JUMO tecLine CR-4P

Conductive 4-electrode conductivity sensor
Type 202930

Operating Instructions

20293000T90Z001K000

V1.00/EN/00502496

WARNING:

Incorrect measurement values or failure of the instrument or a transmitter connected to it, could potentially cause dangerous, imprecise dosing or a system malfunction!
Suitable preventive measures to stop this happening must be in place.

Note:

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

If any difficulties should arise during startup, please do not tamper with the instrument in any way. By doing so, you could endanger your rights under the instrument warranty! Please contact your supplier.

Contents

1.1 Warning signs

Danger

This symbol is used when there may be **danger to personnel** if the instructions are ignored or not followed correctly!

Caution

This symbol is used when there may be **damage to equipment or data** if the instructions are ignored or not followed correctly!

1.2 Reference signs

Note

This symbol is used to draw your **special attention** to a remark.

abc[1]

Footnote

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

A marker in the text and the footnote text.

The markers in the text are arranged as consecutive superscript numbers.

✱

Action instruction

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

The individual steps are marked by this asterisk.

Example:

✱ Connect the cable.

2 Description

General

Conductive conductivity sensors are used in conjunction with suitable transmitters in industrial analysis measurement technology to determine the electrolytic conductivity of liquids.

The JUMO tecLine CR-4P fills the gap between conductive conductivity measurement with two-electrode measuring sensors, and inductive conductivity measurement.

Four-pin technology makes it possible to cover a very wide measuring range from about 1 µS/cm to 600 mS/cm, with just one measuring sensor.

The hygienic design of both, the sensor and the system for process connection (JUMO PEKA), mean that it can be used in pharmaceutical and food technology without difficulty. JUMO PEKA is an adapter system that combines the measuring sensor with the process connection. All the materials are physiologically safe, and meet FDA standards.

Stainless steel electrodes are inserted into a circular, plastic body. The process seal provided as standard is an EPDM O-ring. A fast-response temperature probe delivers information about the process temperature to the measurement amplifier. Electrical connection is made via an M12 connector.

The measuring sensor is available in three fitting lengths, for optimum installation in different pipe diameters. The measuring sensor can also be installed in container walls. No incident flow is required to make it work, but is recommended for fast, stable measurement values and to prevent the accumulation of deposits.

A certificate of quality is included among the items supplied (exact cell constant, FDA approval for the material, typical surface roughness, etc.).

Operative range

Their vast measuring range of 1 µS/cm to 600 mS/cm, allows the sensors to be used in washing processes in food and drink applications, pharmaceuticals and biotechnology, where the different conductivities have to be safely recorded by a measuring system (e.g. CIP/SIP applications, reverse processes in ion exchangers, phase separation, bottle cleaning plants, process water).

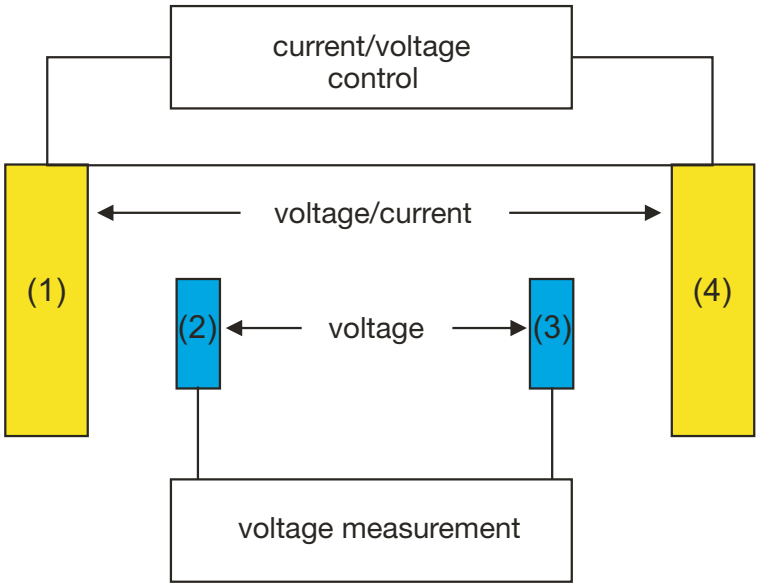
Note

Used in combination with the JUMO AQUIS 500 CR transmitter/controller, as per data sheet 202565 and JUMO PEKA process connection adapters as per data sheet 409711.

