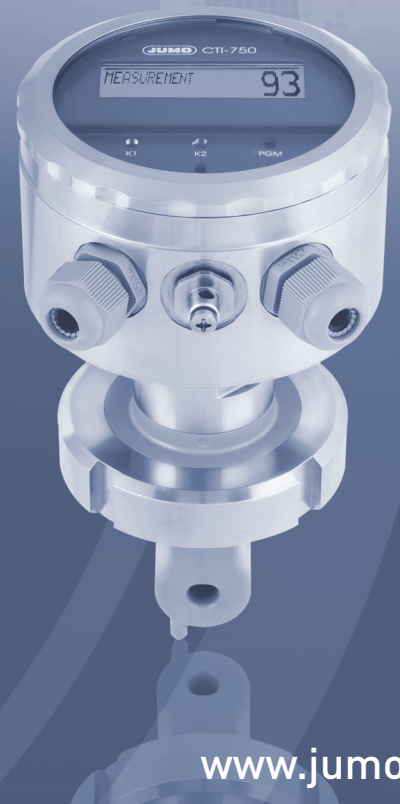




More than **sensors + automation**



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# Products

Liquid analysis



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## Liquid analysis

### Electrochemical Sensors

	<b>No.</b>
pH combination electrode JUMO ecoLine/JUMO BlackLine	201005
Redox combination electrode JUMO ecoLine/JUMO BlackLine (see data sheet 201005)	201010
pH combination electrode JUMO tecLine pH	201020
Redox combination electrode JUMO tecLine Rd (see data sheet 201020)	201025
pH combination electrode for laboratory measurements	201030
Redox combination electrode for laboratory measurements (see data sheet 201030)	201035
Ammonia-sensitive sensor for measuring ammonia in aqueous solutions	201040
ISFET pH combination electrode	201050
JUMO glass pH electrodes	201081
JUMO single/twin redox electrodes	201082
JUMO reference electrodes	201083
JUMO compensation thermometers	201085

### Conductivity Cells

	<b>No.</b>
Electrolytic 2-electrode conductivity cells JUMO BlackLine Lf-GT/-EC/-GS	202922
Electrolytic 2-electrode conductivity cells JUMO ecoLine Lf-PVC	202923
Electrolytic 2-electrode conductivity cells JUMO tecLine CR	202924
Electrolytic 2-electrode conductivity cells JUMO tecLine Lf-GT	202925
Electrolytic 4-electrode conductivity cells JUMO tecLine Lf-4P	202930
Hygienic inductive conductivity and temperature sensor JUMO tecLine Ci	202941
Inductive conductivity and temperature sensor for general process engineering JUMO tecLine Ci-S	202942
Inductive conductivity and temperature sensor for general water engineering JUMO ecoLine Ci	202943

### Measuring and control devices for pH and redox

	<b>No.</b>
Transmitter/controller for pH, redox, ammonia, standard signals and temperature JUMO dTRANS pH 02	202551
Transmitter/controller for pH, ORP, NH <sub>3</sub> (ammonia) concentration and temperature JUMO AQUIS 500 pH	202560
Two-wire transmitter for pH and redox	202701
Hand-held Meters for analytical measurement variables	202710
Microprocessor transmitter/switching device for pH/redox voltage and temperature JUMO ecoTRANS pH 03	202723

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**Accessories**
**No.**

Simulators and Calibration Adapters for pH, Redox and Conductivity Measurement	202711
Technical buffer and cleaning solutions	202950
Lines, plugs and sockets for pH, redox, conductivity and temperature sensors	202990
Impedance converter	202995

---

**Measuring and control devices for conductivity and high-purity water**
**No.**

Transmitter/controller for conductivity, TDS, resistivity, standard signals and temperature JUMO dTRANS CR 02	202552
Transmitter/controller for conductivity, TDS, resistivity and temperature JUMO AQUIS 500 CR	202565
Transmitter/controller for inductive conductivity, concentration and temperature JUMO AQUIS 500 Ci	202566
Hand-held Meters for analytical measurement variables	202710
Transmitter/switching device for conductivity JUMO ecoTRANS Lf 01/02	202731
Transmitter/switching device for conductivity or resistivity and temperature JUMO ecoTRANS Lf 03	202732
Inductive Conductivity/Concentration and Temperature Transmitter JUMO CTI-500	202755
Inductive Conductivity/Concentration and Temperature Transmitter JUMO CTI-750	202756

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**Measuring and control devices for standard signals**
**No.**

Transmitter/controller for standard signals and temperature JUMO dTRANS AS 02	202553
Indicator/controller for standard signals JUMO AQUIS 500 AS	202568

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**Measuring and control devices for digital sensors with Modbus protocol**
**No.**

Indicator/controller for digital sensors with Modbus protocol JUMO AQUIS 500 RS (in preparation)	202569
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**Multi-parameter measuring, control and recording devices**

Modular multichannel measuring device for liquid analysis with integrated controller and paperless recorder JUMO AQUIS touch P	202580
Modular multichannel measuring device for liquid analysis with integrated controller and paperless recorder JUMO AQUIS touch S	202581

---

**Measuring and control devices for dissolved oxygen**
**No.**

Transmitter/controller for oxygen JUMO dTRANS O2 01	202610
Optical sensor with digital interface for dissolved oxygen JUMO ecoLine O-DO (in preparation)	202613

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**Sensors for water disinfection****No.**

Sensor for free chlorine JUMO tecLine Cl2	202630
Sensor for total chlorine JUMO tecLine TC	202631
Sensor for chlorine dioxide and ozone JUMO tecLine ClO2, JUMO tecLine O3	202634
Sensor for hydrogen peroxide and peracetic acid JUMO tecLine H2O2, JUMO tecLine PAA	202636

**Fittings for transducers (pH/redox)****No.**

Flow-through fittings	202810
Immersion fittings	202820
Process immersion fitting	202821
Manual quick-change fittings	202822
Pneumatic retractable assembly	202823
Process fittings	202825

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# JUMO ecoLine / JUMO BlackLine pH and redox combination electrodes

in glass or plastic shaft versions

**201005 series - pH electrodes**

**201010 series - redox electrodes**

## Brief description

The electrodes of the JUMO ecoLine and JUMO BlackLine series are high-quality measurement sensors with a good price/performance ratio.

**Active pH component:** The JUMO ecoLine and JUMO BlackLine electrodes are equipped with low-resistance JUMO UW glass. This guarantees fast and safe measurement results.

**Active redox component:** A sturdy platinum tip provides safe measurements and makes the sensor easy to clean.

**Reference system:** Acrylamide-free JUMO gel is used in the glass and PEI plastic shaft versions. This highly viscous KCl solution is ideal for measurement in general, aqueous media. The electrolyte can be equipped with an optional "salt reserve" to increase the service life when measurements take place in media with fewer ions or at high flow rates. A polymerized solid KCl electrolyte is used in the JUMO BlackLine version. The JUMO cartridge-style conduction system has proved its worth over the years and is the reference system used here. This keeps the electrolyte free of silver ions throughout the life of the sensor, making it less susceptible to electrode poisons.

In the "glass shaft" (1) version, JUMO ecoLine electrodes have a ceramic diaphragm. A glass fiber diaphragm is provided for the plastic shaft version made from transparent PEI (2). A push-on protection basket guards the sensor when it is used with hand-held meters. The JUMO BlackLine (3) has a high-quality ceramic diaphragm. The shaft is made from black PPO and has an integrated protection basket.

The option is available to have the electrodes delivered in a storage container (holder). This is recommended if sensors are only used sporadically, to refresh them after lengthy periods of intensive use, or if they are stored for extended periods of time.

OEM versions of all sensors can be supplied to order.

Special versions are available on request.

## Areas of application

- Drinking water monitoring and treatment
- Swimming pools
- Aquariums (also marine aquariums)
- Greenhouse systems
- Lightly polluted service water, process water and wastewater
- Rainwater, pond water and surface water
- Hand-held meters

### Not recommended for:

- Electroplating water treatment
- Industrial process water and wastewater
- Ultra-pure water
- Therapy pools
- Biotechnology, sterilization processes

**For other applications, refer to the data sheets  
for JUMO tecLine or JUMO labLine pH and redox electrodes!**



- (1) Glass shaft version  
(2) Version with plastic shaft and push-on protection basket  
(3) JUMO BlackLine version with plastic shaft and fixed protection basket

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## Technical data



	Glass shaft version (Figure 1, page 1/8)	Version with plastic shaft and push-on protection basket (Figure 2, page 1/8)	JUMO BlackLine Version with plastic shaft and fixed protection basket (Figure 3, page 1/8)
Shaft material	glass	PEI <sup>a</sup>	PPO <sup>b</sup>
Diaphragm	ceramic	glass filament	ceramic
Conduction system	plastic cartridge		
Temperature range	0 to 60 °C		
Pressure range <sup>c</sup>	0 to 6 bar		
Fitting length	120 mm		
Electrode head	plug cap plug cap with fixed cable Pg13.5 screw cap Pg13.5 screw cap with fixed cable The connecting cable of versions with a fixed cable has anti-kink protection. Versions with a fixed cable have IP68 enclosure protection		
Active pH component	UW glass (pH 0 to 12, briefly pH 14)		
Active redox component	platinum tip (±2000 mV)		
Electrolyte	gel (highly viscous KCl solution)		solid electrolyte
Recommended minimum conductivity of the medium	without salt reserve:100 µS/cm	without salt reserve:150 µS/cm	without salt reserve:100 µS/cm
	with salt reserve:50 µS/cm	with salt reserve:100 µS/cm	with salt reserve:50 µS/cm

<sup>a</sup> PEI = polyetherimide.

<sup>b</sup> PPO = polyphenylene ether.

<sup>c</sup> The pressure figures relate to stable conditions at the installation location: severe pressure surges and fluctuations should be avoided.

## Extra codes

KCl reservoir (holder), extra code 052	Salt reserve, extra code 837
 <p>The foot of the KCl reservoir can also be used as a mounting wrench for pH and redox electrodes with a Pg13.5 thread. The indentations in the (detachable) foot of the reservoir fit the hexagon flats of the electrode head. When storing the electrodes, the reservoir must be filled with KCl (<b>not with buffer solution or similar</b>).</p>	 <p>The option is available to equip the electrode with a salt reserve, in the form of four salt rings (see illustration). This is recommended when using the electrode in media with fewer ions or at high flow rates. The salt reserve helps to increase the service life of the electrode. The rings are not a manufacturing defect (crystallization).</p>

## Further pH and redox electrodes can be found in the following data sheets:

- Data sheet 201020 – JUMO tecLine pH/Rd combination electrodes
- Data sheet 201050 – JUMO ISFET pH combination electrode
- Data sheet 201082 – JUMO single/twin redox electrodes
- Data sheet 201085 – JUMO compensation thermometers
- Data sheet 201030 – JUMO laboratory pH combination electrodes
- Data sheet 201081 – JUMO glass pH electrodes
- Data sheet 201083 – JUMO reference electrode

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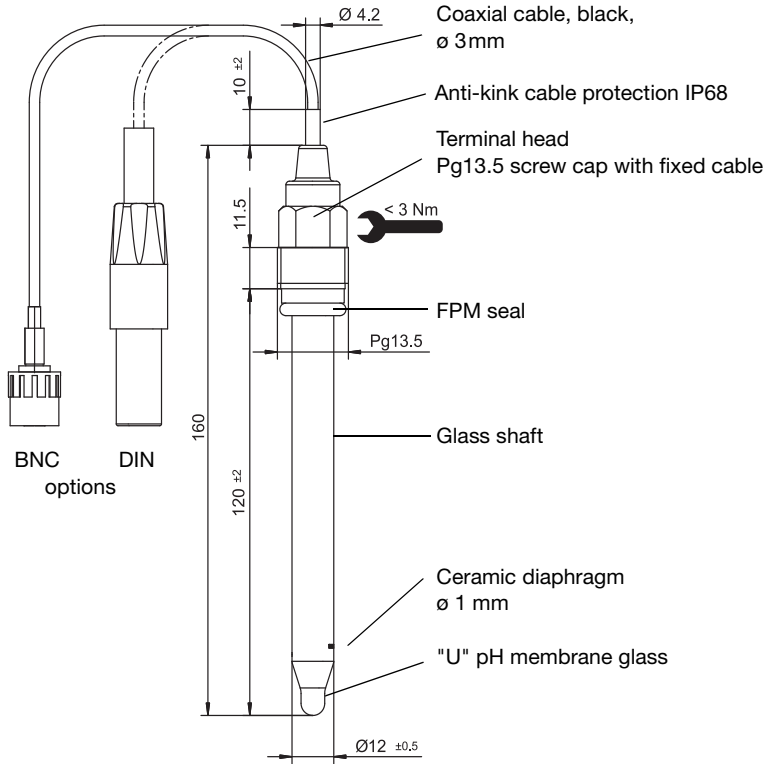
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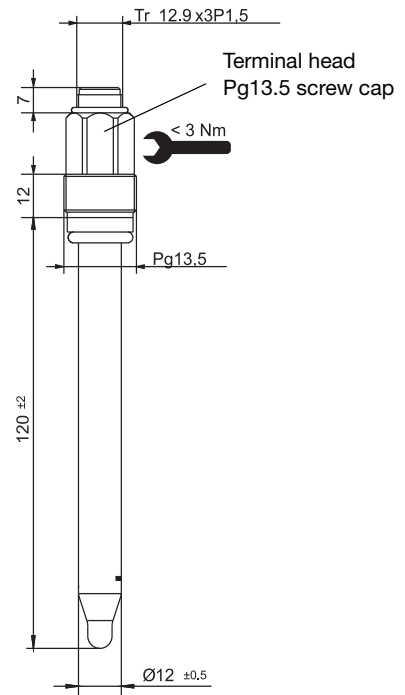


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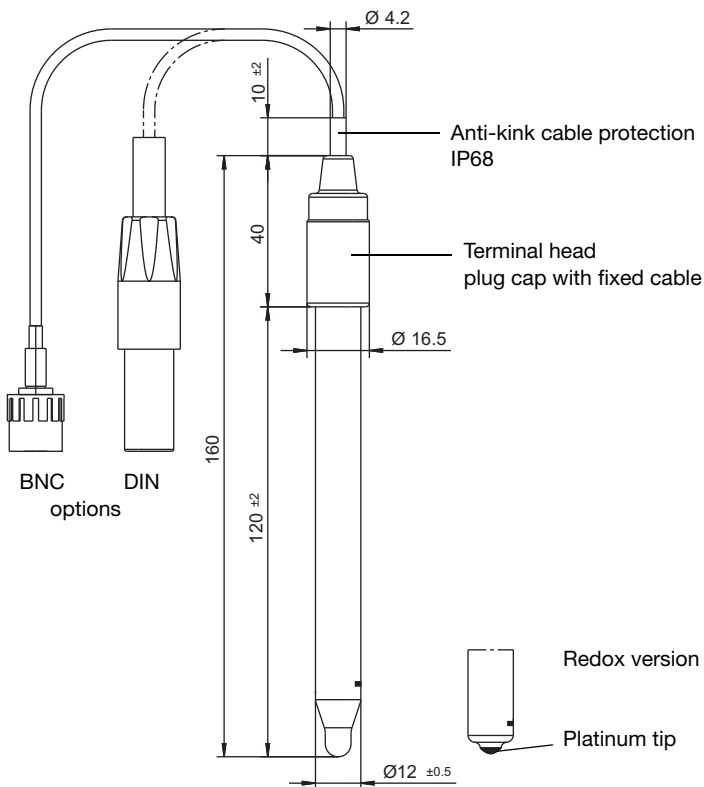
### Glass shaft version



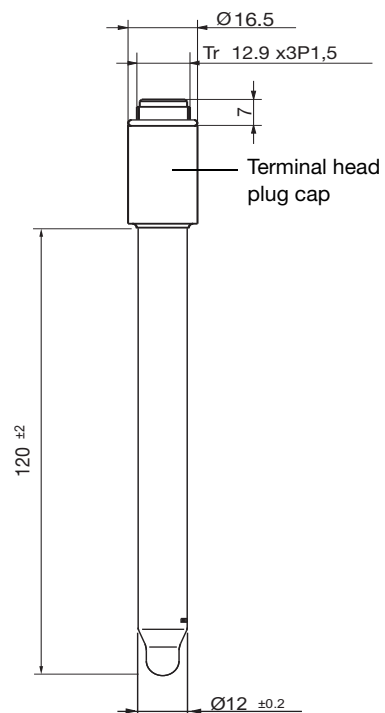
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Type 2010xx/51-18-22-0000-00-120/000



Type 2010xx/51-18-40-xxxx-xx-120/000



Type 2010xx/21-18-51-0000-00-120/000

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**Order details:**

**JUMO ecoLine / JUMO BlackLine - pH / redox combination electrodes with glass shaft**

		<b>(1) Basic type</b>
	201005	pH electrodes
	201010	redox electrodes
		<b>(2) Basic type extension</b>
x	x	51 Glass version, ceramic diaphragm, K cartridge
		<b>(3) Active component</b>
x		18 UW glass (for pH version)
	x	22 platinum tip (for redox version)
		<b>(4) Electrical connection</b>
	o	21 plug cap
x	x	22 Pg13.5 screw cap
	o	40 plug cap with fixed cable
	o	60 Pg13.5 screw cap with fixed cable
		<b>(5) Cable length<sup>a</sup></b>
x	x	0000 no cable
	o	xxxx length in mm (whole meters only, max. 10 m) standard length 1,000 mm (1 m)
		<b>(6) Instrument connector</b>
x	x	00 none
	o	76 BNC connector
	o	78 DIN connector
		<b>(7) Fitting length</b>
x	x	120 120 mm
		<b>(8) Extra codes</b>
x	x	000 none
	o	052 KCl reservoir (holder)
	o	837 salt reserve

<sup>a</sup> Possible only for 40 or 60 electrical connection.

x = as standard  
 o = option  
 - = not available

**Order code**      (1)      (2)      (3)      (4)      (5)      (6)      (7)      (8)  
 [ ] / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] / [ ] , ...<sup>a</sup>  
**Order example**      201005      /      51      -      18      -      21      -      2000      -      76      -      120      /      000

<sup>a</sup> List extra codes in sequence, separated by commas.

**Note:**

The type code is not a modular system.  
 If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features.

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## Stock versions

(delivery 3 working days after receipt of order)

Type	Description	Sales No.
201005/51-18-22-0000-00-120/000	pH, glass shaft, Pg13.5 screw cap	00405532
201010/51-22-22-0000-00-120/000	Redox, glass version, Pg13.5 screw cap	00413906

## Production version

(delivery 10 working days after receipt of order)

Type	Description	Sales No.
201005/51-18-60-1000-76-120/000	pH, glass shaft, 1 m fixed cable with Pg13.5, BNC connector	00459671

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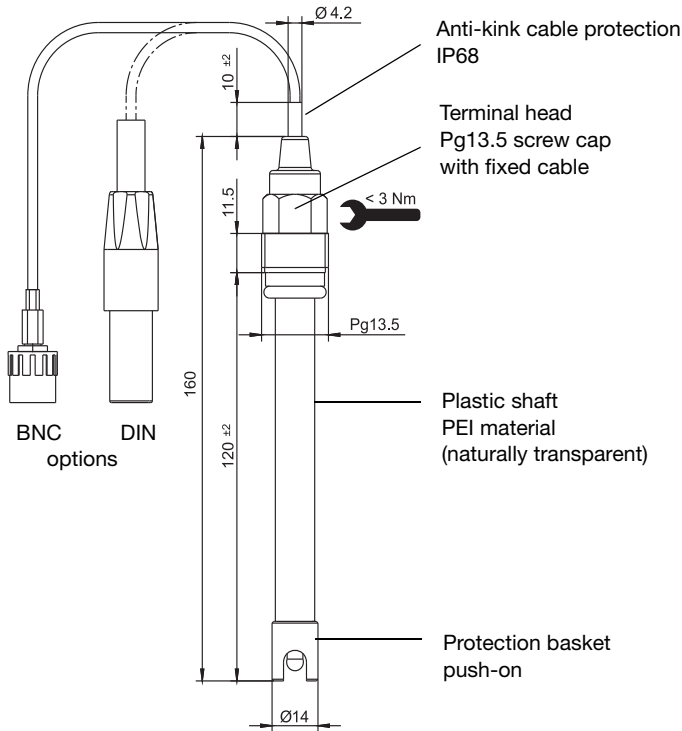
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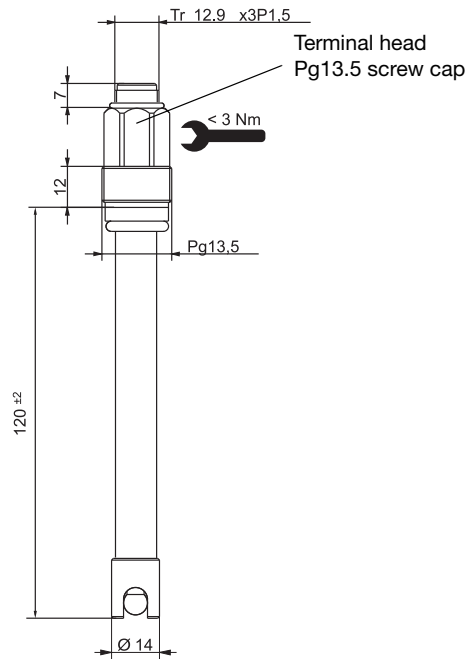


## Dimensions

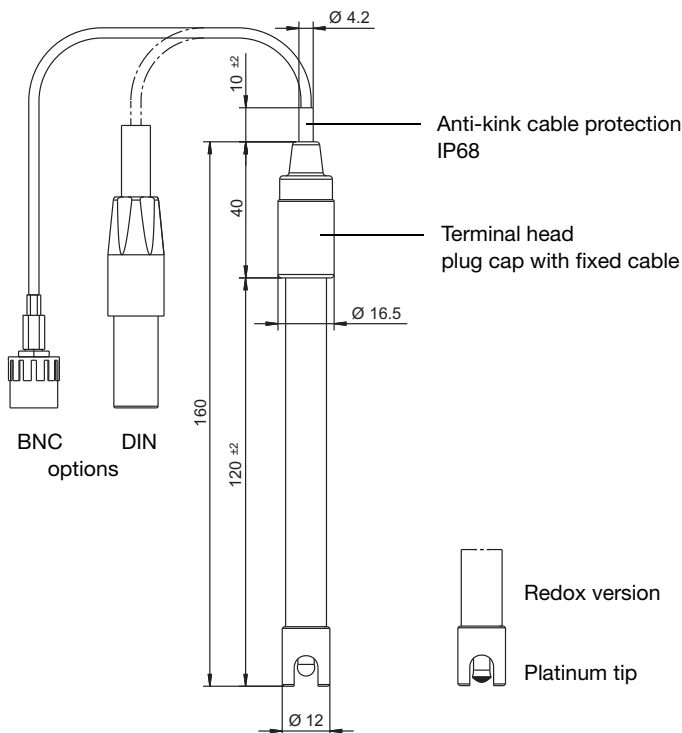
### Version with (PEI) plastic shaft and push-on protection basket



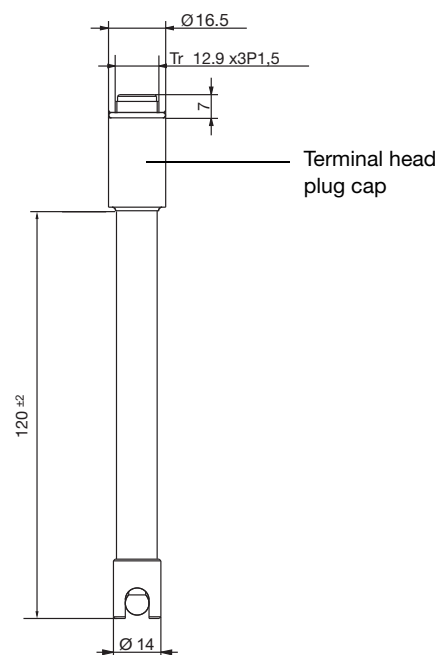
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 Type 201010/53-22-60-xxxx-xx-120/000 (redox)



Type 201005/53-18-22-0000-00-120/000 (pH)  
 Type 201010/53-22-22-0000-00-120/000 (redox)



Type 201005/53-18-40-xxxx-xx-120/000 (pH)  
 Type 201010/53-22-40-xxxx-xx-120/000 (redox)



Type 201005/21-18-0000-00-120/000 (pH)  
 Type 201010/53-22-21-0000-00-120/000 (redox)

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**Order details:**

**JUMO ecoLine / JUMO BlackLine - pH / redox combination electrodes with plastic shaft and push-on protection basket**

	<b>(1) Basic type</b>	
	201005	pH electrodes
	201010	redox electrodes
	<b>(2) Basic type extension</b>	
x x	53	PEI plastic shaft <sup>a</sup> , glass filament diaphragm, K cartridge
	<b>(3) Active component</b>	
x	18	UW glass (for pH version)
x	22	platinum tip (for redox version)
	<b>(4) Electrical connection</b>	
o o	21	plug cap
x x	22	Pg13.5 screw cap
o o	40	plug cap with fixed cable
o o	60	Pg13.5 screw cap with fixed cable
	<b>(5) Cable length<sup>b</sup></b>	
x x	0000	no cable
o o	xxxx	length in mm (whole meters only, max. 10 m) standard length 1,000 mm (1 m)
	<b>(6) Instrument connector</b>	
x x	00	none
o o	76	BNC connector
o o	78	DIN connector
	<b>(7) Fitting length</b>	
x x	120	120 mm
	<b>(8) Extra codes</b>	
x x	000	none
o o	052	KCl reservoir (holder)
o o	837	salt reserve

<sup>a</sup> PEI = polyetherimide.

<sup>b</sup> Possible only for 40 or 60 electrical connection.

x = as standard

o = option

- = not available

**Order code**      (1)      (2)      (3)      (4)      (5)      (6)      (7)      (8)  
 [ ] / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] / [ ] , ...<sup>a</sup>  
**Order example**      201005      /      53      -      18      -      21      -      1000      -      76      -      120      /      000

<sup>a</sup> List extra codes in sequence, separated by commas

**Note:**

The type code is not a modular system.

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We will have to technically inspect and approve a free combination of individual key features.

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Fax: 315-437-5860  
E-mail: info.us@jumo.net  
Internet: www.jumousa.com



## Stock versions

(delivery 3 working days after receipt of order)

Type	Description	Sales No.
201005/53-18-22-0000-00-120/000	pH, PEI shaft, Pg13.5 screw cap	00357022
201010/53-22-22-0000-00-120/000	Redox, PEI shaft, Pg13.5 screw cap	00357020

## Production versions

(delivery 10 working days after receipt of order)

Type	Description	Sales No.
201005/53-18-40-1000-78-120/000	pH, PEI shaft, 1 m fixed cable, no thread, DIN connector	00300149
201005/53-18-21-0000-00-120/000	pH, PEI shaft, plug cap	00300192
201005/53-22-40-1000-76-120/000	Redox, PEI shaft, 1 m fixed cable, no thread, BNC connector	00343525

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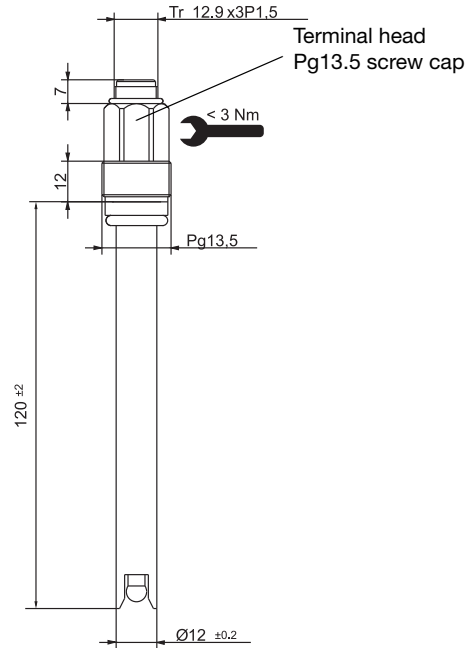
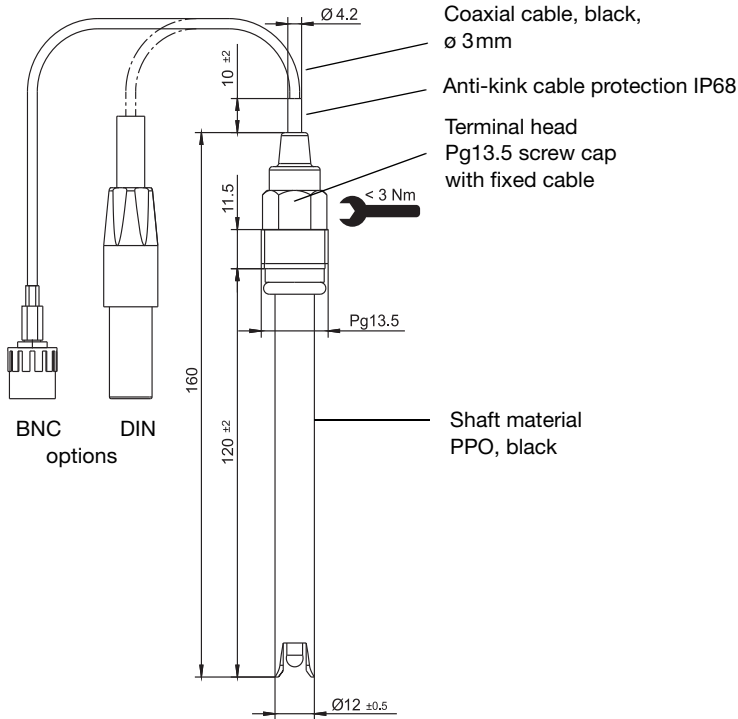
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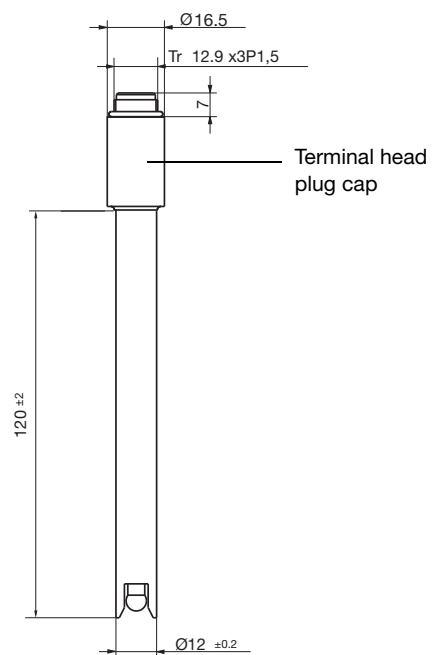
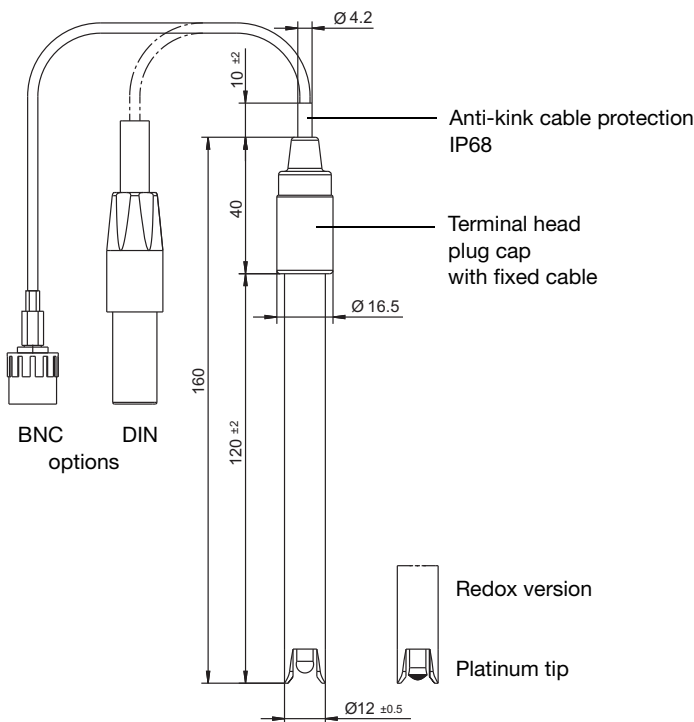
## Dimensions

### JUMO BlackLine: version with (PPO) plastic shaft and fixed protection basket



Type 201005/65-18-65-xxxx-xx-120/000 (pH)  
 Type 201010/65-22-65-xxxx-xx-120/000 (redox)

Type 201005/65-18-22-0000-00-120/000 (pH)  
 Type 201010/65-22-22-0000-00-120/000 (redox)



Type 201005/65-18-45-xxxx-xx-120/000 (pH)  
 Type 201010/65-22-45-xxxx-xx-120/000 (redox)

Type 201005/65-18-21-0000-00-120/000 (pH)  
 Type 201010/65-22-21-0000-00-120/000 (redox)

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**Order details:**

**JUMO ecoLine / JUMO BlackLine - pH / redox combination electrodes with plastic shaft and push-on protection basket**

	<b>(1) Basic type</b>	
	201005	pH electrodes
	201010	redox electrodes
	<b>(2) Basic type extension</b>	
x x	65	BlackLine version, PPO plastic shaft <sup>a</sup> black, ceramic diaphragm, solid electrolyte, cartridge-style conduction system
	<b>(3) Active component</b>	
x	18	UW glass (for pH version)
x	22	platinum tip (for redox version)
	<b>(4) Electrical connection</b>	
o o	21	plug cap
x x	22	Pg13.5 screw cap
o o	45	plug cap with fixed cable
o o	65	Pg13.5 screw cap with fixed cable
	<b>(5) Cable length<sup>b</sup></b>	
x x	0000	no cable
o o	xxxx	length in mm (whole meters only, max. 10m) standard length 2,000 mm (2 m)
	<b>(6) Instrument connector</b>	
x x	00	none
o o	76	BNC connector
o o	78	DIN connector
	<b>(7) Fitting length</b>	
x x	120	120 mm
	<b>(8) Extra codes</b>	
o o	052	KCl reservoir (holder)
x x	837	salt reserve (standard)

<sup>a</sup> PPO = polyphenylene ether.

<sup>b</sup> Possible only for 45 or 65 electrical connection.

x = as standard  
 o = option  
 - = not available

	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>	<b>(8)</b>								
<b>Order code</b>	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>	, ... <sup>a</sup>
<b>Order example</b>	201005	/	65	-	18	-	22	-	2000	-	00	-	120	/	000	

<sup>a</sup> List extra codes in sequence, separated by commas.

**Note:**

The type code is not a modular system.  
 If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features.

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## Stock versions

(delivery 3 working days after receipt of order)

Type	Description	Sales No.
201005/65-18-22-0000-00-120/837	pH, Pg13.5 screw cap, no cable	00419812
201005/65-18-45-2000-76-120/837	pH, no thread, 2m fixed cable, BNC connector	00417300
201005/65-18-65-2000-76-120/837	pH, with Pg13.5 thread, 2m fixed cable, BNC connector	00424828
201010/65-22-45-2000-76-120/837	Redox, no thread, 2m fixed cable, BNC connector	00417301
201010/65-22-65-2000-76-120/837	Redox, with Pg13.5 thread, 2m fixed cable, BNC connector	00424950

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# JUMO tecLine pH, JUMO tecLine Rd

## pH and redox combination electrodes in glass or plastic shaft versions

### 201020 series - pH electrodes

### 201025 series - redox electrodes

## Brief description

JUMO tecLine electrodes are high-quality sensors for professional applications in process and industrial measurement technology. These electrodes are known for their use of top-quality materials and components. They are designed as combined electrodes (the glass or metal electrode and the reference electrode are combined in one shaft). A temperature probe can also be integrated as an option, depending on the type.

Suitable versions are available to meet a wide variety of requirements:

#### JUMO tecLine

- For industrial and communal water and wastewater engineering
- For measurements in suspensions and varnishes
- For measurements in low-ion media
- For high-alkaline, high-temperature and sterilization processes
- For media containing fluorides and low-temperature applications
- PRO version for the toughest operating conditions

JUMO tecLine sensors are state-of-the-art for modern pH and redox electrodes. Each electrode is a quality product and is individually tested as a matter of routine. Modern production facilities ensure consistent characteristics.

#### General information about the construction of the JUMO tecLine series

All standard electrodes are made from physiologically safe and FDA-listed materials. The sensors are equipped with lead-free shaft glass and are therefore conform to RoHS.



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### Active element of pH and redox electrodes

Membrane glass or active component	Designation	pH or redox range	Temperature range	Typical application
UW glass	Universal glass	pH 0 to 12 (briefly pH 14)	-5 to +80 °C	Water and wastewater engineering, process measurement technology, low-ion media
HA glass	High-alkaline glass	pH 0 to 14	-5 to +80 °C	For heavily alkaline media (above pH 12)
HT glass	High-temperature glass	pH 0 to 14	0 to 135 °C	For temperatures above 80 °C or for heavily alkaline media
DS glass	Steam-sterilizable glass	pH 0 to 12	-5 to +80 °C briefly up to 130 °C (20 min)	Biotechnology, pharmaceutical and food technology, sterilization processes
C glass	Fluoride-resistant glass	pH 0 to 11	-5 to +50 °C	Media containing fluorides (hydrofluoric acid) (c(HF) ≤ 1000 mg/l)
Platinum tip	Redox measurement	±2000 mV	-10 to +135 °C	Chromate reduction, nitrite oxidation, swimming pool and drinking water disinfection
Gold tip	Redox measurement	±2000 mV	-10 to +135 °C	Cyanide oxidation, water disinfection

### Reference system design variations (reference electrode)

The only reference electrolytes used for JUMO tecLine electrodes are those that have no silver ions. A cartridge-style conduction system contains the silver/silver chloride (Ag/AgCl). Various forms of diaphragm are used.

Diaphragm type	Explanation	Possible electrolytes	Recommended minimum conductivity of the medium	Typical application/limitations
1× ceramic diaphragm	High-quality zirconium dioxide diaphragm <sup>a</sup>	Polymerized solid electrolyte Liquid KCl	Without salt reserve: 100 µS/cm With salt reserve: 50 µS/cm 5 µS/cm	General water or wastewater engineering, industrial processes, etc.
3× ceramic diaphragm	As above, the increased number means more KCl escapes	Polymerized solid electrolyte Liquid KCl	Without salt reserve: 50 µS/cm With salt reserve: <50 µS/cm 0,1 µS/cm	For polluted or low-ion media; low-temperature applications
Glass fiber diaphragm	Glass fiber bundle instead of a ceramic diaphragm for electrodes with a plastic shaft	Polymerized solid electrolyte	Without salt reserve: 150 µS/cm With salt reserve: 100 µS/cm	General water or wastewater engineering (lightly polluted media)
PTFE ring diaphragm	Large surface area ring diaphragm	Polymerized solid electrolyte	Without salt reserve: 100 µS/cm With salt reserve: 50 µS/cm	Only for very heavily polluted media or adherent media containing oil, for example
Annular-gap or perforated diaphragm	Open transition between the solid electrolyte and the medium, implemented in annular or punctate form	Polymerized solid electrolyte	Without salt reserve: 500 µS/cm With salt reserve: 500 µS/cm	Suspensions, varnishes, media containing solids, heavily polluted media; not suitable for very pure drinking water or low-ion media

<sup>a</sup> Zirconium dioxide diaphragm: high-quality ceramic material of consistent porosity. This means optimum diffusion properties.

### Other pH and redox electrodes can be found in the following data sheets:

- Data sheet 201005 – JUMO ecoLine/JUMO BlackLine pH and redox combination electrodes
- Data sheet 201081 – JUMO glass pH electrodes
- Data sheet 201083 – JUMO reference electrode
- Data sheet 201030 – JUMO laboratory pH combination electrodes
- Data sheet 201050 – JUMO ISFET pH combination electrode
- Data sheet 201082 – JUMO single/twin redox electrodes
- Data sheet 201085 – JUMO compensation thermometer

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# JUMO tecLine pH/Rd

## pH and redox combination electrodes with ceramic or glass fiber diaphragm for water and process measurement technology

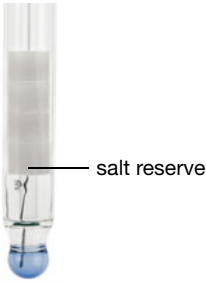
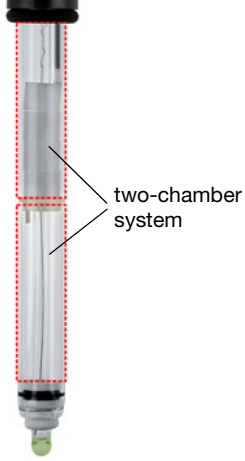
### Typical areas of application

- Industrial and communal, as well as general water and wastewater engineering
- Process measurements, electroplating plants, final inspections, neutralization plants
- Drinking and well water, boiler feed water
- Lightly polluted wastewater
- Two-chamber system for when electrode poisons (e.g. sulphides, cyanides) are present
- Low-temperature applications (-30 to +30 °C), e.g. measurement in cooling systems
- Media containing fluorides (hydrofluoric acid) up to 1000 mg/l HF
- High-alkaline applications (reduced alkaline error at pH values > pH 12)

### Key features

- High-quality zirconium dioxide diaphragms (glass fiber diaphragm for plastic shaft)
- Cartridge-style conduction system with a reference electrolyte with no silver ions
- Pressure-resistant versions up to 10 bar (50 °C)
- Temperature range: up to -5 to +80 °C (90 °C for redox) or -30 to +30 °C (for TT version)
- Temperature probe integration options
- Salt reserve option for increasing service life in media with lower conductivity or in drinking water
- JUMO HA glass for continuous measurements in the up to pH 14 range
- Redox versions with a platinum or gold tip up to ±2000 mV

### Extra code

Salt reserve, extra code 837		Two-chamber system (DOKA), extra code 838	
 <p>salt reserve</p>	<p>The option is available to equip the electrode with a salt reserve, in the form of four salt rings (see illustration). This is recommended when using the electrode in media with fewer ions or at high flow rates. The salt reserve helps to increase the service life of the electrode. The rings are not a manufacturing defect (crystallization).</p>	 <p>two-chamber system</p>	<p>If electrode poisons (e.g. sulphides) are in the sample medium, the extended diffusion path (two consecutive chambers (double chamber)) and the double diaphragm foreclose prevent electrode poisoning.</p>

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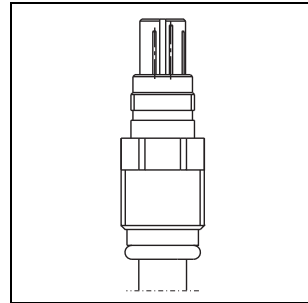
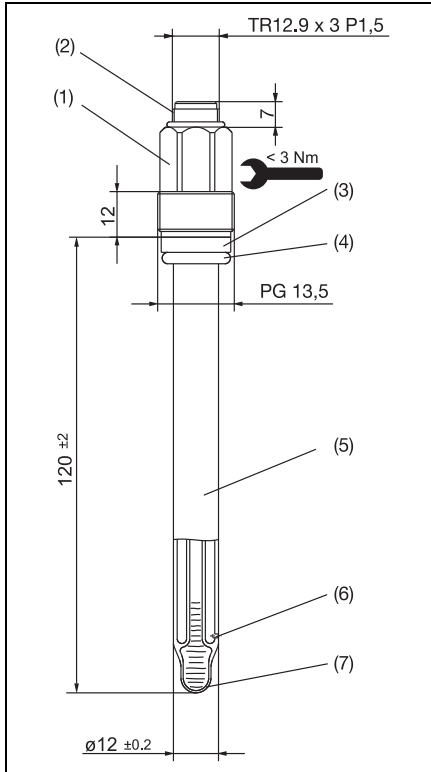
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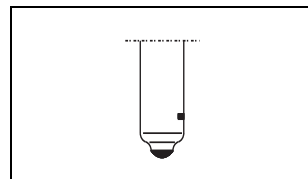
## Dimensions

### Type 20102x/51



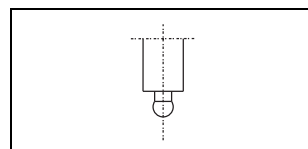
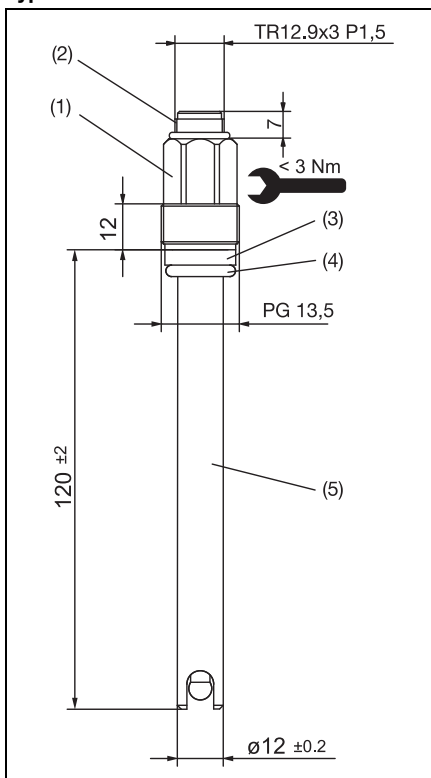
VP Pg13.5 screw head

- (1) Pg13.5 screw head  
(max. tightening torque 3 Nm)
- (2) TR12.9 × 3 P1.5 thread
- (3) Ring (PSU)
- (4) O-Ring 10 × 3,5 (FPM70)
- (5) Electrode shaft (DIN19263 glass)
- (6) 1 to 3 diaphragms  
(zirconium dioxide Ø 1 mm)
- (7) Rounded membrane

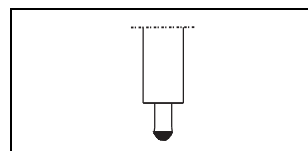


Platinum or gold tip  
type 201025/...

### Type 20102x/74



pH, no protection basket



Platinum or gold tip  
type 201025/74

- (1) Pg13.5 screw head  
(max. tightening torque 3 Nm)
- (2) TR12.9 × 3 P1.5 thread
- (3) Ring (PSU)
- (4) O-ring 10 × 3.5 (FPM70)
- (5) Electrode shaft (plastic PSU)

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## Order details

	<b>(1) Basic type</b>	
	201020	JUMO tecLine pH - pH combination electrodes for water and process measurement technology
	201025	JUMO tecLine Rd - redox combination electrodes for water and process measurement technology
	<b>(2) Basic type extension</b>	
x x	51	Glass shaft, cartridge-style conduction system
o o	72	PEI plastic shaft with protection basket, glass filament diaphragm, cartridge-style conduction system
o o	73	PSU plastic shaft without protection basket, glass filament diaphragm, cartridge-style conduction system <sup>a</sup>
o o	74	PSU plastic shaft with protection basket, glass filament diaphragm, cartridge-style conduction system <sup>a</sup>
	<b>(3) Active component</b>	
x	18	UW glass, pH 0 - 12 (briefly 14), -5 to +80 °C
o	11	C glass, pH 0 - 12, -5 to +50 °C, fluoride-resistant up to 1000 mg HF/l
o	17	HA glass, pH 0 - 14, -5 to +80 °C, high-alkaline use
x	22	Platinum tip, redox range ±2000 mV, -5 to +90 °C
o	32	Gold tip, redox range ±2000 mV, -5 to +90 °C
	<b>(4) Diaphragm</b>	
o o	05	1× glass filament diaphragm <sup>b</sup>
x x	07	1× zirconium dioxide diaphragm (special ceramic)
o o	09	3× zirconium dioxide diaphragm (special ceramic)
	<b>(5) Connection</b>	
o	18	VP Pg13.5 screw head <sup>c</sup>
x x	22	Pg13.5. screw head
	<b>(6) Fitting length</b>	
x x	120	120 mm (standard)
o o	225	225 mm
		Other length on request
	<b>(7) Extra codes</b>	
o o	000	None
x x	837	Salt reserve
o o	838	Two-chamber system (DOKA) with KCl/KCl bridge
o	840	Pt100 temperature probe
o	841	Pt1000 temperature probe

<sup>a</sup> Only available in fitting length 225.

<sup>b</sup> Only for basic type extension 72, 73 or 74.

<sup>c</sup> For electrodes with extra code 840 or 841.

x = as standard

o = option

**Order code**                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (7)                    , ...<sup>a</sup>  
**Order example**            201020            /            51            -            18            -            07            -            22            -            120            /            837

<sup>a</sup> List extra codes in sequence, separated by commas.

**Note:**

The type code is not a modular system.

If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.

We will have to technically inspect and approve a free combination of individual key features.

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**pH stock versions**

(delivery 3 working days after receipt of order)

Typ	Brief description	Part no.
201020/51-18-07-22-120/837	Glass shaft, zirconium dioxide diaphragm, screw head, 120 mm, salt reserve	00300151
201020/51-18-07-22-120/000	Glass shaft, zirconium dioxide diaphragm, screw head, 120 mm	00300148
201020/51-18-07-18-120/837, 840	Glass shaft, zirconium dioxide diaphragm, VP screw head, 120 mm, salt reserve, integrated Pt100	00595184
201020/51-17-07-22-120/837	Glass shaft, zirconium dioxide diaphragm, screw head, 120 mm (high-alkaline applications)	00408953
201020/74-18-05-22-225/000	PSU plastic shaft with protection basket, glass filament diaphragm, screw head, 225 mm	00354295
201020/73-18-05-22-225/000	PSU plastic shaft without protection basket, glass filament diaphragm, screw head, 225 mm	00330857
201020/72-18-05-22-120/837, 838	PEI plastic shaft with protection basket, glass filament diaphragm, screw head, 120 mm, salt reserve, two-chamber system	00303398

**pH production versions**

(delivery 10 working days after receipt of order)

Typ	Brief description	Part no.
201020/51-18-07-22-225/000	Glass shaft, zirconium dioxide diaphragm, screw head, 225 mm	00399535
201020/51-11-07-22-120/000	Glass shaft, zirconium dioxide diaphragm, screw head, 120 mm	00375623

**Redox stock versions**

(delivery 3 working days after receipt of order)

Typ	Brief description	Part no.
201025/51-22-07-22-120/837	Glass shaft, platinum tip, zirconium dioxide diaphragm, screw head, 120 mm, salt reserve	00300397
201025/51-32-07-22-120/837	Glass shaft, gold tip, zirconium dioxide diaphragm, screw head, 120 mm, salt reserve	00300396
201025/72-22-05-22-120/837, 838	PEI plastic shaft without protection basket, platinum tip, glass filament diaphragm, screw head, 120 mm, salt reserve, two-chamber system	00084011

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## JUMO tecLine pH/Rd

**pH and redox combination electrodes with ceramic or glass fiber diaphragm for wastewater, heavily polluted media, suspensions, varnishes**

### Typical areas of application

- Industrial wastewater engineering
- Process measurements, electroplating plants, paper industry, drinks industry
- Wastewater containing oil
- Suspensions, varnishes, media containing solid particles
- Two-chamber system for when electrode poisons are present
- Media containing fluorides (hydrofluoric acid) up to 1000 mg/l HF

### Key features

- A dirt-repellent PTFE ring diaphragm with a highly viscous KCl solution (gel) or a perforated or annular-gap diaphragm with a polymerized solid electrolyte – virtually blockage-free
- Cartridge-style conduction system with a reference electrolyte with no silver ions
- Pressure-resistant versions up to 10 bar (50 °C)
- Temperature range: see order details
- Temperature probe integration options
- Salt reserve option for increasing service life in media with lower conductivity

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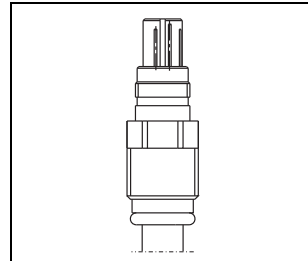
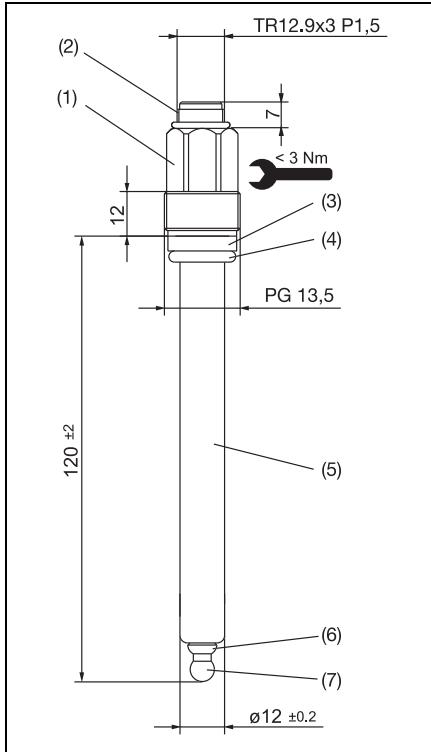
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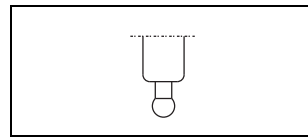
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### Type 201020/51



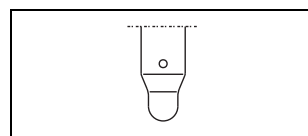
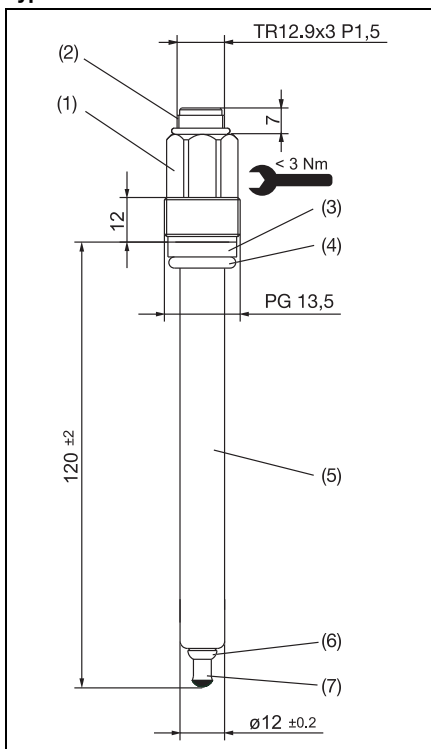
VP Pg13.5 screw head

- (1) Pg13.5 screw head  
(max. tightening torque 3 Nm)
- (2) TR12.9 × 3 P1.5 thread
- (3) Ring (PSU)
- (4) O-ring 10 × 3,5 (FPM70)
- (5) Electrode shaft (DIN19263 glass)
- (6) Ring diaphragm (PTFE)
- (7) Rounded membrane



Annular-gap diaphragm

### Type 201025/51



Perforated diaphragm

- (1) Pg13.5 screw head  
(max. tightening torque 3 Nm)
- (2) TR12.9 × 3 P1.5 thread
- (3) Ring (PSU)
- (4) O-ring 10 × 3,5 (FPM70)
- (5) Electrode shaft (DIN19263 glass)
- (6) Ring diaphragm (PTFE)
- (7) Platinum or gold tip

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## Order details

	<b>(1) Basic type</b>	
	201020	JUMO tecLine pH - pH combination electrodes with ceramic or glass fiber diaphragm for wastewater, heavily polluted media, suspensions, varnishes
	201025	JUMO tecLine Rd - redox combination electrodes with ceramic or glass fiber diaphragm for wastewater, heavily polluted media, suspensions, varnishes
	<b>(2) Basic type extension</b>	
x x	51	Glass shaft, cartridge-style conduction system
	<b>(3) Active component</b>	
x	18	UW glass, pH 0 - 12 (briefly 14), -5 to +80 °C
o	11	C glass, pH 0 - 12, -5 to +50 °C, fluoride-resistant up to 1000 mg HF/l
o	17	HA glass, pH 0 - 14, -5 to +80 °C, high-alkaline use
x	22	Platinum tip, redox range ±2000 mV, -5 to +90 °C
o	32	Gold tip, redox range ±2000 mV, -5 to +90 °C
	<b>(4) Diaphragm</b>	
x x	04	PTFE ring diaphragm
o o	10	Annular-gap diaphragm, gel of polymerized solid electrolyte ("diaphragm-free")
o o	11	Perforated diaphragm, gel of polymerized solid electrolyte ("diaphragm-free")
	<b>(5) Connection</b>	
o	18	VP Pg13.5 screw head <sup>a</sup>
x x	22	Pg13.5 screw head
	<b>(6) Fitting length</b>	
x x	120	120 mm (standard)
o o	225	225 mm
		Other lengths on request
	<b>(7) Extra codes</b>	
o o	000	None
x x	837	Salt reserve
o o	838	Two-chamber system (DOKA) with KCl/KCl bridge <sup>b</sup>
o	840	Pt100 temperature probe <sup>c</sup>
o	841	Pt1000 temperature probe <sup>c</sup>

<sup>a</sup> For electrodes with extra code 840 or 841.

<sup>b</sup> Not in conjunction with diaphragm 10 or 11.

<sup>c</sup> With connection 18 only.

x = as standard

o = option

**Order code**                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (7)                    , ...<sup>a</sup>  
 [ ] / [ ] - [ ] - [ ] - [ ] - [ ] / [ ]  
**Order example**                    201020                    /                    51                    -                    18                    -                    04                    -                    22                    -                    120                    /                    837

<sup>a</sup> List extra codes in sequence, separated by commas.

**Note:**

The type code is not a modular system.

If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.

We will have to technically inspect and approve a free combination of individual key features.

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## pH stock versions

(delivery 3 working days after receipt of order)

Type	Brief description	Part no.
201020/51-18-04-22-120/000	Glass shaft, PTFE diaphragm, Pg13.5 screw head, 120 mm	00327907
201020/51-18-04-22-120/837	Glass shaft, PTFE diaphragm, Pg13.5 screw head, 120 mm, salt reserve	00321035
201020/51-18-04-22-225/837	Glass shaft, PTFE diaphragm, Pg13.5 screw head, 225 mm, salt reserve	00327142
201020/51-17-04-22-120/837	Glass shaft, PTFE diaphragm, Pg13.5 screw head, 120 mm (high-alkaline applications)	00332794
201020/51-18-04-18-120/837, 840	Glass shaft, PTFE diaphragm, VP Pg13.5 plug head, 120 mm, salt reserve, integrated Pt100	00595188
201020/51-18-10-22-120/837	Glass shaft, annular-gap diaphragm, Pg13.5 screw head 120 mm, salt reserve	00446112

## pH production versions

(delivery 10 working days after receipt of order)

Type	Brief description	Part no.
201020/51-18-04-17-120/840	Glass shaft, PTFE diaphragm, VP Pg13.5 screw head, 120 mm, integrated Pt100	00383865
201020/51-18-04-22-225/000	Glass shaft, PTFE diaphragm, Pg13.5 screw head, 225 mm	00372505
201020/51-18-11-22-120/837	Glass shaft, perforated diaphragm and solid electrolyte, screw head, 120 mm, salt reserve	00445428
201020/51-18-11-18-120/837, 840	Glass shaft, perforated diaphragm and solid electrolyte, VP screw head, 120 mm, salt reserve, integrated Pt100	00516974

## Redox stock versions

(delivery 3 working days after receipt of order)

Type	Brief description	Part no.
201025/51-22-04-22-120/837	Glass shaft, platinum tip, PTFE diaphragm, Pg13.5 screw head, 120 mm, salt reserve	00321746

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## JUMO tecLine pH/Rd

### pH and redox combination electrodes for high-temperature and sterilization applications

#### Typical areas of application

- Processes with permanently elevated temperatures (max. 135 °C)
- Sterilization applications
- Two-chamber system for when electrode poisons are present
- Media containing fluorides (hydrofluoric acid) up to 1000 mg HF/l

#### Key features

- Proven JUMO HT glass (pH high-temperature membrane glass) 0 - 14 pH
- JUMO DS membrane glass for sterilization applications
- Cartridge-style conduction system with a (gel) reference electrolyte with no silver ions
- Pressure-resistant versions up to 10 bar (50 °C)
- Temperature range: 0 to 135 °C<sup>1</sup>
- Temperature probe integration options
- Redox versions with a platinum or gold tip up to ±2000 mV

<sup>1</sup> Sterilizable version: sterilization at max. 135 °C for up to 20 minutes. Continuous electrode operation after sterilization up to max. 80 °C.

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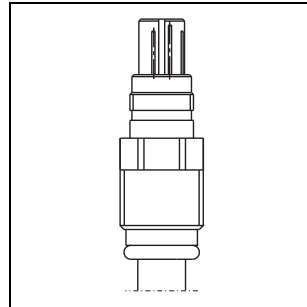
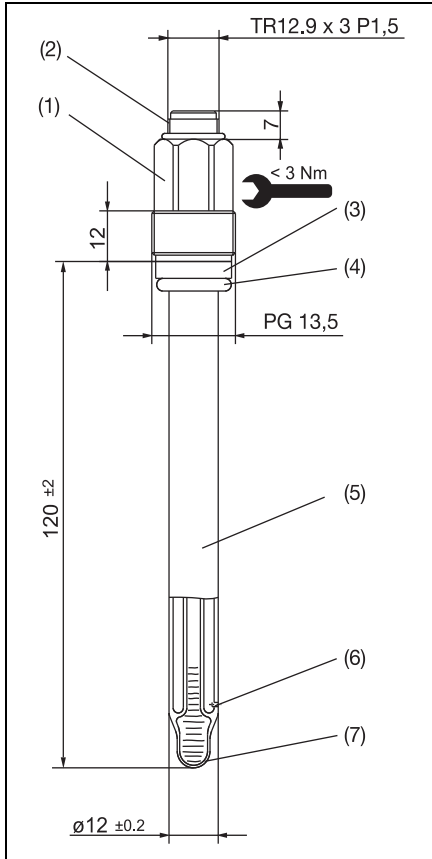
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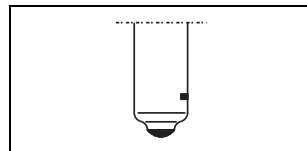


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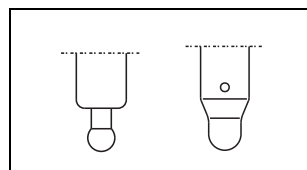
### Type 20102x/75



VP Pg13.5 screw head



Platinum or gold tip  
type 201025/...



Annular-gap/perforated  
diaphragm

- (1) Pg13.5 screw head  
(max. tightening torque 3 Nm)
- (2) TR12.9 × 3 P1.5 thread
- (3) Ring (PSU)
- (4) O-ring 10 × 3,5 (FPM70)
- (5) Electrode shaft (DIN 19263 glass)
- (6) 1 to 3 diaphragms  
(zirconium dioxide Ø 1 mm)
- (7) Rounded membrane

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**Order details**

	<b>(1) Basic type</b>	
	201020	JUMO tecLine pH - pH combination electrodes with ceramic or glass fiber diaphragm for high-temperature and sterilization applications
	201025	JUMO tecLine Rd - redox combination electrodes with ceramic or glass fiber diaphragm for high-temperature and sterilization applications
	<b>(2) Basic type extension</b>	
x x	75	Glass shaft, high-temperature gel, sealed, cartridge-style conduction system
	<b>(3) Active component</b>	
x	12	HT glass, pH 0 - 14, -5 to +135 °C
o	14	DS glass, pH 0 - 14, -5 to +80 °C, can be sterilized for 20 minutes at 135 °C
x	22	Platinum tip, redox range ±2000 mV, -5 to +135 °C
o	32	Gold tip, redox range ±2000 mV, -5 to +135 °C
	<b>(4) Diaphragm</b>	
x x	07	1× zirkonium dioxide diaphragm (special ceramic)
o o	09	3× zirkonium dioxide diaphragm (special ceramic)
o o	10	Annular-gap diaphragm, gel of polymerized solid electrolyte ("diaphragm-free" <sup>a</sup> )
o o	11	Perforated diaphragm, gel of polymerized solid electrolyte ("diaphragm-free" <sup>a</sup> )
	<b>(5) Connection</b>	
o	18	VP Pg13.5 screw head <sup>a</sup>
x x	22	Pg13.5 screw head
	<b>(6) Fitting length</b>	
x x	120	120 mm (standard)
o o	225	225 mm
		Other length on request
	<b>(7) Extra codes</b>	
o o	000	None
x x	837	Salt reserve <sup>b</sup>
o	840	Pt100 temperature probe <sup>c</sup>
o	841	Pt1000 temperature probe <sup>c</sup>

<sup>a</sup> For electrodes with extra code 840 or 841.  
<sup>b</sup> Only in conjunction with diaphragma 10 and 11.  
<sup>c</sup> With connection 18 only.

x = serienmäßig  
 o = optional

<b>Bestellschlüssel</b>	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Bestellbeispiel</b>	201020	/ 75	- 12	- 07	- 22	- 120	/ 000

**Note:**  
 The type code is not a modular system.  
 If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features.

**pH stock versions**

(delivery 3 working days after receipt of order)

Type	Brief description	Part no.
201020/75-12-07-22-120/000	Glass shaft, HT gel, zirconium dioxide diaphragm, Pg13.5 screw head, 120 mm (high-temperature applications)	00304030

**pH production versions**

(delivery 10 working days after receipt of order)

Type	Brief description	Part no.
201020/75-12-11-18-120/837, 840	Glass shaft, solid electrolyte, perforated diaphragm, VP Pg13.5 screw head, 120 mm (high-temperature applications)	00542508

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## JUMO tecLine pH/Rd

### pH and redox combination electrodes with liquid KCl filling, refillable

#### Typical areas of application

- Media with very low conductivity ( $> 0,1 \mu\text{S}/\text{cm}$  in case of 3 diaphragms,  $> 5 \mu\text{S}/\text{cm}$  in case of 1 diaphragm)
- Ultra-pure water applications
- Electroplating processes, PCB production
- Fermenters
- Heavily polluted, adherent media
- Suspensions, varnishes
- Boiler feed water

#### Key features

- Can be combined with all JUMO membrane glasses
- Zirconium dioxide diaphragm
- Cartridge-style conduction system Refillable, KCl solution with no silver ions
- Temperature range:  $-10$  to  $+135 \text{ }^\circ\text{C}^1$
- Redox versions with platinum or gold tip  $\pm 2000 \text{ mV}$

#### Construction of an electrolyte bridge

In the case of pH and redox measurement, there are several disruptive factors that can reduce the accuracy or the service life of the measurement electrode. If the medium disrupts, pollutes or chemically attacks the measurement electrode, the only possible remedies are to use selected measurement electrodes, to treat the samples, or to use an electrolyte bridge.

Disruptive factors can include:

- Getting oiled-up, blocked-up  
Diaphragm is blocked because of precipitation or coating buildup, for example
- Poisoning  
Chemical reaction of reference system with medium
- Pressure fluctuations  
Medium penetrates the electrode

When using an electrolyte bridge, the reference electrode is removed from the medium and installed in a separate vessel somewhere safe. The use of an electrolyte bridge in tubing (flow-through) and in a container, is shown on the next page.

<sup>1</sup> Depending on the type of glass

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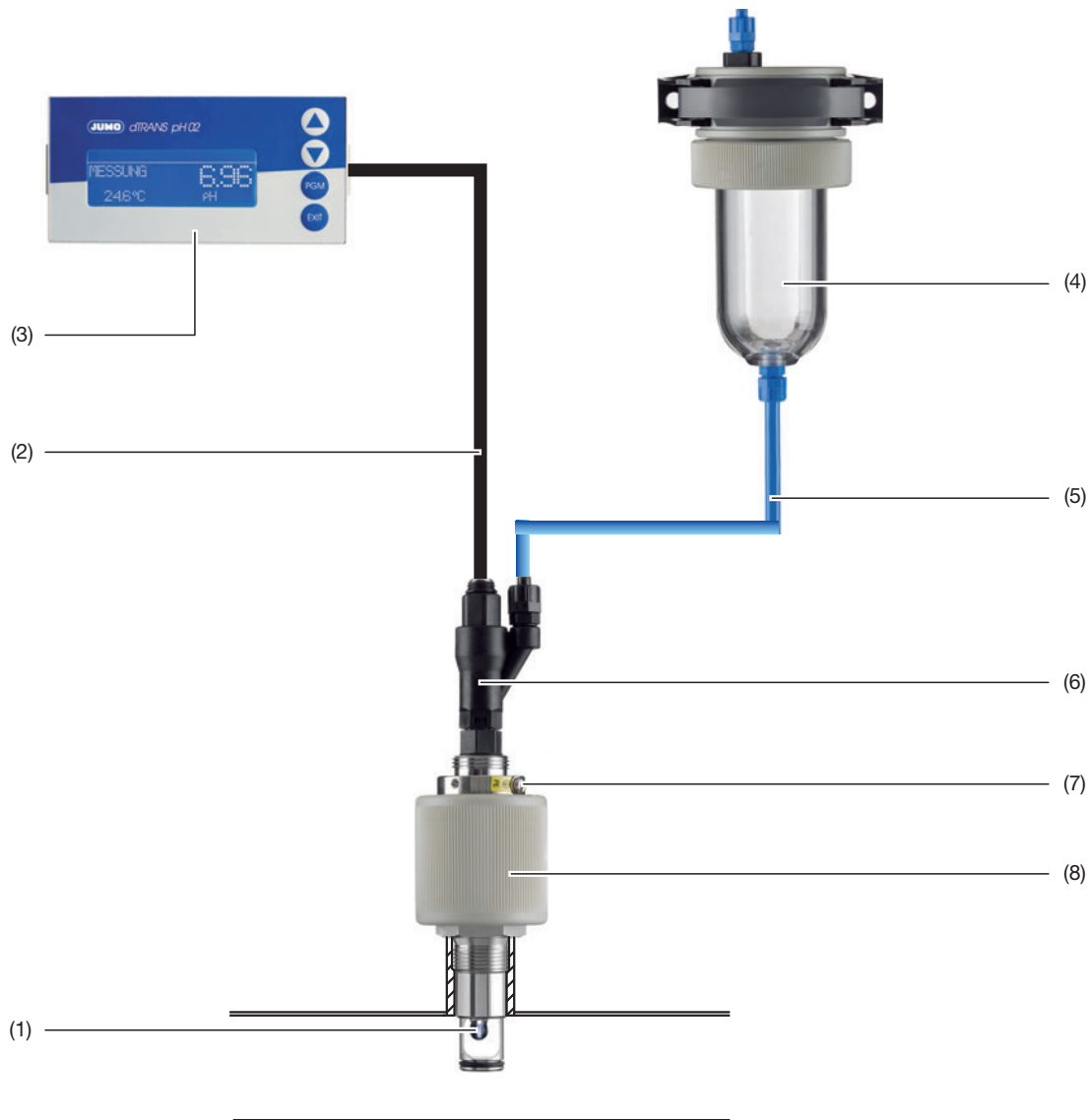
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## Construction of an electrolyte bridge für combination electrodes with liquid KCl supply

In water with very low conductivity it is recommended to measure with a pH electrode, which is filled with liquid KCl as reference electrolyte. The KCl solution is released into the measuring medium through the diaphragm and thus locally increases the electrical conductivity of the measuring medium. This decreases the resistance between pH electrode part and reference electrode part and enables a stable pH measurement. Potassium chloride (KCl) "contaminates" the previously treated water, therefore, it should be checked whether the water has to be discarded after the measurement.

For more information, see also JUMO technical essay (FAS) 614 „Information on high-purity water“.



- (1) pH combination electrode with KCl liquid electrolyte, e.g. 201020/76-18-09-22-180/833, part no. 00373964
- (2) Electrode connecting cable, e.g. 202990/02-92-5-13, part no. 00307298
- (3) Transmitter JUMO dTRANS pH 02, e.g. 202551/01-8-01-4-0-00-23/000, part no. 00560379
- (4) KCl storage vessel, pressure-resistant, for wall mounting, part no. 00060254
- (5) Hose coupling from diaphragm tube to KCl storage vessel (included in 4)
- (6) KCl connection (accessorie for 1), part no. 00475617
- (7) Grounding
- (8) Quick-change fittings, e.g. 202822/105-062-26, part no. 00366915

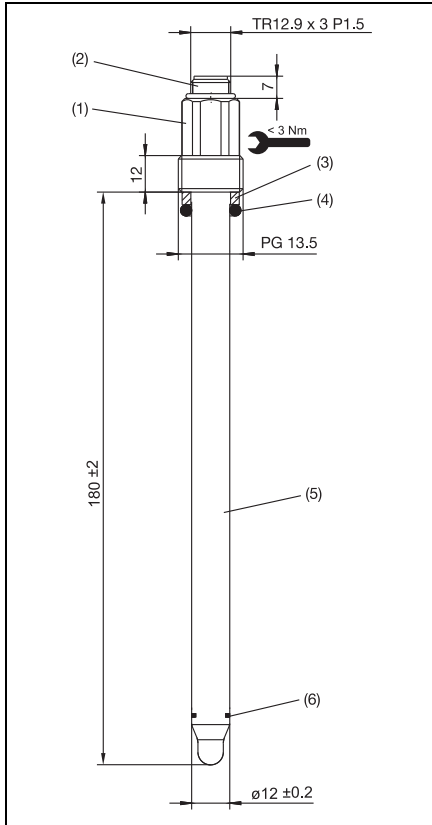
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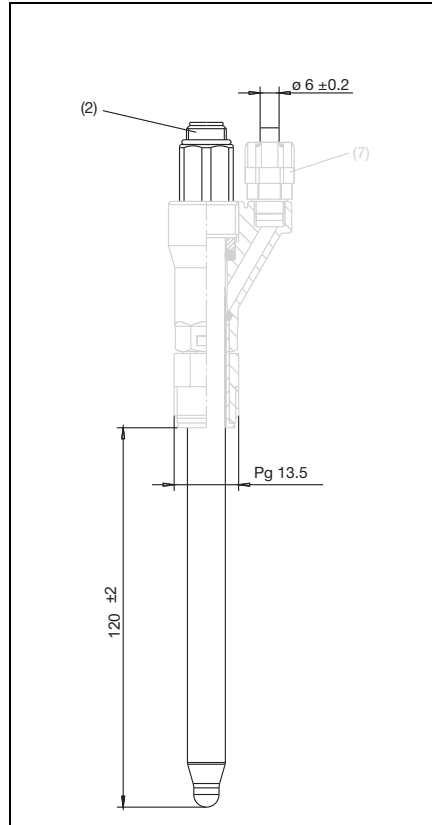
**JUMO Process Control, Inc.**  
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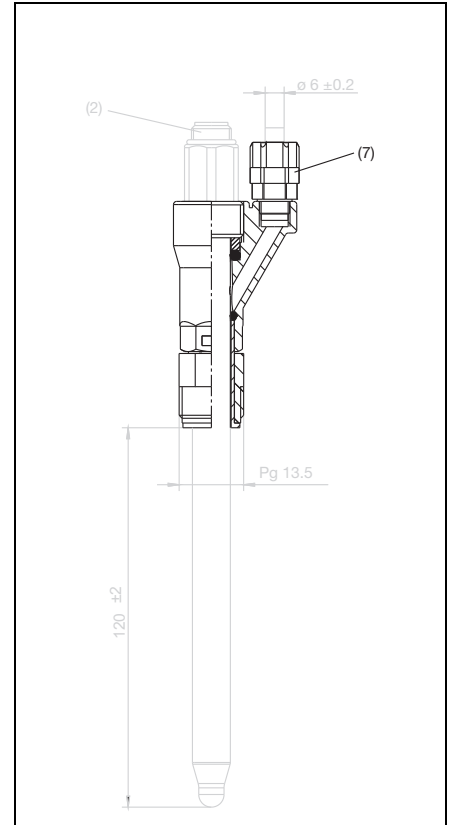
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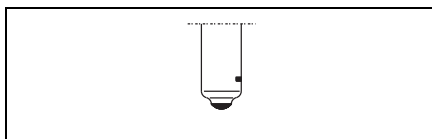
**Electrode type 201020/76-...**  
 Fitting length 180 mm  
 Zirconium dioxide diaphragm  
 (diaphragm 09)



**Electrode type 201020/76-...-...-.../833**  
 Fitting length 180 mm  
 Applicable for KCl connection



**KCl connection  
 for electrode type 201020/76-...-...-.../833**  
 (ordered as accessories, part no. 00475617)  
 Material: PPO (polyphenylene ether)  
 Temperature range: 0 to 105 °C,  
 briefly +130 °C  
 Pressure range: max. 10 bar (25 °C)



**Platinum or gold tip  
 type 201025/...**

- |   |                             |
|---|-----------------------------|
| (1) Pg13.5 screw head (max. tightening torque 3 Nm) | (2) TR12.9 × 3 P1.5 thread  |
| (3) Ring (PSU)                                      | (4) O-ring 10 × 3,5 (FPM70) |
| (5) Electrode shaft (DIN19263 glass)                | (6) 1 to 3 diaphragms       |
| (7) Connection for overpressure attachment          |                             |

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## Order details

	<b>(1) Basic type</b>	
	201020	JUMO tecLine pH - pH combination electrodes with liquid KCl filling, refillable
	201025	JUMO tecLine Rd - redox combination electrodes with liquid KCl filling, refillable
	<b>(2) Basic type extension</b>	
x x	76	Glass shaft, KCl liquid electrolyte, cartridge-style conduction system
	<b>(3) Active component</b>	
x	18	UW glass, pH 0 - 12 (briefly 14), -5 to +80 °C
o	11	C glass, pH 0 - 12, -5 to +50 °C
o	12	HT glass, pH 0 - 14, 0 to 135 °C (also for high-alkaline use)
o	14	DS glass, pH 0 - 12, 0 to 80 °C (can be sterilized for 20 minutes at 135 °C)
x	22	Platinum tip, redox range ±2000 mV, -5 to +90 °C
o	32	Gold tip, redox range ±2000 mV, -5 to +90 °C
	<b>(4) Diaphragm</b>	
x x	07	1× zirconium dioxide diaphragm (special ceramic)
o o	09	3× zirconium dioxide diaphragm (special ceramic)
	<b>(5) Connection</b>	
x x	22	Pg13.5 screw head
	<b>(6) Fitting length</b>	
o o	120	120 mm (standard)
x x	180	Effective fitting length 120mm, but glass length 180mm <sup>a</sup>
	<b>(7) Extra code</b>	
o o	000	None
x	833	Applicable for KCl connection <sup>b</sup>

<sup>a</sup> Only in conjunction with extra code 833.

<sup>b</sup> Only in conjunction with fitting length 180 mm.

x = as standard  
 o = option

	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>
<b>Order code</b>	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
<b>Order example</b>	201020	/	76	-	18	-	07
				-	22	-	120
						/	000

**Note:**

The type code is not a modular system.

If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.

We will have to technically inspect and approve a free combination of individual key features.

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## pH production versions

(delivery 10 working days after receipt of order)

Type	Brief description	Part no.
201020/76-18-09-22-180/833	Glass shaft, KCl liquid electrolyte, 3× zirconium dioxide diaphragm, fitting length 180 mm	00373964
201020/76-12-07-20-120/000	Glass shaft, KCl liquid electrolyte, zirconium dioxide diaphragm, hose olive with Pg13.5 threaded coupling cemented with putty, 120 mm	00300160

## Redox production versions

(delivery 10 working days after receipt of order)

Type	Brief description	Part no.
201025/76-22-07-22-180/833	Glass shaft, KCl liquid electrolyte, 1× zirconium dioxide diaphragm, fitting length 180 mm	00303849

## Accessories

Type	Part no.
KCl connection (PG 209791)	00475617
KCl storage vessel, pressure-resistant, for wall mounting for construction an electrolyte bridge or when using electrodes filled with KCl (PG 209791)	00060254
3-molar KCl solution, 5 × 250 ml pack unit (also see data sheet 201090) (PG 202950)	00306215

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# JUMO tecLine PRO pH/Rd

## pH and redox combination electrodes

### 201020 series - pH electrodes

### 201025 series - redox electrodes

(previous designation 2 GE-20-...)

### General description

The electrodes of the 201020(25)/79 series are known for their high mechanical and chemical resistance. Thanks to their sturdy PVDF body, there is hardly any risk of the sensor breaking. The electrolyte of these combination electrodes guarantees a stable measurement value, even in critical media containing sulphides.

There is an integrated Pt1000 temperature probe. The electrodes can be manufactured as pH or redox electrodes, subject to the application. An open annular-gap diaphragm is the type of diaphragm used.

### Areas of operation

- Chemical industry
- Wastewater treatment
- Sewage treatment works
- Paper industry



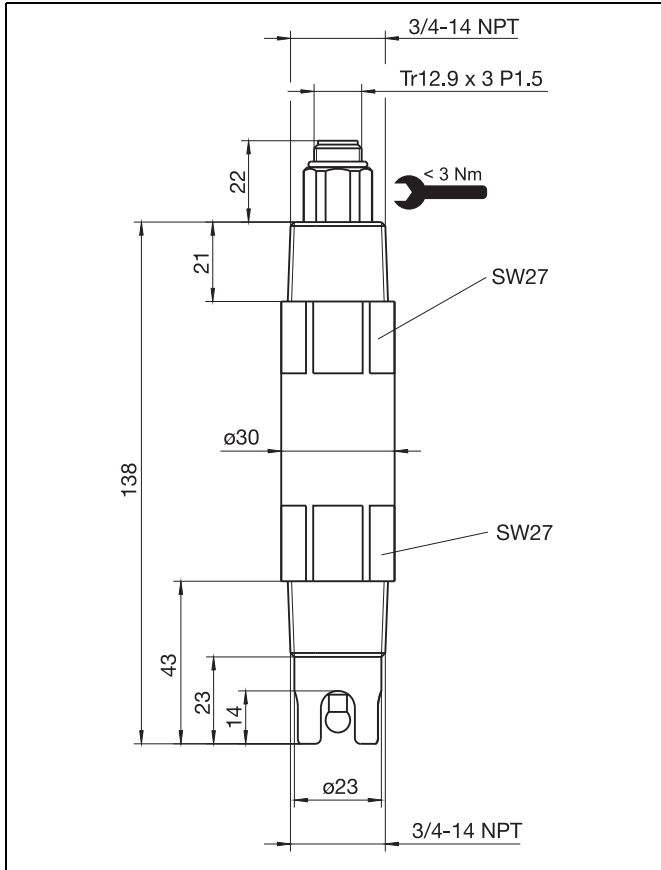
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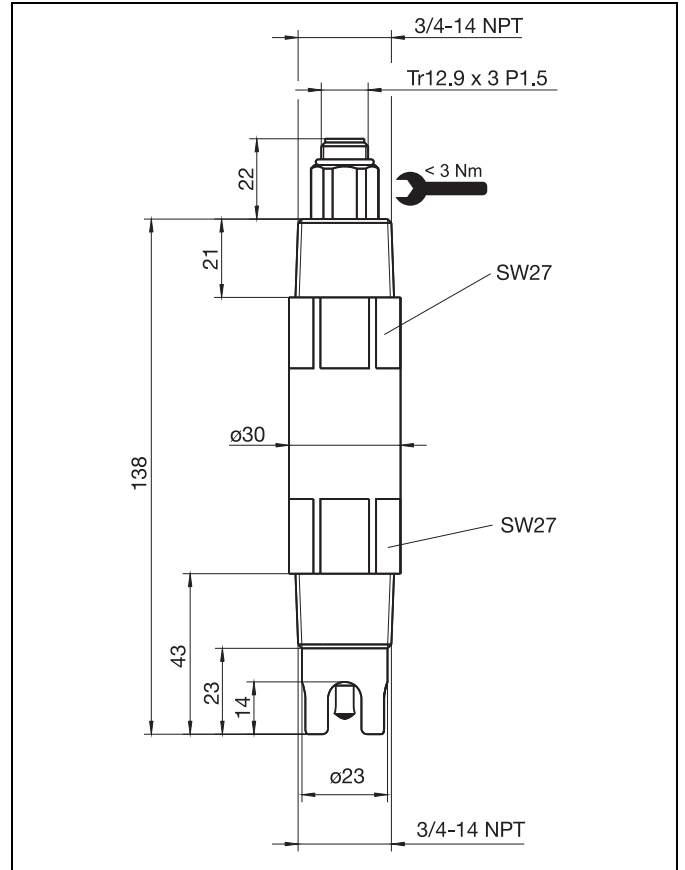
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## Dimensions



Type 201020/...



Type 201025/...

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## Order details

	<b>(1) Basic type</b>	
	201020	JUMO tecLine PRO pH - pH combination electrodes
	201025	JUMO tecLine PRO Redox - redox combination electrodes
	<b>(2) Basic type extension</b>	
x x	79	Process electrode
	<b>(3) Active component</b>	
	12	HT glass, 0 to 110 °C; pH 0 - 14
x	18	UW glass, -5 to +80°C; pH 0 - 12 (briefly pH 14)
o x	22	Platinum tip, 0 to 110 °C; ±2000 mV
o	32	Gold tip, 0 to 110 °C; ±2000 mV
	<b>(4) Diaphragm</b>	
x x	10	Annular-gap diaphragm; gel of polymerized solid electrolyte ("diaphragm-free")
	<b>(5) Electrical connection</b>	
o o	18	VP Pg13.5 screw head
x x	22	screw head
	<b>(6) Extra code</b>	
x x	837	Salt reserve
o	841	Integrated Pt1000

x = as standard  
 o = option

	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>	<b>(4)</b>	<b>(5)</b>	<b>(6)</b>	<b>(7)</b>						
<b>Order code</b>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>						
<b>Order example</b>	201020	/	79	-	12	-	10	-	22	-	43	/	841

**Note:**

The type code is not a modular system.  
 If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features.

## pH production versions

(delivery 10 working days after receipt of order)

Type	Brief description	Part no.
201020/79-18-10-22/837	UW glass, screw head, solid electrolyte, annular-gap diaphragm, salt reserve	00468999
201020/79-12-10-22/837	HT glass, screw head, solid electrolyt, annular-gap diaphragm, salt reserve	00469853

## Accessories

Type	Part no.
Connecting cable VP screw head, 5 m, type 202990/11-95-5-11	00372919
Connecting cable VP screw head, 10 m, type 202990/11-95-10-11	00373029

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# pH and Redox Combination Electrodes for laboratory measurements with glass or plastic shaft

## 201030 Series – pH electrodes

## 201035 Series – redox electrodes

### Brief description

These electrodes are high-quality sensors for pH and redox potential (ORP) measurements in the laboratory. The sensors can be supplied with either a glass shaft or a sturdy plastic shaft. These electrodes are suitable for all measurements in liquid media. They offer a high degree of measurement accuracy and reliability for all applications.

