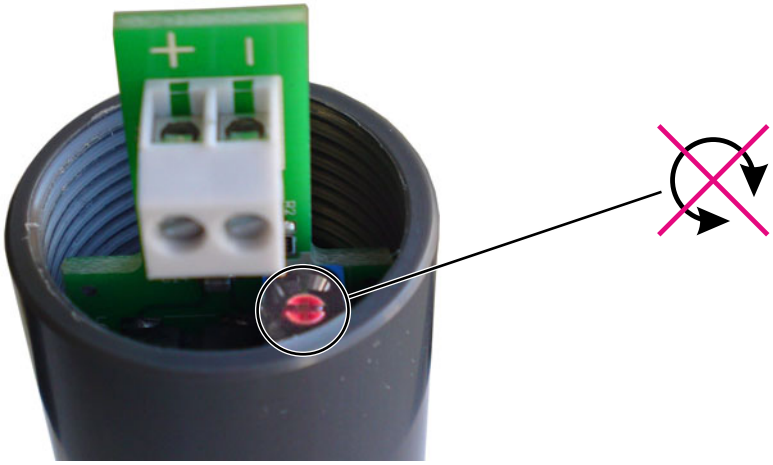
▶ Loosen the Pg screw connection before unscrewing the cover.

5 Electrical connection

NOTE!

Screws protected by locking varnish must not be adjusted.

Any damage to the locking varnish will result in the loss of the manufacturer's guarantee.

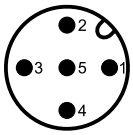


5.2 Sensors with digital interface output signal (types 202630/50 and /53)

5.2.1 General requirements

- Use connecting cable PN 00638333 (1.5 m) or PN 00638337 (5 m) or PN 00638341 (10 m) for connecting to JUMO AQUIS 500 RS or JUMO AQUIS touch S/P

5.2.2 Terminal assignment

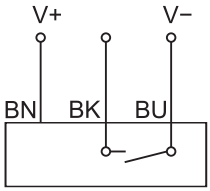


Function	Pin on M12 flange connector
not connected	1
+24 V voltage supply from transmitter/controller	2
GND	3
RS 485 B (RxD/TxD-)	4
RS 485 A (RxD/TxD+)	5

5.3 Flow monitoring (combination fitting and flow monitor)

5.3.1 Terminal assignment

Switching contact = NPN N/O contact (illustration = minimum inflow not reached)

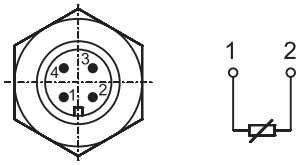


Function	Wire color
+12 V voltage supply from transmitter/controller (V+)	brown (bn)
Contact (NPN N/O contact)	black (bk)
GND (V-)	blue (bu)

5.4 Combination fitting temperature probe

5.4.1 Terminal assignment

Connection for M12 machine connector



5 Electrical connection

5.5 Example of a measuring section with the sensor type 202630/40

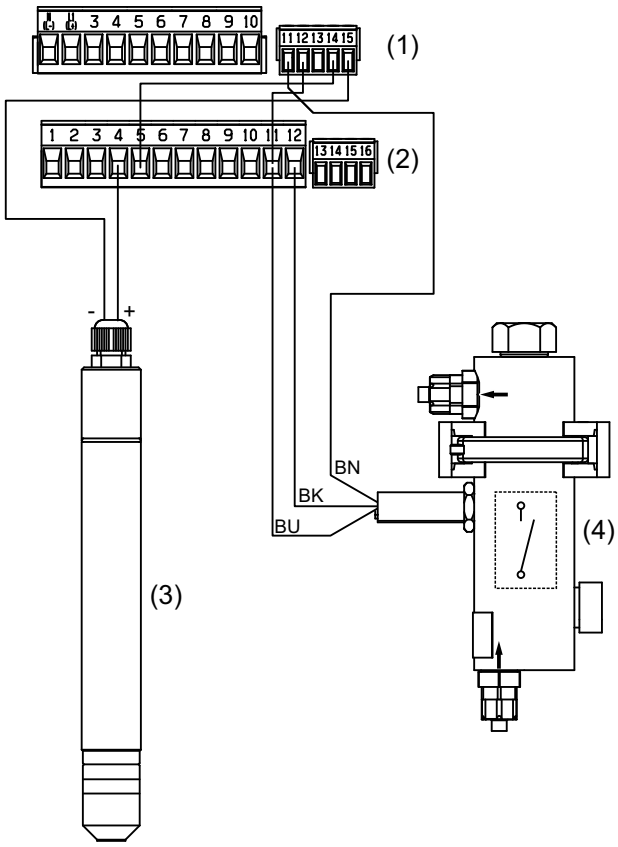
5.5.1 General information

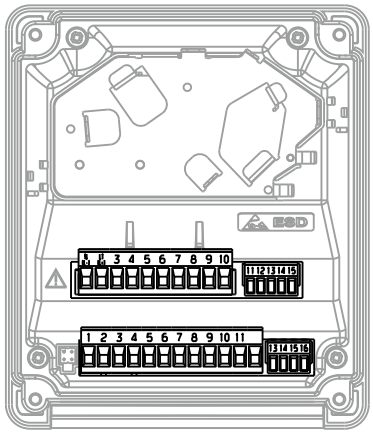
The electronics integrated into the sensor shaft provide an uncalibrated signal of 4 to 20 mA. The signal can be processed by the JUMO AQUIS 500 AS, the JUMO dTRANS AS 02 or the JUMO AQUIS touch S/P. The devices provide the required voltage supply and allow for easy calibration of the measuring system. However, the sensor can also be connected to other indicators, controllers, recorders or PLC systems[1] as long as they supply the sensor with voltage and are able to be calibrated.