Key features

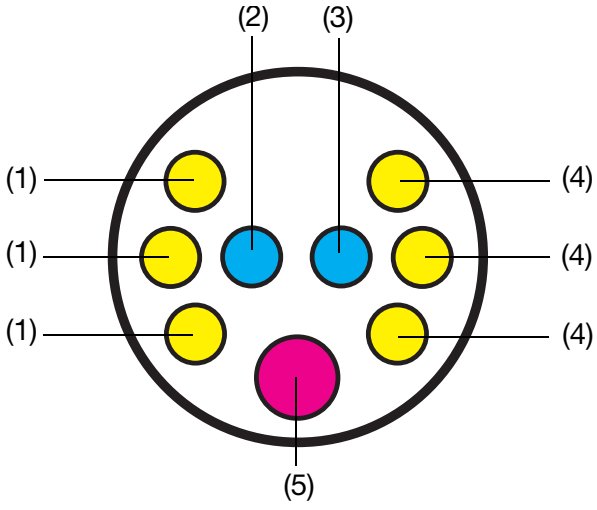
- Vast measuring range
- Hygienic process connections (clamp, Varivent®, aseptic NKS)
- CIP/SIP capability
- Design complies with EHEDG and FDA standards
- Certificate of quality included

Function



The measuring sensors have two pairs of electrodes. The transmitter applies alternating current at the outer pair of electrodes. A voltage is released at the inner electrodes - subject to the conductivity of the measuring material. The transmitter acquires the voltage and uses it to calculate the electrolytic conductivity value. Functionally, excitation and measurement are kept separate. This has some advantages compared to 2-electrode measuring sensors, as the effects of polarization recede into the background. To a large extent, incoming resistances are automatically compensated. Measurement errors as a result of contamination or deposits, are reduced.

Measuring sensors

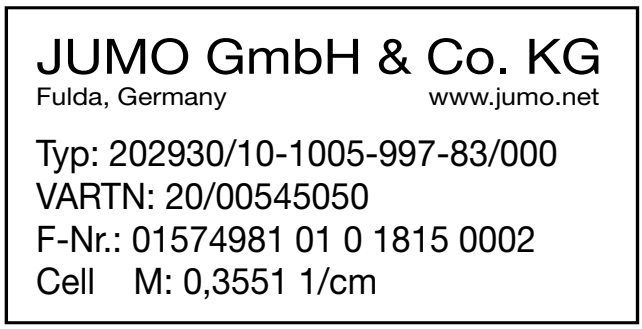


	Description	M12 connector pin
(1)	Current supply, outer electrode 1	6
(2)	Voltage tap, inner electrode 1	7
(3)	Voltage tap, inner electrode 2	3
(4)	Current supply, outer electrode 2	4
(5)	Pt1000 temperature probe	1, 2 and 5

3 Identifying the device version

3.1 Nameplate

On the sensor



The date of manufacture is encoded in "F-Nr." (serial number):
1815 means year of manufacture 2018/calendar week 15.

3.2 Order details

	(1)	**Basic type**
202930		JUMO tecLine CR-4P Conductive 4-electrode conductivity sensor
	(2)	**Basic type extension**
10		Short design
20		Medium design
30		Long design
	(3)	**Temperature compensation**
1005		Pt1000
	(4)	**Electrode material**
31		Stainless steel 1.4435 (316L)
	(5)	**Process connection**[a]
997		JUMO PEKA
	(6)	**Electrical connection**[b]
83		M12 connector
	(7)	**Extra codes**
000		none

[a] Process connection adadpters (see "Accessories") must be ordered separately.