Suitable models are available for the most diverse requirements:

- *Active component for pH:*  
There is a choice of different membrane glasses for the pH versions.
- *Active component for redox:*  
A sturdy platinum or gold tip can be supplied.
- *Reference system:*  
The tried and tested JUMO silver/silver chloride conductive system (Ag/AgCl) and the acrylamide-free KCl gel together constitute the reference system. The conductive system is designed in cartridge style. As a result, the reference electrolyte remains free from silver ions over the entire life span of the sensor, which makes it less susceptible to electrode poisons.
- *Diaphragm:* In the standard version, JUMO labLine electrodes feature a sturdy ceramic diaphragm in zirconium dioxide. On the models with a plastic shaft, a glass fiber diaphragm forms the connection between the substance being measured and the reference system. PTFE diaphragms are available for special applications.

The electrical connection of the sensors is made through:

- plug cap
- plug cap with attached cable

These sensors incorporate state-of-the-art technology for modern pH or redox electrodes. Each electrode is a quality product and is individually tested. Modern production facilities ensure a constant quality.

### General notes on sensors of the 201030 and 201035 series

All standard electrodes are manufactured from physiologically harmless, FDA-listed materials.

### Area of application

- general laboratory applications
- surface measurements on paper and textiles
- insertion measurements in food
- pharmaceutical and cosmetic applications
- measurements in small sample volumes
- measurements in low-ion media



Type 201030/51-xx-07-21-...



Type 201035/51-xx-07-40-...

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### Active elements of the pH or redox electrode

Membrane glass or active component	Designation	pH or redox range	Temperature range	Typical application
UW glass	Universal glass	pH 0 – 12 (briefly pH 14)	-5 to +80 °C	General liquid media
HA glass	High-alkaline glass	pH 0 – 14	-5 to +80 °C	For highly alkaline media (above pH 12)
C glass	Fluoride-resistant glass	pH 0 – 11	-5 to +50 °C	Media containing fluoride (hydrofluoric acid) media (HF) up to 1000 mg/l
Platinum tip	Redox measurement	+/- 2000 mV	-10 to +135 °C <sup>a</sup>	General redox measurements
Gold tip	Redox measurement	+/- 2000 mV	-10 to +135 °C <sup>a</sup>	Highly oxidizing redox applications

<sup>a</sup> Depending on the electrode model

### Constructional variations of the reference system (reference electrode)

Only reference electrolytes that are free from silver ions are used for the electrodes. A cartridge-style conductive system contains the silver/silver chloride (Ag/AgCl). Various forms of diaphragm are used.

Diaphragm type	Explanation	Possible electrolytes	Recommended minimum conductivity of the medium	Typical application / limitations
1x ceramic diaphragm	High-quality zirconium dioxide diaphragm <sup>a</sup>	Polymerized solid electrolyte	Without salt reserve: 100 µS/cm With salt reserve: 50 µS/cm	General liquid media
		Liquid KCl	5 µS/cm	
2x ceramic diaphragm or 3x ceramic diaphragm	As above, but due to increased number, more KCl escapes	Polymerized solid electrolyte, with TT glass: low-temperature gel	Without salt reserve: 50 µS/cm With salt reserve: <50 µS/cm	For polluted or low-ion media low-temperature applications
		Liquid KCl	0,1 µS/cm	
Glass fiber diaphragm	Glass fiber bundle instead of ceramic diaphragm for electrodes with plastic shaft	Polymerized solid electrolyte	Without salt reserve: 150 µS/cm With salt reserve: 100 µS/cm	General liquid media

<sup>a</sup> Zirconium dioxide diaphragm: high-quality ceramic material of constant porosity. This means optimum diffusion properties.

### Additional pH and redox electrodes can be found in the following data sheets:

- Data sheet 201005 – JUMO ecoLine pH/Rd
- Data sheet 201020 – JUMO tecLine pH/Rd
- Data sheet 201050 – JUMO ISFET pH combination electrode
- Data sheet 201081 – JUMO pH single sensors
- Data sheet 201082 – JUMO Rd single sensors
- Data sheet 201083 – JUMO reference electrodes, diaphragm tubes
- Data sheet 201085 – JUMO compensation thermometers

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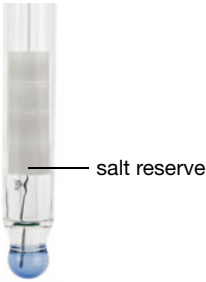
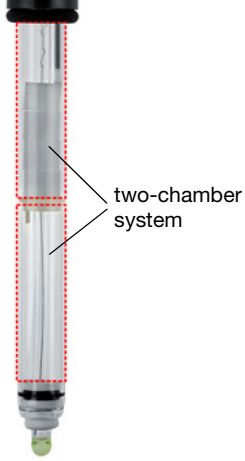


# pH and Redox Combination Electrodes for laboratory measurements with glass or plastic shaft PEI/PSU

## Key features

- High-quality zirconium dioxide diaphragm; glass fiber diaphragm for plastic shaft
- Cartridge-style conductive system with reference electrolyte (free from silver ions)
- pH range: 0 – 12 pH, briefly up to 14 pH
- Temperature range: up to -5 to +80 °C
- Optional salt reservoir for extending the operational life in low-conductivity media
- Redox versions with platinum or gold tip up to +/-2000 mV

## Extra code

Salt reserve, extra code 837		Two-chamber system (DOKA), extra code 838	
 <p>— salt reserve</p>	<p>The option is available to equip the electrode with a salt reserve, in the form of four salt rings (see illustration). This is recommended when using the electrode in media with fewer ions or at high flow rates. The salt reserve helps to increase the service life of the electrode. The rings are not a manufacturing defect (crystallization).</p>	 <p>— two-chamber system</p>	<p>If electrode poisons (e.g. sulphides) are in the sample medium, the extended diffusion path (two consecutive chambers (double chamber)) and the double diaphragm foreclosures prevent electrode poisoning.</p>

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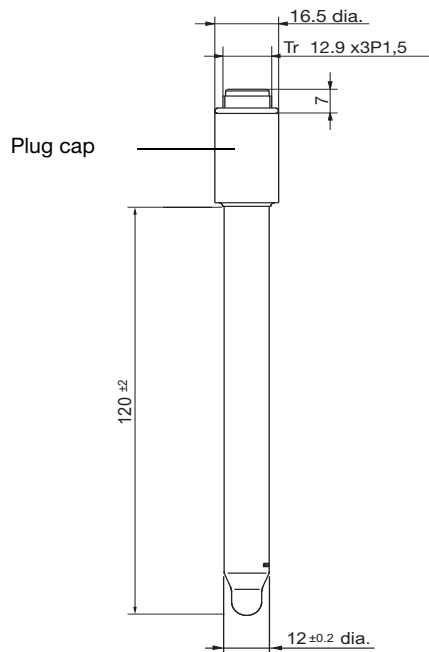
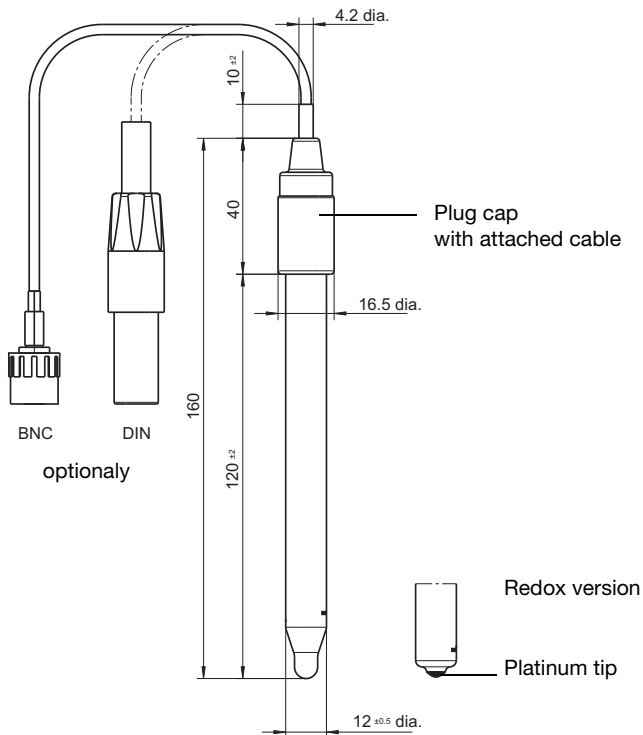
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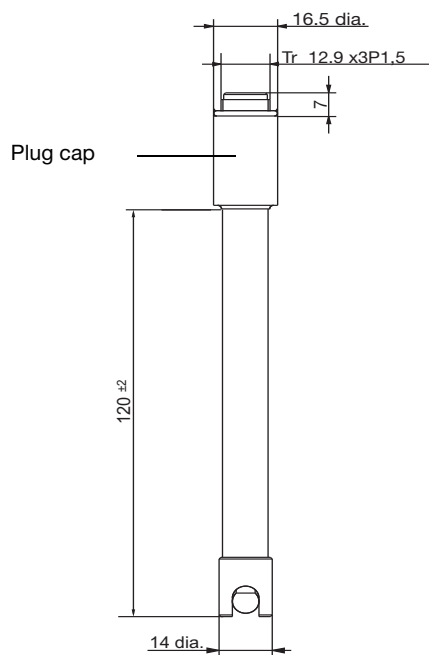
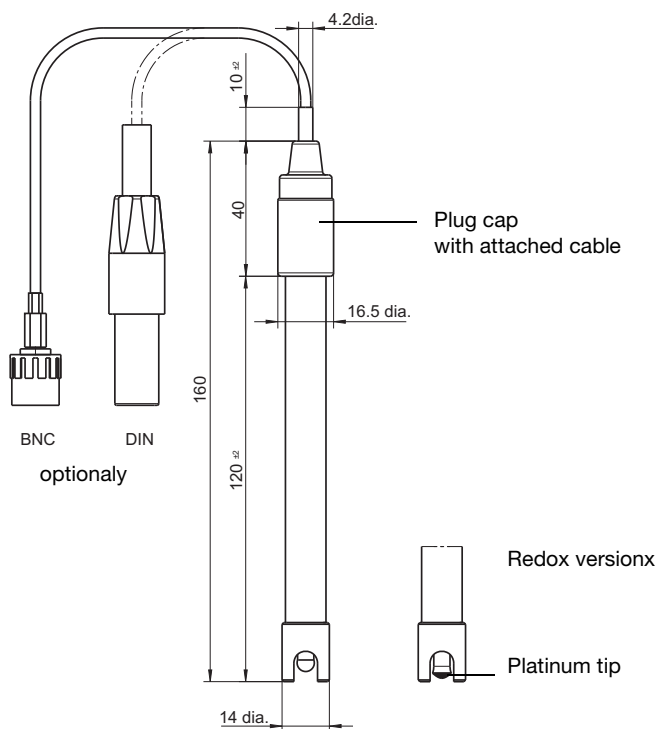


**Dimensions**



Type 201030/51-18-07-40-xxxx-76-120/000 (pH)  
Type 201030/51-18-07-40-xxxx-78-120/000 (pH)  
Type 201035/51-22-07-40-xxxx-76-120/000 (redox)  
Type 201035/51-22-07-40-xxxx-78-120/000 (redox)

Type 201030/51-18-07-21-0000-00-120/000 (pH)  
Type 201035/51-22-07-21-0000-00-120/000 (redox)



Type 201030/53-18-05-40-xxxx-76-120/000 (pH)  
Type 201030/53-18-05-40-xxxx-78-120/000 (pH)  
Type 201035/53-22-05-40-xxxx-76-120/000 (redox)  
Type 201035/53-22-05-40-xxxx-78-120/000 (redox)

Type 201030/53-18-05-21-0000-00-120/000 (pH)  
Type 201035/53-22-05-21-0000-00-120/000 (redox)

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**Order details: pH and Redox Combination Electrodes for laboratory measurements with glass or plastic shaft PEI/PSU**

	<b>(1) Basic type</b>	
	201030	pH combination electrode
	201035	Redox combination electrode
	<b>(2) Basic type extensions</b>	
x x	51	Glass shaft/cartridge-style conductive system
o o	53	Plastic shaft PEI/cartridge-style conductive system
	<b>(3) Active component</b>	
o	11	C glass/pH 0 – 11/-5 to +50 °C
o	17	HA glass/pH 0 – 14/-5 to +80 °C
x	18	UW glass/pH 0 – 12 (briefly 14)/-5 to +80 °C
x	22	Platinum tip/+/- 2000 mV/-5 to +90 °C
o	32	Gold tip/ +/- 2000 mV/-5 to +90 °C
	<b>(4) Diaphragm</b>	
o o	04	PTFE diaphragm <sup>a</sup>
o o	05	1× glass silk diaphragm <sup>b</sup>
x x	07	1× zirconium dioxide diaphragm (special ceramic) <sup>a</sup>
	<b>(5) Connection</b>	
x x	21	Plug cap (S6)
o o	40	Plug cap (S6) with attached cable
	<b>(6) Cable length</b>	
x x	0000	No attached cable
o o	xxxx	Length in mm (only full meters/up to 10 m/standard length 1000 mm = 1 m)
	<b>(7) Instrument connector</b>	
x x	00	No connector
o o	76	BNC connector
o o	78	DIN connector
	<b>(8) Fitting length</b>	
x x	120	Fitting length 120 mm (standard) <sup>c</sup>
	<b>(9) Extra codes</b>	
o o	000	None
o o	052	KCl reservoir (holder)
x x	837	Salt reservoir <sup>a</sup>
o o	838	2-chamber system (DOKA) with KCl/KCl bridge

x = standard

o = optional

<sup>a</sup> Only available with basic type extension /51

<sup>b</sup> Only available with basic type extension /53

<sup>c</sup> Other fitting length on request

**Order code**      (1)      (2)      (3)      (4)      (5)      (6)      (7)      (8)      (9)      ...<sup>a</sup>  
 [ ] / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] / [ ]  
**Order example**      201030      /      51      -      18      -      07      -      21      -      0000      -      00      -      120      /      000

<sup>a</sup> List extra codes in sequence, separated by commas

**Note:**

The type code is a type designation, not a modular system.

If at all possible, please choose the items listed under “**Stock versions**” or “**Production versions**” when placing your order.

Any free combination of individual code features must be technically checked and approved by us.

Please ask us in case of doubt.

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## Stock versions pH

(delivery: 3 working days after receipt of order)

Type	Brief description	Sales No.
201030/51-18-07-21-0000-00-120/837	Glass shaft PEI, UW glass, plug cap, 120 mm, 2-chamber system, salt reservoir	00303348

## Production versions pH

(delivery: 10 working days after receipt of order)

Type	Brief description	Sales No.
201030/51-18-04-21-0000-00-120/837,838	Glass shaft, UW glass, plug cap, 120 mm,	00335215
201030/53-18-05-21-0000-00-120/837,838	Plastic shaft PEI, UW glass, plug cap, 120 mm, 2-chamber system, compatible with Mettler Toledo InLab417/Schott BlueLine 22pH	00303399
201030/53-11-05-21-0000-00-120/837,838	Plastic shaft PEI, C glass, plug cap, 120 mm, 2-chamber system	00345114

## Production versions Redox (ORP)

(delivery: 10 working days after receipt of order)

Type	Brief description	Sales No.
201035/51-22-07-21-0000-00-120/837	Glass shaft, platinum tip, zirconium dioxide diaphragm, plug cap, 120 mm	00300394

## Production versions Redox (ORP)

(delivery: 10 working days after receipt of order)

Type	Brief description	Sales No.
201035/51-32-07-21-0000-00-120/837	Glass shaft, gold tip, zirconium dioxide diaphragm, plug cap (S6), 120 mm	00300395
201035/51-22-07-40-1000-76-120/837	Glass shaft, platinum tip, zirconium dioxide diaphragm, attached cable, BNC connector, 120 mm	00472792

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# pH Combination Electrodes for measurement in solids (Insertion Electrodes)

## Typical applications

- Food checks (measurements in meat, cheese, vegetables, etc.)
- Soil samples

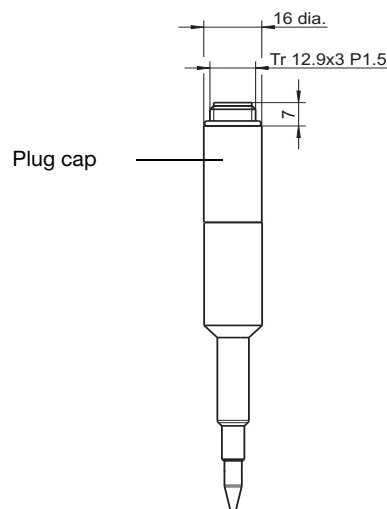
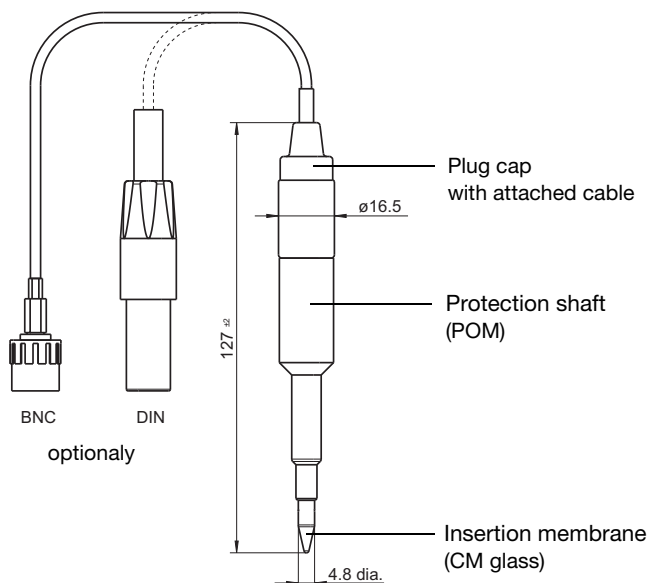
## Key features

- Insertion probe 6 mm
- Solid electrolyte, annular gap diaphragm
- Cartridge-style conductive system with reference electrolyte (free from silver ions)
- pH range: 0 – 11 pH, briefly up to 14 pH
- Temperature range: -5 to +50°C (please refer to the order details)
- Salt reservoir for extending the operational life in low-conductivity media



Type 201030/62-15-08-21-...

## Dimensions



Type 201030/62-15-08-40-xxxx-76-120/000 (pH)  
 Type 201030/62-15-08-40-xxxx-78-120/000 (pH)

Type 201030/62-15-08-21-xxxx-76-120/000 (pH)  
 Type 201030/62-15-08-21-xxxx-78-120/000 (pH)

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**Order details: pH Combination Electrodes for measurement in solids**

	<b>(1) Basic type</b>	
	201030	pH combination electrode
	<b>(2) Basic type extensions</b>	
	60	Plastic shaft PE/solid electrolyte/cartridge-style conductive system/insertion probe
	<b>(3) Active component</b>	
x	15	CM glass/pH 0 – 11/-5 to +50 °C
	<b>(4) Diaphragm</b>	
o	08	2x zirconium dioxide diaphragm
x	11	Annular gap diaphragm
	<b>(5) Connection</b>	
x	21	Plug cap
o	40	Plug cap with attached cable
	<b>(6) Cable length</b>	
x	0000	No attached cable
o	xxxx	Length in mm (only full meters/up to 10 m/standard length: 1000 mm = 1 m)
	<b>(7) Instrument connector</b>	
x	00	No connector
o	76	BNC connector
o	78	DIN connector
	<b>(8) Fitting length</b>	
x	120	Fitting length 120 mm (standard)
	<b>(9) Extra codes</b>	
x	052	KCl reservoir (holder)

x = standard  
 o = optional

**Order code**      **(1)**      **(2)**      **(3)**      **(4)**      **(5)**      **(6)**      **(7)**      **(8)**      **(9)**  
 \_\_\_\_\_ / \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ - \_\_\_\_\_ / \_\_\_\_\_  
**Order example**      201030      /      60      -      15      -      08      -      21      -      0000      -      00      -      120      /      052

**Note:**

The type code is a type designation, not a modular system.  
 If at all possible, please choose the items listed under “**Stock versions**” or “**Production versions**” when placing your order.  
 Any free combination of individual code features must be technically checked and approved by us.  
 Please ask us in case of doubt.

**Production versions**

(delivery: 15 working days after receipt of order)

Type	Brief description	Sales No.
201030/60-15-08-21-0000-00-120/052	Solid electrolyte, zirconium dioxide diaphragm, plug cap, 120 mm	00432926
201030/60-15-08-40-1000-76-120/052	Solid electrolyte, zirconium dioxide diaphragm, plug cap with attached cable, 120 mm	00448527

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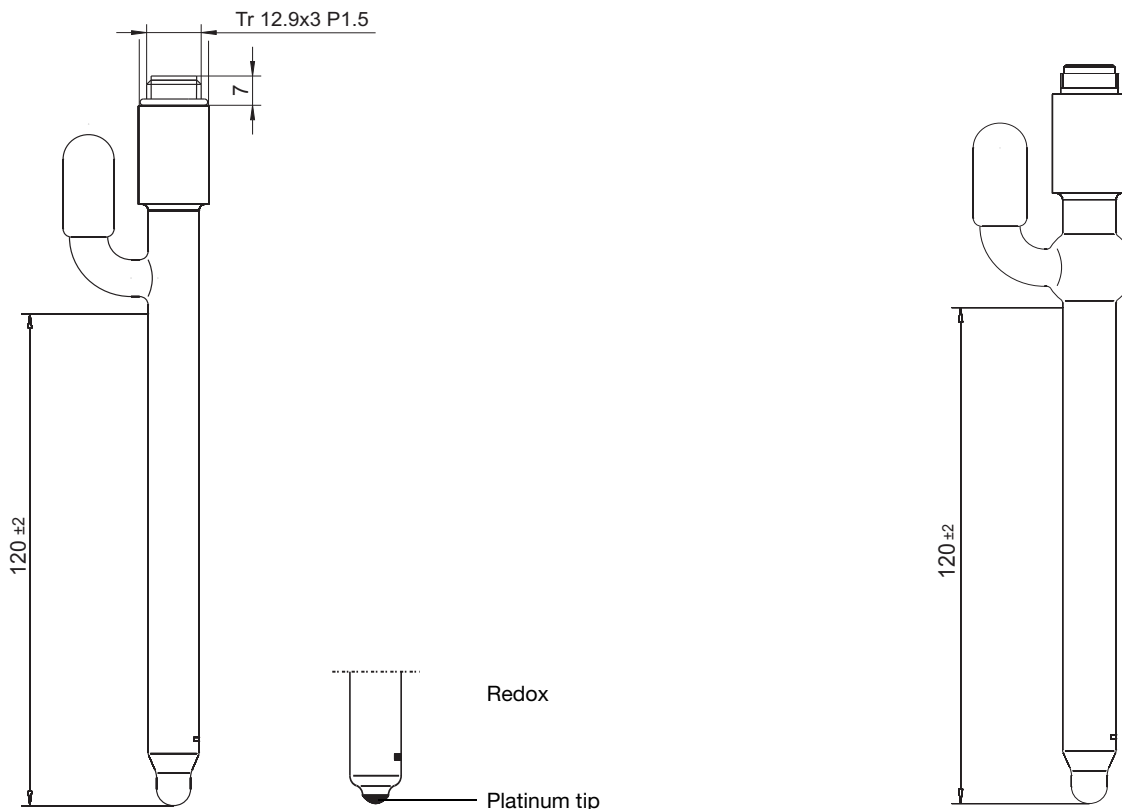


# pH and Redox Combination Electrodes with KCl liquid electrolyte, refillable

## Key features

- High-quality zirconium dioxide diaphragm
- Cartridge-style conductive system with reference electrolyte (free from silver chloride)
- pH range: 0 – 12 pH, briefly up to 14 pH
- Temperature range: -5 to +130 °C (depending on the membrane glass selected)
- Redox versions with platinum or gold tip up to +/-2000 m

## Dimensions



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**Order details: pH and Redox Combination Electrodes with KCl liquid electrolyte, refillable**

	<b>(1) Basic type</b>	
	201030	pH combination electrode
	201035	Redox combination electrode
	<b>(2) Basic type extensions</b>	
o o	12	Glass shaft/KCl/ tube nipple <b>(discontinued line)</b>
o o	13	Glass shaft/KCl/ tube nipple/spherically enlarged shaft <b>(discontinued line)</b>
x x	76	Glass shaft/KCl liquid electrolyte/cartridge-style conductive system
	<b>(3) Active component</b>	
o	11	C glass/pH 0 – 12/-5 to +50 °C/fluoride-resistant
o	12	HT glass/pH 0 – 14/-5 to +130 °C/high-alkaline or high-temperature application
x	18	UW glass/pH 0 – 12, briefly pH 14/-5 to +80 °C
x	22	Platinum tip/redox range +/-2000 mV/-5 to +90 °C
o	32	Gold tip/redox range +/-2000 mV/-5 to +90 °C
	<b>(4) Diaphragm</b>	
x x	07	1× zirconium dioxide diaphragm (special ceramic)
o o	09	3× zirconium dioxide diaphragm (special ceramic)
	<b>(5) Connection</b>	
x x	21	Plug cap
o o	40	Plug cap with attached cable
	<b>(6) Cable length</b>	
x x	0000	No attached cable
o o	xxxx	Length in mm (only full meters/up to 10 m/standard length: 1000 mm = 1 m)
	<b>(7) Instrument connector</b>	
x x	00	No connector
o o	76	BNC connector
o o	78	DIN connector
	<b>(8) Fitting length</b>	
x x	120	Fitting length 120 mm (standard) <sup>a</sup>
	<b>(9) Extra codes</b>	
x x	000	None
o o	052	KCl reservoir (holder)

<sup>a</sup> Other fitting length on request

x = serienmäßig  
 o = optional

<b>Order code</b>	<input type="text" value="(1)"/>	/	<input type="text" value="(2)"/>	-	<input type="text" value="(3)"/>	-	<input type="text" value="(4)"/>	-	<input type="text" value="(5)"/>	-	<input type="text" value="(6)"/>	-	<input type="text" value="(7)"/>	-	<input type="text" value="(8)"/>	/	<input type="text" value="(9)"/>
<b>Order example</b>	201030	/	76	-	18	-	07	-	21	-	0000	-	00	-	120	/	000

**Note:**

The type code is a type designation, not a modular system.  
 If at all possible, please choose the items listed under “**Stock versions**” or “**Production versions**” when placing your order.  
 Any free combination of individual code features must be technically checked and approved by us.  
 Please ask us in case of doubt.

**Production version**

(delivery: 15 working days after receipt of order)

Type	Brief description	Sales No.
201030/76-18-07-40-1000-76-120/000	pH electrode, UW glass, zirconium dioxide diaphragm, 1 m attached cable, BNC connector, 120 mm	00300196

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# Ammonia-sensitive sensor for ammonia measurements in aqueous solutions

## Brief description

This sensor can be used to measure ammonia ( $\text{NH}_3$ ) in aqueous solutions. In an aqueous solution, ammonia is in a pH-dependent equilibrium with ammonium ions ( $\text{NH}_4^+$  ions). Provided the  $\text{NH}_4^+$  ions are converted into ammonia by adding lye, the sensor also detects the resultant ammonia. The  $\text{NH}_4^+$  ions themselves are not detected.

The ammonia sensor consists of a pH glass electrode and a reference electrode. Both the electrodes are in an electrolyte. The electrolyte is separated from the process medium by a hydrophobic, gas-permeable membrane. The pH value of the electrolyte changes if  $\text{NH}_3$  gas diffuses through the hydrophobic membrane. This local change in the pH value is measured at high resistance by the integrated pH electrode.

JUMO ammonia sensors feature the advantage of having ready-made membrane caps. There is no need to put the sensitive membrane on by hand. With the JUMO sensor, the membrane cap is quickly and easily replaced as a complete unit.

## Monitoring ammonia leakage in refrigerating plants

Refrigerating plants (in indoor ice rinks or cold storage, for example) frequently use ammonia as a refrigerant. As ammonia ( $\text{NH}_3$ ) is a toxic, pungent-smelling, colorless gas, the plants are monitored for escaping ammonia (leakage). Gas sensors are used to monitor the ambient air (these are not supplied by JUMO). In addition, the pipes and system components that carry the liquids are monitored for ammonia ingress. JUMO's ammonia-sensitive sensor can be used for this purpose. Measuring ammonia with a JUMO ammonia sensor gives a far more selective response than measuring the pH. The JUMO ammonia sensor can also be used in online analyzers/samplers or in the laboratory.

More information can be found in JUMO white paper 631, "Information on measuring ammonia in water".



Type 201040

## Technical data

Analyte <sup>a</sup>	$\text{NH}_3$
Measuring range	0.01 to 9,999 ppm (mg/l) $\text{NH}_3$
Temperature range	
Standard	0 to 50 °C
For low temperature (extra code 854)	-8 to +30 °C
pH range	7.5 to 14
Length	120 mm
Diameter	12 mm
Connection	Pg13.5 screw-on head
Medium pressure	
Installed in quick-change fitting, part no. 00379538	2 to 3 bar (max.6 bar)
Not installed	1 bar abs. (atmospheric pressure)
Membrane cap material	Special PTFE
Suitable transmitters	JUMO AQUIS 500 pH, see data sheet 202560 JUMO dTRANS pH 02, see data sheet 202551

<sup>a</sup> The sensor is used to detect  $\text{NH}_3$  ammonia. It must not be used as a sensor for continuous measurement of  $\text{NH}_3$  ammonia.

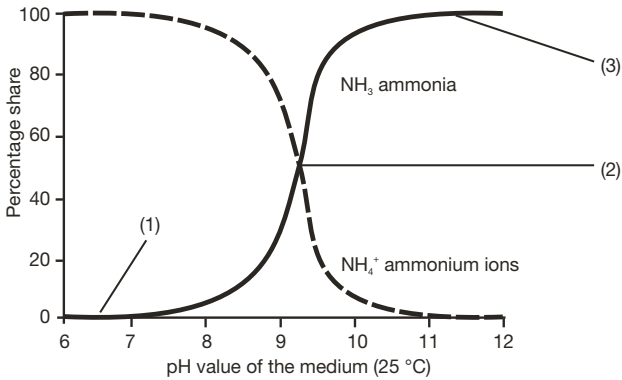
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**Operating range**



- (1) Only  $\text{NH}_4^+$  ions (ammonium) present
- (2) The ratio of  $\text{NH}_4^+$  ions (ammonium) and  $\text{NH}_3$ (ammonia) is 1:1
- (3) Only  $\text{NH}_3$  ions present

**Note**

The presence of ammonia in the sample medium is heavily dependent on its pH value (see diagram "Operating range").

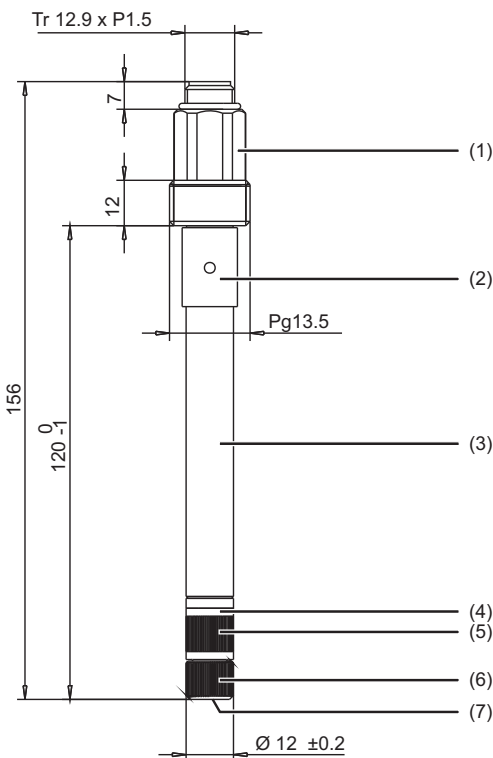
Ammonium ions ( $\text{NH}_4^+$ ) predominate in the acidic range and are not detected by the sensor!

At a pH of approximately 9.3, the concentration ratio of ammonia ( $\text{NH}_3$ ) and ammonium ( $\text{NH}_4^+$ ) is about 1:1.

Ammonia is only dominant in the reaction in the heavily alkaline range.

The process medium must not contain any substances that could damage the sensor membrane (such as oils, greases, particles of dirt or surfactants).

**Dimensions**



- (1) Pg 13.5 screw-on head
- (2) Hose connection (silicone)
- (3) Shaft (PPO)
- (4) O-ring (FPM)
- (5) Sleeve (PSU)
- (6) Membrane cap (stainless steel 1.4571)
- (7) Membrane (PTFE)

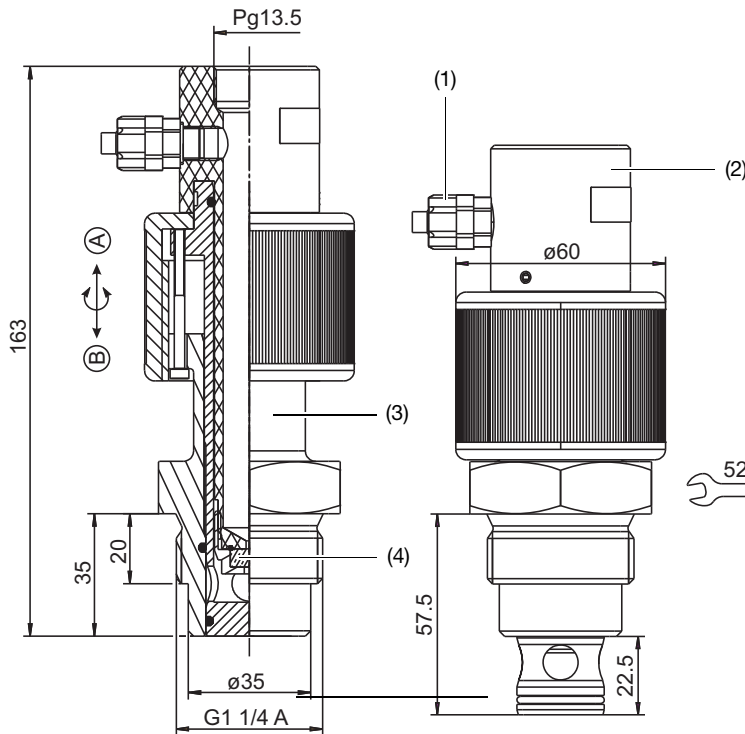
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## Accessories



- |     |                               |     |                         |
|-----|-------------------------------|-----|-------------------------|
| (1) | G 1/8 A (POM) hose connection | (2) | Material PP             |
| (3) | Shaft (PPO)                   | (4) | Replaceable PTFE washer |
| A   | Closed                        | B   | Open                    |

Manual quick-change fitting	Part no.: 00379538
Optimum operating pressure	2 to 4 bar
Maximum operating pressure	6 bar
Operating temperature	-8 to +50 °C

The purpose of the manual quick-change fitting is to hold the ammonia sensor. It protects the sensor against excessively high pressures during operation and limits the flow rate of the process medium through the measurement chamber. The throughput of measuring fluid depends on the viscosity and temperature of the medium and the pressure in the line it flows through. PTFE washers for normal flow rate (white) or increased flow rate (black) are available as accessories.

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## Order details

<b>(1) Basic type</b>	
201040/65	Ammonia sensor
<b>(2) Connection</b>	
22	Pg13,5 screw-on head
<b>(3) Insertion length</b>	
120	120 mm (standard)
<b>(4) Extra codes</b>	
000	None
854	Low-temperature electrolyte

<b>Order code</b>	(1)	(2)	(3)	(4)
<b>Order example</b>	201040/65	- 22	- 120	/ 000

**Note:**

The type code is not a modular system.

If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.

We will have to technically inspect and approve a free combination of individual key features.

## Stock versions

(delivery 3 working days after receipt of order)

Type	Brief description	Part no.
201040/65-22-120/000	Ammonia sensor, Pg13.5 screw-on head, 120 mm	00440655
201040/65-22-120/854	Ammonia sensor, Pg13.5 screw-on head, 120 mm for use in highly concentrated refrigerants, -8 to +30 °C	00478869

## Accessories

Type	Part no.
Quick-change fitting for ammonia sensor	00379538
Maintenance kit for ammonia sensor (standard)	00449637
Maintenance kit for ammonia sensor (code 854, temperature electrolyte)	00477746
202560/20-888-888-310-310-23/00	00480051
PTFE washers for manual quick-change fitting (standard, white, 3 washers)	00583477
PTFE washers for manual quick-change fitting (increased flow rate, black, 3 washers)	00583479

# ISFET pH combination electrode

Type 201050

## Brief description

The ISFET pH combination electrode can provide accurate and stable pH measurements in a vast number of industrial applications. The main features of this sensor are its sturdy design and its fast response time. The sensor works without a glass membrane. Measurement of the pH value is based on ISFET (ionselective field-effecttransistor) technology.

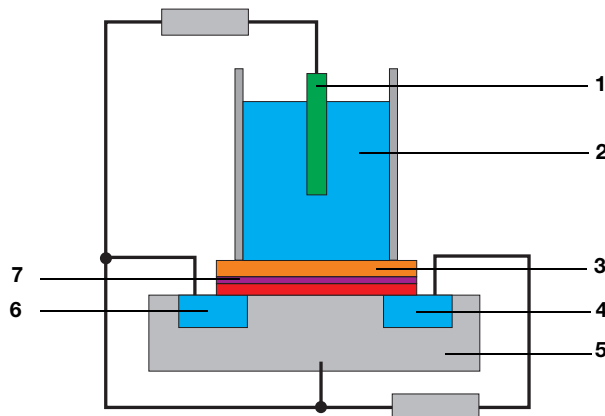
## Areas of application

- Food and drinks industry
- Dairies, cheese factories
- Hygienic production processes to meet 3-A requirements<sup>1</sup>
- Pharmaceuticals and
- In all hygienic production processes

## Function

A semi-conductor chip - the ISFET - takes on the function of the familiar glass membrane of normal combination electrodes. This measuring chip is embedded in a stable plastic body. This ensures a long service life in a variety of different media. When in operation, voltage is applied to the measuring chip. The extent of the current between source and drain is determined by the pH-sensitive gate. With a transmitter (such as the JUMO AQUIS 500 pH), the current can be displayed as a pH-Wert or used for control.

## Block diagram



- |   |                      |
|---|----------------------|
| 1 Reference electrode                                   | 2 Measurement medium |
| 3 Gate region with H <sup>+</sup> ion-sensitive coating | 4 Drain (N)          |
| 5 Silicon substrate (P)                                 | 6 Source (N)         |
| 7 Insulation  |                      |



Type 201050/04...

Type 201050/

## Key features

- Break-resistant
- Good response rate
- High measuring accuracy even at low temperatures
- Stable measurement values
- Can be used without a fitting
- Not susceptible to "dry-running"
- Excellent shelf life

<sup>1</sup> 3-A Sanitary Standards define the standards for food-safe materials that also have to be suitable for cleaning and disinfecting. These standards should ensure product quality, thus safeguarding the health of the final consumer.



## Storage

ISFET pH combination electrodes can be stored for a very long time. Checks only have to be made once a year, to make sure that the padding in the protective probe cap is still damp. If necessary, the padding should be soaked in a saturated KCl solution.

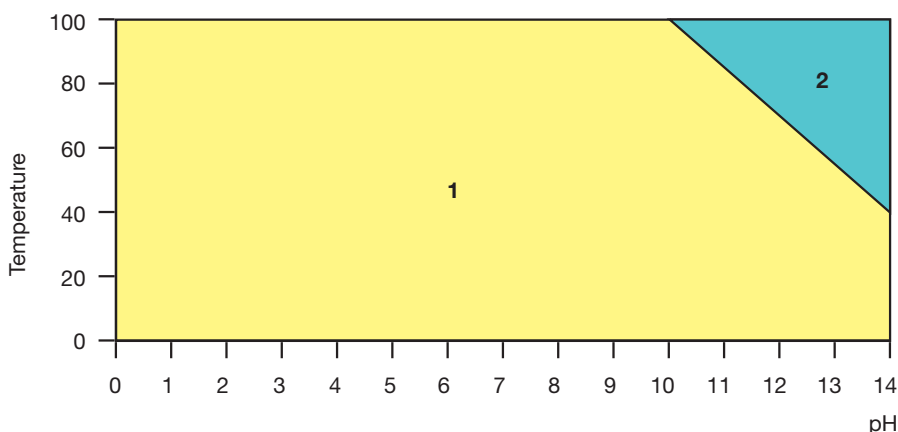
## Not suitable for use

- At temperatures below -10°C and above +110°C, as well as at pressures above 10 bar
- In fluoride-rich media
- In media with pH 14 at temperatures above +45°C (limited durability)
- In highly effective oxidizing agents
- In media with excessive salt concentrations
- For ultra-pure water applications (conductivity less than 10 µS/cm)
- In polluted media, that could block the ceramic diaphragm

## Installation guidelines

- The ISFET pH combination electrode can be installed in any position.
- The incident flow velocity should not exceed 1.5 m/s.
- The flow rate quantity should be reduced for media of higher viscosity or abrasiveness.
- When used in abrasive media, the ISFET sensor should be turned away from the direction of flow.
- When used in oil-containing media, the ISFET sensor should be parallel to the direction of flow.
- For immersion measuring, the ISFET pH combination electrode must be submerged at least 5 cm deep in the medium.
- The ISFET pH combination electrode is not susceptible to "dry-running"; however, in this situation, a small amount of the gel filling may escape, and be more quickly consumed than in normal operation.
- Calibration is advisable if dry-running continues for some time.

## Operative range



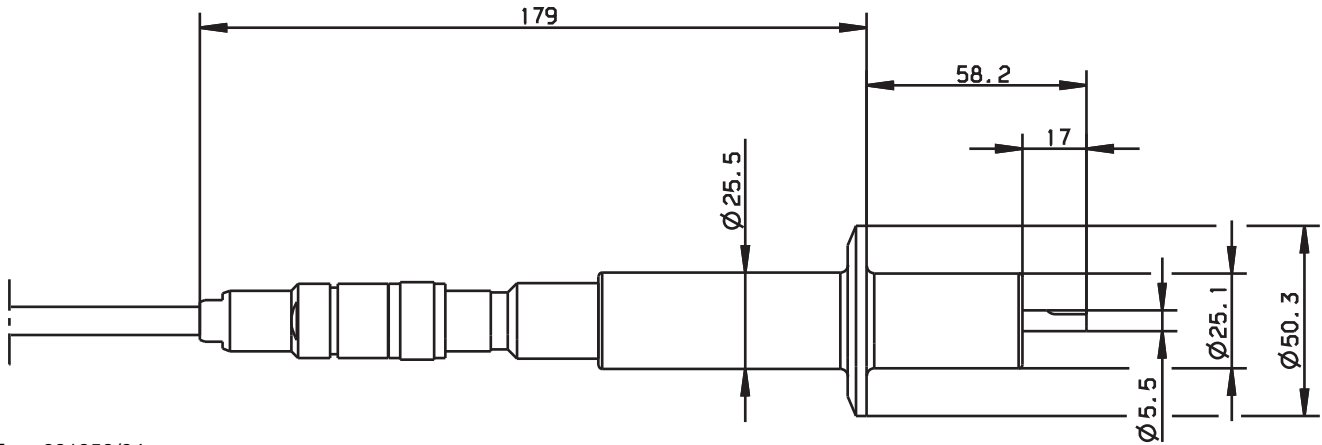
1 ideal working range                      2 restricted service life

## Technical data

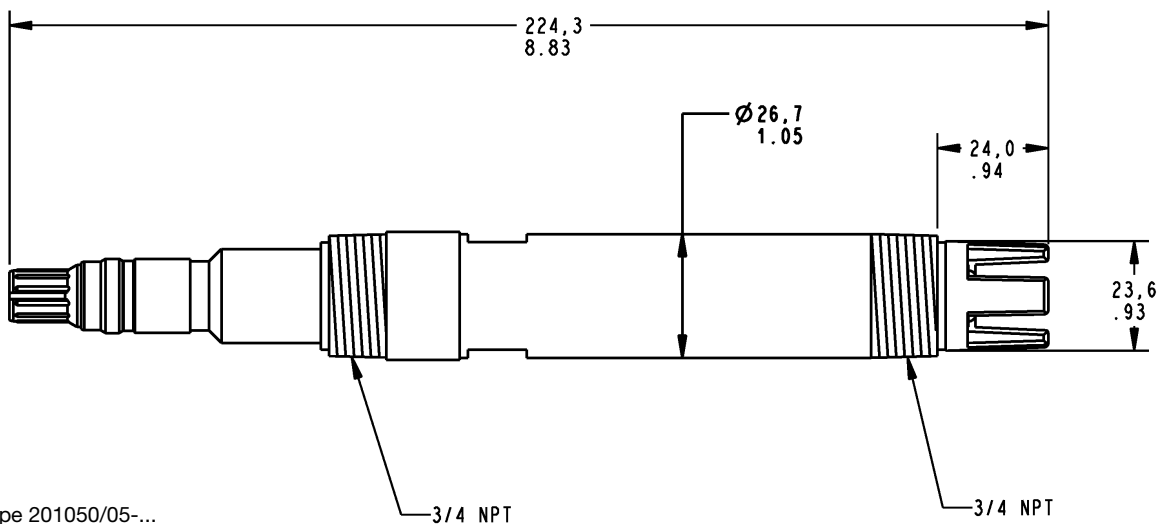
Sensor	
Measuring range	0 - 14 pH
Temperature range	-10 to +110
Sterilizable at	+130°C at max. 3.5 bar (20 min.)
Maximum process pressures	0 to 7 bar at -10 to +100°C 0 to 3.5 bar at temperatures above +100°C
Body material	PPS (polyphenylene sulfide), FDA-compliant PSU (polysulfone), FDA-compliant Silicone
Sealant	FPM (fluoropolymer rubber)
Process connection	G3/4" NPT thread or 1.5" clamp
Electrical connection	VarioPin connector, IP68
Weight	approx. 200 g

Cap adapter	
Pre-amplifier	A pre-amplifier is integrated in the cap adapter.
Cable length	6 m
Electrode connection	VarioPin socket, IP68
Electrical connection	Stripped ends, tinned

## Dimensions

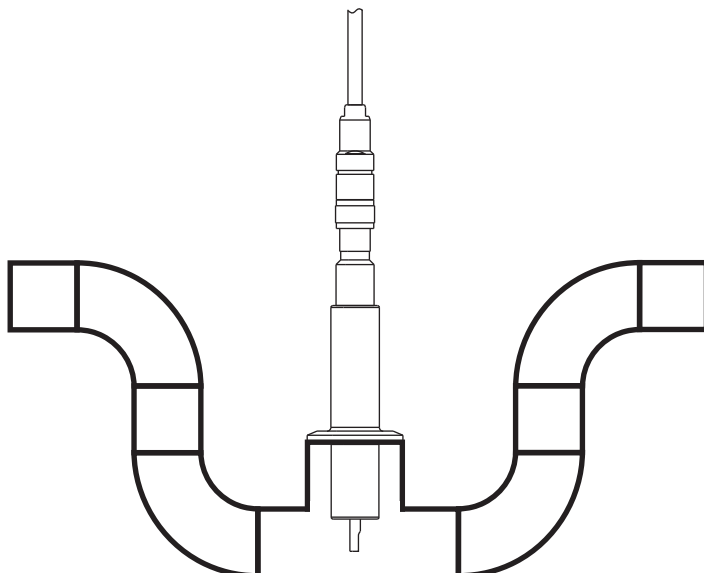


Type 201050/04-...



Type 201050/05-...

## Installation example



**Note**

When installed in tubing systems, the sensor should be mounted in the siphon, as shown.



## Electrical connection

to the JUMO AQUIS 500 pH transmitter/controller, as per data sheet 202560

Connection		Color	Terminal	Row
<b>Supply voltage for the cap adapter</b>				
Supply voltage ± 5 V DC, 5 mA		Blue Black Green	11 L+ 12 $\perp$ 13 L-	2
<b>pH sensor</b>				
Sensor Reference		White / black Shield	1 3 + 5 bridged	2
Resistance thermometer in 3-wire circuit, Pt 1000		White Red Red / black	8 9 10	

## Order details: ISFET pH combination electrode

201050 (1) **Basic type**  
ISFET pH combination electrode

(2) **Basic type extension**

	04	Version for hygienic applications
	05	Screw-in version
x x	50	(3) <b>Active component</b> ISFET module
x x	28	(4) <b>Electrical connection</b> VarioPin (VP) connector
x	145	(5) <b>Process connection</b> 3/4" NPT thread
x	615	1.5" clamp
x	24	(6) <b>Fitting length</b> 24 mm (for connection 145 only)
x	58,2	58.2 mm (for connection 615 only)
x x	000	(7) <b>Extra codes</b> none

Order code  /  -  -  -  -  /   
 Sample order 201050 / 04 - 50 - 28 - 145 - 24 / 000

**Note:**

The type code is a type designation, not a modular system.  
 If possible, choose items listed under "stock versions" or "production versions" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features.  
 In case of doubt, please ask.

## Production versions (delivery 2 weeks after receipt of order)

Type	Brief description	Sales No.
201050/04-50-28-615-95/000	ISFET pH combination electrode, ceramic diaphragm, 1.5" clamp connection, 58.2 mm fitting length	20/00525411
201050/05-50-28-145-24/000	ISFET pH combination electrode, ceramic diaphragm, 3/4" NPT thread, 24 mm fitting length	20/00525415

## Accessories (delivery 2 weeks after receipt of order)

Type	Brief description	Sales No.
Cap adapter	Preamplifier, 6 m connecting cable, prefabricated	(PG 201090) 20/00525421
Cap adapter	Preamplifier, 15 m connecting cable, prefabricated	(PG 201090) 20/00525420

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# JUMO glass pH electrodes

## Brief description

Glass pH electrodes are used in conjunction with reference electrodes to record the pH value. The sensor part of the glass pH electrode is made from a special, pH-sensitive membrane glass. Electrodes with special types of membrane glass are available for measuring in the different media:

- UW glass for general, aqueous media
- C glass for media containing fluorides (up to 1000 mg HF/l)
- HT glass for use at temperature ranges > 80 °C and in highly alkaline media



Type 201081/10 ...

## Technical data

<b>pH range</b>	UW glass 0 - 12 pH (briefly pH 14) C glass 0 - 11 pH HT glass 0 - 14 pH
<b>Temperature range</b>	UW glass 0 - 80 °C C glass 0 - 50 °C HT glass 0 - 135 °C
<b>Pressure range</b>	with plug cap: unpressurized operation with Pg 13.5 screw cap: 6 bar/25 °C, 1 bar/80 °C
<b>Terminal head</b>	PPO
<b>Process connection</b>	Plug cap no thread or Pg 13.5 screw cap
<b>Washer</b>	PSU
<b>Seal</b>	FPM70
<b>Shaft material</b>	Glass (DIN 19263)
<b>Fitting length</b>	120 mm (standard) other fitting lengths on request

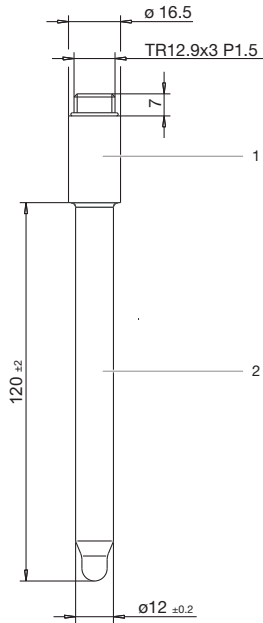
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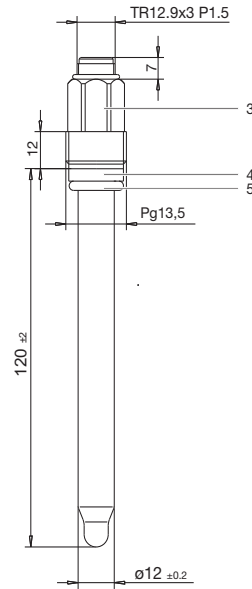
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## Dimensions



**Plug cap**



**Pg 13.5 screw cap**

- 1 Plug cap no thread
- 2 Shaft material (glass DIN 19263)
- 3 Pg 13.5 screw cap
- 4 Washer (PSU)
- 5 Seal (FPM70)

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## Order details

### (1) Basic type

201081 JUMO glass pH electrodes

### (2) Shaft material

x 89 glass

### (3) Active component

o 11 C glass/pH 0 - 12/-5 to +80 °C/fluoride-resistant up to 1000 mg HF/l  
 o 12 HT glass/pH 0 - 14/-5 to +130 °C/high-temperature applications  
 x 18 UW glass/pH 0 - 12 (briefly 14)/-5 to +80 °C

### (4) Connection

o 21 plug cap  
 x 22 Pg 13.5 screw cap  
 o 40 plug cap with fixed cable

### (5) Length of fixed cable

x 0 Standard

### (6) Instrument connector

x 00 none  
 o 76 BNC connector  
 o 78 DIN connector

### (7) Fitting length

x 120 120 mm (standard)  
 ... Other fitting lengths on request

x = as standard

o = optional:

	(1)	-	(2)	-	(3)	-	(4)	-	(5)	-	(6)	/	(7)
<b>Order code</b>	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
<b>Order example</b>	201081	-	89	-	18	-	22	-	0	-	00	/	120

**Note:** The order code is a type designation, not a modular system. If possible, choose items listed under "stock versions" or "production versions" for your orders. We will have to technically inspect and approve a free combination of individual key features. In case of doubt, please ask.

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## Stock version

(delivery 3 working days after receipt of order)

Type	Brief description	Sales no.
201081-89-18-22-0-00-120 (2G-2-U)	Glass pH electrode, UW glass, Pg 13.5 screw cap, 120 mm	00083302

## Production versions

(delivery 10 working days after receipt of order)

Type	Brief description	Sales no.
201081-89-11-21-0-00-120 (2G-1-C)	Glass pH electrode, C glass, plug cap, 120 mm	00083300
201081-89-12-21-0-00-120 (2G-1-HT)	Glass pH electrode, HT glass, plug cap, 120 mm	00083301
201081-89-11-22-0-00-120 (2G-2-C)	Glass pH electrode, C glass, Pg 13.5 screw cap, 120 mm	00083303
201081-89-12-22-0-00-120 (2G-2-HT)	Glass pH electrode, HT glass, Pg 13.5 screw cap, 120 mm	00083304

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# JUMO single/twin redox electrodes

## Brief description

Single/twin redox electrodes consist of a glass or plastic shaft, to the lower end of which a metal pin or metal tip is fused or cemented. With metal electrodes, the redox potential of aqueous media can be determined in conjunction with a reference electrode (data sheet 201083). Twin metal electrodes are used to measure the end point in amperometric titrations.

The following active components are available:

- gold: tip for media with a powerful oxidizing action, such as in cyanide detoxification
- platinum: tip for media with a powerful reducing action, such as in chromate reduction
- platinum/gold: pins in twin metal electrodes
- platinum/platinum: pins in twin metal electrodes
- antimony: for determining the pH value in media with a high hydrofluoric acid content (HF)



Type 201082/13 ...

## Technical data

<b>Redox range</b>	Pt tip/Pt pin $\pm 2000$ mV Au tip/Au pin $\pm 2000$ mV Sb pin
<b>Temperature range</b>	Pt tip 0 - 135 °C Au tip 0 - 135 °C Sb pin
<b>Pressure range</b>	with plug cap: unpressurized operation with Pg 13.5 screw cap: 6 bar/25 °C, 1 bar/80 °C
<b>Terminal head</b>	PPO
<b>Process connection</b>	plug cap without thread or Pg 13.5 screw cap
<b>Washer</b>	PSU
<b>Seal</b>	FPM70
<b>Shaft material</b>	glass (DIN 19 263)
<b>Fitting length</b>	120 mm (standard) other fitting lengths on request

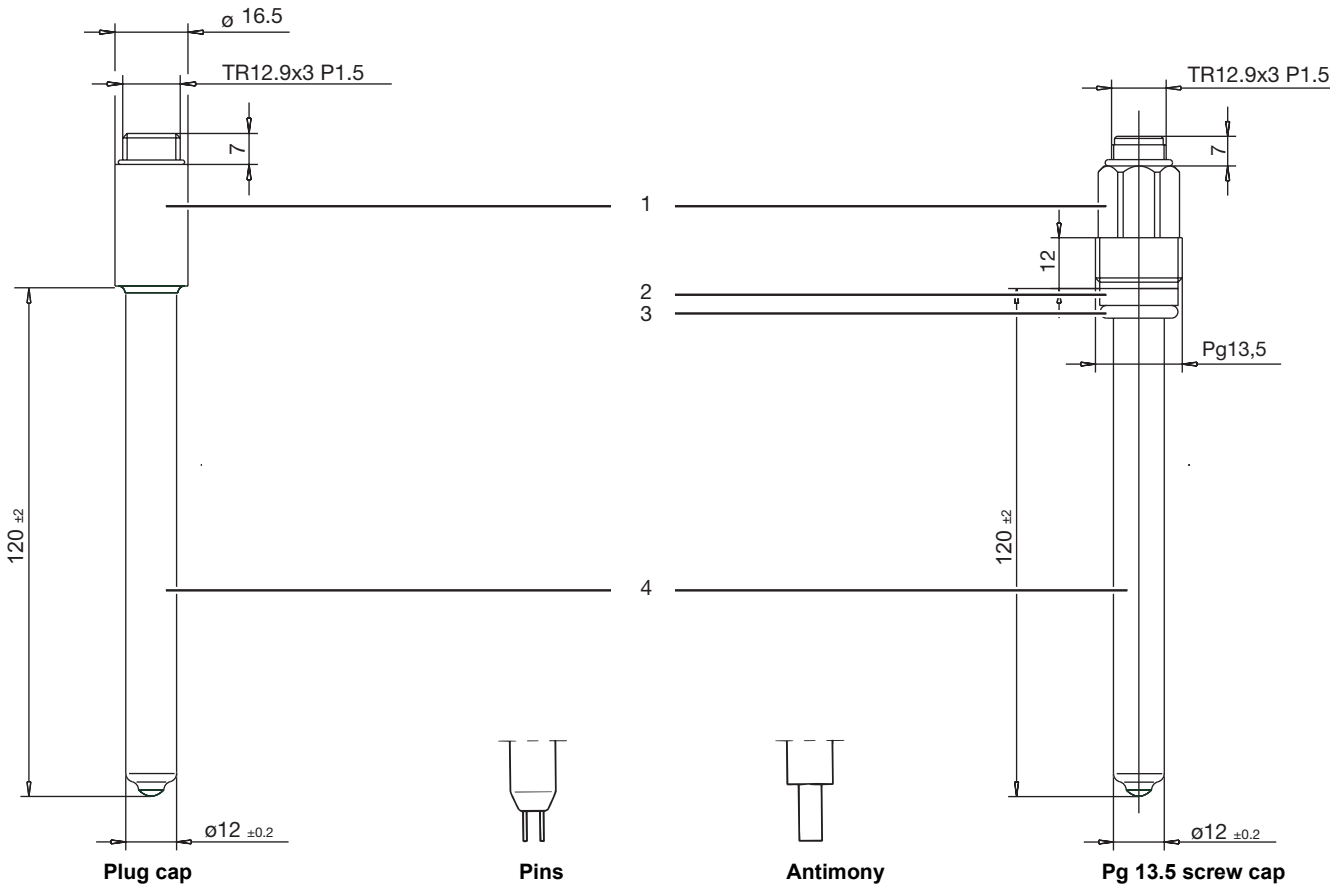
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## Dimensions



- 1 Plug cap without thread or Pg 13.5 screw cap
- 2 Washer
- 3 Seal
- 4 Shaft material

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## Order details

(1) **Basic type**  
 201082 JUMO single/twin redox electrodes

(2) **Basic type extension**

12 antimony electrode for measuring the pH value  
 13 metal redox electrode  
 14 twin metal redox electrode

(3) **Shaft material**

x x 85 glass  
 x 89 plastic

(4) **Active component**

x 22 platinum tip/redox range ±2000 mV/-5 to +135°C  
 o 23 platinum/platinum pin/redox range ±2000 mV/-5 to +135°C  
 x 24 platinum/gold pin/redox range ±2000 mV/-5 to +135°C  
 x 27 antimony/pH 0 - 10/fluoride concentration > 1000 mg HF/l  
 o 32 gold tip/redox range ±2000 mV/-5 to +135°C

(5) **Connection**

o o 21 Plug cap  
 x x x 22 Pg 13.5 screw cap

(6) **Fitting length<sup>a</sup>**

x x x 120 120 mm (standard)

x = as standard

o = option

<sup>a</sup> Other fitting lengths on request.

<b>Order code</b>	(1)	/	(2)	-	(3)	-	(4)	-	(5)	-	(6)
<b>Order example</b>	201082	/	13	-	89	-	22	-	22	-	120

**Note:**

The order code is a type designation, not a modular system. If possible, choose items listed under "stock versions" or "production versions" for your orders. We will have to technically inspect and approve a free combination of individual key features. In case of doubt, please ask.

## Production versions

(delivery 10 working days after receipt of order)

Type	Brief description	Sales no.
201082/13-89-22-21-120	Metal redox electrode, platinum tip, plug cap, 120 mm	20/00300402
201082/13-89-22-22-120	Metal redox electrode, platinum tip, Pg 13.5 screw cap, 120 mm	20/00300403
201082/12-85-27-22-120	Antimony electrode, Pg 13.5 screw cap, 120 mm	20/00325951

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## JUMO reference electrode

### Brief description

It is the task of reference electrodes to supply a constant potential during potentiometric measurements. The potential of an indicator electrode (such as a glass pH electrode) serves as a counterpoint. Reference electrodes are equipped with a cartridge-style silver/silver chloride conduction system.

A 3-molar potassium chloride solution is used as the standard reference electrolyte. The operating temperature range is between 0 and 90°C.

Reference electrodes can also be supplied with a liquid KCl electrolyte as an option. The operating temperature range is then between 0 and 135°C. The maximum working temperature of the glass electrode must be taken into account here.



Type 201083 ...

### Technical data

<b>Temperature range</b>	gel filling 0 - 80 °C KCl filling 0 - 135 °C
<b>Pressure range</b>	with plug cap: unpressurized operation with Pg 13.5 screw cap: 10 bar/25 °C, 1 bar/80 °C
<b>Terminal head</b>	plug cap, Pg 13.5 screw cap
<b>Process connection</b>	Pg 13.5 thread
<b>Washer</b>	PSU
<b>Seal</b>	FPM70
<b>Shaft material</b>	glass (DIN 19 263)
<b>Fitting length</b>	120 mm (standard), other fitting lengths on request
<b>Diaphragm</b>	1 mm zirconium dioxide

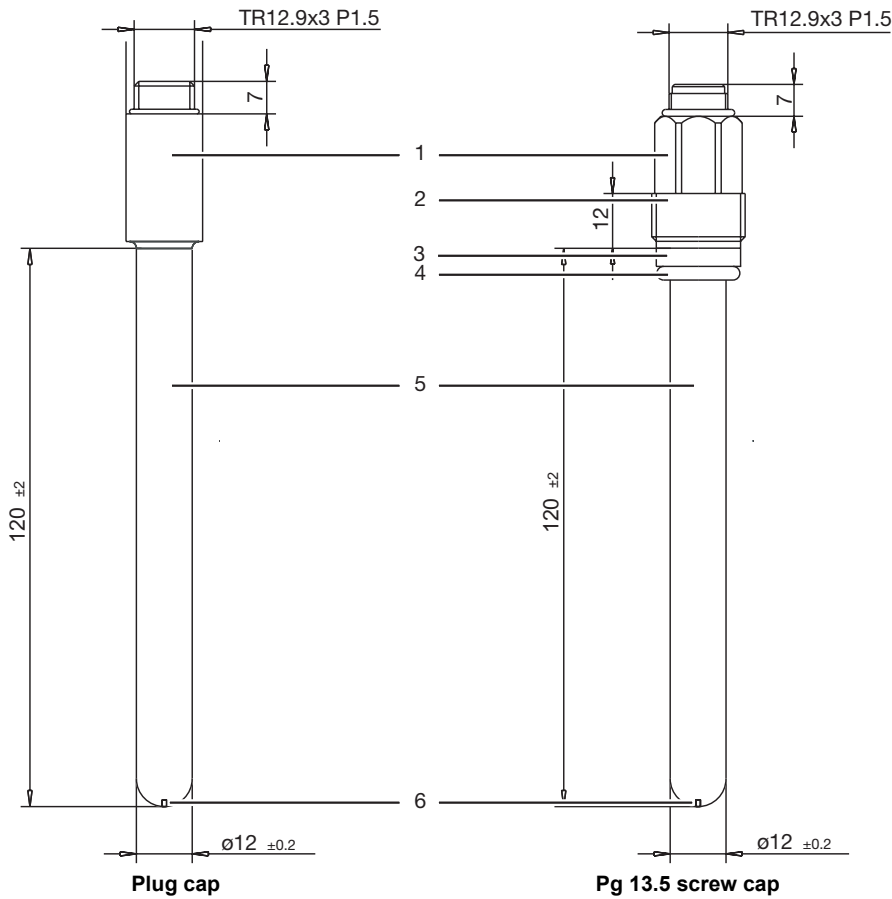
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## Dimensions



- 1 Plug cap or Pg 13.5 screw cap
- 2 Pg 13.5 process connection
- 3 PSU washer
- 4 FPM70 seal
- 5 Glass shaft material

**JUMO GmbH & Co. KG**

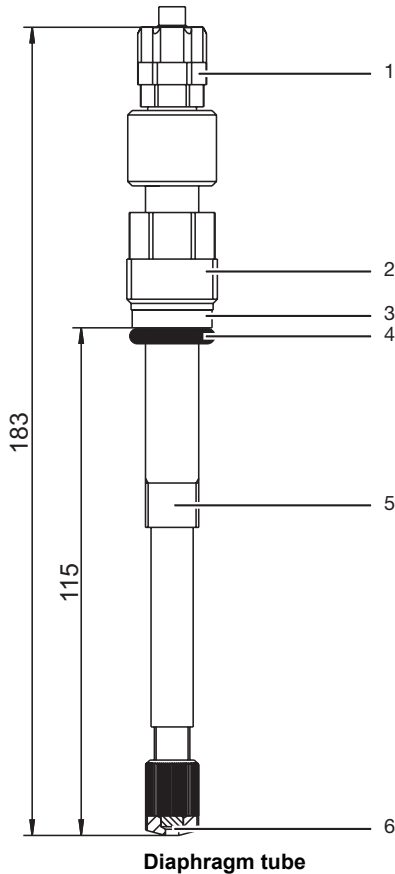
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**Accessories**

- 1 Hose connection
- 2 PPO terminal head with process connection
- 3 PSU washer
- 4 FPM70 seal
- 5 PP shaft material

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## Order details

### (1) Basic type

201083		JUMO reference electrode
	<b>(2) Shaft material</b>	
x	89	glass
	<b>(3) Electrolyte</b>	
x	04	gel filling
o	05	KCl filling
	<b>(4) Diaphragm</b>	
x	04	PTFE diaphragm
x	07	1 x zirconium dioxide diaphragm (special ceramic)
o	09	3 x zirconium dioxide diaphragm (special ceramic)
	<b>(5) Connection</b>	
o	21	screw cap
x	22	Pg 13.5 screw cap
o	40	screw cap with attached cable
o	60	Pg 13.5 screw cap with attached cable
	<b>(6) Fitting length</b>	
x	120	120 mm (standard)
o	225	225 mm
	...	Other fitting lengths on request
x = as standard		
o = option		

Order code	(1)	(2)	(3)	(4)	(5)	(6)
Order example	201083	89	04	07	22	120

**Note:**

The order code is a type designation, not a modular system. If possible, choose items listed under "stock versions" or "production versions" for your orders. We will have to technically inspect and approve a free combination of individual key features. In case of doubt, please ask.

### Stock version

(delivery 3 working days after receipt of order)

Type	Brief description	Sales no.
201083-89-04-07-22-0-120	Reference electrode, 1 x zirconium diaphragm, gel filling, Pg 13.5 screw cap, 120 mm	20/00083865

### Production version

(delivery 10 working days after receipt of order)

Type	Brief description	Sales no.
201083-89-04-07-21-0-120	Reference electrode, 1 x zirconium diaphragm, gel filling, plug cap, 120 mm	20/00083861

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201083-89-05-07-21-0-120

Reference electrode, 1 x zirconium diaphragm,  
KCl filling, plug cap, 120 mm

20/00083862

**Accessories**

(delivery 10 working days after receipt of order)

**Description**

Diaphragm tube

10 x replacement PTFE diaphragms

**Sales no.**

20/00084582

20/00304567

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## JUMO compensation thermometers

### Brief description

Temperature error can falsify the measurement signal during electrochemical measurements. Compensation thermometers are used to compensate measurement error caused by temperature. Compensation thermometers detect the temperature of the sample. The acquired signal is transferred to the downstream transmitter. In the transmitter, the measurement value is calculated back to the 25°C reference temperature.



Type 201085- ...

### Technical data

<b>Temperature range</b>	0 - 150 °C
<b>Pressure range</b>	with plug cap: unpressurized operation with Pg 13.5 screw cap: 10 bar/25 °C, 1 bar/80 °C with Pg 13.5 M12 screw cap: 10 bar/25 °C, 1 bar/80 °C
<b>Terminal head</b>	plug cap without thread (PPO) or Pg 13.5 screw cap (PPO)
<b>Process connection</b>	no thread or Pg 13.5 thread
<b>Washer</b>	PSU
<b>Seal</b>	FPM70
<b>Shaft material</b>	glass (DIN 19 263)
<b>Active component</b>	Pt100 DIN/IEC class B
<b>Fitting length</b>	120 mm (standard), other fitting lengths on request

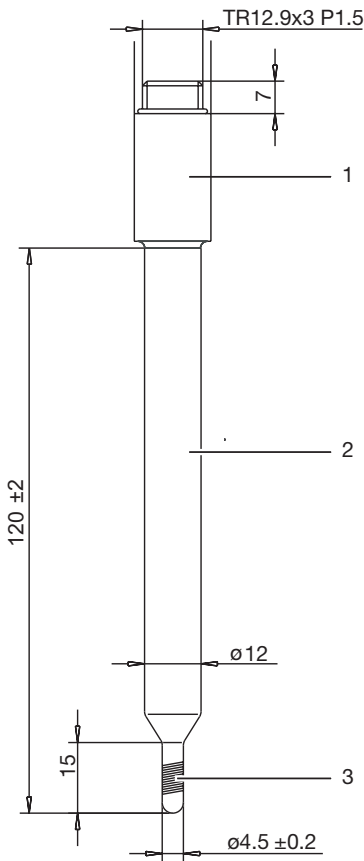
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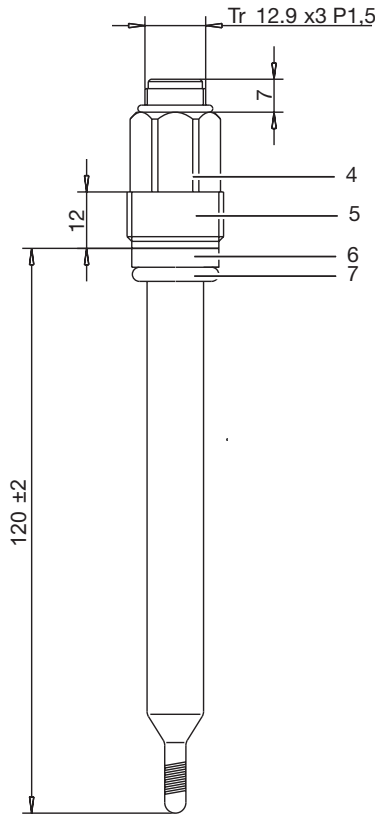
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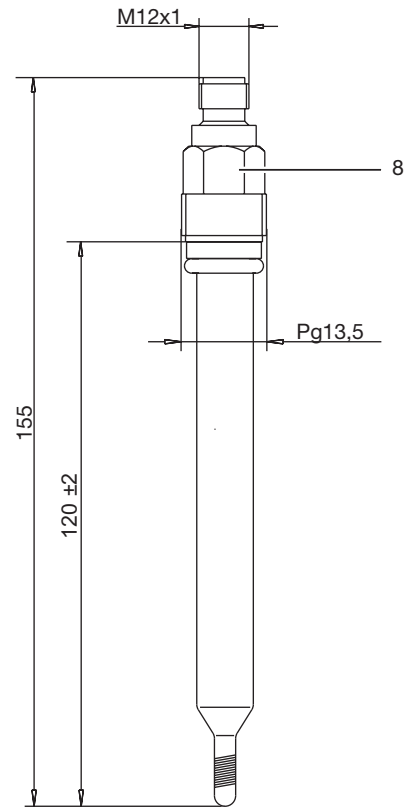
## Dimensions



Plug cap



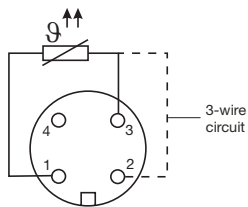
Pg 13.5 screw cap



Pg 13.5 screw cap with M12 connector

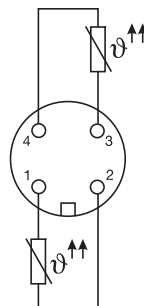
## M12 connector pin assignment

1 x Pt 100/Pt 1000



M12 connector x 1,  
4-pin 713 series

2 x Pt 100



M12 connector x 1,  
4-pin 713 series



M12 socket x 1,  
5-pin 713 series (accessories)

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**Order details:**

	(1) <b>Basic type</b>	201085	JUMO compensation thermometer
x	(2) <b>Shaft material</b>	89	glass
o	(3) <b>Active component</b>	1001	Pt 100 in a 3-wire circuit/class B/0 - 150°C <sup>a</sup>
x		1003	Pt 100 in a 2-wire circuit/class B/0 - 150°C
o		1005	Pt 1000 in a 2-wire circuit/class B/0 - 150°C
o		1006	Pt 1000 in a 3-wire circuit/class B/0 - 150°C <sup>a</sup>
o		2003	twin Pt 100/class B/0 - 150°C <sup>a</sup>
o	(4) <b>Connection</b>	21	plug cap
x		22	Pg 13.5 screw cap
o		70	Pg 13.5 screw cap with M12 connector
x	(5) <b>Fitting length</b>	120	120 mm (standard) <sup>b</sup>

x = as standard

o = option

<sup>a</sup> Only possible in conjunction with connection 70.

<sup>b</sup> Other fitting lengths on request.

<b>Order code</b>	(1)	-	(2)	-	(3)	-	(4)	-	(5)
<b>Order example</b>	201085	-	89	-	1003	-	22	-	120

**Note:**

The order code is a type designation, not a modular system.

If possible, choose items listed under "stock versions" or "production versions" for your orders.

We will have to technically inspect and approve a free combination of individual key features.

In case of doubt, please ask.

**Stock version**

(delivery 3 working days after receipt of order)

Type	Brief description	Sales no.
201085-89-1003-22-120	Compensation thermometer, Pt 100, Pg 13.5 screw cap, 120 mm	20/00300443

**Production version**

(delivery 10 working days after receipt of order)

Type	Brief description	Sales no.
201085-89-1003-70-120	Compensation thermometer, Pt 100, Pg 13.5 screw cap with M12 connector, 120 mm	20/00492092
201085-89-1003-70-120	Compensation thermometer, Pt 100, Plug cap, 120 mm	20/00300442

**Accessories**

Type	Brief description	Sales no.
------	-------------------	-----------

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M12 socket x 1

5-pin M12 socket; in conjunction with connection 70  
(Pg 13.5 screw cap with M12 connector)

20/00458581

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# JUMO dTRANS pH 02

## Transmitter/controller for pH, redox, ammonia, standard signals and temperature

### Brief description

The JUMO dTRANS pH 02 is a compact, modular instrument. It is highly flexible (for example 3 slots for optional boards) and capable of performing a wide range of tasks. The main input of the JUMO dTRANS pH 02 is designed for sensors used to measure the pH value or redox potential (both conventional glass sensors and ISFET sensors can be connected) or ammonia concentration. Resistance thermometers Pt100 and Pt1000, NTC/PTC or standard signals 0(4) - 20 mA or 0 - 10 V can be connected to the second analog input (compensation input). The two binary inputs can be used either as initiators for actions (e.g. HOLD, keyboard inhibit) or when connecting pulse generators (for example impeller sensors) for flow-rate measurement. The high-contrast graphic display allows for several options including display of input signal with numbers or as bar graph. Parameters are displayed in plain text for easily comprehensible and reliable operation.

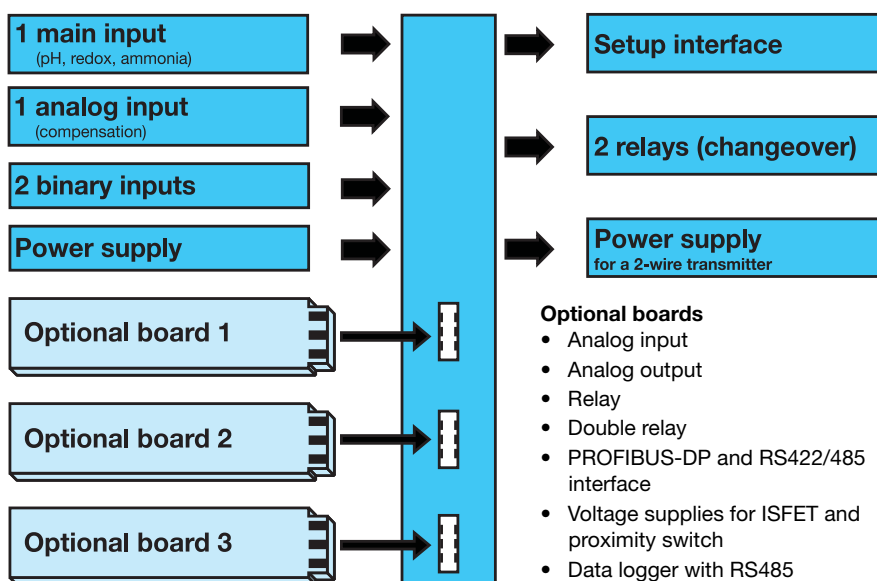
The JUMO dTRANS pH 02 can be used as a two-point or three-point controller, three-point modulating controller or continuous controller. All controller outputs can be configured to P, PI, PD or PID action. The software for the controllers includes parameter set selection, a math module and more.

A setup program is available for convenient configuration via PC. The instrument can be integrated into a data network by means of an RS422/485 or PROFIBUS-DP interface. Screw terminals on the back are used for the electrical connection.

Some applications:

- Neutralization
- Detoxification applications (parameter set selection)
- Redundant pH measurement with one instrument
- pH measurement including flow-rate measurement
- pH measurement including measurement of free chlorine (pH compensated chlorine measurement).

### Block diagram



### Approval/Approval marks (see Technical data)



**JUMO dTRANS pH 02, type 202551/01... in panel case**



**JUMO dTRANS pH 02, type 202551/05... in surface-mounted case**

### Key features

- A choice of display visualizations: large numbers, bar graph or trend display
- Integrated calibration routines: with 1, 2 and 3 points
- Math and logic module
- Calibration logbook
- Wash timer to control cleaning equipment
- 13 operator languages integrated; see order details
- Setup program provides: convenient programming, system documentation
- Flush-mounted instrument - just 96 mm x 48 mm x 95 mm
- Electrode monitoring can be activated
- Flow-rate measurement

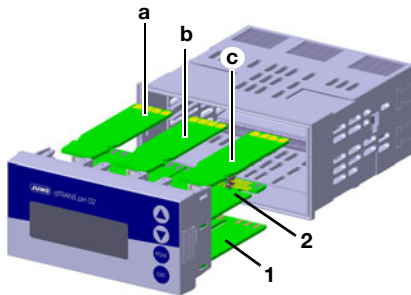
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**Boards**



(1)	PSU board
(2)	Main board
(a)	Optional board 1
(b)	Optional board 2
(c)	Optional board 3

**PSU board (1)**

This board is always fitted in the instrument and no variations are possible.

The board includes the following items:

- The voltage supply for the JUMO dTRANS pH 02.
- The voltage supply for external 2-wire transmitters.
- 2 relays with changeover contacts.

**Main board (2)**

This board can **not** be changed subsequently! The main board (pH/redox) has:

- The main input for connecting a pH, redox or ammonia electrode.
- The secondary input for connecting a temperature sensor Pt100, Pt1000, a resistance transmitter or a standard signal 0(4) to 20 mA or 0 to 10 V.
- 2 binary inputs.
- The setup interface (for PC interface adapter).

**Optional board (1), (2) or (3)**

These boards are combinable and can be ordered in the following versions:

- Analog input
- 1 continuous output
- 1 relay (changeover)
- 2 relays (NO with common pin)
- 1 Triac (1 A)
- 1 PhotoMOS® relay (0.2 A)
- 1 voltage supply for an ISFET sensor (4.85 V)

The following boards can **only** be placed in slot 3, either:

- Modbus/Jbus
- PROFIBUS-DP
- Data logger

For versions with a wall-mounted case the (re)placement of the optional boards by the customer is not possible.

**Functional description**

The instrument is a modularly designed indicator/controller for use in both simple and demanding control tasks. It can be integrated into the PLC via interfaces

To make programming and operation easy, all parameters are clearly assigned to levels and displayed in plain text. Operation is protected by a code word. Operation can be adapted on an individual basis because parameters can be generally enabled or assigned to the protected area.

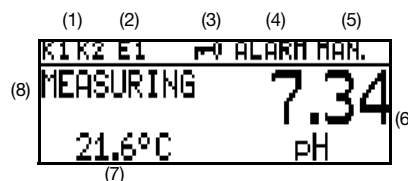
A setup program for the PC is available as a more convenient configuration option, rather than using the instrument keypad.

**User data**



Up to 8 parameters that are frequently changed by the user can be combined in the user level under "User data" (via setup program only).

**Displays and controls**



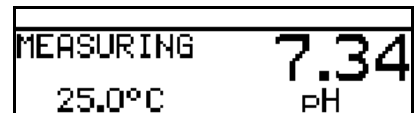
(1)	<b>Binary outputs (relays)</b> Output active if symbol is visible.
(2)	<b>Binary input</b> Input closed if symbol is visible.
(3)	<b>Keyboard inhibit</b> Keys locked if symbol is visible.
(4)	<b>Alarm message</b> ALARM (flashing): Broken sensor or overrange, etc. AL R1: Controller monitoring alarm from controller channel 1. AL R2: Controller monitoring alarm from controller channel 2. CALIB: Calibration mode active. CALIB (flashing): Calibration timer elapsed.
(5)	<b>Output mode</b> MAN.: Manual mode active. HOLD: Hold mode active.
(6)	<b>Upper display</b> Measured value and unit of the variable set by parameter "Upper display".

(7)	<b>Lower display</b> Measured value and unit of the variable set by parameter "Lower display".
(8)	<b>Operating mode</b> MEASUREMENT: Normal measuring mode is active.

**Display modes**

The following display modes are available:

**Normal display**



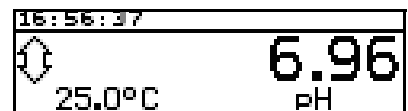
In this display method the measurements appear in numbers, as usual.

**Large display**



This method uses the complete display height.

**Trend display**



In this display a symbol is added to the numerical value to indicate the direction and speed of change for the measurement value. This can be very useful for optimizing the controller, for example.

From left to right:

Fast, medium and slow rise, steady, slow, medium and fast fall.

**Bar graph**



In this display mode, it only takes a glance to ascertain the range for the current measurement.

Any scale can be used for the bar graph.

**Trend curve (data monitor)**



The ring buffer contains about 100 measuring points. The sampling and storage rates can be adjusted.

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**Flow rate quantity**

K1	
FLOW RATE	0.37 l/s
VOLUME	0.61 m <sup>3</sup>
TOTAL QU.	83.61 m <sup>3</sup>

If an input has been configured for flow-rate measurement, this display can be accessed.

**Function modes of the main board****pH measurement**

Both pH combination electrodes and glass electrodes with separate reference electrode can be connected. There are two ways to connect these measurement chains:

- Asymmetrical high-resistance (the variant generally used)
- Symmetrical high-resistance (connection type used in special cases)

The impedance of the connected electrode can be monitored. The glass and reference impedance can be recorded individually (when a separate ground pin is used) or as a cumulative value.

Special electrodes, for example antimony electrodes, can also be connected.

The instrument makes a voltage supply available for ISFET sensors. This makes it possible to operate the corresponding sensors directly.

ISFET sensors are used in special applications when there is a preference not to use glass sensors (e.g. non-glass pH value measurement). Because these sensors are not standardized, usability should be checked before they are used.

The temperature of the pH value is compensated by means of the automatic temperature measurement by the second input or by entering the value manually.

**Redox measurement**

Both redox combination electrodes and metal electrodes with separate reference electrode can be connected.

The display can be in mV or any scale can be used.

**Ammonia measurement**

After the instrument is configured as an NH<sub>3</sub> (ammonia) transmitter/controller, the corresponding sensors can be connected.

Ammonia measurements are required for example in leakage monitoring of cooling circuits.

**Analog input for main board**

0(4) to 20 mA; 0 to 10 V and Pt100/Pt1000/NTC/PTC (max. 30 kΩ)/customized.

Typical application: Compensation input for temperature compensation of the main measurement variable.

**Function modes of the option inputs, multi-channel mode**

If analog inputs have been fitted (optional board), the device will have multi-channel functions. The following signal types can be processed:

- 0(4) to 20 mA
- 0 to 10 V
- Pt100/Pt1000

Sensors that return one of the output signals listed above can be connected to the instrument for the following measurement variables, for example:

- free chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid as per data sheet 20.2630.
- pH value or redox potential as per data sheet 20.2701.
- liquid level measurements.
- flow rate measurements etc.

The instrument provides the following calibration options in this function mode:

- Zero point
- End value
- Zero point and end value
- Cell constant
- Temperature coefficient

This allows optimum adaptation of the instrument to the sensor.

**Linear scaling**

Select this mode when the input signal will be displayed linearly.

One of the following units is used for display or control:

- μS/cm
- mS/cm
- %
- mV
- pH
- ppm
- customized (5 characters)

**Electrolytic conductivity**

μS/cm or mS/cm are the units used for display and control.

**Specific resistance (ultra-pure water)**

Display/control with the unit kΩ × cm or MΩ × cm.

**TDS**

Display/control with the unit ppm.

The specific TDS factor can also be entered in this mode.

**Concentration**

In this mode, the concentration of a liquid can be determined from its uncorrected conductivity.

% or "customized" are the units used for display and control.