5.5.2 Connection example

NOTE!

Before connecting the sensor, you must read the operating manual for the JUMO AQUIS 500 AS.





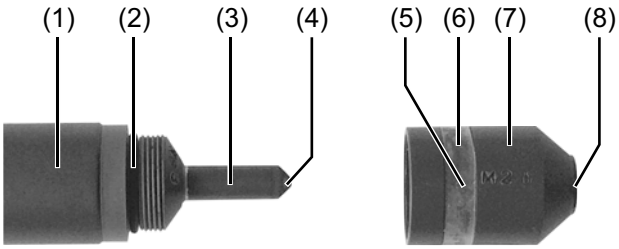
(1) Terminal block 1
(2) Terminal block 2
(3) Sensor for free chlorine, type 202630/40
(4) Flow monitor, type 202811/20
(5) JUMO AQUIS 500 AS, type 202568/... with open front cover, please also refer to data sheet and operating manual 202568

Flow monitoring

If the flow monitor (4) signals that the sensor (3) inflow is too low, the input into the JUMO AQUIS 500 AS (5) is switched to binary - the device will go into "Hold" mode and an alarm will sound.

[1] Galvanic isolation required.

6.1 Important notes for screwing the membrane cap on and off



Example: type 202630/40

WARNING!

Risk of burns (types 202630/43 and 202630/53)

When the membrane cap (7) is unscrewed, electrolyte can spray out of the valve opening (5) and cause skin irritation.

▶ Be sure to wear protective eyewear when starting up the sensor. Wash away any liquids which may spray out (aqueous solution of an alkali halide) with running water.

NOTICE

Touching the electrode finger may damage it

Touching and contaminating the electrode finger (3, 4) can damage it, making the sensor unusable.

▶ Do not touch the electrode finger when carrying out any of the following steps. Carry out the steps exactly as they are described.

NOTICE

Damage to the membrane due to overpressure or underpressure

The membrane is extremely sensitive. Screwing the membrane cap (7) on and off can create overpressure or underpressure in the cap which can damage the membrane.

▶ Follow the instructions for filling the reference electrolyte (chapter 6.2 "Filling up the reference electrolyte", page 32) closely.

NOTICE

Damage to the membrane due to mechanical influences

When the sensor is ready to take a measurement (membrane cap fully screwed on), the distance between the electrode finger (3, 4) and the membrane (8) is extremely small. Pushing the tip against the sensor can damage the membrane.

▶ The membrane cap must only be screwed onto the sensor immediately before inserting it into a fitting.

NOTE!

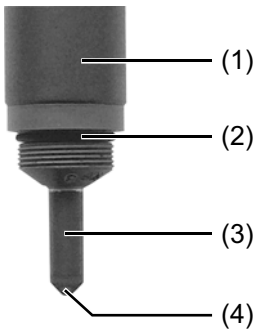
In order for the sensor to function correctly, the membrane must be **fully** screwed onto the sensor. The first screw-in resistance is the sealing O-ring (2). The membrane cap must be screwed on further until it comes into contact with the sensor shaft (1).

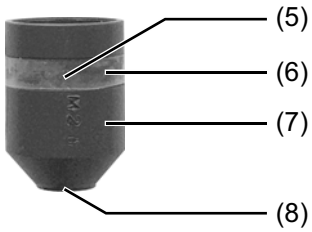
6.2 Filling up the reference electrolyte

NOTE!

The service life of the reference electrolyte is around 3 to 6 months.

6.2.1 Notes for types 202630/40 and 202630/50





(1) Sensor shaft
(2) O-ring
(3) Electrode finger
(4) Electrode tip
(5) Valve opening
(6) Valve cover
(7) Membrane cap
(8) Membrane

1.	Lift the transparent cover (6) of the valve opening (5) above the engraving near the valve opening with a small screwdriver or similar and push it down. *The valve opening is open.*	

NOTICE

Damage to the membrane due to overpressure or underpressure

The membrane is extremely sensitive. Screwing the membrane cap (6) on and off can create overpressure or underpressure in the cap which can damage the membrane.

▶ Follow the instructions for filling the reference electrolyte closely.

2.	Unscrew the membrane cap (7) from the sensor shaft (1)	
3.	Slide the transparent cover back again until the cover is back in the groove and the valve opening closes. *The valve opening is closed*	
4.	When refilling: discard the used electrolyte, clean the membrane cap with clean water and dry. Place the membrane cap on a clean, non-absorbant surface.	

5.	Fill the membrane cap up to the brim with **bubble-free** electrolyte (contained in the scope of delivery of the sensor) and place it back on the support surface.	
6.	Holding the sensor shaft vertically, fit it onto the filled membrane cap. If required, turn the sensor shaft counter-clockwise first so that the thread engages, then slowly screw it into the membrane cap in a clockwise direction. When holding the membrane cap, do not hold it by the valve (see arrow in the figure on the right). Any surplus electrolyte will leak out of the valve.	
7.	Ensure that the membrane cap is screwed on over the sealing O-ring (2) and tightly against the sensor shaft. Rinse off any electrolyte on the exterior with water.	