[b] The CR-4P cable is required for electrical connection (see "Accessories")!

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code		/		-		-		-		-		/	
Sample order	202930	/	10	-	1005	-	31	-	997	-	83	/	000

3.3 Accessories

Designation	Sales No.
CR-4P cable, 5 m, made up, with M12 connector	00528699
CR-4P cable, 10 m, made up, with M12 connector	00528700
CR-4P cable, 5 m, made up, with M12 connector, version for use with JUMO AQUIS touch (extended connection cables for Pt1000)	00502027
CR-4P cable, 10 m, made up, with M12 connector, version for use with JUMO AQUIS touch (extended connection cables for Pt1000)	00502029

JUMO PEKA process connection adapter for	Material	Sales No.
Varivent DN 40-125	Stainless steel 1.4435/316L	00445046
Varivent DN 40-125	Stainless steel 1.4435/316L; Ra < 0,8 µ with certificate EN 10204-3.1	00577961
Clamp DN 25/32/40	Stainless steel 1.4435/316L	00445047
Clamp DN25/32/40	Stainless steel 1.4435/316L; Ra < 0,8 µ with certificate EN 10204-3.1	00577998
Clamp DN 50	Stainless steel 1.4435/316L	00445037
Clamp DN 50	Stainless steel 1.4435/316L; Ra < 0,8 µ with certificate EN 10204-3.1	00577997
Aseptic DN 40	Stainless steel 1.4435/316L	00446458
Aseptic DN 40	Stainless steel 1.4435/316L; Ra < 0,8 µ with certificate EN 10204-3.1	00577995
Aseptic DN 50	Stainless steel 1.4435/316L	00445035
Aseptic DN 50	Stainless steel 1.4435/316L; Ra < 0,8 µ with certificate EN 10204-3.1	00577979
Aseptic NKS DN 40	Stainless steel 1.4435/316L	00447555
Aseptic NKS DN 40	Stainless steel 1.4435/316L; Ra < 0,8 µ with certificate EN 10204-3.1	00577999

4 Mounting

4.1 General

Mounting location

Find a location that ensures easy accessibility for the later calibration.

The fastening must be secure and must ensure low vibration for the instrument.

The operating conditions (temperature, pressure, chemical composition of the measuring material, etc.,) must not be allowed to damage the sensor.

The sensor must not be modified mechanically (e.g. shortened, drilled, ground).

Do not touch (contaminate) the electrodes!

A **minimum distance** (MD) of 18 mm between the electrodes and the container wall must be maintained!

A **minimum distance** of at least two meters must be maintained when installing several type 202930 conductivity sensors.

Installation position

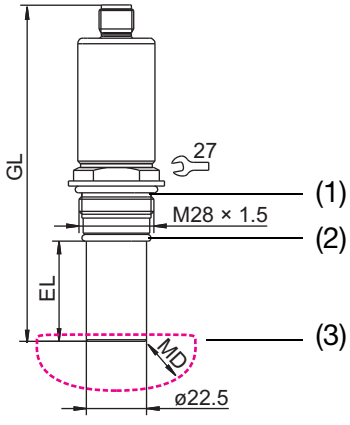
The conductivity sensor can be mounted in any position. But it is essential to make sure that the sensor electrodes are fully immersed in the measuring material.

Incident flow

No incident flow is required to make the conductivity sensor work, but is recommended for fast, stable measurement values and to prevent the accumulation of deposits. Structural measures must be taken to prevent flow separation or gas bubbles in the measuring material.

Immersion length

The immersion length (EL) of the conductivity sensor must be in keeping with the installation situation.



(1) JUMO PEKA process connection
A suitable process connection adapter is an essential requirement of installation, see below.