Concentration measurement:

**Caustic solution**

NaOH 0 to 15 % by wt. 0 to 90 °C  
NaOH 25 to 50 % by wt. 0 to 90 °C

**Nitric acid**

HNO<sub>3</sub> 0 to 25 % by wt. 0 to 80 °C  
HNO<sub>3</sub> 36 to 82 % by wt. -20 to 80 °C

**Sulfuric acid**

H<sub>2</sub>SO<sub>4</sub> 0 to 28 % by wt. 0 to 100 °C  
H<sub>2</sub>SO<sub>4</sub> 36 to 85 % by wt. 0 to 115 °C  
H<sub>2</sub>SO<sub>4</sub> 92 to 99 % by wt. 0 to 115 °C

**Hydrochloric acid**

HCl 0 to 18 % by wt. 0 to 65 °C  
HCl 22 to 44 % by wt. -20 to 65 °C

**Customized with table**

Non-linear correlations between the input and output variable can be processed in this mode. Typical applications include measuring the level of liquid in horizontal, cylindrical containers or simply measuring the concentration.

The input values are processed in a table (max. 20 value pairs). Values can only be entered in the table using the optional setup program.

The units used for display and control are:

- μS/cm
- mS/cm
- customized (5 characters)
- Use the offset parameter to adjust the display.

**Calibration****pH value measurement**

- One-point calibration
- Two-point calibration
- Three-point calibration

**Redox potential measurement**

- One-point calibration with display in mV
- Two-point calibration with display in % (free scaling)

**NH<sub>3</sub> (ammonia) measurement**

- One-point calibration (zero point of the measurement chain)

**Calibration logbook**

The last five successful calibrations can be accessed from the calibration logbook. This makes it possible to evaluate the aging of the connected sensor.

The logbook can be deleted if necessary (useful when changing the sensor).

If a data logger has been fitted (optional board), additional information such as the date and time are documented.



**Calibration timer**

The calibration timer indicates (on request) a required routine calibration. The calibration timer is activated by entering the number of days that must expire before there is a scheduled re-calibration (specified by the system or the operator).

**Additional functions of the JUMO dTRANS pH 02**

**Min/max value memory**

This memory records the minimum and maximum input quantities that occur. This information can be used, for example, to assess whether the design of the connected sensor is suitable for the values that actually occur.

**Binary input**

The following functions can be accessed through the binary input:

- Key lock activation  
 When this function is activated, operation is no longer possible via the keypad.
- "HOLD" mode activation  
 When this function is activated, the outputs (analog and relay) adopt the states previously defined.
- Alarm suppression (controller alarm only)  
 This function is used to temporarily deactivate alarm generation by means of the appropriately configured relay.
- Flow-rate measurement (counting input)  
 Instantaneous value  
 Partial quantity  
 Total quantity

Bridging the corresponding connection terminals with a floating contact (for example a relay) activates a predefined function.

**Wash timer**

A software function can be used to trigger cyclically recurring actions by controlling a relay.

**Control functions**

Functions can be assigned to the relays. The functions can be configured in turn by parameters P, PI, PD and PID structures can be freely programmed as control functions.

**Relay outputs**

Two relay changeover contacts are available for the main measurement variable and/or the temperature.

The following functions can be programmed:

- Switching direction (min/max)
- Limit controller (energizing/deenergizing delay, hysteresis)
- Pulse length output (see control functions)

- Pulse frequency output (see control functions)
- Modulating function (see control functions)
- Pulse controls  
 With this function, the output briefly switches on when the switching point is reached and then switches off again
- Wash timer elapsed
- Alarm
- Sensor/range error
- Behavior in the event of an alarm, underrange or overrange measurement, calibration and "HOLD"

**Flow-rate measurement**

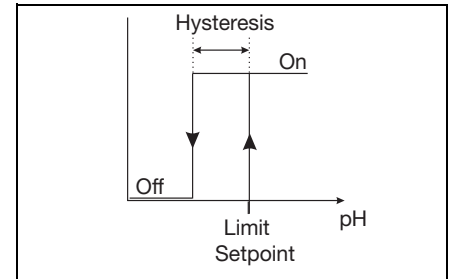
Flow rate transmitters can be connected directly to the binary inputs. One input is available for "slow speed" (up to about 300 Hz) and one for "high speed" (up to about 10 kHz). The current flow rate, partial quantity and total quantity can be displayed in different units (l/s, l/min, l/h, m<sup>3</sup>/min, m<sup>3</sup>/h, GAL(US)/s, GAL(US)/min, GAL(US)/h, or l, m<sup>3</sup>, GAL(US)).

**Data logger**

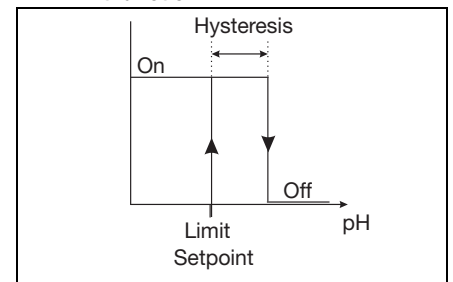
Up to 43,500 data sets can be stored in the data logger (ring buffer). Depending on the resolution, that corresponds to a storage time ranging from about 10 hours to 150 days. Data can be read by means of the setup program and then further processed with an "Office" product. The data logger makes it possible to record and document processes and supports analysis of the same processes.

**Contact functions**

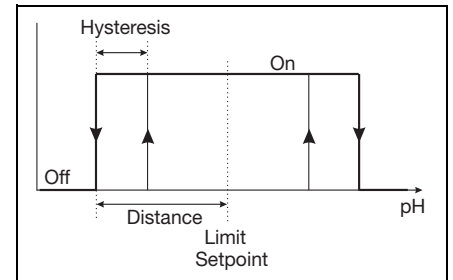
**Max. limit function**



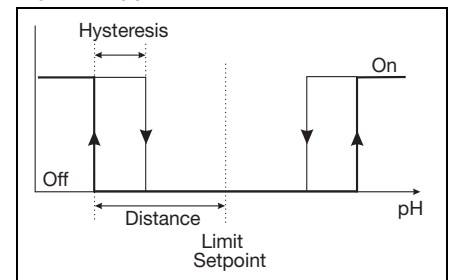
**Min. limit function**



**Alarm window 1**

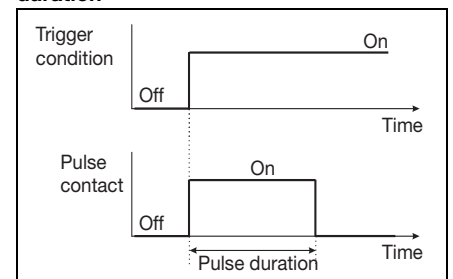


**Alarm window 2**



**Pulse contact**

**Triggering condition longer than pulse duration**



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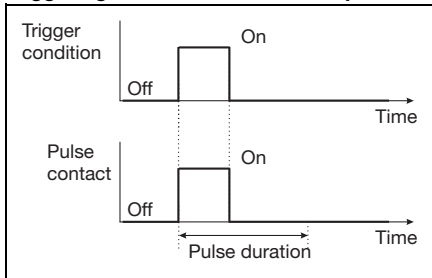
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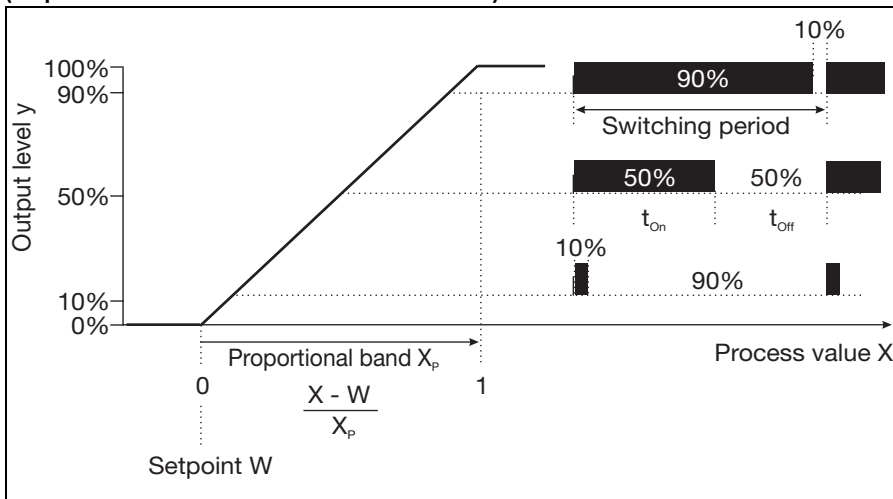
**Pulse contact**

Triggering condition shorter than pulse duration



**Pulse width controller**

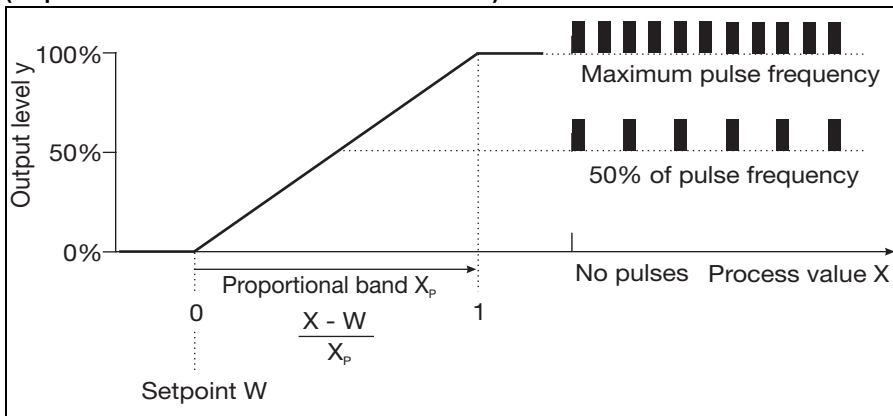
(output active with  $x > w$  and P control structure)



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

**Pulse frequency controller**

(output active with  $x > w$  and P control structure)



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

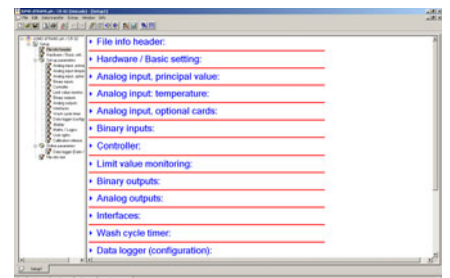
**Math and logic module**

The math module makes it possible to integrate measurement value of the analog inputs into a mathematical formula so that the calculated process variable can be displayed. The logic module can be used, for example, to link binary inputs and limit comparators with each other logically.

Up to two math or logic formulas can be entered with the setup program and the results of calculations can be displayed or exported via outputs (via PC setup software only).

**Setup PC program (accessory)**

The setup PC program is available in German, English and French for configuring the instrument. You can use it to create and edit sets of data and transfer them to the instrument, as well as read them out from it. The data can be stored and printed.



**Setup interface**

The setup interface is integrated into the JUMO dTRANS pH 02 by default. You can use it, together with the setup program (accessory) and a setup interface (accessory), to configure the instrument.

**RS232/RS485 interface**

The serial interface is used for communication with higher-level systems when the Modbus/Jbus protocol is used.

**PROFIBUS-DP**

The JUMO dTRANS pH 02 can be integrated into a fieldbus system according to the PROFIBUS-DP standard via the PROFIBUS-DP interface. This PROFIBUS-DP version is especially designed for communication between automation systems and distributed peripheral devices at the field level and is optimized for speed.

Data is transferred serially based on the RS485 standard.

Using the project design tool that is included in the delivery (GSD generator; GSD = device master file), a standardized GSD file is created by selecting characteristic device features of the JUMO dTRANS pH 02. This file is used to integrate the controller into the fieldbus system.

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## Technical data

### Inputs (main board)

Main input	Measuring range/control range	Accuracy	Effect of temperature
pH value	-2 to +16 pH	≤ 0.3 % of range	0.2 %/10 K
Redox potential	-1500 to +1500 mV	≤ 0.3 % of range	0.2 %/10 K
NH <sub>3</sub> (ammonia)	0 to 9999 ppm	≤ 0.3 % of range	0.2 %/10 K
<b>Secondary input</b>			
Temperature Pt100/1000	-50 to +250 °C <sup>a</sup>	≤ 0.25 % of range	0.2 %/10 K
Temperature NTC/PTC	0.1 to 30 kΩ Entry via table with 20 value pairs	≤ 1.5 % of range	0.2 %/10 K
Standard signal	0(4) to 20 mA or 0 to 10 V	0.25 % of range	0.2 %/10 K
Resistance transmitter	Minimum: 100 Ω Maximum: 3 kΩ	±5 Ω	0.1 %/10 K

<sup>a</sup> Selectable in °F.

### Resistance thermometer inputs (optional board)

Designation	Connection type	Measuring range	Measuring accuracy		Effect of ambient temperature
			3-wire/4-wire	2-wire	
Pt100 DIN EN 60751 (factory-set)	2-wire/3-wire 4-wire	-200 to +850 °C	≤ 0.05 %	≤ 0.4 %	50 ppm/°C
Pt1000 DIN EN 60751 (factory-set)	2-wire/3-wire 4-wire	-200 to +850 °C	≤ 0.1 %	≤ 0.2 %	50 ppm/°C
Sensor lead resistance	Maximum 30 Ω per line with three- and four-wire circuit				
Measurement current	approx. 250 µA				
Lead compensation	Not required for three- and four-wire circuit. With a 2-wire circuit, lead resistance can be compensated in the software by correcting the process value.				

### Standard signals inputs (optional board)

Designation	Measuring range	Measuring accuracy	Effect of ambient temperature
Voltage	0(2) to 10 V 0 to 1 V Input resistance <sub>E</sub> > 100 kΩ	≤ 0.05 %	100 ppm/°C
Electrical current	0(4) to 20 mA, Voltage drop ≤ 1.5 V	≤ 0.05 %	100 ppm/°C
Resistance transmitter	Minimum: 100 Ω Maximum: 4 kΩ	±4 Ω	100 ppm/°C

### Temperature compensation

Measurement variable	Compensation	Range <sup>a</sup>
pH value	Yes	-10 to +150°C
Redox potential	No	Not applicable
NH <sub>3</sub> (ammonia)	Yes	-20 to +50°C

<sup>a</sup> Note the sensor operating temperature range!

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**Measuring circuit monitoring**

Inputs	Over range/underrange	Short circuit	Broken lead
pH value	Yes	Yes <sup>a</sup>	Yes <sup>a</sup>
Redox potential	Yes	No	No
NH <sub>3</sub> (ammonia)	Yes	No	No
Temperature	Yes	Yes	Yes
Voltage	2 to 10 V	Yes	Yes
	0 to 10 V	Yes	No
Current	4 to 20 mA	Yes	Yes
	0 to 20 mA	Yes	No
Resistance transmitter	No	No	Yes

<sup>a</sup> The sensor can be monitored for short circuit and broken lead during the pH measurement by activating the impedance measurement.

**Impedance measurement**

The impedance measurement can optionally be activated. Because it depends on some boundary parameters, note the following points:

- Only glass-based sensors are permitted.
- The sensors must be connected directly to the transmitter. Only one impedance converter may be used in the measuring circuit!
- The maximum permissible line length between sensor and transmitter is 10 m.
- Liquid resistances are included directly in the measurement results.

We therefore recommend activating the measurement in liquids beginning with a minimum conductivity of about 100 µS/cm.

**Binary input**

Activation	Floating contact is open: function is not active Floating contact is closed: function is active
Function	Key lock, manual mode, HOLD, HOLD inverse, alarm suppression, freeze measured value, level lock, reset day counter, reset total counter, parameter set changeover, flow-rate measurement
Pulse input for flow measurement	Binary input 1: approx. 3 to 2000 Hz, resolution 2 Hz Binary input 2: approx. 4 to 300 Hz, resolution 0,5 Hz At the device only one binary input for flow measurement can be used.

**Controller**

Controller type	Limit comparators, limit controllers, pulse length controllers, pulse frequency controllers, modulating controllers, continuous controllers
Controller structure	P/PI/PD/PID

**Outputs**

Relay (changeover)	PSU board	5 A at AC 240 V resistive load
Contact rating		350,000 operations at nominal load/750,000 operations at 1 A
Contact service life		
Voltage supply for 2-wire transmitter	PSU board	Electrically isolated, non-controlled DC 17 V at 20 mA, open-circuit voltage approx. DC 25 V
Voltage supply for ISFET	Optional board	DC ±5 V; 5 mA
Voltage supply for inductive proximity switch	Optional board	DC 12 V; 10 mA
Relay (changeover)	Optional board	8 A at AC 240 V resistive load
Contact rating		100,000 operations at nominal load/350,000 operations at 3 A
Contact service life		
Relay SPST (normally open)	Optional board	
Contact rating		3 A at AC 240 V resistive load
Contact service life		350,000 operations at nominal load/900,000 operations at 1 A
Semiconductor relay	Optional board	
Contact rating		1 A at 240 V
Protective circuit		Varistor

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PhotoMOS <sup>®</sup> relay	Optional board	$U \leq \text{AC/DC } 50 \text{ V}$ $I \leq 200 \text{ mA}$
Voltage Output signals Load resistance Accuracy	Optional board	0 to 10 V or 2 to 10 V $R_{\text{load}} \geq 500 \Omega$ $\leq 0.5 \%$
Electrical current Output signals Load resistance Accuracy	Optional board	0 to 20 mA or 4 to 20 mA $R_{\text{load}} \leq 500 \Omega$ $\leq 0.5 \%$

**Display**

Type	LC graphic display, blue with background lighting, 122 × 32 pixels
------	--

**Electrical data**

Voltage supply (switch-mode PSU)	AC 110 to 240 V +10/-15 %; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz
Electrical safety	To DIN EN 61010, Part 1 overvoltage category II, pollution degree 2
Power draw	Approx. 14 VA (20 A fuse max.)
Data backup	EEPROM
Electrical connection	On the back via screw terminals, conductor cross-section up to max. 2.5 mm <sup>2</sup>
Electromagnetic Compatibility (EMC) Interference emission Interference immunity	DIN EN 61326-1 Class A To industrial requirements

**Case**

Enclosure type	Plastic case for panel mounting to DIN IEC 61554 (indoor use)
Depth behind panel	90 mm
Ambient temperature Storage temperature	-5 to +55 °C -30 to +70 °C
Climatic rating	Rel. humidity $\leq 90 \%$ annual mean, no condensation
Site altitude	Up to 2000 m above sea level
Operating position	Horizontal
Enclosure protection In panel case In surface-mounted case	To DIN EN 60529 Front IP65, rear IP20 IP65
Weight (fully fitted)	About 380 g

**Interface**

<b>Modbus</b>	
Interface type	RS422/RS485
Protocol	Modbus, Modbus Integer
Baud rate	9600, 19200, 38400
Device address	0 to 255
Max. number of nodes	32
<b>PROFIBUS-DP</b>	
Device address	0 to 255

**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	Type 202551/01...

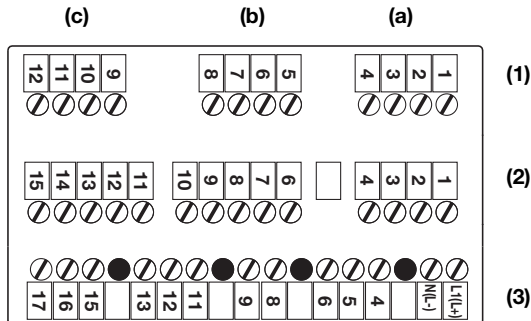
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## Electrical connection



### Mounting information for conductor cross-sections and ferrules

Ferrule	Conductor cross-section		Minimum ferrule length or stripping
	Minimum	Maximum	
Without ferrule	0.34 mm <sup>2</sup>	2.5 mm <sup>2</sup>	10 mm (stripping)
Without collar	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	10 mm
With collar up to 1.5mm <sup>2</sup>	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	10 mm
Twin, with collar	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	12 mm

(1)	Row 1	(a)	Option 1	(b)	Option 2	(c)	Option 3
(2)	Row 2	Main board (pH/redox/temperature/standard signal)					
(3)	Row 3	PSU board (voltage supply/2x relays)					

### Optional board (row 1, slot a, b or c)

Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
<b>Analog input</b>				
<b>Temperature sensor in a two-wire circuit</b> Pt100 or Pt1000		2 4	6 8	10 12
<b>Temperature sensor in a three-wire circuit</b> Pt100 or Pt1000		2 3 4	6 7 8	10 11 12
<b>Resistance transmitter</b>		2 3 4	6 7 8	10 11 12
<b>Electrical current</b>		3 4	7 8	11 12
<b>Voltage</b> 0(2) to 10 V		1 2	5 6	9 10
<b>Voltage</b> 0 to 1 V		2 3	6 7	10 11
<b>Continuous output</b>				
<b>Current or voltage</b>		2 3	6 7	10 11
<b>Modbus interface</b>				
RS422		-	-	9 10 11 12
RS485		-	-	11 12

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Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
<b>PROFIBUS-DP interface</b>				
	VP(+5V) RxD/TxD-P(B) RxD/TxD-N(A) DGND	-	-	9 10 11 12
<b>Data logger interface</b>				
RS485	RxD/TxD+ RxD/TxD-	-	-	10 11
<b>Relay (1x changeover)</b>				
		K3 1 2 3	K4 5 6 7	K5 9 10 11
<b>Relay (2x NO, common pin)</b>				
		K3 1 2 K6 3	-	K5 9 10 K8 11
<b>Triac (1 A)</b>				
		K3 2 3	K4 6 7	K5 10 11
<b>PhotoMOS<sup>®</sup> relay (0.2 A)</b>				
		K3 1 2	K4 5 6	K5 9 10
		K6 3 4	K7 7 8	K8 11 12
<b>Voltage supply for ISFET sensor</b>				
DC ±5 V GND		1 2 3 4	5 6 7 8	9 10 11 12
DC +12 V GND		1 2	5 6	9 10

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**Main board (row 2)**

Function	Symbol	Terminal
<b>Voltage supply for ISFET sensor</b> DC $\pm 4.85$ V GND		11 10 15
<b>Standard signal input for electrical current</b> 0(4) to 20 mA		3 4
<b>Standard signal input for voltage</b> 0(2) to 10 V or 10 to 0(2) V		1 4
<b>Temperature sensor in a two-wire circuit</b> Pt100 or Pt1000		2 3 4
<b>Temperature sensor in a three-wire circuit</b> Pt100 or Pt1000		2 3 4
<b>Resistance transmitter</b>		4 3 2
<b>pH/redox electrode</b>		
Shield for pH (with triaxial cable <b>only!</b> )		6
Glass/metal electrode		7
Reference electrode		8
Liquid potential (LP) With <b>asymmetrical</b> connection, bridge between terminal 8 and 9 With <b>symmetrical</b> connection, LP on terminal 9		9
<b>Binary inputs</b>		
Binary input 1		12+ 14
Binary input 2		13+ 14

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**PSU board (row 3)**

Function	Symbol	Terminal
<b>Voltage supply for JUMO dTRANS 02</b>		
Voltage supply: AC 110 to 240 V		1 L1 (L+)
Voltage supply: AC/DC 20 to 30 V		2 N (L-)
n.c.		4 5 6
<b>Voltage supply for external 2-wire transmitter</b>		
DC 24 V (+20/-15 %)		8 L +
		9 L -
<b>Relay 1</b>		
Switching output K1 (floating)		11 12 13
<b>Relay 2</b>		
Switching output K2 (floating)		15 16 17

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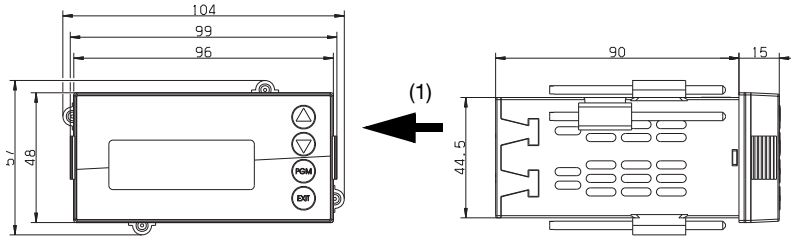
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 Fax: +44 1279 635262  
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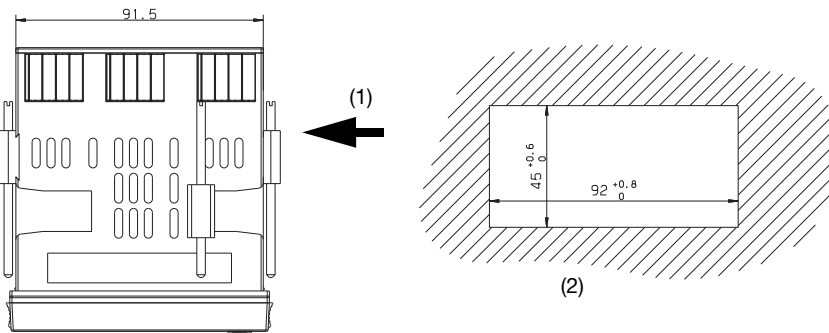
## Dimensions

### Panel case



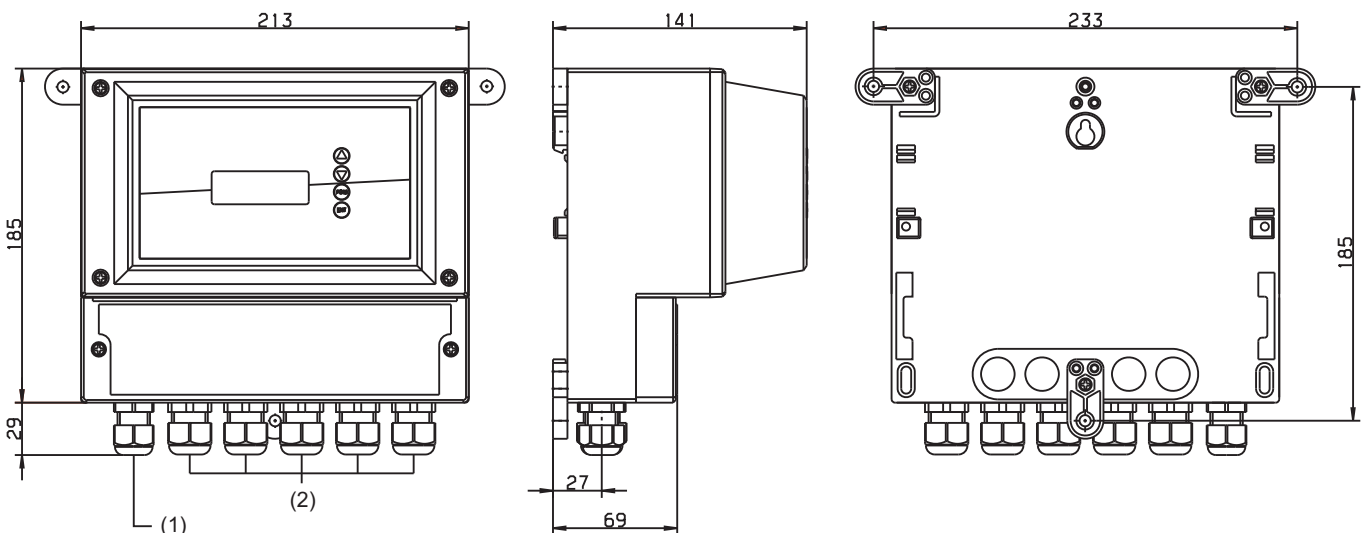
### Close mounting

Minimum spacing of panel cutouts	Horizontal	Vertical
Without setup connector	30 mm	11 mm
With setup connector (see arrow)	65 mm	11 mm



- (1) PC interface socket
- (2) Panel cutout to DIN IEC 61554: 2002-08

### Surface-mounted case



- (1) Cable gland M16
- (2) Cable gland M20

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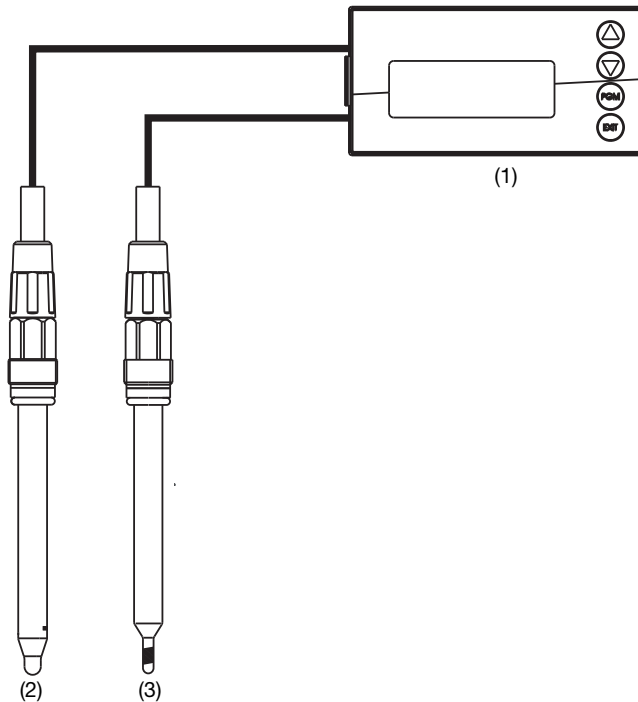
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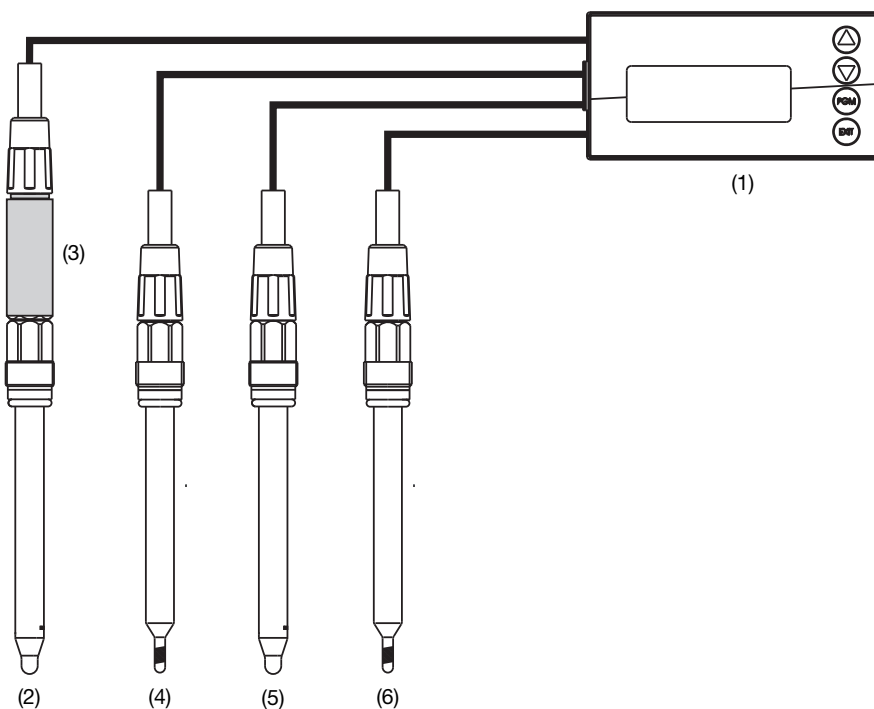
## Application examples

### pH measurement (temperature compensated)



- (1) JUMO dTRANS pH 02
- (2) pH combination electrode
- (3) Compensation thermometer, type 201085

### Redundant pH measurement (temperature compensated)



- (1) JUMO dTRANS pH 02
- (2) pH combination electrode
- (3) 2-wire transmitter, type 202701
- (4) Compensation thermometer, type 201085
- (5) pH combination electrode
- (6) Compensation thermometer, type 201085

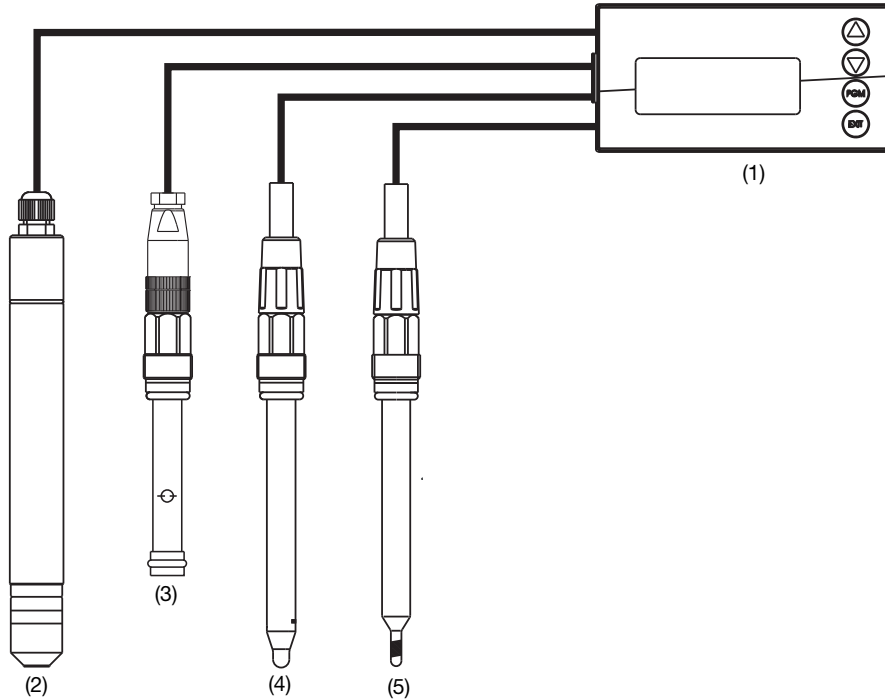
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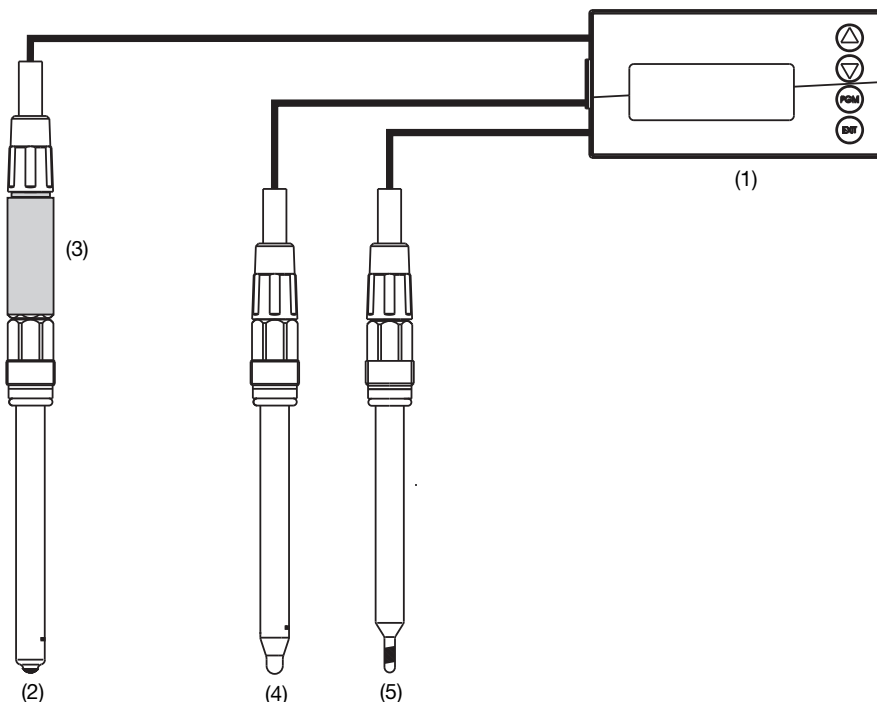


**pH-compensated chlorine measurement (pH measurement temperature compensated)**



- (1) JUMO dTRANS pH 02
- (2) Measuring cell for free chlorine, type 202630
- (3) Flow monitor, part no.: 00396471
- (4) pH combination electrode
- (5) Compensation thermometer, type 201085

**Redox measurement and pH measurement (temperature compensated)**



- (1) JUMO dTRANS pH 02
- (2) Redox combination electrode
- (3) 2-wire transmitter, type 202701
- (4) pH combination electrode
- (5) Compensation thermometer, type 201085

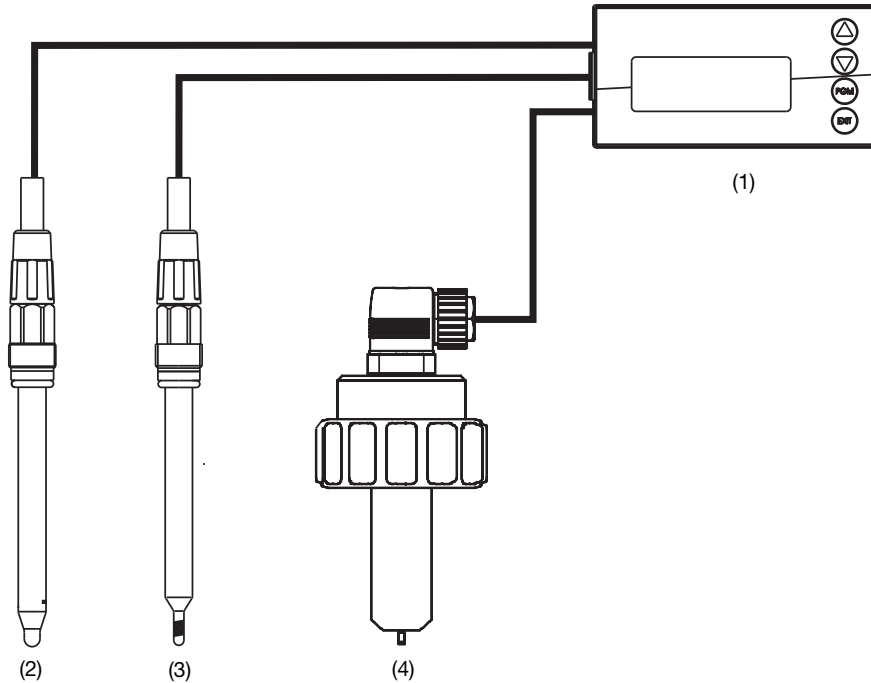
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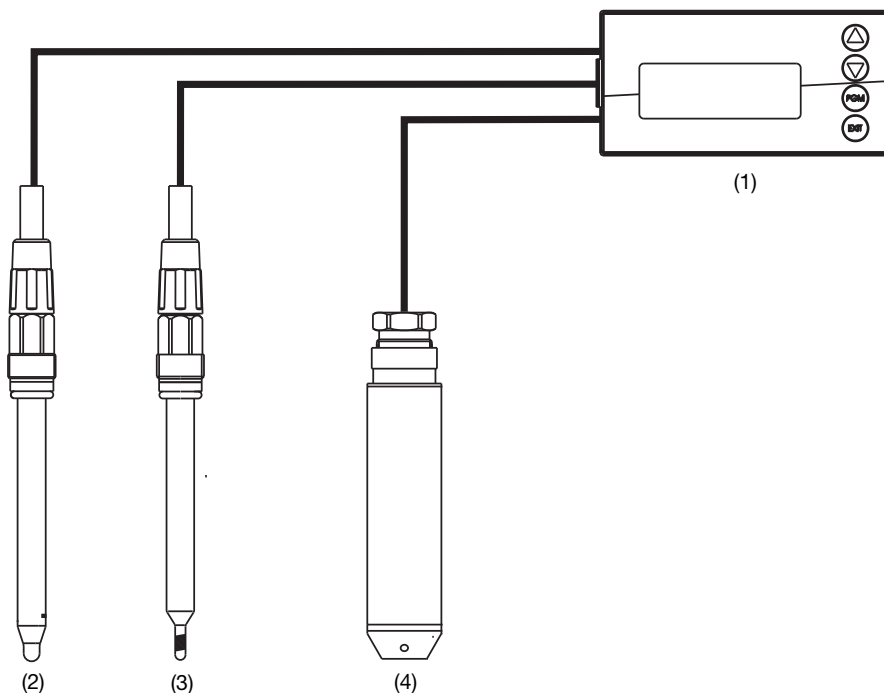


**pH value (temperature compensated) and flow-rate measurement**



- (1) JUMO dTRANS pH 02
- (2) pH combination electrode
- (3) Compensation thermometer, type 201085
- (4) MID flow transmitter, type 406010, and paddlewheel flow sensor, type 406020

**pH value (temperature compensated) and level or liquid level measurement<sup>1</sup>**



- (1) JUMO dTRANS pH 02
- (2) pH combination electrode
- (3) Compensation thermometer, type 201085
- (4) Level measurement probe Type JUMO dTRANS p90 or type 402090 or type 404391

<sup>1</sup> The setup program, which is available as an option, can be used to linearly assign a display in liters or other unit to a non-linear input variable such as the volume of a horizontal, cylindrical tank (20 value pairs).

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**Order details**

<b>(1) Basic type</b>	
202551/01	JUMO dTRANS pH 02 - Transmitter/controller for pH, redox, ammonia, standard signals and temperature in panel case, 96 mm × 48 mm (front IP65)
202551/05	JUMO dTRANS pH 02 - Transmitter/controller for pH, redox, ammonia, standard signals and temperature in surface-mounted case (IP67)
<b>(2) Version</b>	
8	Standard with factory setting
9	Programming to customer specification
<b>(3) Operating language<sup>a</sup></b>	
01	German
02	English
03	French
04	Dutch
05	Russian
06	Italian
07	Hungarian
08	Czech
09	Swedish
10	Polish
13	Portuguese
14	Spanish
16	Rumanian
<b>(4) Optional slot 1</b>	
0	Not used
1	Analog input (universal)
2	Relay (1× changeover)
3	Relay (2× normally open)
4	Analog output
5	2 PhotoMOS <sup>®</sup> relays
6	Solid state relay 1 A
7	Voltage supply output ±5 V DC (e.g. for ISFET)
8	Voltage supply output 12 V DC (e.g. for inductive proximity switch)
<b>(5) Optional slot 2</b>	
0	Not used
1	Analog input (universal)
2	Relay (1× changeover)
4	Analog output
5	2 PhotoMOS <sup>®</sup> relays
6	Solid state relay 1 A
7	Voltage supply output ±5 V DC (e.g. for ISFET)
8	Voltage supply output 12 V DC (e.g. for inductive proximity switch)
<b>(6) Optional slot 3</b>	
00	Not used
01	Analog input (universal)
02	Relay (1× changeover)
03	Relay (2× normally open)
04	Analog output
05	2 PhotoMOS <sup>®</sup> relays
06	Solid state relay 1 A
07	Voltage supply output ±5 V DC (e.g. for ISFET)
08	Voltage supply output 12 V DC (e.g. for inductive proximity switch)

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10	Interface RS422/485
11	Data logger with interface RS485 <sup>b</sup>
12	PROFIBUS-DP interface
<b>(7) Voltage supply</b>	
23	AC 110 to 230 V, +10/-15 %, 48 to 63 Hz
25	AC/DC 20 to 30 V, 48 to 63 Hz
<b>(8) Extra code</b>	
000	None

<sup>a</sup> All languages are available on the instrument and can be changed by the customer at any time. Factory default setting to a language (other than "German") is available for a charge.

<sup>b</sup> The only way to read data is with the PC setup software!

**Order code**                    (1)        (2)        (3)        (4)        (5)        (6)        (7)        (8)        , ...<sup>a</sup>  
**Order example**            202551/01 - 8 - 01 - 2 - 2 - 04 - 23 / 000

<sup>a</sup> List extra codes in sequence, separated by commas.

## Stock versions

(delivery 3 working days after receipt of order)

Order code	Part no.
202551/01-8-01-4-0-02-23/000	00560378
202551/01-8-01-4-0-00-23/000	00560379

## Accessories

(delivery 10 working days after receipt of order)

Item	Part no.
Holder for C rail (PG 709710)	00375749
Dummy cover 96 mm x 48 mm (PG 709710)	00069680
Pipe mounting set (PG 209791)	00398162
Weather protection roof complete for basic type extension 05 (PG 209791)	00401174
PC setup software (PG 202599)	00560380
PC interface cable including USB/TTL converter and two adapters (USB connecting cable) (PG 709720)	00456352

Optional board	Code	Sales No.
Analog input (universal)	1	00442785
Relay (1x changeover)	2	00442786
Relay (2x NO)	3	00442787
Analog output	4	00442788
2 PhotoMOS <sup>®</sup> relays	5	00566677
Solid state relay 1 A	6	00442790
Voltage supply output DC ±5 V (e.g. for ISFET)	7	00566681
Voltage supply output DC 12 V (e.g. for inductive proximity switch)	8	00566682
Interface RS422/485	10	00442782
Data logger with RS485 interface	11	00566678
PROFIBUS-DP interface	12	00566679

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# JUMO dTRANS CR 02

## Transmitter/controller for conductivity, TDS, resistance, standard signals and temperature

Meets requirements of USP <645>



**JUMO dTRANS CR 02, type 202552/01... in panel case**

### Brief description

The JUMO dTRANS CR 02 is a compact, modular instrument. It is highly flexible (for example 3 slots for optional boards) and capable of performing a wide range of tasks. The main input of the JUMO dTRANS CR 02 is used for sensors for measuring electrolytic conductivity, specific resistance, or the TDS value. Both conductive two-electrode and four-electrode cells can be connected to the instrument. The second analog input (compensation input) is designed for resistance thermometers Pt100 and Pt1000, NTC/PTC or standard signals 0(4) to 20 mA or 0 to 10 V. The two binary inputs can be used either as initiators for actions (e.g. HOLD, keyboard inhibit) or when connecting pulse generators (for example impeller sensors) for flow-rate measurement. The high-contrast graphic display allows for several options including display of input signal with numbers or as bar graph. Parameters are displayed in plain text for easily comprehensible and reliable operation.

The JUMO dTRANS CR 02 can be used as a two-point or three-point controller, a three-point modulating controller, or as a continuous controller. All controller outputs can be configured to P, PI, PD or PID action. The software for the controllers includes parameter set selection, a math module and more.

A setup program is available for convenient configuration via PC. The instrument can be integrated into a data network by means of an RS422/485 or PROFIBUS-DP interface. Screw terminals on the back are used for the electrical connection.

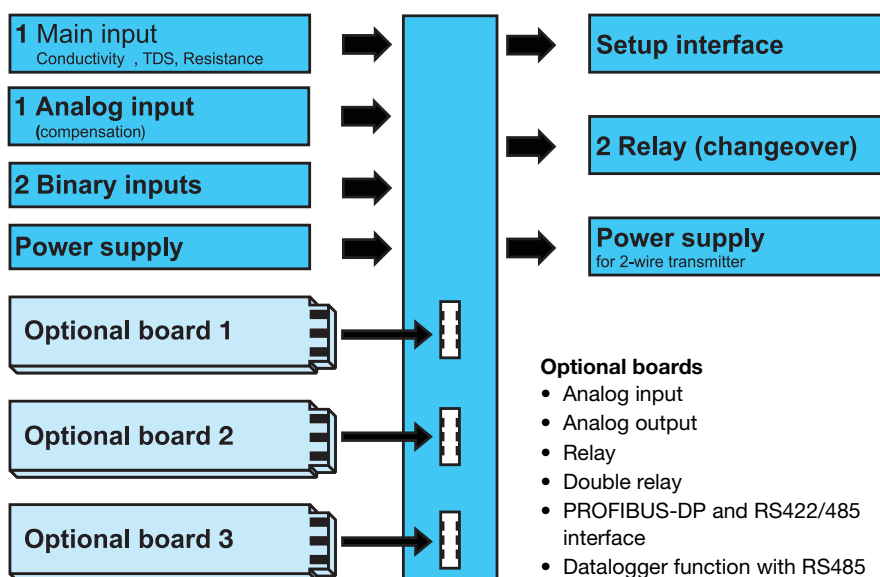
Some applications:

- Industrial and process water.
- Drinking and well water.
- Pure, ultra-pure and pharmaceutical water (e.g. as per USP, Ph. Eur., WFI).
- Cleaning processes in pharmaceutical applications (four-electrode cells in conjunction with measuring range selection).



**JUMO dTRANS CR 02, type 202552/05... in surface-mounted case**

### Block diagram



### Special features

- A choice of display visualizations: large numbers, bar graph or tendency (trend) display
- Integrated calibration routines: Cell constant, temperature coefficient
- Math and logic module
- Calibration logbook
- Integrated washing timer to control the cleaning equipment
- 13 operator languages integrated; see order details
- Setup program provides: convenient programming, system documentation
- RS422/485 interface (optional)
- PROFIBUS-DP interface (optional)
- Flush-mounted instrument - just 96 mm x 48 mm x 95 mm
- Electrode monitoring can be activated
- Flow-rate measurement

### Approvals/approval marks (see Technical data)



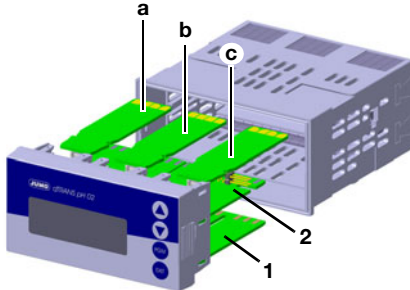
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**Boards**



(1)	PSU board
(2)	Main board
(a)	Optional board 1
(b)	Optional board 2
(c)	Optional board 3

**PSU board (1)**

This board is always fitted in the instrument and no variations are possible.

The board includes the following items:

- The voltage supply for the JUMO dTRANS CR 02.
- The voltage supply for external 2-wire transmitters.
- 2 relays with changeover contacts.

**Main board (2)**

This board can **not** be changed subsequently! The main board (CR) has:

- The main input for connecting a two- or four-electrode conductivity cell.
- The secondary input for connecting a temperature sensor Pt100, Pt1000, a resistance transmitter or a standard signal 0(4) to 20 mA or 0 to 10 V.
- 2 binary inputs.
- The setup interface (for PC interface adapter).

**Optional board (1), (2) or (3)**

These boards are combinable and can be ordered in the following versions:

- 1 analog input
- 1 continuous output
- 1 relay (changeover)
- 2 relays (NO with common pin)
- 1 Triac (1 A)
- 1 PhotoMOS® relay (0.2 A)

The following boards can **only** be placed in slot 3, either:

- Modbus/Jbus
- PROFIBUS-DP
- Datalogger

For versions with a wall-mounted case the (re)placement of the optional boards by the customer is not possible.

**Functional description**

The instrument is a modularly designed indicator/controller for use in both simple and demanding control tasks. It can be integrated into the PLC via interfaces

To make programming and operation easy, all parameters are clearly assigned to levels and displayed in plain text. Operation is protected by a code word. Operation can be adapted on an individual basis because parameters can be generally enabled or assigned to the protected area.

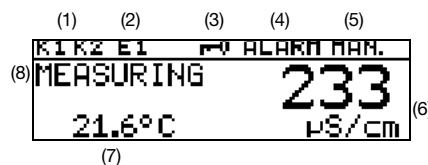
A setup program for the PC is available as a more convenient configuration option, rather than using the instrument keypad.

**User data**



Up to 8 parameters that are frequently changed by the user can be combined in the user level under "User data" (via setup program only).

**Displays and controls**



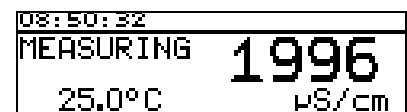
(1)	<b>Binary outputs</b> (relays) Output active if symbol is visible.
(2)	<b>Binary input</b> Input closed if symbol is visible.
(3)	<b>Keyboard inhibit</b> Keys locked if symbol is visible.
(4)	<b>Alarm message</b> ALARM (flashing): Broken sensor or overrange, etc. AL R1: Controller monitoring alarm from controller channel 1. AL R2: Controller monitoring alarm from controller channel 2. CALIB: Calibration mode active. CALIB (flashing): Calibration timer elapsed.
(5)	<b>Output mode</b> MAN.: Manual mode active. HOLD: Hold mode active.
(6)	<b>Top display</b> Measured value and unit of the variable set by parameter "Top display".

(7)	<b>Bottom display</b> Measured value and unit of the variable set by parameter "Bottom display".
(8)	<b>Operating mode</b> MEASURING: Standard measuring mode is active.

**Display modes**

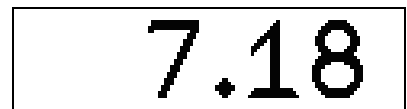
The following display modes are available:

**Normal display**



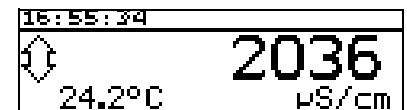
In this display method the measurements appear in numbers, as usual.

**Large display**



This method uses the complete display height.

**Tendency display**



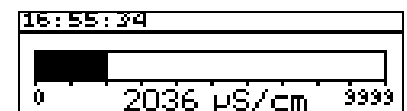
In this display a symbol is added to the numerical value to indicate the direction and speed of change for the measurement value. This can be very useful for optimizing the controller, for example.



From left to right:

Fast, medium and slow rise, steady, slow, medium and fast fall.

**Bar graph**



In this display mode, it only takes a glance to ascertain the range for the current measurement. Any scale can be used for the bar graph.

**Tendency curve (data monitor)**



The ring buffer contains about 100 measuring points. The sampling and storage rates can be adjusted.

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**Flow rate quantity**

K1	
FLOW RATE	0.37 l/s
VOLUME	0.61 m <sup>3</sup>
TOTAL QU.	83.61 m <sup>3</sup>

If an input has been configured for flow-rate measurement, this display can be accessed.

**Function modes of the main board****Conductivity measurement**

The measurement can be conducted either with standard two-electrode or with four-electrode cells.

Two-electrode cells can be connected in the usual grid of cell constants (K = 0.01; 0.1; 1.0; 3.0 and 10.0). The "relative cell constant" can be adjusted over wide ranges, which makes it possible to connect sensors with different cell constants as well (for example K = 0.2).

Values K = 0.5 and 1.0 are predefined for four-electrode cells. In this case as well, the device can be adjusted to sensors with different cell constants (for example K = 0.4).

The instrument is able to perform an automatic temperature compensation.

**Resistance**

The instrument can be switched to resistance measurement for applications in which display of the resistance value is preferred over the conductivity value.

**TDS**

Display/control with the unit ppm.

The specific TDS factor can also be entered in this mode.

**Temperature compensation**

The conductivity or resistance of aqueous solutions often depends greatly on the temperature. The instrument provides the following procedures for temperature compensation, depending on the display size:

- Off (e.g. USP)
- Linear
- ASTM
- Natural waters (EN 27888/ISO 7888)

**Analog input for main board**

0(4) to 20 mA; 0 to 10 V and Pt100/Pt1000/NTC/PTC (max. 30 k $\Omega$ )/cust. specs.

Typical application: Compensation input for temperature compensation of the main measurement variable.

**Function modes of the input options, "Multi-channel mode"**

If analog inputs have been fitted (optional board), the device will have multi-channel functions. The following signal types can be processed:

- 0(4) to 20 mA
- 0 to 10 V
- Pt100/Pt1000

Sensors that return one of the output signals listed above can be connected to the instrument for the following measurement variables, for example:

- free chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid as per data sheet 202630.
- pH value or redox potential as per data sheet 202701.
- Liquid level measurements.
- Flow rate measurements etc.

The instrument provides the following calibration options in this function mode:

- Zero point
- Limit value
- Zero point and limit value
- Cell constant
- Temperature coefficient

This allows optimum adaptation of the instrument to the sensor.

**Linear scaling**

Select this mode when the input signal will be displayed linearly.

One of the following units is used for display or control:

- $\mu$ S/cm
- mS/cm
- %
- mV
- pH
- ppm
- Cust. specs. (5 characters)

**Electrolytic conductivity**

$\mu$ S/cm or mS/cm are the units used for display and control.

**Specific resistance (ultra-pure water)**

Display/control with the unit k $\Omega$   $\times$  cm or M $\Omega$   $\times$  cm.

**TDS**

Display/control with the unit ppm.

The specific TDS factor can also be entered in this mode.

**Concentration**

In this mode, the concentration of a liquid can be determined from its uncompensated conductivity.

% or "Cust. specs." are the units used for display and control.

Concentration measurement:

**Caustic solution**

NaOH	0 to 15 % by wt.	0 to 90 °C
NaOH	25 to 50 % by wt.	0 to 90 °C

**Nitric acid**

HNO <sub>3</sub>	0 to 25 % by wt.	0 to 80 °C
HNO <sub>3</sub>	36 to 82 % by wt.	-20 to 80 °C

**Sulfuric acid**

H <sub>2</sub> SO <sub>4</sub>	0 to 28 % by wt.	0 to 100 °C
H <sub>2</sub> SO <sub>4</sub>	36 to 85 % by wt.	0 to 115 °C
H <sub>2</sub> SO <sub>4</sub>	92 to 99 % by wt.	0 to 115 °C

**Hydrochloric acid**

HCl	0 to 18 % by wt.	0 to 65 °C
Hal	22 to 44 % by wt.	-20 to 65 °C

**Cust. specs. with table**

Non-linear correlations between the input and output variable can be processed in this mode. Typical applications include measuring the level of liquid in horizontal, cylindrical containers or simply measuring the concentration.

The input values are processed in a table (max. 20 value pairs). Values can only be entered in the table using the optional setup program.

The units used for display and control are:

- $\mu$ S/cm
- mS/cm
- Cust. specs. (5 characters)
- Use the offset parameter to adjust the display.

**Calibration****Calibration logbook**

The last five successful calibrations can be accessed from the calibration logbook. This makes it possible to evaluate the aging of the connected sensor.

The logbook can be deleted if necessary (useful when changing the sensor).

If a datalogger has been fitted (optional board), additional information such as the date and time are documented.

**Calibration timer**

The calibration timer indicates (on request) a required routine calibration. The calibration timer is activated by entering the number of days that must expire before there is a scheduled re-calibration (specified by the system or the operator).



## Additional functions of the JUMO dTRANS CR 02

### Min/max value memory

This storage records the minimum and maximum input quantities that have occurred. This information can be used, for example, to assess whether the design of the connected sensor is suitable for the values that actually occur.

### Binary input

The following functions can be accessed through the binary input:

- Key lock activation  
When this function is activated, operation is no longer possible via the keypad.
- "HOLD" mode activation  
When this function is activated, the outputs (analog and relay) adopt the states previously defined.
- Alarm suppression (controller alarm only)  
This function is used to temporarily deactivate alarm generation by means of the appropriately configured relay.
- Flow-rate measurement (counting input)  
Instantaneous value  
Partial quantity  
Total quantity

Bridging the corresponding connection terminals with a floating contact (for example a relay) activates a predefined function.

### Deposit detection

Deposit detection can be activated for four-electrode cells.

It may happen during normal operation that a coating forms on the electrodes. Because of this, the conductivity that is displayed is lower than the actual conductivity. When the "Deposit detection" function is activated, cell maintenance is required.

### Auto range

In some processes it is advantageous to have two measurement ranges available, for example in rinsing and regeneration processes.

Normally in these processes a low conductivity must be recorded exactly. In the case of rinsing/regeneration, however, the conductivity is significantly higher, which would result in measurement overrange (error). The Autorange function can be used to define two measurement ranges between which the instrument switches in a defined manner.

### Wash timer

A software function can be used to trigger cyclically recurring actions by controlling a relay.

### Control functions

Functions can be assigned to the relays. The functions can be configured in turn by parameters P, PI, PD and PID structures can be freely programmed as control functions.

### Relay outputs

Two relay changeover contacts are available for the main measurement variable and/or the temperature.

The following functions can be programmed:

- Switching direction (min/max)
- Limit controller (on-delay/delayed release, hysteresis)
- Pulse length output (see control functions)
- Pulse frequency output (see control functions)
- Modulating function (see control functions)
- Pulse functions  
With this function, the output briefly switches on when the switching point is reached and then switches off again
- Wash timer elapsed
- Alarm
- Sensor/range error
- Behavior in the event of an alarm, underrange or overrange measurement, calibration and "HOLD"

### Flow-rate measurement

Flow rate transmitters can be connected directly to the binary inputs. One input is available for "slow speed" (up to about 300 Hz) and one for "high speed" (up to about 10 kHz). The current flow rate, partial quantity and total quantity can be displayed in different units (l/s, l/min, l/h, m<sup>3</sup>/min, m<sup>3</sup>/h, GAL(US)/s, GAL(US)/min, GAL(US)/h, or l, m<sup>3</sup>, GAL(US)).

### Datalogger

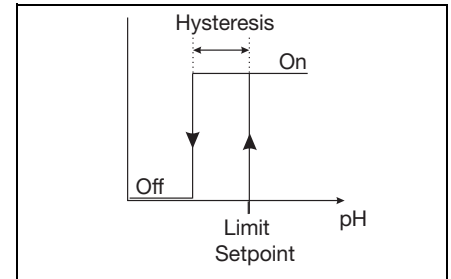
Up to 43,500 data sets can be stored in the datalogger (ring buffer). Depending on the resolution, that corresponds to a storage time ranging from about 10 hours to 150 days.

Data can be read by means of the setup program and then further processed with an "Office" product.

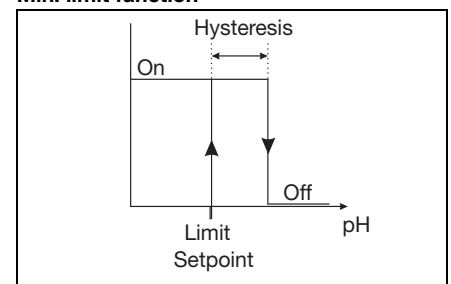
The datalogger makes it possible to record and document processes and supports analysis of the same processes.

## Contact functions

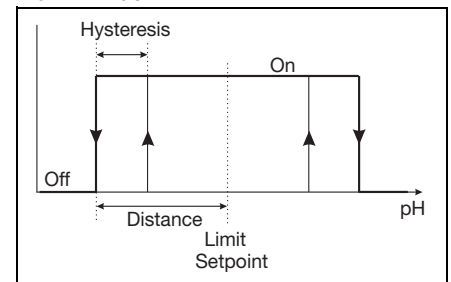
### Max. limit function



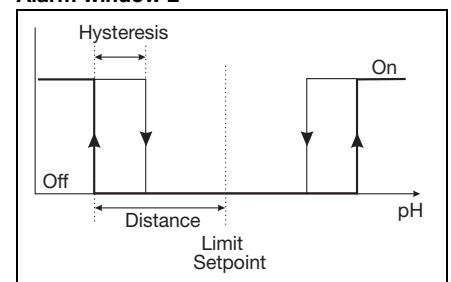
### Min. limit function



### Alarm window 1

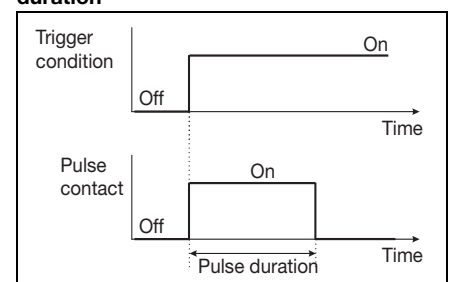


### Alarm window 2



### Pulse contact

#### Triggering condition longer than pulse duration



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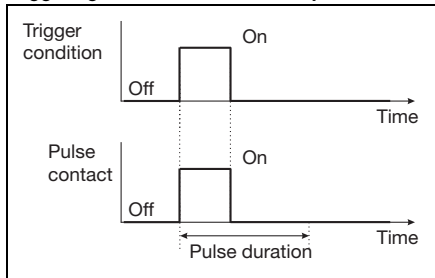
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**Pulse contact**

Triggering condition shorter than pulse duration



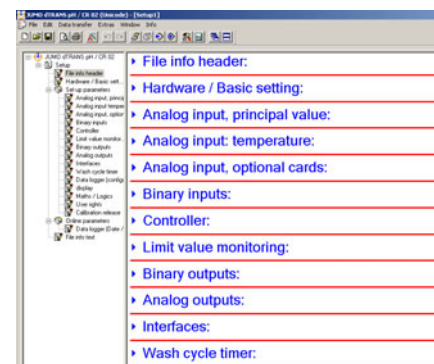
**Math and logic module**

The math module makes it possible to integrate measurement value of the analog inputs into a mathematical formula so that the calculated process variable can be displayed. The logic module can be used, for example, to link binary inputs and limit comparators with each other logically.

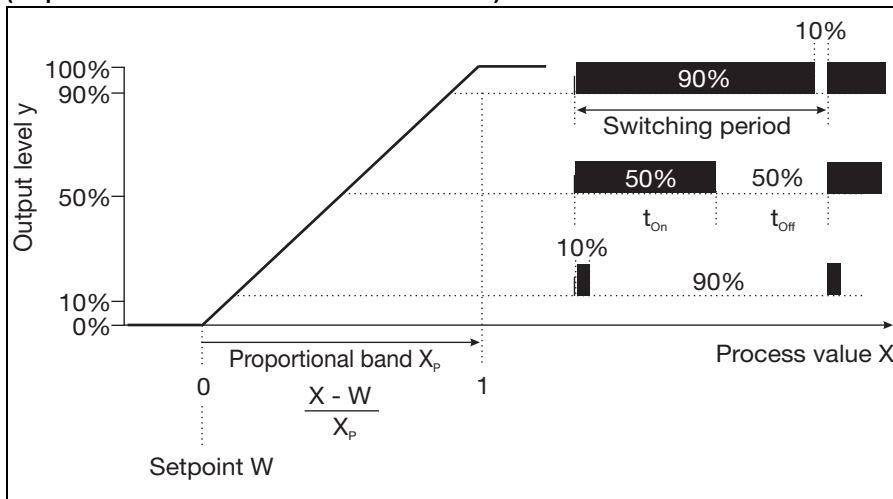
Up to two math or logic formulas can be entered with the optional setup program and the results of calculations can be displayed or exported via outputs (via PC setup software only).

**Setup PC program (accessory)**

The setup PC program is available in German, English and French for configuring the instrument. You can use it to create and edit sets of data and transfer them to the instrument, as well as read them out from it. The data can be stored and printed.

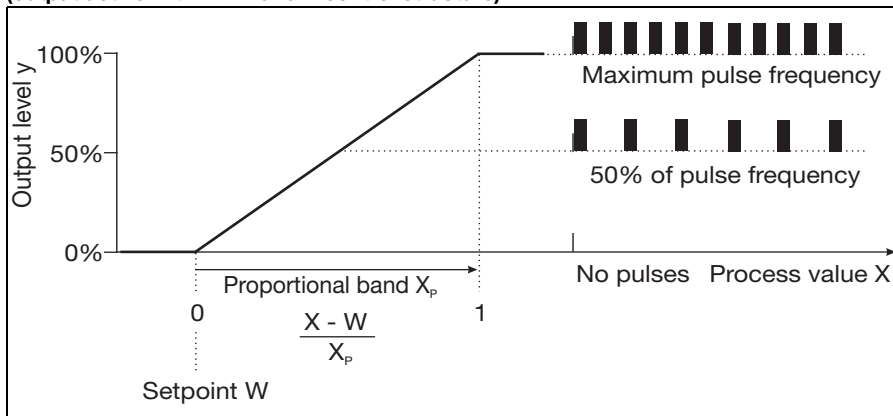


**Pulse width controller (output active with  $x > w$  and P control structure)**



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

**Pulse frequency controller (output active with  $x > w$  and P control structure)**



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

**Setup interface**

The setup interface is integrated into the JUMO dTRANS CR 02 by default. You can use it, together with the setup program (accessory) and a setup interface (accessory), to configure the instrument.

**RS232/RS485 interface**

The serial interface is used for communication with higher-level systems when the Modbus/Jbus protocol is used.

**PROFIBUS-DP**

The JUMO dTRANS CR 02 can be integrated into a fieldbus system according to the PROFIBUS-DP standard via the PROFIBUS-DP interface. This PROFIBUS-DP version is especially designed for communication between automation systems and distributed peripheral devices at the field level and is optimized for speed.

Data is transferred serially based on the RS485 standard.

Using the project design tool that is included in the delivery (GSD generator; GSD = device master file), a standardized GSD file is created by selecting characteristic device features of the JUMO dTRANS CR 02. This file is used to integrate the controller into the fieldbus system.

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## Measurement ranges/cell constants

This modern instrument features a much higher dynamic range on the input side than conductivity cells are able to control physically or chemically. The measurement range of the instrument must therefore be coordinated with the operating range of the cell.

### Sample measuring ranges for combinations with two-electrode cells

Cell constant (K)	Recommended/practical measurement scope (depending on the conductivity cell)
0.01 1/cm	0.05 $\mu\text{S}/\text{cm}$ to 20 $\mu\text{S}/\text{cm}$
0.1 1/cm	1 $\mu\text{S}/\text{cm}$ to 1000 $\mu\text{S}/\text{cm}$
1.0 1/cm	0.01 $\text{mS}/\text{cm}$ to 100 $\text{mS}/\text{cm}$
3.0 1/cm	0.1 $\text{mS}/\text{cm}$ to 30 $\text{mS}/\text{cm}$
10.0 1/cm	0.1 $\text{mS}/\text{cm}$ to 200 $\text{mS}/\text{cm}$

#### Example

To conduct a measurement in the range from 10  $\mu\text{S}/\text{cm}$  to 500  $\mu\text{S}/\text{cm}$ , select a conductivity cell with a cell constant  $K = 0.1$  1/cm. Configure the unit  $\mu\text{S}/\text{cm}$  on the instrument without places after the decimal.

### Combination with four-electrode cells and two-electrode cells with cell constant differing from the grid above

This case requires a more in-depth use of the instrument technology. Both the uncompensated and the temperature compensated measurement scope must be considered.

The uncompensated measurement scope of the instrument may be calculated according to the following formula:

Measurement scope =  $0.1 \mu\text{S}/\text{cm} \times \text{cell constant (K)}$  to  $2500 \text{ mS} \times \text{cell constant (K)}$ .

After consideration of the temperature compensation range, approximately the following compensated measurement scope remains:

Measurement scope =  $0.1 \mu\text{S}/\text{cm} \times \text{cell constant (K)}$  to  $1250 \text{ mS} \times \text{cell constant (K)}$ .

Cell constant (K)	Measurement scope based on instrument (temperature-compensated)
0.01	0.001 $\mu\text{S}/\text{cm}$ to 1.25 $\text{mS}/\text{cm}$
0.1	0.01 $\mu\text{S}/\text{cm}$ to 12.5 $\text{mS}/\text{cm}$
1.0	0.1 $\mu\text{S}/\text{cm}$ to 125 $\text{mS}/\text{cm}$
3.0	0.3 $\mu\text{S}/\text{cm}$ to 375 $\text{mS}/\text{cm}$
10.0	0.1 $\text{mS}/\text{cm}$ to 1250 $\text{mS}/\text{cm}$

It may be assumed that the measurement scope of the instrument is always greater than the recommended or practically usable range of the conductivity cell that is used.

The smaller range (instrument or conductivity cell) determines the maximum usable range.

#### Example

What measurement scope can the instrument cover with a specified cell constant?

The specified cell constant is  $K = 0.4$

The measurement scope of the instrument =  $0.1 \mu\text{S}/\text{cm} \times 0.4$  1/cm to  $1250 \text{ mS}/\text{cm} \times 0.4$  1/cm  
→ 0.04  $\mu\text{S}/\text{cm}$  to 500  $\text{mS}/\text{cm}$

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## Technical data

### Inputs (main board)

Main input	Measuring range/control range	Accuracy	Effect of temperature
$\mu\text{S/cm}$	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	$\leq 0.6\%$ of range + $0.3\ \mu\text{S} \times \text{cell constant (K)}$	0.2 %/10 K
$\text{mS/cm}$	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999 <sup>a</sup>	$\leq 0.6\%$ of range + $0.3\ \mu\text{S} \times \text{cell constant (K)}$	0.2 %/10 K
$\text{k}\Omega \times \text{cm}$	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	$\leq 0.6\%$ of range + $0.3\ \mu\text{S} \times \text{cell constant (K)}$	0.2 %/10 K
$\text{M}\Omega \times \text{cm}$	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	$\leq 0.6\%$ of range + $0.3\ \mu\text{S} \times \text{cell constant (K)}$	0.2 %/10 K
<b>Secondary input</b>			
Temperature Pt100/1000	-50 to +250 °C <sup>b</sup>	$\leq 0.25\%$ of range	0.2 %/10 K
Temperature NTC/PTC	0.1 to 30 k $\Omega$ Entry via table with 20 value pairs	$\leq 1.5\%$ of range	0.2 %/10 K
Standard signal	0(4) to 20 mA or 0 to 10 V	0.25% of range	0.2 %/10 K
Resistance transmitter	Minimum: 100 $\Omega$ Maximum: 3 k $\Omega$	$\pm 5\ \Omega$	0.1 %/10 K

<sup>a</sup> In the range between 1 to 10 S the accuracy is 1 % of the measuring range.

<sup>b</sup> Selectable in °F

### Resistance thermometer inputs (optional board)

Designation	Connection type	Measuring range	Measuring accuracy		Effect of ambient temperature
			3-wire/4-wire	2-wire	
Pt100 DIN EN 60751 (factory-set)	2-wire/3-wire/ 4-wire	-200 to +850 °C	$\leq 0.05\%$	$\leq 0.4\%$	50 ppm/K
Pt1000 DIN EN 60751 (factory-set)	2-wire/3-wire/ 4-wire	-200 to +850 °C	$\leq 0.1\%$	$\leq 0.2\%$	50 ppm/K
Sensor lead resistance	Maximum 30 $\Omega$ per line with 3- and 4-wire circuit				
Measurement current	Approx. 250 $\mu\text{A}$				
Lead compensation	Not required for 3- and 4-wire circuit. With a 2-wire circuit, lead resistance can be compensated in the software by correcting the process value.				

### Standard signals inputs (optional board)

Designation	Measuring range	Measuring accuracy	Effect of ambient temperature
Voltage	0(2) to 10 V 0 to 1 V Input resistance <sub>E</sub> > 100 k $\Omega$	$\leq 0.05\%$	100 ppm/K
Electrical current	0(4) to 20 mA, voltage drop $\leq 1.5\ \text{V}$	$\leq 0.05\%$	100 ppm/K
Resistance transmitter	Minimum: 100 $\Omega$ Maximum: 4 k $\Omega$	$\pm 4\ \Omega$	100 ppm/K

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**Temperature compensation**

Type of compensation	Range <sup>a</sup>
Linear 0 to 8 %/K	-10 to +160 °C
ASTM D1125 - 95 (ultra-pure water)	0 to 100 °C
Natural waters (ISO 7888)	0 to 36 °C
<b>Reference temperature</b>	
Adjustable from 15 to 30 °C; preset to 25 °C (default)	

<sup>a</sup> Note the sensor operating temperature range!

**Measuring circuit monitoring**

Inputs	Underrange/overrange	Short circuit	Broken lead
Conductivity	Yes	Depends on measuring range	Depends on measuring range
Temperature	Yes	Yes	Yes
Voltage 2 to 10 V 0 to 10 V	Yes	Yes	Yes
	Yes	No	No
Current 4 to 20 mA 0 to 20 mA	Yes	Yes	Yes
	Yes	No	No
Resistance transmitter	No	No	Yes

**Two-electrode systems**

Cell constant [1/cm]	Setting range of the relative cell constant	Resulting usable range [1/cm]
0.01	20 to 500 %	0.002 to 0.05
0.1		0.02 to 0.5
1.0		0.2 to 5
3.0		0.6 to 15
10.0		2.0 to 50

**Four-electrode systems**

Cell constant [1/cm]	Setting range of the relative cell constant	Resulting usable range [1/cm]
0.5	20 to 150 %	0.1 to 0.75
1.0		0.2 to 1.5

**Binary input**

Activation	Floating contact is open: function is not active Floating contact is closed: function is active
Function	Key lock, manual mode, HOLD, HOLD inverse, alarm suppression, freeze measured value, level lock, reset day counter, reset total counter, parameter set changeover, flow-rate measurement
Pulse input for flow measurement	Binary input 1: approx. 3 to 2000 Hz, resolution 2 Hz Binary input 2: approx. 4 to 300 Hz, resolution 0,5 Hz At the device only one binary input for flow measurement can be used.

**Controller**

Controller type	Limit comparators, limit controllers, pulse length controllers, pulse frequency controllers, modulating controllers, continuous controllers
Controller structure	P/PI/PD/PID

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**Outputs**

Relay (changeover) Contact rating Contact service life	PSU board	5 A at AC 240 V resistive load 350,000 operations at nominal load/750,000 operations at 1 A
Voltage supply for 2-wire transmitter	PSU board	Electrically isolated, non-controlled DC 17 V at 20 mA, open-circuit voltage approx. DC 25 V
Voltage supply for inductive proximity switch	Optional board	DC 12 V; 10 mA
Relay (changeover) Contact rating Contact service life	Optional board	8 A at AC 240 V resistive load 100,000 operations at nominal load/350,000 operations at 3 A
Relay SPST (normally open) Contact rating Contact service life	Optional board	3 A at AC 240 V resistive load 350,000 operations at nominal load/900,000 operations at 1 A
Semiconductor relay Contact rating Protective circuit	Optional board	1 A at 240 V Varistor
PhotoMOS <sup>®</sup> relay	Optional board	$U \leq \text{AC/DC } 50 \text{ V}$ $I \leq 200 \text{ mA}$
Voltage Output signals Load resistance Accuracy	Optional board	0 to 10 V or 2 to 10 V $R_{\text{load}} \geq 500 \ \Omega$ $\leq 0.5 \ \%$
Electrical current Output signals Load resistance Accuracy	Optional board	0 to 20 mA or 4 to 20 mA $R_{\text{load}} \leq 500 \ \Omega$ $\leq 0.5 \ \%$

**Display**

Type	LC graphic display, blue with background lighting, 122 × 32 pixels
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**Electrical data**

Voltage supply (switch-mode PSU)	AC 110 to 240 V +10/-15 %; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz
Electrical safety	To DIN EN 61010, Part 1 overvoltage category II, pollution degree 2
Power consumption	Max. 14 VA (20 A fuse max.)
Data backup	EEPROM
Electrical connection	On the back via screw terminals, conductor cross-section up to max. 2.5 mm <sup>2</sup>
Electromagnetic Compatibility (EMC) Interference emission Interference immunity	DIN EN 61326-1 Class A To industrial requirements

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**Case**

Enclosure type	Plastic case for panel mounting to DIN IEC 61554 (indoor use)
Depth behind panel	90 mm
Ambient temperature	-5 to +55 °C
Storage temperature	-30 to +70 °C
Climatic rating	Rel. humidity ≤ 90 % annual mean, no condensation
Site altitude	Up to 2000 m above sea level
Operating position	Horizontal
Enclosure protection	To DIN EN 60529
In panel case	Front IP65, rear IP20
In surface-mounted case	IP65
Weight (fully fitted)	Approx. 380 g

**Interface**

<b>Modbus</b>	
Interface type	RS422/RS485
Protocol	Modbus, Modbus Integer
Baud rate	9600, 19200, 38400
Device address	0 to 255
Max. number of nodes	32
<b>PROFIBUS-DP</b>	
Device address	0 to 255

**Approvals/approval marks**

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	Type 202552/01...

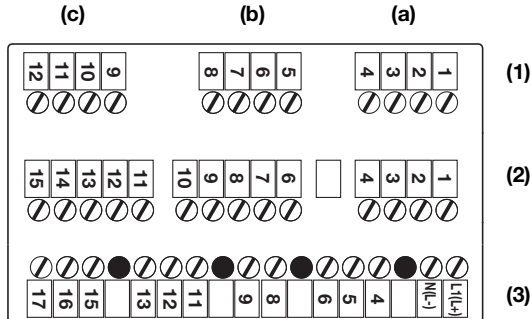
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## Electrical connection



### Mounting information for conductor cross-sections and ferrules

Ferrule	Conductor cross-section		Minimum ferrule length or stripping
	Minimum	Maximum	
Without ferrule	0.34 mm <sup>2</sup>	2.5 mm <sup>2</sup>	10 mm (stripping)
Without collar	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	10 mm
With collar up to 1.5 mm <sup>2</sup>	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	10 mm
Twin, with collar	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	12 mm

(1)	Row 1	(a)	Option 1	(b)	Option 2	(c)	Option 3
(2)	Row 2	Main board (conductivity/resistance/temperature/standard signal)					
(3)	Row 3	PSU board (voltage supply/2x relays)					

### Optional board (row 1, slot a, b or c)

Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
<b>Analog input</b>				
<b>Temperature sensor in a 2-wire circuit</b> Pt100 or Pt1000		2 4	6 8	10 12
<b>Temperature sensor in a 3-wire circuit</b> Pt100 or Pt1000		2 3 4	6 7 8	10 11 12
<b>Resistance transmitter</b>		2 3 4	6 7 8	10 11 12
<b>Electrical current</b>		3 4	7 8	11 12
<b>Voltage</b> 0(2) to 10 V		1 2	5 6	9 10
<b>Voltage</b> 0 to 1 V		2 3	6 7	10 11
<b>Continuous output</b>				
<b>Current or voltage</b>		2 3	6 7	10 11
<b>Modbus interface</b>				
RS422		-	-	9 10 11 12
RS485		-	-	11 12

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Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
<b>PROFIBUS-DP interface</b>				
	VP(+5V) RxD/TxD-P(B) RxD/TxD-N(A) DGND	-	-	9 10 11 12
<b>Datalogger interface</b>				
RS485	RxD/TxD+ RxD/TxD-	-	-	10 11
<b>Relay (1x changeover)</b>				
		K3 1 2 3	K4 5 6 7	K5 9 10 11
<b>Relay (2x NO, common pin)</b>				
		K3 1 2 3 K6 3	-	K5 9 10 11 K8 11
<b>Triac (1 A)</b>				
		K3 2 3	K4 6 7	K5 10 11
<b>PhotoMOS<sup>®</sup> relay (0.2 A)</b>				
		K3 1 2	K4 5 6	K5 9 10
		K6 3 4	K7 7 8	K8 11 12

**Main board (row 2)**

Function	Symbol	Terminal
<b>Standard signal input for electrical current</b> 0(4) to 20 mA		3 4
<b>Standard signal input for voltage</b> 0(2) to 10 V or 10 to 0(2) V		1 4
<b>Temperature sensor in a 2-wire circuit</b> Pt100 or Pt1000		2 3 4
<b>Temperature sensor in a 3-wire circuit</b> Pt100 or Pt1000		2 3 4
<b>Resistance transmitter</b>		4 3 2

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Function	Symbol	Terminal
<b>Conductivity cell</b>		
Conductivity cell (2-electrode system) Terminals 6+7 and 8+9 can be bridged on the instrument; 2-wire cable routing up to the head of the conductivity cell. For concentric cells, terminal 6 must be connected with the outer electrode.		6 7 8 9
Conductivity cell (2-electrode system) Wiring for highest accuracy; 4-wire cable routing to the head of the conductivity cell. For concentric cells, terminal 6 must be connected with the outer electrode.		6 7 8 9
Conductivity cell (4-electrode system) 6 - Outer electrode 1 7 - Inner electrode 1 8 - Inner electrode 2 9 - Outer electrode 2		6 7 8 9
<b>Shield connection</b>		
Conductivity cell		10 GND
<b>Binary inputs</b>		
Binary input 1		12+ 14
Binary input 2		13+ 14

**PSU board (row 3)**

Function	Symbol	Terminal
<b>Voltage supply for JUMO dTRANS 02</b>		
Voltage supply: AC 110 to 240 V Voltage supply: AC/DC 20 to 30 V		1 L1 (L+) 2 N (L-)
n.c.		4 5 6
<b>Voltage supply for external 2-wire transmitter</b>		
DC 24 V (+20/-15 %)		8 L + 9 L -
<b>Relay 1</b>		
Switching output K1 (floating)		11 12 13
<b>Relay 2</b>		
Switching output K2 (floating)		15 16 17

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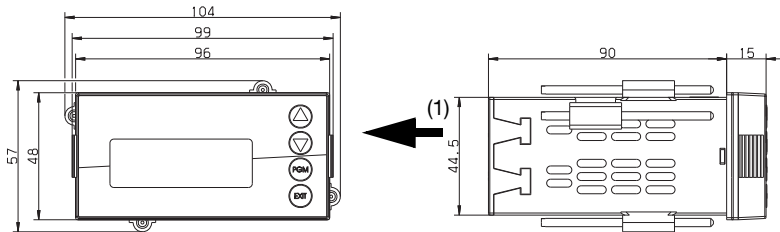
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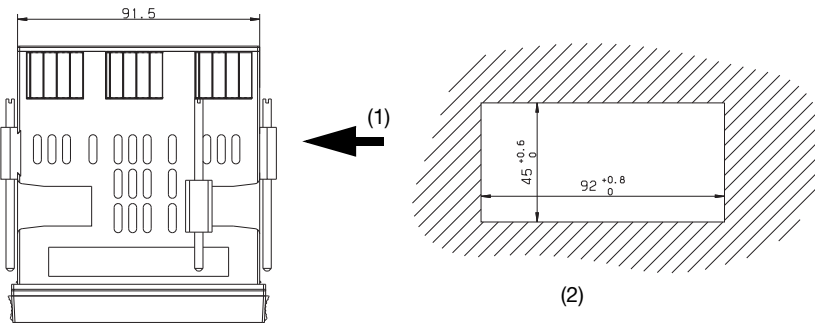
## Dimensions

### Panel case



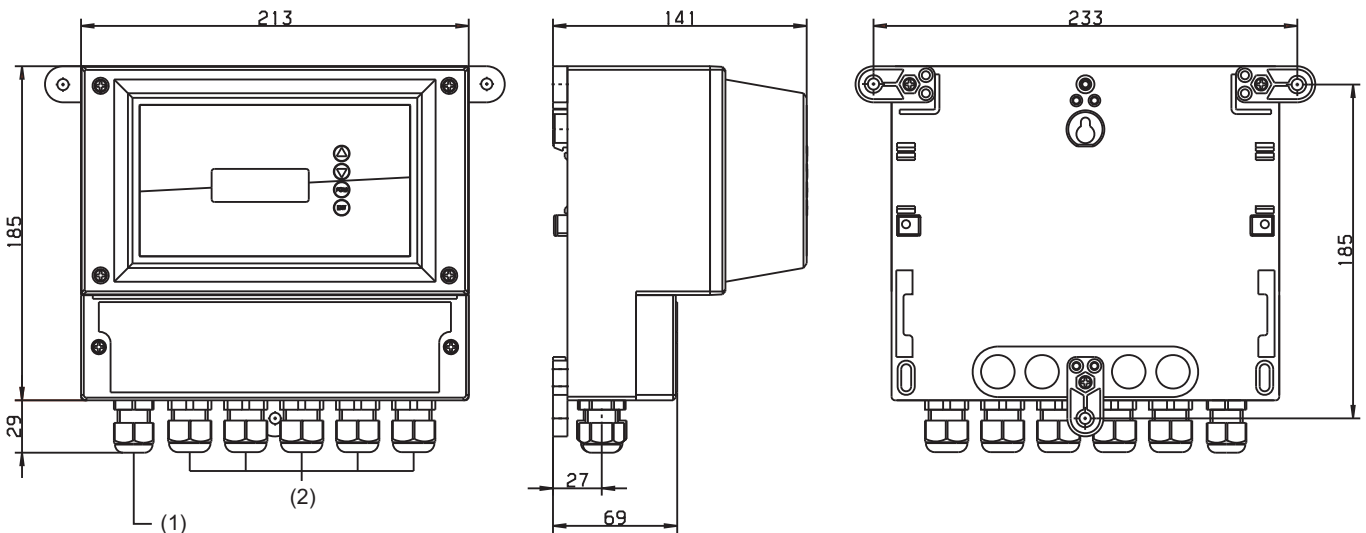
### Close mounting

Minimum spacing of panel cutouts	Horizontal	Vertical
Without setup connector	30 mm	11 mm
With setup connector (see arrow)	65 mm	11 mm



- (1) PC interface socket
- (2) Panel cutout to DIN IEC 61554: 2002-08

### Surface-mounted case



- (1) Cable gland M16
- (2) Cable gland M20

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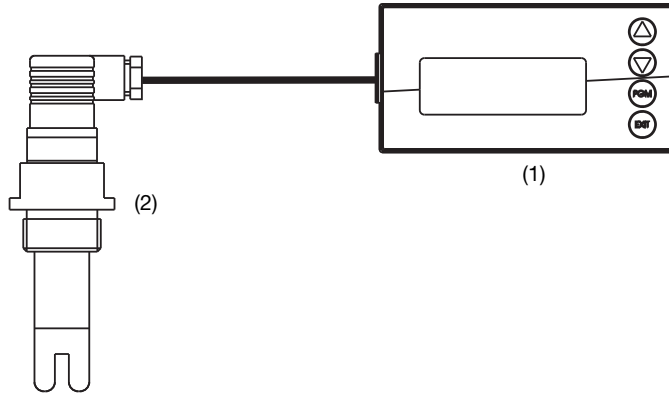
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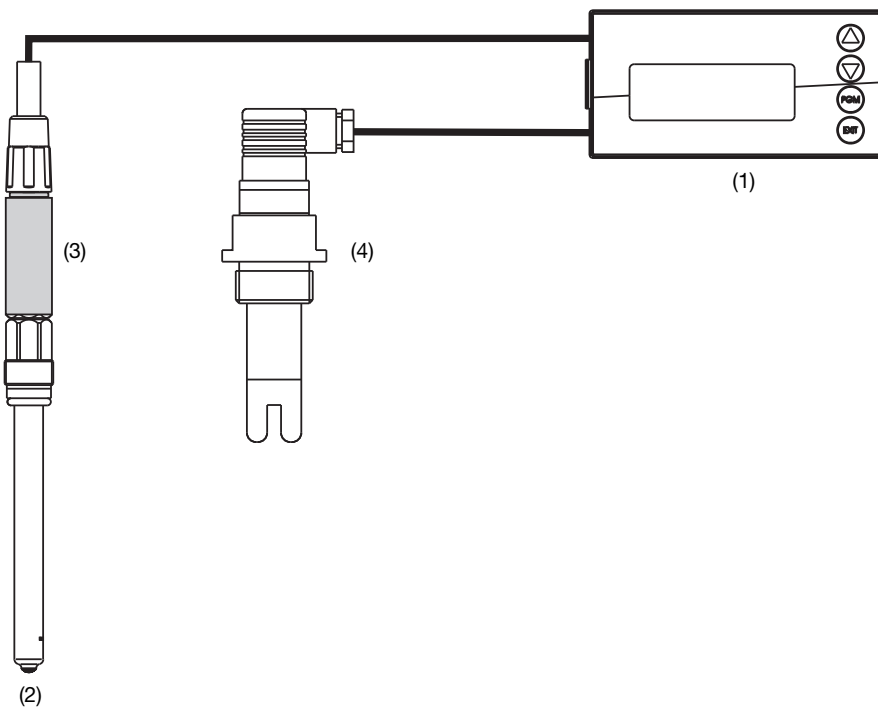
## Application examples

### Conductivity measurement (temperature compensated)



- (1) JUMO dTRANS CR 02
- (2) Conductivity sensor

### Redox measurement and conductivity measurement (temperature compensated)



- (1) JUMO dTRANS CR 02
- (2) Redox combination electrode
- (3) 2-wire transmitter, type 202701
- (4) Conductivity sensor

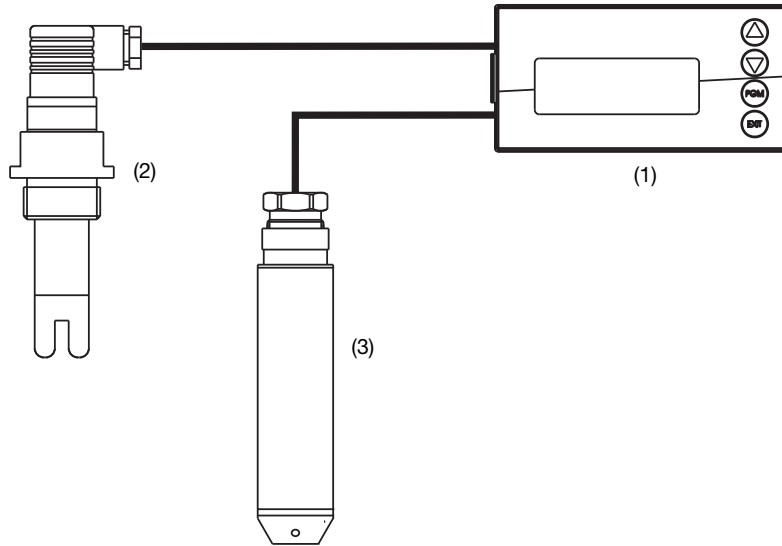
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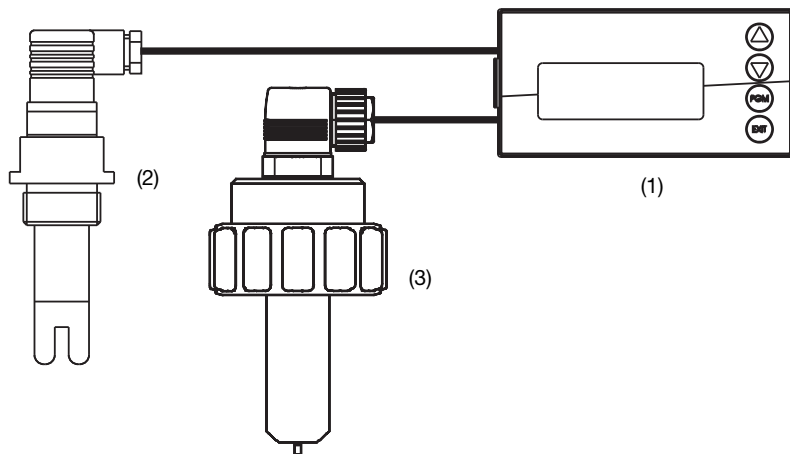
**Conductivity measurement and level or liquid level measurement<sup>1</sup>**



- (1) JUMO dTRANS CR 02
- (2) Conductivity sensor
- (3) Level measurement probe, type JUMO dTRANS p90 or type 402090 or type 404391

<sup>1</sup> The setup program, which is available as an option, can be used to linearly assign a display in liters or other unit to a non-linear input variable such as the volume of a horizontal, cylindrical tank (20 value pairs).