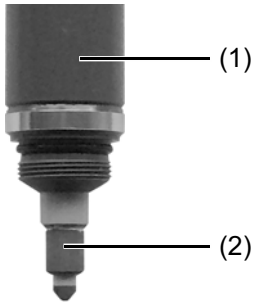
6.2.2 Notes for types 202630/43 and 202630/53 (reduced pH-dependence)

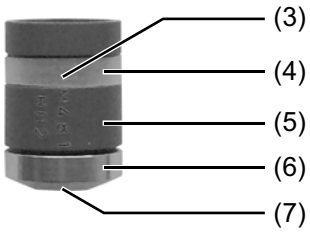
NOTE!

Gel electrolytes must not be shaken and must be stored upside down or standing on the end cap.

NOTE!

We recommend that you use warm water to rinse off any gel electrolyte residues on the electrode finger (1) and in the membrane cap (5).





(1) Sensor shaft
(2) Electrode finger
(3) Valve opening
(4) Valve cover
(5) Membrane cap
(6) Membrane holder
(7) Membrane

1.	Remove the transparent protective cap from the membrane cap (5). Lift the transparent cover (4) of the valve opening (3) above the engraving near the valve opening with a small screwdriver or similar and push it down. *The valve opening is open.*	

NOTICE

Damage to the membrane due to overpressure or underpressure

The membrane is extremely sensitive. Screwing the membrane cap (5) on and off can create overpressure or underpressure in the cap which can damage the membrane.

▶ Follow the instructions for filling the reference electrolyte closely.

2.	Unscrew the membrane cap (5) from the sensor shaft (1)	
3.	Slide the transparent cover back again until the cover is back in the groove and the valve opening closes. *The valve opening is closed*	
4.	When refilling: discard the used electrolyte, clean the membrane cap with clean water and dry. Place the membrane cap on a clean, non-absorbant surface.	

5.	Fill the membrane cap up to the brim with **bubble-free** electrolyte (contained in the scope of delivery of the sensor).	
6.	Holding the sensor shaft vertically, slowly insert it into the filled membrane cap. Fit it onto the membrane cap, turning the shaft counterclockwise first if necessary so that the thread engages, then slowly screw the electrode shaft into the membrane cap in a clockwise direction. When holding the membrane cap, do not hold it by the valve (see arrow in the figure on the right). Any surplus electrolyte will leak out of the valve.	
7.	Ensure that the membrane cap is screwed on over the sealing O-ring and tightly against the sensor shaft. Rinse off any electrolyte on the exterior with water.	

6.3 Minimum inflow

NOTE!

The flow rate from the measurement medium must be at least **15 cm/s** in order for the sensor to work correctly. The minimum flow rate in the combination fitting or the flow fitting is **30 l/h**. Values measured by the sensors below the minimum inflow speed are too low. This can cause dangerous overdosage in a connected regulating system. If values are measured above the minimum inflow speed, the measurement signal is only marginally influenced by the inflow speed.

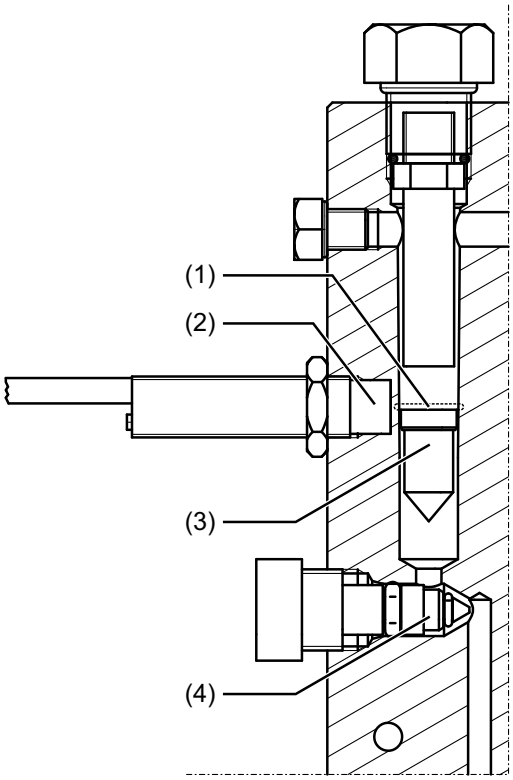
6.3.1 Adjusting the minimum inflow (combination fitting and flow monitor)

The flow in the fitting is regulated by turning the valve insert (4).

The minimum inflow is reached when the flow of the measurement medium lifts the floating body (3) enough for the top edge to reach the marking (1).

If the combination fitting is equipped with a flow monitor, the contact of the inductive proximity sensor (2) closes and sends a signal to the connected evaluation unit/controller indicating that the minimum inflow has been reached; please refer to "Flow monitoring ", page 30.

The principle is illustrated by the graphic using the combination fitting as an example, but the same principle applies for separate flow monitors (when the sensor is used in the flow fitting).



6.4 Settling time

NOTE!

The sensors will only measure a constant value at the end of the settling time and can then be calibrated.

Settling time	
Type 202630/40	1 hour
Type 202630/43	2 hours
Type 202630/50	1 hour
Type 202630/53	2 hours

On the day after the initial startup, the calibration procedure should be repeated.