(2) 21 × 2.5 O-ring (EPDM)

(3) Minimum distance (MD) 18 mm to the container wall

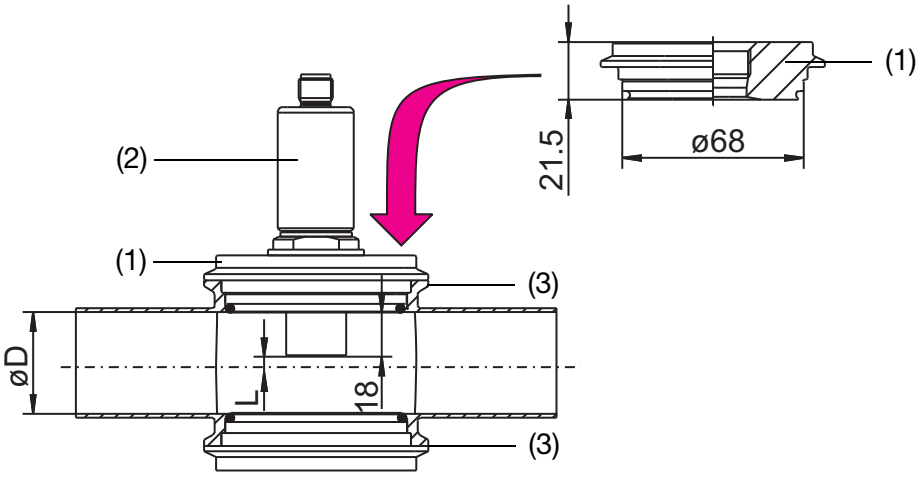
Immersion length EL	Total length GL	Type
18	126	202930/10
38	146	202930/20
48	156	202930/30

4.2 JUMO PEKA process connection adapter

The hygienic system for process connection – JUMO PEKA – allows it to be used in pharmaceutical and food technology without difficulty. JUMO PEKA is an adapter system that combines the sensor with the process connection. All the materials are physiologically safe, and meet FDA standards.

4.3 Mounting suggestions

Varivent®



(1) JUMO PEKA process connection adapter
Varivent® DN 40-125, sales no.: 00445046

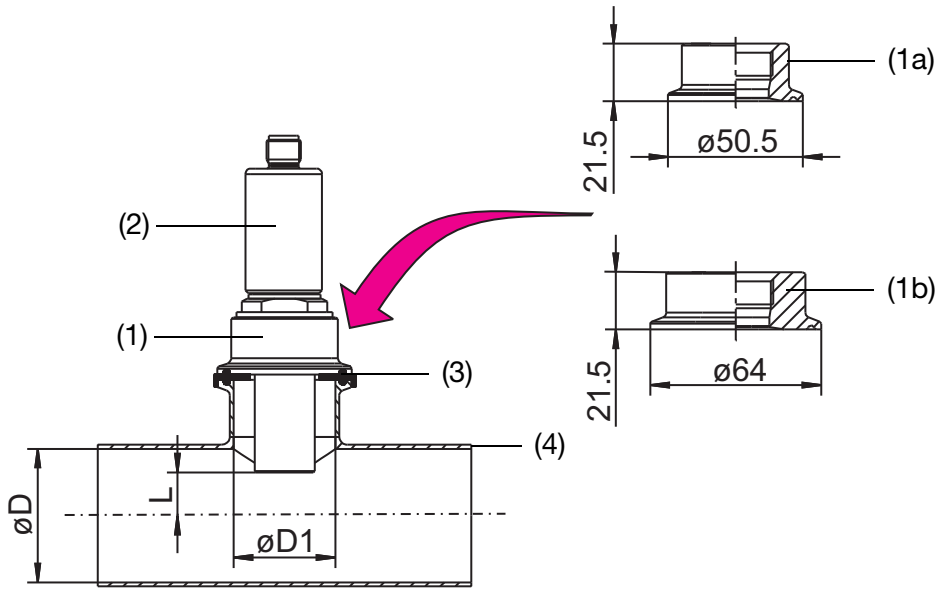
(2) JUMO tecLine CR-4P conductivity sensor.