**Conductivity measurement and flow-rate measurement**



- (1) JUMO dTRANS CR 02
- (2) Conductivity sensor
- (3) MID flow transmitter, type 406010, and paddlewheel flow sensor, type 406020

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**Order details**

<b>(1) Basic type</b>	
202552/01	JUMO dTRANS CR 02 - Transmitter/controller for conductivity, TDS, resistance, standard signals and temperature in panel case, 96 mm x 48 mm (front IP65)
202552/05	JUMO dTRANS CR 02 - Transmitter/controller for conductivity, TDS, resistance, standard signals and temperature in surface-mounted case, 96 mm x 48 mm (IP67)
<b>(2) Version</b>	
8	Standard with factory setting
9	Programming to customer specification
<b>(3) Operating language<sup>a</sup></b>	
01	German
02	English
03	French
04	Dutch
05	Russian
06	Italian
07	Hungarian
08	Czech
09	Swedish
10	Polish
13	Portuguese
14	Spanish
16	Rumanian
<b>(4) Optional slot 1</b>	
0	Not used
1	Analog input 2 (universal)
2	Relay (1x changeover)
3	Relay (2x normally open)
4	Analog output
5	2 PhotoMOS <sup>®</sup> relay
6	Solid state relay 1 A
8	Voltage supply output DC 12 V (e.g. for inductive proximity switch)
<b>(5) Optional slot 2</b>	
0	Not used
1	Analog input 2 (universal)
2	Relay (1x changeover)
4	Analog output
5	2 PhotoMOS <sup>®</sup> relay
6	Solid state relay 1 A
8	Voltage supply output DC 12 V (e.g. for inductive proximity switch)
<b>(6) Optional slot 3</b>	
00	Not used
01	Analog input 2 (universal)
02	Relay (1x changeover)
03	Relay (2x normally open)
04	Analog output
05	2 PhotoMOS <sup>®</sup> relay
06	Solid state relay 1 A
08	Voltage supply output DC 12 V (e.g. for inductive proximity switch)
10	Interface RS422/485
11	Datalogger with interface RS485 <sup>b</sup>

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12	PROFIBUS-DP interface
<b>(7) Power supply</b>	
23	AC 110 to 230 V, +10/-15 %, 48 to 63 Hz
25	AC/DC 20 to 30 V, 48 to 63 Hz
<b>(8) Extra code</b>	
000	None

<sup>a</sup> All languages are available on the instrument and can be changed by the customer at any time. Factory default setting to a language (other than "German") is available for a charge.

<sup>b</sup> The only way to read data is with the PC setup software!

**Order code**                    (1)        (2)        (3)        (4)        (5)        (6)        (7)        (8)        /        , ...<sup>a</sup>  
 [ ] - [ ] - [ ] - [ ] - [ ] - [ ] - [ ] / [ ] , ...<sup>a</sup>  
**Order example**                    202552/01 - 8 - 01 - 2 - 2 - 04 - 23 / 000

<sup>a</sup> List extra codes in sequence, separated by commas.

## Stock versions

(delivery 3 working days after receipt of order)

Order code	Part no.
202552/01-8-01-4-0-00-23/000	00550843

## Accessories

(delivery 10 working days after receipt of order)

Item	Part no.
Holder for C rail (PG 709710)	00375749
Dummy cover 96 mm x 48 mm (PG 709710)	00069680
Pipe mounting set (PG 209791)	00398162
Weather protection roof complete for basic type extension 05 (PG 209791)	00401174
PC setup software (PG 202599)	00560380
PC interface cable including USB/TTL converter and two adapters (USB connecting cable) (PG 709720)	00456352

Optional board	Code	Part no.
Analog input (universal)	1	00442785
Relay (1x changeover)	2	00442786
Relay (2x NO)	3	00442787
Analog output	4	00442788
2 PhotoMOS <sup>®</sup> relay	5	00566677
Solid state relay 1 A	6	00442790
Supply voltage output DC ±5 V (e.g. for ISFET)	7	00566681
Supply voltage output DC 12 V (e.g. for inductive proximity switch)	8	00566682
Interface RS422/485	10	00442782
Datalogger with RS485 interface	11	00566678
PROFIBUS-DP interface	12	00566679

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# JUMO dTRANS AS 02

## Transmitter/controller for standard signals and temperature

### Brief description

The JUMO dTRANS AS 02 is a compact, modular instrument. It is highly flexible (for example 3 slots for optional boards) and capable of performing a wide range of tasks. Resistance thermometers Pt100 or Pt1000, NTC/PTC or standard signals 0(4) to 20 mA or 0 to 10 V can be connected to the main input of the JUMO dTRANS AS 02. The two binary inputs can be used as initiators for actions (for example HOLD, keypad lock). The high-contrast graphic display allows for several options including display of input signal with numbers or as bar graph. Parameters are displayed in plain text for easily comprehensible and reliable operation.

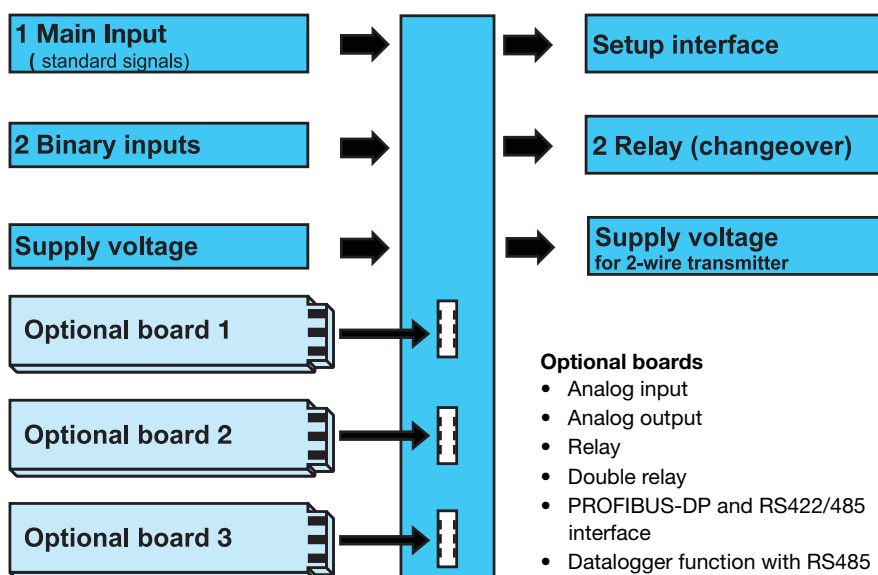
The JUMO dTRANS AS 02 can be used as a two-point or three-point controller, a three-point modulating controller, or as a continuous controller. All controller outputs can be configured to P, PI, PD or PID action. The software for the controllers includes parameter set selection, a math module and more.

A setup program is available for convenient configuration via PC. The instrument can be integrated into a data network by means of an RS422/485 or PROFIBUS-DP interface. Screw terminals on the back are used for the electrical connection.

Some applications:

- Free chlorine, total chlorine, hydrogen peroxide, peracetic acid, chlorine dioxide and ozone in combination with sensors as per data sheet 20263X.
- The pH value or redox potential with 2-wire transmitters as per data sheet 202701.
- (Hydrostatic) liquid levels with 2-wire transmitters (level and pressure measuring instruments) as per data sheet 402090 or data sheet 404391.
- Flow rate in combination with relevant transmitters.
- Two temperature measuring points.

### Block diagram



### Approval/approval marks (see Technical data)



**JUMO dTRANS AS 02, type 202553/01... in panel case**



**JUMO dTRANS AS 02, type 202553/05... in surface-mounted case**

### Special features

- Display: mg/l, pH, mV,  $\mu\text{S}/\text{cm}$ , etc. Special visualizations are also possible with the setup program
- A choice of display visualizations: large numbers, bar graph or tendency (trend) display
- Integrated calibration routines: 1-point and 2-point
- Math and logic module
- Calibration logbook
- Integrated washing timer to control the cleaning equipment
- 13 operator languages integrated; see order details
- Setup program provides: convenient programming, system documentation
- Flush-mounted instrument - just 96 mm x 48 mm x 95 mm

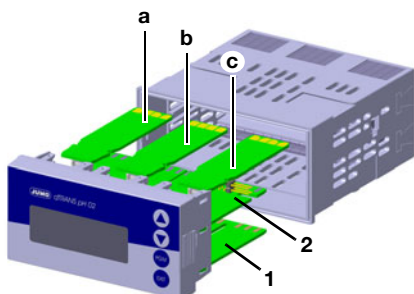
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**Boards**



(1)	PSU board
(2)	Main board
(a)	Optional board 1
(b)	Optional board 2
(c)	Optional board 3

**PSU board (1)**

This board is always fitted in the instrument and no variations are possible.

The board includes the following items:

- The voltage supply for the JUMO dTRANS AS 02.
- The voltage supply for external 2-wire transmitters.
- 2 relays with changeover contacts.

**Main board (2)**

This board is **not** be changed subsequently! The main board (AS) has:

- The main input for connecting a temperature sensor Pt100, Pt1000, a resistance transmitter or a standard signal 0(4) to 20 mA or 0 to 10 V.
- 2 binary inputs.
- The setup interface (for PC interface adapter).

**Optional board (1), (2) or (3)**

These boards are combinable and can be ordered in the following versions:

- 1 analog input
- 1 continuous output
- 1 relay (changeover)
- 2 relays (NO with common pin)
- 1 Triac (1 A)
- 1 PhotoMOS® relay (0.2 A)

The following boards can **only** be placed in slot 3, either:

- Modbus/Jbus
- PROFIBUS-DP
- Datalogger

For versions with a wall-mounted case the (re)placement of the optional boards by the customer is not possible.

**Functional description**

The instrument is a modularly designed indicator/controller for use in both simple and demanding control tasks. It can be integrated into the PLC via interfaces

To make programming and operation easy, all parameters are clearly assigned to levels and displayed in plain text. Operation is protected by a code word. Operation can be adapted on an individual basis because parameters can be generally enabled or assigned to the protected area.

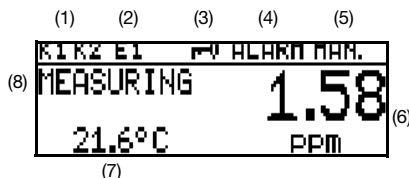
A setup program for the PC is available as a more convenient configuration option, rather than using the instrument keypad.

**User data**



Up to 8 parameters that are frequently changed by the user can be combined in the user level under "User data" (via setup program only).

**Displays and controls**



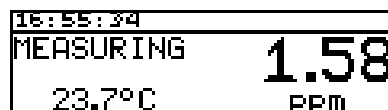
(1)	<b>Binary outputs (relays)</b> Output active if symbol is visible.
(2)	<b>Binary input</b> Input closed if symbol is visible.
(3)	<b>Keypad lock</b> Keys locked if symbol is visible.
(4)	<b>Alarm message</b> ALARM (flashing): Broken sensor or overrange, etc. AL R1: Controller monitoring alarm from controller channel 1. AL R2: Controller monitoring alarm from controller channel 2. CALIB: Calibration mode active. CALIB (flashing): Calibration timer elapsed.
(5)	<b>Output mode</b> MAN.: Manual mode active. HOLD: Hold mode active.
(6)	<b>Top display</b> Measured value and unit of the variable set by parameter "Top display".

(7)	<b>Bottom display</b> Measured value and unit of the variable set by parameter "Bottom display".
(8)	<b>Operating mode</b> MEASURING: Standard measuring mode is active.

**Display modes**

The following display modes are available:

**Normal display**



In this display method the measurements appear in numbers, as usual.

**Large display**



This method uses the complete display height.

**Tendency display**



In this display a symbol is added to the numerical value to indicate the direction and speed of change for the measurement value. This can be very useful for optimizing the controller, for example.



From left to right:  
Fast, medium and slow rise, steady, slow, medium and fast fall.

**Bar graph**



In this display mode, it only takes a glance to ascertain the range for the current measurement. Any scale can be used for the bar graph.

**Tendency curve (data monitor)**



The ring buffer contains about 100 measuring points. The sampling and storage rates can be adjusted.

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## Function modes of the main board

### Main board input

0(4) to 20 mA; 0 to 10 V and Pt100/Pt1000/NTC/PTC (max. 30 k $\Omega$ )/cust. specs.

Typical application: Compensation input for temperature compensation of the main measurement variable.

### Linear scaling

Select this mode when the input signal will be displayed linearly.

One of the following units is used for display or control:

- $\mu$ S/cm
- mS/cm
- %
- mV
- pH
- ppm
- Cust. specs. (5 characters)

Sensors can be connected to the instrument for the following measurement variables, for example:

- Free chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid as per data sheet 202630.
- Redox potential as per data sheet 202701.
- Liquid level measurements.
- Flow rate measurements.
- etc.

The instrument has three calibration options available in this function mode:

- Zero point
- Limit value
- Zero point and limit value

This allows optimum adaptation of the instrument to the sensor.

### Conductivity

This mode is intended for sensors that make uncorrected standard signals available.  $\mu$ S/cm or mS/cm are the units used for display or control.

Different calibration routines can be activated:

- Calibrating the cell constant.  
Because of manufacturing constraints, the cell constant of a conductivity measuring cell may differ slightly from its nominal value (the value printed on it). Wear or the accumulation of deposits during operation can also cause the cell constant to change. This changes the output signal from the measuring cell. With this instrument, the user has the opportunity to compensate for deviations in the nominal value of the cell constant by **manual input** (80 to 120 % range) or **automatic calibration** of the relative cell constant  $K_{rel}$ .
- Calibrating the temperature coefficient  $\alpha$ .  
The conductivity of virtually all solutions is temperature-dependent. To ensure correct measurement both the

temperature and the temperature coefficient  $\alpha$  [%/K] of the measurement solution must therefore be known. The temperature can either be measured automatically with a Pt100 or Pt1000 temperature probe or the user must set the temperature by hand.

The temperature coefficient can be determined automatically by the instrument or entered manually in the 0 to 5.5 %/K range.

### Concentration

In this mode, the concentration of a liquid can be determined from its uncompensated conductivity.

% or "Cust. specs." are the units used for display and control.

Concentration measurement:

#### Caustic soda

NaOH 0 to 15 % by weight

NaOH 25 to 50 % by weight

#### Nitric acid

HNO<sub>3</sub> 0 to 25 % by weight

HNO<sub>3</sub> 36 to 82 % by weight

#### Sulfuric acid

H<sub>2</sub>SO<sub>4</sub> 0 to 28 % by weight

H<sub>2</sub>SO<sub>4</sub> 36 to 85 % by weight

H<sub>2</sub>SO<sub>4</sub> 92 to 99 % by weight

#### Hydrochloric acid

HCl 0 to 18 % by weight

HCl 22 to 44 % by weight

The cell constant can be calibrated.

### pH or redox

Connection option for transmitters that emit an uncalibrated pH or redox standard signal, such as JUMO data sheet 202701 2-wire transmitters.

The dTRANS AS 02 provides the required voltage supply for this type of 2-wire transmitter.

pH: a pH calibration (zero point or zero point and slope) can be performed, as well as the option of temperature compensation. "pH" display and control variable.

Redox: Both relative and absolute calibration are possible (zero point or as a percentage, using reference values). "mV" or "%" display and control variables.

### Cust. specs. with table

Non-linear correlations between the input and output variable can be processed in this mode. Typical applications include measuring the level of liquid in horizontal, cylindrical containers or simply measuring the concentration.

The input values are processed in a table (max. 20 value pairs). Values can only be entered in the table using the optional setup program.

The units used for display and control are:

- $\mu$ S/cm
- mS/cm
- Cust. specs. (5 characters)
- Use the offset parameter to adjust the display.

### Temperature compensation

The instrument is able to perform an automatic temperature compensation.

The conductivity or resistance of aqueous solutions often depends greatly on the temperature. The instrument provides the following procedures for temperature compensation, depending on the display size:

- Off (e.g. USP)
- Linear
- ASTM
- Natural waters (EN 27888/ISO 7888)

## Function modes of the optional inputs, "Multi-channel mode"

If analog inputs have been fitted (optional board), the device will have multi-channel functions. The following signal types can be processed:

- 0(4) to 20 mA
- 0 to 10 V
- Pt100/Pt1000

Sensors that return one of the output signals listed above can be connected to the instrument for the following measurement variables, for example:

- Free chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid as per data sheet 202630.
- pH value or redox potential as per data sheet 202701.

- Liquid level measurements.
- Flow rate measurements.
- etc.

The instrument provides the following calibration options in this function mode:

- Zero point
- Limit value
- Zero point and limit value
- Cell constant
- Temperature coefficient

This allows optimum adaptation of the instrument to the sensor.

### Linear scaling

Select this mode when the input signal will be displayed linearly.

One of the following units is used for display or control:

- $\mu$ S/cm
- mS/cm
- %
- mV
- pH
- ppm
- Cust. specs. (5 characters)

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**Electrolytic conductivity**

$\mu\text{S/cm}$  or  $\text{mS/cm}$  are the units used for display and control.

**Specific resistance (ultra-pure water)**

Display/control with the unit  $\text{k}\Omega \times \text{cm}$  or  $\text{M}\Omega \times \text{cm}$ .

**TDS**

Display/control with the unit ppm.

The specific TDS factor can also be entered in this mode.

**Concentration**

In this mode, the concentration of a liquid can be determined from its uncompensated conductivity.

% or "Cust. specs." are the units used for display and control.

Concentration measurement:

**Caustic solution**

NaOH 0 to 15 % by wt. 0 to 90 °C

NaOH 25 to 50 % by wt. 0 to 90 °C

**Nitric acid**

HNO<sub>3</sub> 0 to 25 % by wt. 0 to 80 °C

HNO<sub>3</sub> 36 to 82 % by wt. to 20 to 80 °C

**Sulfuric acid**

H<sub>2</sub>SO<sub>4</sub> 0 to 28 % by wt. 0 to 100 °C

H<sub>2</sub>SO<sub>4</sub> 36 to 85 % by wt. 0 to 115 °C

H<sub>2</sub>SO<sub>4</sub> 92 to 99 % by wt. 0 to 115 °C

**Hydrochloric acid**

Hal 0 to 18 % by wt. 0 to 65 °C

Hal 22 to 44 % by wt. -20 to 65 °C

**Cust. specs. with table**

Non-linear correlations between the input and output variable can be processed in this mode. Typical applications include measuring the level of liquid in horizontal, cylindrical containers or simply measuring the concentration.

The input values are processed in a table (max. 20 value pairs). Values can only be entered in the table using the optional setup program.

The units used for display and control are:

- $\mu\text{S/cm}$
- $\text{mS/cm}$
- Cust. specs. (5 characters)
- Use the offset parameter to adjust the display.

**Calibration****Calibration logbook**

The last five successful calibrations can be accessed from the calibration logbook. This makes it possible to evaluate the aging of the connected sensor.

The logbook can be deleted if necessary (useful when changing the sensor).

If a datalogger has been fitted (optional board), additional information such as the date and time are documented.

**Calibration timer**

The calibration timer indicates (on request) a required routine calibration. The calibration timer is activated by entering the number of days that must expire before there is a scheduled re-calibration (specified by the system or the operator).

**Additional functions of the JUMO dTRANS AS 02****Min/max value memory**

This storage records the minimum and maximum input quantities that have occurred. This information can be used, for example, to assess whether the design of the connected sensor is suitable for the values that actually occur.

**Binary input**

The following functions can be accessed through the binary input:

- Key lock activation  
When this function is activated, operation is no longer possible via the keypad.
- "HOLD" mode activation  
When this function is activated, the outputs (analog and relay) adopt the states previously defined.
- Alarm suppression (controller alarm only)  
This function is used to temporarily deactivate alarm generation by means of the appropriately configured relay.

Bridging the corresponding connection terminals with a floating contact (for example a relay) activates a predefined function.

**Wash timer**

A software function can be used to trigger cyclically recurring actions by controlling a relay.

**Control functions**

Functions can be assigned to the relays. The functions can be configured in turn by parameters P, PI, PD and PID structures can be freely programmed as control functions.

**Relay outputs**

Two relay changeover contacts are available for the main measurement variable and/or the temperature.

The following functions can be programmed:

- Switching direction (min/max)
- Limit controller (on-delay/delayed release, hysteresis)
- Pulse length output (see control functions)
- Pulse frequency output (see control functions)

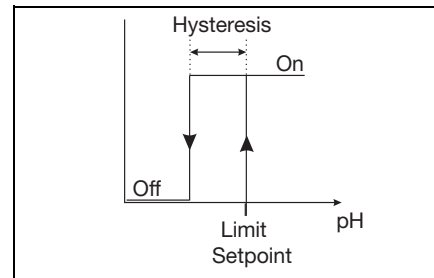
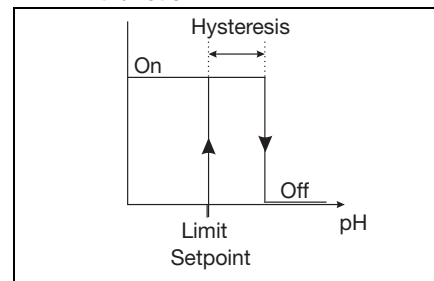
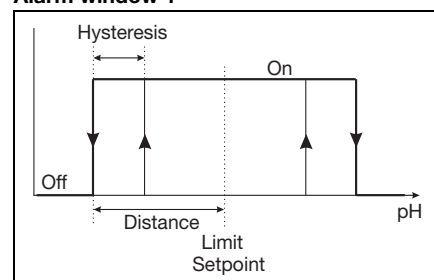
- Modulating function (see control functions)
- Pulse functions  
With this function, the output briefly switches on when the switching point is reached and then switches off again
- Wash timer elapsed
- Alarm
- Sensor/range error
- Behavior in the event of an alarm, underrange or overrange measurement, calibration and "HOLD"

**Datalogger**

Up to 43,500 data sets can be stored in the datalogger (ring buffer). Depending on the resolution, that corresponds to a storage time ranging from about 10 hours to 150 days.

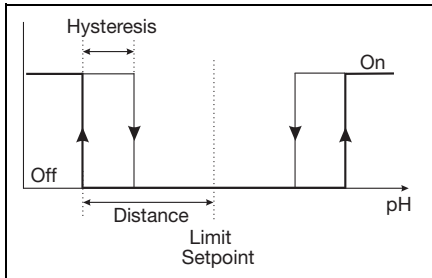
Data can be read by means of the setup program and then further processed with an "Office" product.

The datalogger makes it possible to record and document processes and supports analysis of the same processes.

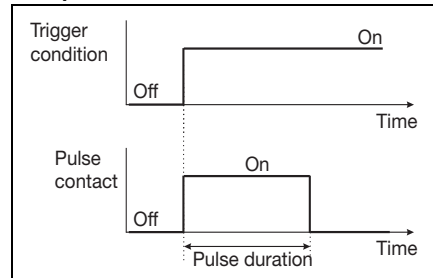
**Contact functions****Max. limit function****Min. limit function****Alarm window 1**



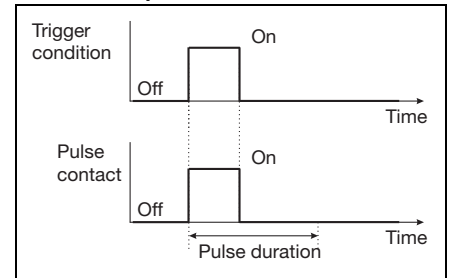
**Alarm window 2**



**Pulse contact: Triggering condition longer than pulse duration**

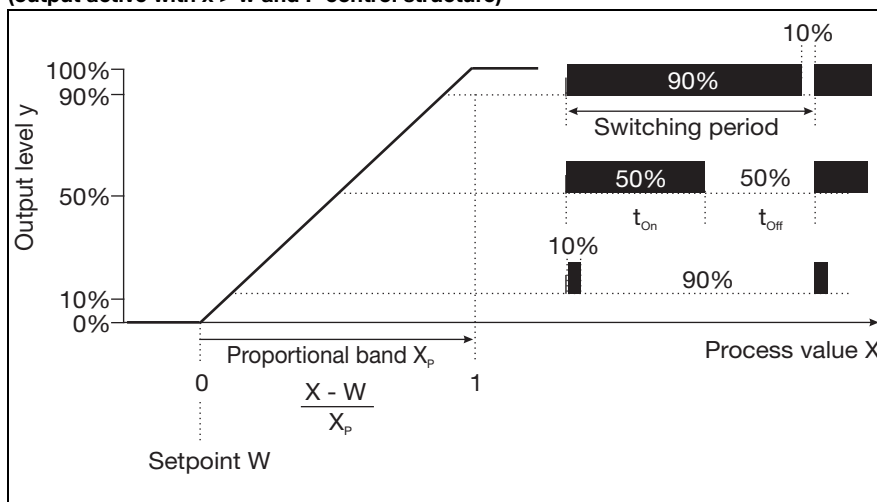


**Pulse contact: Triggering condition shorter than pulse duration**



**Pulse width controller**

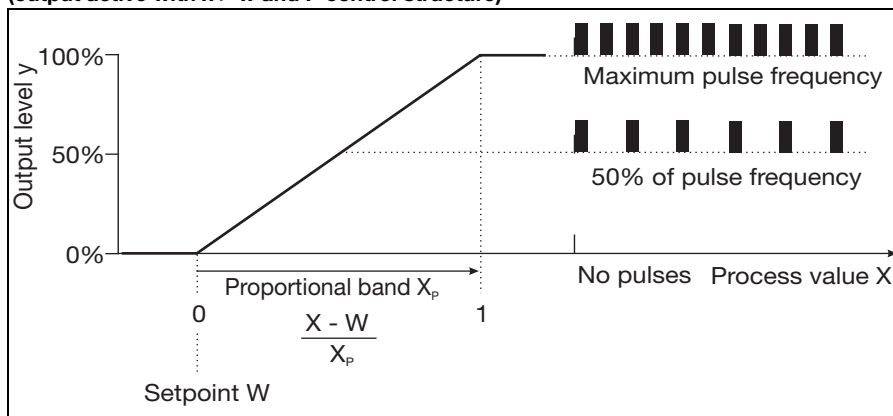
(output active with  $x > w$  and P control structure)



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

**Pulse frequency controller**

(output active with  $x > w$  and P control structure)



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

**Math and logic module**

The math module makes it possible to integrate measurement value of the analog inputs into a mathematical formula so that the calculated process variable can be displayed.

The logic module can be used, for example, to link binary inputs and limit comparators with each other logically.

Up to two math or logic formulas can be entered with the optional setup program and the results of calculations can be displayed or exported via outputs (via PC setup software only).

**Setup PC program (accessory)**

The setup PC program is available in German, English and French for configuring the instrument. You can use it to create and edit sets of data and transfer them to the instrument, as well as read them out from it. The data can be stored and printed (via PC setup software only).

**Setup interface**

The setup interface is integrated into the JUMO dTRANS AS 02 by default. You can use it, together with the setup program (accessory) and a setup interface (accessory), to configure the instrument.

**RS232/RS485 interface**

The serial interface is used for communication with higher-level systems when the Modbus/Jbus protocol is used.

**PROFIBUS-DP**

The JUMO dTRANS AS 02 can be integrated into a fieldbus system according to the PROFIBUS-DP standard via the PROFIBUS-DP interface. This PROFIBUS-DP version is specially designed for communication between automation systems and distributed peripheral devices at the field level and is optimized for speed.

Data is transferred serially based on the RS485 standard.

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## Technical data

### Inputs (main board)

	Measuring range/control range	Accuracy	Effect of temperature
Standard signal	0(4) to 20 mA or 0 to 10 V	0.25 % of range	0.2 %/10 K
<b>Secondary input</b>			
Temperature Pt100/1000	-50 to +250 °C <sup>a</sup>	≤ 0.25 % of range	0.2 %/10 K
Temperature NTC/PTC	0.1 to 30 kΩ Entry via table with 20 value pairs	≤ 1.5 % of range	0.2 %/10 K
Resistance transmitter	Minimum: 100 Ω Maximum: 3 kΩ	±5 Ω	0.1 %/10 K

<sup>a</sup> Selectable in °F.

### Resistance thermometer inputs (optional board)

Designation	Connection	Measuring range	Measuring accuracy		Effect of ambient temperature
			3-wire/4-wire	2-wire	
Pt100 DIN EN 60751 (factory-set)	2-wire/3-wire/ 4-wire	-200 to +850 °C	≤ 0.05 %	≤ 0.4 %	50 ppm/K
Pt1000 DIN EN 60751 (factory-set)	2-wire/3-wire/ 4-wire	-200 to +850 °C	≤ 0.1 %	≤ 0.2 %	50 ppm/K
Sensor lead resistance	Maximum 30 Ω per line with 3- and 4-wire circuit				
Measurement current	Approx. 250 µA				
Lead compensation	Not required for 3- and 4-wire circuit. With a 2-wire circuit, lead resistance can be compensated in the software by correcting the process value.				

### Standard signals inputs (optional board)

Designation	Measuring range	Measuring accuracy	Effect of ambient temperature
Voltage	0(2) to 10 V 0 to 1 V Input resistance <sub>E</sub> > 100 kΩ	≤ 0.05 %	100 ppm/K
Electrical current	0(4) to 20 mA, voltage drop ≤ 1.5 V	≤ 0.05 %	100 ppm/K
Resistance transmitter	Minimum: 100 Ω Maximum: 4 kΩ	±4 Ω	100 ppm/K

### Temperature compensation for conductivity

Type of compensation	Range <sup>a</sup>
Linear 0 to 8 %/K	-10 to +160 °C
ASTM D1125 - 95 (ultra-pure water)	0 to 100 °C
Natural waters (ISO 7888)	0 to 36 °C
<b>Reference temperature</b>	
Adjustable from 15 to 30 °C; preset to 25 °C (default)	

<sup>a</sup> Note the sensor operating temperature range!

### Measuring circuit monitoring

Inputs	Underrange/overrange	Short circuit	Broken lead
Temperature	Yes	Yes	Yes
Voltage	2 to 10 V	Yes	Yes
	0 to 10 V	No	No
Current	4 to 20 mA	Yes	Yes
	0 to 20 mA	No	No
Resistance transmitter	No	No	Yes

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**Binary input**

Activation	Floating contact is open: function is not active Floating contact is closed: function is active
Function	Key lock, manual mode, HOLD, HOLD inverse, alarm suppression, freeze measured value, level lock, reset day counter, reset total counter, parameter set switchover

**Controller**

Controller type	Limit comparators, limit controllers, pulse length controllers, pulse frequency controllers, modulating controllers, continuous controllers
Controller structure	P/PI/PD/PID

**Outputs**

Relay (changeover) Contact rating Contact service life	PSU board	5 A at AC 240 V resistive load 350,000 operations at nominal load/750,000 operations at 1 A
Voltage supply for 2-wire transmitter	PSU board	Electrically isolated, non-controlled DC 17 V at 20 mA, open-circuit voltage approx. DC 25 V
Voltage supply for inductive proximity switch	Optional board	DC 12 V; 10 mA
Relay (changeover) Contact rating Contact service life	Optional board	8 A at AC 240 V resistive load 100,000 operations at nominal load/350,000 operations at 3 A
Relay SPST (normally open) Contact rating Contact service life	Optional board	3 A at AC 240 V resistive load 350,000 operations at nominal load/900,000 operations at 1 A
Semiconductor relay Contact rating Protective circuit	Optional board	1 A at 240 V Varistor
PhotoMOS <sup>®</sup> relay	Optional board	$U \leq \text{AC/DC } 50 \text{ V}$ $I \leq 200 \text{ mA}$
Voltage Output signals Load resistance Accuracy	Optional board	0 to 10 V or 2 to 10 V $R_{\text{load}} \geq 500 \Omega$ $\leq 0.5 \%$
Electrical current Output signals Load resistance Accuracy	Optional board	0 to 20 mA or 4 to 20 mA $R_{\text{load}} \leq 500 \Omega$ $\leq 0.5 \%$

**Display**

Type	LC graphic display, blue with background lighting, 122 × 32 pixels
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**Electrical data**

Voltage supply (switch-mode PSU)	AC 110 to 240 V +10/-15 %; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz
Electrical safety	To DIN EN 61010, Part 1 overvoltage category II, pollution degree 2
Power consumption	Max. 14 VA (20 A fuse max.)
Data backup	EEPROM
Electrical connection	On the back via screw terminals, conductor cross-section up to max. 2.5 mm <sup>2</sup>
Electromagnetic Compatibility (EMC) Interference emission Interference immunity	DIN EN 61326-1 Class A To industrial requirements

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**Enclosure**

Enclosure type	Plastic enclosure for panel mounting to DIN IEC 61554 (indoor use)
Depth behind panel	90 mm
Ambient temperature	-5 to +55 °C
Storage temperature	-30 to +70 °C
Climatic rating	Rel. humidity ≤ 90 % annual mean, no condensation
Site altitude	Up to 2000 m above sea level
Operating position	Horizontal
Enclosure protection in panel case in surface-mounted case	To DIN EN 60529 Front IP65, rear IP20 IP65
Weight (fully fitted)	About 380 g

**Interface**

<b>Modbus</b>	
Interface type	RS422/RS485
Protocol	Modbus, Modbus Integer
Baud rate	9600, 19200, 38400
Device address	0 to 255
Max. number of nodes	32
<b>PROFIBUS-DP</b>	
Device address	0 to 255

**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	Type 202553/01...

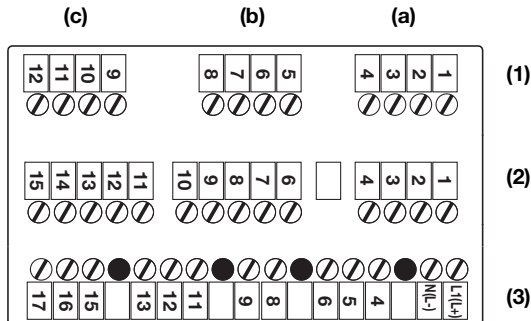
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## Electrical connection



### Mounting information for conductor cross-sections and ferrules

Ferrule	Conductor cross-section		Minimum ferrule length or stripping
	Minimum	Maximum	
Without ferrule	0.34 mm <sup>2</sup>	2.5 mm <sup>2</sup>	10 mm (stripping)
Without collar	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	10 mm
With collar up to 1.5 mm <sup>2</sup>	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	10 mm
Twin, with collar	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	12 mm

(1)	Row 1	(a)	Option 1	(b)	Option 2	(c)	Option 3
(2)	Row 2	Main board (standard signal/resistance/temperature)					
(3)	Row 3	PSU board (voltage supply/2x relays)					

### Optional board (row 1, slot a, b or c)

Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
<b>Analog input</b>				
<b>Temperature sensor in a 2-wire circuit</b> Pt100 or Pt1000		2 4	6 8	10 12
<b>Temperature sensor in a 3-wire circuit</b> Pt100 or Pt1000		3 2 4	7 6 8	11 10 12
<b>Resistance transmitter</b>		2 3 4	6 7 8	10 11 12
<b>Electrical current</b>		3 4	7 8	11 12
<b>Voltage</b> 0(2) to 10 V		1 2	5 6	9 10
<b>Voltage</b> 0 to 1 V		2 3	6 7	10 11
<b>Continuous output</b>				
<b>Current or voltage</b>		2 3	6 7	10 11
<b>Modbus interface</b>				
RS422		-	-	9 10 11 12
RS485		-	-	11 12

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 Internet: www.jumousa.com



Function	Symbol	Terminal for slot (a)	Terminal for slot (b)	Terminal for slot (c)
<b>PROFIBUS-DP interface</b>				
	VP(+5V) RxD/TxD-P(B) RxD/TxD-N(A) DGND	-	-	9 10 11 12
<b>Datalogger interface</b>				
RS485	RxD/TxD+ RxD/TxD-	-	-	10 11
<b>Relay (1x changeover)</b>				
		K3 1 2 3	K4 5 6 7	K5 9 10 11
<b>Relay (2x NO, common pin)</b>				
		K3 1 2 K6 3	-	K5 9 10 K8 11
<b>Triac (1 A)</b>				
		K3 2 3	K4 6 7	K5 10 11
<b>PhotoMOS<sup>®</sup> relay (0.2 A)</b>				
		K3 1 2	K4 5 6	K5 9 10
		K6 3 4	K7 7 8	K8 11 12
<b>Voltage supply for proximity switch</b>				
		1 2	5 6	9 10

**Main board (row 2)**

Function	Symbol	Terminal
<b>Standard signal input for electrical current</b> 0(4) to 20 mA		3 4
<b>Standard signal input for voltage</b> 0(2) to 10 V or 10 to 0(2) V		1 2
<b>Temperature sensor in a 2-wire circuit</b> Pt100 or Pt1000		2 3 4
<b>Temperature sensor in a 3-wire circuit</b> Pt100 or Pt1000		2 3 4

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<b>Temperature sensor in a 4-wire circuit</b> Pt100 or Pt1000		1 2 3 4
<b>Resistance transmitter</b>		4 3 2
<b>Binary inputs</b>		
Binary input 1		6+ 10
Binary input 2		7+ 10

**PSU board (row 3)**

Function	Symbol	Terminal
<b>Voltage supply for JUMO dTRANS 02</b>		
Voltage supply: AC 110 to 240 V Voltage supply: AC/DC 20 to 30 V		1 L1 (L+) 2 N (L-)
n.c.		4 5 6
<b>Voltage supply for external 2-wire transmitter</b>		
DC 24 V (+20/-15 %)		8 L + 9 L -
<b>Relay 1</b>		
Switching output K1 (floating)		11 12 13
<b>Relay 2</b>		
Switching output K2 (floating)		15 16 17

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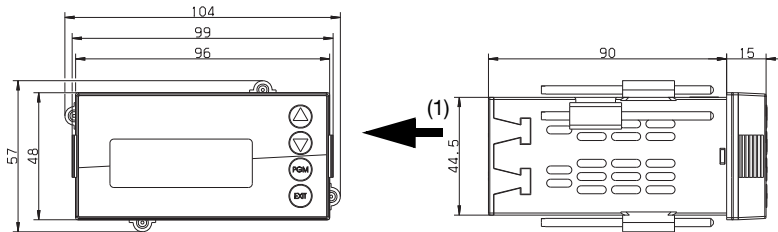
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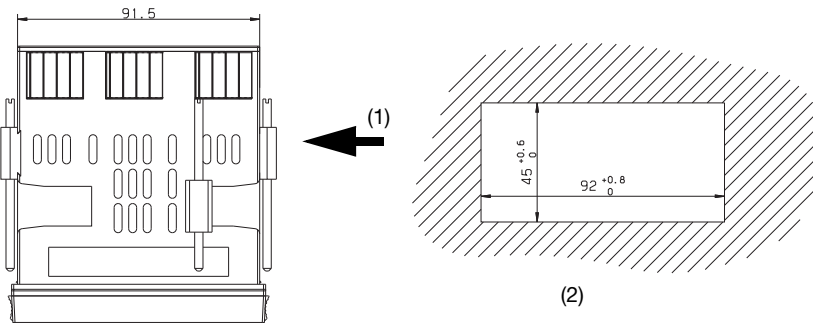
## Dimensions

### Panel case



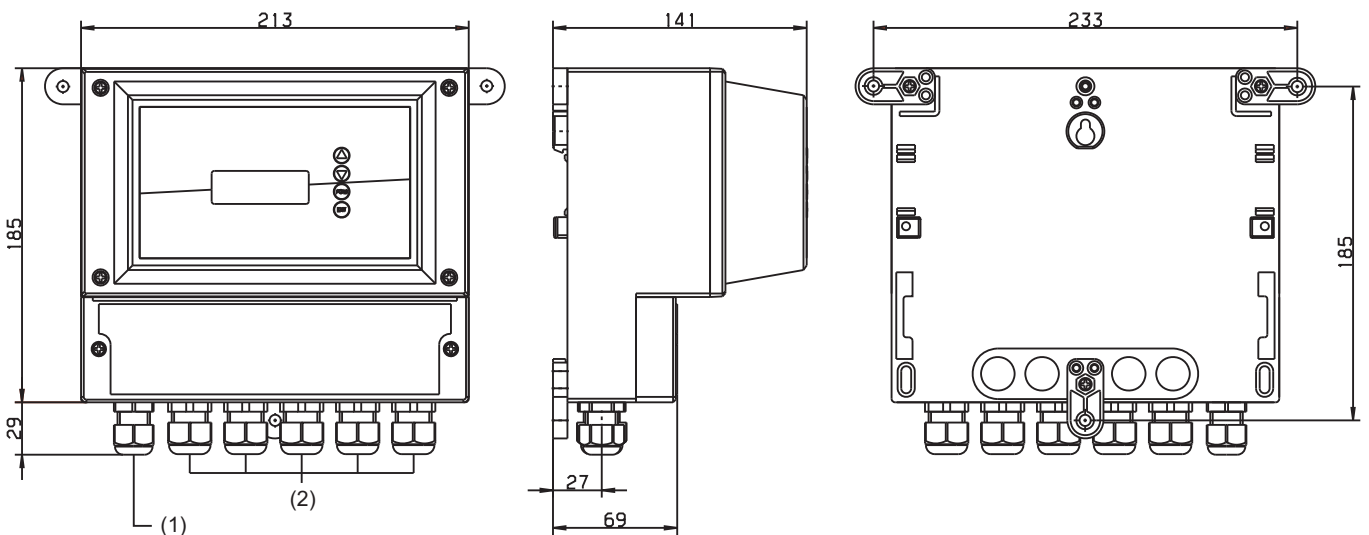
### Close mounting

Minimum spacing of panel cutouts	Horizontal	Vertical
Without setup connector	30 mm	11 mm
With setup connector (see arrow)	65 mm	11 mm



- (1) PC interface socket
- (2) Panel cutout to DIN IEC 61554: 2002-08

### Surface-mounted case



- (1) Cable gland M16
- (2) Cable gland M20

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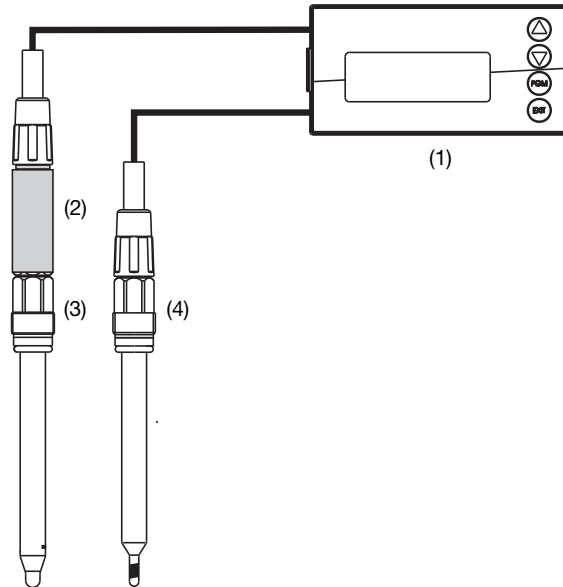
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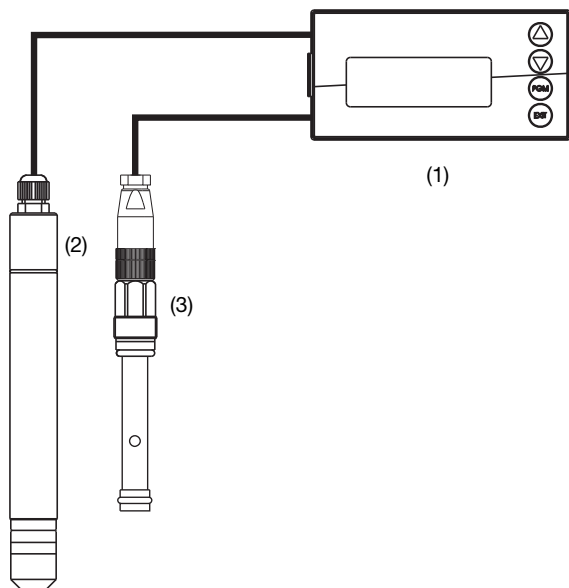
## Application examples

### Indicator/controller for pH (temperature compensation)



- (1) JUMO dTRANS AS 02
- (2) 2-wire transmitter, type 202701
- (3) pH combination electrode
- (4) Compensation thermometer, type 201085

### Indicator/controller for free chlorine, chlorine dioxide, hydrogen peroxide, peracetic acid or ozone (with flow monitoring)



- (1) JUMO dTRANS AS 02
- (2) Measuring cell for free chlorine, type 202630
- (3) Flow monitor, sales No. 00396471

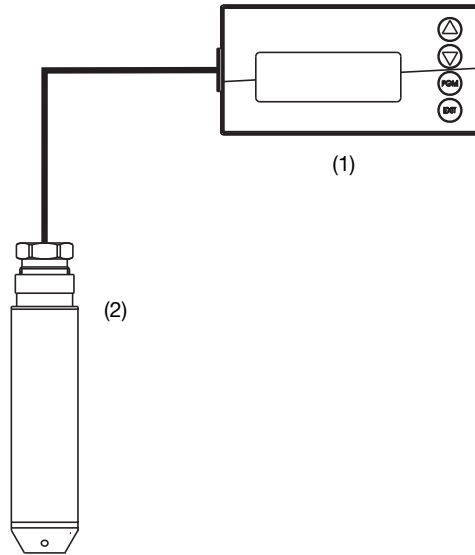
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Indicator/controller for level or liquid level measurement



- (1) JUMO dTRANS AS 02
- (2) Level measurement probe, type 402090 or type 404391

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**Order details**

<b>(1) Basic type</b>	
202553/01	JUMO dTRANS AS 02 - Transmitter/controller for standard signals and temperature in panel case, 96 mm x 48 mm (front IP65)
202553/05	JUMO dTRANS AS 02 - Transmitter/controller for standard signals and temperature in surface-mounted case (IP65)
<b>(2) Version</b>	
8	Standard with factory setting
9	Programming to customer specification
<b>(3) Operating language</b>	
01	German
02	English
<b>(4) Optional slot 1</b>	
0	Not used
1	Analog input
2	Relay (changeover)
3	2 Relay (normally open)
4	Analog output
5	2 PhotoMOS <sup>®</sup> relays
6	Solid state relay 1 A
7	Voltage supply output DC ±5 V
8	Voltage supply output DC 12 V
<b>(5) Optional slot 2</b>	
0	Not used
1	Analog input
2	Relay (changeover)
3	2 Relay (normally open)
4	Analog output
5	2 PhotoMOS <sup>®</sup> relays
6	Solid state relay 1 A
7	Voltage supply output DC ±5 V
8	Voltage supply output DC 12 V
<b>(6) Option für Steckplatz 3</b>	
0	Not used
1	Analog input
2	Relay (changeover)
3	2 Relay (normally open)
4	Analog output
5	2 PhotoMOS <sup>®</sup> relays
6	Solid state relay 1 A
7	Voltage supply output DC ±5 V
8	Voltage supply output DC 12 V
10	Interface RS422/485
11	Data logger with interface RS422/485
12	PROFIBUS-DP interface
<b>(7) Voltage supply</b>	
23	AC 110 to 230 V, +10/-15 %, 48 to 63 Hz
25	AC/DC 20 to 30 V, 48 to 63 Hz

Order code      (1)      (2)      (3)      (4)      (5)      (6)      (7)  
 Order example      202553/01      -      8      -      01      -      2      -      2      -      04      -      23

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## Stock version

(delivery 3 working days after receipt of order)

Order code	Part no.
202553/01-8-01-4-0-00-23/000	00550842

## Accessories

(delivery 10 working days after receipt of order)

Item	Part no.
Holder for C rail (PG 709710)	00375749
Dummy cover 96 mm × 48 mm (PG 709710)	00069680
Pipe mounting set (PG 209791)	00398162
Weather protection roof complete for basic type extension 05 (PG 209791)	00401174
PC setup software (PG 202599)	00560380
PC interface cable including USB/TTL converter and two adapters (USB connecting cable) (PG 709720)	00456352

Optional board	Code	Part no.
Analog input (universal)	1	00442785
Relay (1× changeover)	2	00442786
Relay (2× NO)	3	00442787
Analog output	4	00442788
2 PhotoMOS <sup>®</sup> relay	5	00566677
Solid state relay 1 A	6	00442790
Supply voltage output DC ±5 V (e.g. for ISFET)	7	00566681
Supply voltage output DC 12 V (e.g. for inductive proximity switch)	8	00566682
Interface RS422/485	10	00442782
Datalogger with RS485 interface	11	00566678
PROFIBUS-DP interface	12	00566679

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# JUMO AQUIS 500 pH

## Transmitter/Controller for pH, ORP, NH<sub>3</sub> (ammonia) concentration and temperature

### Brief description

The instrument is used for measuring/controlling the pH, ORP or NH<sub>3</sub> (ammonia) concentration. The function is switchable on the instrument itself. Depending on the measured variable, combination electrodes (e. g. pH/redox combination electrodes, gas-sensitive sensors) or split versions (glass/metal electrodes with a separate reference electrode) can be readily connected. Temperature serves as the second input variable, measured by a Pt100/1000, for example. It is therefore possible to implement automatic temperature compensation for the pH and NH<sub>3</sub> variables.

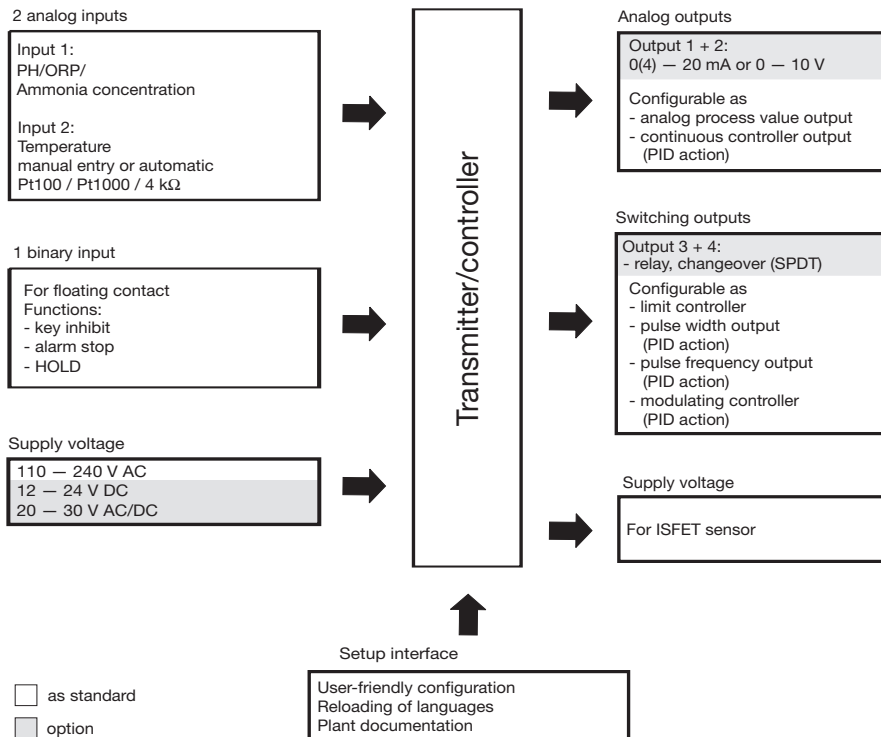
The instruments are operated using unambiguous keys and a large LC graphics display on which the measurements are clearly legible. The plain-text presentation of the parameters makes it easier for the user to configure the instrument, and also helps in programming it correctly.

Thanks to its modular design, the instrument can be perfectly matched to the specific application requirements. Up to four outputs are available (see the block diagram for the functions).

### Typical areas of application

Universal application in water and wastewater engineering, service/process water and wastewater, drinking water and well/surface water, leakage monitoring in refrigeration plant

### Block diagram



Type 202560

### Key features

- Directly switchable to pH, ORP or NH<sub>3</sub> (ammonia) concentration
- Automatic temperature compensation
- Large LC graphics display with background lighting
- Choice of display mode: large numbers, bar graph or trend display
- Solder-free connection system
- Calibration options according to measured variable: 1-/2-/3-point calibration
- Calibration logbook
- Impedance measurement can be activated for pH measurement
- Symmetrical and asymmetrical connection of pH sensors
- pH-ISFET sensors can be connected thanks to the sensor supply integrated in the output
- IP67 protection (in surface mountable housing) IP65 protection (for panel mounting)
- Language changeover: German, English, French; further languages can be loaded through the setup program
- Using the setup program: user-friendly programming, plant documentation, additional languages can be loaded

### Approvals



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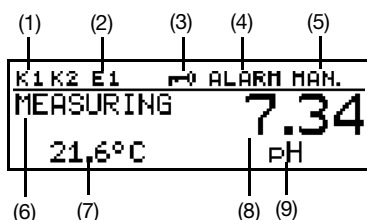
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## Functional description

The instrument is designed for use on site. A rugged housing protects the electronics and the electrical connections from corrosive environmental conditions (IP67). As an alternative, the instrument can also be installed in a control panel; it is then protected to IP65 at the front. The electrical connection is made by easy-to-fit pluggable screw terminals.

## Displays and controls



- (1) Switching output 1 or 2 is active
- (2) Binary input 1 has been actuated
- (3) Keypad is inhibited
- (4) Alarm has been activated
- (5) Instrument is in manual mode
- (6) Instrument status
- (7) Temperature of medium
- (8) Principal measurement
- (9) Unit of principal measurement

The user can define what is to be shown in positions (7) and (8) of the display:

- No display
- Compensated measurement
- Temperature
- Output level 1
- Output level 2
- Setpoint 1
- Setpoint 2

## Operation

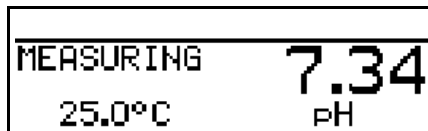
For easy programming and operation, all parameters are arranged in clearly structured levels and shown in plain text. Operation is protected by a code word. This facilitates individual adaptation of the operation, since parameters can be generally enabled or assigned to the protected area.

As a highly convenient alternative to configuration from the keys, the instrument can also be configured through the setup program for PC (option).

## Display modes

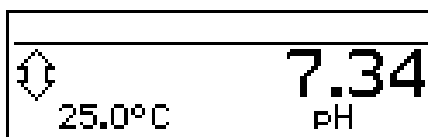
Three display modes are available:

### Large digits



In this display mode, the measurements are, as usual, shown in digits.

### Trend display



The numerical value is supplemented by a symbol which indicates the change direction and change speed of the measurement.

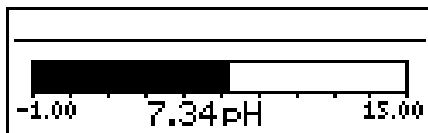
This can, for instance, be very useful during controller tuning.



from left to right:

fast, medium and slow rise, stable, slow, medium and fast drop.

### Bar graph



This display mode allows the user to see at a glance in which region the measurement is at present.

The bar graph can be freely scaled.

## pH measurement

Both combination pH electrodes and glass electrodes with a separate reference electrode can be connected. There are two ways of connecting the electrodes:

- asymmetrical, high-impedance (this is usual way)
- symmetrical, high-impedance (in special cases)

What is new is the possibility of monitoring the impedance of the connected electrode(s). Thanks to this feature, the glass and reference impedances can be acquired individually (when used with a separate ground pin), or as a cumulative value.

Special electrodes, which use antimony as the pH-sensitive element, can also be connected.

A supply for ISFET sensors has been integrated. This enables the user to operate suitable sensors directly.

ISFET sensors are employed for special applications where glass sensors are not required (glass-free pH measurement). However, because these sensors are not standardized, it is necessary to check their usability before application.

The pH is temperature-compensated through automatic temperature measurement, by means of the second input, or by entering the value manually.

## ORP measurement

Combination redox electrodes as well as metal electrodes with a separate reference electrode can be connected.

The value is displayed in mV, or is freely scalable.

## Ammonia measurement

After the transmitter/controller has been configured for NH<sub>3</sub> (ammonia) measurement, the appropriate sensors can be connected.

Applications:

Leakage monitoring of cooling circuits

## Calibration

### pH measurement

- 1-point calibration
- 2-point calibration
- 3-point calibration

### ORP measurement

- 1-point calibration
- with display in mV
- 2-point calibration with display in % (freely scalable)

### NH<sub>3</sub> (ammonia) measurement

- 1-point calibration (zero of electrode)

## Calibration logbook

The five most recent calibrations performed successfully can be called up in the calibration logbook. This makes it possible to evaluate the ageing of the sensor that is connected.

If required, the logbook can also be deleted (this makes sense when changing the sensor).

## Calibration timer

The calibration timer indicates (if required) when the next routine calibration is due. The calibration timer is activated by entering a number of days, after which recalibration has to be carried out (plant or operator requirement).

## Min/Max value memory

This memory acquires the minimum (bottom) or maximum (peak) input variables that have occurred. This information serves, for example, to decide whether the sensor that is connected is designed for the values that are actually present.



## Binary input

The following functions can be activated through the binary input:

- Activate key inhibit  
 When this function has been activated, operation from the keys is no longer possible.
- Activate HOLD mode  
 After activating this function, the outputs (analog and relay) adopt the states that have previously been defined.
- Alarm suppression  
 This function temporarily deactivates the alarm generation via the relay (has to be configured accordingly).

Linking the corresponding terminals by means of a floating contact (e. g. relay) will activate the pre-defined function.

## Control functions

The relays can have functions assigned that are configured via parameters. The control function is freely programmable as P, PI, PD or PID action.

## Relay outputs

One or two relay changeover (SPDT) contacts are available.

The following functions can be programmed:

- Switching direction (min/max)
- Limit controller (pull-in/drop-out delay, hysteresis)
- Pulse width output (see control functions)
- Pulse frequency output (see control functions)
- Modulating controller function (see control functions)
- Limit comparators (pull-in/drop-out delay, hysteresis)
- Pulse function  
 The output switches on in a defined way when reaching the switching point and then switches off again.

## Analog outputs

One or two analog outputs are available. The following functions can be chosen:

Output	Analog process value output		Continuous controller Principle measurement variable
	Principle measurement variable	Temperature	
1	X	-	X
2	-	X	X

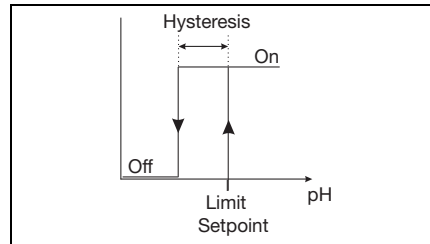
With the analog process value output, the range start and end values are freely selectable. The response of the outputs to over/underrange, alarm and calibration is freely programmable. Simulation function:

The analog process value outputs can be freely set in the manual ("Hand") mode. Application: "Dry-run" start-up of the plant, trouble-shooting, servicing.

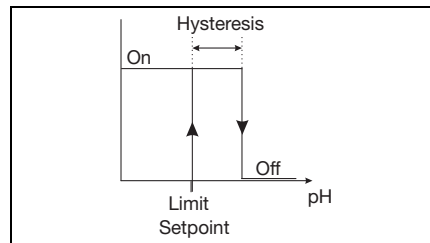
- Alarm
- Sensor or range error
- Response to alarm, over/underrange, calibration and HOLD

### Contact functions

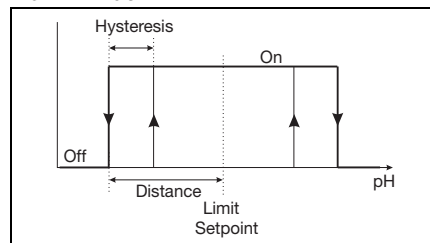
#### MAX limit function



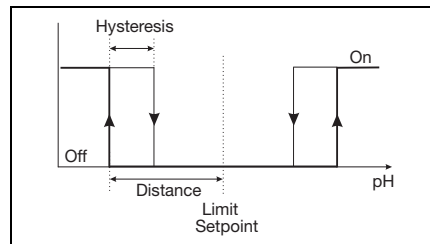
#### MIN limit function



#### Alarm window 1

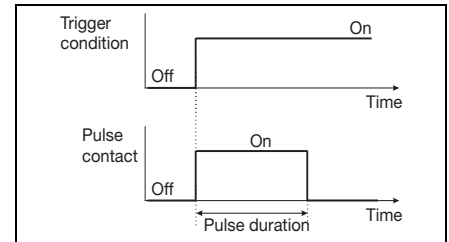


#### Alarm window 2



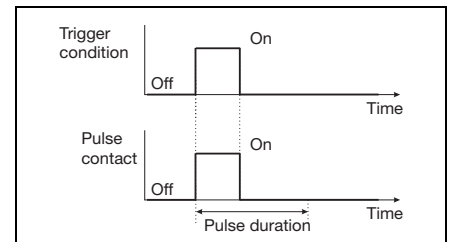
### Pulse contact

Trigger condition longer than pulse duration



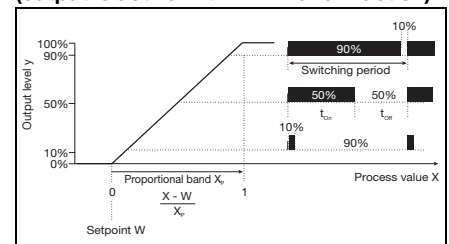
### Pulse contact

Trigger condition shorter than pulse duration



### Pulse width controller

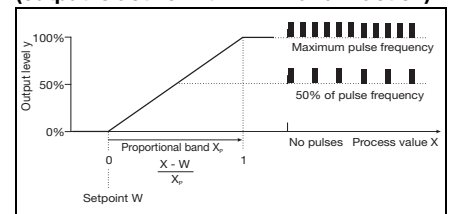
(output is active with  $X > W$  and P action)



If the process value X exceeds the setpoint W, the P controller will control proportionally to the control deviation. On going outside the proportional band, the controller operates with an output level of 100% (100% duty cycle).

### Pulse frequency controller

(output is active with  $X > W$  and P action)



If the process value X exceeds the setpoint W, the P controller will control proportionally to the control deviation. On going outside the proportional band, the controller operates with an output level of 100% (maximum switching frequency).

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## Technical data

### Inputs

Principal input	Measurement/control range	Accuracy	Temperature error
pH	-1 to 15 pH	≤ 0.3%	0.2%/10°C
ORP	-1500 to 1500 mV	≤ 0.3%	0.2%/10°C
NH <sub>3</sub> (ammonia)	0 to 9999 ppm	≤ 0.3%	0.2%/10°C
<b>Secondary input</b>			
Temperature Pt100/1000 (automatic detection)	-10 to 150°C <sup>1</sup>	≤ 0.5°C	0.05%/10°C
Temperature NTC/PTC	4 kΩ max. Entry via table with 20 value pairs	≤ 0.3% <sup>2</sup>	0.05%/10°C

<sup>1</sup> Switchable to °F.

<sup>2</sup> Depending on supporting points.

### Temperature compensation

Measurement variable	Compensation	Range <sup>1</sup>
pH	yes	-10 to 150°C
ORP	no	not applicable
NH <sub>3</sub> (ammonia)	yes	-10 to 150°C

<sup>1</sup> Please note operating temperature range of sensor.

### Measuring circuit monitoring

Inputs	Over/underrange	Short-circuit	Cable break
pH	yes	yes <sup>1</sup>	yes <sup>1</sup>
ORP	yes	no	no
NH <sub>3</sub> (ammonia)	yes	no	no
Temperature	yes	yes	yes

<sup>1</sup> For pH measurement, the sensor can be monitored for short-circuit and cable break by activating the impedance measurement.

### Impedance measurement

Impedance measurement can optionally be activated.

Since it depends on some marginal parameters, the following points must be noted:

- Only glass-based sensors are permissible.
- The sensors must be directly connected to the transmitter.  
It is not permissible to use an impedance converter in the measuring circuit.
- The maximum permissible cable length between sensor and transmitter is 10 m.
- Liquid impedances will directly influence the measurement result.  
We therefore recommend activating the measurement in liquids from about 100 µS/cm upwards.

### Binary input

<b>Activation</b>	Through floating contact
<b>Function</b>	Key inhibit HOLD Alarm suppression

### Controller

<b>Controller type</b>	Limit comparators, limit controller, pulse width controller, pulse frequency controller, modulating controller, continuous controller
<b>Controller action</b>	P / PI / PD / PID
<b>A/D converter</b>	Dynamic resolution up to 14-bit
<b>Sampling time</b>	500 msec

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### Analog outputs (one or two)

Output mode	Signal range	Accuracy	Temperature error	Permissible load resistance
Current signal	0/4 – 20 mA	≤ 0.25%	0.08%/10 °C	≤ 500Ω
Voltage signal	0 – 10 V	≤ 0.25%	0.08%/10 °C	≥ 500 Ω

The analog outputs respond as per NAMUR NE43 recommendation.  
 They are electrically isolated, 30 V AC / 50 V DC.

### Switching outputs (two changeover (SPDT) max.)

<b>Rated load</b>	3 A/250 VAC (resistive load)
<b>Contact life</b>	>2x10 <sup>5</sup> operations at rated load

### Supply for ISFET

±5 V DC; 5 mA

### Setup interface

Interface for configuring the instrument through the optionally available setup program (for instrument configuration only).

### Electrical data

<b>Supply voltage</b>	AC 110 – 240 V, -15/+10%, 48 – 63 Hz AC/DC 20 – 30 V, 48 – 63 Hz DC 12 – 24 V, +/-15% (permissible only for connection to SELV/PELV circuits)
<b>Power consumption</b>	approx. 14 VA
<b>Electrical safety</b>	EN 61 010, Part 1 overvoltage category III <sup>1</sup> , pollution degree 2
<b>Data backup</b>	EEPROM
<b>Electrical connection</b>	pluggable screw terminals conductor cross-section up to 2.5 mm <sup>2</sup> (supply, relay outputs, sensor inputs) conductor cross-section up to 1.5 mm <sup>2</sup> (analog outputs; ISFET supply)

<sup>1</sup> Not valid with protective extra-low voltage of power supply variant 12 – 24 V DC.

### Housing

<b>Material</b>	ABS
<b>Cable entry</b>	cable glands, 3xM16 and 2xM12 max.
<b>Special feature</b>	venting device to prevent condensation
<b>Ambient temperature range</b> (the accuracy specified is adhered to within this range)	-10 to 50°C
<b>Operating temperature range</b> (instrument is operational)	-15 to 65°C
<b>Storage temperature range</b>	-30 to 70°C
<b>Climatic conditions</b>	rel. humidity ≤ 90% annual mean, no condensation (following EN 60721 3-3 3K3)
<b>Enclosure protection</b> as per EN 60529	in surface mountable housing: IP67 for panel mounting: IP65 front, IP20 rear
<b>Vibration strength</b>	as per EN 60068-2-6
<b>Weight</b>	in surface mountable housing: approx. 900 g for panel mounting: approx. 480 g
<b>Dimensions</b>	see dimensioned drawings on page 8.

### Standard accessories

Cable glands  
 Internal mounting material  
 Operating Instructions

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**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	all types

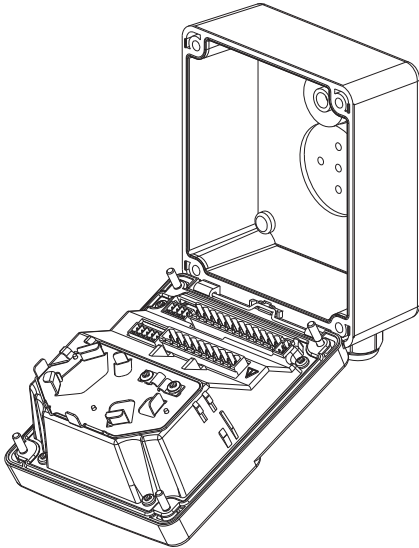
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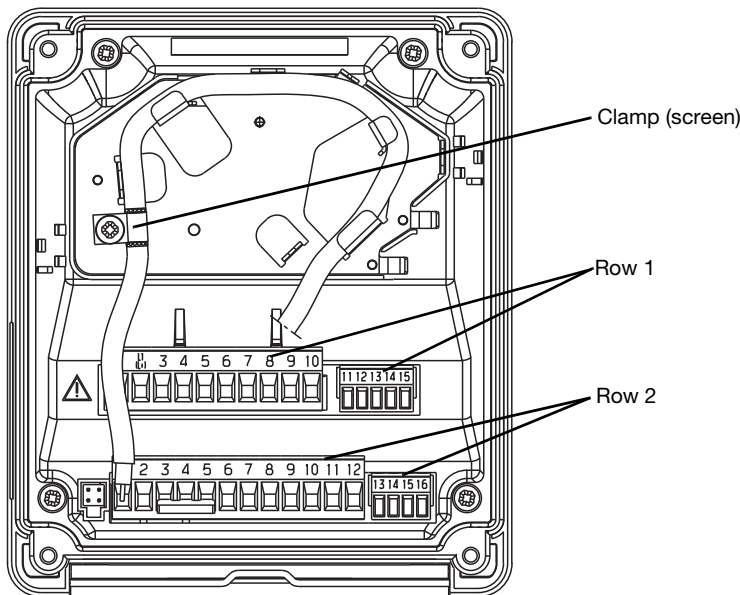
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## Electrical connection



The electrical connection for the “in surface mountable housing” version can be made easily after opening the unit.



The connection cable between sensor and transmitter must be a special coaxial cable with a diameter of 3 to 5 mm (e. g. 2992-2(x)-0).

The instrument contains a guide plate for optimized cable routing.

The sensor cables (incorporating strain relief) are run to the pluggable screw terminals, where they are connected up without the use of solder.

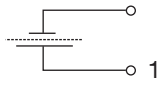
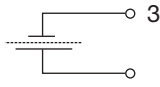

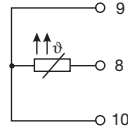



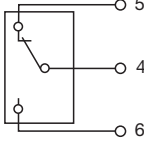
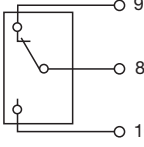
Connection		Terminal	Row
<b>Supply for transmitter/controller</b>			
Supply voltage (23): AC 110 – 230 V, -15/+10%, 48 – 63 Hz		1 N (L-)	1
Supply voltage (25): AC/DC 20 – 30 V, 48 – 63 Hz		2 L1 (L+)	
Supply voltage (30): DC 12 – 24 V, +/-15%			
NC		3	
<b>Supply voltage for ISFET sensor</b>			
Supply voltage ± 5 V DC, 5 mA		11 L+	1
		12 L	
		13 L-	
NC		14	
NC		15	

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Connection		Terminal	Row
<b>Inputs</b>			
Glass/metal electrode		1	2
NC		2	
Reference electrode		3	
NC		4	
GND		5	
Link terminal 3 and terminal 5 (asymmetrical connection only)		6	
FP (liquid potential) For connection with symmetrical connection only		7	
NC		8	
RTD in 3-wire circuit, Pt100 or Pt1000		9 10	
Binary input		11 12	
<b>Outputs</b>			
Analog output 1 0 – 20 mA or 20 – 0 mA or 4 – 20 mA or 20 – 4 mA or 0 – 10 V or 10 – 0 V (electrically isolated)		+ 13 - 14	2
Analog output 2 0 – 20 mA or 20 – 0 mA or 4 – 20 mA or 20 – 4 mA or 0 – 10 V or 10 – 0 V (electrically isolated)		+ 15 - 16	
Switching output K1 (floating)		4 common 5 break (SPST-NC) 6 make (SPST-NO)	1
NC		7	
Switching output K2 (floating)		8 common 9 break (SPST-NC) 10 make (SPST-NO)	

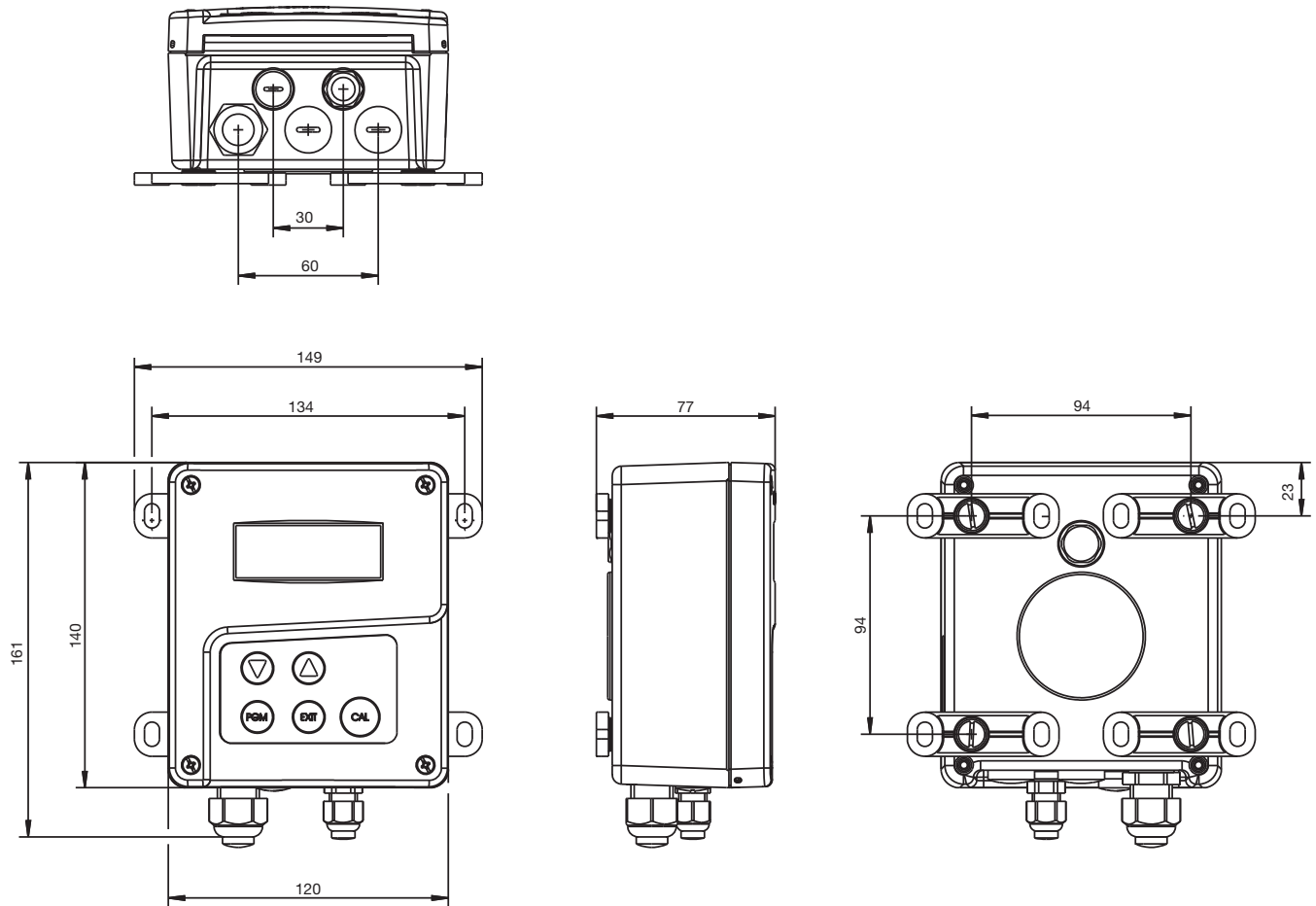
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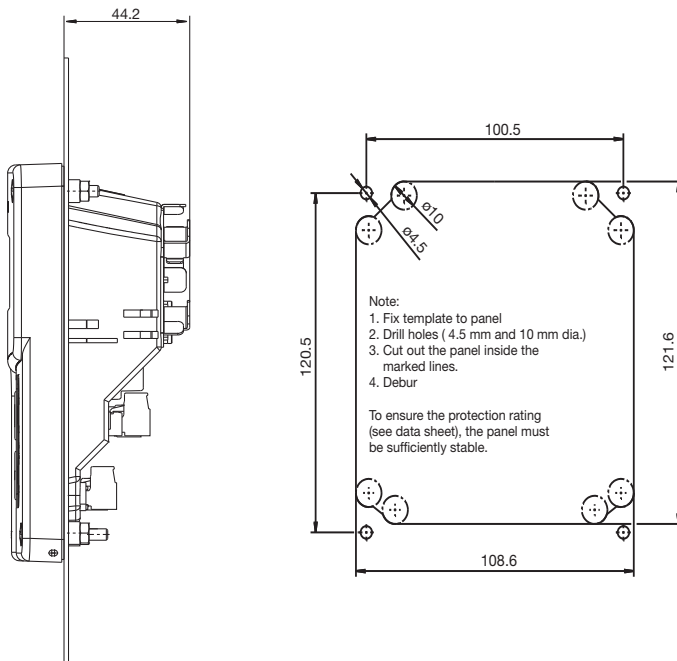
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## Dimensions



## Panel-mounting/drilling diagram



**Note:**  
 The drilling template (in actual size) is shown in the Operating Instructions B 202560.0.

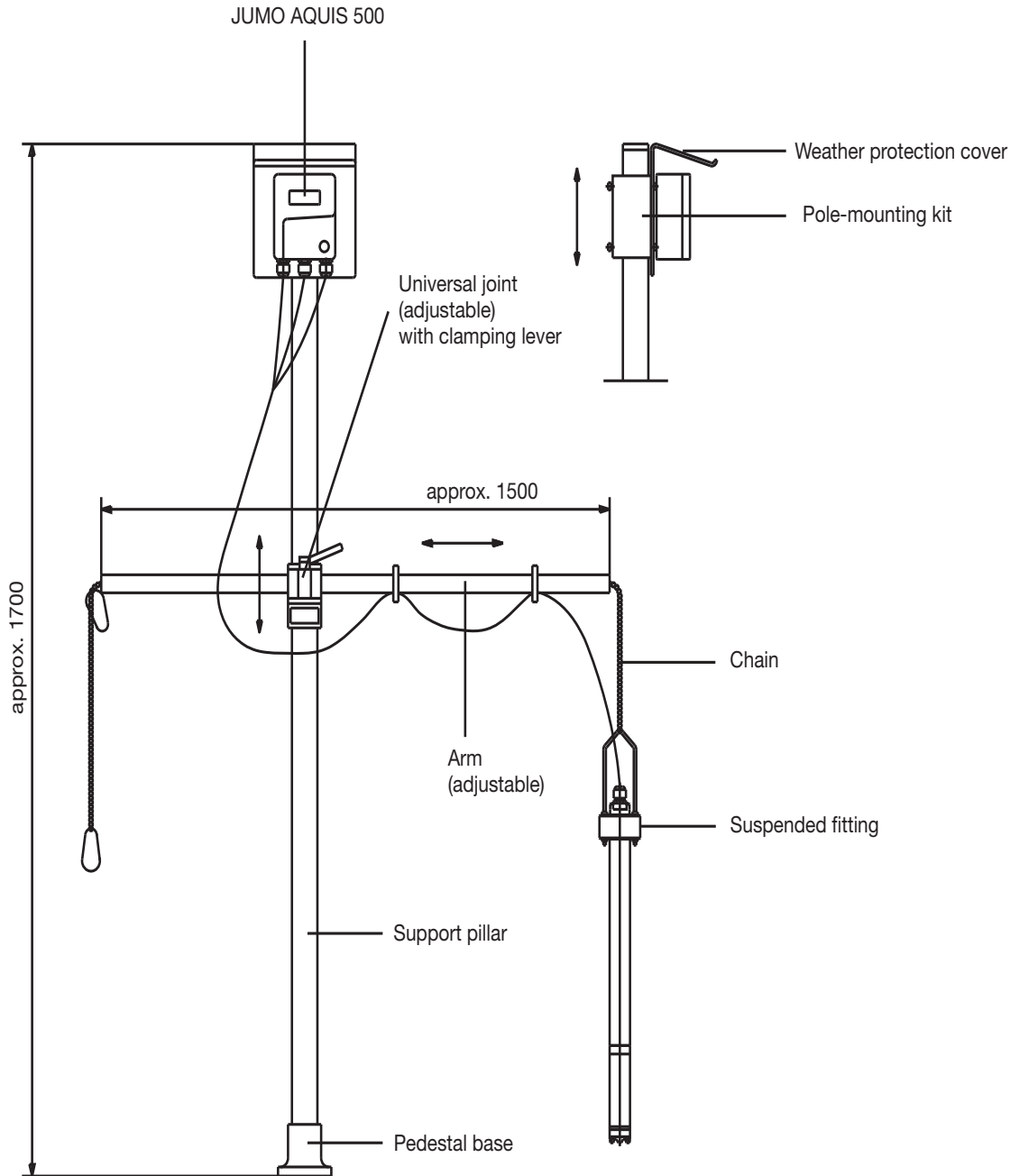
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**Accessories**



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**Order details: JUMO AQUIS 500 pH**

- (1) Basic type**  
 JUMO AQUIS 500 pH  
 202560 Transmitter/controller for pH, ORP,  
 NH<sub>3</sub> (ammonia) concentration and temperature
- (2) Basic type extensions**  
 10 for panel mounting  
 20 in surface mountable housing
- (3) Output 1 (for principle measurement variable or continuous controller)**  
 000 no output  
 888 analog output 0(4) – 20 mA or 0(2) – 10 V
- (4) Output 2 (for principle measurement variable or continuous controller)**  
 000 no output  
 888 analog output 0(4) – 20 mA or 0(2) – 10 V
- (5) Output 3**  
 000 no output  
 310 relay with changeover (SPDT) contact
- (6) Output 4**  
 000 no output  
 310 relay with changeover (SPDT) contact
- (7) Supply voltage**  
 25 20 – 30 V AC/DC, 48 – 63 Hz<sup>1</sup>  
 23 110 – 240 V AC + 10% / -15%, 48 – 63 Hz  
 30 12 – 24 V DC ± 15%<sup>1</sup>
- (8) Extra codes**  
 000 none

**Order code**                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (7)                    (8)  
 Order example                202560 / 20 - 888 - 000 - 310 / 000 - 23 / 000, ...<sup>2</sup>

**Stock items** (shipment: 3 working days after receipt of order)

Type	Part no.
202560/20-888-888-310-310-23/000	00480051
202560/20-888-000-310-000-23/000	00480050

**Production items** (shipment: 10 days after receipt of order)

Type	Part no.
202560/10-888-888-310-310-23/000	00480048
202560/10-888-000-310-000-23/000	00480044
202560/20-888-888-310-310-25/000 <sup>1</sup>	00480049

**Accessories** (shipment: 10 days after receipt of order)

Type	Part no.
Protective roof for JUMO AQUIS 500 <sup>1</sup>	00398161
Pipe installation set for JUMO AQUIS 500 <sup>2</sup>	00483664
DIN rail installation set for JUMO AQUIS 500 <sup>3</sup>	00477842
Support pillar with base clamp, arm and chain	00398163
Holder for suspension fitting	00453191
Back panel set 202560/65	00506351
PC setup software	00483602
PC interface cable including USB/TTL converter and two adapters (USB connecting cable)	00456352

<sup>1</sup> The pole-mounting kit is needed for mounting the protection cover.  
<sup>2</sup> With the pipe installation set, the JUMO AQUIS 500 can be attached to a pipe (e. g. a support pillar or a railing).  
<sup>3</sup> With the DIN rail installation set, the JUMO AQUIS 500 can be attached to a 35 mm x 7.5 mm DIN rail as per EN 60715 A.1.