7.1 Cleaning the electrode finger tip/changing the electrolyte and the membrane cap

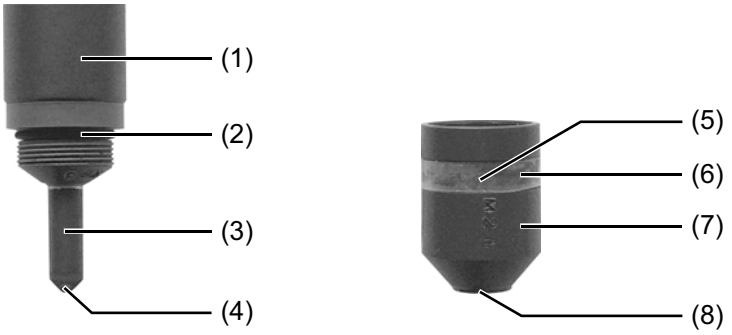
7.1.1 Notes for types 202630/40 and 202630/50

NOTICE

Potential damage to the sensor

Cleaning the electrode finger (3/4) incorrectly may damage the sensor.

- ▶ Do not sand down the brown deposit on the combined counter and reference electrode (3).
- ▶ Do not touch or contaminate the electrode finger (3/4).
- ▶ Carry out the following steps exactly as they are described.



1.	Unscrew the membrane cap (7) from the sensor shaft; see chapter 6.2.1 "Notes for types 202630/40 and 202630/50", page 32.	
2.	Clean the electrode finger (3/4) and the membrane cap (7) with drinking water and dry, see chapter 6.2.1 "Notes for types 202630/40 and 202630/50", page 32.	
3.	Use the special abrasive paper provided to clean **just the tip** of the dry electrode finger (4). Then place the special abrasive paper on a paper towel, hold it in place by one corner, and, while holding the sensor vertically, run the tip of the electrode over the abrasive paper two or three times.	
4.	Fill the membrane cap up to the brim with the electrolyte provided, ensuring that it is **free of air bubbles.**	
5.	Screw the membrane cap onto the sensor shaft; see chapter 6.2.1 "Notes for types 202630/40 and 202630/50", page 32.	

7 Maintenance

7.1.2 Notes for types 202630/43 and 202630/53 (reduced pH-dependence)

NOTICE

Potential damage to the sensor

Cleaning the electrode finger (2) incorrectly may damage the sensor.

- ▶ Do not sand down the brown deposit on the combined counter and reference electrode of the electrode finger.
- ▶ Do not touch or contaminate the electrode finger.
- ▶ Carry out the following steps exactly as they are described.

NOTICE

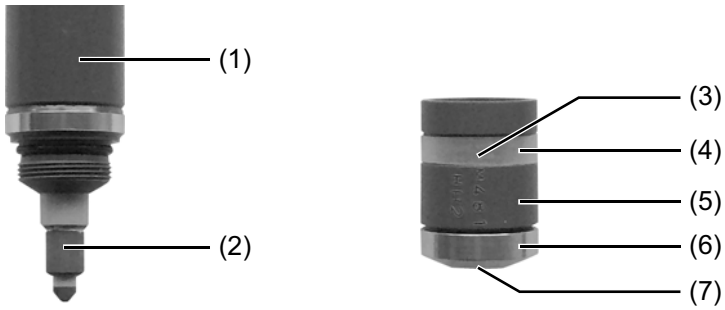
Potential damage to the membrane cap

Unscrewing the membrane holder (6) from the membrane cap (5) causes the membrane (7) to be misaligned, and may damage it.

- ▶ Do not unscrew the membrane holder from the membrane cap.

NOTE!

We recommend that you use warm water to rinse off any gel electrolyte residues on the electrode finger and in the membrane cap.



1.	Unscrew the membrane cap (5) from the sensor shaft; see chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34.	
2.	Clean the electrode finger (2) and the membrane cap (5) with drinking water and dry, see chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34.	
3.	Use the special abrasive paper provided to clean **just the tip** of the dry electrode finger (2). Then place the special abrasive paper on a paper towel, hold it in place by one corner, and, while holding the sensor vertically, run the tip of the electrode over the abrasive paper two or three times.	
4.	Fill the membrane cap up to the brim with the electrolyte provided, ensuring that it is **free of air bubbles**; see chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34.	
5.	Screw the membrane cap onto the sensor shaft; see chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34.	

NOTE!

The service life of the electrolyte is around 3 to 6 months. The service life of the membrane is heavily dependent on the quality of the water. We recommend that you replace the membrane cap at least once a year.

NOTE!

Severe contamination of the membrane must be prevented.

NOTE!

If the connected transmitter is still showing a value that is too low after the tip of the electrode finger has been cleaned, a new membrane cap must be used.

7.2 Removing calcium deposits from the membrane cap

1. Unscrew the membrane cap from the sensor shaft; see chapter 6.1 "Important notes for screwing the membrane cap on and off", page 31.
2. Discard the electrolyte.
3. Place the membrane cap in 1% hydrochloric acid for a few hours.
4. Rinse thoroughly with distilled water or drinking water before startup.
5. When it is filled with electrolyte, screw the membrane cap onto the sensor shaft; see chapter 6.1 "Important notes for screwing the membrane cap on and off", page 31.

7.3 Storage

NOTE!

Membrane caps which have been in operation for longer than a day cannot be stored and used again.

7.3.1 Notes for types 202630/40 and 202630/50

Preparation

1. Unscrew the membrane cap from the sensor shaft; see chapter 6.2.1 "Notes for types 202630/40 and 202630/50", page 32.
2. Discard the electrolyte.
3. Rinse the membrane cap and electrode finger with distilled water and dry them, ensuring they are free from dust.
4. Unscrew the dry membrane cap loosely from the sensor shaft. The membrane must not be positioned at the tip of the electrode finger.