(3) The Varivent® housing DN xx
is **not** supplied by JUMO and must be provided by the customer!

Varivent housing DN	Diameter D	L	**Type**
40	38	3	202930/10
50	50	9	
65	66	18	
80	81	24.5	
100	100	34	

4 Mounting

Clamp



(1) JUMO PEKA process connection adapter
(1a) Clamp DN 25/32/40, sales no.: 00445046
(1b) Clamp DN 50, sales no.: 00445037

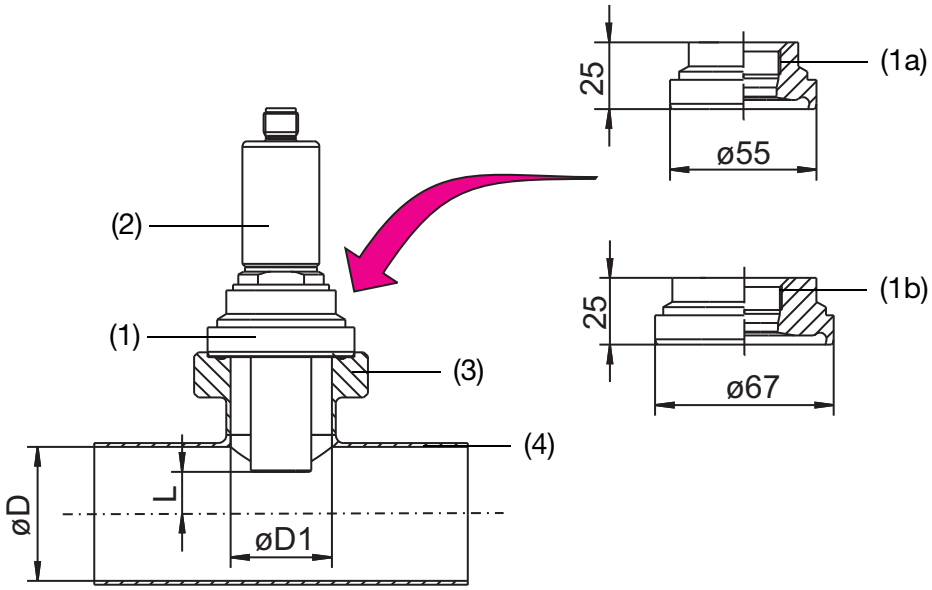
(2) JUMO tecLine CR-4P conductivity sensor.

(3) The DN xx clamp adapter, DIN 32676
is **not** supplied by JUMO and must be provided by the customer!

(4) The clamp DN xx T-piece, DIN short, similar to DIN 11852
is **not** supplied by JUMO and must be provided by the customer!

Clamp adapter DN	T-piece DN	Diamter D	Diamter D1	L	Type
25	32-25	32	26	5	202930/20
	40-25	38		0	202930/30
	50-25	50		7	
	65-25	66		15	
	80-25	81		20	
	100-25	100		30	
50	65-50	66	50	15	
	80-50	81		20	
	100-50	100		30	

Aseptic



(1) JUMO PEKA process connection adapter
(1a) Aseptic DN 40, sales no.: 00446458
(1b) Aseptic DN 50, sales no.: 00445035

(2) JUMO tecLine CR-4P conductivity sensor.