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# JUMO AQUIS 500 CR

## Transmitter/Controller for conductivity, TDS, resistivity and temperature

Compliant with  
 USP <645>



Type 202565

### Brief description

The instrument is used for the conductive measurement/control of electrolytic conductivity, resistivity or the TDS value. In addition, the JUMO AQUIS 500 CR also offers the possibility of showing the measured conductivity according to a customer-specific table.

Conductive two-electrode cells as well as four-electrode cells can be connected to the instrument.

Temperature serves as the second input variable, measured by a Pt100/1000 probe. Depending on the measured variable, it is therefore possible to implement specific, automatic temperature compensation.

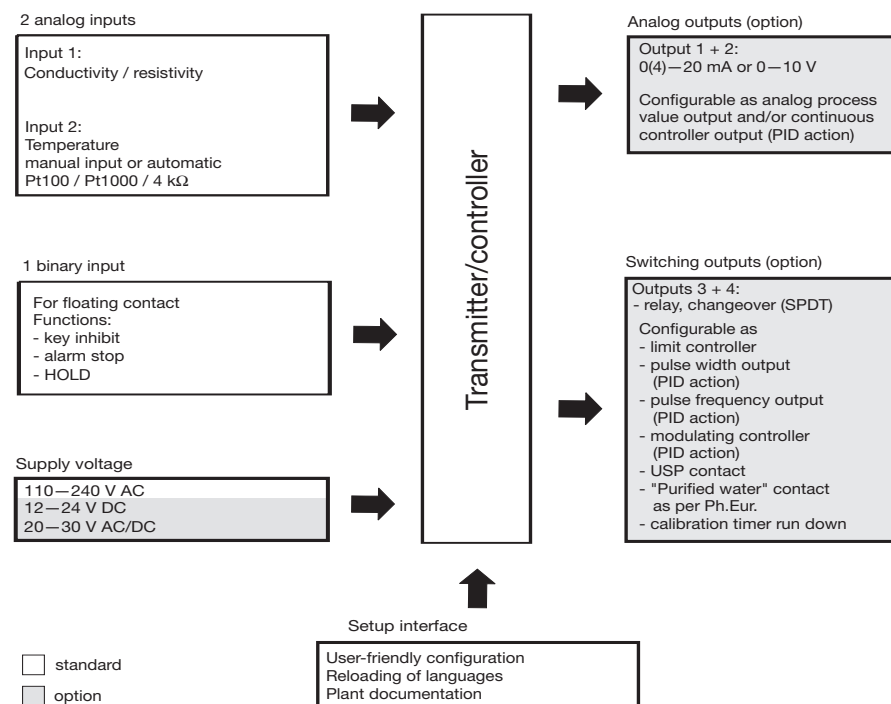
The instrument is operated using keys and a large LC graphics display on which the measurements are clearly legible. The plain-text presentation of the parameters makes it easier for the user to configure the instrument, and also helps in programming it correctly.

Thanks to its modular design, the instrument can be perfectly matched to the particular application requirement. Up to four outputs are available (see the block diagram for the functions).

### Typical areas of application

Universally applicable in water and wastewater engineering, service/process water and wastewater, drinking water and well/surface water, pure and high-purity water as well as for pharmaceutical water (e.g. as per USP, Ph.Eur., WFI), water quality measurements, TDS measurements (ppm or mg/l).

### Block diagram



### Key features

- Direct changeover to
  - conductivity (μS/cm or mS/cm)
  - resistivity (kΩ x cm or MΩ x cm)
  - TDS measurement (ppm or mg/l)
  - customer-specific table
- Automatic temperature compensation: off (e.g. USP), linear, ASTM, natural water (EN 27888/ISO 7888)
- Large LC graphics display with background lighting
- Choice of display: large numbers, bar graph or trend display
- Calibration options according to measured variable: cell constant and temperature coefficient
- Calibration logbook
- Two-electrode cells (as standard) or four-electrode cells can be connected
- Pollution detection can be activated
- Auto-range operation
- IP67 enclosure protection (in surface mountable housing)  
 IP65 enclosure protection (for panel mounting)
- Language changeover: German, English, French; further languages can be loaded through the setup program
- Using the setup program: user-friendly programming, plant documentation, additional languages can be loaded

### Approvals/approval marks (see Technical data)



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## Functional description

The instrument is designed for use on site. A rugged housing protects the electronics and the electrical connections from corrosive environmental conditions (IP67). As an alternative, the instrument can also be installed in a control panel, and is then protected to IP65 on the front. The electrical connection is made by easy-to-fit pluggable screw terminals.

### Transmitter

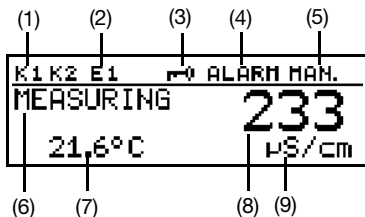
Two-electrode cells (standard) as well as four-electrode cells can be used for measurement.

Two-electrode cells can be connected, in the usual increments for cell constants ( $K=0.01$ ;  $0.1$ ;  $1.0$ ;  $3.0$  and  $10.0$ ). Thanks to the widely adjustable relative cell constant, it is also possible to connect sensors with different cell constants (e.g.  $K=0.2$ ).

In the case of the 4-electrode cells, the values  $K=0.5$  and  $1.0$  have been predefined for the cell constant. Here too, the instrument can be matched to sensors with different cell constants (e.g.  $K=0.4$ ).

The instrument can perform automatic temperature compensation, by acquiring the temperature of the sample solution.

### Displays and controls



- (1) Switching output 1 or 2 is active
- (2) Binary input 1 is actuated
- (3) Keypad is inhibited
- (4) Alarm has been activated
- (5) Instrument is in manual mode
- (6) Instrument status
- (7) Temperature of medium
- (8) Principal measurement
- (9) Unit of principal measurement

The user can define what is to be shown in positions (7) and (8) of the display:

- no display
- compensated or uncompensated measurement
- temperature
- output level 1 or 2
- setpoint 1 or 2

## Operation

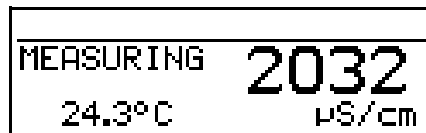
For easy programming and operation, all parameters are arranged in clearly structured levels and shown in plain text. Operation is protected by a code word. This facilitates individual adaptation of the operation, since parameters can be generally enabled or specifically assigned to the protected area.

As an alternative to configuration from the keys, the instrument can also be configured through the convenient setup program for PC (option).

### Display modes

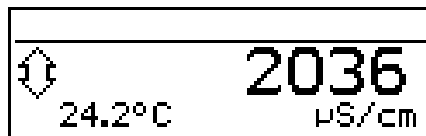
Three display modes are available:

#### Large numbers



In this display mode, the measurements are shown in digits, as usual.

#### Trend display



The numerical value is supplemented by a symbol which indicates the change direction and change speed of the measurement.

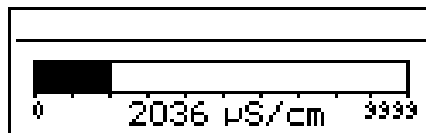
This can, for instance, be very useful during controller optimization.



from left to right:

fast, medium and slow rise, stable, slow, medium and fast fall.

#### Bar graph



This display mode allows the user to see at a glance in which region the measurement is at present.

The bar graph can be freely scaled.

## Function modes

### Electrolytic conductivity

Display/control, unit  $\mu\text{S}/\text{cm}$  or  $\text{mS}/\text{cm}$ .

### Resistivity (high-purity water)

Display/control, unit  $\text{k}\Omega \times \text{cm}$  or  $\text{M}\Omega \times \text{cm}$ .

## TDS

Display/control with ppm for the unit.

In this mode, the specific TDS factor can be entered in addition.

### Customer-specific table

In this mode, the input value (conductivity or resistivity) can be displayed in accordance with a table (up to 20 value pairs). Thanks to this function, it is possible to implement simple concentration measurements, for example. The values in the table can only be entered through the optional setup program.

## Calibration

### Cell constant

Because of manufacturing tolerances, the cell constant of a conductivity cell may deviate slightly from its nominal value. In addition, the cell constant may change during operation (due to deposits or wear, for example). This results in a change of the output signal from the cell. The instrument provides the user with the possibility of compensating any deviation from the nominal value of the cell constant by manual entry or automatic calibration of the relative cell constant. A manual entry is used, for instance, for calibration during high-purity water measurement.

### Temperature coefficient

The conductivity of almost all solutions depends on the temperature. To ensure correct measurement, it is therefore necessary to know both the temperature and the temperature coefficient [ $\%/^{\circ}\text{C}$ ] of the sample solution. The temperature can either be measured automatically, with a Pt100 or Pt1000 temperature probe, or it has to be set manually by the user.

The temperature coefficient can be automatically determined by the instrument, or it can be entered manually.

### Calibration logbook

The five most recent successful calibrations can be called up in the calibration logbook. This makes it possible to evaluate the ageing of the sensor that is connected.

### Calibration timer

The calibration timer indicates (if required) when the next routine calibration is due. The calibration timer is activated by entering a number of days, after which recalibration has to be carried out (plant or operator requirement).

## MIN / MAX value memory

This memory acquires the minimum or maximum input variables that have occurred. This information serves, for example, to decide whether the sensor that is connected is suited to the values that are actually present.

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### Detection of deposits

Deposit detection can be activated for 4-electrode cells. During normal operation, it can happen that deposits form on electrodes. This has the result that a lower concentration is displayed than actually present. With activated "deposit detection" function, the instrument tells you when the cell needs to be serviced.

### Auto-range

For some processes, the availability of two measuring ranges is advantageous, for instance for rinsing or regeneration processes. What is usually required here, is the precise acquisition of a low conductivity. Rinsing or regeneration, however, involves a much higher conductivity, which could lead to an out-of-range condition (error). This situation is not just unsatisfactory, but may even be dangerous. Thanks to the auto-range function, two measuring ranges can be determined. The instrument then switches between them in a defined manner.

### Binary input

The following functions can be activated through the binary input:

- Activate key inhibit  
 When this function has been activated, operation from the keys is no longer possible.
- Activate HOLD mode  
 After activating this function, the outputs (analog and relay) adopt the states that have previously been defined.
- Alarm suppression (controller alarm only)  
 This function temporarily deactivates the alarm generation via the relay (has to be configured accordingly).

Linking the corresponding terminals by means of a floating contact (e. g. relay) will activate the pre-defined function.

### Analog Outputs

There are up to 2 analog outputs available. The following functions can be selected:

Output	Analog process value output		Continuous controller main value
	Main variable	Temperature	
1	X	-	X
2	-	X	X

With the analog process value output, the range start and end values are freely selectable. The response of the outputs to over/underrange, alarm and calibration is freely programmable. Simulation function: The analog process value outputs can be freely set in the manual ("Hand") mode.

Application: "Dry run" start-up of the plant, troubleshooting, servicing.

### Control functions

The relays can have functions assigned that are configured via parameters. The control function is freely programmable as P, PI, PD or PID action.

### Relay outputs

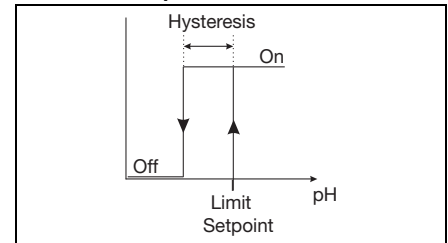
Two relay changeover contacts are available for the principle measurement variable and/or temperature.

The following functions can be programmed:

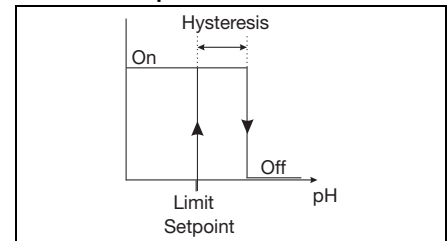
- Switching direction (min/max)
- Limit controller (pull-in/drop-out delay, hysteresis)
- Pulse width output (see control functions)
- Pulse frequency output (see control functions)
- Modulating controller function (see control functions)
- Limit comparators (pull-in/drop-out delay, hysteresis)
- Pulse function  
 The output switches on briefly when reaching the switching point and then off again.
- Alarm
- Sensor or range error
- Response to alarm, over/underrange, calibration and HOLD

### Contact functions

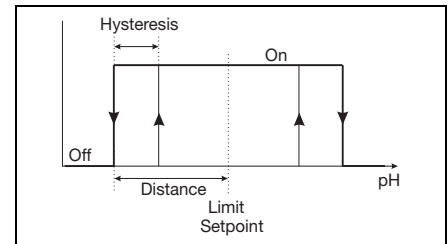
#### MAX limit comparator



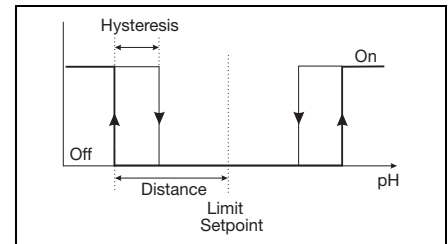
#### MIN limit comparator



#### Alarm window 1

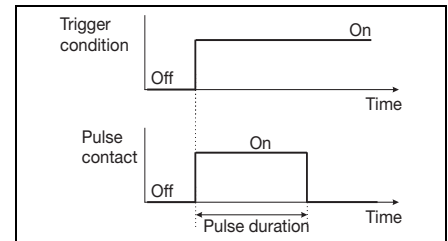


#### Alarm window 2



#### Pulse contact

#### Trigger condition longer than pulse duration



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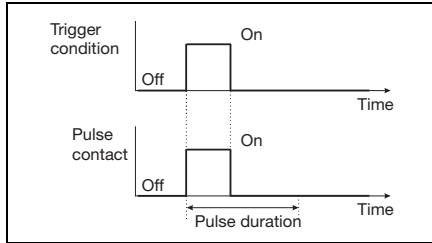
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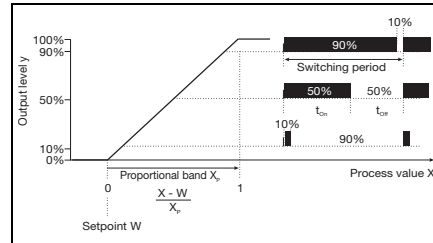
**Pulse contact**

**Trigger condition shorter than pulse duration**



**Pulse width controller**

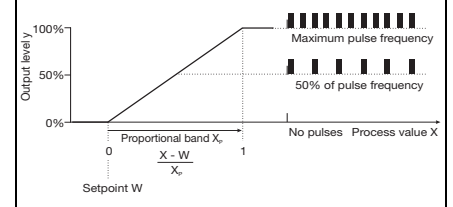
**(output is active with X > W and P action)**



If the process value X exceeds the setpoint W, the P controller will control proportionally to the control deviation. On going outside the proportional band, the controller operates with an output level of 100 % (100 % duty cycle).

**Pulse frequency controller**

**(output is active with X > W and P action)**



If the process value X exceeds the setpoint W, the P controller will control proportionally to the control deviation. On going outside the proportional band, the controller operates with an output level of 100 % (maximum switching frequency).

**Measuring ranges / cell constants**

This state-of-the art instrument offers a far wider dynamic range on the input side than can be managed physically or chemically by the conductivity cells. For this reason, the range must be matched to the operating range of the cell.

**Examples of ranges for combination with 2-electrode cells**

Cell constant (K)	Recommended/practical measuring span (depending on the conductivity cell)
0.01 1/cm	0.05 µS/cm to 20 µS/cm
0.1 1/cm	1 µS/cm to 1000 µS/cm
1.0 1/cm	0.01 mS/cm to 100 ms/cm
3.0 1/cm	0.1 mS/cm to 30 ms/cm
10.0 1/cm	0.1 mS/cm to 200 ms/cm

**Example**

A measurement is to be carried out in the 10 µS/cm to 500 µS/cm range. A conductivity cell with the cell constant K = 0.1 1/cm is chosen.

The unit µS/cm without a decimal place is configured on the instrument.

**Combination with 4-electrode cells and 2-electrode cells having cell constants that deviate from the above graduation**

This requires taking a closer look at the instrument technology and considering both the uncompensated and the temperature-compensated measuring span.

The uncompensated measuring span of the instrument is calculated according to the formula: Measuring span = 0.1 µS/cm x cell constant (K) to 2500 mS x cell constant (K).

After taking account of the temperature compensation range, the following compensated measuring span (approx.) will remain:

Measuring span = 0.1 µS/cm x cell constant (K) to 1250 mS x cell constant (K).

Cell constant (K)	Measuring span covered by instrument (temperature-compensated)
0.01	0.001 µS/cm to 1.25 ms/cm
0.1	0.01 µS/cm to 12.5 ms/cm
1.0	0.1 µS/cm to 125 ms/cm
3.0	0.3 µS/cm to 375 ms/cm
10.0	0.1 mS/cm to 1250 ms/cm

It is assumed that the measuring span of the instrument is always larger than the recommended or practically usable range of the conductivity cell.

The smaller range (instrument or conductivity cell) determines the maximum range that can be used.

**Example**

Which span can the instrument cover with a predefined cell constant?

The predefined cell constant is K=0.4

The span of the instrument is

0.1 µS/cm x 0.4 1/cm to

1250 mS/cm x 0.4 1/cm

→ 0.04 µS/cm — 500 mS/cm

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## Technical data

### Inputs

Principal input	Indication range	Accuracy	Temperature error
µS/cm	0.000 v 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	≤ 0.6 % of range + 0.3 µS x cell constant (K)	0.2 %/10 °C
mS/cm	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	≤ 0.6 % of range + 0.3 µS x cell constant (K)	0.2 %/10 °C
kΩ x cm	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	≤ 0.6 % of range + 0.3 µS x cell constant (K)	0.2 %/10 °C
MΩ x cm	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	≤ 0.6 % of range + 0.3 µS x cell constant (K)	0.2 %/10 °C
Secondary input	Measuring range	Accuracy	Temperature error
Temperature Pt100/1000 (automatic detection)	-50 to +250°C <sup>a</sup>	≤ 0.5 °C	0.05 %/10 °C
Temperature NTC/PTC	max. 4 kOhm Input via table with 20 value pairs, through setup program	≤ 0.3 % <sup>b</sup>	0.05 %/10 °C

<sup>a</sup> Switchable to °F

<sup>b</sup> Depending on interpolation points.

### Temperature compensation

Type of compensation	Range <sup>a</sup>
Linear 0 to 8 %/°C	-10 to 160 °C
ASTM D1125 - 95 (high-purity water)	0 to 100 °C
Natural water (ISO 7888)	0 to 36 °C
Reference temperature	
adjustable from 15 to 30 °C; preset to 25 °C (standard)	

<sup>a</sup> Please note operating temperature range of sensor.

### Measuring circuit monitoring

Inputs	Over/underrange	Short-circuit	Cable break
Conductivity	yes	depending on range	depending on range
Temperature	yes	yes	yes

### 2-electrode systems

Cell constant [1/cm]	Setting range of relative cell constant	Resulting usable range [1/cm]
0.01	20 to 500 %	0.002 to 0.05
0.1		0.02 to 0.5
1.0		0.2 to 5
3.0		0.6 to 15
10.0		2.0 to 50

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**4-electrode systems**

Cell constant [1/cm]	Setting range of relative cell constant	Resulting usable range [1/cm]
0.5	20 to 150 %	0.1 to 0.75
1.0		0.2 to 1.5

**Binary input**

<b>Activation</b>	through floating contact
<b>Function</b>	key inhibit HOLD alarm suppression

**Controller**

<b>Controller type</b>	limit comparators, limit controller, pulse width controller, pulse frequency controller, modulating controller, continuous controller
<b>Controller action</b>	P/PI/PD/PID
<b>A/D converter</b>	dynamic resolution up to 14-bit
<b>Sampling time</b>	500 msec

**Analog outputs (one or two)**

Output mode	Signal range	Accuracy	Temperature error	Permissible load resistance
Current signal	0/4 to 20 mA	≤ 0.25 %	0.08 %/10 °C	≤ 500 Ω
Voltage signal	0 to 10 V	≤ 0.25 %	0.08 %/10 °C	≥ 500 Ω

The analog outputs respond in accordance with the recommendation as per NAMUR NE43.  
 They are electrically isolated, AC 30 V/DC 50 V.

**Switching outputs (two changeover (SPDT) max.)**

<b>Rated load</b>	3 A/250 VAC (resistive load)
<b>Contact life</b>	>2x10 <sup>5</sup> operations at rated load

**Setup interface**

Interface for configuring the instrument through the optionally available setup program (for instrument configuration only).

**Electrical data**

<b>Supply voltage</b>	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 % (permissible only for connection to SELV/PELV circuits)
<b>Power consumption</b>	approx. 14 VA
<b>Electrical safety</b>	EN 61 010, Part 1 overvoltage category III <sup>a</sup> , pollution degree 2
<b>Data backup</b>	EEPROM
<b>Electrical connection</b>	pluggable screw terminals conductor cross-section up to 2.5 mm <sup>2</sup> (supply, relay outputs, sensor inputs) conductor cross-section up to 1.5 mm <sup>2</sup> (analog outputs)

<sup>a</sup> Not valid with protective extra-low voltage (PELV) of power supply variant DC 12 to 24 V.

**Display**

<b>Graphics LC display</b>	120 x 32 pixels
<b>Background lighting</b>	programmable: - off - on for 60 seconds during operation

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**Housing**

<b>Material</b>	ABS
<b>Cable entry</b>	cable glands, 3xM16 and 2xM12 max.
<b>Special feature</b>	venting device to prevent condensation
<b>Ambient temperature range</b> (the specified accuracy is adhered to within this range)	-10 to +50°C
<b>Operating temperature range</b> (instrument is operational)	-15 to +65°C
<b>Storage temperature range</b>	-30 to +70°C
<b>Climatic conditions</b>	rel. humidity ≤ 90 % annual mean, no condensation (following EN 60721 3-3 3K3)
<b>Enclosure protection</b> as per EN 60529	in surface mountable housing: IP67 for panel mounting: IP65 front, IP20 rear
<b>Vibration strength</b>	as per EN 60068-2-6
<b>Weight</b>	surface mountable housing: approx. 900 g for panel mounting: approx. 480 g
<b>Dimensions</b>	see dimensioned drawings on page 10.

**Standard accessories**

- Cable glands
- Internal mounting material
- Operating Instructions

**Approvals/approval marks**

Mark of conformity	Testing laboratory	Certifikates/certification numbers	Test basis	valid for
c UL us	Underwriters Laboratories	E 201387	UL 61010-1	all versions

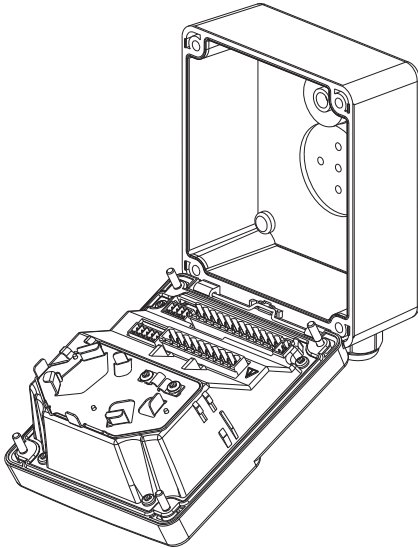
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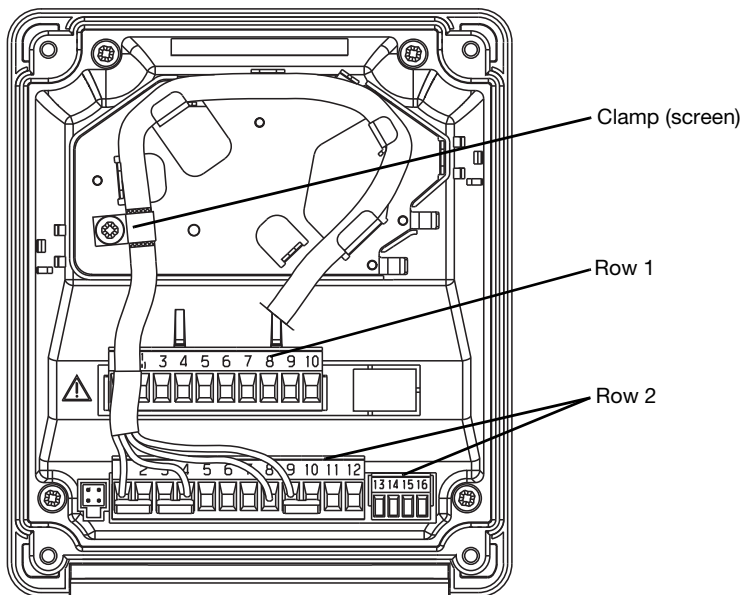
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## Electrical connection



The electrical connection for the “surface mountable housing” version can be made easily, after opening the unit.



The connection cable between sensor and transmitter must be a screened cable with a diameter of 8 mm max. The instrument contains a guide plate for an optimized cable routing. The sensor cables (incorporating strain relief) are run to the pluggable screw terminals where they are connected without using any solder.

Connection		Terminal	Row
<b>Supply for transmitter/controller</b>			
Supply voltage (23): AC 110 to 240 V; -15/+10 %; 48 to 63 Hz		1 N (L-)	1
Supply voltage (25): AC/DC 20 to 30 V; 48 to 63 Hz		2 L1 (L+)	
Supply voltage (30): DC 12 to 24 V; +/- 15 %			
NC		3	

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Connection		Terminal	Row
<b>Inputs</b>			
Conductivity cell (2-electrode system) Terminals 1+2 and 3+4 are linked in the instrument; 2-wire cable routed to the head of the conductivity cell. For concentric cells, terminal 1 is connected to the outer electrode.		1 2 3 4	2
Conductivity cell (2-electrode system) Wiring for the highest accuracy; 4-wire cable routed to the head of the conductivity cell. For concentric cells, terminal 1 is connected to the outer electrode.		1 2 3 4	
Conductivity cell (4-electrode system) 1 - outer electrode 1 (I hi) 2 - inner electrode 1 (U hi) 3 - inner electrode 2 (U lo) 4 - outer electrode 2 (I lo)		1 2 3 4	
NC		5 6 7	
RTD in 2-wire circuit		8 9 10	
RTD in 3-wire circuit		8 9 10	
Binary input		11 12	
<b>Outputs</b>			
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 (electrically 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 (electrically isolated)		+ 15 - 16	
Switching output K1 (floating)		4 common 5 break (SPST-NC) 6 make (SPST-NO)	1
NC		7	
Switching output K2 (floating)		8 common 9 break (SPST-NC) 10 make (SPST-NO)	

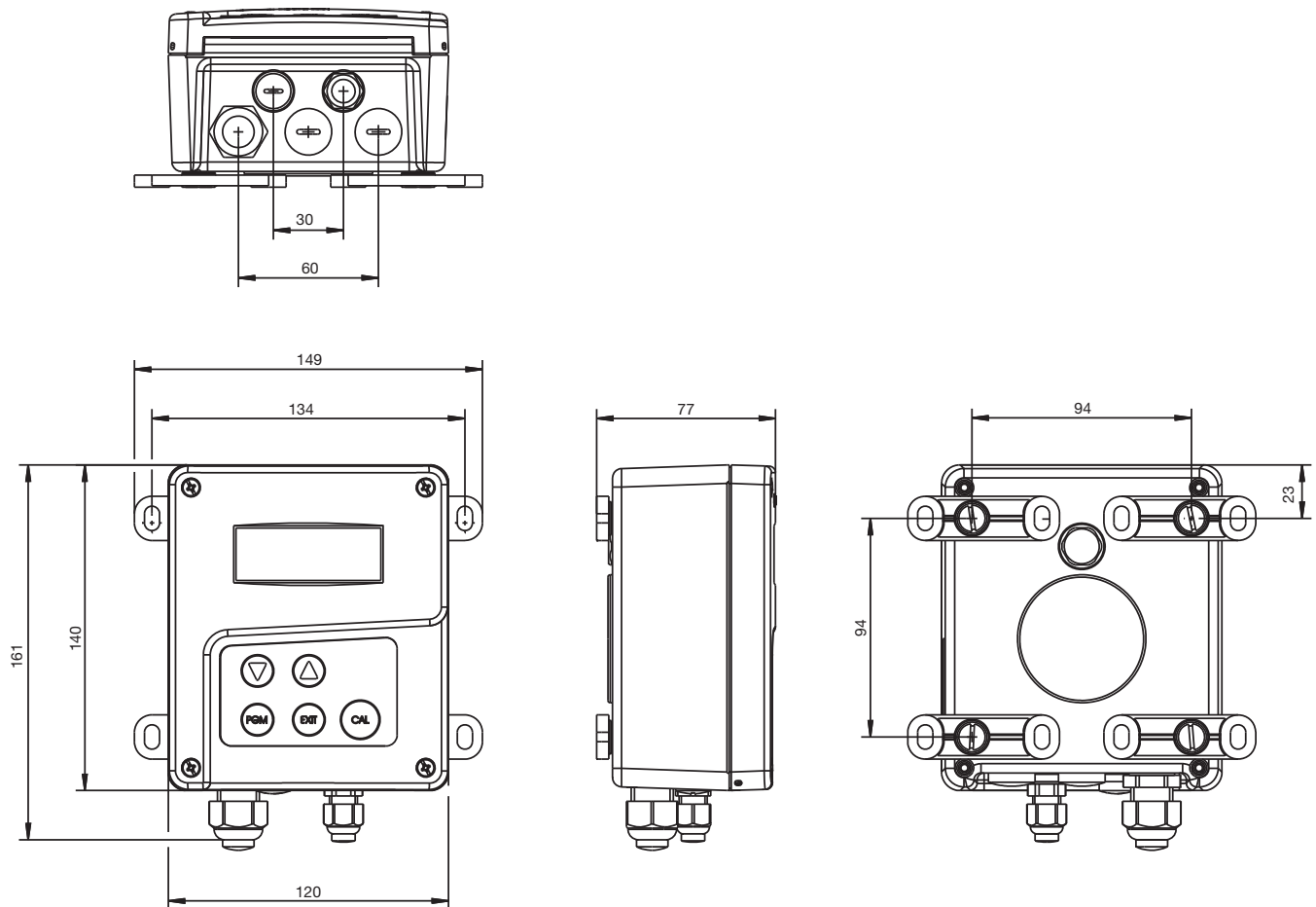
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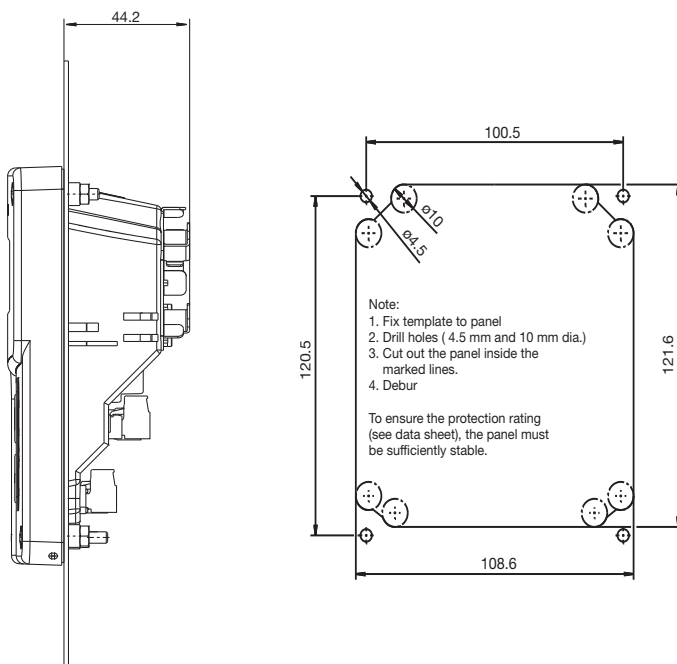
**JUMO Process Control, Inc.**  
 6733 Myers Road  
 East Syracuse, NY 13057, USA  
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 1-800-554-5866  
 Fax: 315-437-5860  
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 Internet: www.jumousa.com



## Dimensions



## Panel-mounting/drilling diagram



Note:  
 The drilling template is shown in its actual size in the Operating Instructions B 202565.0.

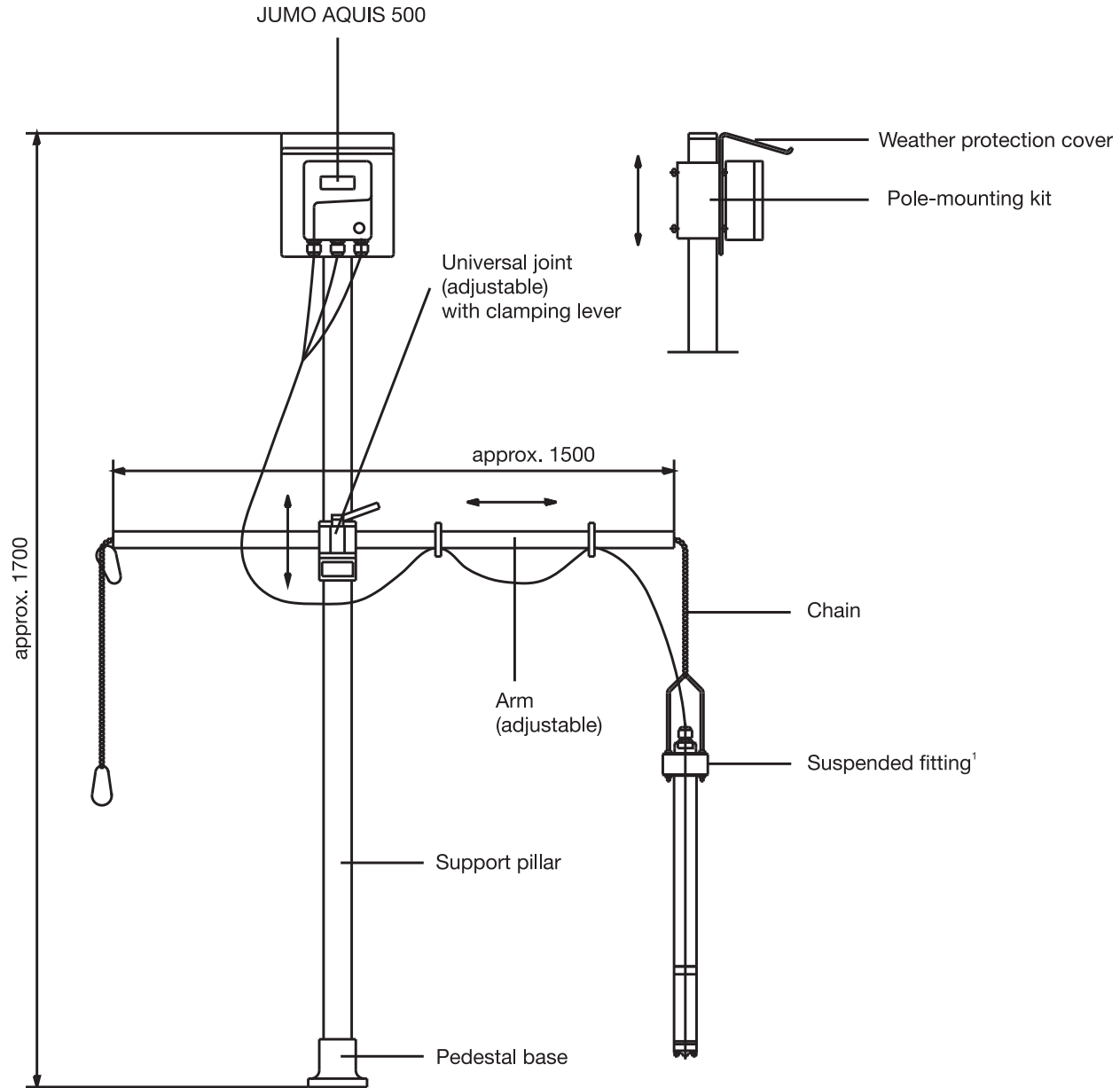
**JUMO GmbH & Co. KG**  
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### Accessories



<sup>1</sup> The suspended fitting consists of a fixing 20/00453191 (see accessories) and a cell with a suitable fitting (see data sheet 202922, for example).

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**Order details: JUMO AQUIS 500 CR**

<b>(1) Basic type</b>	
202565	JUMO AQUIS 500 CR - Transmitter/controller for conductivity, TDS, resistivity and temperature
<b>(2) Basic type extensions</b>	
10	for panel mounting
20	in surface mountable housing
<b>(3) Output 1 (for principle measurement variable or continuous controller)</b>	
000	no output
888	analog output 0(4) to 20 mA or 0 to 10 V
<b>(4) Output 2 (for principle measurement variable or continuous controller)</b>	
000	no output
888	analog output 0(4) to 20 mA or 0 to 10 V
<b>(5) Output 3</b>	
000	no output
310	relay with changeover (SPDT) contact
<b>(6) Output 4</b>	
000	no output
310	relay with changeover (SPDT) contact
<b>(7) Supply voltage</b>	
23	AC 110 to 240 V; +10 %/-15 %, 48 to 63 Hz
25	AC/DC 20 to 30 V, 48 to 63 Hz
30	DC 12 to 24 V; ±15 %
<b>(8) Extra codes</b>	
000	none

Order code                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (7)                    (8) , ...  
Order example                202565                /                20                -                888                -                000                -                310                -                000                -                23                /                000

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**Stock items** (shipment: 3 working days after receipt of order)

Type	Part no.
202565/20-888-888-310-310-23/000	00480055
202565/20-888-000-310-000-23/000	00480054

**Production items** (shipment: 10 days after receipt of order)

Type	Pert no.
202565/10-888-888-310-310-23/000	00480053
202565/10-888-000-310-000-23/000	00480052
202565/10-888-888-310-310-25/000	00484566

**Accessories** (shipment: 10 days after receipt of order)

Type	Pert no.
Protective roof for JUMO AQUIS 500 <sup>a</sup>	00398161
Pipe installation set for JUMO AQUIS 500 <sup>b</sup>	00483664
DIN rail installation set for JUMO AQUIS 500 <sup>c</sup>	00477842
Support pillar with base clamp, arm and chain	00398163
Holder for suspension fitting	00453191
Back panel set 202560/65	00506351
PC setup software	00483602
PC interface cable including USB/TTL converter and two adapters (USB connecting cable)	00456352

<sup>a</sup> The pole-mounting kit is needed for mounting the protection cover.

<sup>b</sup> With the pipe installation set, the JUMO AQUIS 500 can be attached to a pipe (e. g. a support pillar or a railing).

<sup>c</sup> With the DIN rail installation set, the JUMO AQUIS 500 can be attached to a 35 mm x 7.5 mm DIN rail as per EN 60715 A.1.

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# JUMO AQUIS 500 Ci

## Transmitter/controller for inductive conductivity, concentration and temperature

### Brief description

The instrument is used for the inductive measurement and control of electrolytic conductivity, or concentration. The conductivity is converted into a specified unit by means of a customized table. Inductive JUMO conductivity cells can be connected to the instrument. The instrument is particularly recommended for use in media in which heavy deposits from contaminants, oil and grease, or gypsum and lime precipitation are to be expected. Because temperature measurement is integrated, temperature compensation takes place quickly and precisely, which is particularly important when measuring conductivity. Specific and automatic temperature compensation is possible, depending on the measurement variable. The instrument is operated by keys and a large LC graphic display. The measurement value is easy to read on this display. The parameters are shown in plain text, making configuration easier for the user, and helping with the proper programming of the instrument. Its modular configuration allows the instrument to be adapted to the requirements of the application. There are up to four outputs available (see block diagram for functions).

### Typical areas of application:

Dairies, breweries, soft drinks manufacturing/bottling, mineral springs, drinking water, liquid food production, CIP/SIP systems, other rinsing and cleaning processes, measuring the concentration of acids, lyes and cleaning chemicals, etc.

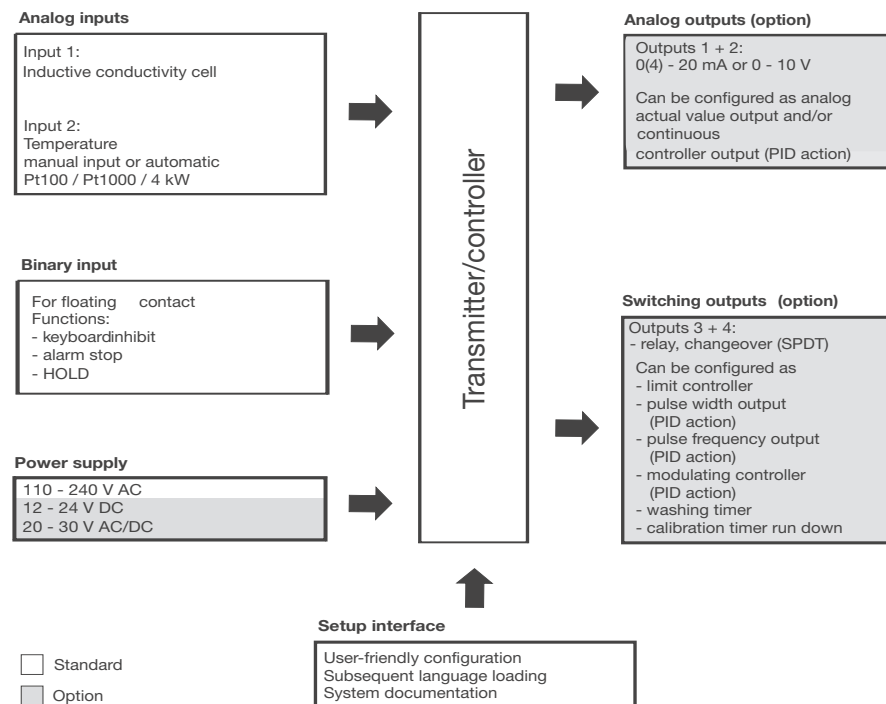


Type 202566

### Key features

- A direct selection option for
  - specific conductivity ( $\mu\text{S}/\text{cm}$  and  $\text{mS}/\text{cm}$ )
  - concentration, NaOH,  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4$ , HCl
  - a customized table
- Automatic temperature compensation: off, linear, natural water (EN 27888/ISO 7888), non-linear
- Large, backlit LC graphic display
- A choice of display visualizations: large numbers, bar graph or trend display
- Calibration options relevant to the measurement variable: cell constant and temperature coefficient
- Calibration logbook
- Option to connect inductive JUMO measuring cells
- IP67 enclosure protection for surface mounting  
IP65 enclosure protection for control cabinet mounting
- Selectable languages: German, English, French; additional languages can be loaded later through the setup program
- The setup program provides: user-friendly programming, system documentation, subsequent loading of additional languages

### Block diagram



### Approvals/Approval marks (see Technical data)



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## Functional description

The instrument is designed for on-site use. A robust housing protects the electronics and electrical connections against aggressive environmental conditions (IP67). As an alternative, the instrument can also be installed in a panel; the front then has IP65 enclosure protection. Easily installed screw connectors are used for electrical connection. A ventilation screw with a PTFE membrane prevents condensation buildup.

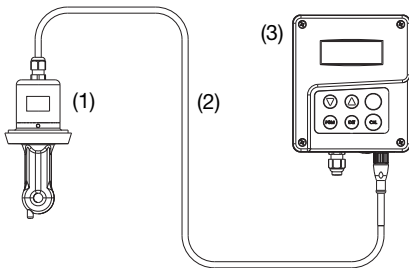
### Transmitter

The transmitter receives the measurement signal from the inductive measuring cells of the JUMO tecLINE Ci series, see data sheet 202941.

With the inductive measurement method, acquisition of specific conductivity is largely maintenance-free, even in the most difficult of medium conditions. Unlike the conductive measurement method, there are practically no problems such as electrode breakdown and polarization.

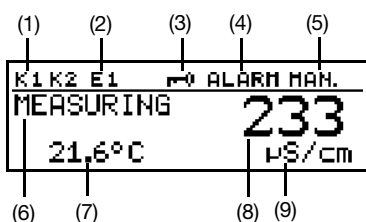
By acquiring the temperature of the sample medium, the instrument can automatically perform temperature compensation.

### Components of the measurement chain



- (1) JUMO tecLine Ci, inductive conductivity and temperature sensor
- (2) Cable (JUMO tecLine Ci component)
- (3) JUMO AQUIS 500 Ci, transmitter/controller for conductivity, concentration and temperature

### Displays and controls



- (1) Switching output 1 or 2 is active
- (2) Binary input 1 is triggered

- (3) Keyboard inhibited
- (4) Alarm has been activated
- (5) Instrument is in manual mode
- (6) Instrument status
- (7) Medium temperature
- (8) Main measurement
- (9) Unit of main measurement

The user can specify what is to appear in positions (7) and (8) of the display:

- No display
- Corrected or uncorrected measurement
- Temperature
- Output level 1 or 2
- Setpoint 1 or 2

### Operation

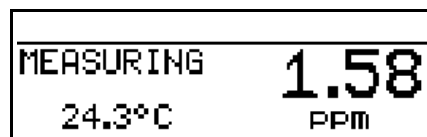
To make programming and operation easy, all parameters are clearly assigned to levels and displayed in plain text. Operation is protected by a code word. Operation can be adapted on an individual basis because parameters can be generally enabled or assigned to the protected area.

A setup program for the PC is available as a more convenient configuration option, rather than using the instrument keyboard.

### Display modes

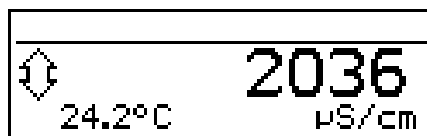
Three display modes are available:

#### Large numbers



Here the measurements are displayed in numbers, as usual.

#### Trend display



Here the numerical value is supplemented by a symbol to indicate the direction and speed of change for the measurement.

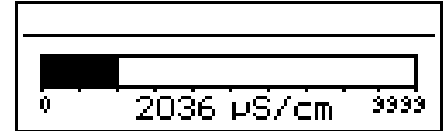
This can be very useful when the controller is being optimized, for example.



from left to right:

fast, medium and slow rise, steady, slow, medium and fast fall.

### Bar graph



In this display mode, it only takes a glance to ascertain the range for the current measurement.

Any scale can be used for the bar graph.

### Function modes

#### Electrolytic conductivity

µS/cm or mS/cm are the units used for display and control.

#### Concentration measurement

- Caustic soda
  - NaOH0 to 12 % by weight
  - NaOH25 to 50 % by weight
- Nitric acid
  - HNO<sub>3</sub>0 to 25 % by weight
  - HNO<sub>3</sub>36 to 82 % by weight
- Sulphuric acid
  - H<sub>2</sub>SO<sub>4</sub>0 to 28 % by weight
  - H<sub>2</sub>SO<sub>4</sub>36 to 85 % weight
  - H<sub>2</sub>SO<sub>4</sub>92 to 99 % by weight
- Hydrochloric acid
  - HCl 0 to 18 % by weight
  - HCl22 to 44 % by weight

#### Customized table

In this mode, the input value (specific conductivity) can be displayed in accordance with a table (max. 20 value pairs). This function can be used to implement simple concentration measurements, for example. Table values can only be entered using the optional setup program.

### Calibration

#### Cell constant

Because of manufacturing constraints, the cell constant of a conductivity measuring cell may differ slightly from its nominal value. Wear or the accumulation of deposits during operation can also cause the cell constant to change. This changes the output signal from the measuring cell. With this instrument, the user has the opportunity to compensate for deviations in the nominal value of the cell constant by manual input, or by automatic calibration of the relevant cell constant.

#### Installation factor

This parameter can be used to compensate for unfavorable sensor mounting conditions.

#### Temperature coefficient

The conductivity of virtually all solutions is temperature dependent. To ensure correct measurement therefore, both the temperature and the temperature coefficient a [%/C] of the measurement solution must be known. The temperature can either be measured automatically with a Pt 100 or Pt 1000 temperature probe, or the user must set the

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temperature by hand.

The temperature coefficient can be automatically determined by the instrument, or it can be entered by hand.

**Calibration logbook**

The last five successful calibrations can be accessed in the calibration logbook. This allows the ageing of the connected sensor to be assessed.

CELL CONST	102.9 %
TEHPCO.	2.0 %/K
TEHP. 1	74.3 °C
TEHP. 2	24.3 °C

**Calibration timer**

The calibration timer indicates (on request) a required routine calibration. The calibration timer is activated by entering the number of days that must expire before there is a scheduled re-calibration (specified by the system or the operator).

**Min/max value memory**

This memory records the minimum and maximum input quantities that occur. This information can be used, for example, to assess whether the design of the connected sensor is suitable for the values that actually occur.

MIN/MAX VALUES	
282 µS/cm	0.0 °C
8277 µS/cm	24.4 °C

**Binary input**

The following functions can be accessed through the binary input:

- Key inhibit activation  
When this function is activated, operation is no longer possible via the keyboard.
- "HOLD" mode activation  
When this function is activated, the outputs (analog and relay) adopt the

**Analog outputs**

There are up to 2 analog outputs available. The following functions can be selected:

Output	Analog process value output		Continuous controller main value
	Main variable	Temperature	
1	X	-	X
2	-	X	X

With the analog process value output, the range start and end values are freely selectable. The response of the outputs to over/underrange, alarm and calibration is freely programmable. Simulation function: The analog process value outputs can be freely set in the manual ("Hand") mode.

Application: "Dry run" start-up of the plant, troubleshooting, servicing.

states previously defined.

- Alarm suppression (controller alarm only)  
With this function, it is possible to temporarily deactivate alarm generation via the relevantly configured relay.

The predefined function is activated using a floating contact (such as a relay) to bridge the relevant terminals.

**Control functions**

Functions that are configured by parameters can be assigned to the relay. P, PI, PD and PID structures can be freely programmed as control functions.

**Relay outputs**

Two relay changeover contacts are available for the main measurement variable and/or the temperature.

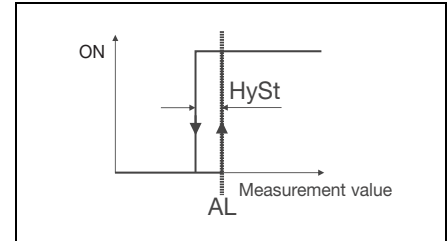
The following functions can be programmed:

- Switching direction (min/max)
- Limit controller (switch-on/switch-off delay, hysteresis)
- Pulse width output (see Control functions)
- Pulse frequency output (see Control functions)
- Modulating function (see Control functions)
- Alarm functions (switch-on/switch-off delay, hysteresis)
- Pulse controls  
With this function, the output briefly switches on when the switching point is reached and then switches off again

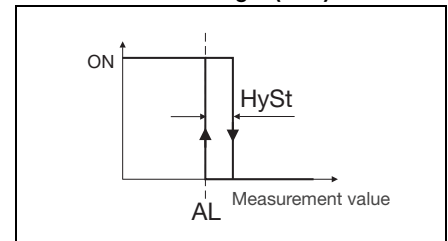
- Alarm
- Sensor/range error
- Behavior in the event of an alarm, underrange or overrange measurement, calibration and "HOLD"

**Contact functions**

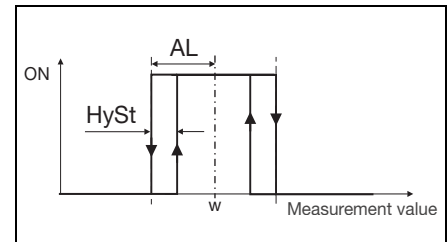
**Alarm function AF 7 left (max.)**



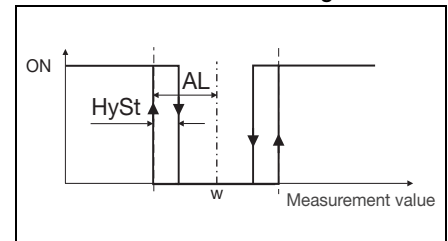
**Alarm function AF 8 right (min.)**



**Window alarm function AF 1 left**

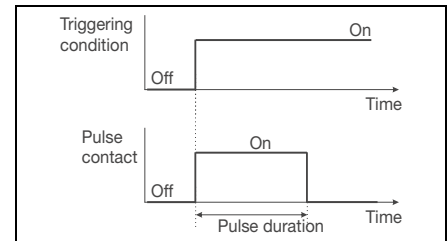


**Window alarm function AF 2 right**



**Pulse contact**

**Triggering condition longer than pulse duration**



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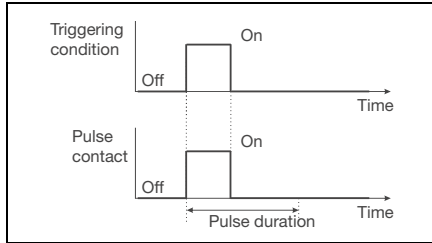
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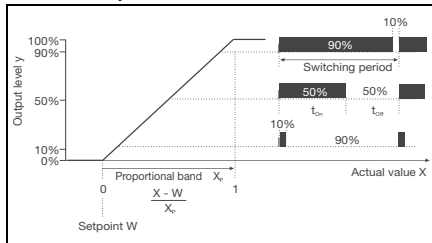
**Pulse contact**

Triggering condition shorter than pulse duration



**Pulse width controller**

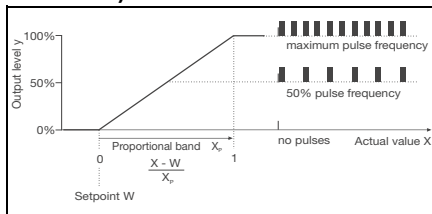
(output active with  $X > W$  and control structure P)



If actual value X exceeds setpoint W, the P controller will control in proportion to the control deviation. When the proportional band is exceeded, the controller operates with an output level of 100 % (100 % clock ratio).

**Pulse frequency controller**

(output active with  $X > W$  and control structure P)



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

**Technical data**

**Main input conductivity**

<b>Measuring range</b>	0000 to 9999 $\mu\text{S/cm}$ 0.000 to 9.999 $\text{mS/cm}$ 0.00 to 99.99 $\text{mS/cm}$ 0.0 to 999.9 $\text{mS/cm}$ 0 to 2000 $\text{mS/cm}$
<b>Accuracy<sup>a</sup></b>	0.000 to 1.000 $\text{mS/cm}$ 1.5 % of the measuring range 1.01 to 500 $\text{mS/cm}$ 1 % of the measuring range 501 to 2000 $\text{mS/cm}$ 1.5 % of the measuring range
<b>Operating mode</b>	
<b>Concentration measurement</b>	
NaOH caustic solution	Range 1: 0 to 12 % by weight Range 2: 20 to 50 % by weight
HNO <sub>3</sub> nitric acid	Range 1: 0 to 25 % by weight Range 2: 36 to 82 % by weight
H <sub>2</sub> SO <sub>4</sub> sulphuric acid	Range 1: 0 to 28 % by weight Range 2: 36 to 85 % by weight Range 3: 92 to 99 % by weight
HCL hydrochloric acid	Range 1: 0 to 18 % by weight Range 2: 22 to 44 % by weight
<b>Operating mode</b>	The compensated conductivity is converted to a new display value by means of a table. The table can contain as many as 29 value pairs. The display unit can also be adapted. Process sequence: Uncompensated conductivity > Temperature compensation > Linearization with table > Display value.
<b>Customized table</b>	

<sup>a</sup> Temperature error at JUMO AQUIS 500 Ci with inductive conductivity probe JUMO tecLINE Ci. Deviation of 22 °C relative to the output signal end value 0(4) to 20 mA and 0 to 10 V.

**Secondary input temperature**

<b>Pt100/Pt1000</b>	
Measuring range	-50 to 250 °C
Accuracy	≤ 0.5 °C
Ambient temperature error	0.05 %/10 °C
<b>NTC / PTC</b>	
Measuring range	max. 4 k $\Omega$ Table input with up to 20 value pairs via setup program
Accuracy	≤ 0.3 °C (dependent on interpolation points)
Ambient temperature error	0.05 %/10 °C

**Temperature compensation**

<b>Linear</b>	
TC ( $\alpha$ ) setting range	0 to 5.5 %/C
Temperature range	0(to10) to 100 °C
<b>Natural water (ISO 7888)</b>	
TC ( $\alpha$ ) setting range	n/a
Temperature range	0 to 36 °C
<b>Reference temperature</b>	adjustable: 15 to 30 °C preset to 25 °C (standard)

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**Measuring circuit monitoring**

<b>Conductivity input</b>	
Overrange	yes
Short circuit	dependent on range
Broken lead	dependent on range
<b>Temperature input</b>	
Overrange/underrange	yes
Short circuit	yes

**Cell constant**

<b>Adjustment range 1</b>	4 to 6 [1/cm]
<b>Adjustment range 2</b>	6 to 8 [1/cm]
<b>Setting range of the relative cell constant</b>	80 to 120 %
<b>Installation factor</b>	80 to 120 %

**Binary input**

<b>Activation</b>	by floating contact
<b>Function</b>	key inhibit HOLD alarm suppression

**Controller**

<b>Controller type</b>	alarm functions, limit controllers, pulse width controllers, pulse frequency controllers, modulating controllers, continuous controllers
<b>Controller structure</b>	P/PI/PD/PID
<b>A/D converter</b>	dynamic resolution up to 14 bits
<b>Sampling time</b>	500 ms

**Analog outputs (max. 2)**

Output type	Signal range	Accuracy	Temperature error	Permissible load resistance
Current signal	0/4 to 20 mA	≤ 0.25 %	0.08 %/10 °C	≤ 500 Ω
Voltage signal	0 to 10 V	≤ 0.25 %	0.08 %/10 °C	≥ 500 Ω

The analog outputs respond in accordance with NAMUR recommendation NE43.  
The analog outputs are electrically isolated, AC 30 V/DC 50 V.

**Switching outputs (max. two (SPDT) changeovers)**

<b>Rated load</b>	AC 3 A/250 V (resistive load)
<b>Contact life</b>	>2x10 <sup>5</sup> operations at rated load

**Setup interface**

Interface for configuring the instrument with the available setup program option (for instrument configuration only).

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**Electrical data**

<b>Power supply</b>	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 % (permissible only for connection to SELV/PELV circuits)
<b>Power consumption</b>	approx. 14 VA
<b>Electrical safety</b>	EN 61 010, Part 1 overvoltage category III <sup>a</sup> , pollution degree 2
<b>Data backup</b>	EEPROM
<b>Electrical connection</b> Power supply, relay outputs, sensor inputs Analog outputs Inductive conductivity sensor	Pluggable screw terminals, conductor cross-section max. 2.5 mm <sup>2</sup>  Pluggable screw terminals, conductor cross-section max. 1.5 mm <sup>2</sup> M12 connection

<sup>a</sup> Not valid for power supply 30, DC 12 to 24 V

**Display**

<b>Graphic LC display</b>	120 x 32 pixels
<b>Backlighting</b>	Programmable: - off - on for 60 seconds during operation

**Housing**

<b>Material</b>	ABS
<b>Cable entry</b>	Cable glands, max. 2 x M16 and 2 x M12
<b>Feature</b>	Venting element to prevent condensation
<b>Ambient temperature range</b> (the specified accuracy is adhered to in this range)	-10 to +50 °C
<b>Operating temperature range</b> (instrument operational)	-15 to +65 °C
<b>Storage temperature range</b>	-30 to +70 °C
<b>Climatic rating</b>	Rel. humidity ≤ 90 % annual mean, no condensation (based on EN 60721 3-3 3K3)
<b>Enclosure protection</b> to EN 60529	Surface-mounted housing: IP67 Control cabinet mounting: at front IP65, at rear IP20
<b>Vibration resistant</b>	to EN 60068-2-6
<b>Weight</b>	Surface-mounted housing: approx. 900 g Control cabinet mounting: approx. 480 g
<b>Dimensions</b>	See dimensioned drawings on page 10

**Approvals/approval marks**

Mark of conformity	Testing laboratory	Certifikates/certification numbers	Test basis	valid for
c UL us	Underwriters Laboratories	E 201387	UL 61010-1	all versions

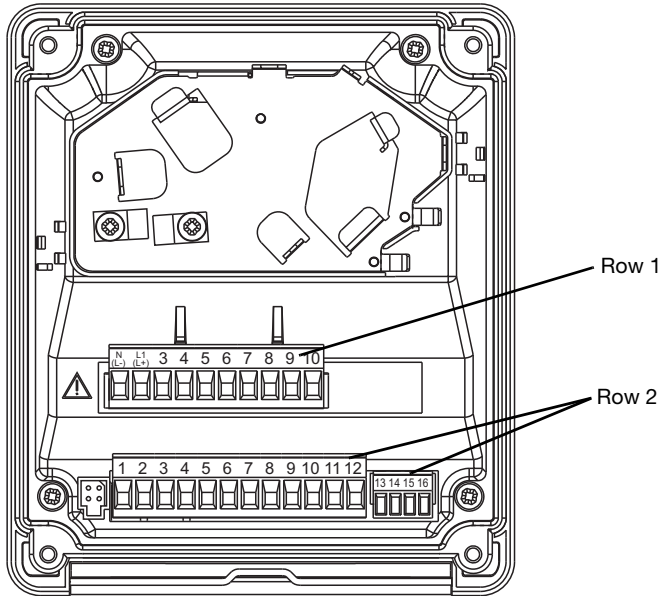
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## Electrical connection



The JUMO AQUIS 500 Ci power supply is connected at the row 1 terminals.  
 The row 2 terminals are factory-wired for connecting a JUMO tecLINE Lf Ci inductive conductivity cell.

Connection		Terminal	Row
<b>Inputs</b>			
<b>Power supply for transmitter/controller</b>			
Power supply (23): AC 110 to 240 V, +10 %/-15 %, 48 to 63 Hz Power supply (25): AC/DC 20 to 30 V, 48 to 63 Hz Power supply (30): DC 12 to 24 V, ± 15 %		1 N (L-) 2 L1 (L+)	1
NC		3	
Do <b>not</b> change this wiring! Only JUMO tecLINE Lf Ci inductive conductivity cells must be operated at the M12 connector, see data sheet 202941!		1 2 3 4 5 6 7 8 9	
Resistance thermometer in 2-wire circuit		8 9 10	2
Resistance thermometer in 3-wire circuit		8 9 10	
Binary input		11 12	

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Connection		Terminal	Row
<b>Outputs</b>			
Analog output 1 0 to 20 mA and 20 to 0 mA or 4 to 20 mA and 20 to 4 mA or 0 to 10 V and 10 to 0 V (electrically isolated)		+ 13 - 14	2
Analog output 2 0 to 20 mA and 20 to 0 mA or 4 to 20 mA and 20 to 4 mA or 0 to 10 V and 10 to 0 V (electrically isolated)		+ 15 - 16	
Switching output K1 (floating)		4 pole 5 NC 6 NO	1
NC		7	
Switching output K2 (floating)		8 pole 9 NC 10 NO	

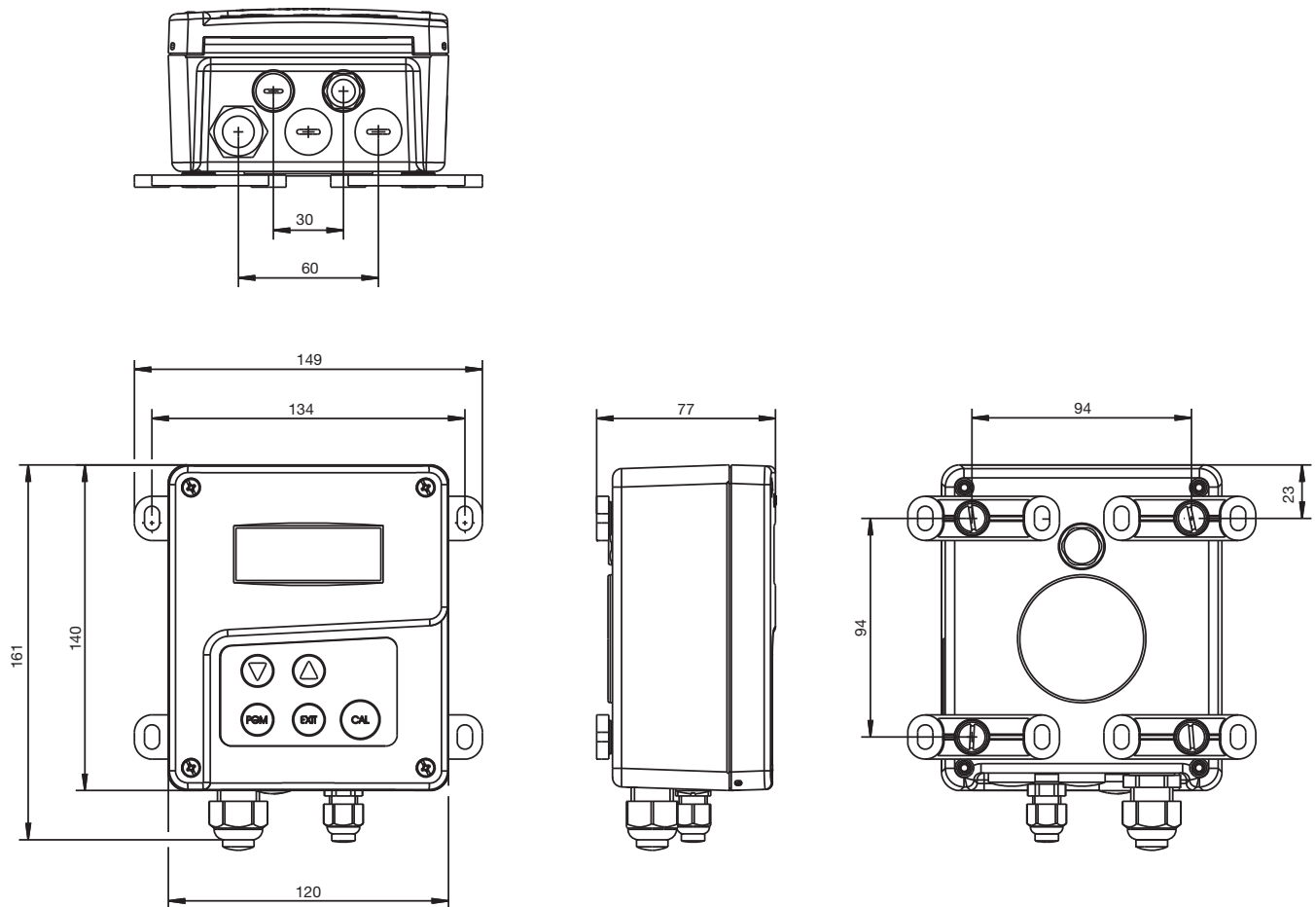
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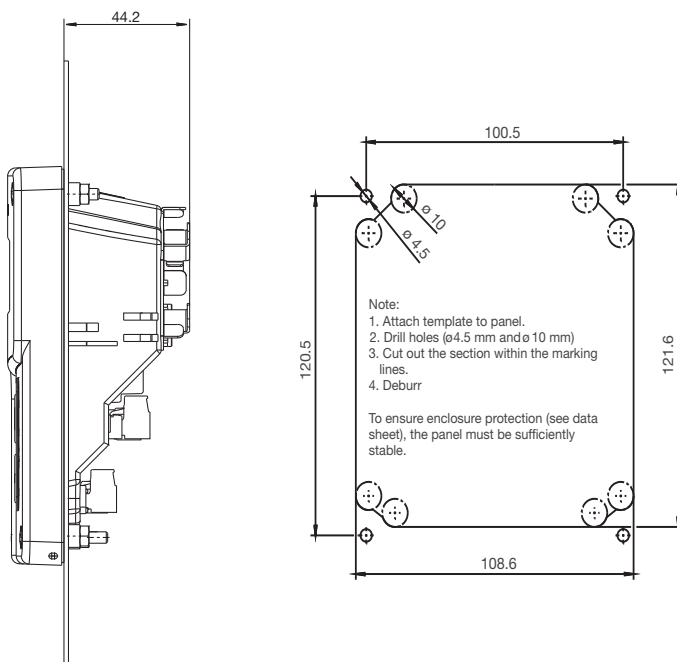
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## Dimensions



## Panel mounting/drilling diagram



**Note:**  
 The drilling template is shown actual size in operating manual B 202566.0.

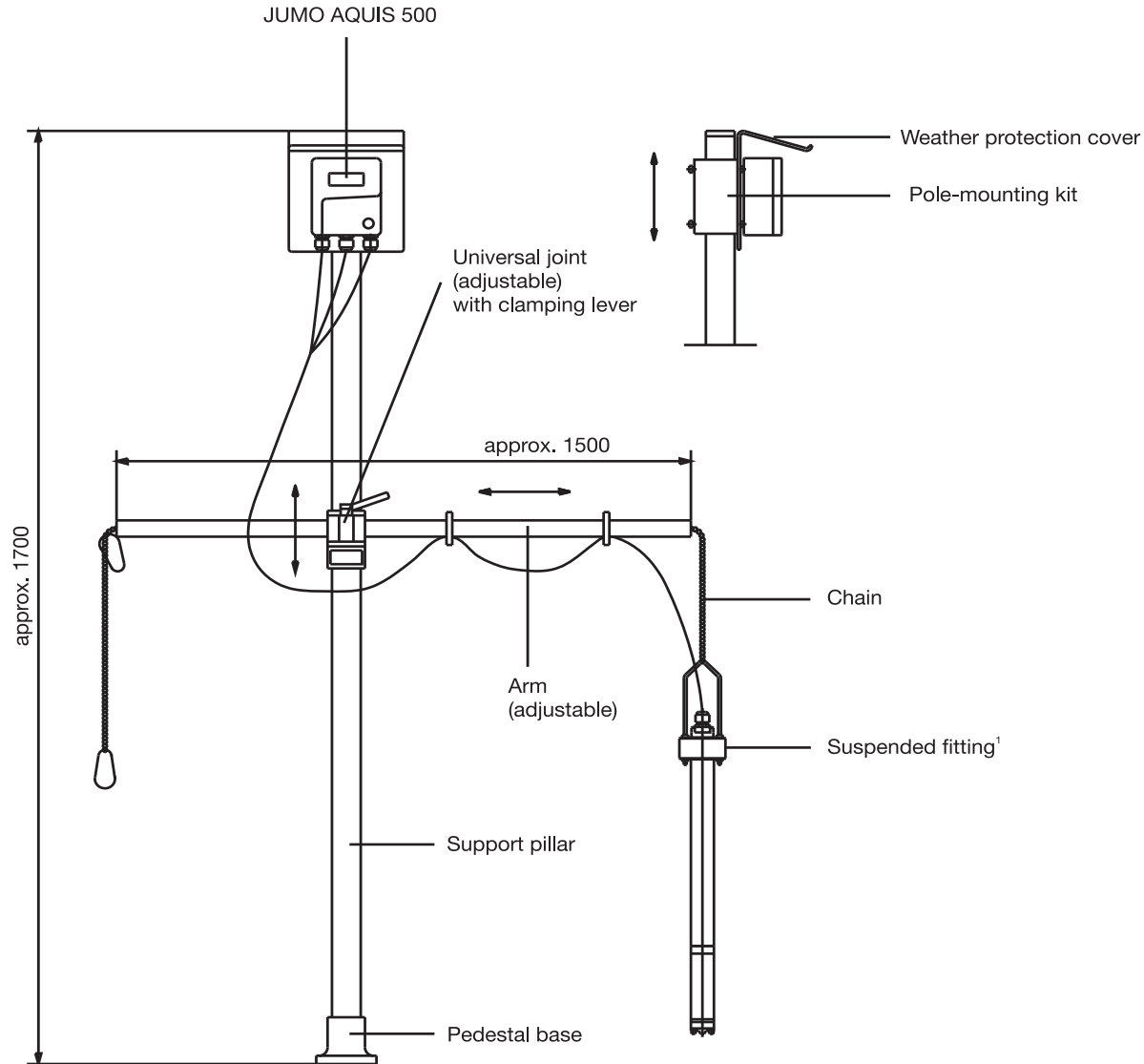
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## Accessories



<sup>1</sup> The suspension fitting comprises a holder for suspension fitting 00453191 (see Accessories) and a measuring cell with a suitable fitting (see data sheet 202922, for example):

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**Order details: JUMO AQUIS 500 Ci**

<b>(1) Basic type</b>	
202566	JUMO AQUIS 500 Ci - transmitter/controller for inductive conductivity, concentration and temperature
<b>(2) Basic type extension</b>	
10	for panel mounting
20	in surface-mounted housing
<b>(3) Output 1 (for main value or continuous controller)</b>	
000	no output
888	analog output 0(4) to 20 mA and 0 to 10 V
<b>(4) Output 2 (for temperature or continuous controller)</b>	
000	no output
888	analog output 0(4) to 20 mA and 0 to 10 V
<b>(5) Output 3</b>	
000	no output
310	relay with changeover contact
<b>(6) Output 4</b>	
000	no output
310	relay with changeover contact
<b>(7) Power supply</b>	
23	AC 110 to 240 V, +10 %/-15 %, 48 to 63 Hz
25	AC/DC 20 to 30 V, 48 to 63 Hz
30	DC 12 to 24 V, ± 15 %
<b>(8) Extra codes</b>	
000	none

Order code                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (7)                    (8) , ...  
 Order example            202566            /            20            -            888            -            000            -            310            -            000            -            23            /            000

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**Stock versions** (delivery 3 days after receipt of order)

Type	Part no.
202566/20-888-888-310-310-23/000	00542691

**Production version** (delivery 10 days after receipt of order)

Type	Part no.
202566/20-888-000-310-000-23/000	00550657
202566/20-888-888-310-310-25/000	00548188

**Accessories** (delivery 10 days after receipt of order)

Type	Part no.
Protective roof for JUMO AQUIS 500 <sup>a</sup>	00398161
Pipe installation set for JUMO AQUIS 500 <sup>b</sup>	00483664
DIN rail installation set for JUMO AQUIS 500 <sup>c</sup>	00477842
Support pillar with base clamp, arm and chain	00398163
Holder for suspension fitting	00453191
Back panel set 202560/65/66/68	00506351
PC setup software	00483602
PC interface cable including USB/TTL converter and two adapters (USB connecting cable)	00456352
Calibration adapter for inductive conductivity measurement, type 202711/21	00543395

<sup>a</sup> The pipe installation set is needed for fitting the protective roof.

<sup>b</sup> With the pipe installation set, the JUMO AQUIS 500 can be attached to a pipe (e. g. a support pillar or a railing).

<sup>c</sup> With the DIN rail installation set, the JUMO AQUIS 500 can be attached to a 35 mm x 7.5 mm DIN rail as per EN 60715 A.1.

**Note**

The following are required for the initial commissioning of the sensor and transmitter/controller or when replacing components:

- transmitter/controller e. g. JUMO AQUIS 500 Ci, data sheet 202566
- JUMO tecLine Ci inductive conductivity and temperature sensor, data sheet 202941
- Calibration adapter for inductive conductivity measurement, type 202711/21, data sheet 202711



# JUMO AQUIS 500 AS

## Indicator/controller for standard signals

### Brief description

The instrument has 2 analog inputs and 1 binary input. The first analog input is suitable for connecting standard or standardized signals (0 to 10 V or 0/4 to 20 mA), which can be prepared by any transmitter or sensor (such as a 2-wire transmitter). Pt100, Pt1000 or NTC/PTC resistance thermometers (up to 4 k ohms) can be connected to the second analog input. The power supply for a 2-wire transmitter is integrated in the instrument.

Input signals can be shown as numbers or as a bar graph on the graphic display. Parameters are displayed in plain text for easily comprehensible and secure operation.

With two optional relay switching contacts, it is possible to implement both simple switching or alarm functions and demanding control tasks with P, PI, PD and PID action. If required, the instrument can also be provided with two freely configurable and scalable analog outputs (0 to 10 V or 0/4 to 20 mA).

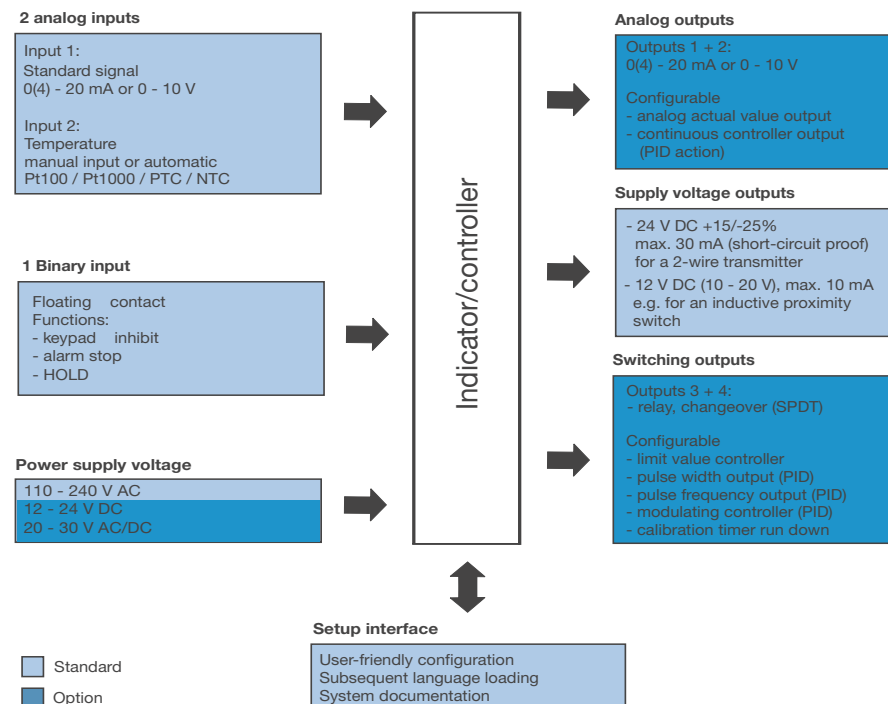
The instrument is suitable, for example, for displaying, measuring, and controlling:

- free chlorine, hydrogen peroxide, peracetic acid, chlorine dioxide and ozone in combination with sensors as per data sheet 202630
- the pH value or redox potential with 2-wire transmitters as per data sheet 202701
- (hydrostatic) liquid levels with 2-wire transmitters (level and pressure measuring instruments) as per data sheet 402090 or data sheet 404390
- flow rate in combination with relevant transmitters.
- two temperature measuring points.
- most sensors and transmitters that output standard signals (0 to 10 V or 0/4 to 20 mA).



Type 202568

### Block diagram



### Key features

- Display: mg/l, pH, mV, μS/cm, etc. Special visualizations are also possible with the setup program
- large, backlit LC graphic display
- a choice of display visualizations: large numbers, bar graph or trend display
- integrated calibration routines: 1-point and 2-point
- Calibration logbook
- IP67 enclosure protection for surface mounting  
IP65 enclosure protection for switch cabinet mounting
- selectable languages: German, English, French; additional languages can be loaded later through the setup program
- the setup program<sup>1</sup> allows: user-friendly configuration, system documentation, subsequent loading of additional languages

<sup>1</sup> Option

### Approvals/Approval marks (see Technical data)



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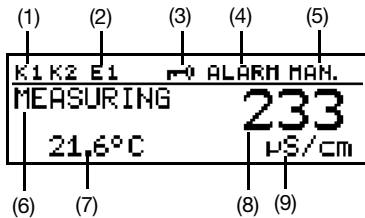
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## Functional description

The instrument is designed for on-site use. A robust housing protects the electronics and electrical connections against aggressive environmental conditions (IP67). As an alternative, the instrument can also be installed in a panel; the front then has IP65 enclosure protection. Easily installed screw connectors are used for electrical connection. A ventilation screw with a PTFE membrane prevents condensation buildup.

## Displays and controls



- (1) switching output 1 or 2 is active
- (2) binary input 1 is triggered
- (3) keypad inhibited
- (4) alarm has been activated
- (5) instrument is in manual mode
- (6) instrument status
- (7) temperature of measured medium
- (8) main measurement
- (9) unit of main measurement

The user can specify what is to appear in positions (7) and (8) of the display:

- no display
- corrected or uncorrected measurement
- temperature
- output level 1 or 2
- setpoint 1 or 2

## Operation

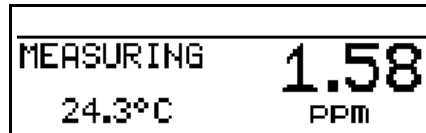
To make programming and operation easy, all parameters are clearly assigned to levels and displayed in plain text. Operation is protected by a code word. Operation can be adapted on an individual basis because parameters can be generally enabled or assigned to the protected area.

A setup program for the PC is available as a more convenient configuration option, rather than using the instrument keypad.

## Display modes

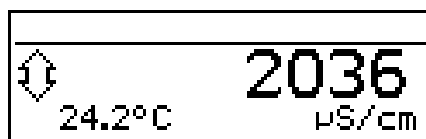
Three display modes are available:

### Large numbers



Here the measurements are displayed in numbers, as usual.

### Trend display

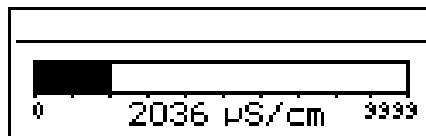


Here the numerical value is supplemented by a symbol to indicate the direction and speed of change for the measurement. This can be very useful when the controller is being optimized, for example.



from left to right:  
 fast, medium and slow rise, steady, slow, medium and fast fall.

### Bar graph



In this display mode, it only takes a glance to ascertain the range for the current measurement. Any scale can be used for the bar graph.

## Function modes

### Linear scaling

This mode is selected when the input signal is to be displayed linearly.

One of the following units is used for display or control:

- µS/cm
- mS/cm
- %
- mV
- pH
- ppm
- customized (5 characters)

Sensors can be connected to the instrument for the following measurement variables, for example:

- free chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid as per data sheet 202630
- redox potential as per data sheet 202701
- liquid level measurements
- flow rate measurements, etc.

The instrument has three calibration options available in this function mode:

- zero point
- end value
- zero point and end value

This allows optimum adaptation of the instrument to the sensor.

### Conductivity

This mode is intended for sensors that make uncorrected standard signals available. µS/cm or mS/cm are the units used for display or control.

Different calibration routines can be activated:

- Calibrating the cell constant. Because of manufacturing constraints, the cell constant of a conductivity measuring cell may differ slightly from its nominal value (the value printed on it). Wear or the accumulation of deposits during operation can also cause the cell constant to change. This changes the output signal from the measuring cell. With this instrument, the user has the opportunity to compensate for deviations in the nominal value of the cell constant by **manual input** (80 to 120 % range) or **automatic calibration** of the relative cell constant  $K_{rel}$ .

- Calibrating the temperature coefficient  $\alpha$ . The conductivity of virtually all solutions is temperature-dependent. To ensure correct measurement therefore, both the temperature and the temperature coefficient  $\alpha$  [%/K] of the measurement solution must be known. The temperature can either be measured automatically with a Pt100 or Pt1000 temperature probe or the user must set the temperature by hand.

The temperature coefficient can be determined automatically by the instrument or entered manually in the 0 to 5.5 %/K range.

### Concentration

In this mode, the concentration of a liquid can be determined from its uncorrected conductivity. % or "customized" are the units used for display or control.