The sensor is ready to be stored.

Restarting

1. Use the special abrasive paper provided to clean the tip of the electrode finger; refer to chapter 7.1 "Cleaning the electrode finger tip/changing the electrolyte and the membrane cap", page 37.
2. Fill the new membrane cap with electrolyte and screw it onto the sensor shaft; refer to chapter 6.2.1 "Notes for types 202630/40 and 202630/50", page 32

The sensor is ready for operation.

7.3.2 Notes for types 202630/43 and 202630/53 (reduced pH-dependence)

Preparation

1. Unscrew the membrane cap from the sensor shaft; see chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34.
2. Discard the electrolyte.
3. Rinse the membrane cap and electrode finger with distilled water or drinking water and dry them, ensuring they are free from dust.
4. Unscrew the dry membrane cap loosely from the sensor shaft. The membrane must not be positioned at the tip of the electrode finger.

The sensor is ready to be stored.

Restarting

1. Use the special abrasive paper provided to clean the tip of the electrode finger; refer to chapter 7.1.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 38.
2. Fill the new membrane cap with electrolyte and screw it onto the sensor shaft; refer to chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34.

The sensor is ready for operation.

7.4 Consumable material

Spare part sets and electrolytes

Description	Part no.
Spare part set for 202630/40 and /50 (1x membrane cap, fine abrasive paper)	00392331
Spare part set for 202630/41 and /51 (1x membrane cap, device holder, fine abrasive paper) until 09/2016	00402292
Spare part set for 202630/43 and /53 (1x membrane cap, fine abrasive paper) from 10/2016	00687804
Special electrolyte (100 ml) for 202630/40 and /50	00438122
Special electrolyte (100 ml) for 202630/41, 202630/43, 202630/51 and 202630/53	00438123

8.1 General information

NOTE!

According to requirements, the sensor should be inspected or calibrated at regular fixed intervals.

Recommendation: weekly, or more frequently depending on the accuracy requirements.

8.2 Calibrating with an indicator/controller

Reference method

NOTE!

Suitable reference methods for calibration can be found in standard DIN EN ISO 7393-2, for example.

Photometric determination with the **DPD** method is frequently used for calibration (DPD = N,N-**d**iethyl-1,4-**p**henylen**d**iamin). Corresponding testing systems are commercially available. Some examples of providers include VWR International (formerly Merck), (Spectroquant®), Macherey-Nagel (Nanocolor®), etc.

Initial situation

Display format and measuring range are set, refer to the operating manual for the indicator/controller used.

The sensor is installed in a suitable flow fitting (refer to chapter 4.3 "Flow fitting for membrane-covered sensors (type 202811/30)", page 24) or combination fitting (refer to chapter 4.2 "Combination fitting (type 202811/10)", page 21).

The settling time for the sensor (**1 hour** for types 202630/40 and 202630/50; **2 hours** for types 202630/43 and 202630/53) has elapsed and the measured value is stable.

Procedure

1. Take a water sample from the outlet of the fitting (or from the immediate vicinity).
2. Immediately determine the analyte concentration (free chlorine) of the sample using a suitable reference method.
3. Calibrate the indicator on the basis of the reference value; refer to the operating manual for the transmitter/controller used.

Checking the determined slope

Many transmitters/controllers (e.g. the JUMO AQUIS 500 AS) have a "calibration logbook". This logbook is used to record the relevant data during every calibration.

NOTE!

If the value for the nominal slope is **under 30%**, the membrane cap and the electrolyte must be replaced and the electrode tip must be cleaned; see chapter 7.1 "Cleaning the electrode finger tip/changing the electrolyte and the membrane cap", page 37.

Setting the slope manually

Refer to the operating manual for the transmitter/controller used.

8 Calibration

Zero point adjustment

A zero point adjustment is **not** required for the sensors described in this operating manual. If there is no analyte in the measurement medium, the value displayed will be a zero. The zero point is **not dependent** on changes in the flow, conductivity, temperature or the pH value.

9.1 General troubleshooting

Error/fault	Possible cause	Remedy	Preventative measures
Output signal of the sensor is too low or too high	Incorrect calibration	Repeat calibration according to the DPD method; refer to "Initial situation", page 41	Calibrate the sensor more frequently, if required
Output signal of the sensor is too low Sensor cannot be calibrated to the DPD value	Settling time too short	Wait for at least two hours	
	Deposit on the electrode finger tip (measuring electrode)	Clean the electrode finger tip	Shorten the maintenance intervals, if required
	Inflow to the measuring cell is too low	Increase the inflow	Monitor the minimum inflow
Output signal of the sensor is too low Sensor cannot be calibrated to the DPD value Output signal of the sensor decreases or stays the same when the DPD value is increased Fluctuating signal	Membrane destroyed: electrolyte leaking out - measurement medium leaking in	Replace the membrane cap	Avoid damaging the membrane. Do not push the sensor open when the membrane cap is screwed on. Prevent coarse particles or fragments of glass from flowing in
	Deposits on the membrane cap	Replace the membrane cap	
	Gas bubbles on the outside of the membrane	Briefly increase the flow	Check the installation and change if necessary
	No electrolyte in the membrane cap	Fill the membrane cap with electrolyte; refer to chapter 6.2 "Filling up the reference electrolyte", page 32	
Output signal of the sensor is too high. Sensor cannot be calibrated to the DPD value	Besides the analytes, the measurement medium also contains other oxidants, such as ClO_2 O_3	Avoid adding these substances. Change the water	Ensure cleaning agents and disinfectants are removed fully after being used
DPD and sensor values correspond to each other, the redox measurement trend is correct, but the setpoint value is not reached	Incorrect control parameters	Optimize the control parameters	
	The amount of disinfectant dosed per unit of time is too high. The concentration is exceeded before the measurement medium reaches the sensor	Reduce the amount added per unit of time. Reduce the concentration of disinfectant in the solution added	
	Flow through the system is too low	Improve through-mixing	Implement structural measures for better through-mixing
Sensor and DPD values do not correspond to each other, the sensor values fluctuate: too high/too low	Incorrect controller parameters	Optimize the control parameters	
	Flow through the system is too low	Improve through-mixing	Implement structural measures for better through-mixing