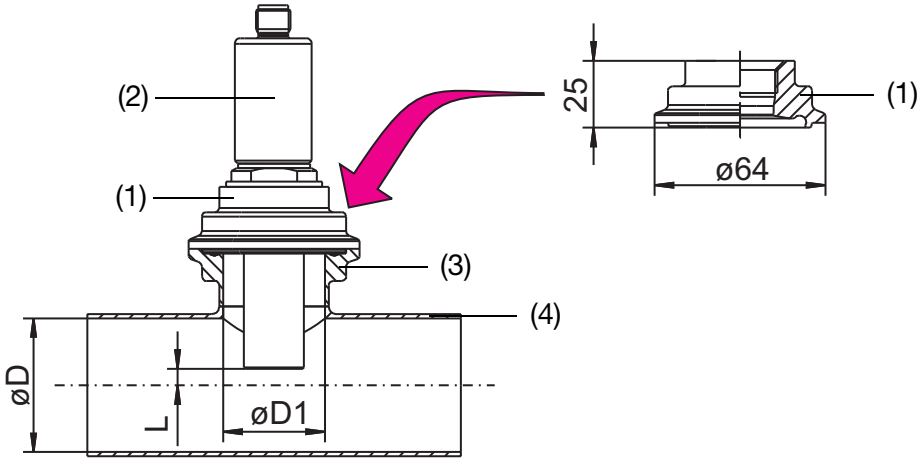
(3) The DN xx threaded adapter, DIN 11864
is **not** supplied by JUMO and must be provided by the customer!

(4) The DN xx T-piece
is **not** supplied by JUMO and must be provided by the customer!

Threaded adapter	T-piece DN	Diameter D	Diameter D1	L	Type
40	50-40	50	38	10	202930/30
	65-40	66		18	
	80-40	81		27	
	100-40	100		37	
50	65-50	66	50	18	
	80-50	81		27	
	100-50	100		37	

4 Mounting

Aseptic NKS



(1) JUMO PEKA process connection adapter
Aseptic NKS DN 40, sales no.: 00447555

(2) JUMO tecLine CR-4P conductivity sensor.

(3) Collar clamp adapter NKS DN 40, Form A, DIN 11864-3
is **not** supplied by JUMO and must be provided by the customer!

(4) The DN xx T-piece
is **not** supplied by JUMO and must be provided by the customer!

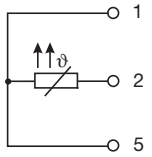
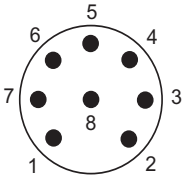
Collar clamp adapter	**T-piece DN**	**Diameter D**	**Diameter D1**	**L**	**Type**
NKS DN 40 Form A	50-40	50	38	10	202930/30
	65-40	66		18	
	80-40	81		27	
	100-40	100		37	

5.1 Electrical connection

- Lay the input, output, and supply lines so they are physically separated from each other and are not parallel
- If possible, use the CR-4P cable (see Accessories) to connect the conductivity sensor; do not lay the connecting cable close to components or lines through which current is flowing
- The cables must have an uninterrupted run (do not route them via terminal blocks or similar arrangements)
- No other consumers can be connected to the power terminals of the instrument
- The conductivity sensor is not suitable for installation in areas with an explosion hazard
- It is essential to comply with the electrical connection instructions in the operating manual of the transmitter that is being used
- Apart from faulty installation, incorrect settings on the transmitter may also affect the proper functioning of the subsequent process or lead to damage; you should therefore always provide safety equipment that is independent and it should only be possible for qualified personnel to make settings

5.2 Terminal assignment and wiring colors

Incorrect connection of the conductivity sensor will produce inaccurate measurement results!

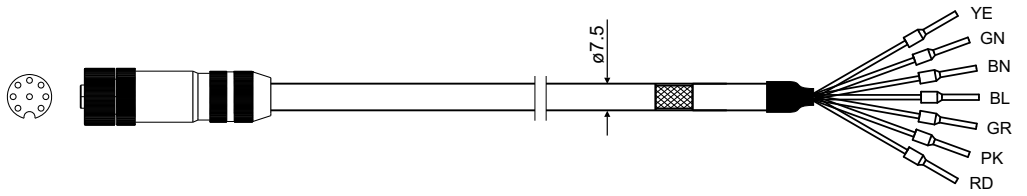
Connection for		M12 connector		CR-4P cable
		Pin	Assignment	Color
Pt1000 temperature probe for temperature compensation		1 2 5		GN YE BN
Voltage tap inner electrode 2		3		PK
Current entry outer electrode 2		4		BL
Current entry outer electrode 1		6		RD
Voltage tap inner electrode 1		7		GR
NC		8		
Warning: The shielding of the cable has to be connected to the transmitter only – not to the sensor!				