Concentration measurement:

Caustic soda	
NaOH	0 to 15 % by weight
NaOH	25 to 50 % by weight
Nitric acid	
HNO <sub>3</sub>	0 to 25 % by weight
HNO <sub>3</sub>	36 to 82 % by weight
Sulphuric acid	
H <sub>2</sub> SO <sub>4</sub>	0 to 28 % by weight
H <sub>2</sub> SO <sub>4</sub>	36 to 85 % by weight
H <sub>2</sub> SO <sub>4</sub>	92 to 99 % by weight
Hydrochloric acid	
HCl	0 to 18 % by weight
HCl	22 to 44 % by weight

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The cell constant can be calibrated.

**pH or redox**

Connection option for transmitters that emit an uncalibrated pH or redox standard signal, such as JUMO data sheet 202701 2-wire transmitters.

The AQUIS 500 AS provides the required supply voltage for this type of 2-wire transmitter.

pH: a pH calibration (zero point or zero point and slope) can be performed, as well as the option of temperature compensation. "pH" display and control variable.

Redox: Both relative and absolute calibration are possible (zero point or as a percentage, using reference values). "mV" or "%" display and control variables.

**Customized with table**

Non-linear correlations between the input and output variable can be processed in this mode. Typical applications include measuring the level of liquid in horizontal, cylindrical containers or simply measuring the concentration.

The input values are processed in a table (max. 20 value pairs). Values can only be entered in the table using the optional setup program.

The units used for display or control are:

- $\mu\text{S/cm}$
- $\text{mS/cm}$
- customized (5 characters)
- Use the offset parameter to adjust the display.

**Analog outputs**

As many as two analog outputs are available (programmable 0(4) to 20 mA or 0(2) to 10 V).

The main input variable is assigned to **analog output 1**.

The (Pt100/Pt1000/NTC) temperature input is assigned to **analog output 2**.

Depending on the configuration, the two outputs output the actual value signal of the assigned measurement variable or the continuous controller signal of the main value. With the analog actual value output, the start and end values of the measurement range are freely adjustable.

The behavior of the outputs in the event of overrange or underrange measurements, alarms and calibration, is freely programmable.

**Further functions of the JUMO AQUIS 500 AS****Simulation function:**

The analog actual value outputs and relay outputs can be set as required in "manual" mode. This function is used, for example, for the "dry-run" commissioning of a system, for troubleshooting or during servicing.

**Min/max value memory**

This memory records the minimum and maximum input quantities that occur. This information can be used, for example, to assess whether the design of the connected sensor is suitable for the values that actually occur.

**Binary input**

The following functions can be accessed through the binary input:

- Key inhibit activation  
When this function is activated, operation is no longer possible via the keypad.
- "HOLD" mode activation  
When this function is activated, the outputs (analog and relay) adopt the states previously defined.
- Alarm suppression (controller alarm only)  
With this function, it is possible to temporarily deactivate alarm generation via the relevantly configured relay.

The predefined function is activated by shorting the relevant terminals (with the floating contacts of a relay, for example).

**Control functions**

The instrument provides both simple switching functions (limit function, alarm window and pulse contact) as well as more significant control functions.

P, PI, PD and PID structures can be freely programmed as control functions.

Simple switching functions can be assigned to main and secondary inputs.

The more significant control functions can only be assigned to the main input.

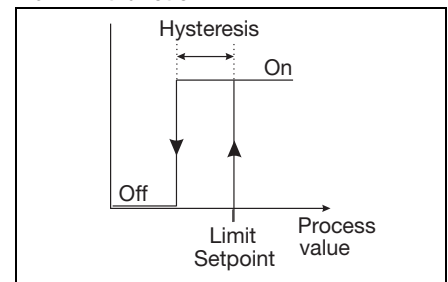
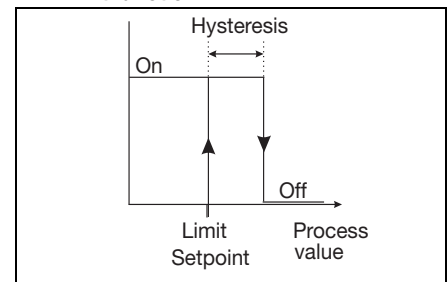
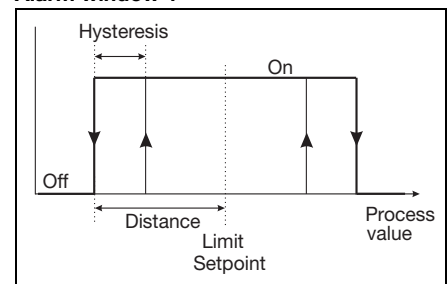
**Relay outputs**

Two relay changeover contacts are available for the main measurement variable and/or the temperature.

The following functions can be programmed:

- Switching direction (min/max)

- Limit controller (switch-on/switch-off delay, hysteresis)
- Pulse width output<sup>1</sup> (main value only; see control functions)
- Pulse frequency output<sup>1</sup> (main value only; see control functions)
- Modulating function<sup>1</sup> (main value only; see control functions)
- Pulse controls  
With this function, the output briefly switches on when the switching point is reached and then switches off again
- Alarm
- Sensor/range error
- Behavior in the event of an alarm, underrange or overrange measurement, calibration and "HOLD"

**Contact functions****Max. limit function****Min. limit function****Alarm window 1**

<sup>1</sup> Can only be assigned to the main variable.

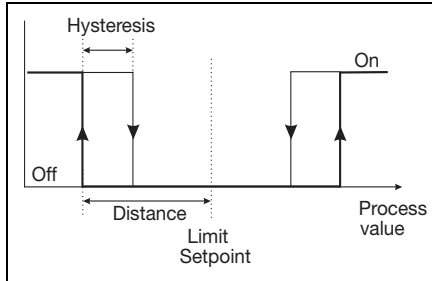
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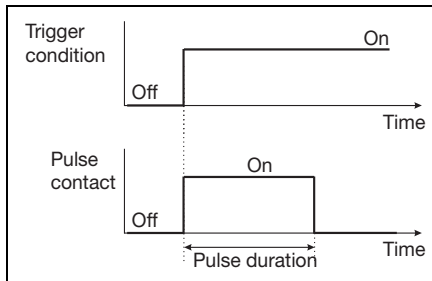


**Alarm window 2**



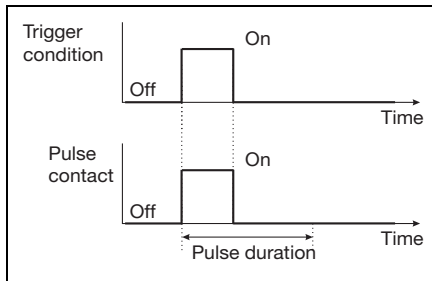
**Pulse contact**

**Triggering condition longer than pulse duration**



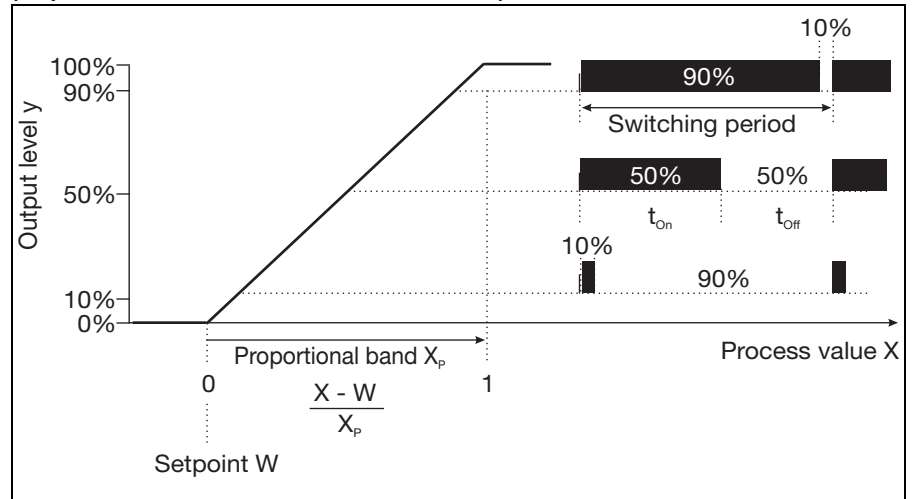
**Pulse contact**

**Triggering condition shorter than pulse duration**



**Pulse width controller**

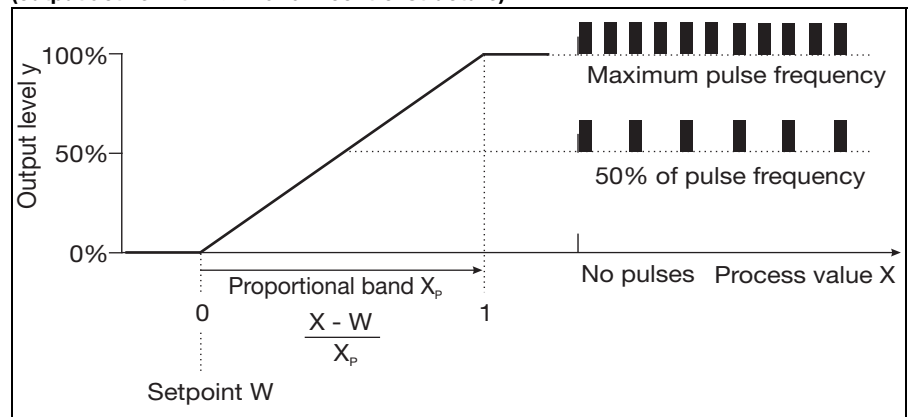
(output active with  $x > w$  and P control structure)



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

**Pulse frequency controller**

(output active with  $x > w$  and P control structure)



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

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## Technical data

### Analog inputs

Main input	Display range	Accuracy	Temperature error
0(4) to 20 mA 0 to 10 V	0.000 to 9.999 00.00 to 99.99 000.0 to 999.9 0000 to 9999	≤ 0.6 % of range	0.2%/10 °C
Secondary input	Measuring range	Accuracy	Temperature error
Temperature Pt100/1000 (automatic detection)	-50 to +250 °C <sup>a</sup>	≤ 0.5 °C	0.05%/10 °C
Temperature NTC/PTC	max. 4 kΩ Input via table with 20 value pairs through setup program	≤ 0.3 % <sup>b</sup>	0.05%/10 °C

<sup>a</sup> Selectable in °F

<sup>b</sup> Dependent on interpolation points

### Temperature compensation

	Compensation	Range <sup>a</sup>
in pH function mode	linear	-10 to +150 °C
in conductivity function mode	linear, 0 to 5.5 %/°C	-10 to +100 °C
	natural water (ISO 7888)	0 to 36

Reference temperature is adjustable from 15 to 30 °C; preset to 25 °C (default)

<sup>a</sup> Note the sensor operating temperature range!

### Measuring circuit monitoring

Inputs	Overrange/underrange	Short circuit	Sensor break
Main variable	yes	dependent on signal type	dependent on signal type
Temperature	yes	yes	yes

### Binary input

Activation	by floating contact
Function	key inhibit HOLD alarm stop

### Controller

Controller type	limit controller, pulse length controller, pulse frequency controller, modulating controller, continuous controller
Controller structure	P/PI/PD/PID
A/D converter	dynamic resolution up to 14 bits
Sampling time	500 ms

### Analog outputs (max. 2)

Output type	Signal range	Accuracy	Temperature error	Permissible load resistance
Current signal	0(4) to 20 mA	≤ 0.25 %	0.08 %/10 °C	≤ 500 Ω
Voltage signal	0 to 10 V	≤ 0.25 %	0.08 %/10 °C	≥ 500 Ω

The analog outputs behave in accordance with NAMUR recommendation NE43.  
 They are electrically isolated, AC 30 V/DC 50 V.

### Switching outputs (max. two (SPDT) changeovers)

Rated load	3 A/250 VAC (resistive load)
Contact life	> 2 × 10 <sup>5</sup> operations at rated load

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### Supply voltage for sensors

Supply voltage for 2-wire transmitter	DC 24 V; -15/+20 % max. 30 mA
Voltage supply for inductive proximity switch <sup>a</sup>	DC 12 V; 10 to 20 V max. 10 mA

<sup>a</sup> e.g. type EI1808 NPOSS

### Setup interface

Interface for configuring the instrument with the available setup program option (for instrument configuration only).

### Electrical data

Power supply voltage	AC 110 to 240; -15/+10 %; 48 to 63 Hz AC/DC 20 to 30 V; 48 to 63 Hz DC 12 to 24 V; +/-15 % (permissible only for connection to SELV/PELV circuits)
Power consumption	approx. 14 VA
Electrical safety	DIN EN 61 010, Part 1 overvoltage category III <sup>a</sup> , pollution degree 2
Data backup	EEPROM
Electrical connection	pluggable screw terminals conductor cross-section max. 2.5 mm <sup>2</sup> (supply voltage, relay outputs, sensor inputs) conductor cross-section max. 1.5 mm <sup>2</sup> (analog outputs, supply voltage for sensors)

<sup>a</sup> Not valid for SELV/PELV of power supply variant DC 12 - 24 V

### Display

Graphic LC display	120 × 32 pixels
Background lighting	Programmable: <ul style="list-style-type: none"> <li>• off</li> <li>• on for 60 seconds during operation</li> </ul>

### Housing

Material	ABS
Cable entry	Cable glands, max. 3 × M16 and 2 × M12
Feature	ventilation to prevent condensation
Ambient temperature range (the specified accuracy is adhered to in this range)	-10 to +50 °C
Operating temperature range (instrument operational)	-15 to +65 °C
Storage temperature range	-30 to +70 °C
Climatic rating	rel. humidity ≤ 90 % annual mean, no condensation (based on EN 60721 3-3 3K3)
Enclosure protection to EN 60529	surface-mounted housing: IP67 panel mounting: at front IP65, at rear IP20
Vibration resistant	to EN 60068-2-6
Weight	surface-mounted housing: approx. 900 g panel mounting: approx. 480 g

### Standard accessories

Cable glands
Installation material
Operating manual

### Approvals/approval marks

Mark of conformity	Testing laboratory	Certifikates/certification numbers	Test basis	valid for
c UL us	Underwriters Laboratories	E 201387	UL 61010-1	all versions

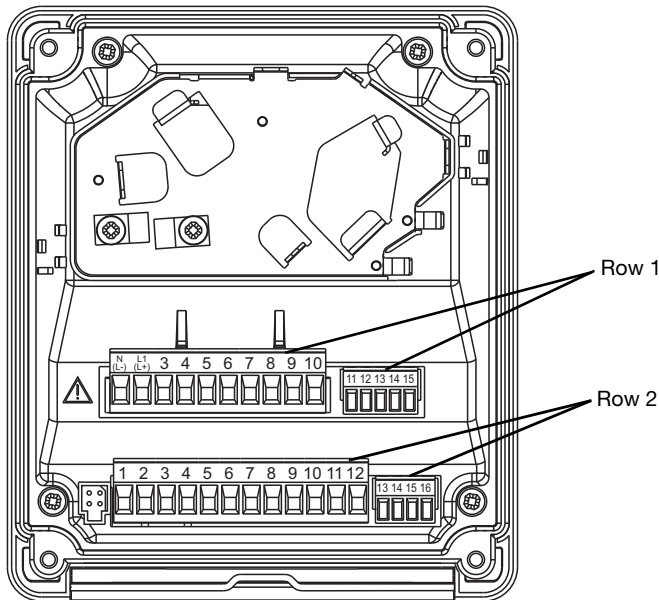
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## Electrical connection



The connecting cable between the sensor and the transmitter must be a shielded cable with a maximum diameter of 8 mm. There is a guide plate to ensure optimum cable routing. The cable run to the pluggable screw terminals incorporates strain relief, and the sensor cables are connected without using solder.

Connection		Terminal	Row
<b>Power supply voltage for transmitter/controller</b>			
Supply voltage (23): AC 110 to 240 V; -15/+10 %; 48 to 63 Hz		1 N (L-)	1
Supply voltage (25): AC/DC 20 to 30 V; 48 to 63 Hz		2 L1 (L+)	
Supply voltage (30): DC 12 to 24 V; +/-15 %			
NC		3	
<b>Power supply voltage for proximity switch</b>			
DC 12 V (10 to 20 V)		11 + 12 -	1
<b>Power supply voltage for transmitter</b>			
DC 24 V (-15/+20 %)		14 + 15 -	1
<b>Inputs</b>			
NC		1 2 3 6 7	2
Standard signal input 0(4) to 20 mA or 0 to 10 V and 10 to 0 V		4 - 5 +	
Resistance thermometer in 2-wire circuit		8 9 10	
Resistance thermometer in 3-wire circuit		9 8 10	

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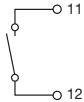


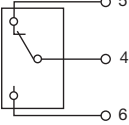
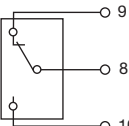
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Connection		Terminal	Row
Binary input		11 12	2
<b>Outputs</b>			
Analog output 1 0 to 20 mA and 20 to 0 mA or 4 to 20 mA and 20 to 4 mA or 0 to 10 V and 10 to 0 V (electrically isolated)		+ 13 - 14	2
Analog output 2 0 to 20 mA and 20 to 0 mA or 4 to 20 mA and 20 to 4 mA or 0 to 10 V and 10 to 0 V (electrically isolated)		+ 15 - 16	
Switching output K1 (floating)		4 pole 5 NC 6 NO	1
NC		7	
Switching output K2 (floating)		8 pole 9 NC 10 NO	

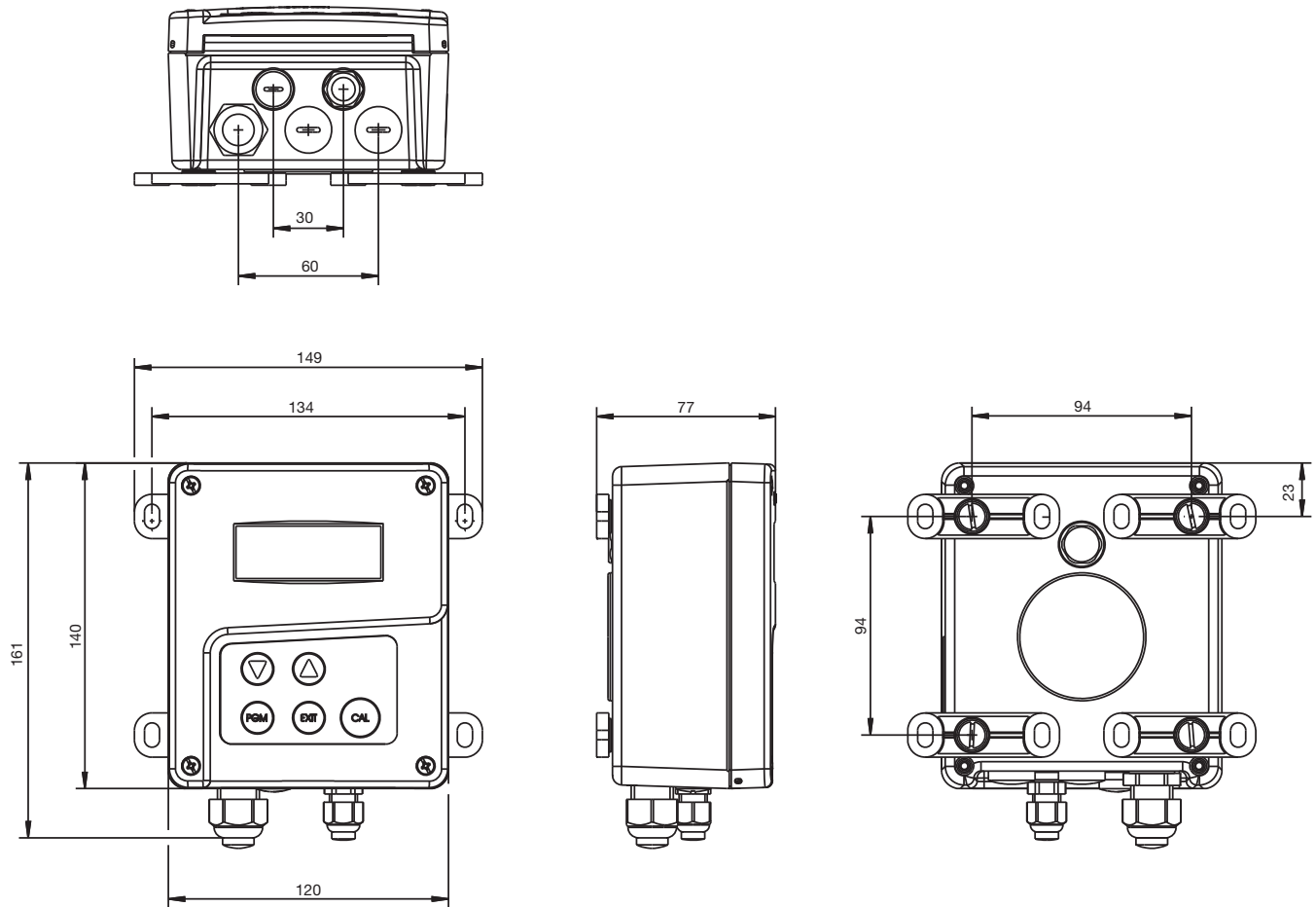
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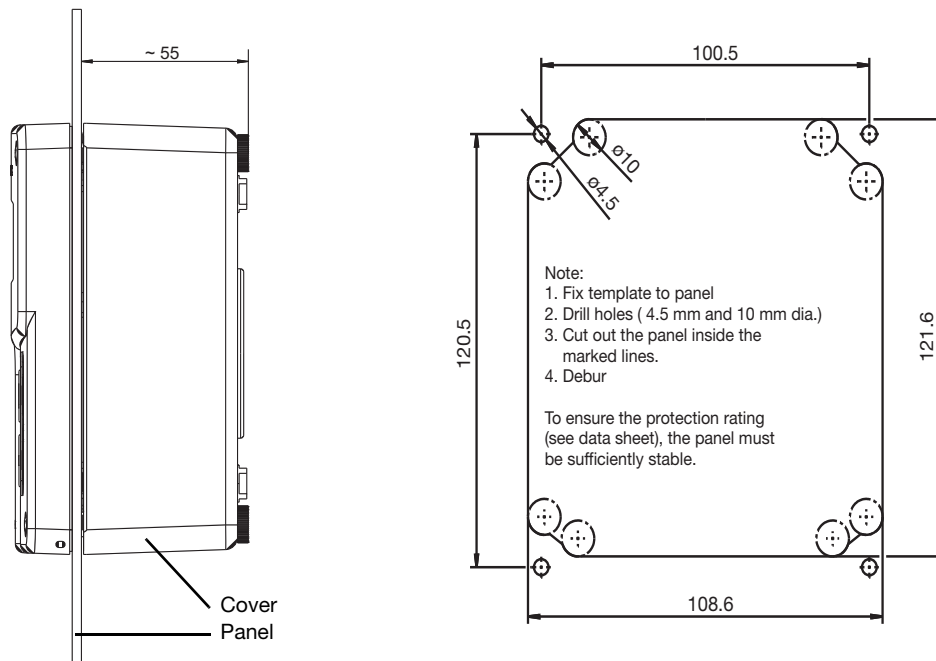
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## Dimensions



## Panel mounting/drilling diagram



**Note:**  
 The drilling template (in actual size) is shown in the operating manual B 202568.0

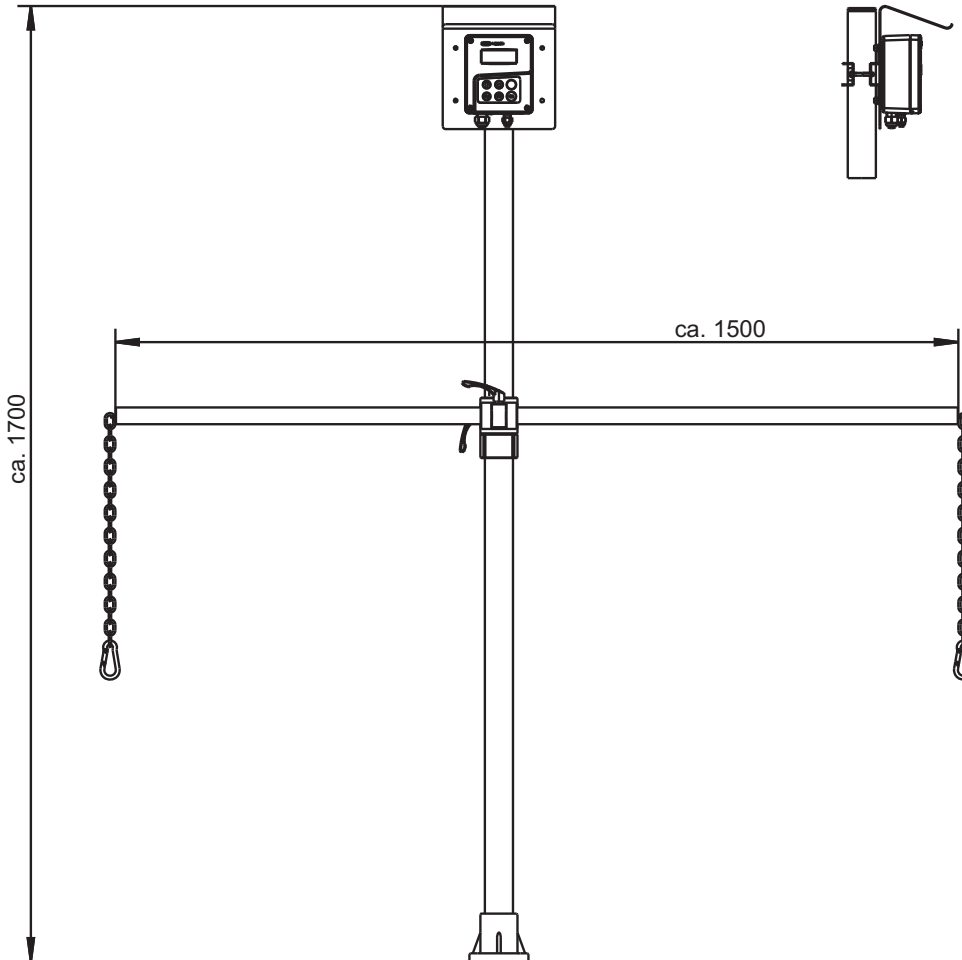
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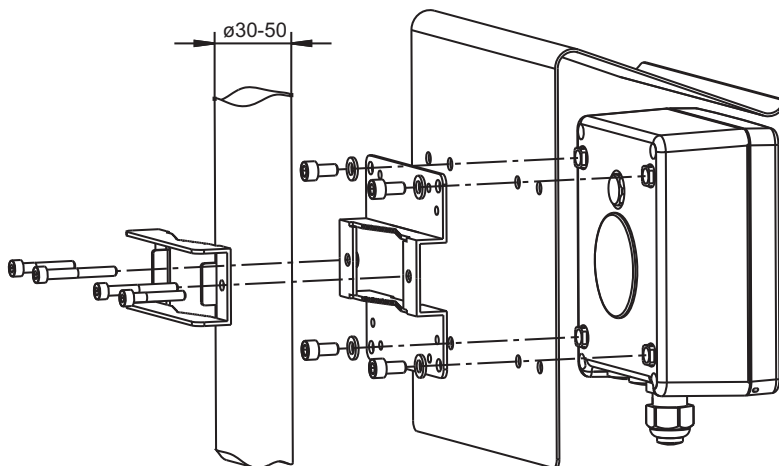
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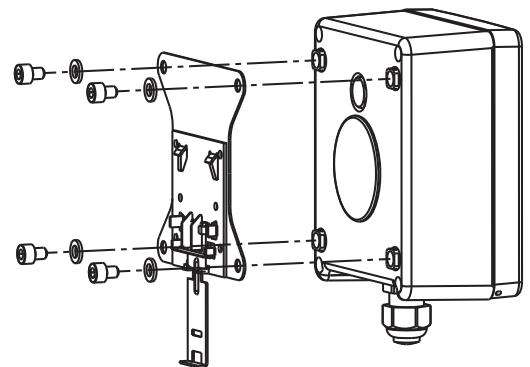
**Accessories**



Support pillar with base, arm and chain  
 Part no.: 00398163



Pipe installation set for JUMO AQUIS 500  
 Part no.: 00483664  
 Protective roof for JUMO AQUIS 500  
 Part no.: 00398161

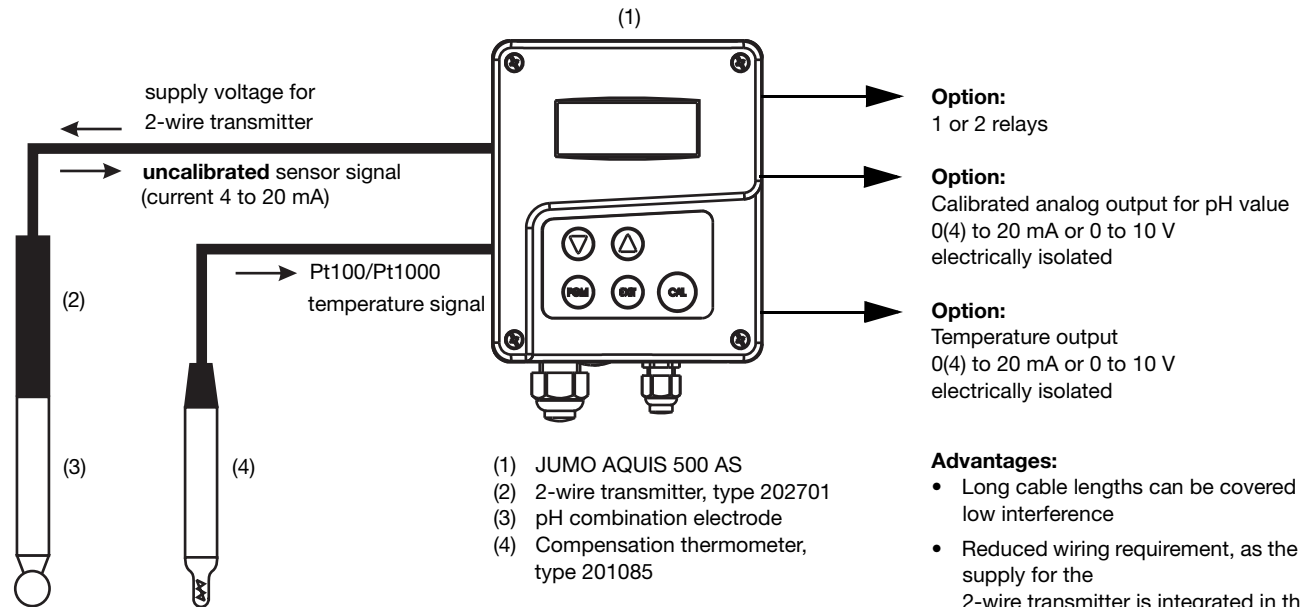


DIN rail installation set for JUMO AQUIS 500  
 for mounting the instrument on a 35 mm x 7.5 mm DIN  
 rail as per EN 60715 A.1  
 Part no.: 00477842



## Application examples

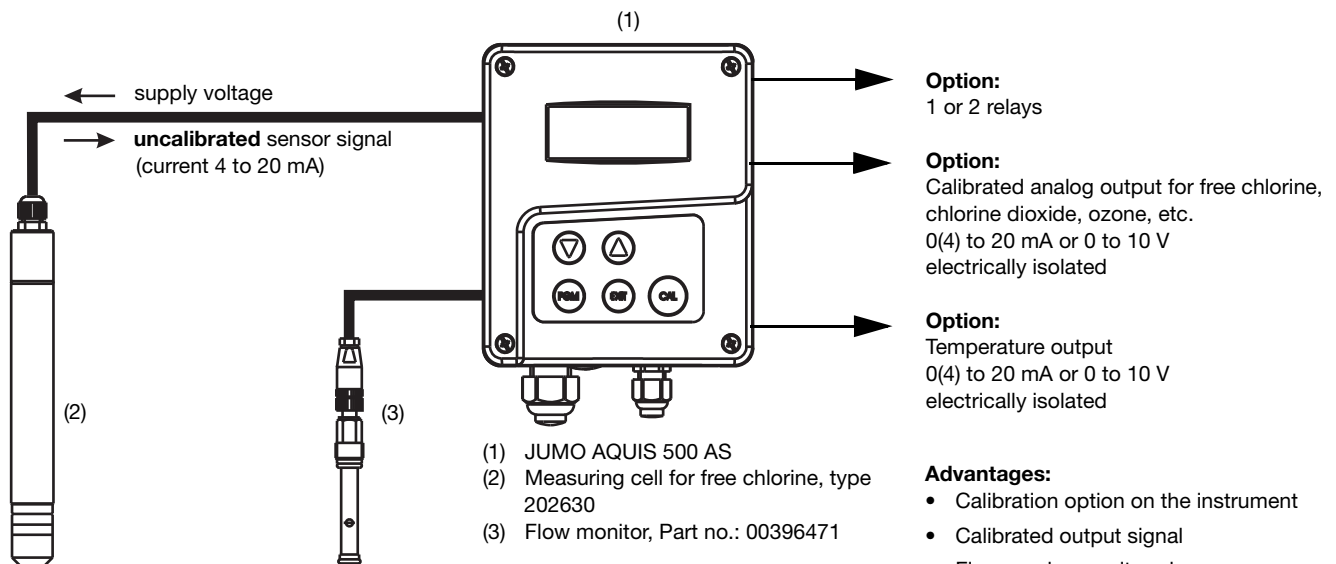
### Indicator/controller for pH



#### Advantages:

- Long cable lengths can be covered with low interference
- Reduced wiring requirement, as the power supply for the 2-wire transmitter is integrated in the instrument
- Calibration option on the instrument
- Moisture and humidity problems during calibration are minimized

### Indicator/controller for free chlorine, chlorine dioxide, hydrogen peroxide, peracetic acid or ozone



#### Advantages:

- Calibration option on the instrument
- Calibrated output signal
- Flow can be monitored

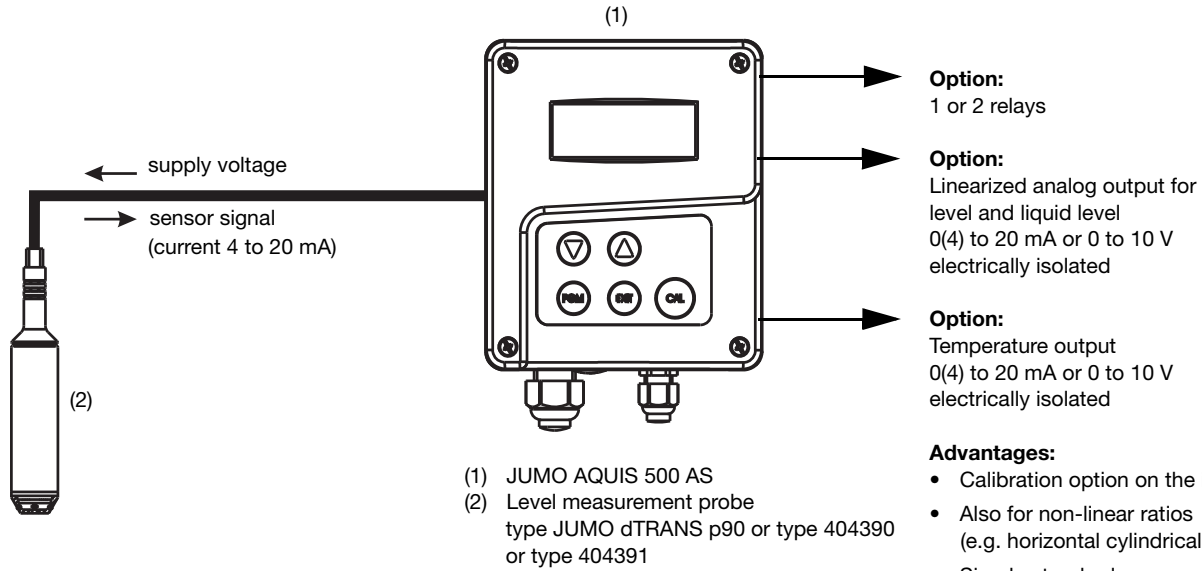
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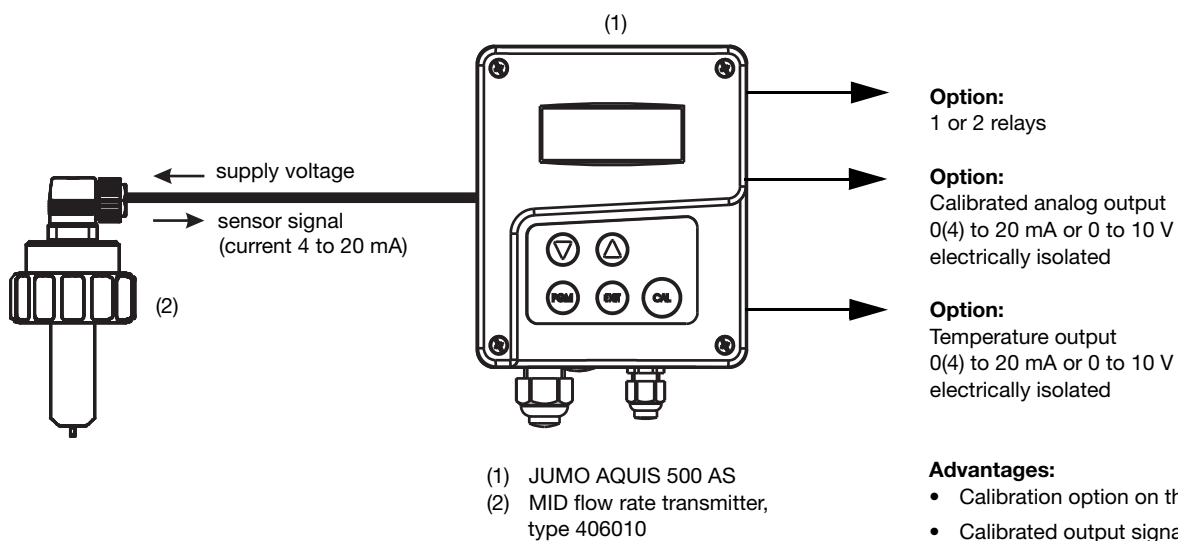


**Indicator/controller for level or liquid level**



<sup>1</sup> The setup program, which is available as an option, can be used to linearly assign a display in liters or similar, to a non-linear input variable such as the liquid level of a horizontal, cylindrical tank (20 value pairs)

**Indicator/controller for flow rate**



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## Order Details

<b>(1) Basic type</b>	
202568	JUMO AQUIS 500 AS Indicator/controller for standard signals in analytical systems
<b>(2) Basic type extension</b>	
10	for panel mounting
20	in surface mountable housing
<b>(3) Input (freely configurable)</b>	
888	0(4) to 20 mA and 0 to 10 V
<b>(4) Output 1 (for main value or continuous controller)</b>	
000	no output
888	analog output 0(4) to 20 mA and 0 to 10 V
<b>(5) Output 2 (for temperature or continuous controller)</b>	
000	no output
888	analog output 0(4) to 20 mA and 0 to 10 V
<b>(6) Output 3</b>	
000	no output
310	relay with changeover contact
<b>(7) Output 4</b>	
000	no output
310	relay with changeover contact
<b>(8) Supply voltage</b>	
23	AC 110 to 240 V, +10%/-15 %, 48 to 63 Hz
25	AC/DC 20 to 30 V, 48 to 63 Hz
30	DC 12 to 24 V, ±15 %
<b>(9) Extra codes</b>	
000	without

Order code                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (7)                    (8)                    (9)  
 Sample order                202568                /                20                -                888                -                888                -                000                -                310                -                000                -                23                /                000

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Internet: www.jumousa.com



## Stock versions

(delivery 3 days after receipt of order)

Type	Part no.
202568/20-888-888-888-310-310-23/000	00528718
202568/20-888-888-000-310-000-23/000	00528719

## Production version

(delivery 10 days after receipt of order)

Type	Part no.
202568/10-888-888-888-310-310-23/000	00528743
202568/10-888-888-000-310-000-23/000	00528744
202568/10-888-888-888-310-310-25/000	00528745

## Accessories

(delivery 10 days after receipt of order)

Type	Part no.
Protective roof for JUMO AQUIS 500 <sup>a</sup>	00398161
Pipe installation set for JUMO AQUIS 500 <sup>b</sup>	00483664
DIN rail installation set for JUMO AQUIS 500 <sup>c</sup>	00477842
Support pillar with base clamp, arm and chain	00398163
Holder for suspension fitting	00453191
Back panel set 202560/65	00506351
PC setup software	00483602
PC interface cable including USB/TTL converter and two adapters (USB connecting cable)	00456352

<sup>a</sup> The pole-mounting kit is needed for mounting the protection cover

<sup>b</sup> With the pipe installation set, the JUMO AQUIS 500 can be attached to a pipe (e. g. a support pillar or a railing)

<sup>c</sup> With the DIN rail installation set, the JUMO AQUIS 500 can be attached to a 35 mm × 7.5 mm DIN rail as per EN 60715 A.1

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# JUMO AQUIS touch S

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

### Brief description

#### Measuring

The JUMO AQUIS touch S provides a central platform for the display and processing of pH value, redox voltage, electrolytic conductivity, resistance of high-purity water, temperature, quantities of disinfecting agents such as free chlorine, total chlorine, chlorine dioxide, ozone, hydrogen peroxide and peracetic acid or even flow rates. Pulse frequency inputs (counters) are available for flow rate measurement. Universal inputs can be used to measure almost any analog measurands using standard signals (0(4) to 20 mA or 0 to 10 V). The unit can measure and manage up to 19 parameters simultaneously.

#### Controlling

Besides numerous simple alarm, limit value or time-controlled switching functions, up to 4 higher-order control loops can be defined in the JUMO AQUIS touch S at the same time. Tried and tested JUMO control algorithms are used for P, PI, PD, and PID control in these applications.

#### Display

A 5.5" TFT color screen with touch function serves to display all parameters as well as operate and setup the device. The plain text operation philosophy virtually eliminates the need for a manual. German, English, and, on request, French are included in the device at the factory as selectable user interface languages (see order details). Using the PC setup program, the language library of the unit can be expanded to as many as 15 languages. It's also possible to display languages that use Chinese and Cyrillic characters. As a result, the device is predestined for global use.

#### Recording

A paperless recorder is integrated for data recording. Up to 8 analog measurands and 6 binary signals are recorded and displayed on the screen in their chronological sequence. Storage is tamper-proof and enables official recording obligations to be fulfilled. The data can be extracted via JUMO-PCC software or USB flash drive and evaluated using the PC evaluation software JUMO PCA3000.

#### Application examples

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

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



**JUMO AQUIS touch S**  
type 202581/...

### Special features

- Up to 4 analysis inputs in any combination for direct connection of sensors for liquid analysis
- Up to 15 further measuring signals can be connected either directly or via interface
- 2 pulse frequency inputs for flow measurement (max. 300 Hz or 10 kHz)
- Up to 17 switching outputs that are configurable as controller, switching, and alarm outputs
- Interfaces: USB host, USB device, Modbus, PROFIBUS-DP, and Ethernet
- Ethernet functions: web server, alarm alerts via e-mail, setup via PC, extraction of recorded measurement data
- Math and logic functions
- Integrated timers, wash timers, and calibration timers
- Service and operating hours counters
- Process-data recording with tamper-proof storage
- Vibrant TFT color graphics screen with 5.5" screen diagonal
- Intuitive operation via touchscreen
- Configurable user rights
- Freely configurable operation screen
- PC setup program
- Conductivity measurement for natural waters and TDS-measurement
- Switchable conductivity measuring ranges for CIP/SIP-plants in the beverage industry
- Compliance with pharmaceutical industry requirements to USP <645>
- Wall casing (protection type IP67) with ample connection space

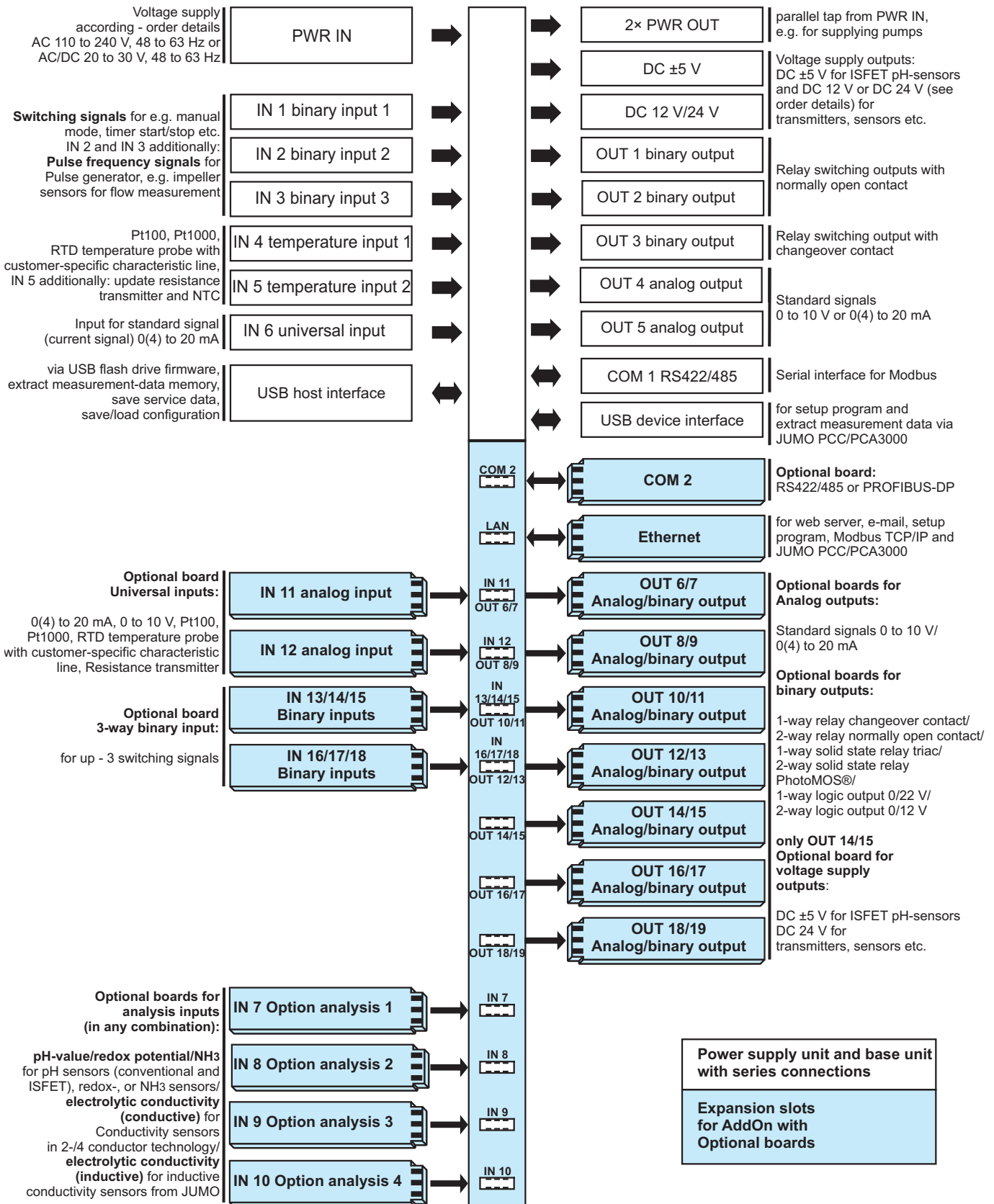
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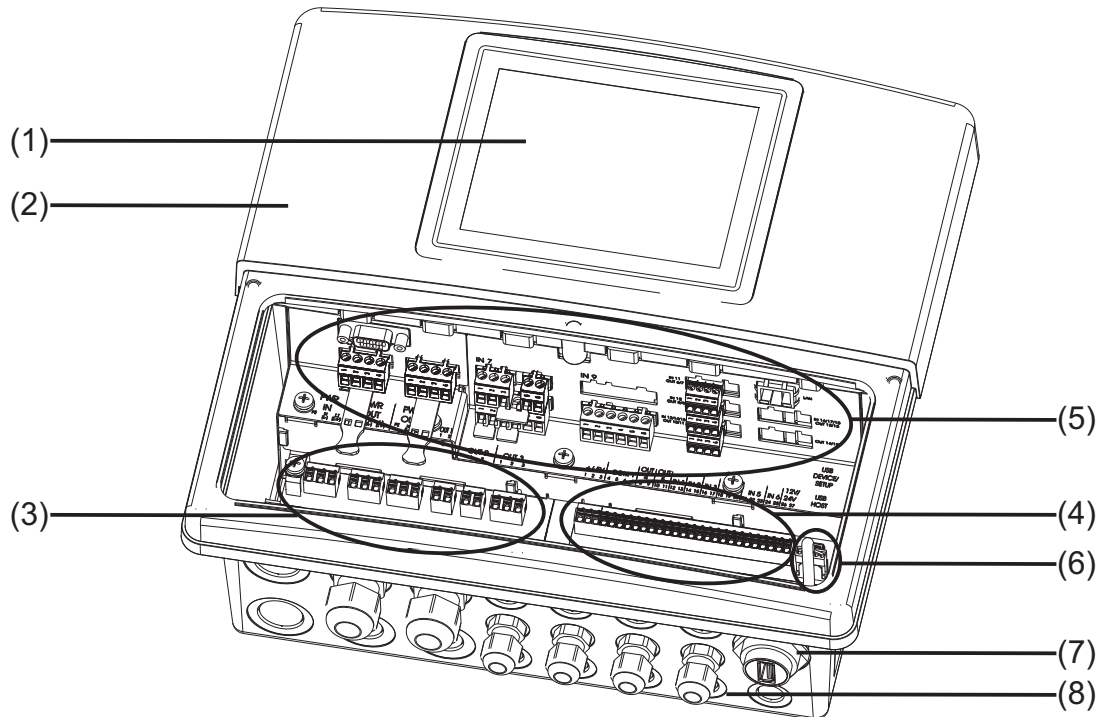


## Block diagram



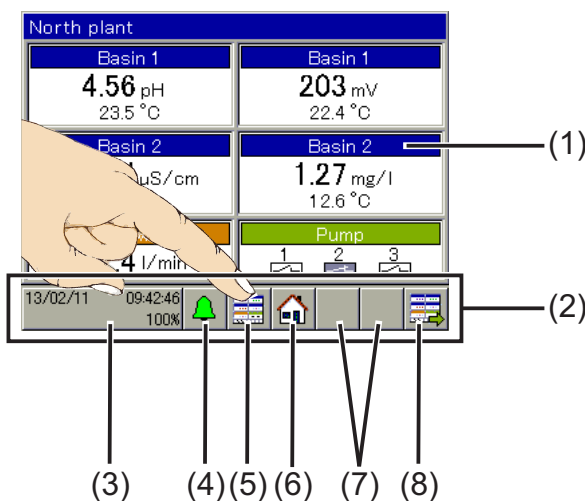


## Device setup



- |  |   |
|--|---|
| (1) TFT-touchscreen                          | (5) Expansion slots                       |
| (2) Case (terminal compartment cover opened) | (6) USB interfaces                        |
| (3) Connection terminals, power supply unit  | (7) USB host socket IP67 (also available) |
| (4) Connection terminals, base unit          | (8) Cable inlets                          |

## Display and control elements



- |   |
|---|
| (1) Touchscreen   |
| (2) Toolbar with buttons for operation  |
| (3) "Device settings menu" button with: <ul style="list-style-type: none"> <li>• Display of date, time</li> <li>• Logged-in user ("Master" in the example)</li> <li>• Remaining memory display in percent for recording function (in the example: 100 %)</li> </ul> |
| (4) "Alarm/Event List" button   |
| (5) "Select operation screen" button  |
| (6) "Home" button (back to main screen)   |
| (7) Placeholder for context-sensitive buttons (assignment based on operation screen concerned)  |
| (8) "Next operation screen" button  |

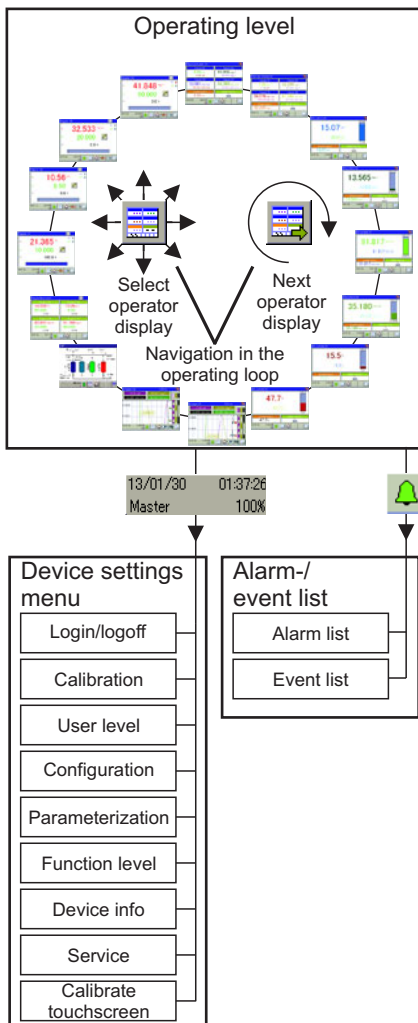


## Description

### Operating concept

The JUMO AQUIS touch S is operated via the touch-display. Measured values, operating states and diagrams of the individual functions are displayed and visualized on up to 16 operation screens. The device functions can be controlled using the buttons on the corresponding operation screens. Touching the navigation buttons selects the operation screen to be shown. The operator displays are arranged in an operating loop and can be run in a loop via the "Next operator display" button and selected using the "Select operator display" button.

The "Device settings menu" button is for configuration and parameterization. A further menu for viewing pending alarms and an event protocol can be opened via the "Alarm/Event list" button.



- Master: Complete device configuration permitted
- Service: Access for authorized service personnel
- User1/User2: Restricted user rights

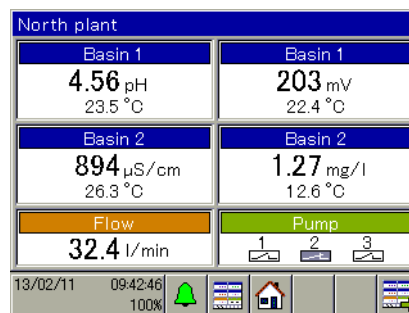
The scope of the user rights, as well as passwords and user names can be edited via the PC setup program.

### Operating loop/operation screens

The operating loop comprises 2 general screens and 6 detailed screens as standard. Further operation screens are created by configuring controllers and recording groups, thereby provisioning controller screens and diagrams in the operating loop. The individual operation screens can be configured for showing selected measured values or binary signals and for defining headings.

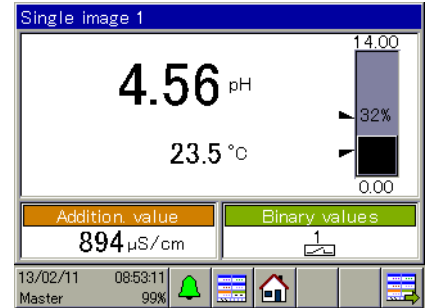
### General screens

The general screens are pooled displays of measured values and binary signal states. For the analog measurands, 2-part screens, or 4-part screens can be configured for displaying 2 or 4 display fields, each with a main and a secondary measured value. One additional value and up to 3 binary values can also be displayed in each general screen. Headings of the display window and the display fields can be renamed. Input signals can be freely assigned to the display fields. One 4-part overview screen displays up to 9 analog and 3 binary signals.



### Detailed screens

The detailed screens are large-scale displays of a main measured value with a secondary measured value. One additional value and 3 binary signals can also be displayed. The main value is visualized by a bar graph. Limit values for alarm functions of the measuring input concerned are displayed by marks on the bar graph.



### Data monitor

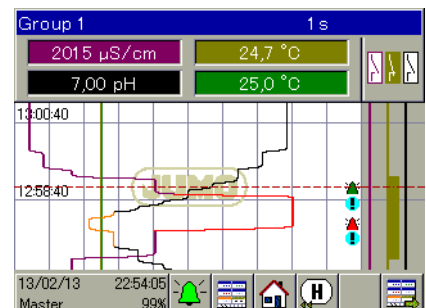
This function is included in the standard version. The data monitor displays measurement data as a line recorder diagram with time stamp. There are 2 groups available. For each activated group, a diagram is displayed in the operating loop as long as the group concerned is configured. 4 analog channels and 3 binary channels can be displayed per group. The measurement data are stored in a ring buffer. The oldest measurement data are overwritten to allow measurement data recording to continue when the ring buffer is full.

### Recording function

This function equates to a conventional paperless recorder and is available as an extra code. It corresponds essentially to an expanded data monitor function with the following additional options:

- Display measurement data history (scroll diagram)
- Data retrieval via USB flash drive or JUMO PCC software

The measurement data histories can be retrieved via JUMO PCC software or alternatively via USB flash drive and can be displayed, evaluated, and archived using the JUMO PCA3000 PC Evaluation Software.



### User rights

The available operating and setting options depend on the user rights of the logged-in user. The device holds 4 user accounts.

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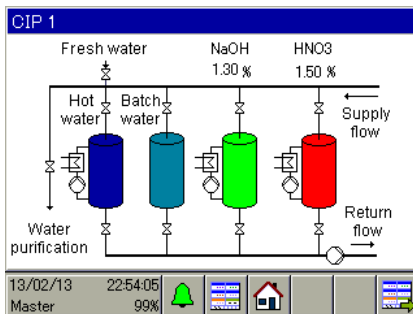
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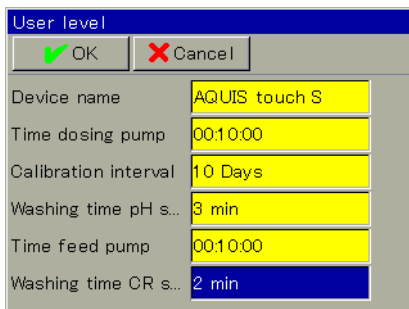
**Process screen**

The PC setup program is able to create a customer-specific process screen in which a global overview of the plant process can be displayed. Once created, the process screen is transferred by the PC setup program to the JUMO AQUIS touch S, where it becomes a component of the operating loop. Up to 50 items (screens, binary displays, bar graphs, texts, etc.) can be used in the process screen. Typical for a process screen:



**User level**

A user level is a menu which the user can access quickly and simply to define certain parameters and configuration settings. A user-defined block of up to 25 settings can be selected via the PC setup program and stored at user level.

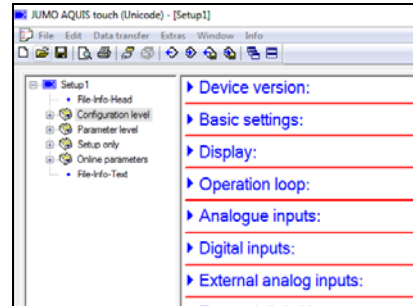


**Functional level**

The "Functional level" menu allows internal functions to be used and the status of these functions to be displayed. For example, counters can be reset or a wash operation started manually here.

**PC setup program**

The PC setup program enables the JUMO AQUIS touch S to be conveniently configured and parameterized using a PC. Data records can be created, edited, transmitted to the device and extracted in this way. The data can be saved and printed.



**Analysis inputs**

Four expansion slots for analysis inputs can be flexibly equipped with optional boards for measuring pH-value, redox potential, NH<sub>3</sub>, and electrolytic conductivity (conductive/inductive). The conductivity measurement also covers TDS and ultra-pure water applications within its performance range of services.

A compensation for numerous influencing variables (e.g. temperature) can be configured. This makes the JUMO AQUIS touch S the central measuring point for all analysis measurands in one process. The diverse range of connectable electrodes and sensors enable all process-relevant measurands to be recorded in a single device. In addition to analysis measurands, these measurands include physical measurands, such as temperature and flow rate, and also any measurand capable of being transferred as a pulse frequency signal or standard signal. Alarm functions ensure the monitoring of measured values for overrun and underrun of limit values. The limit values can be defined by the user.

**Analog inputs**

In addition to the standard temperature measuring inputs (Pt100, Pt1000, resistance transmitters, NTC etc.) and the universal input (0(4) to 20 mA) of the base unit, other analog inputs with optional boards can be made available. The optional analog inputs can be used for RTD temperature probes, resistance transmitters, voltage, and current signal. This makes the JUMO AQUIS touch S an extremely flexible tool for measuring numerous measurands. Here too, the user can configure alarm functions for monitoring measured values for underrun/overrun.

**Customer-specific linearization**

In addition to the standardized, factory-stored sensor characteristic lines, customer-specific linearization is also possible. This option allows any sensor characteristic lines to be entered. Programming is done via the PC setup program based on value tables (up to 40 value pairs) or by inputting a 4th grade polynomial.

**Binary inputs**

The signals from 3 standard and up to 6 binary inputs also available can be used to trigger various internal functions, switchover of a parameter block or the start of autotuning, for example.

IN 2 and IN 3 enable the frequency of encoders to be measured to perform flow measurements using impeller sensors or monitor the rotational speed of pumps, for instance. There are 2 measuring ranges available, depending on how the measuring principle in the flow function is configured:

- 3 to 300 Hz (periodic time measurement)
- 300 Hz to 10 kHz (pulse counting)

**External inputs**

Bus technologies enable a further 8 analog and 8 binary inputs to be employed for signal transmission with bus users.

**Analog outputs**

The analog outputs are freely scalable (current, voltage). They can be used to output controller outputs, setpoint values, math results, and the analog input signals (e.g. actual value).

Besides the 2 standard analog outputs of the base unit, up to 7 more with optional boards can be retrofitted.

**Binary outputs**

Binary outputs are switching and logic outputs.

Binary outputs enable the output of alarms, limit value contacts, logic results and controller signals.

Three binary outputs are provided as standard (OUT 1 to 3 relay). A maximal of 17 binary outputs can be realized in the device by means of optional boards.

The following variants are available as optional boards:

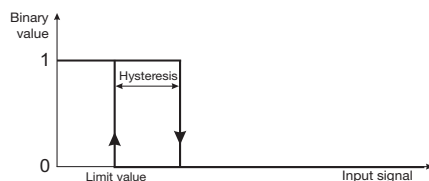
- 1-way output relay (changeover contact)
- 2-way output relay (normally open contact)
- 1-way output solid state relay triac
- 2-way output solid state relay PhotoMOS® (wear-free control, e.g. of metering pumps)



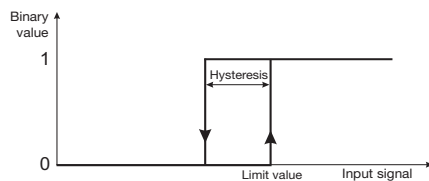
## Limit value monitoring

In addition to the alarm functions of the measuring inputs, there are 8 limit value monitors, each with 4 selectable switching functions (min. alarm, max. alarm, alarm window, inverted alarm window) available. The limit value can be permanently configured. This function enables the monitoring of any analog values. The violation of a limit value can trigger alarms, event list entries, or switching functions. The diagrams below show the limit value functions concerned.

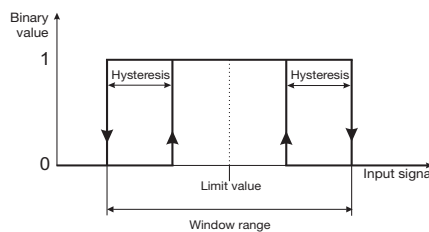
### Min. alarm



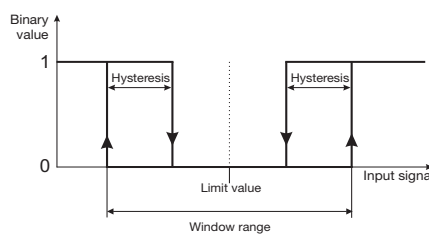
### Max. alarm



### Alarm window



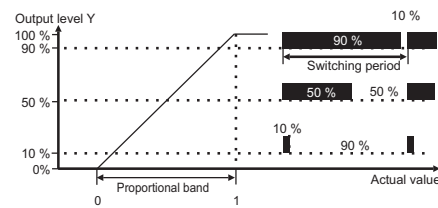
### Invert alarm window



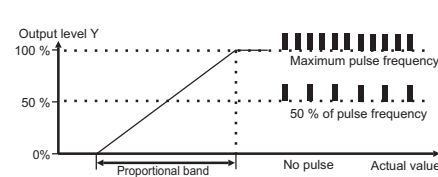
## Controller

Up to 4 PID controllers can be activated at the same time. Each analog input signal (analysis size, temperature, standard signal, etc.) can be freely assigned to one of the controller channels. Ena. variable disturbance, parameter block switchover, and a coarse/fine control function enable especially stable controller behavior. The controller outputs can be configured as continuous output (output level as standard signal), pulse length output (output level as pulse length), or pulse frequency output (output level as pulse frequency).

## Pulse length output

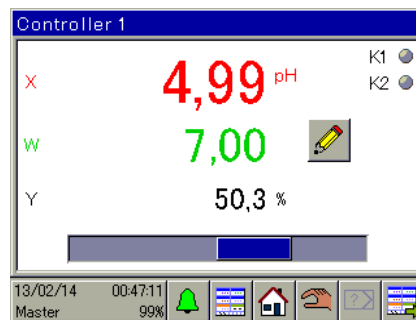


## Pulse frequency output



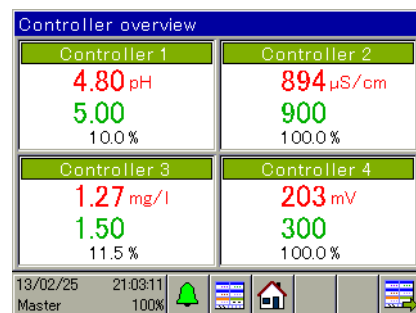
## Controller detailed screens

The controller functions are visualized in detail here. Data such as actual value, setpoint value, and output level are displayed. The controller can be used in this view (manual output ratio, setpoint value input).



## Controller general screen

If at least 2 controller channels are configured, an overview of all controllers with the most important data is displayed in the operating loop.



## Controller parameters

Two parameter blocks can be saved for each of the 4 controller channels. Each parameter block has 25 parameters for adapting the controller to the conditions of the process concerned. Each controller can be toggled between its two parameter blocks to adapt

the controller behavior if certain process conditions change. Parameter blocks can be toggled separately for each controller channel.

## Autotuning

The autotuning function also enables a user who is not a control technology expert to adapt the controller to the control path. During this process, the reaction of the control path to the changes in the actuating variable is evaluated. The step response method is implemented in the controller channels of the JUMO AQUIS touch S to allow autotuning.

## Math and logic function

The math and logic module enables analog channels to be associated with one another, and also analog channels to be associated with counters and binary inputs. Numerous operators are available for the formulae. The JUMO PC setup program can be used to create formulae with basic arithmetic operations, root functions, power functions, logarithm functions, angle functions, and many other functions. Operators AND, OR, NOT, XOR, and edge detections are available for logic printouts. The math and logic module can be configured solely via the PC setup program. This function is available as an option.

## Flow rate

Two flow measurement functions can be configured. Flow rates can be measured on the basis of the pulse signals at IN 2 or IN 3 and/or of an analog input signal. The measured flow rate can be integrated via the "Total quantity" function. In this way, the liquid volume that has passed over the measuring point is cumulated over a configurable period.

## Counter

Four counters can be used to count activation operations or operating hours of binary functions such as alarms, binary inputs, wash timers etc. This function is intended primarily for monitoring maintenance intervals.

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**Timer**

Two timer functions are included. They can be configured either as timers or time switches. Configured as a timer, the functions act like a time relay. The timer is controlled for starting, resetting, and stopping via binary signals. A timer can also be stopped, or its start delayed, by the tolerance band function. The tolerance band is the deviation of a measured value from a predefined reference. If the configured deviation is exceeded, the timer concerned stops.

The chronological sequence of the timer signal can be influenced by the settings "Time", "Lead time" and "Stop time" in such a manner that a typical time relay functions (e.g. response delay or fallback delay) can be achieved.

The time switch function corresponds to a week timer. Up to 4 activation and deactivation times can be set for each weekday.

**Wash timer**

Two wash timers are used for the regular cleaning of electrodes. Certain recurring functions are triggered at pre-configurable intervals. Wash timers can, for example, control binary outputs to activate a cleaning process in the plant. By cleaning sensors on a regular basis, optimal measuring certainty can be guaranteed.

**Calibration timer**

The calibration timer function reminds the operator to re-calibrate the sensors. Corresponding alarms and event list entries can be individually configured.

**Calibration logbook**

Analog inputs IN 6 to IN 12 are covered by a calibration logbook in which all successfully completed calibration processes are recorded along with the date, time, and numerous other details. An overview of the calibration history on the analysis sensors is therefore available at all times.

**Alarm/Event list**

The alarm list reports currently pending errors. Possible alarm messages include calibration alarms or alarms triggered by input signals. Once the error sources are eliminated, alarms disappear automatically.

The event list stores and reports events, such as the appearance and disappearance of alarms, voltage supply failures, calibrations, etc. However, event list entries can also be configured in the functions of the JUMO AQUIS touch S.

**USB interfaces**

There are two types of USB interface — a host interface and a device interface. A USB flash drive can be connected to the host interface. Measurement data, configuration data, and service data can thus be saved. Additionally, configurations can be uploaded from the memory stick to the device and device software updates can be run. The device interface serves, in combination with a standard USB cable, to operate the PC setup program and to retrieve measurement data for the recording function also available via the JUMO PCC software. Both USB interfaces are located next to the connection terminals in the base board. The host interface can also be attached to a USB host socket (see order details) on the case next to the cable entries, allowing it to be used without opening the case.

**Serial interfaces RS422/485**

The JUMO AQUIS touch S has a standard RS422/485 interface with Modbus RTU protocol (slave). A further interface can be retrofitted as an optional board. Serial interfaces are used to integrate the device into an automation network. This allows the JUMO AQUIS touch S to communicate with a SCADA system or other Modbusmaster devices.

**PROFIBUS-DP interface**

The PROFIBUS-DP interface can be used to integrate the JUMO AQUIS touch S into a fieldbus system operating according to the PROFIBUS-DP standard. An application-specific GSD file, via which the JUMO AQUIS touch S is integrated into the fieldbus system, is generated by means of the project engineering tool supplied (GSD generator; GSD = basic device data (Gerätstammdaten)).

**Ethernet interface**

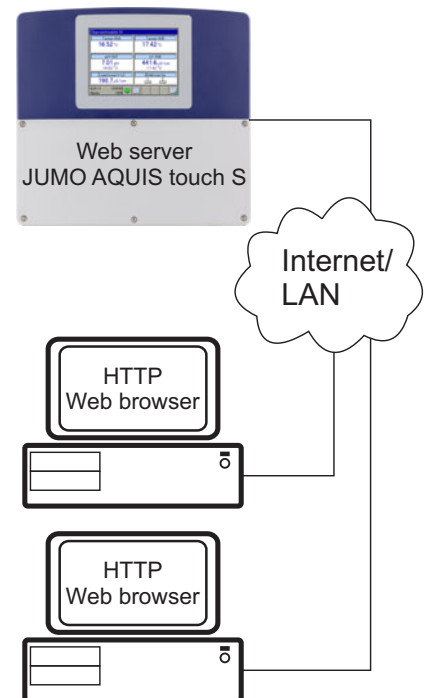
The JUMO AQUIS touch S can be integrated into a LAN via the Ethernet interface also available. This enables the device to communicate with all PCs in the LAN concerned. The PC setup program and PCC communication software can be accessed from these PCs using the JUMO programs. The Ethernet interface permits use of the web server, e-mail, and Modbus TCP/IP functions.

**E-mail/SMS text message**

The JUMO AQUIS touch S can be configured for event-controlled sending of e-mail notifications. This enables maintenance personnel to be notified about the presence of alarms, for example (also via transmission as SMS text message in the e-mail/SMS gateway of a cellular phone provider).

**Web server (online-visualization)**

HTML documents, which can be created using a conventional HTML editor, can be stored in the JUMO AQUIS touch S using the PC setup program. These documents can contain texts, graphics, and JavaScript code. Analog and binary values of the JUMO AQUIS touch S can be displayed via JavaScript. The result is a website which can be retrieved over the Internet or LAN and displayed via a PC using a conventional web browser. On this website, the user can now see a clear display of the plant or the process, including measured values and operating states. A "Standard online-visualization" function is stored at the factory. A PC with Microsoft® Windows® operating system and Silverlight® installed is required to use this function.



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## Technical data

### Analog inputs base unit

#### Temperature measuring input (IN 4)

Probe/signal type	Connection type	Measuring range	Measuring accuracy	Ambient temperature influence
Pt100 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.05 % of MR <sup>a</sup>	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1 % of MR <sup>a</sup>	≤ 50 ppm/K
RTD temperature probes with customer-specific characteristic line <sup>b</sup> up to 400 Ω to 4000 Ω	2-wire/3-wire 2-wire/3-wire	0 to 400 Ω 0 to 4000 Ω	≤ 0.1 % of R <sub>max</sub> <sup>c</sup>	≤ 100 ppm/K
Sensor lead resistance	maximal 30 Ω per line with 3-wire circuit			
Lead compensation	Not required for 3-wire circuit. With a 2-wire circuit, lead calibration can be executed at the respective input by means of an measured value correction with the aid of the "Offset" setting.			

<sup>a</sup> MR: measuring range span

<sup>b</sup> Customer-specific linearization can be used to enter a sensor characteristic line.

<sup>c</sup> R<sub>max</sub>: maximal resistance across the measuring range (400 Ω, or 4000 Ω)

#### Temperature measuring input (IN 5)

Probe/signal type	Connection type	Measuring range	Measuring accuracy	Ambient temperature influence
Pt100 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.05 % of MR <sup>a</sup>	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1 % of MR <sup>a</sup>	≤ 50 ppm/K
Resistance transmitter	3-wire <sup>©</sup>	0 to 100 kΩ	0.5 % of R <sub>Tot</sub> <sup>b</sup>	≤ 100 ppm/K
RTD temperature probes with customer-specific characteristic line <sup>c</sup> up to 400 Ω to 4000 Ω to 100 kΩ	2-wire/3-wire 2-wire/3-wire 2-wire/3-wire	0 to 400 Ω 0 to 4000 Ω 0 to 100 kΩ	≤ 0.1 % of R <sub>max</sub> <sup>d</sup>	≤ 100 ppm/K
NTC 8k55	2-wire/3-wire	0 to 150 °C	≤ 0.1 % of R <sub>max</sub> <sup>d</sup>	≤ 100 ppm/K
NTC 22k	2-wire/3-wire	0 to 150 °C		
Sensor lead resistance	maximal 30 Ω per line with 3-wire circuit			
Lead compensation	Not required for 3-wire circuit. With a 2-wire circuit, lead calibration can be executed at the respective input by means of an measured value correction with the aid of the "Offset" setting.			

<sup>a</sup> MR: measuring range span

<sup>b</sup> R<sub>Tot</sub>: total resistance of the resistance transmitter/Resistance potentiometer

<sup>c</sup> Customer-specific linearization can be used to enter a sensor characteristic line.

<sup>d</sup> R<sub>max</sub>: maximal resistance across the measuring range (400 Ω, 4000 Ω or 100 kΩ)

#### Universal input (IN 6)

Signal type	Measuring range	Measuring accuracy	Ambient temperature influence
Current signal	0(4) to 20 mA	0.1 % of MR <sup>a</sup>	100 ppm/K

<sup>a</sup> MR: measuring range span

#### Measuring circuit monitoring base unit

Inputs	Underrange/overrange
Temperature input	Yes
Universal input (current signal)	Yes

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**Analog inputs optional boards**

**Universal input (IN 11, IN 12)**

Probe/signal type	Connection type	Measuring range	Measuring accuracy	Ambient temperature influence
Pt100 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.05 % of MR <sup>a</sup>	≤ 50 ppm/K
Pt1000 DIN EN 60751	2-wire/3-wire	-200 to +850 °C	≤ 0.1 % of MR <sup>a</sup>	≤ 50 ppm/K
Resistance transmitter	3-wire	100 to 4000 Ω	0.5 % of R <sub>Tot</sub> <sup>b</sup>	≤ 100 ppm/K
RTD temperature probes with customer-specific characteristic line <sup>c</sup> up to 400 Ω to 4000 Ω	2-wire/3-wire 2-wire/3-wire	0 to 400 Ω 0 to 4000 Ω	≤ 0.1 % of R <sub>max</sub> <sup>d</sup>	≤ 100 ppm/K
Voltage signal	-	0 to 10 V	0.2 % of MR <sup>a</sup>	100 ppm/K
Current signal	-	0(4) to 20 mA	0.1 % of MR <sup>a</sup>	100 ppm/K
Sensor lead resistance <sup>e</sup>	maximal 30 Ω per line with 3-wire circuit			
Lead calibration <sup>e</sup>	Not required for 3-wire circuit. With a 2-wire circuit, lead calibration can be executed at the respective input by means of an measured value correction with the aid of the "Offset" setting.			

- <sup>a</sup> MR: measuring range span
- <sup>b</sup> R<sub>Tot</sub>: total resistance of the resistance transmitter/Resistance potentiometer
- <sup>c</sup> Customer-specific linearization can be used to enter a sensor characteristic line.
- <sup>d</sup> R<sub>max</sub>: maximal resistance across the measuring range (400 Ω, or 4000 Ω)
- <sup>e</sup> Specification does not apply for standard signals

**Analysis input: pH/Redox/NH<sub>3</sub>**

Measurand	Measuring range	Temperature compensation	Measuring accuracy	Ambient temperature influence
pH-value (standard electrode)	-2 to +16 pH	-10 to +150 °C	≤ 0.3 % of MR <sup>a</sup>	0.2 %/10 K
pH-value (ISFET electrode)	-2 to +16 pH	through electrode <sup>b</sup>		
Redox voltage	-1500 to +1500 mV	None		
NH <sub>3</sub> (ammonia)	0 to 20000 ppm	-10 to +150 °C		

- <sup>a</sup> MR: measuring range span
- <sup>b</sup> ISFET electrodes supply a temperature-compensated pH-measured value.

**Analysis input: CR (resistive conductivity)**

Units	Display ranges <sup>a</sup>	Temperature compensation	Cell constant	Measuring range toggling <sup>b</sup>	Measuring accuracy	Ambient temperature influence
μS/cm mS/cm kΩ × cm MΩ × cm	0.0000 to 9.9999 00.000 to 99.999 000.00 to 999.99 0000.0 to 9999.9 00000 to 99999	TC-linear, natural water DIN EN 27888, natural water with expanded range, TDS <sup>c</sup> , ASTM D-1125-95 for neutral (NaCl), acid (HCl) and alkali (NaOH) impurities	0.01 to 10 cm <sup>-1</sup>	4 measuring ranges Configurable	≤ 0.6 % of MR <sup>d</sup> +0.3 μS × cell constants (C)	0.2 %/10 K

- <sup>a</sup> The display range is scalable. The Comma format is freely configurable. An automatic decimal place can also be set.
- <sup>b</sup> Up to 4 different measuring ranges with separate display range limits, units, temperature compensation processes, and alarm functions can be configured. The respective active measuring range is selected via binary signals.
- <sup>c</sup> TDS (Total Dissolved Solids)
- <sup>d</sup> MR: measuring range span

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**Analysis input: Ci (conductivity, inductive)**

Units	Measuring/display ranges <sup>a</sup>	Temperature compensation	Cell constant	Measuring range toggling <sup>b</sup>	Measuring accuracy	Ambient temperature influence
µS/cm mS/cm	0.0000 to 9.9999 00.000 to 99.999 000.00 to 999.99 0000.0 to 9999.9 00000 to 99999	TC-linear, <sup>c</sup> TC-curve, natural water, natural water with expanded temperature range, NaOH 0 to 12 %, NaOH 25 to 50 %, HNO <sub>3</sub> 0 to 25 %, HNO <sub>3</sub> 36 to 82 %, H <sub>2</sub> SO <sub>4</sub> 0 to 28 %, H <sub>2</sub> SO <sub>4</sub> 36 to 85 %, H <sub>2</sub> SO <sub>4</sub> 92 to 99 %, HCl 0 to 18 %, HCl 22 to 44 %	4.00 to 8.00 cm <sup>-1</sup>	4 measuring ranges Configurable	for 0 to 999 µS/cm: 1.5 % of MRE <sup>d</sup>  for 1 to 500 mS/cm: 1 % of MRE <sup>d</sup>  for 500.1 to 2000 mS/cm 1.5 % of MBE <sup>d</sup>	0.1 %/K

<sup>a</sup> The display range is scalable. The Comma format is freely configurable. An automatic decimal place can also be set.

<sup>b</sup> Up to 4 different measuring ranges with separate display range limits, units, temperature compensation processes, and alarm functions can be configured. The respective currently active measuring range is selected via binary signals.

<sup>c</sup> TC: temperature coefficient

<sup>d</sup> MRE: Measuring range end value

**Temperature compensations**

Compensation type	Compensation range
Linear TC <sup>a</sup>	-50 to +250 °C
TC curve	-50 to +250 °C
TDS	-50 to +250 °C
natural water according to DIN EN 27888	0 to 36 °C
natural water with expanded temperature range <sup>b</sup>	0 to 100 °C
ASTM D-1125-95 (neutral, alkali, and acid impurities)	0 to 100 °C
NaOH 0 to 12 %	0 to 90 °C
NaOH 25 to 50 %	10 to 90 °C
HNO <sub>3</sub> 0 to 25 %	0 to 80 °C
HNO <sub>3</sub> 36 to 82 %	-20 to +65 °C
H <sub>2</sub> SO <sub>4</sub> 0 to 28 %	-17 to +104 °C
H <sub>2</sub> SO <sub>4</sub> 36 to 85 %	-17 to +115 °C
H <sub>2</sub> SO <sub>4</sub> 92 to 99 %	-17 to +115 °C
HCl 0 to 18 %	10 to 65 °C
HCl 22 to 44 %	-20 to +65 °C

<sup>a</sup> TC: temperature coefficient

<sup>b</sup> The temperature compensation "natural water with expanded temperature range" extends beyond the standardized temperature thresholds of DIN EN 27888.

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**Measuring circuit monitoring, optional boards**

Input/sensor	Underrange/over-range	Short circuit/sensor break	Open circuit	Detection of deposits
pH-value (glass electrode)	Yes	Configurable Impedance measurement <sup>a</sup>	Configurable Impedance measurement <sup>a</sup>	-
pH-value (ISFET)	Yes	No <sup>b</sup>	No <sup>b</sup>	-
Resistive conductivity	Yes	No <sup>b</sup>	Configurable	Only with 4-wire circuit <sup>a</sup>
Inductive conductivity	Yes	No <sup>b</sup>	No <sup>b</sup>	-
Universal input for connection of: voltage/current signal, RTD temperature probe	Yes	No <sup>b</sup>	No <sup>b</sup>	-
Universal input for connection of: resistance transmitter	No <sup>b</sup>	No <sup>b</sup>	No <sup>b</sup>	-

<sup>a</sup> With impedance monitoring and detection of deposit, the sensor alarm is tripped in case of a fault. Monitoring via impedance measurement can also be activated. The following points should be observed to ensure correct function: Impedance measurements are possible only with glass-based sensors. Sensors must be connected directly to an analysis input for pH/redox/NH<sub>3</sub> on the device. Impedance converters must not be installed in the measuring circuit. The maximal admissible cable length between sensor and device is 10 m. Liquid resistance has a direct impact on the measurement result. It is therefore advisable to activate the impedance measurement in liquids from a minimum conductivity of approx. 100 µS/cm.

<sup>b</sup> Errors in the measuring circuit (short circuit or line break) lead to display errors (underrange or overrange or inadmissible value).

**Analog outputs base unit and optional boards**

Signal type	Signal range	Admissible load resistance	Accuracy	Ambient temperature influence
Voltage signal	0 to 10 V	> 500 Ω	≤ 0.25 %	≤ 100 ppm / K
Current signal	0/4 to 20 mA	< 450 Ω	≤ 0.25 %	≤ 100 ppm / K

**Binary inputs base unit**

Description	Input frequency ranges	Min. pulse duration		Signal type	Switching thresholds <sup>a</sup>	
		On	Off		On	Off
IN 1 <sup>b</sup>	≤ 1 Hz	300 ms	300 ms	Configurable as: "Potential-free contact" or "Ext. voltage supply" (maximal 28 V)	> 8 V	< 5 V
IN 2 to 3 <sup>b,c</sup> Switching signal	≤ 1 Hz	30 µs	30 µs		> 1.8 mA	< 1.2 mA
IN 2 to 3 <sup>b,c</sup> Flow	3 to 300 Hz 300 Hz to 10 kHz	30 µs	30 µs			

<sup>a</sup> This specification is relevant only if "Ext. voltage supply" option is selected from the "Contact" option in the Configuration. Sensors and transmitters should be supplied from voltage supply outputs on the HUMO AQUIS touch S. An externally supplied voltage signal must not have a voltage over 28 V.

<sup>b</sup> All binary inputs IN 1 to 3 are suitable for connecting proximity switches. Recommended types are: Wachendorff P2C2B1208NO3A2 and Balluff BES M12EG-PSC80F-BP03.

<sup>c</sup> Binary inputs IN 2 and IN 3 can be used for impeller flow sensors (water meters) or magnetic-inductive flow meters, for example. The input frequency depends on the configured measurement principle in the flow function.

**Binary inputs optional boards**

Max. number of retrofittable binary inputs	Max. pulse frequency	Min. pulse duration		Signal type
		On	Off	
Max. 2 optional boards with 3 binary inputs each	1 Hz	300 ms	300 ms	Potential-free contact

**Binary outputs power supply unit board**

Description	Switching output	Ampacity at resistive load	Contact life <sup>a</sup>

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OUT 1	Relay, normally open contact	3 A at AC 250 V	150,000 switching cycles
OUT 2	Relay, normally open contact		
OUT 3	Relay, changeover contact		

<sup>a</sup> The maximal ampacity of the contacts must not be exceeded.