9 Overcoming errors and malfunctions

Error/fault	Possible cause	Remedy	Preventative measures
Sensor displays unusual sluggish response behavior	The membrane is partially blocked by pollutants such as calcium or oil. Disinfectant is prevented from reaching the sensor	Replace the membrane cap	Take measures to improve the quality of the water
Only for types 202630/40 and 202630/43 (output signal of 4 to 20 mA):			
Output signal of the sensor is "0"	The sensor has been connected to the transmitter/controller with reverse polarity	Connect the sensor correctly; refer to chapter 5 "Electrical connection", page 27	
	The measuring cable is broken	Replace the measuring cable	
	The sensor is faulty	Send the sensor to the manufacturer for inspection/reconditioning	
	The transmitter/controller is faulty	Send the transmitter/controller to the manufacturer for inspection/overhauling	
Only for types 202630/50 and 202630/53 (digital interface output signal)			
Green LED			
Lights flickering or not lighting up	The voltage is too low, therefore preventing the processor from working correctly	Set up the voltage supply in accordance with the specifications in the section "Technical Data"	
	The sensor is faulty	Send the sensor to the manufacturer for inspection/reconditioning	
Orange LED			
Continuously lit	The sensor signal has a negative analyte value	Carry out maintenance on the sensor; refer to chapter 7 "Maintenance", page 37, or send the sensor to the manufacturer for inspection/reconditioning	
Regular flashing	The electrochemical cell is overloaded ***The concentration of chlorine is too high***	Check the system and rectify the errors. If necessary, calibrate the sensor or carry out maintenance	

9.2 Specific troubleshooting on the sensor

If the electrode finger has a bright silvery or white appearance, the sensor must be reconditioned by the manufacturer. Brown-gray colors are normal.

9.2.1 Testing the leak-tightness of the membrane cap

Types 202630/40 and 202630/50

1. Carefully dry the outside of the membrane cap to be checked.
2. Prepare the membrane cap for mounting in accordance with chapter 6.2.1 "Notes for types 202630/40 and 202630/50", page 32 and fill it with electrolyte or clean water.
3. If necessary, dry the outside of the membrane cap again.
4. Slowly and carefully screw the membrane cap onto the sensor shaft in accordance with chapter 6.2.1 "Notes for types 202630/40 and 202630/50", page 32.
5. When screwing the membrane cap on, check if any liquid leaks through the membrane.

NOTE!

You must check carefully to determine that liquid does not leak through the membrane but that it escapes at the outlets designed for this purpose; repeat the leakage test if necessary.

– If liquid leaks through the membrane, the membrane is faulty and you must use a new membrane cap.
– If the membrane cap is not leak-proof, you must check if the reference electrode has been damaged by replacing the measuring water and electrolyte. If the electrode finger has a bright silvery or white appearance, the measuring cell must be sent to the manufacturer for inspection.

Types 202630/43 and 202630/53

1. Carefully dry the outside of the membrane cap to be checked.
2. Prepare the membrane cap for mounting in accordance with chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34 and fill it with electrolyte.
3. If necessary, dry the outside of the membrane cap again.
4. Slowly and carefully screw the membrane cap onto the sensor shaft in accordance with chapter 6.2.2 "Notes for types 202630/43 and 202630/53 (reduced pH-dependence)", page 34.
5. When screwing the membrane cap on, check if the gel leaks through the membrane.

NOTE!

You must check carefully to determine that liquid does not leak through the membrane but that it escapes at the outlets designed for this purpose; repeat the leakage test if necessary.

– If droplets form on the membrane, the membrane is faulty and you must use a new membrane cap. The formation of a small meniscus is acceptable as the membrane has hydrophilic properties.
– If the membrane cap is not leak-proof, you must check if the reference electrode was damaged when the measuring water and electrolyte were replaced. If the electrode finger has a bright silvery or white appearance, the measuring cell must be sent to the manufacturer for inspection.

9.2.2 Electronics test

Types 202630/40 and 202630/43

1. Unscrew the membrane cap; refer to chapter 6 "Startup", page 31.
2. Carefully rinse the electrode finger and dry it carefully with a clean cloth.

3. Connect the sensor to the indicator/controller and wait for approx. 5 minutes.
4. Read the original signal from the measuring cells on the measuring device/controller or measure it with a digital multimeter.

   The measured value should be approx. 4 mA.

– If the sensor signal corresponds to roughly this value, the electronics are likely to be working correctly.
– If the measured value is significantly different from the value stated above, the sensor must be sent to the manufacturer for inspection.

9.2.3 Testing the zero point

NOTE!

The zero point should be tested after the electronics have been tested.