5 Installation

5.3 Connecting cable for CR-4P

Only use the following cables to connect the conductivity sensor:

- CR-4P cable, 5 m, made up, with M12 connector, part no.: 00528699
- CR-4P cable, 10 m, made up, with M12 connector, part no.: 00528700
- CR-4P cable, 5 m, made up, with M12 connector, version for use with JUMO AQUIS touch (extended connection cables for Pt1000), part no.: 00502027
- CR-4P cable, 10 m, made up, with M12 connector, version for use with JUMO AQUIS touch (extended connection cables for Pt1000), part no.: 00502029



M12 cable socket:	metal, 8-pin
Cable diameter:	7.5 mm
Cable material:	PUR, blue
Ambient temperature:	-30 to +80 °C
Cable length:	5 m or 10 m

For metrological reasons, the maximum cable length is limited to 10 m!

5.4 Connection to transmitters/controllers

The sensor can be connected to the following transmitters/controllers:

- JUMO AQUIS 500 CR
- JUMO dTRANS CR 02
- JUMO AQUIS touch S/P

You will find the necessary information for connecting the sensor to the above-mentioned transmitters/controllers in the corresponding operating manuals of the devices!

6.1 Notes

Ageing and contamination (deposits) can cause the cell constant of the conductivity sensor to change.

The transmitter should therefore be calibrated to the connected conductivity sensor at regular intervals (subject to the measuring material and the operating conditions)!

6.2 General

JUMO tecLine CR-4P conductivity sensors are exactly gaged at the factory. The cell constant of every measuring sensor is documented both on the cell stem and on the calibration certificate that is also supplied.

This cell constant should be entered directly into the connected transmitter (e. g. JUMO AQUIS 500 CR).

In combination with the JUMO AQUIS 500 CR, measuring accuracy in the 20 µS/cm to 600 mS/cm range is better than 5 %. To achieve far greater measuring accuracy, calibrate the transmitter close to its later working point.

To monitor and increase the quality of measurement, the conductivity measurement chain (conductivity sensor + connecting cable + transmitter) should be regularly calibrated.

Reference solutions

It is advisable to use one of the following reference solutions for calibration:

- ASTM D 1125, reference solution B: 0.1 N KCl with 12856 µS/cm
- DIN 38404, Part 8, Section 8.3: 0.1 mol/l KCl with 12.95×10^3 µS/cm

However, any calibration solution in the medium conductivity range can also be used.

6.3 Settings on the transmitter/controller

The operating instructions of the transmitter/controller used (e.g. JUMO AQUIS 500 CR, JUMO dTRANS CR 02 or JUMO AQUIS touch S/P) must be strictly observed!

The following settings are the minimum that have to be made:

- Cell type (type of connection): 4-electrode or 4-wire
- Nominal cell constant 1.0 1/cm
- Relative cell constant as % (see sensor nameplate or certificate)

7 Maintenance/troubleshooting

7.1 Cleaning the conductivity sensor

Conductive conductivity sensors are not authorized for use in highly adherent, oily or glutinous media - we recommend using our inductive conductivity measuring instruments here!

After cleaning the conductivity sensor, always rinse it with water!

The conductive conductivity sensor electrodes are in direct contact with the measurement medium. **Regular cleaning must therefore be performed, relative to the contamination susceptibility of the measuring material!**

Abrasive cleaners have limited suitability! The measurement electrodes must not be damaged!