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**Binary outputs optional boards**

Optional card	Switching output	Max. current	Contact life <sup>a</sup>	Special features
Relay output 2-way Normally open contact	2 normally open con- tacts <sup>b</sup>	3 A at AC 250 V	150,000 switching cy- cles	-
Relay output 1-way changeover contact	1 changeover contact			-
Solid state relay triac	Switching output with triac (protected by Va- ristor) <sup>c</sup>	1 A at AC 230 V	Wear-free	-
Solid state relay PhotoMOS®	Switching output with PhotoMOS®	200 mA at DC 50 V and/or AC 35 V	Wear-free	not short-circuit-proof; max. Voltage DC 50 V AC 35 V
Logic output 0/12 V	High/low signal	20 mA <sup>d</sup>	Wear-free	-
Logic output 0/22 V	High/low signal	30 mA <sup>d</sup>	Wear-free	-

- <sup>a</sup> The maximal ampacity of the contacts must not be exceeded.
- <sup>b</sup> Combining a mains voltage circuit with a protective low-voltage circuit on a 2-way normally open contact option is not admissible.
- <sup>c</sup> A varistor protects the Triac against excessive voltages, such as can occur during switching processes.
- <sup>d</sup> Current limiting via the logic output of the device

**Voltage supply outputs base unit**

Description	Output voltage	Ampacity	Connection
DC 12 V/24 V voltage supply <sup>a</sup> (e.g. for external transmitters)	DC 12 V +15 / -25 %	25 mA	Spring-cage terminals
	DC 24 V +15 / -25 %	30 mA	
DC ±5 V voltage supply (e.g. for IS- FET pH-sensors)	DC +5 V ±15 %	200 mA	
	DC -5 V ±15 %	40 mA	

<sup>a</sup> based on order code

**Voltage supply outputs, power supply unit board**

Description	Output voltage	Total ampacity <sup>a</sup>	Connection
PWR OUT	AC 110 to 240 V +10 / -15 %; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz	4 A	Spring-cage terminals

<sup>a</sup> The sum total of the output currents for the two PWR OUT connections must not exceed the total ampacity.

**Voltage supply outputs, optional board**

Description	Output voltage	Ampacity	Connection
DC 24 V voltage supply (e.g. for external transmitters) <sup>a</sup>	DC 24 V +15 / -25 %	30 mA	Screw terminals
DC ±5 V voltage supply (e.g. for IS- FET pH-sensors)	DC +5 V ±15 % (between terminals 3 and 4)	150 mA	
	DC -5 V ±15 % (between terminals 5 and 4)	30 mA	

<sup>a</sup> An optional board for voltage supply outputs accommodates all the outputs listed in this table. A maximal of 1 such optional board can be integrated into a device.

**Interfaces**

**Serial Interface RS422/485 (base unit and optional board)**

Protocol	Data formats <sup>a</sup>	Device addresses	Baud rates in baud	Connection
Modbus (slave)	8 - 1 - no parity	1 to 254	9600	Base unit: Spring-cage terminals
	8 - 1 - odd parity		19200	
	8 - 1 - even parity		38400	
				Option: Screw terminals

<sup>a</sup> Specification in useful bit - stop bit - parity format. Therefore, the frame always comprises 8 useful bits and 1 stop bit. Only the parity is differentiated.

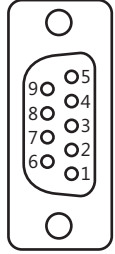
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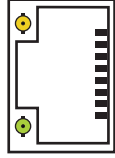


**PROFIBUS-DP (optional board)**

Protocol	Data formats <sup>a</sup>	Device addresses	Baud rates	Connection
DP-V0	Big Endian Little Endian	0 to 127	9.6 kBaud to 12 MBaud	D-sub socket 9-pole 

<sup>a</sup> Big Endian corresponds to the Motorola® data format and Little Endian to Intel® data format.

**Ethernet optional board (10/100Base-T)**

Function	Use	Application protocol/ program	Special features	Connection
Web server	Online-visualization via web browser	HTTP	Editable via HTML Editor	
E-mail/SMS text message <sup>a</sup>	E-mail dispatch via SMTP server Transmission as SMS text mes- sage	SMTP	Five e-mail tem- plates can be stored, up to 3 receivers for each e-mail template	
Modbus TCP/IP	Process data exchange with Modbus users <sup>b</sup>	Modbus TCP/IP	TCP Port: 502	
Automatic IP configuration	Network administration <sup>c</sup>	DHCP	-	
Setup via PC	Device settings via PC setup pro- gram	JUMO PC setup program (HTTP)	-	
Recording function <sup>d</sup>	Extract, archive, evaluate mea- surement data	JUMO PCC and PCA 3000	-	



<sup>a</sup> The e-mail function allows the device, triggered by internal and/or external binary signals, to send hard-programmed messages. This requires the data of an SMTP server (e-mail intermediate server) to be known. The e-mail function can be configured exclusively via the PC setup program.

<sup>b</sup> Modbus TCP/IP enables Modbus users to communicate via a LAN, provided this is connected to the LAN (e.g. via gateways). To configure a Modbus communication, you will require the interface description for the JUMO AQUIS touch S.

<sup>c</sup> Enlist the help of your network administrator or an IT specialist for the IP configuration.

<sup>d</sup> The recording function stores measurement data in a ring buffer inside the device. Further details appear on Page 16.

**USB interfaces base unit**

Interface	Use	Support	Connection	Version
USB host interface	Extract measurement data memo- ry <sup>a</sup> , Read/write device settings, Save service data <sup>b</sup> Update the firmware	USB flash drive	USB port type A 	USB 2.0
USB device interface	Device setting via PC setup pro- gram, Extract, archive, evaluate measurement data	JUMO PC setup program, JUMO PCC/PCA3000 software	USB port type Mini-B 	

<sup>a</sup> The recording function stores measurement data in a ring buffer inside the device. Further details appear on Page 16.

<sup>b</sup> Service data can be stored on a USB flash drive for diagnostic purposes.

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**Electrical data**

Voltage supply (switch-mode)	AC 110 to 240 V +10 / -15 %; 48 to 63 Hz or AC/DC 20 to 30 V; 48 to 63 Hz
Electrical safety	According to EN 61010, part 1 overvoltage category III, pollution degree 2
Max. power consumption AC 110 to 240 V AC/DC 20 to 30 V	53.7 VA 26.2 VA
Data backup	Flash memory
Electrical connection	Spring-cage terminals and screw terminals Specifications for conductor cross sections on Page 17
Electromagnetic compatibility (EMC): Interference emission Interference immunity	DIN EN 61326-1 Class A Industrial requirements

**Screen Touchscreen**

Type	TFT-touchscreen
Touchscreen sensors	Resistive (can also be operated wearing gloves)
Display protection	Plastic film for protection against damage and scratches
Size	5.5"
Resolution	320 × 240 pixel
Color depth	256 colors
Viewing angle	Horizontal: ±70° Vertical: -70 to +50°

**Case**

Case type	Surface-mounted case made of plastic (ABS)
Materials	Terminal compartment cover screws: 1.4567 stainless steel Mounting plate: 1.4301 stainless steel
Dimensions	301.5 mm × 283.2 mm × 120.5 mm
Ambient temperature	-5 to +50 °C on device version with voltage supply AC 110 to 240 V  -5 to +45 °C on device version with voltage supply AC/DC 20 to 30
Storage temperature	-30 to +70 °C
Resistance to climatic conditions	Relative humidity < 92 % annual average, no condensation
Operating position	Any (with due consideration for the viewing angle of the screen)
Degree of protection	According to DIN EN 60529
Closed case	IP67
Open case	IP20
Cable inlets	
Scope of delivery Standard version	Cable glands: 6× M12 × 1.5 3× M16 × 1.5
Full configuration kit (see accessories)	Cable glands: 9× M12 × 1.5 2× M16 × 1.5 2× M20 × 1.5
Weight without holder for wall mounting (fully configured)	3390 g
Weight of holder for wall mounting	790 g
Installation torques for the cable glands	0.7 Nm for M12 × 1.5 2 Nm for M16 × 1.5 2.7 Nm for M20 × 1.5

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**Functions**

**Controller channels**

Quantity	4
Controller type	Two-state controller Three-state controller Continuous controller Coarse/fine controller Three-step controller Continuous controller with position controller
Controller structure	P, PI, PD, PID
Controller outputs	for each controller channel, 2 outputs configurable as: Pulse length output, pulse frequency output (maximal 240 pulses per minute), continuous output
Ena. variable disturbance	multiplicative and/or additive <sup>a</sup>
Autotuning	Step response method
Sampling rate	250 ms

<sup>a</sup> Ena. variable disturbance permits consideration of influencing variables in the process environment beyond the actual value alone. This keeps the controller behavior stable, even when fluctuations in such ambient conditions occur.

**Recording function**

	Data monitor	Recording function (also available)
Number of groups <sup>a</sup>	2	2
Number of input variables per group	4× analog 3× binary	4× analog 3× binary
Recording/memory cycles	1 to 3600 sec.	1 to 3600 sec.
Memory values	Current value Average value Minimum value Maximum value	Current value Average value Minimum value Maximum value
Size of the ring buffer <sup>b</sup>	sufficient for 150 entries <sup>c</sup>	Sufficient for approx. 31 million entries <sup>c</sup>
History function <sup>d</sup>	No	Yes
Archiving/evaluation	No	Yes (via JUMO PCA3000 evaluation software)

<sup>a</sup> A freely configurable set of input variables can be pooled in one group. Each group has its own display screen. The group affiliation is considered for data storage, to enable evaluation via PC.

<sup>b</sup> The measurement data are stored in a ring buffer. When the ring buffer is full, the recording function begins at the start of the ring buffer by overwriting the measured value history.

<sup>c</sup> The specification relates to 4 analog values and 3 binary values per entry and aids orientation. The sum total of both groups is indicated.

<sup>d</sup> The history function allows you to scroll through the diagram to past recording times. All measurement data stored in the ring buffer can therefore be viewed on the device.

**Customer-specific linearization**

Number of support points <sup>a</sup>	up to 40 value pairs
Interpolation <sup>b</sup>	Linear
Formula entry <sup>c</sup>	4th degree polynomial

<sup>a</sup> Inputting support points (value pairs of the customer-specific characteristic line) enables an approximate characteristic line to be entered.

<sup>b</sup> Linear interpolation means the formation of a slope function through 2 support points.

<sup>c</sup> As an alternative to input support points, a customer-specific characteristic line can be entered as a formula in the form of a polynomial.

**Approvals/approval marks**

Approval mark	Testing agency	Certificates / certification numbers	Inspection basis	valid for
	Underwriters Laboratories	registered	UL 61010-1 CAN/CSA-C22.2 No. 61010-1	Type 202581/...

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## Connection diagram

The connection diagram in the data sheet provides preliminary information about the connection possibilities. For the electrical connection, only the installation instructions or the operating manual should be used. The knowledge and the correct technical execution of the safety information/instructions contained in these documents are mandatory for installation, electrical connection, startup, and for safety during operation.

### Important information on conductor cross-sections and ferrules

Ferrule	Conductor cross-section		Minimum length of ferrule or stripping
	minimal	maximal	
without ferrule			
Power supply unit	0.2 mm <sup>2</sup>	1 mm <sup>2</sup>	8 mm
Base unit	0.2 mm <sup>2</sup>	1 mm <sup>2</sup>	8 mm
with ferrule without lip			
Power supply unit	0.25 mm <sup>2</sup>	0.75 mm <sup>2</sup>	8 mm
Base unit	0.25 mm <sup>2</sup>	0.75 mm <sup>2</sup>	8 mm
with ferrule with lip			
Power supply unit	0.25 mm <sup>2</sup>	0.75 mm <sup>2</sup>	8 mm
Base unit	0.25 mm <sup>2</sup>	0.75 mm <sup>2</sup>	8 mm
Rigid			
Power supply unit	0.2 mm <sup>2</sup>	1.5 mm <sup>2</sup>	8 mm
Base unit	0.2 mm <sup>2</sup>	1.5 mm <sup>2</sup>	8 mm

### Conductor cross-sections for optional boards

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

Optional boards for	Ferrule	Conductor cross-section		Length to strip
		minimal	maximal	
Universal inputs	without ferrule	0.14 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Analog outputs	with ferrule with lip	0.25 mm <sup>2</sup>	0.5 mm <sup>2</sup>	7 mm
Binary inputs				
Binary outputs PhotoMOS®	Ferrule without lip	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Logic outputs				
Voltage supply output	Rigid	0.14 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Analysis input pH/redox/NH <sub>3</sub>	without ferrule	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
CR analysis inputs <sup>a</sup>	with ferrule with lip	0.25 mm <sup>2</sup>	1.5 mm <sup>2</sup>	7 mm
Analysis inputs Ci <sup>b</sup>				
Binary outputs relay	Ferrule without lip	0.25 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm
Binary outputs triac	Rigid	0.2 mm <sup>2</sup>	2.5 mm <sup>2</sup>	7 mm

<sup>a</sup> CR analysis inputs = Analysis inputs for resistive conductivity

<sup>b</sup> Analysis inputs Ci = Analysis inputs for inductive conductivity

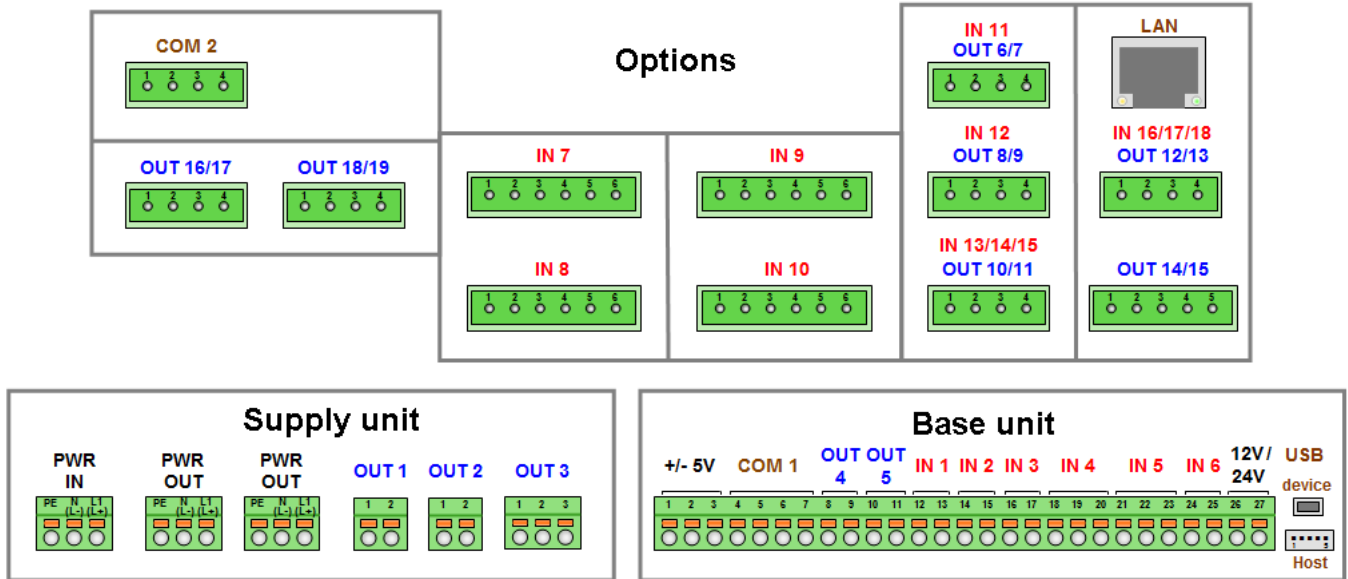
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**Connection overview**



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

<sup>a</sup> The desired output voltage must be stated on the order (see order details).

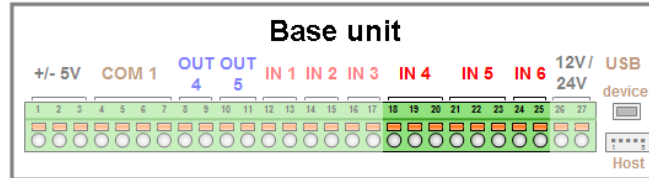
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**Analog inputs base unit**



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

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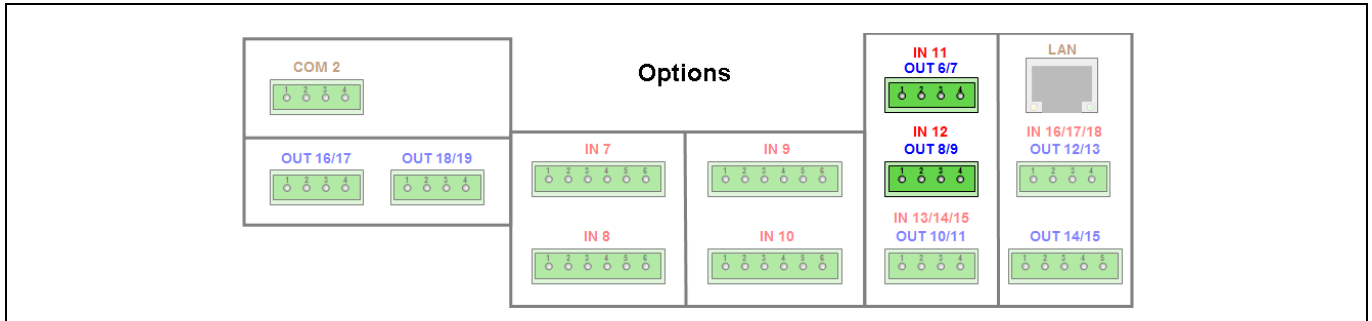
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**Analog inputs optional boards**

**Universal inputs**



Slot	Connection variant	Symbol
IN 11 IN 12	RTD temperature probe 2-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	RTD temperature probe 3-wire circuit Pt100, Pt1000 or customer-specific characteristic line	
	Resistance transmitter A = Start E = End S = Slider	
	Standard signal Voltage 0 to 10 V	
	Standard signal Current 0(4) to 20 mA	

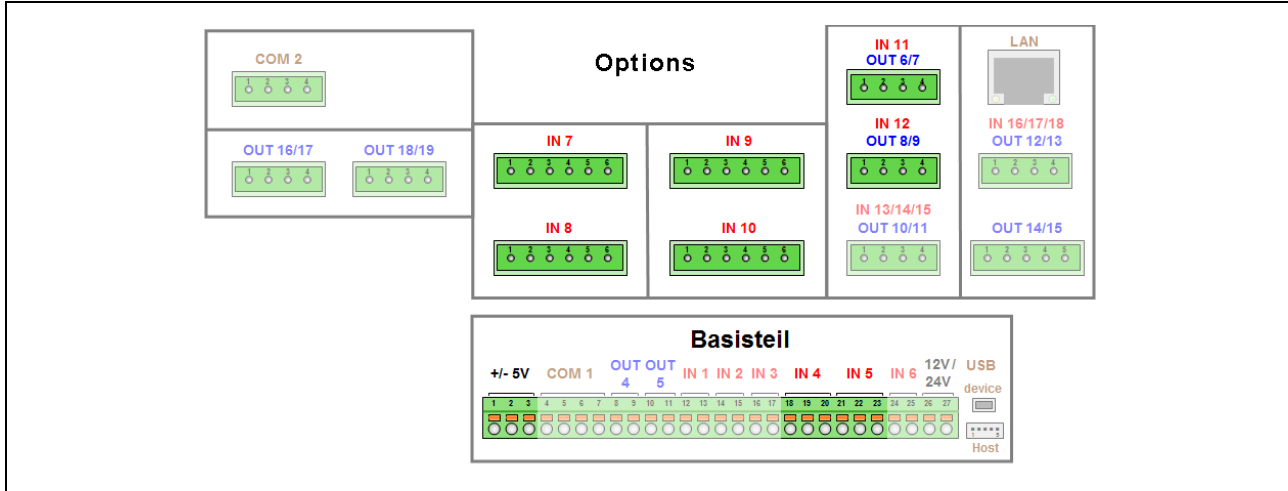
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**Analysis inputs**



Slot	Option/connection variant	Wire (color) <sup>a</sup>	Potential	Terminal			Symbol	
				DC ±5 V	Temperature input	Analysis input pH/redox		
IN 7 IN 8 IN 9 IN 10	ISFET-pH sensor	A (blue)	DC +5 V	1				
		B (black)	GND supply	2				
		C (green)	DC -5 V	3				
		D (white/black)	Ion-sensitive gate			1		
		E	Bypass			3		
		F (shield)	Reference			5		
		G (white)	Compensation thermometer in 3-wire circuit					6
		H (red)						
		I (red/black)						
				Connection <sup>b</sup> 				
The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input. <sup>c</sup> The connection terminal numbers are provided on the connection diagram for the selected analog input.								

<sup>a</sup> The specified wire colors relate to JUMO ISFET-pH sensors.

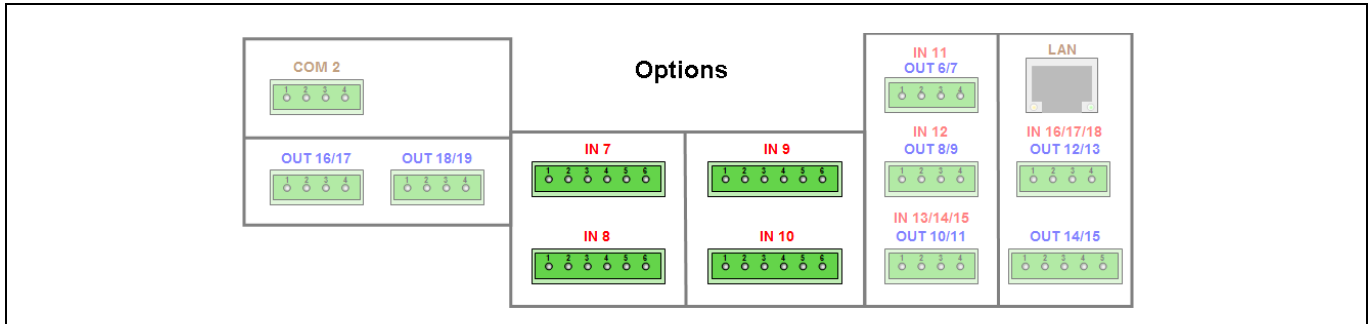
<sup>b</sup> The connection diagram for the analog input concerned must be observed when connecting the temperature probe.

<sup>c</sup> When connecting the temperature probe of the JUMO ISFET-pH sensor with process connection 615 (NTC 8k55), no customer-specific linearization is required as it is with the JUMO AQUIS 500 pH. The temperature input IN 5 supports the connection of 8k55-NTC temperature sensors.

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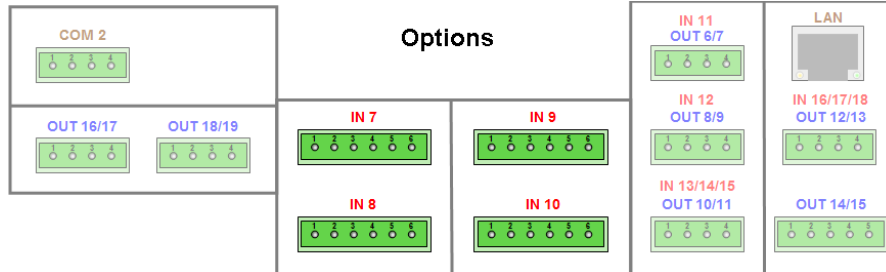


Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	<p>pH/redox  <b>Asymmetric connection of a combination electrode</b>            Standard connection variant            For temperature compensation, a separate temperature sensor can be connected to an analog input.</p> <p>A = Glass/metal electrode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

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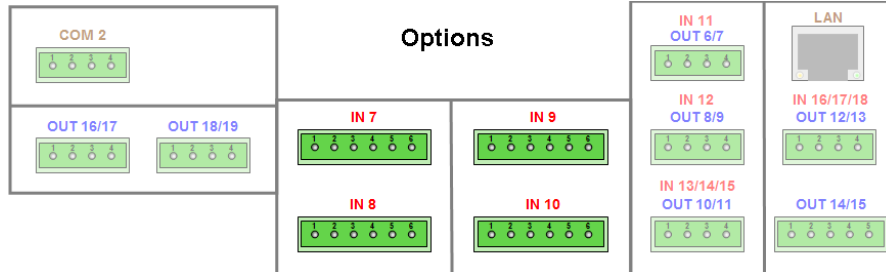


Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	<p>pH/redox</p> <p><b>Asymmetric connection of a combination electrode with integrated RTD temperature probe and VarioPin terminal head</b></p> <p>The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input.</p> <p>A = Glass/metal electrode (core)            B = Reference electrode (inner shield)            C = Shield (outer shield)            D = RTD temperature probe            E = RTD temperature probe            F = RTD temperature probe</p> <p>Terminal 2 is not connected!</p>	

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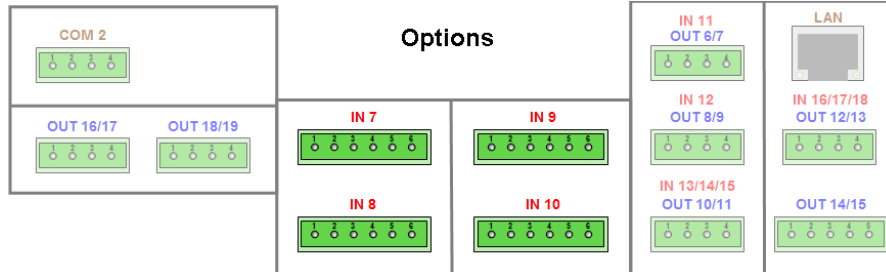


Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	<p>pH/redox  <b>Symmetric connection of a combination electrode</b>            Symmetric connection is used to reduce interference from stray electromagnetic fields along the sensor cable.</p> <p>A = Glass/metal electrode (core)            B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

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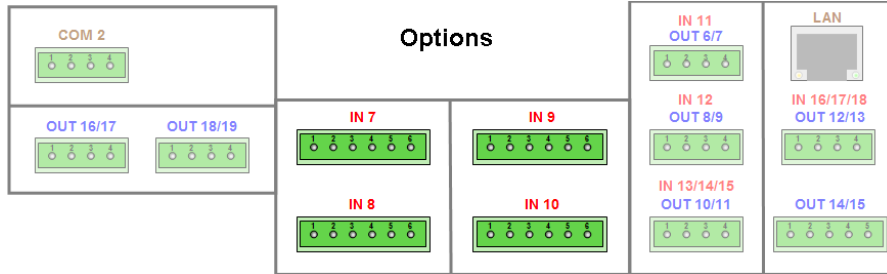


Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	<p>pH/redox</p> <p><b>Symmetric connection of a combination electrode with integrated RTD temperature probe and VarioPin terminal head</b></p> <p>Symmetric connection is used to reduce interference from stray electromagnetic fields along the sensor cable.</p> <p>The RTD temperature probe is used to provide a temperature-compensated pH-value measurement, and can be connected to a temperature input or universal input.</p> <p>A = Glass/metal electrode (core)            B = Reference electrode (inner shield)            C = Liquid potential (grounding pin, pipe, or container wall at the measuring point)            D = Shield (outer shield)            E = RTD temperature probe            F = RTD temperature probe            G = RTD temperature probe            Terminal 2 is not connected!</p>	

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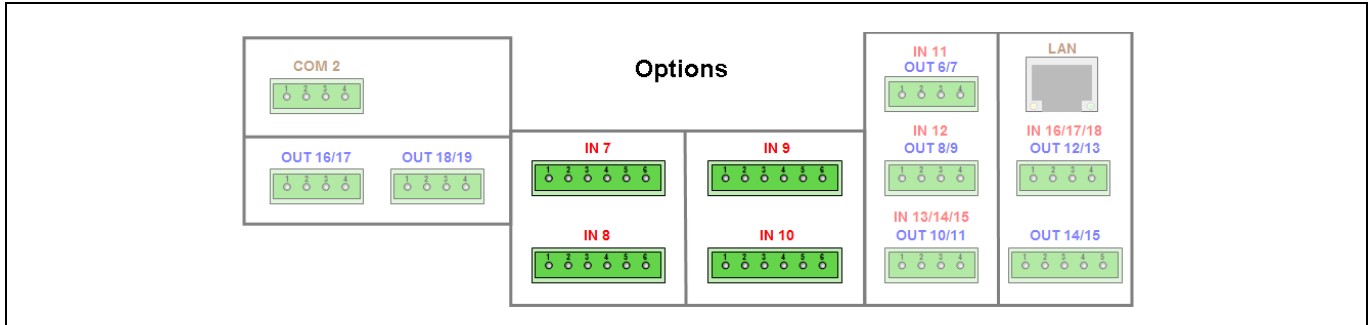


Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	<p>Ci optional board (inductive conductivity measurement)            Connection via M12 connector,            connect compensation thermometer connections            (2-core cable of connection socket) to a            suitable analog input (2-wire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

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Slot	Option/connection variant	Symbol
IN 7 IN 8 IN 9 IN 10	<p>CR optional board (resistive conductivity measurement)            4-electrode system</p> <p>A = Outer electrode 1 (I hi) (core color of CR-4P cable for JUMO types: Red)            B = Inner electrode 1 (U hi) (core color of CR-4P cable for JUMO types: Gray)            C = Inner electrode 2 (U lo) (core color of CR-4P cable for JUMO types: Pink)            D = Outer electrode 2 (I lo) (core color of CR-4P cable for JUMO types: Blue)            E = Shield</p>	



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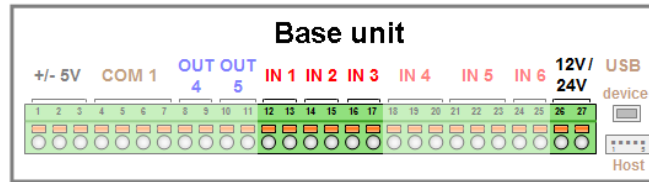
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**Binary inputs**

**Base unit**



Conne- tor/ terminal	Connection variant	Wire	Potential	Terminal			Symbol	
				12 V/ 24 V <sup>a</sup>	IN 1	IN 2		IN 3
IN 1 to 3	Binary input (potential-free contact)	A	Potential-free contact		12	14	16	
		B			13	15	17	
In the binary input configuration, the "Contact" option must be set to "Potential-free contact".								
	Binary input (logic signal)	A	Logic signal +		12	14	16	
		B	Logic signal -		13	15	17	
In the binary input configuration, the "Contact" option must be set to "Ext. voltage supply".								
	Binary input (NPN transistor switching output) <sup>b</sup>	A	Sensor +	26				
		B	Sensor -	27				
		C	Switching signal (collector)		12	14	16	
		D	Sensor -		13	15	17	
In the binary input configuration, the "Contact" option must be set to "Potential-free contact".								
	Binary input (PNP transistor switching output) <sup>b</sup>	A	Sensor +	26				
		B	Sensor -	27				
		C	Switching signal (collector)		12	14	16	
		D	Sensor -		13	15	17	
In the binary input configuration, the "Contact" option must be set to "Ext. voltage supply".								

<sup>a</sup> The voltage supply output on the base unit is available for the DC 24 V or DC 12 V voltage supply to sensors (see order details).

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

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**Optional boards**

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

**Binary outputs**

**Power supply unit board**

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

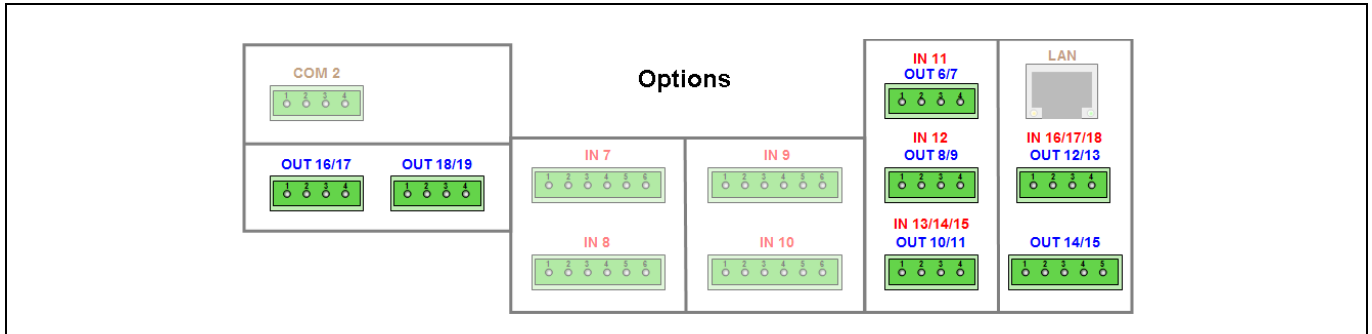
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**Optional boards**



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

<sup>a</sup> Combining a mains voltage circuit with a protective low-voltage circuit on a 2-way normally open contact option is not admissible.

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**Mains power connection**

<div style="text-align: center;"> <p><b>Supply unit</b></p> </div>		
Connector/terminal	Connection variant	Symbol
PWR IN	Mains power input	L1 ————○ L1 N ————○ N PE ————○ PE

**Voltage supply outputs**

**Base unit**

<div style="text-align: center;"> <p><b>Base unit</b></p> </div>		
Connector/terminal	Connection variant	Symbol
DC ±5 V	Voltage supply for ISFET sensors	+ ————○ 1 U <sub>=</sub> - ————○ 2
DC 12 V/24 V	Voltage supply for external transmitters 12 V/24 V (see order details)	+ ————○ 26 U <sub>=</sub> - ————○ 27

**Power supply unit board**

<div style="text-align: center;"> <p><b>Supply unit</b></p> </div>		
Connector/terminal	Connection variant	Symbol
PWR OUT	Mains voltage lead out	L1 ————○ L1 N ————○ N PE ————○ PE

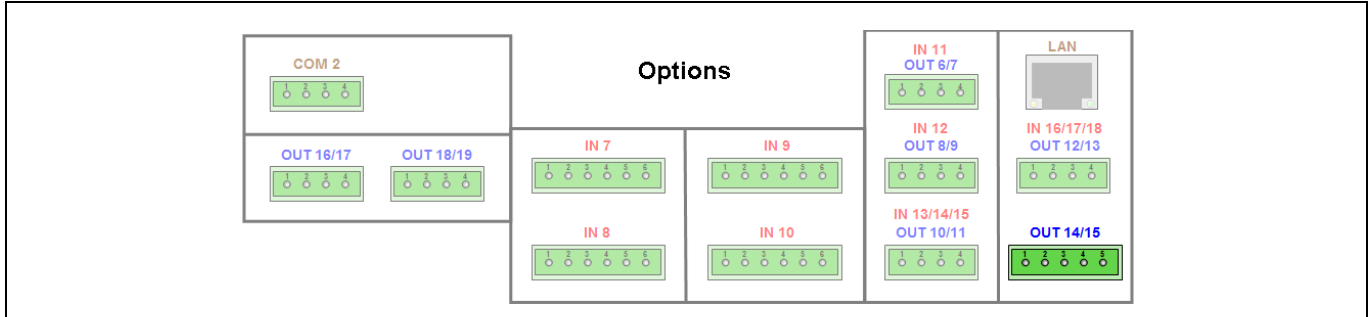
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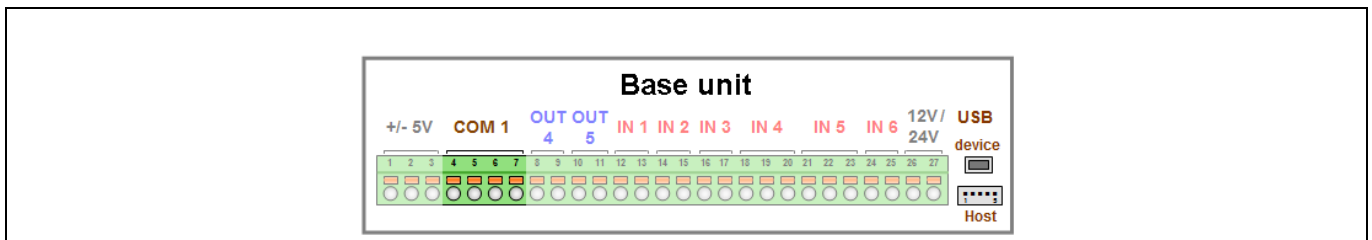
**Optional board**



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

**Interfaces**

**Base unit**



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

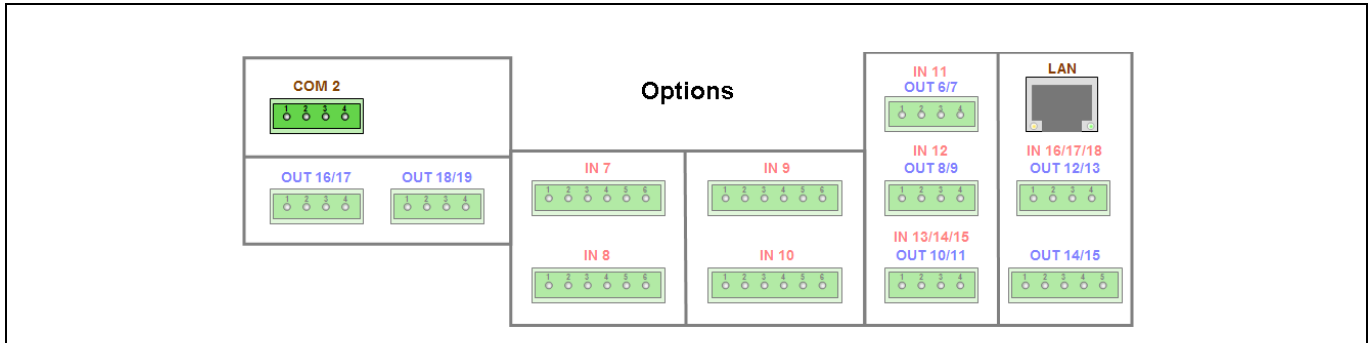
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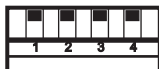
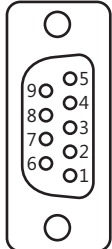
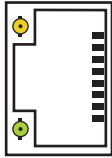
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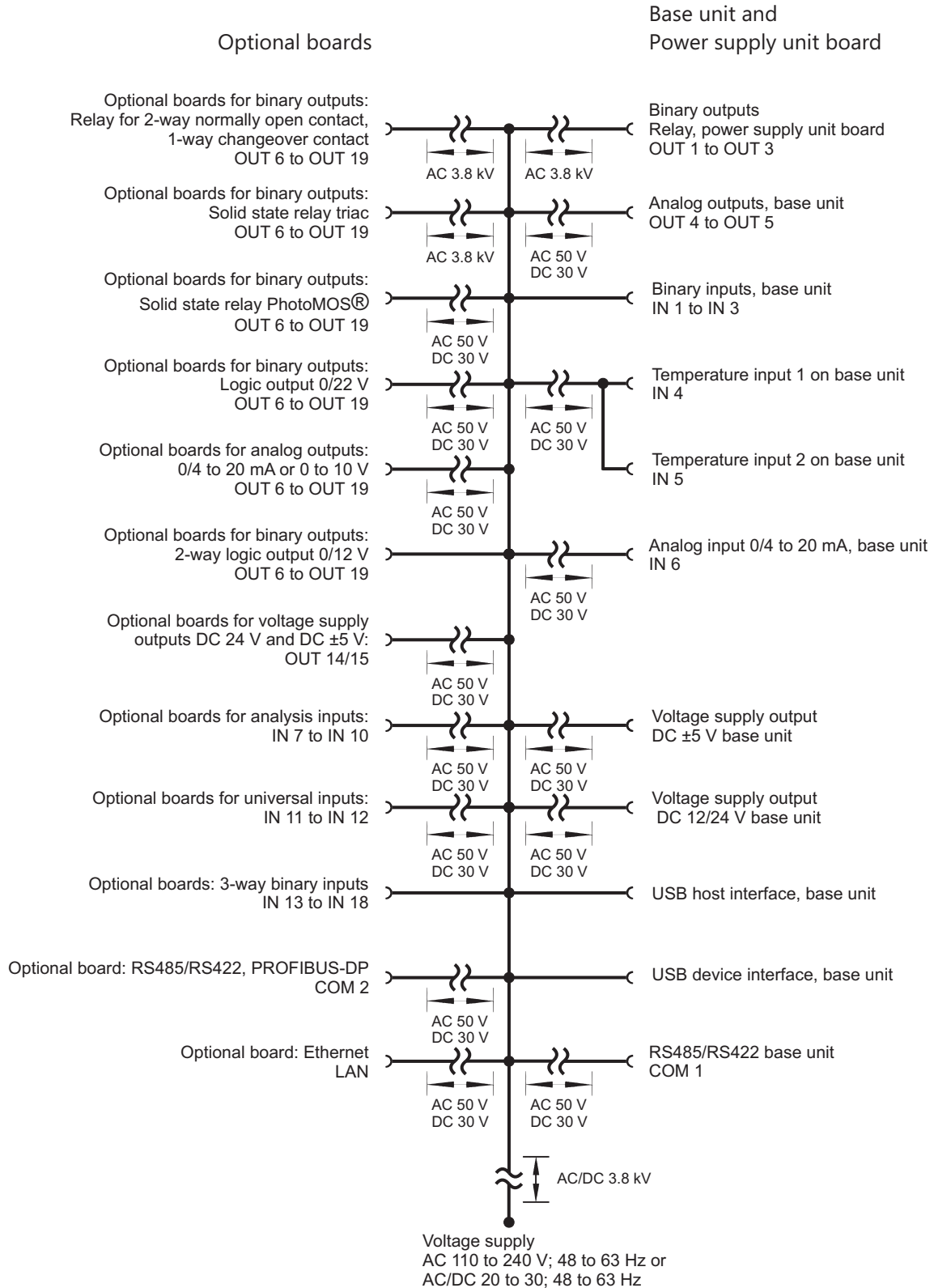
**Optional boards**



Slot	Connection variant	Terminating resistors	Symbol
COM 2	RS422  The terminating resistors with DIP switches on optional boards Configurable	with terminating resistors 	RxD+ —○ 1 RxD- —○ 2 TxD+ —○ 3 TxD- —○ 4
	RS485  The terminating resistors with DIP switches on optional boards Configurable	without terminating resistors 	RxD/TxD+ —○ 3 RxD/TxD- —○ 4
	PROFIBUS-DP 3 = RxD/TxD-P 5 = DGND 6 = VP 8 = RxD/TxD-N	-	
LAN	Ethernet Type RJ-45 (socket)	-	



## Galvanic isolation



### Warning:

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

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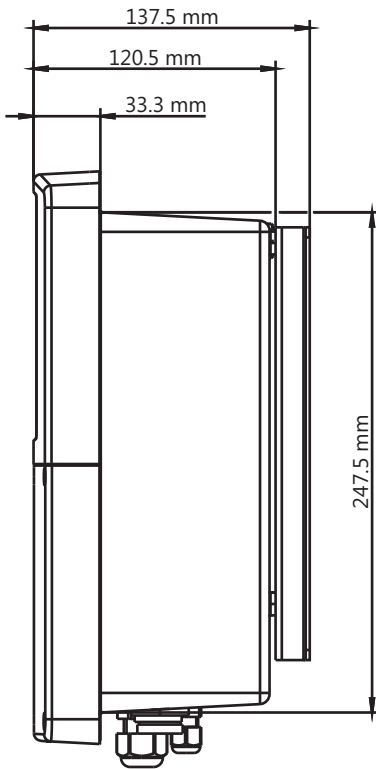
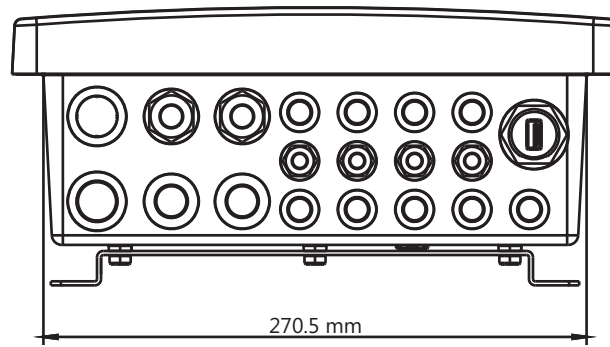
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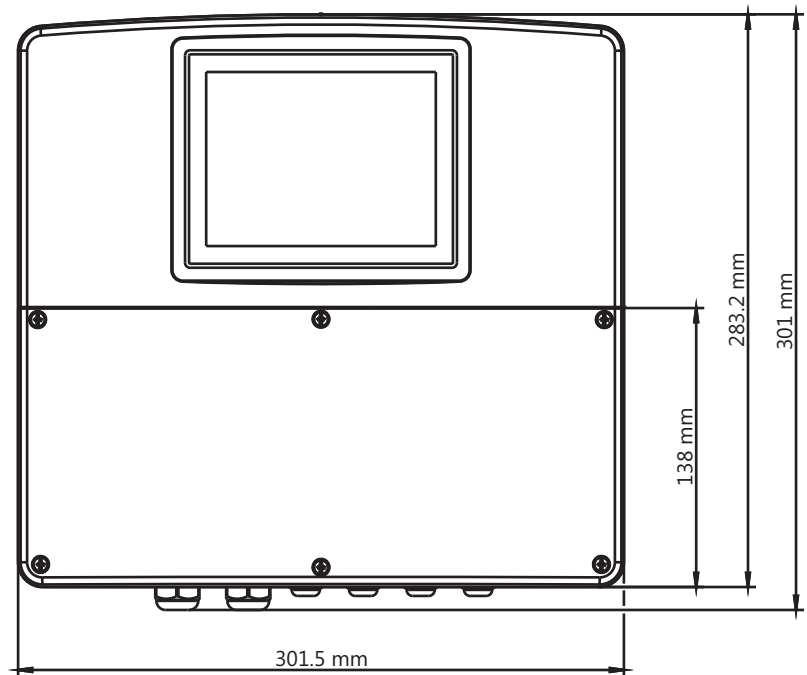


## Dimensions

View from below  
(cable entries)

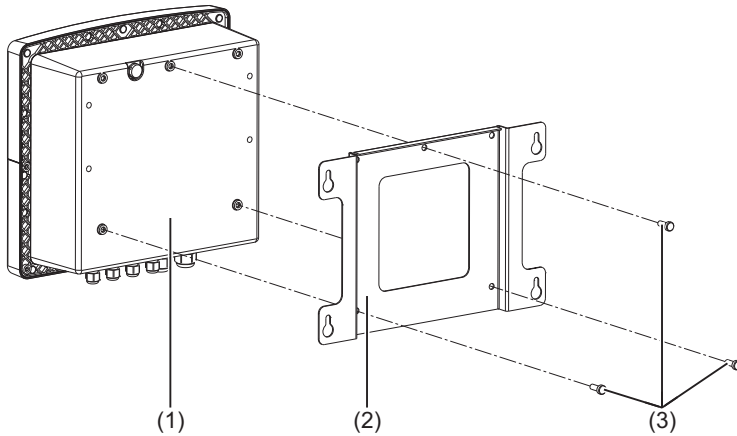


Side view

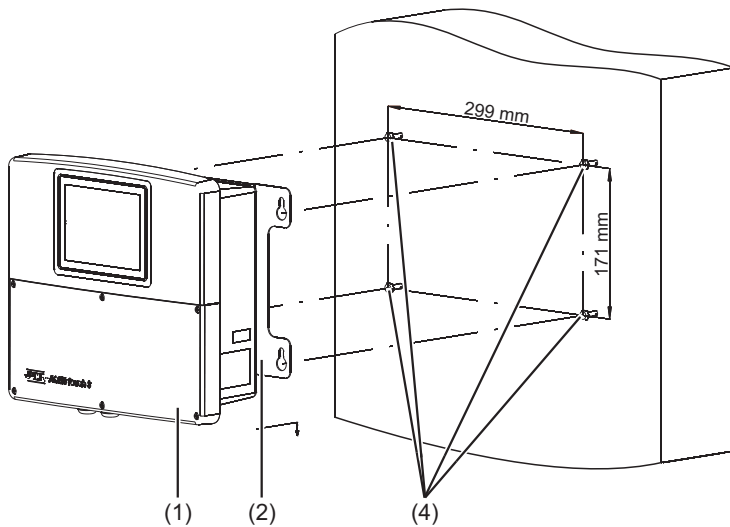
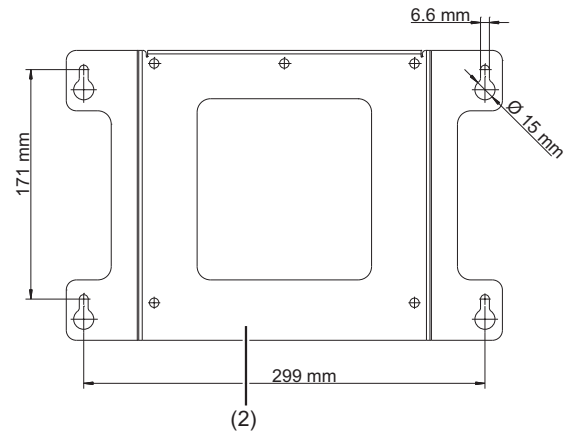


Front view

## Surface mounting

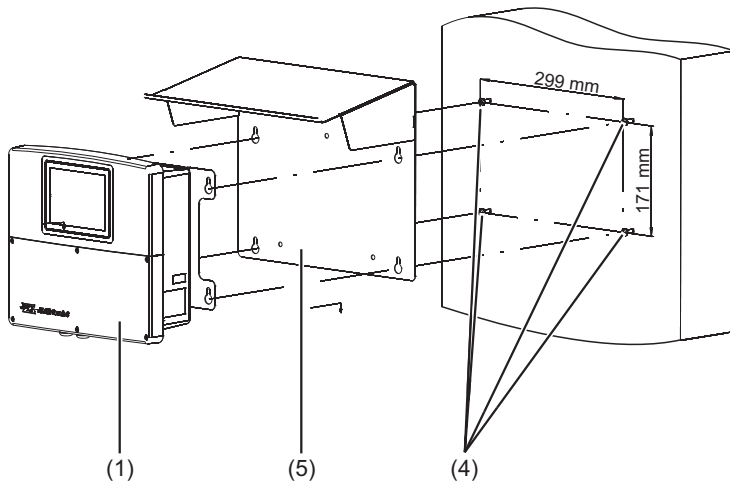


## Drilling diagram



- (1) JUMO AQUIS touch S
- (2) Mounting plate
- (3) Self-tapping screws 60 × 16 TORX PLUS® 30IP (from the JUMO AQUIS touch S accessories pouch)
- (4) Fastening screws (hex-headed screws Ø 6 mm)
- (5) Weather protection canopy (part no. 00602504)

## Surface mounting with weather protection canopy



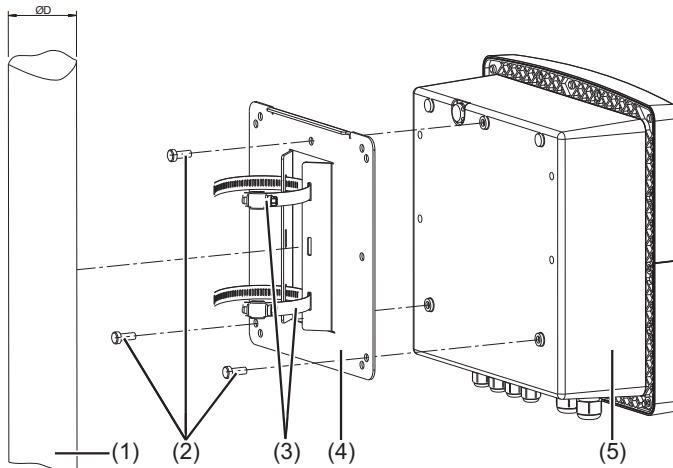
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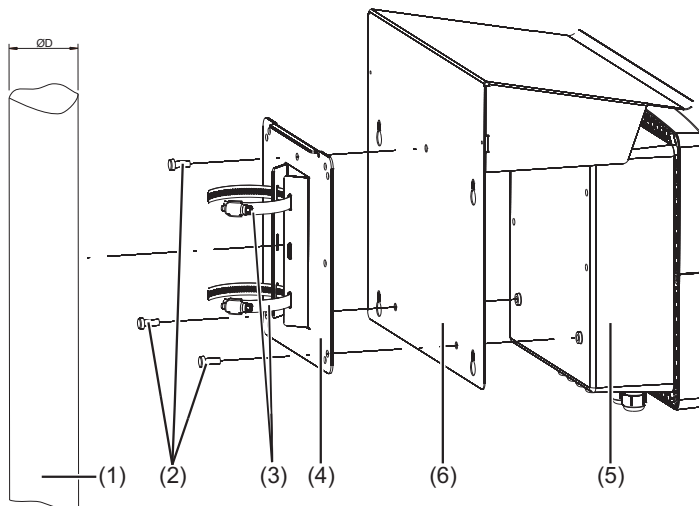


## Pipe mounting



- (1) Pipe/mast (customer provision) with a diameter of 35 to 55 mm
- (2) Self-tapping screws 60 × 16 TORX PLUS® 30IP (from the AQUIS touch S accessories pouch)
- (3) Pipe clips from the pipe mounting kit (part no. 00602401)
- (4) Mounting plate for pipe mounting from the pipe mounting kit (part no. 00602401)
- (5) JUMO AQUIS touch S
- (6) Weather protection canopy (part no. 00602504)

## Pipe mounting with weather protection canopy



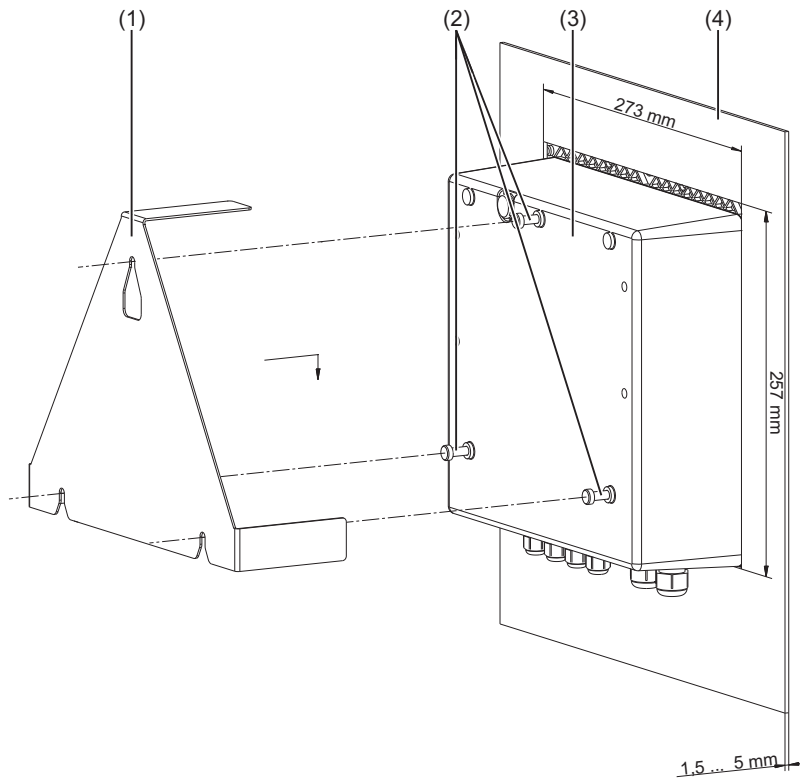
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## Installation in a control panel



- (1) Fastening bracket from the panel mounting kit (part no. 00602403)
- (2) Self-tapping screws 60 × 16 TORX PLUS® 30IP (from the JUMO AQUIS touch S accessories pouch)
- (3) JUMO AQUIS touch S
- (4) Panel with device cutout 273 mm × 257 mm; max. material thickness of panel: 5 mm

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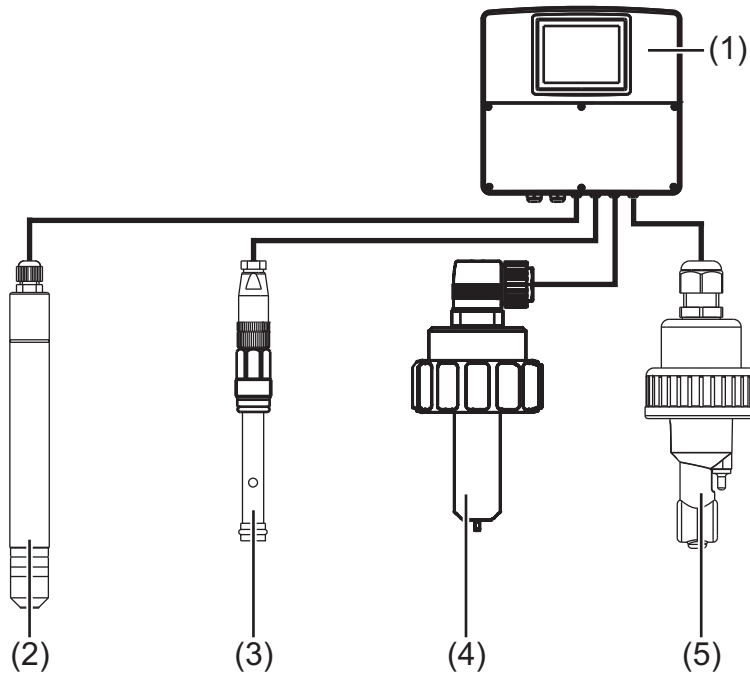
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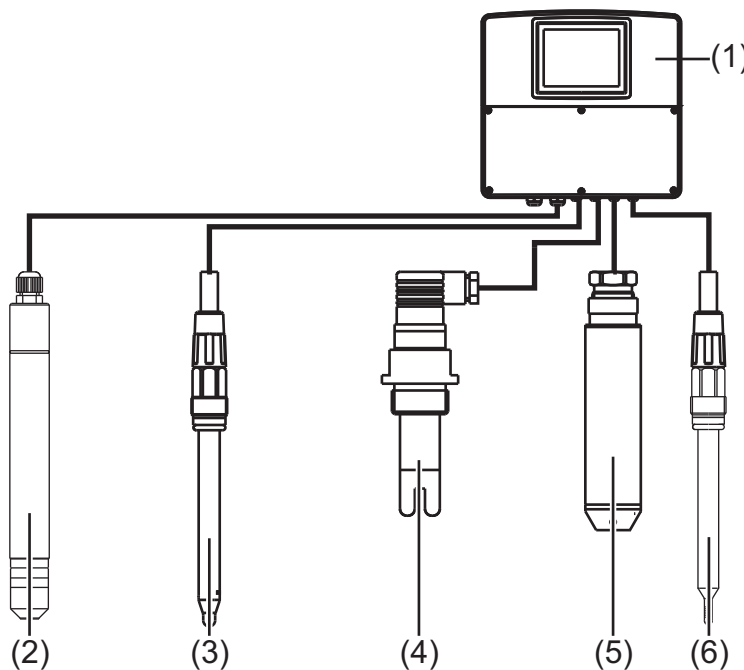
## Application examples

### Cooling tower control



- (1) JUMO AQUIS touch S
- (2) Chlorine electrode (tecLine)
- (3) Flow monitor
- (4) Impeller sensor for flow measurement, Type 406020
- (5) Conductivity sensor (inductive)

### Drinking water monitoring



- (1) JUMO AQUIS touch S
- (2) Chlorine electrode (tecLine)
- (3) pH-single rod measuring chain
- (4) Conductivity sensor (conductive)
- (5) Level measurement probe
- (6) Compensation thermometer, type 201085

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**Order details**

		Slot
<b>(1) Basic type</b>		
202581	JUMO AQUIS touch S	
<b>(2) Version</b>		
8	Standard with factory settings	
9	Customer-specific configuration (specification in plain text)	
<b>(3) Language</b>		
01	German	
02	English	
03	French	
<b>(4) Analysis input 1</b>		<b>IN 7</b>
0	Not used	
1	pH/redox/NH <sub>3</sub>	
2	CR resistive conductivity measurement (2 and 4-pole)	
3	Ci inductive conductivity measurement	
<b>(5) Analysis input 2</b>		<b>IN 8</b>
0	Not used	
1	pH/redox/NH <sub>3</sub>	
2	CR resistive conductivity measurement (2 and 4-pole)	
3	Ci inductive conductivity measurement	
<b>(6) Analysis input 3</b>		<b>IN 9</b>
0	Not used	
1	pH/redox/NH <sub>3</sub>	
2	CR resistive conductivity measurement (2 and 4-pole)	
3	Ci inductive conductivity measurement	
<b>(7) Analysis input 4</b>		<b>IN 10</b>
0	Not used	
1	pH/redox/NH <sub>3</sub>	
2	CR resistive conductivity measurement (2 and 4-pole)	
3	Ci inductive conductivity measurement	
<b>(8) Input/output 1</b>		<b>IN 11, OUT 6/7</b>
00	Not used	
10	Universal input	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	Analog output	
17	2× solid state relay PhotoMOS®	
<b>(9) Input/output 2</b>		<b>IN 12, OUT 8/9</b>
00	Not used	
10	Universal input	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	Analog output	
17	2× solid state relay PhotoMOS®	

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Internet: www.jumousa.com



<b>(10) Input/output 3</b>		<b>IN 13/14/15, OUT 10/11</b>
00	Not used	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	Analog output	
17	2× solid state relay PhotoMOS®	
18	3× binary inputs	
<b>(11) Input/output 4</b>		<b>IN 16/17/18, OUT 12/13</b>
00	Not used	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	Analog output	
17	2× solid state relay PhotoMOS®	
18	3× binary inputs	
<b>(12) Output 5</b>		<b>OUT 14/15</b>
00	Not used	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	Analog output	
17	2× solid state relay PhotoMOS®	
19	Voltage supply output DC ±5 V, 24 V	
<b>(13) Output 6</b>		<b>OUT 16/17</b>
00	Not used	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	Analog output	
17	2× solid state relay PhotoMOS®	
<b>(14) Output 7</b>		<b>OUT 18/19</b>
00	Not used	
11	Relay (changeover contact)	
12	2× relays (normally open contact)	
13	Solid state relay triac 230 V, 1 A	
14	Logic output 0/22 V	
15	2× logic outputs 0/12 V	
16	Analog output	
17	2× solid state relay PhotoMOS®	
<b>(15) Voltage supply</b>		
23	AC 110 to 240 V +10/-15 %; 48 to 63 Hz	
25	AC/DC 20 to 30 V; 48 to 63 Hz	

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<b>(16) Interface Com2</b>		<b>COM 2</b>
00	Not used	
54	RS422/485 Modbus RTU	
64	PROFIBUS-DP	
<b>(17) Interface Com3</b>		<b>LAN</b>
00	Not used	
08	Ethernet	
<b>(18) Voltage output</b>		
1	DC 12 V	
2	DC 24 V	
<b>(19) Extra code</b>		
000	without extra code	
213	Recording function	
214	Math and logic module	
269	USB host socket (IP67)	

**Order code:**     (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19)  
 /  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  -  /  , ...<sup>a</sup>  
**Order example:** 202581 / 8 - 01 - 1 - 2 - 0 - 0 - 10 - 10 - 13 - 13 - 11 - 11 - 11 - 23 - 64 - 00 - 1 / 213 , 214

<sup>a</sup> List all desired extra codes separated by commas.

## Scope of delivery

JUMO AQUIS touch S according to order details
Mini-DVD with JUMO PC setup program as demo version, Adobe Acrobat Reader, operating manual and data sheet in PDF format, GSD generator and JUMO PCC / PCA3000 as demo version
Accessories kit JUMO AQUIS touch S part no. 00597460
Mounting plate for surface mounting part no. 00597799
Installation instructions in 2 volumes B 202581.4

## Accessories

Order code	Type	Part no.
703571 (20258x)/10	Universal input	00581159
703571 (20258x)/213	Activation of the recording function	00581176
703571 (20258x)/214	Activate math and logic module	00581177
703571 (20258x)/11	Binary output relay (changeover contact)	00581160
703571 (20258x)/12	Binary outputs 2x relay (normally open contact)	00581162
703571 (20258x)/13	Solid state relay triac 230 V, 1 A	00581164
703571 (20258x)/14	Logic output 0/22 V	00581165
703571 (20258x)/15	2x logic output 0/12 V	00581168
703571 (20258x)/16	Analog output	00581169
703571 (20258x)/17	Binary outputs 2x solid state relays PhotoMOS®	00581171
703571 (20258x)/54	Serial interface RS422/485 for Modbus RTU	00581172
703571 (20258x)/64	PROFIBUS-DP	00581173
703571 (20258x)/08	Ethernet	00581174
20258x/3	Analysis input Ci for inductive conductivity	00584265
20258x/2	Analysis input CR for resistive conductivity	00584263
20258x/1	Analysis input pH/redox/NH <sub>3</sub>	00584264
20258x/18	Binary inputs 3x potential-free contact	00592962
20258x/19	Voltage supply output DC ±5 V, 24 V	00592963
202581/269	USB host socket (IP67)	00608741
	Ethernet RJ-45 connector for self-assembly (4-pole) (PG209791)	00594813

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Order code	Type	Part no.
	USB flash drive 2.0 (1 GB) <sup>a</sup>	00505592
	USB cable, A-connector on mini B-connector, length 3 m	00506252
	Full configuration kit, cable glands	00597461
	Panel mounting kit	00602403
	Pipe-mounting kit	00602401
	Protective roof kit	00602404
	JUMO PC setup program AQUIS touch S/P, (PG202599)	00594355
	JUMO PCA3000/PCC software package <sup>b</sup>	00431884

<sup>a</sup> The USB flash drive indicated has been tested and is designed for industrial applications. No liability is assumed for other brands.

<sup>b</sup> Communication and evaluation software for stored recording function measurement data

## Notes on the trademark

PhotoMOS® is a registered trademark of Panasonic.

Motorola® is a registered trademark of Motorola Trademark Holdings, LLC, Libertyville, US

Intel® is a registered trademark of Intel Corp., Santa Clara California, US

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# JUMO dTRANS O2 01 Two-wire Transmitter for dissolved oxygen (DO)

with optional terminal box or operating unit

## Type 202610

### Brief description

The JUMO dTRANS O2 01 two-wire transmitter is used for the measurement of dissolved oxygen in aqueous solutions. It provides an electrically isolated 4 to 20 mA output signal corresponding to the oxygen content. The instrument can be configured through a setup program or from a terminal box/operating unit (available as an option). The temperature of the medium can be acquired through a Pt1000 in the two-wire transmitter and further processed (from the standard version and above, also as 4 to 20 mA two-wire signal).

The measurement is made with an electrochemical, membrane-covered sensor. The microprocessor circuit incorporated in the two-wire transmitter takes account of the temperature, atmospheric pressure and salinity (salt content) factors.

The sensor is of modular design and is easy to maintain and replace.

#### Typical areas of application

- Municipal and industrial sewage-treatment plants
- Drinking water monitoring
- Prevention of water pollution
- Fish farming (fresh and salt water)
- Processing plants

### Versions and delivery package

#### Basic version

- Two-wire transmitter  
JUMO dTRANS O2 01
- 8 m attached cable
- Terminal box (IP65) with button for calibration

The basic version is designed for direct connection to a PLC or a recording instrument. The calibration function can be initiated locally. The transmitter can be configured through the setup program (available as an option).

The supply to the two-wire transmitter is provided by a separate power supply (optional), e.g. JUMO TN-22, see Data Sheet 707500.

The JUMO dTRANS Az 01 (Data Sheet 202550), with bezel size 96 mm × 48 mm, is a suitable indicator/controller for the basic version. This instrument is recommended where there is no requirement for a direct connection to a PLC or recording instrument.

The JUMO dTRANS Az 01 can also provide the supply required for the two-wire transmitter.

#### Standard version

As for the basic version, but with an operating unit (instead of the terminal box) that has a display and additional operating keys. The supply for the two-wire transmitter and the operating section is provided by an (optional) separate power supply, e.g. JUMO TN-22, see Data Sheet 707500. An additional power supply (e.g. JUMO TN-22) is required for the optional two-wire transmitter for temperature. The instrument is operated from the membrane keypad. Operator guidance in plain text ensures that operation is easy to understand. The dTRANS O2 01 is configured via the operating unit.

#### Maximum version

As for the standard version. In addition, the operating unit has its own power supply for the oxygen and temperature two-wire transmitters, a signal output (4 to 20 mA) for temperature, and two freely programmable relays for alarm functions and limit control. This version features a backlit display.



Two-wire transmitter  
JUMO dTRANS O2 01



Optional operating unit

### Key features

- Measurement of dissolved oxygen (DO) in aqueous solutions
- Safe single-point calibration
- Two-wire transmitter (with basic and standard versions)
- Electrical isolation of measurement signal (DO) and output signal (mA)
- Problem-free linking to an existing installation (e.g. PLC)
- The full (maximum) version provides a stand-alone solution
- Compensation of temperature, atmospheric pressure and salinity
- Further processing of the temperature of the medium possible (separate Pt1000 and two-wire transmitter)
- Setup program provides convenient transmitter configuration/documentation
- Simpler, safer servicing by replacing modules
- Backlit display, i.e. easy to read even in darkness (for the maximum version)
- Comprehensive range of accessories

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## Technical data

### General

#### Supply

Basic version Type 202610/80 and standard version Type 202610/81 DC 19 to 31 V; nominal DC 24 V  
 Maximum version Type 202610/82 AC 110 to 240 V +10/-15 %, 48 to 63 Hz or AC/DC 20 to 30 V, 48 to 63 Hz  
 Power drawn: approx. 8 VA

**Permissible ambient temperature**  
 -5 to +50 °C

**Cable length between oxygen transmitter and indicator/operating unit**  
 8 m

**Electrical connection**  
 Pluggable screw terminals

**Lightning protection**  
 Coarse and fine protection

**Electromagnetic compatibility (EMC)**  
 To EN 61326

### Oxygen transmitter

**Range**  
 0 to 2 to 0 to 50 mg/l (freely programmable)

**Measurement units**  
 mg/l or % saturation

**Accuracy**  
 ±1 % of end of range (20 mg/l)

**Temperature compensation**  
 0 to +50 °C

### Atmospheric pressure compensation

Direct via atmospheric pressure:  
 500 to 1500 hPa (mbar) or  
 indirect via height a.m.s.l.: 0 to 3000 m

**Salinity** (salt content compensation)  
 0 to 40 g/kg

**Output signal**  
 4 to 20 mA, freely scalable within the range

**Response time** (at 25 °C)  
 $t_{90} < 180$  sec

**Minimum inflow**  
 5 cm/sec

**Safe pressure**  
 6 bar max. at 20 °C  
 Pressure variations will affect the output signal !

**Protection**  
 IP68 to EN 60529

**Housing material**  
 Shaft: stainless steel 1.4305  
 Sensor head and protective basket: PVC

**Weight**  
 Approx. 700 g

### Terminal box and operating unit

**Protection**  
 IP65 to EN 60529

**Housing material**  
 PC

**Weight**  
 approx. 2 kg

### Burden

Basic version Type 202610/80  
 Output dissolved oxygen:  
 $\leq \frac{U_B - 10 V}{0.02 A}$

Standard version Type 202610/81:  
 Output dissolved oxygen/temperature  
 $\leq \frac{U_B - 17 V}{0.02 A}$

Maximum version Type 202610/82  
 Output dissolved oxygen/temperature:  
 $\leq 350 \Omega$

**Display resolution**  
 0.01 mg/l and 0.1 %; 0.1 °C

### Temperature measurement

**Range**  
 0 to 50°C (fixed)

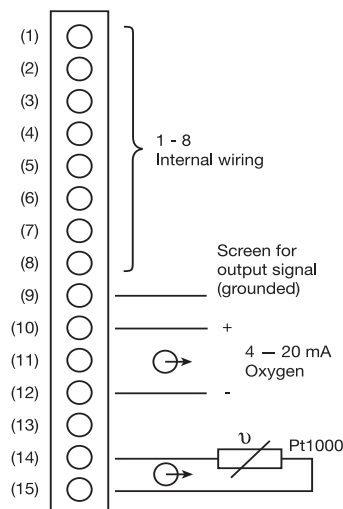
**Accuracy**  
 Basic version  
 Type 202610/80-500-2000-08-28  
 Sensor: Pt1000, Class B  
 Display: n/a  
 Output signal: n/a

Standard version  
 Type 202610/81-500-2000-08-28  
 Sensor: Pt1000, Class B  
 Display: 0.25 % of range  
 Output signal: n/a

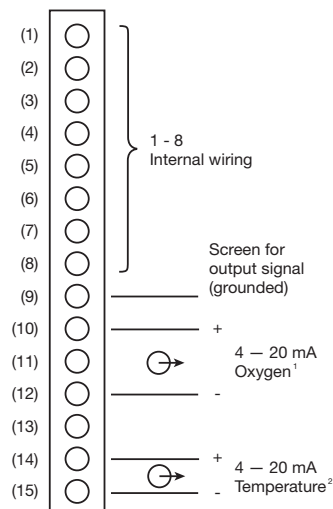
Standard version  
 Type 202610/81-405-2000-08-28  
 Display: 0.25 % of range  
 Output signal: 1 % of range

Maximum version  
 Type 202610/82-006-2000-08-23  
 Display: 0.25 % of range  
 Output signal: 1 % of range

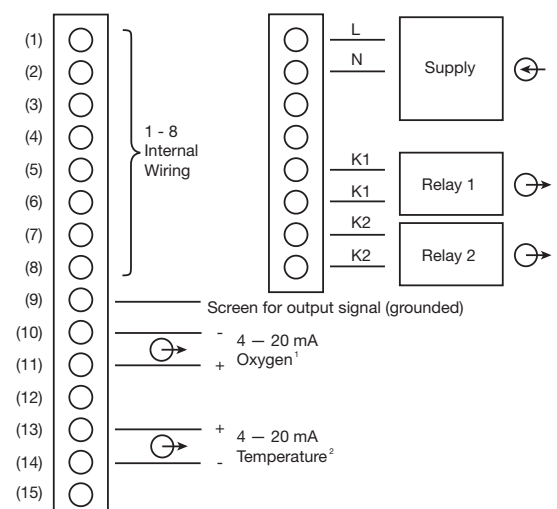
## Electrical connection



Type 202610/80-500-2000-08-28  
 Type 202610/81-500-2000-08-28



Type 202610/81-405-2000-08-28



Type 202610/82-006-2000-08-23  
 Type 202610/82-006-2000-08-25

<sup>1</sup> Freely scalable

<sup>2</sup> Fixed setting: 10 to 50 °C corresponding to 4 to 20 mA

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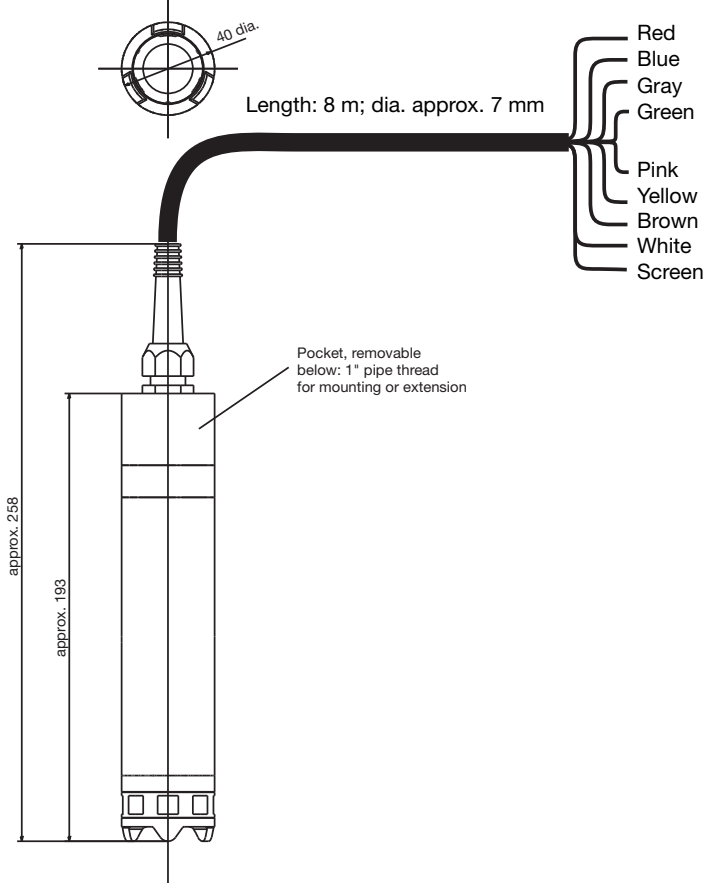
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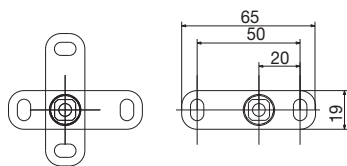
## Dimensions

### Oxygen transmitter



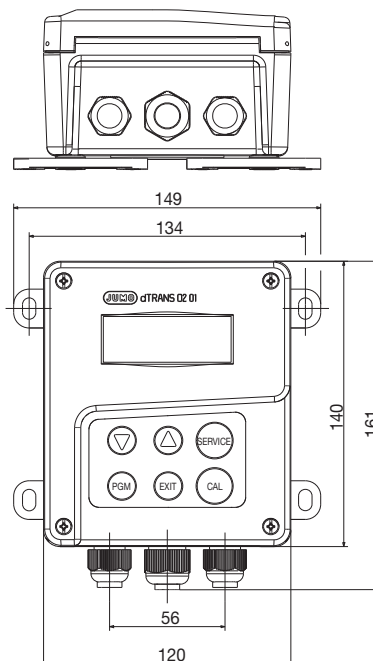
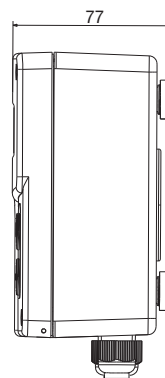
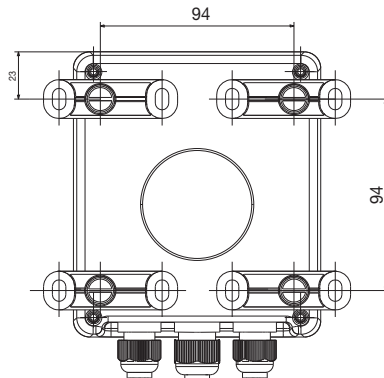
Color	Terminal in box	Signal
Pink	1	RXD
Green	2	GND
Yellow	3	TXD
White	4	b Pt1000
Brown	5	a Pt1000
Red	6	+e/-l
Blue	7	-e/+l
Screen	8	
Gray	11	CAL/NC

### Terminal box or operating unit



Befestigungslaschen  
 (serienmäßiges Zubehör)

The fixing brackets can be mounted in 2 positions.  
 For wall mounting, laterally or above/below the terminal box or operating unit.



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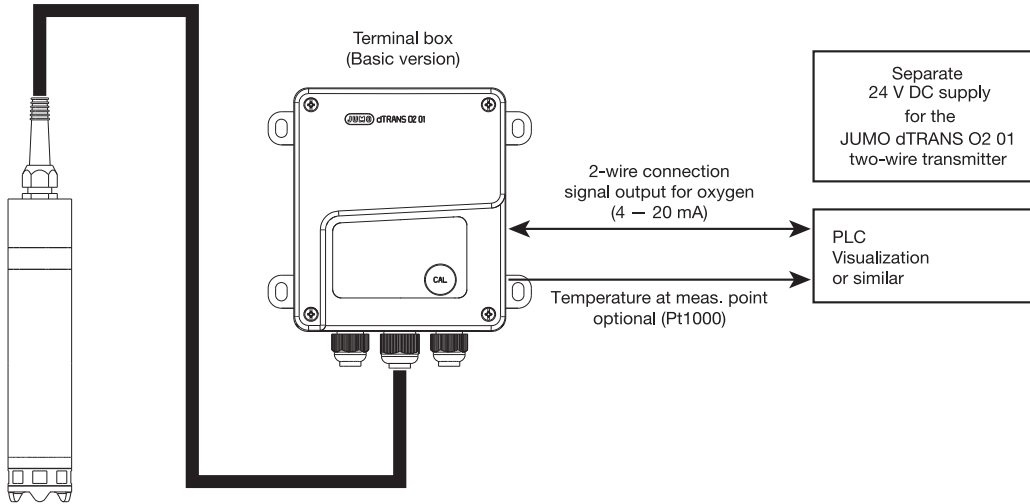
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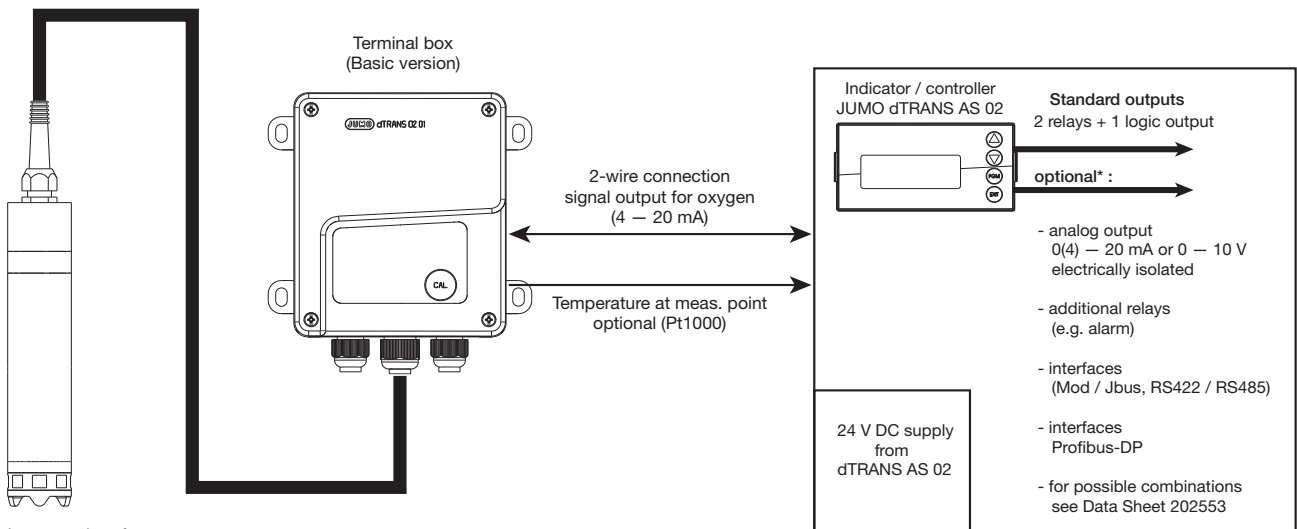
## Connection examples

Basic version 202610/80-500-2000-08-28 with terminal box



Two-wire transmitter for dissolved oxygen (DO)

Basic version 202610/80-500-2000-08-28 with terminal box and JUMO dTRANS Az 01



Two-wire transmitter for dissolved oxygen (DO)

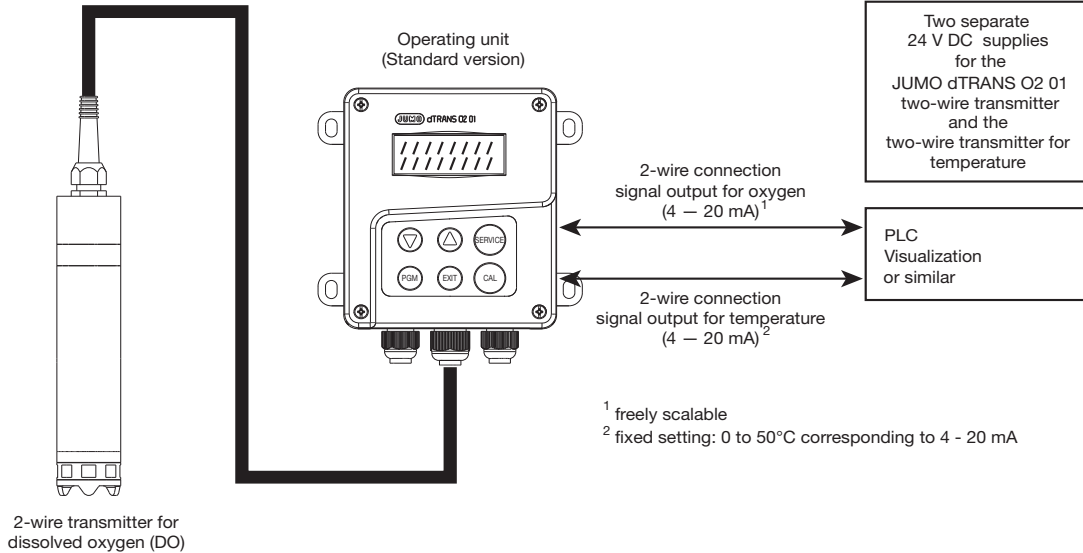
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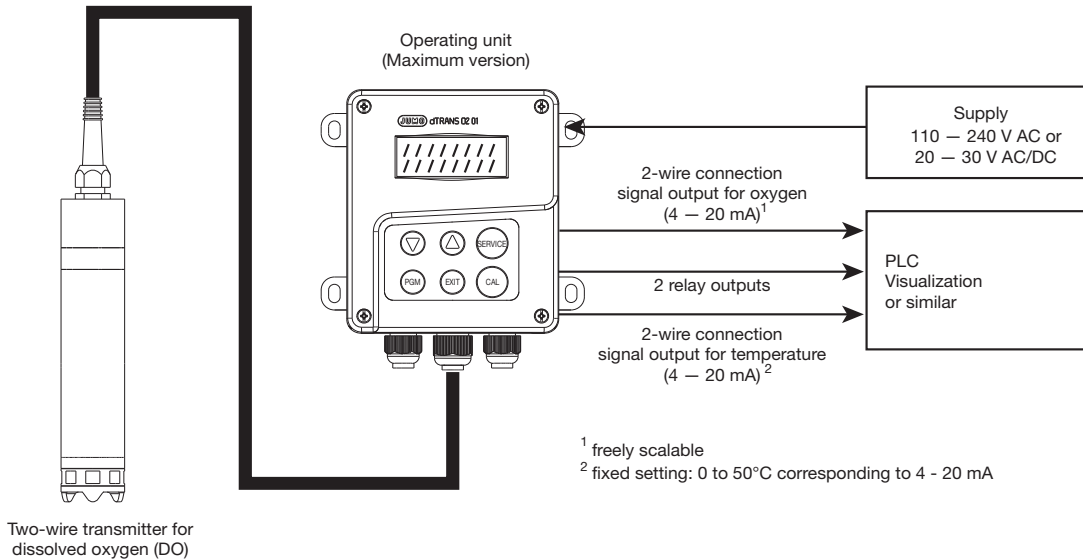
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Standard version 202610/81-405-2000-08-28 with operating unit



Maximum version 202610/82-006-2000-08-23 with operating unit



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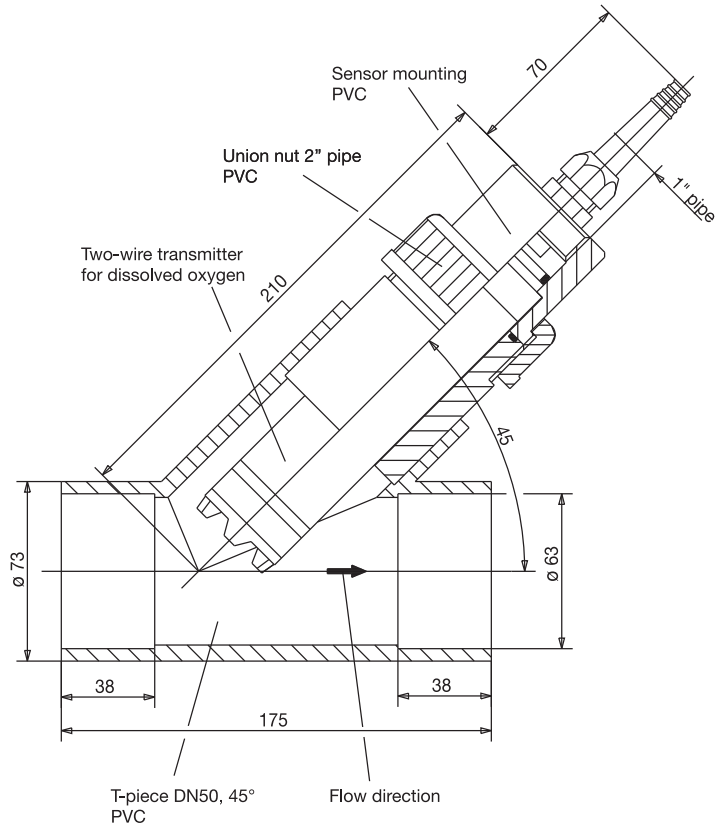
## Accessories

### Flow-through fittings

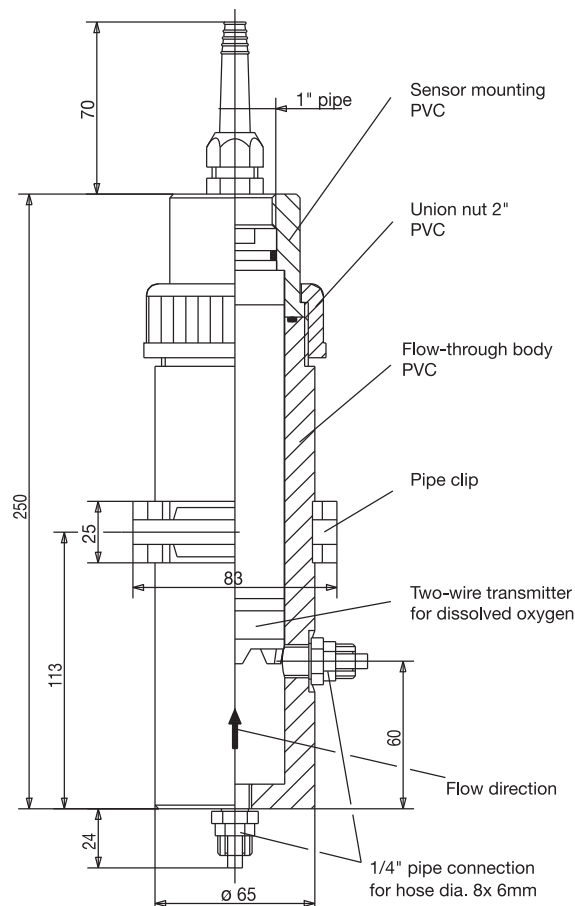
The dTRANS O2 01 oxygen transmitter can be mounted in flow-through fittings. The fittings are installed directly in the pipeline conveying the medium, or in the bypass. The special construction of the fitting ensures a correct flow into the sensors, and therefore avoids measurement errors.