1. Prepare the sensor for startup; refer to chapter 6 "Startup", page 31.
2. Connect the sensor to the indicator/controller.
3. Carefully place the sensor in a beaker with clean tap water (free of disinfectant).
4. Move the sensor around in the beaker for approx. 30 s (without creating air bubbles).
5. Leave the sensor in the beaker for >1 h and wait for the settling time to elapse.
6. Read the original signal on the measuring device/controller or measure it with a digital multimeter.
7. The sensor signal should be around the zero point.

– If the sensor signal tends towards zero, the zero point is very likely to be okay.
– If the measured value deviates significantly from zero, maintenance must be carried out on the sensor (refer to chapter 7 "Maintenance", page 37) and the "zero point test" must be repeated. Note that a recently cleaned cathode has a relatively high zero point. In this case, the sensor will take a few days to reach its lowest zero point.
– If the measured value does not tend towards zero, even after maintenance has been carried out, the sensor must be sent to the manufacturer for inspection.

NOTE!

In general, the zero points of sensors with an extremely small measuring range, or which are more sensitive, are slightly higher than for measuring cells with large measuring ranges or which are less sensitive.

9.2.4 Measurement signal test

NOTE!

The signal should be tested after the zero point has been tested.

1. Add a little disinfectant to the water in the beaker (which was used in the section "Testing the zero point"; refer to chapter 9.2.3 "Testing the zero point", page 46).
2. With the sensor connected to the measuring device, move it around as evenly as possible in the beaker for at least five minutes.
3. Check to see if the measuring signal increases in this time.

– If the sensor signal increases, the sensor is likely to be working correctly. If the sensor does not react to the disinfectant, carry out maintenance on the sensor (refer to chapter 7 "Maintenance", page 37) before repeating the "signal test".
– If the sensor still does not react to the disinfectant after these steps have been carried out, it must be sent to the manufacturer for inspection.

9.2.5 Testing the environment

If the cause of the error cannot be clearly identified after carrying out the tests mentioned above, the following points in the area around the measuring chain must be tested:

- Flow
- Indicating device / controller
- Dosing device
- Correct calibration
- Pressure in the flow fitting
- Concentration of the disinfectant in the measured water (analysis)
- Measuring cable
- pH value of the measured water
- Temperature of the measured water
- Analysis
- Suitability of the sensor for measuring the dosed disinfectant
- Concentration of the disinfectant in the dosing tank

9 Overcoming errors and malfunctions

10.1 Sensors for free chlorine

Sensor type	202630/40	202630/50
Measurand	**Free chlorine**	
Area of application	Swimming pool water, drinking water, service water and process water	
Suitable chlorination agents	Inorganic chlorine compounds: NaOCl (sodium hypochlorite), $Ca(OCl)_2$, chlorine gas, chlorine produced by membrane electrolysis (not suitable: chlorine electrolysis without a membrane)	
Measuring principle	Membrane-covered, amperometric, two-electrode system with integrated electronics	
Membrane type	Hydrophobic PTFE membrane	
Measuring cable connection	2-pin terminal connection (2 × 1 mm^2)	5-pin flange connector, M12
Voltage supply	U_B DC 12 to 30 V (galvanic isolation required)	U_B DC 22.5 to 26 V (galvanically isolated from the sensor)
Electromagnetic compatibility[a]	Interference emission: class B[b] Interference immunity: to industrial requirements	
Output signal	4 to 20 mA	Modbus RTU
Load/current consumption	≤ (U_B - 7.5 V) ÷ 0.02 A	approx. 20 mA
Settling time	1 h	
Inflow speed	Approx. 15 cm/s (corresponds to a flow of approx. 30 l/h when installed in the JUMO flow fitting (part no.: 00392611))	
Measuring ranges[c]	0.05 to 0.5 mg/l (ppm) 0.05 to 2 mg/l (ppm) 0.05 to 5 mg/l (ppm) 0.05 to 10 mg/l (ppm) 0.05 to 100 mg/l (ppm) 0.05 to 200 mg/l (ppm)	0.05 to 2 mg/l (ppm) 0.05 to 20 mg/l (ppm)
Resolution	0.01 mg/l with measuring range 0.5/2/5/10 mg/l 0.1 mg/l with measuring range 100/200 mg/l	0.001 mg/l with measuring range 2 mg/l 0.01 mg/l with measuring range 20 mg/l
Slope drift[d]	Approx. < -1 % per month	
Response time $_{t90}$	approx. 30 s	
Operating temperature		
Sample water temperature	0 to 45 °C[e]	
Ambient temperature	0 to 55 °C	
Temperature compensation	Automatic, using integrated temperature probe	
Zero point adjustment	Not required	
Slope adjustment	On evaluation unit/controller using analytical chlorine determination (DPD-1-method)	
pH value operating range	pH 6 to pH 8 Note the effect of the pH value on the disinfecting properties, corrosion and the dissociation curve.	
pH dependence (loss of slope)	with pH 8, approx. 65% with pH 9, approx. 95% (starting at pH 7)	
Disturbances	ClO_2: recorded with a concentration factor of 9 O_3: recorded Chlorine electrolysis without a membrane can cause disturbances	

10 Technical data

Sensor type	202630/40	202630/50
Pressure resistance[f]	P_{abs} max. 2 bar P_{rel} max. 1 bar	
Materials	Semi-permeable membrane, PVC-U	
Dimensions	Dia. 25 mm, length 220 mm (housing with membrane cap)	Dia. 25 mm, length 205 mm (housing with membrane cap)
Weight	Approx. 125 g	

[a] EN 61326-1, EN 61326-2-3.