- Light contamination can be wiped off with a soft, cleansing tissue, or similar
- Wash off sticky contamination or greasy and oily contamination with a hot rinsing agent solution and a soft cloth or soft brush; Ethanol can also be used to clean the sensor, if necessary
- Diluted hydrochloric acid (3 % by weight) can also be used to dissolve the contamination in the event of calciferous coatings or precipitated metal hydroxides or metal oxides
- If none of the methods mentioned above remove the contamination, other solvents, acids or caustic solutions may be used, with the aid of ultrasonic baths where required;
  in this case, it is necessary to ensure that the conductivity sensor components are resistant to the cleaning agents being used, see section 8 "Technical data"

7.2 Troubleshooting

Troubleshooting must always consider all the components of the conductivity measurement chain! The transmitter and the connecting cable must also be tested, as well as the conductivity sensor.

Error	Possible cause	Remedy
Measurement value is too high or too low	Conductivity sensor is dirty	Clean the conductivity sensor
The transmitter does not display conductivity (e.g. display shows "0")	Broken lead or incorrect electrical connection	Check the electrical connection
	Measuring sensor exposed to air (not fully immersed)	Check the measuring sensor installation location. Is measuring material present?
Conductivity displayed by transmitter is too high or too low	The measuring sensor electrical connection is incorrect: poles are inverted or "right - left" assignment is incorrect	Check the electrical connection
The transmitter does not display temperature	Broken lead or incorrect electrical connection	Check the electrical connection
Display value unstable, fluctuating	Malfunction caused by incorrectly/insufficiently shielded connecting cable	Use CR-4P cables for connection
	Malfunction caused by gas bubbles	Check cable connection and cable routing Check installation location and position of the measuring sensor

The conductivity sensor can also be tested for short-circuits or internal contact problems, see section 2 "Description", part "Measuring sensors" and section 5.2 "Terminal assignment and wiring colors".
A continuity tester (such as the diode tester of a multimeter) is needed for this.

8 Technical data

Typical measuring range[1]	1 µS/cm to approx. 600 mS/cm
Cell constant[2]	typically, K = 0.3 - 0.4 cm^{-1}
Operating temperature	-10 to +120 °C, briefly +140 °C (sterilization)
Maximum pressure	16 bar at 25 °C 6 bar at -10 °C and +140 °C
Temperature measurement	With Pt1000, DIN EN 60751 Class A
Electrical connection[3]	M12 connector
Protection	IP65
Fitting length	18 mm 38 mm 48 mm (see Dimensions)
Materials in contact with the measuring medium	FDA compliant
• Cell housing	PEEK
• Electrodes	Stainless steel 1.4435 (316L)
• Probe pocket	Stainless steel 1.4435 (316L)
• Seal	EPDM (other material on request)
Process connection	JUMO PEKA[4] (hygienic process connection) Available process connection adapters: • Varivent DN 40-125, stainless steel 1.4435 (316L) • Clamp DN 25/32/40 and DN 50, stainless steel 1.4435 (316L) • Aseptic DN 40 and DN 50, stainless steel 1.4435 (316L) • Aseptic NKS DN 40, stainless steel 1.4435 (316L)
Measuring sensor installation	Only possible in conjunction with JUMO PEKA process connection adapters![c]
Surface quality (roughness)	Stainless steel components ≤ 0.6 µm Plastic components ≤ 0.8 µm

[1] Measuring ranges are also dependent on the transmitter being used.

[2] The measured cell constant is recorded on the stem of the conductivity sensor.
A cell constant deviation can be adjusted at the transmitter.

[3] The CR-4P cable is required for connection (see section 5.3 "Connecting cable for CR-4P")

[4] See 4.2 "JUMO PEKA process connection adapter" and data sheet 409711.

JUMO
More than sensors + automation

产品组别 Product group: 202930 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)	○	○	○	○	○	○
过程连接 Process connection (Prozessanschluss)	X	○	○	○	○	○
螺母 Nuts (Mutter)	○	○	○	○	○	○
螺栓 Screw (Schraube)	○	○	○	○	○	○

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.

9 China RoHS

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