[b] The product is suitable for industrial use as well as for households and small businesses.

[c] Other measuring ranges upon request.

[d] Under replicable conditions (25 °C, pH 7.2 in drinking water).

[e] Prerequisite: no ice crystals in the measurement medium.

[f] Pressure fluctuations are not admissible. Pressure-free operation (atmospheric pressure) recommended.

10.1.1 Maintenance and storage

Maintenance	
Inspection of the measuring signal	Regularly, at least once a week
Replacing the membrane cap	Once a year (depending on the quality of the water)
Replacing the electrolyte	Every 3 to 6 months
Storage	
Sensor	Can be stored indefinitely in a frost-free and dry place, without electrolyte and between +5 and 40 °C
Membrane cap	Used membrane caps cannot be stored.
Electrolyte	In original bottle, away from sunlight, and at a temperature between +5 and 35 °C

10.2 Sensors for free chlorine (reduced pH dependence)

Sensor type	202630/43	202630/53
Measurand	**Free chlorine (reduced pH dependence)**	
Area of application	Swimming pool water, drinking water and seawater	
Suitable chlorination agents	Inorganic chlorine compounds: NaOCl (sodium hypochlorite), $Ca(OCl)_2$, chlorine gas, chlorine produced by electrolysis	
Measuring principle	Membrane-covered, amperometric, potentiostatic three-electrode system with integrated electronics	
Membrane type	Hydrophilic membrane	
Measuring cable connection	2-pin terminal connection (2 × 1 mm^2)	5-pin flange connector, M12
Voltage supply	U_B DC 12 to 30 V (galvanic isolation required)	U_B DC 22.5 to 26 V (galvanically isolated from the sensor)
Electromagnetic compatibility[a]	Interference emission: class B[b] Interference immunity: to industrial requirements	
Output signal	4 to 20 mA	Modbus RTU
Load/current consumption	≤ (U_B - 7.5 V) ÷ 0.02 A	approx. 20 mA
Settling time	2 h	
Inflow speed	Approx. 15 cm/s (corresponds to a flow of approx. 30 l/h when installed in the JUMO flow fitting (part no.: 00392611))	
Measuring ranges[c]	0.05 to 2 mg/l (ppm) 0.05 to 5 mg/l (ppm) 0.05 to 10 mg/l (ppm) 0.05 to 200 mg/l (ppm)	0.05 to 2 mg/l (ppm) 0.05 to 20 mg/l (ppm) 0.05 to 200 mg/l (ppm)
Resolution	0.01 mg/l with measuring range 2/5/10 mg/l 0.1 mg/l with measuring range 200 mg/l	0.001 mg/l with measuring range 2 mg/l 0.01 mg/l with measuring range 20 mg/l 0.1 mg/l with measuring range 200 mg/l
Accuracy[d]		
Measuring range 2 mg/l	< 1 % with 0.4 mg/l < 1 % with 1.6 mg/l	
Measuring range 20 mg/l	< 1 % with 4 mg/l < 3 % with 16 mg/l	
Slope drift[e]	Approx. < -1 % per month	
Response time $_{t90}$	Approx. 2 min	
Operating temperature		
Sample water temperature	0 to 45 °C[f]	
Ambient temperature	0 to 55 °C	
Temperature compensation	Automatic, using integrated temperature probe	
Zero point adjustment	Not required	
Slope adjustment	On evaluation unit/controller using analytical chlorine determination (DPD-1-method)	
pH value operating range	pH 4 to pH 9	
pH dependence (loss of slope)	Between pH 5 and 7: no loss of slope with pH 8, approx. 10% with pH 9, approx. 30% (starting at pH 7)	
Conductivity of the measurement medium	10 µS/cm to 50 mS/cm (seawater)	

10 Technical data

Sensor type	202630/43	202630/53
Disturbances	ClO_2: recorded with a concentration factor of 0.75 O_3: recorded with a concentration factor of 0.8 Combined chlorine may increase the measured value	
Pressure resistance[g]	P_{abs} max. 4 bar P_{rel} max. 3 bar	
Materials	Microporous, hydrophilic membrane, PVC-U, stainless steel 1.4571	
Dimensions	Dia. 25 mm, length 220 mm (housing with membrane cap)	Dia. 25 mm, length 205 mm (housing with membrane cap)
Weight	Approx. 125 g	

[a] EN 61326-1, EN 61326-2-3.

[b] The product is suitable for industrial use as well as for households and small businesses.

[c] Other measuring ranges upon request.

[d] After calibration under replicable conditions (25 °C, pH 7.2 in drinking water) from the measuring range end value.

[e] Under replicable conditions (25 °C, pH 7.2 in drinking water).

[f] Prerequisite: no ice crystals in the measurement medium.

[g] Pressure fluctuations are not admissible. Pressure-free operation (atmospheric pressure) recommended.

10.2.1 Maintenance and storage

Maintenance	
Inspection of the measuring signal	Regularly, at least once a week
Replacing the membrane cap	Once a year (depending on the quality of the water)
Replacing the electrolyte	Every 3 to 6 months
Storage	
Sensor	Can be stored indefinitely in a frost-free and dry place, without electrolyte and between +5 and 40 °C
Membrane cap	Used membrane caps cannot be stored.
Electrolyte	In original bottle, away from sunlight, and at a temperature between +5 and 35 °C

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