The following points should be noted when planning the pipework layout:

- The fitting must be readily accessible, to allow regular maintenance and cleaning of the transmitter or the fitting itself.
- Bypass measurements are recommended. Shut-off valves should be provided so that the transmitter can be removed.
- Where systems are subject to temperature or pressure stresses, the fitting and transmitter must meet the requirements.
- The suitability of the materials of the fitting and the transmitter (e.g. chemical compatibility) must be checked by the system designer.



Flow-through fitting, angled seat	
Material	PVC
Permissible temperature	+5 to +50 °C
Safe pressure	Up to 1 bar
Connection	Solvent weld sockets
Process connection	T-piece DN50, 45°
Part no.	00398137



Flow-through fitting, hose connection	
Material	Housing PVC pipe clip PP
Permissible temperature	+5 to +50 °C
Safe pressure	Up to 1 bar
Connection	Solvent weld sockets
Process connection	1/4" pipe (for hose 8 mm x 6 mm dia.)
Part no.	00398142

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**Immersion fittings**

The dTRANS O2 01 oxygen transmitter can be mounted in immersion fittings. The fittings are installed in open containers or sluices using the pipe clips supplied. Different immersion depths are facilitated by various immersion lengths.

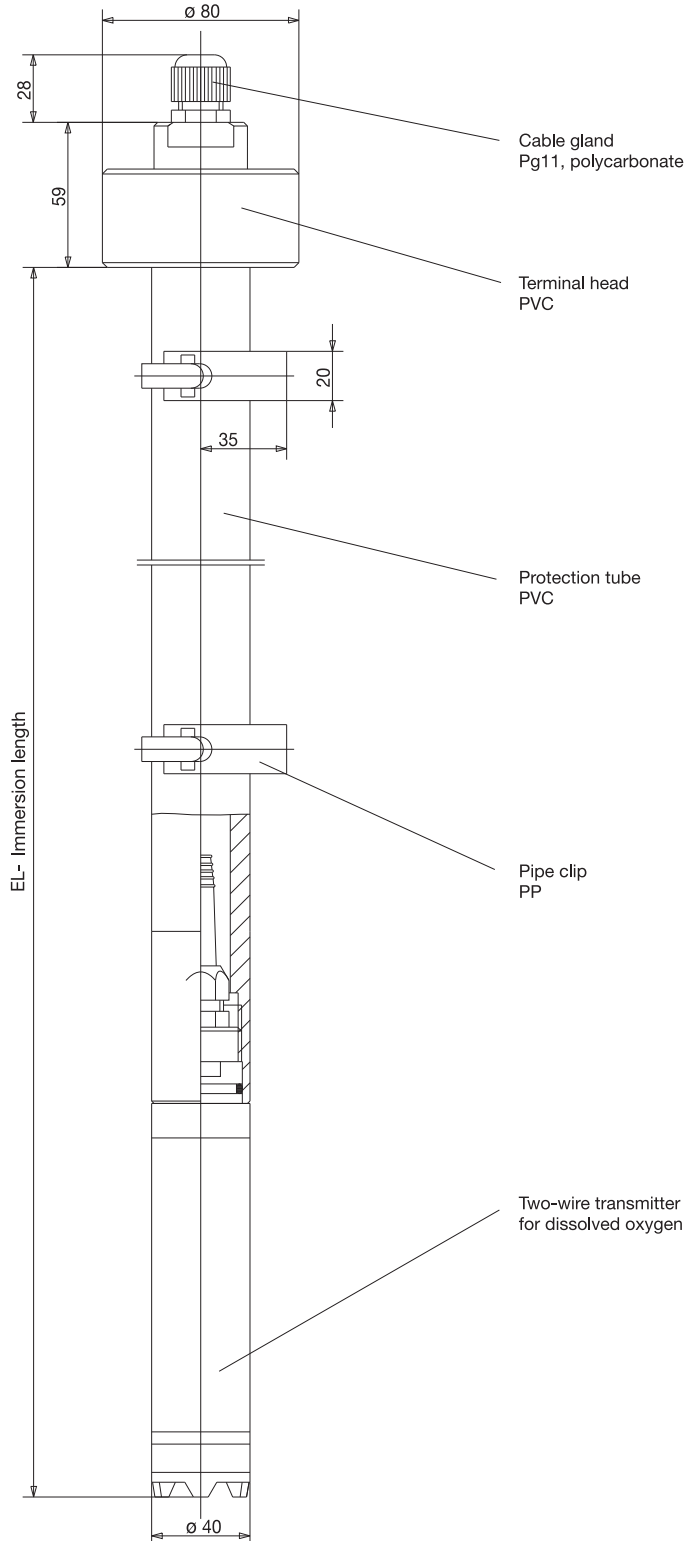
The following points should be noted at the design stage:

- The fitting must be readily accessible, to allow regular maintenance and cleaning of the transmitter or the fitting itself.
- The suitability of the materials of the fitting and the transmitter (e.g. chemical compatibility) must be checked by the system designer.

Immersion fitting	
Material	Immersion tube PVC pipe clip PP
Permissible temperature	+5 to +50 °C
Safe pressure	Up to 1 bar
Cable gland	Pg11
Protection	IP65 EN 60529

Immersion length	500 mm
Part no.	00398131

Immersion length	1500 mm
Part no.	00398135



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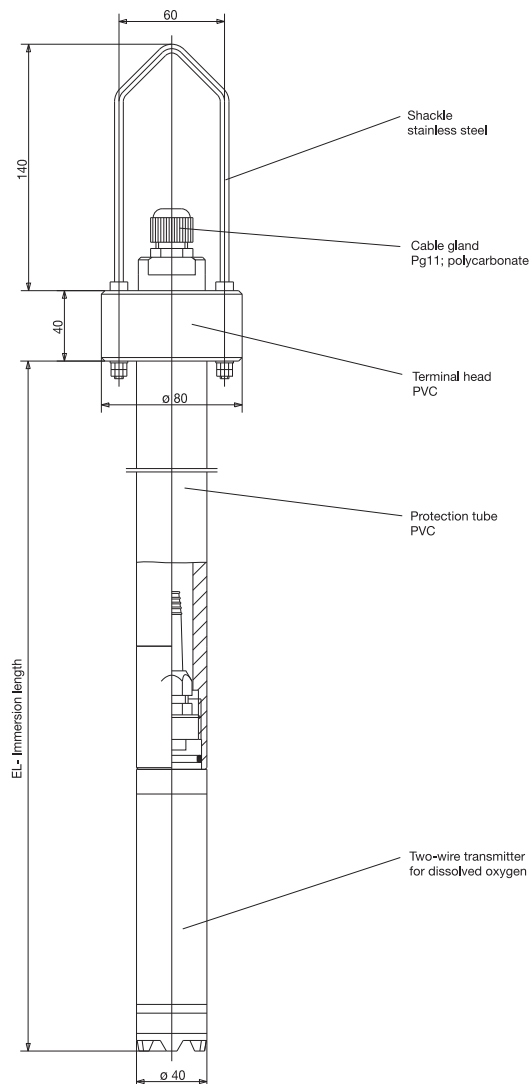
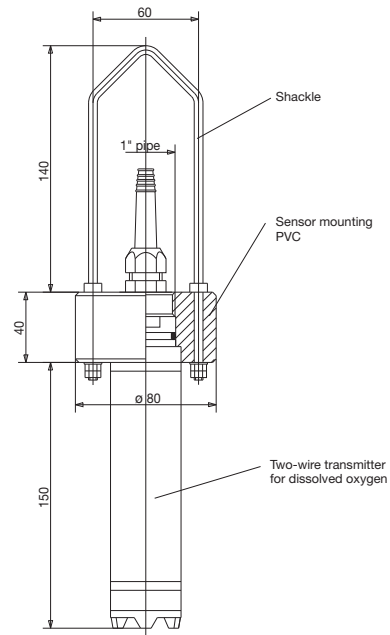


### Suspension fittings

The dTRANS O2 01 oxygen transmitter can be mounted in suspension fittings. The fittings are used primarily for measurement in open vessels. The fitting can be positioned far from the edge of the vessel, suspended from a chain by the shackle, for example. Different immersion depths are facilitated by various immersion tube lengths.

The following points should be noted at the design stage:

- The fitting must be readily accessible, to allow regular maintenance and cleaning of the transmitter or the fitting itself.
- The fitting (and with it the transmitter) must not strike the side of the vessel as a result of pendular movements.
- The suitability of the materials of the fitting and the transmitter (e.g. chemical compatibility) must be checked by the system designer.



Suspension fitting	
<b>Material</b>	Immersion tube PVC shackle stainless steel
<b>Permissible temperature</b>	+5 to +50 °C
<b>Safe pressure</b>	Up to 1 bar
<b>Cable gland</b>	Pg11
<b>Protection</b>	IP65 EN 60529

<b>Immersion length</b>	150 mm
<b>Part no.</b>	00398148

<b>Immersion length</b>	500 mm
<b>Part no.</b>	00398143

<b>Immersion length</b>	1500 mm
<b>Part no.</b>	00398144

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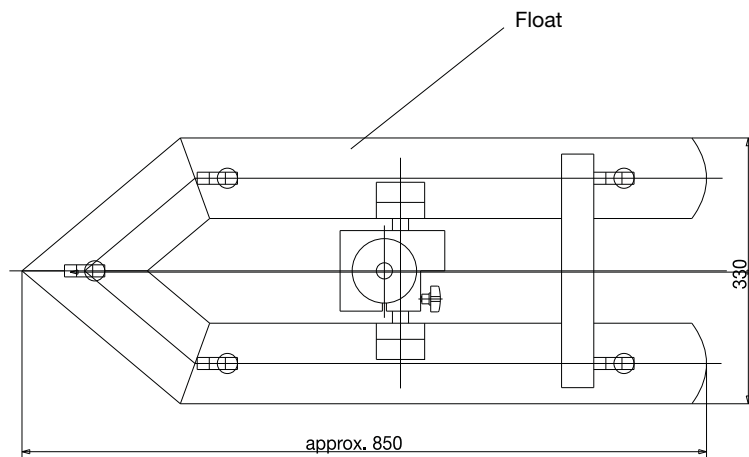
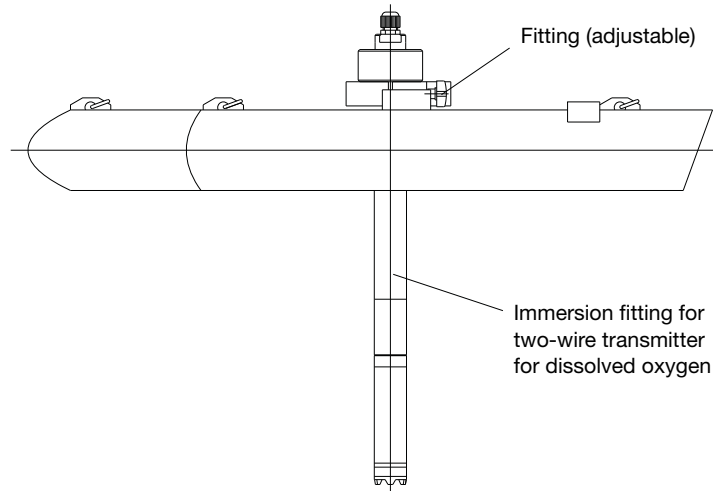
## Float fittings

### Brief description

Float fittings are used to mount an immersion transmitter in which a dTRANS O2 01 oxygen transmitter is installed. The fittings are used primarily for measurement in open vessels or watercourses. Different immersion depths are facilitated by various support tube lengths of the immersion fitting.

The following points should be noted at the design stage:

- The fitting must be readily accessible, to allow regular maintenance and cleaning of the transmitter or the fitting itself.
- Where the depth of water fluctuates, it must be ensured that the fitting (and with it the transmitter) does not strike the base of the vessel or the water-course when the water level is low.
- The suitability of the materials of the fitting and the transmitter (e.g. chemical compatibility) must be checked by the system designer.



<b>Float fitting</b>	
<b>Material</b>	PVC
<b>Permissible temperature</b>	+5 to +50 °C
<b>Fitting mounting</b>	40 mm
<b>Part no.</b>	00397483

<b>Suitable immersion fitting</b>	
<b>Immersion length</b>	500 mm
<b>Sales No.</b>	00398131

<b>Immersion length</b>	1500 mm
<b>Part no.</b>	00398135

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**Support column with pedestal base, arm, chain and weather protection canopy**

**Brief description**

This accessory is intended for installation at the edge of a vessel. The dTRANS O2 01 oxygen transmitter is installed in a suspension fitting. Different immersion depths and distances from the edge of the vessel are facilitated by the arm and the chain.

The weather protection canopy protects the terminal box or operating unit against the effects of the weather.

The following points should be noted at the design stage:

- The fitting must be readily accessible, to allow regular maintenance and cleaning of the transmitter or the fitting itself.
- The fitting (and with it the transmitter) must not strike the side of the vessel as a result of pendular movements.
- The suitability of the materials of the fitting and the transmitter (e.g. chemical compatibility) must be checked by the system designer.

Support column with pedestal base, arm, chain	
<b>Material</b>	
Column	Stainless steel
Pedestal base	Die-cast aluminum
Arm	Stainless steel
Chain	Stainless steel
Universal joint	Die-cast aluminum
<b>Permissible temperature</b>	-5 to +50 °C
<b>Part no.</b>	00398163

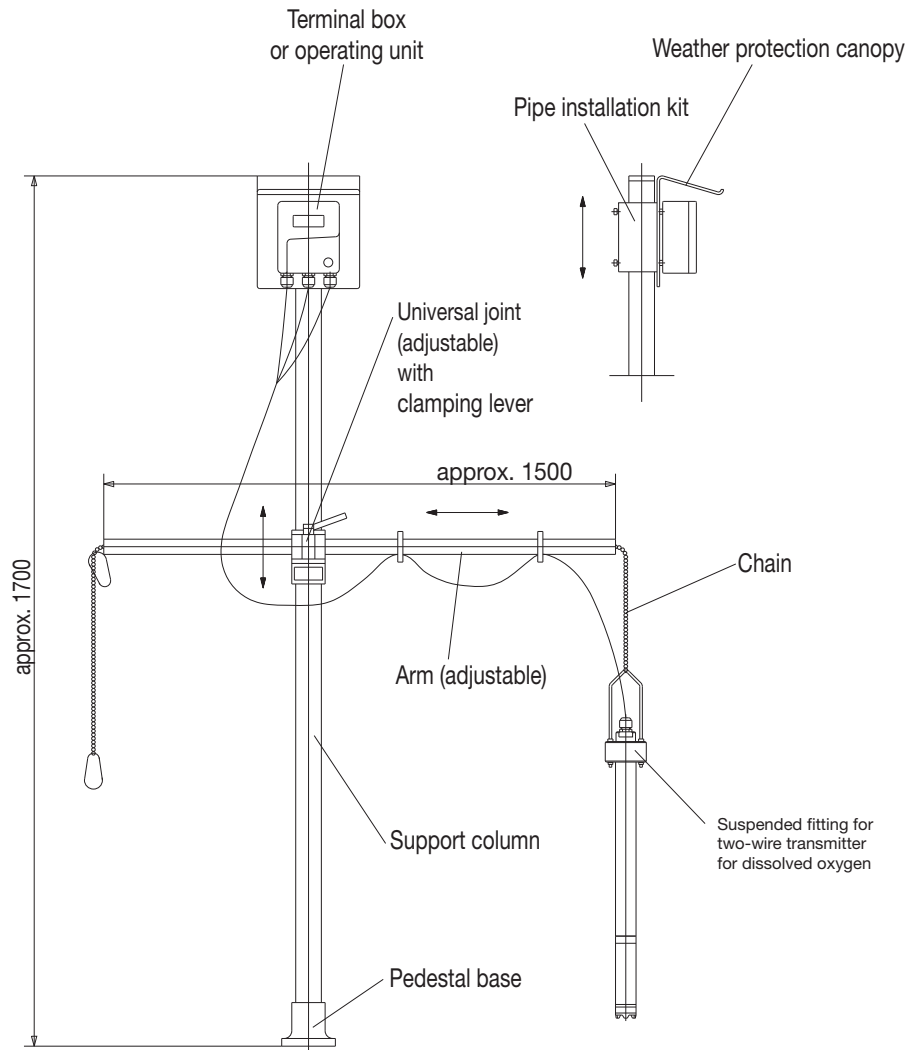
Pipe installation kit <sup>a</sup>	
<b>Material</b>	Stainless steel
<b>Part no.</b>	00398162

<sup>a</sup> Using the pipe installation kit, the terminal box or the operating unit can be attached to a pipe (e.g. support column or railing).

Weather protection canopy <sup>a</sup>	
<b>Material</b>	Stainless steel
<b>Part no.</b>	00398161

<sup>a</sup> The pipe installation kit is required for mounting the weather protection canopy

Suspension fitting	
<b>Material</b>	See above
<b>Part no.</b>	00398143 or 00398144



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## Order details

**(1) Basic type**  
 202610 Two-wire transmitter for dissolved oxygen (DO)

**(2) Basic type extensions**

80 Basic version  
 81 Standard version  
 82 Maximum version

**(3) Output (of additional temperature output)**

	x	006	4 to 20 mA (internal supply)
	x	405	4 to 20 mA (external supply)
x	x	500	Resistance output Pt1000

**(4) Range for oxygen**

x	x	x	2000	0 to 20 mg/l (programmable)
---	---	---	------	-----------------------------

**(5) Cable length**

x	x	x	08	8 m
x	x	x	10	10 m
x	x	x	15	15 m

**(6) Supply**

		x	23	AC 110 to 240 V +10/-15 %, 48 to 63 Hz
		x	25	AC/DC 20 to 30 V, 48 to 63 Hz
x	x		28	DC 19 to 31 V (external supply, two-wire transmitter)

**(7) Language**

x	x		1	German (standard)
		o	2	English
		o	3	French
		o	4	Spanish

	<b>(1)</b>		<b>(2)</b>		<b>(3)</b>		<b>(4)</b>		<b>(5)</b>		<b>(6)</b>		<b>(7)</b>
<b>Order code</b>		/	..	-		-		-	08	-		-	1
<b>Order example</b>	202610	/	81	-	500	-	2000	-	08	-	28	-	1

**Note:**

The type code is a type designation, not a modular system.  
 If at all possible, please choose the items listed under "Available ex-stock" or "Not available ex-stock" when ordering.  
 Any free combination of individual code features must be technically checked by us and released.  
 Please ask us in case of doubt !

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## Available ex-stock

Type	Part no.
202610/81-405-2000-08-28-1 (operator language: German)	00391357
202610/82-006-2000-08-23-1 (operator language: German)	00391358

## Not available ex-stock

Type	Part no.
202610/80-500-2000-08-28-1 (operator language: German)	00391336
202610/82-006-2000-08-25-1 (operator language: German)	00393328
202610/82-006-2000-08-23-2 (operator language: English)	00406637
202610/82-006-2000-08-28-2 (operator language: English)	00409019
202610/82-006-2000-15-23-2 (operator language: English)	00427326
202610/81-405-2000-08-28-3 (operator language: French)	00439522
202610/82-006-2000-08-23-3 (operator language: French)	00439523
202610/82-006-2000-08-23-4 (operator language: Spanish)	00436038
202610/81-405-2000-08-28-4 (operator language: Spanish)	00437029

## Accessories

Description	Part no.
Flow-through fitting, angled seat (PG 202850)	00398137
Flow-through fitting, hose connection (PG 202850)	00398142
Immersion fitting, immersion tube length 500 mm (PG 202850)	00398131
Immersion fitting, immersion tube length 1500 mm (PG 202850)	00398135
Suspension fitting, immersion tube length 150 mm (PG 202850)	00398148
Suspension fitting, immersion tube length 500 mm (PG 202850)	00398143
Suspension fitting, immersion tube length 1500 mm (PG 202850)	00398144
Float fitting (PG 209791)	00397483
Support column with pedestal base, arm and chain (PG 202850)	00398163
Pipe installation kit for terminal box or operating unit <sup>a</sup> (PG 202850)	00398162
Weather protection canopy for terminal box or operating unit <sup>b</sup> (PG 202850)	00398161
Set of replacement sensor modules (2 items + Operating Instructions) (PG 209791)	00393329
Setup program with adapter for dTRANS O2 01 (PG 202599)	00394728
PC interface cable with TTL / RS232 converter (PG 959720)	00301315
PC interface cable including USB/TTL converter and two adapters (USB connecting cable) (PG 959720)	00456352

<sup>a</sup> The pipe installation kit can be used to fix the terminal box or the operating unit to a pipe (e.g. support column or railing).

<sup>b</sup> The pipe installation kit is necessary for mounting the weather protection canopy.

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# JUMO tecLine Cl2 Sensor for free chlorine

**Type 202630/40**  
**Type 202630/41**

- 2- or 3-electrode principle
- Easy calibration
- Integrated temperature compensation
- Proven measuring system

## Brief description

These membrane-covered, amperometric sensors are used to measure the concentration of free chlorine (for example in drinking and swimming water, industrial, process and cooling water).

The following inorganic chlorinating agents can be measured with the sensor for free chlorine: chlorine gas (Cl<sub>2</sub>), electrolytically generated chlorine, sodium hypochlorite (NaOCl, chlorine bleach lye), calcium hypochlorite (Ca(OCl)<sub>2</sub>) or chlorinated lime (Ca(OCl)Cl).

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

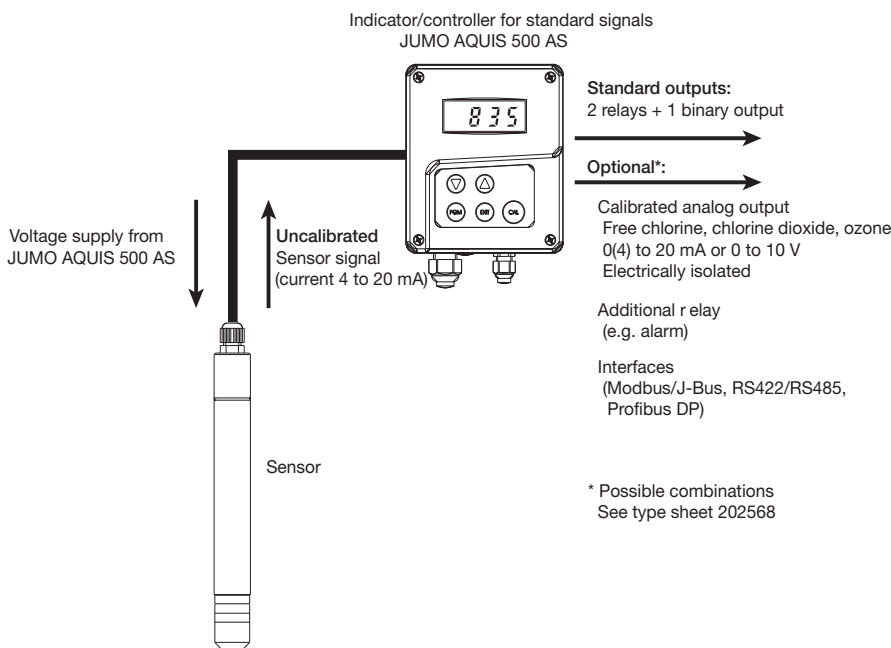
The integrated electronics of the sensors provides a temperature-compensated current signal of 4 to 20 mA. A downstream device (indicator, controller, recorder, PLC, etc.) is used for calibration.

The sensors can be connected directly to a suitable indicator and controller. Two indicators / controllers, the JUMO dTRANS AS 02 (type sheet 202553) and the JUMO AQUIS 500 AS (type sheet 202568) are especially suitable for combining with these sensors. They provide the voltage required for the power supply of the sensor and makes for an easy way to calibrate the measuring system.



Type 202630/40- ...

## Function



## Note

### All types

- This measurement is only possible in a suitable flow-through fitting (see accessories).
- For proper operation, the incident flow of the process medium on the sensor must be at least 15 cm / s (0.5l / min). The minimum inflow can be ensured with JUMO flow monitoring (see accessories), which consists of a flow monitor and the matching fitting.
- A test set is required for calibration to determine the free chlorine content using the DPD method. Suitable photometric or colorimetric test sets can be obtained commercially.
- To ensure fault-free sensor functionality, only one disinfectant should be used.
- Sensors for free chlorine are **not** suitable for determining organic chlorinating agents (for example products based on cyanuric acid).
- For further information about how to set up and use amperometric sensors, refer to our brochure "Information on Amperometric Measurement of Free Chlorine, Chlorine Dioxide and Ozone in Water".

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**Type 202630/40**

- The measurement water for the sensor with a hydrophobic membrane must not contain any surfactants (ingredients of cleaning agents, detergents and disinfectants).
- The pH value for the sensor for free chlorine (type 202630/40) must be kept constant ( $\Delta\text{pH} < 0.05$ ) after calibration. If that is not possible, the sensor for free chlorine with reduced pH dependency (type 202630/41) must be used.

**Type 202630/41 (reduced pH dependency)**

- If the sensor with a hydrophilic membrane is used, a test is required in this special case to determine whether the presence of surfactants results in a significantly reduced service life. In this case as well, however, the water quality should be similar to drinking or swimming pool water.

- The output signal of the sensor for free chlorine with reduced pH dependency (type 202630/41) is independent in the pH value range from pH 5 to 7. Outside this range the pH dependency is reduced (see technical data).
- To ensure proper functionality of the sensor for free chlorine with reduced pH dependency (type 202630/41), the conductivity of the process medium must be least  $50\mu\text{S} / \text{cm}$ .

**Technical data**

Analyte	Free chlorine	
Membrane type	Hydrophobic PTFE membrane Type 202630/40	Hydrophilic membrane Type 202630/41
Measuring cable connection	2-pin terminal, polyamide PG7 screw connection; conductor cross section $2 \times 0.25 \text{ mm}^2$ , cable diameter approx. 4 mm	
Voltage supply	$U_B$ 12 to 30V DC (electrical isolation recommended)	
Electromagnetic compatibility	According to EN 61326-1 Interference emission: Class B Interference immunity: To industrial requirements	
Output signal	4 to 20mA	
Burden	$\leq \frac{U_B - 7.5 \text{ V}}{0.02 \text{ A}}$	
Settling time	1 h	2 h
Incident flow velocity	approx. 15 cm / s If the sensor is installed in the JUMO flow-through fitting (part no: 00392611), this is equivalent to a flow rate of approx. 30l / h.	
Measurement ranges <sup>1</sup>	0 to 0.5 / 0 to 2.0 / 0 to 5 / 0 to 10 mg / l (ppm)	
Resolution	0.001 mg / l, for measurement range 0 to 0.5 mg/l; 0.01 mg / l, for measurement range 0 to 2.0 mg / l	
Response time $t_{90}$	approx. 30 s	approx. 2 min
Operating temperatures / temperature compensation	+5 to +45 °C	
Zero point adjustment	Not required	
pH value operating range	6.0 to 8 pH Note the effect of the pH value on disinfecting properties, corrosion or the dissociation curve.	4 to 9 pH
pH dependency (loss of slope)	At pH 8 about 65%, at pH 9 about 95%, (starting from pH 7)	In the range from pH 5 to 7: No loss of slope, at pH 8 about 10%, at pH 9 about 20% (starting from pH 7)
Disruptive substances / cross sensitivity	Chlorine dioxide not permitted Ozone not permitted	Chlorine dioxide not permitted Ozone not permitted combined chlorine disruptive
Pressure resistance	$p_{\text{abs}}$ max. 2 bar $p_{\text{rel}}$ max. 1 bar No pressure fluctuations are admissible when operating under pressure. We recommend unpressurized operation (atmospheric pressure).	
Material	Shaft, cover, cap: PVC	Shaft, cover, cap: PVC Membrane disk holder: stainless steel
Dimensions	Diameter: 25 mm, length: 220 mm	
Weight	approx 125 g	
Maintenance	Check the measurement signal: regularly, at least once a week Replace the membrane cap: once a year (subject to water quality) Change the electrolyte: every 3 to 6 months	
Storage	Sensor: frost-free, dry, without electrolyte and at +5 to +45 °C can be stored for an unlimited time used membrane caps cannot be stored! Membrane cap: in the original bottle, protected against sunlight and at +5 to +25 °C Electrolyte: in the original bottle, protected against sunlight and at +5 to +25 °C	

<sup>1</sup> Other measuring ranges on request.

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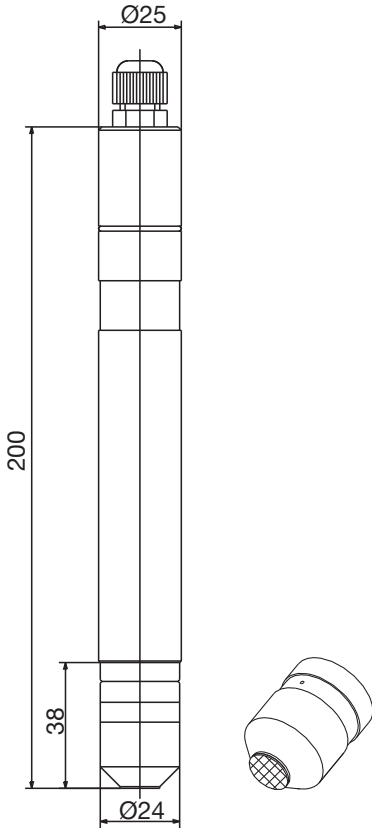
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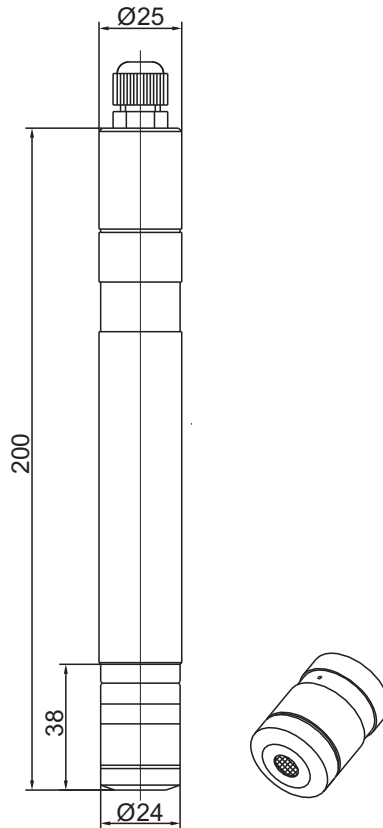


## Dimensions

Type 202630/40



Type 202630/41



## Scope of delivery

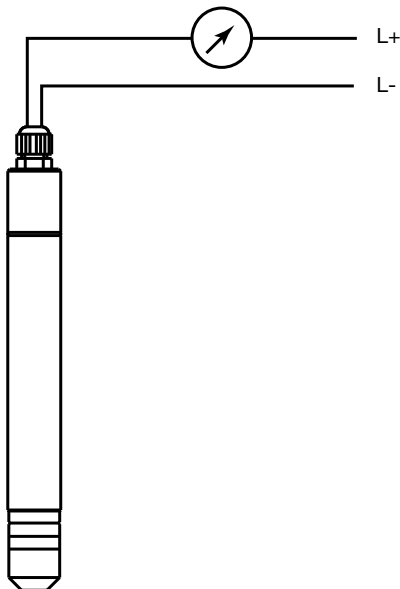
**Type 202630/40:**

Two-wire sensor including membrane cap, electrolyte and special abrasive paper for cathode cleaning

**Type 202630/41:**

Two-wire sensor including membrane cap and device holder, electrolyte and special abrasive paper for cathode cleaning

## Electrical connection



Connection		Screw terminals
Voltage supply DC 12 to 30V		1 L+ 2 L-
Output 4 to 20mA, two wires Impressed current 4 to 20mA in voltage supply		1 L+ 2 L-

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## Accessories

**Flow-through fitting  
 for sensors according to type  
 sheets  
 202630, 202631, 202634, 202636**

Part no.: 00392611

**Materials**

Case: PVC  
 Measuring vessel: PC

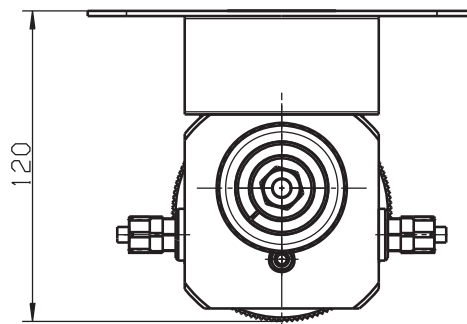
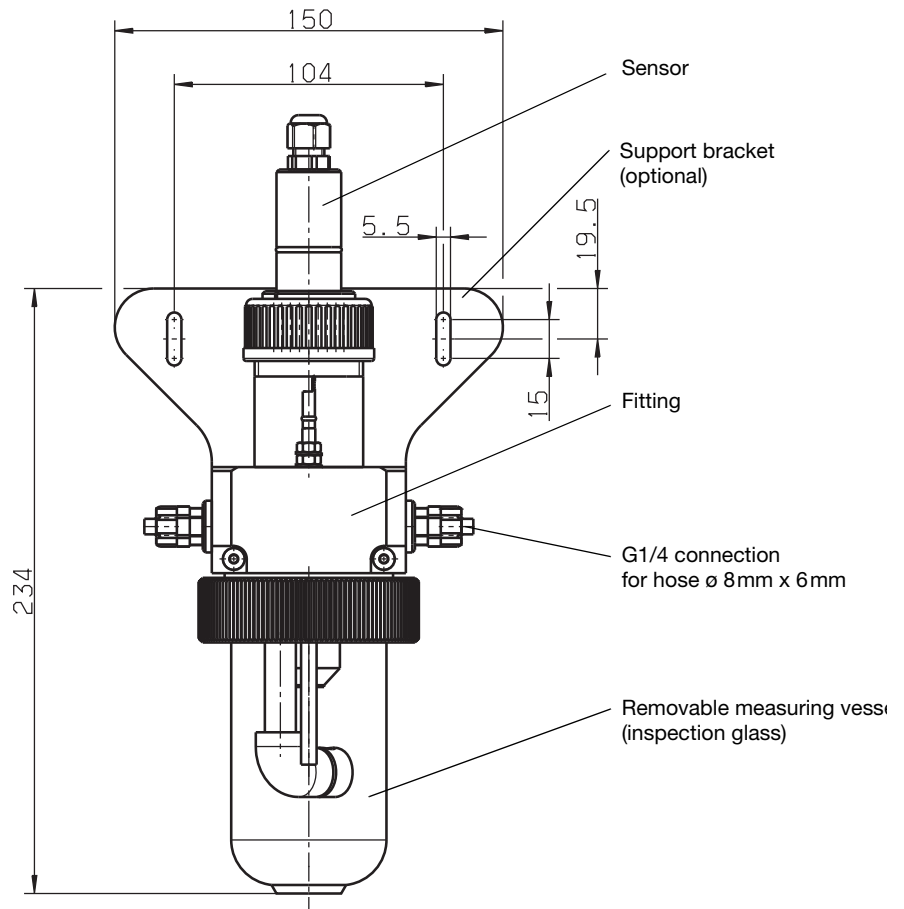
**Admissible temperature / pressure**  
 0 to +50 °C; at 1 bar

**Connection**

Hose screw connection G 1/4

**Mounting**

Optional: stainless steel support bracket,  
 Mat. no. 1.4571  
 Part no.: 00455706



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**Flow monitoring device**

Consisting of:

**Flow monitor**

Part no.: 00396471

and

**Fitting for flow monitor**

Part no.: 00396470

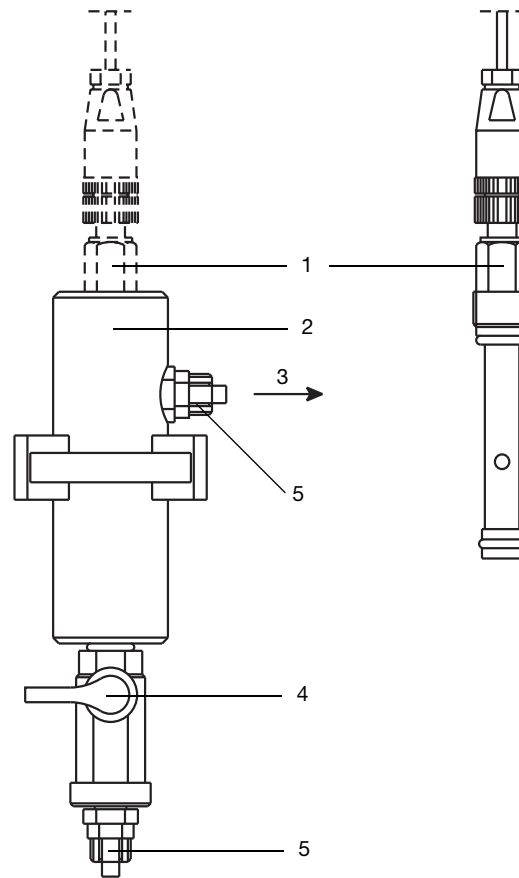
**Function**

For proper operation, the incident flow of the process medium on the sensors must be at least 15cm / s.

Below this minimum incident flow velocity, the sensors will indicate values that are too low. This could result in dangerous overdosing or underdosing in a connected control system. Above the minimum incident flow velocity, the measurement signal is only slightly affected by the incident flow velocity.

The flow monitoring device can be used to monitor the minimum incident flow velocity of 15cm / s.

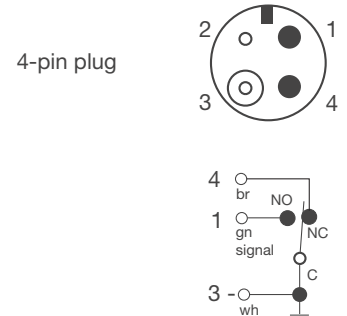
The flow monitoring device consists of a flow monitor and the corresponding fitting. The flow monitoring device is installed in series with the flow-through fitting. If the minimum flow speed is not reached or is exceeded, a contact in the terminal head of the flow monitor switches. The contact can be used, for example, to control a binary input of the indicator/controller for JUMO AQUIS 500 AS standard signals. If the incident flow is too low, the JUMO AQUIS 500 AS is placed in "HOLD". This can prevent imprecise dosing.



- 1 Flow monitor part no.: 00396471
- 2 Fitting for flow monitor part no.: 00396470
- 3 Flow direction
- 4 Shut-off valve
- 5 G1/4 connection (for hose diameter 8mm x 6mm)

**Electrical connection**

of the flow monitor



**Function**

Contact (3 + 4) of the flow monitor is opened at a flow velocity of 15cm/s or greater.

**Options**

**JUMO AQUIS 500 AS**

Indicator/controller for standard signals and temperature  
 (for detailed information, see type sheet 202568)



**JUMO dTRANS AS 02**

Transmitter/controller for standard signals and temperature  
 (for detailed information, see type sheet 202553)



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## Order details

202630 (1) **Basic type**  
Sensor

(2) **Basic type extension**

40 for free chlorine  
41 for free chlorine (reduced pH-dependency)

(3) **Measuring range**

x	10	0.00 to 0.500 mg / l (ppm)
x	20	0.00 to 2.00 mg / l (ppm)
o	25	0.00 to 5.00 mg / l (ppm)
o	35	0.00 to 10.00 mg / l (ppm)

x: Standard  
o: Option

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

**Note:**

The type code is an order detail, not a modular system.

If possible, choose items listed under "stock versions" for your orders.

We will have to technically inspect and approve a free combination of individual key features. In case of doubt, please ask.

## Stock versions

 (delivery 3 working days after receipt of order)

Type	Part no.
Sensor for free chlorine, type 202630/40-10	00391395
Sensor for free chlorine, type 202630/40-20	00391396

## Accessories

Designation	Part no.
Flow-through fitting for sensors according to type sheets 202630, 202631, 202634, 202636	00392611
Support bracket for flow-through fitting	00455706
Flow monitor	00396471
Fitting for flow monitor	00396470
Spare parts set for 202630/40 (1x membrane cap, fine abrasive paper)	00392331
Spare parts set for 202630/41 (1x membrane cap, device holder, fine abrasive paper)	00402292
Special electrolyte for 202630/40, 100 ml	00438122
Special electrolyte for 202630/41, 100 ml	00438123
Matching indicator / controller: JUMO AQUIS 500 AS, type: 202568/20-888-888-888-310-310-23/000 (for other versions see type and price sheet 202568)	00528718
Matching transmitter / controller: JUMO dTRANS AS 02, type: 202553/01-8-01-4-0-00-23/000 (for other versions see type and price sheet 202553)	00550842

# JUMO tecLine TC Sensor for total chlorine

## Type 202631/42

- Three-electrode principle
- Easy calibration
- Integrated temperature compensation
- Proven measuring system

### Brief description

This membrane-covered, amperometric sensor is used to measure the total chlorine concentration in water.

The sensor detects the sum of "free chlorine" (chlorine gas, hypochlorite, etc.) and "bound chlorine" (chloramines, organisch bound chlorine).

This sensor can only be used in media with drinking or swimming pool water quality.

Typical areas of application include swimming pools and monitoring of drinking water.

The sensor is not suitable for detecting the absence of chlorine.

The integrated electronics of the sensor provides a temperature-compensated current signal of 4 to 20 mA. A downstream device (indicator, controller, recorder, PLC, etc.) is used for calibration.

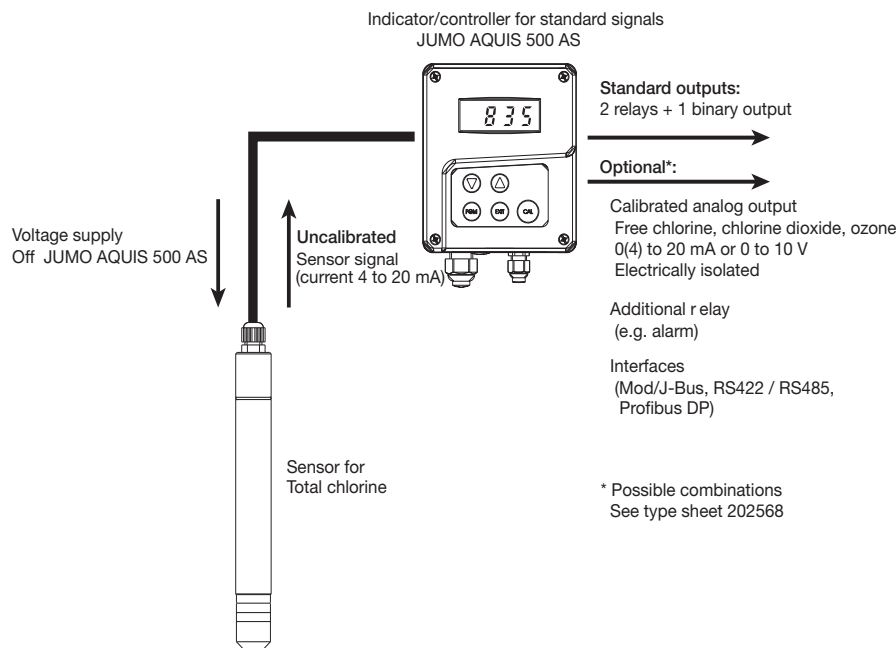
The sensor can be connected directly to a suitable indicator and controller.

Two indicators / controllers, the JUMO dTRANS AS 02 (type sheet 202553) and the JUMO AQUIS 500 AS (type sheet 202568) are especially suitable for combining with this sensor. These devices provide the voltage required for the power supply of the sensor and make for an easy way to calibrate the measuring system.



Type 202631/42 ...

### Function



### Note

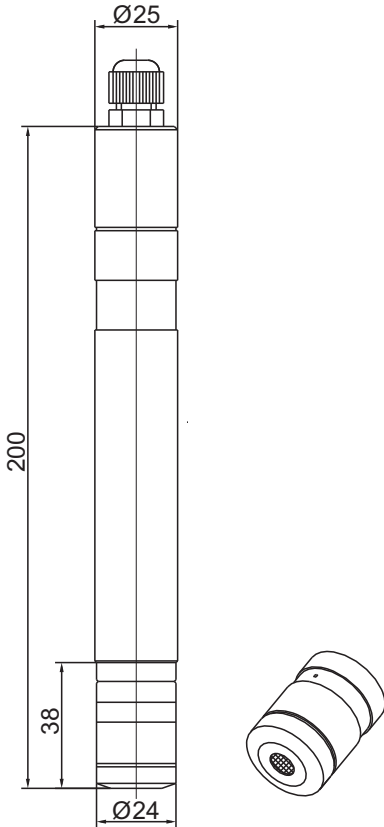
- This measurement is only possible in a suitable flow-through fitting (see accessories).
- For proper operation, the incident flow of the process medium on the sensor must be at least 15 cm / s (0.5 l / min). The minimum inflow can be ensured with JUMO flow monitoring (see accessories), which consists of a flow monitor and the matching fitting.
- A test set is required for calibration to determine the total chlorine content using the DPD method. Suitable photometric or colorimetric test sets can be obtained commercially.
- To ensure fault-free sensor functionality, only one disinfectant should be used.
- For further information about how to set up and use amperometric sensors, refer to our brochure "Information on Amperometric Measurement of Free Chlorine, Chlorine Dioxide and Ozone in Water".



## Technical data

<b>Analyte</b>	<b>Total chlorine</b>
<b>Membrane type</b>	Hydrophilic membrane
<b>Measurement cable connection</b>	2-pin terminal, polyamide Pg7 screw connection; conductor cross section 2× 0.25 mm <sup>2</sup> , cable diameter approx. 4 mm
<b>Voltage supply</b>	U <sub>B</sub> 12 to 30 V DC (electrical isolation recommended)
<b>Electromagnetic compatibility</b>	According to EN 61326-1 Interference emission: Class B Interference immunity: To industrial requirements
<b>Output signal</b>	4 to 20 mA
<b>Burden</b>	$\leq \frac{U_B - 7.5 \text{ V}}{0.02 \text{ A}}$
<b>Settling time</b>	2 h
<b>Incident flow velocity</b>	approx. 15 cm/s If the sensor is installed in the JUMO flow-through fitting (part no. 00392611), this is equivalent to a flow rate of approx. 30 l/h.
<b>Measuring ranges</b>	0 to 0.5 mg/l (ppm) 0 to 2 mg/l (ppm) 0 to 5 mg/l (ppm) 0 to 10 mg/l (ppm) 0 to 20 mg/l (ppm)
<b>Response time t<sub>90</sub></b>	About 2 min
<b>Operating temperatures / temperature compensation</b>	+5 to +45 °C
<b>Zero point adjustment</b>	Not required
<b>pH value operating range</b>	4 to 12 pH
<b>pH dependency (loss of slope)</b>	Linear decrease with approx. 5 % per upward pH unit (starting from pH 7)
<b>Disruptive substances/ cross sensitivity</b>	Chlorine dioxide not permitted Ozone is disruptive
<b>Pressure resistance</b>	p <sub>abs</sub> max. 2 bar p <sub>rel</sub> max. 1 bar No pressure fluctuations are admissible when operating under pressure. We recommend unpressurized operation (atmospheric pressure).
<b>Material</b>	Shaft, cover, cap: PVC Membrane disk holder: stainless steel
<b>Dimensions</b>	Diameter: 25 mm, length: 220 mm
<b>Weight</b>	about 125 g
<b>Maintenance</b>	Check the measurement signal: regularly, at least once a week Replace the membrane cap: once a year (subject to water quality) Change the electrolyte: every 3 to 6 months
<b>Storage</b>	Sensor: frost-free, dry and without electrolyte, can be stored for an unlimited time at +5 to +45 °C Membrane cap: Used membrane caps cannot be stored! Electrolyte: In the original bottle and protected against sunlight at +5 to +25 °C

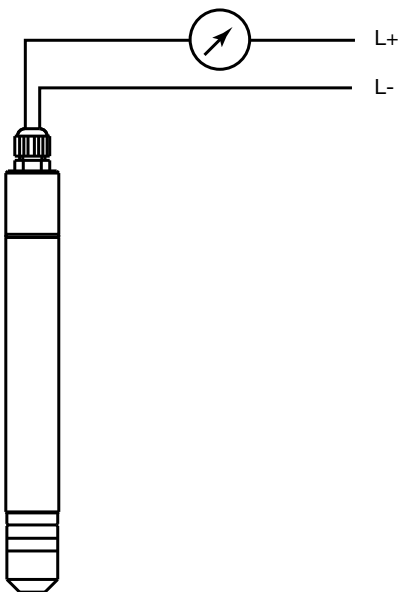
## Dimensions



## Scope of delivery

Sensor including membrane cap, electrolyte and special abrasive paper for cathode cleaning

## Electrical connection



Connection		Screw terminals
Voltage supply DC 12 to 30 V	+ -	1 L+ 2 L-
Output 4 to 20 mA, two wires Impressed current 4 to 20 mA in voltage supply	+ -	1 L+ 2 L-

## Accessories

### Flow-through fitting for sensors according to type sheets 202630, 202631, 202634, 202636

Part no. 00392611

#### Materials

Case: PVC

Measuring vessel: PC

#### Admissible temperature / pressure

0 to +50 °C; at 1 bar

#### Connection

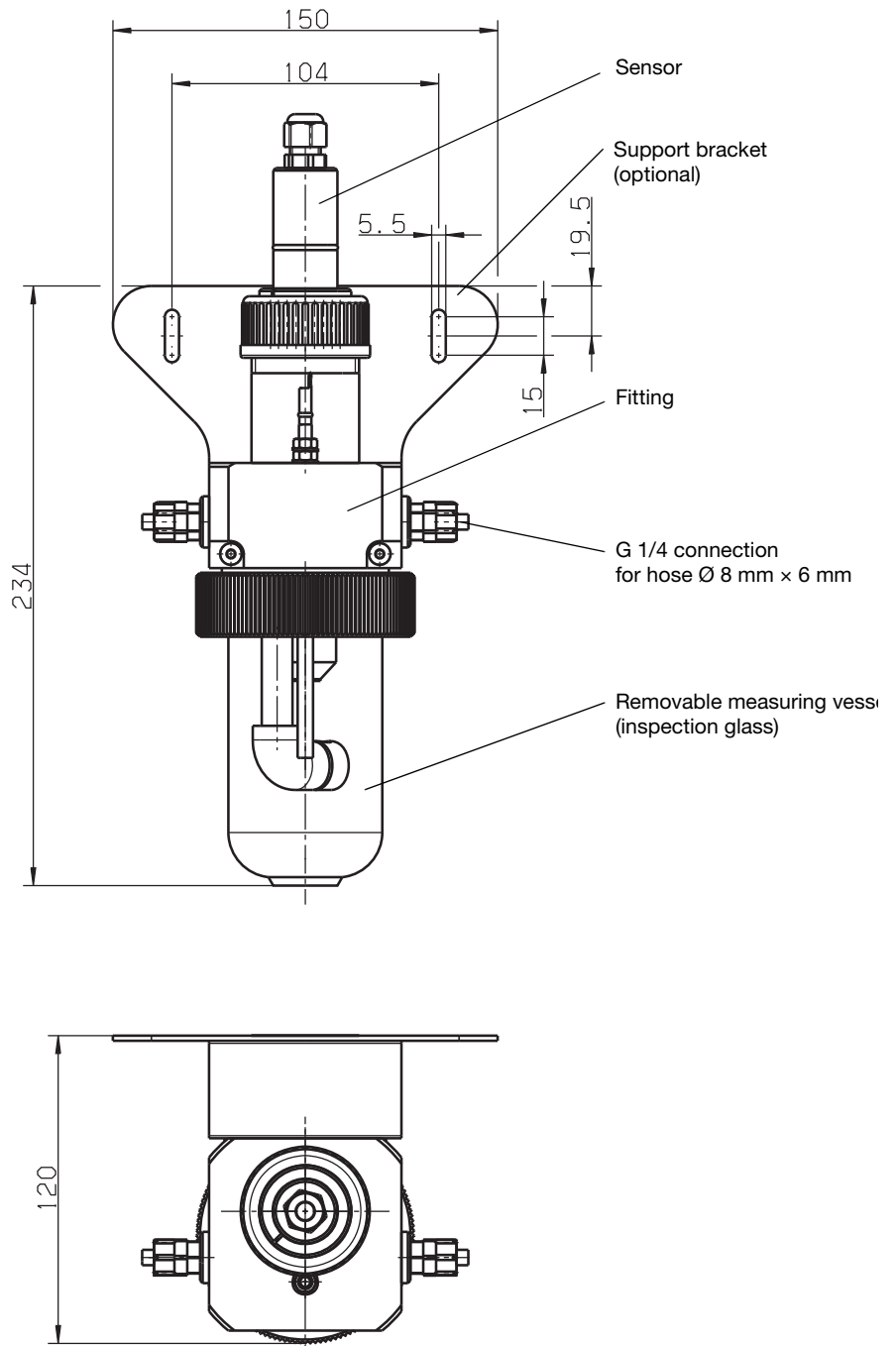
Hose screw connection G 1/4

#### Mounting

Optional: stainless steel support bracket,

Mat. no. 1.4571

Part no. 00455706



**Flow monitoring device**

Consisting of:

**Flow monitor**

Part no.: 00396471

and

**Fitting for flow monitor**

Part no.: 00396470

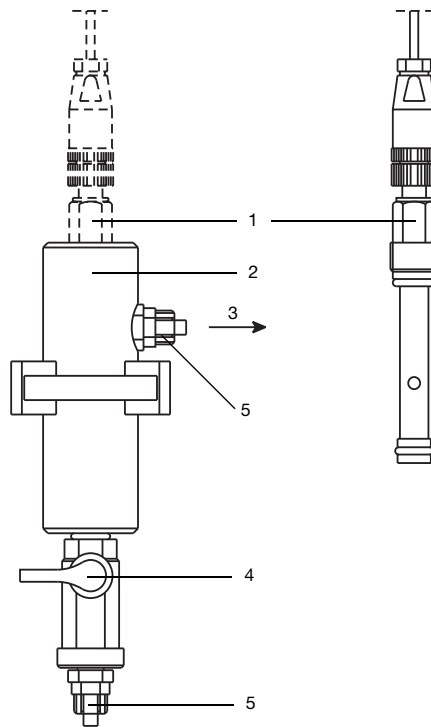
**Function**

For proper operation, the incident flow of the process medium on the sensor must be at least 15cm / s.

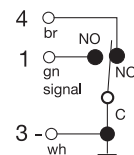
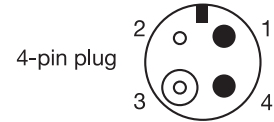
Below this minimum incident flow velocity, the sensor will indicate values that are too low. This could result in dangerous overdosing or underdosing in a connected control system. Above the minimum incident flow velocity, the measurement signal is only slightly affected by the incident flow velocity.

The flow monitoring device can be used to monitor the minimum incident flow velocity of 15cm / s.

The flow monitoring device consists of a flow monitor and the corresponding fitting. The flow monitoring device is installed in series with the flow-through fitting. If the minimum flow speed is not reached or is exceeded, a contact in the terminal head of the flow monitor switches. The contact can be used, for example, to control a binary input of the indicator/controller for JUMO AQUIS 500 AS standard signals. If the incident flow is too low, the JUMO AQUIS 500 AS is placed in "HOLD". This can prevent imprecise dosing.



**Electrical connection of the flow monitor**



**Function**

Contact (3 + 4) of the flow monitor is opened at a flow velocity of 15cm / s or greater.

- 1 Flow monitor, part no.: 00396471
- 2 Fitting for flow monitor, part no.: 00396470
- 3 Flow direction
- 4 Shut-off valve
- 5 G 1/4 connection (for hose diameter 8 mm x 6 mm)

**Options**

**JUMO AQUIS 500 AS**

Indicator/controller for standard signals and temperature  
 (for detailed information, see type sheet 202568)



**JUMO dTRANS AS 02**

Transmitter/controller for standard signals and temperature  
 (for detailed information, see type sheet 202553)



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## Order example

	<b>(1)</b>	<b>Basic type</b>
202631/42		Sensor for total chlorine
	<b>(2)</b>	<b>Measuring range</b>
10		0.00 to 0.500 mg/l (ppm)
20		0.00 to 2.00 mg/l (ppm)
25		0.00 to 5.00 mg/l (ppm)
35		0.00 to 10.00 mg/l (ppm)
37		0.00 to 20.00 mg/l (ppm)

o = optional

Order code             /   
 Order example        202631/42 / 20

**Note:**

The type code is a order details, not a modular system.

If possible, choose items listed under "stock versions" or "production versions" for your orders.

We will have to technically inspect and approve a free combination of individual key features. In case of doubt, please ask.

## Production versions (delivery 10 working days after receipt of order)

Type	Part no.
Sensor for total chlorine, type 202631/42-10	00584806
Sensor for total chlorine, type 202631/42-20	00584807
Sensor for total chlorine, type 202631/42-25	00584808
Sensor for total chlorine, type 202631/42-35	00584809
Sensor for total chlorine, type 202631/42-37	00584854

## Accessories

Designation	Part no.
Flow-through fitting for sensors according to type sheets 202630, 202631, 202634, 202636	00392611
Support bracket for flow-through fitting (PG209791)	00455706
Flow monitor (PG202630)	00396471
Fitting for flow monitor (PG202630)	00396470
Spare parts set for TC sensor (membrane cap/abrasive paper) (PG209791)	00585103
Electrolyte for TC sensor (202631/42) (PG209791)	00585104

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# JUMO tecLine ClO<sub>2</sub>, JUMO tecLine O<sub>3</sub>

## Sensor for chlorine dioxide and ozone

Type 202634/45, type 202634/46, type 202634/50, type 202634/51

- 2-electrode principle
- Easy calibration
- Integrated temperature compensation
- Proven measuring system

### Brief description

These membrane-covered, amperometric sensors are used to measure the concentration of chlorine dioxide and ozone in aqueous solutions (for example in drinking and swimming water, industrial, process and cooling water).

The sensor for chlorine dioxide can be used to measure chlorine dioxide from chlorite/chlorine and chlorite/hydrochloric acid plants. The sensor for ozone can be used for example to measure electrolytically generated ozone.

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

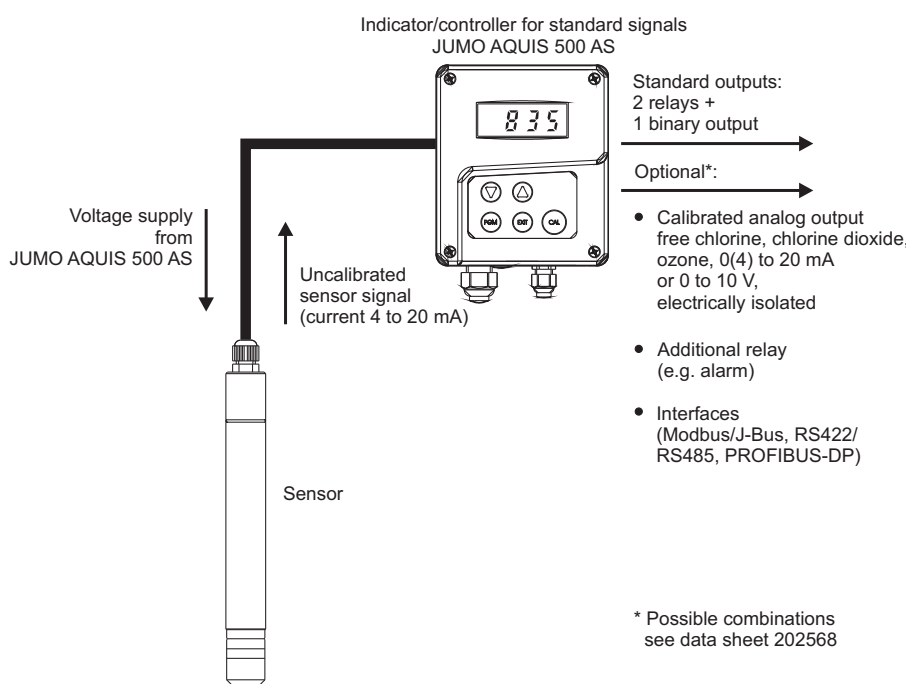
The integrated electronics of the sensors provides a temperature-compensated current signal of 4 to 20mA. A downstream device (indicator, controller, recorder, PLC, etc.) is used for calibration.

The sensors can be connected directly to a suitable indicator and controller. Two indicators/controllers, the JUMO dTRANS AS 02 (type sheet 202553) and the JUMO AQUIS 500 AS (type sheet 202568) are especially suitable for combining with these sensors. They provide the voltage required for the power supply of the sensor and make for an easy way to calibrate the measuring system.



Type 202634/45...

### Function



### Note

#### All types

- This measurement is only possible in a suitable flow-through fitting (see accessories).
- For proper operation, the incident flow of the process medium on the sensor must be at least 15 cm/s (0.5 l/min). The minimum inflow can be ensured with JUMO flow monitoring (see accessories), which consists of a flow monitor and the matching fitting.
- A test set is required for calibration to determine the content of chlorine dioxide or ozone using the DPD method. Suitable photometric or colorimetric test sets can be obtained commercially.
- To ensure fault-free sensor functionality, only one disinfectant should be used.
- For further information about how to set up and use amperometric sensors, refer to our brochure "Information on Amperometric Measurement of Free Chlorine, Chlorine Dioxide and Ozone in Water".

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**Types 202634/45 and 202634/50**

- The measurement water for sensors with a hydrophobic membrane must not contain any surfactants (ingredients of cleaning agents, detergents and disinfectants).

**Types 202634/46 and 202634/51**

- Sensors with a membrane impervious to chemicals and surfactants can also be used in dirty water that is not similar in quality to drinking or swimming pool water.

**Technical data**

Analyte	Chlorine dioxide (ClO <sub>2</sub> )		Ozone (O <sub>3</sub> )	
	Hydrophobic PTFE membrane	Membrane impervious to chemicals and surfactants	Hydrophobic PTFE membrane	Membrane impervious to chemicals and surfactants
	Type 202634/45	Type 202634/46	Type 202634/50	Type 202634/51
Measuring cable connection	2-pin terminal, polyamide PG7 screw connection; conductor cross section 2× 0.25 mm <sup>2</sup> , cable diameter approx. 4 mm			
Voltage supply U <sub>B</sub>	DC 12 to 30 V (electrical isolation recommended)			
Electromagnetic compatibility	According to EN 61326-1			
Interference emission	Class B			
Interference immunity	To industrial requirements			
Output signal	4 to 20mA			
Burden	$\leq \frac{U_B - 7,5 V}{0,02 A}$			
Settling time	1 h	1 h	2 h	1 h
Incident flow velocity	approx. 15 cm/s If the sensor is installed in a JUMO flow-through fitting (part no. 00392611), this is equivalent to a flow rate of about 30l/h.			
Measuring ranges (other ranges on request)	0 to 2.0 mg/l (ppm) 0 to 5 mg/l (ppm) 0 to 10mg/l (ppm)	0 to 2.0 mg/l (ppm)	0 to 0.5 mg/l (ppm) 0 to 2.0 mg/l (ppm) 0 to 5 mg/l (ppm) 0 to 10 mg/l (ppm)	0 to 2.0 mg/l (ppm)
Resolution	0.001 mg/l, for measurement range 0 to 0.5 mg/l; 0.01 mg/l, for measurement range 0 to 2.0 mg/l			
Response time t <sub>90</sub>	Approx. 15 s	Approx. 1.5 min	Approx. 15 s	Approx. 50 s
Operating temperatures/temperature compensation	5 to 45 °C	5 to 50 °C	5 to 45 °C	5 to 50 °C
Zero point adjustment	Not required			
pH value operating range	1 to 11 pH		2 to 11 pH	
pH dependency (loss of slope)	No pH dependency			
Disruptive substances/cross sensitivities	Chlorine is disruptive Ozone is disruptive	Chlorine is <b>not disruptive</b> Ozone is disruptive	Chlorine is disruptive Chlorine dioxide is disruptive	
Pressure resistance	p <sub>abs</sub> max. 2 bar p <sub>rel</sub> max. 1 bar No pressure fluctuations are admissible when operating under pressure. We recommend unpressurized operation (atmospheric pressure).			
Material				
Shaft, cover, cap	PVC	PVC	PVC	PVC
Membrane disk holder	-	Stainless steel	-	Stainless steel
Dimensions	Diameter: 25 mm, length: 220 mm			
Weight	Approx. 125 g			
Maintenance				
Check the measurement signal	Regularly, at least once a week			
Replace the membrane cap	Once a year (subject to water quality)			
Change the electrolyte	Every 3 to 6 months			
Storage				
Sensor	Frost-free, dry and without electrolyte, can be stored for an unlimited time at 5 to 45 °C			
Membrane cap	Used membrane caps cannot be stored!			
Electrolyte	In the original bottle and protected against sunlight at 5 to 25 °C			

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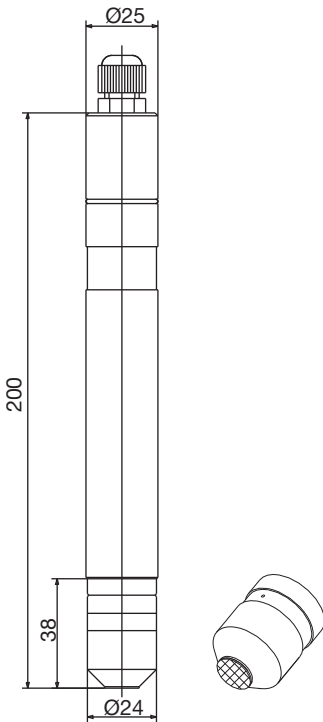
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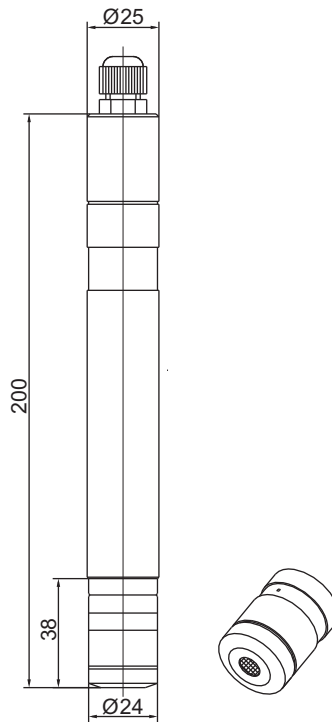


## Dimensions

Type 202634/45,  
type 202634/50



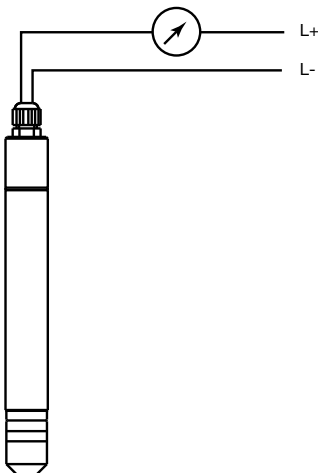
Type 202630/46,  
type 202630/51



## Scope of delivery

Two-wire sensor including membrane cap, electrolyte and special abrasive paper for cathode cleaning

## Electrical connection



Connection		Screw terminals
Voltage supply DC 12 to 30 V		1 L+ 2 L-
Output 4 to 20 mA, two wires Impressed current 4 to 20mA in voltage supply		1 L+ 2 L-

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 Internet: www.jumo.co.uk

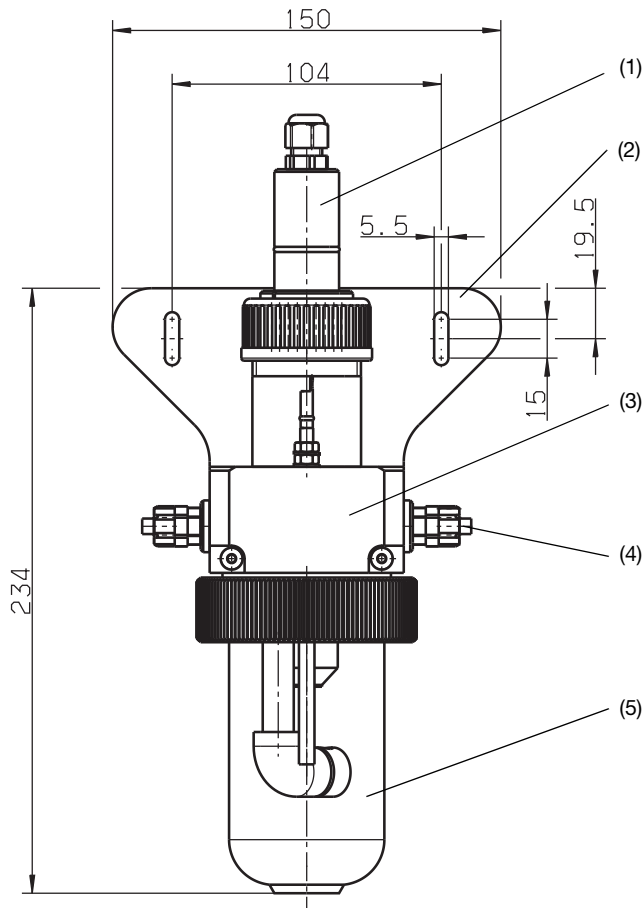
**JUMO Process Control, Inc.**  
 6733 Myers Road  
 East Syracuse, NY 13057, USA  
 Phone: 315-437-5866  
 1-800-554-5866  
 Fax: 315-437-5860  
 E-mail: info.us@jumo.net  
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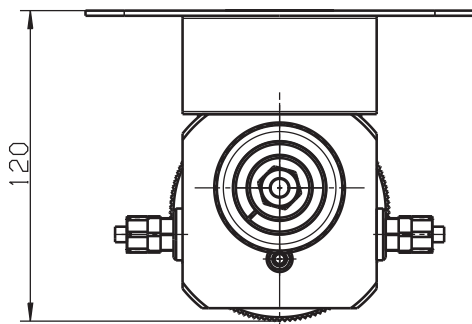
## Accessories

### Flow-through fitting for sensors according to data sheet 202630, 202631, 202634, 202636

Part no. 00392611



Materials	
Case	PVC
Measuring vessel	PC
Admissible temperature/pressure	0 to 50 °C, at 1 bar
Connection	Hose screw connection G 1/4
Mounting	
Optional	Stainless steel support bracket, Mat. no. 1.4571, Part no. 004557066



- (1) Sensor
- (2) Support bracket (optional)
- (3) Fitting
- (4) G 1/4 connection for hose  $\varnothing$  8 mm  $\times$  6 mm
- (5) Removable measuring vess (inspection glass)

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**Flow monitoring device**

Consists of:

	Part no.
Flow monitor	00396471
Fitting for flow monitor	00396470

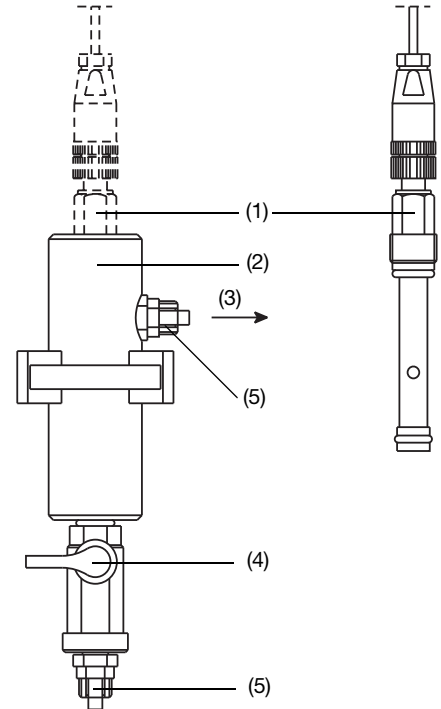
**Function**

For proper operation, the incident flow of the process medium on the sensors must be at least 15cm/s.

Below this minimum incident flow velocity, the sensor will indicate values that are too low. This could result in dangerous overdosing or underdosing in a connected control system. Above the minimum incident flow velocity, the measurement signal is only slightly affected by the incident flow velocity.

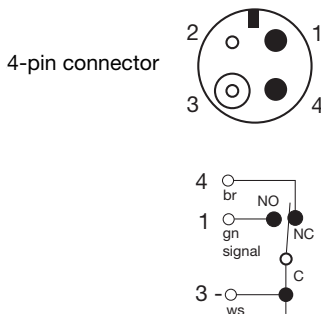
The flow monitoring device can be used to monitor the minimum incident flow velocity of 15 cm/s.

The flow monitoring device consists of a flow monitor and the corresponding fitting. The flow monitoring device is installed in series with the flow-through fitting. If the minimum flow speed is not reached or is exceeded, a contact in the terminal head of the flow monitor switches. The contact can be used, for example, to control a binary input of the indicator/controller for JUMO AQUIS 500 AS standard signals. If the incident flow is too low, the JUMO AQUIS 500 AS is placed in "HOLD". This can prevent imprecise dosing.



- (1) Flow monitor
- (2) Fitting for flow monitor
- (3) Flow direction
- (4) Shut-off valve
- (5) G 1/4 connection  
(for hose diameter 8 mm x 6 mm)

**Electrical connection for flow monitor**



**Function**

Contact (3 + 4) of the flow monitor is opened at a flow velocity of 15 cm/s or greater.

**Options**

**JUMO AQUIS 500 AS**

Indicator/controller for standard signals and temperature  
 (for detailed information, see data sheet 202568)



**JUMO dTRANS AS 02**

Transmitter/controller for standard signals and temperature  
 (for detailed information, see data sheet 202553)



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## Oder details

(1) Basic type			
		202634/45	Sensor for chlorine dioxide
		202634/46	Sensor for chlorine dioxide, impervious to chemicals and surfactants
		202634/50	Sensor for ozone
		202634/51	Sensor for ozone, impervious to chemicals and surfactants
(2) Measuring range			
X	X	10	0 to 0,5 mg/l
X	X	20	0 to 2 mg/l
	X	25	0 to 5 mg/l
X	X	35	0 to 10 mg/l

Order code  -   
 Order example 202634/46 - 20

**Note:**

The type code is an order detail, not a modular system. If possible, choose items listed under "stock versions" for your orders. We will have to technically inspect and approve a free combination of individual key features. In case of doubt, please ask.

## Stock version

(delivery 3 working days after receipt of order)

Type	Part no.
202634/50-20 (Sensor for ozone)	00392202

## Accessories

Article	Part no.
Support bracket for flow-through fitting	00455706
Flow monitor	00396471
Fitting for flow monitor	00396470
Special electrolyte for 202634/45 and 202634/46	00392332
Special electrolyte for 202634/50	00392333
Special electrolyte for 202634/51	00441311
Spare parts set for 202634/45 and 202634/50 (1x membrane cap, fine abrasive paper)	00392331
Spare parts set for 202634/46 (1x membrane cap, fine abrasive paper)	00409344
Spare parts set for 202634/51 (1x membrane cap, fine abrasive paper)	00441309
Matching indicator/controller: JUMO AQUIS 500 AS, type 202568/20-888-888-310-310-23/000 (for other versions see data sheet and price sheet 202568)	00528718
Matching transmitter/controller: JUMO dTRANS AS 02, type 202553/01-8-01-4-0-00-23/000 (for other versions see data sheet and price sheet 202553)	00550842

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# JUMO tecLine H2O2 JUMO tecLine PAA Sensor for hydrogen peroxide and peracetic acid

**Type 202636/55**  
**Type 202636/60**

- Measures the concentration of peracetic acid and hydrogen peroxide in the mg range
- 2-electrode principle
- Membrane impervious to chemicals and surfactants
- Integrated temperature compensation
- Easy calibration

## Brief description

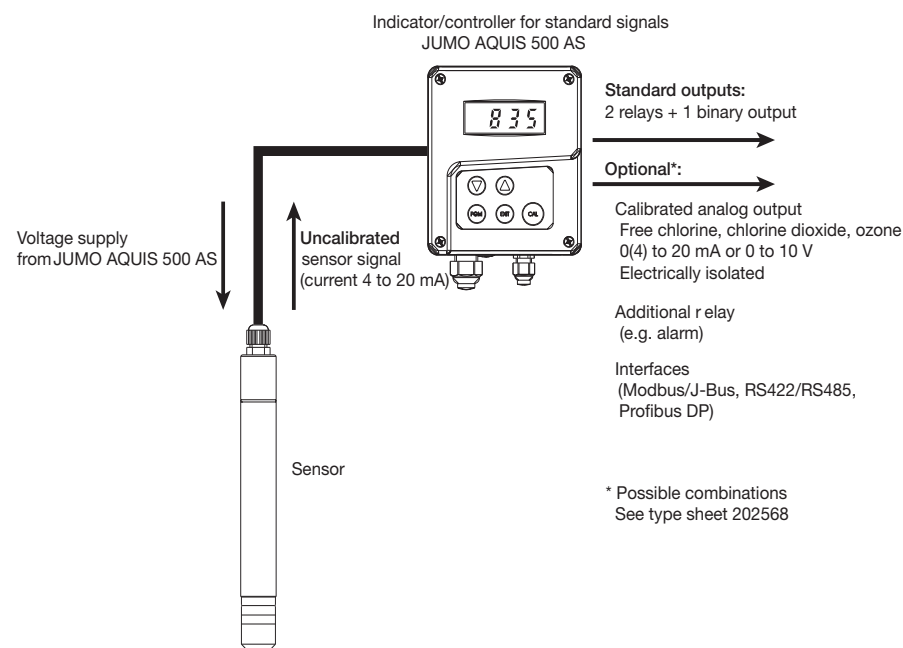
These membrane-covered, amperometric sensors are used to measure the concentration of hydrogen peroxide and peracetic acid in aqueous solutions.

Typical areas of application include electroplating plants, pharmaceuticals, the food and beverage industry, dairies, swimming pools and the chemical industry.

The sensors are not suitable for detecting the absence of hydrogen peroxide and peracetic acid. The integrated electronics of the sensors provides a temperature-compensated current signal of 4 to 20mA. A downstream device (indicator, controller, recorder, PLC, etc.) is used for calibration.

The sensors can be connected directly to a suitable indicator and controller. Two indicators / controllers, the JUMO dTRANS AS 02 (type sheet 202553) and the JUMO AQUIS 500 AS (type sheet 202568) are especially suitable for combining with these sensors. They provide the voltage required for the power supply of the sensor and make for an easy way to calibrate the measuring system.

## Function



Type 202636/55- ...

## Note

### All types

- This measurement is only possible in a suitable flow-through fitting (see accessories).
- For proper operation, the incident flow of the process medium on the sensor must be at least 15 cm / s (0.5l / min). The minimum inflow can be ensured with JUMO flow monitoring (see accessories), which consists of a flow monitor and the matching fitting.
- A test set is required for calibration to determine the content of hydrogen peroxide or peracetic acid. Various forms of manganometric or iodometric titration, etc. can be used as methods of determination.
- To ensure fault-free sensor functionality, only one disinfectant should be used.
- For further information about how to set up and use amperometric sensors, refer to our brochure "Information on Amperometric Measurement of Hydrogen Peroxide and Peracetic Acid in Water".

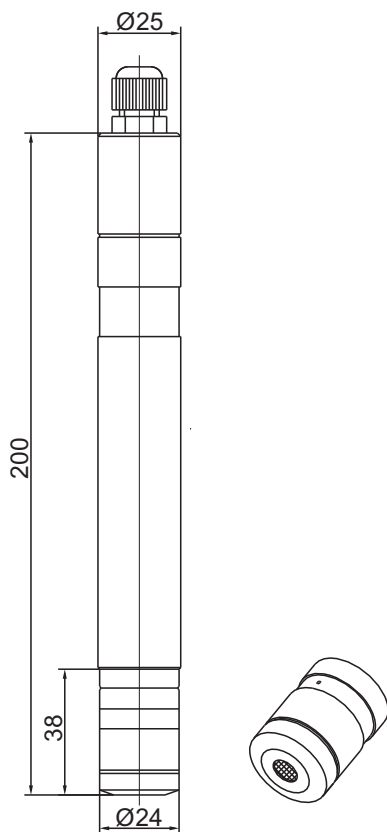


## Technical data

<b>Analyte</b>	<b>Hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) or peracetic acid (PAA)</b>
<b>Membrane type</b>	Silicone/rubber membrane
<b>Measuring cable connection</b>	2-pin terminal, polyamide PG7 screw connection; conductor cross section 2x 0.25 mm <sup>2</sup> , cable diameter approx. 4 mm
<b>Voltage supply</b>	U <sub>B</sub> 12 to 30V DC (electrical isolation recommended)
<b>Electromagnetic compatibility</b>	According to EN 61326-1 Interference emission: Class B Interference immunity: To industrial requirements
<b>Output signal</b>	4 to 20mA
<b>Burden</b>	$\leq \frac{U_B - 7.5 \text{ V}}{0.02 \text{ A}}$
<b>Settling time</b> Hydrogen peroxide Peracetic acid	3 h 1 h
<b>Incident flow velocity</b>	approx. 15cm / s If the sensor is installed in a JUMO flow-through fitting 00392611, this is equivalent to a flow rate of about 30l / h.
<b>Measuring ranges</b> (other ranges on request)	0 to 500 / 0 to 10,000 / 0 to 20,000 / 0 to 50,000 mg / l (ppm)
<b>Measuring accuracy</b>	± 2% of the displayed value
<b>Response time t<sub>90</sub></b> Hydrogen peroxide Peracetic acid	About 5 ... 10 min approx. 3 min
<b>Operating temperatures / temperature compensation</b> Hydrogen peroxide Peracetic acid	+5 to +45 °C +5 to +45 °C
<b>Zero point adjustment</b>	Not required
<b>pH value operating range</b> Hydrogen peroxide Peracetic acid	2 to 11 pH 1 to 7 pH
<b>Disruptive substances / cross sensitivities</b> Hydrogen peroxide Peracetic acid	Chlorine is disruptive, peracetic acid is disruptive, ozone is disruptive, sulfides and phenols will destroy the measuring system Chlorine is disruptive, ozone is disruptive, <b>hydrogen peroxide is not disruptive</b>
<b>Pressure resistance</b>	p <sub>abs</sub> max. 2 bar p <sub>rel</sub> max. 1 bar No pressure fluctuations are admissible when operating under pressure. We recommend unpressurized operation (atmospheric pressure).
<b>Material</b>	Shaft, cover, cap: PVC, stainless steel, silicone rubber, PA
<b>Dimensions</b>	Diameter: 25 mm, length: 220 mm
<b>Weight</b>	approx 125 g
<b>Maintenance</b>	Check the measurement signal: regularly, at least once a week Replace the membrane cap: once a year (subject to water quality) Change the electrolyte: every 3 to 6 months
<b>Storage</b>	Sensor: Frost-free, dry and without electrolyte, can be stored for an unlimited time at +5 to +45 °C Membrane cap: Used membrane caps cannot be stored! Electrolyte: In the original bottle and protected against sunlight at +5 to +25 °C

## Dimensions

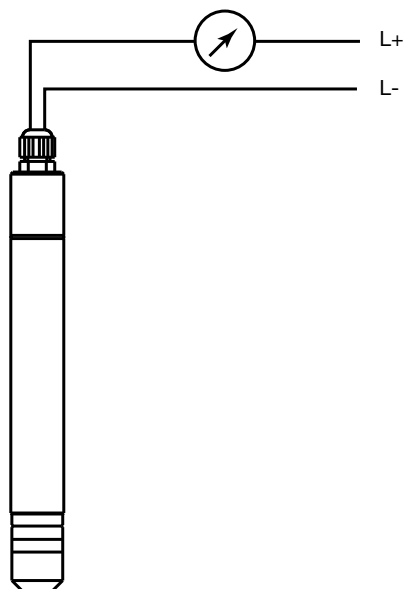
Type 202636/55  
 Type 202636/60



## Scope of delivery

Two-wire sensor including membrane cap, electrolyte and special abrasive paper for cathode cleaning.  
 In addition, for devices with measuring range 0 to 20,000 mg/l and 0 to 50,000 mg/l: device holder with forceps.

## Electrical connection



Connection		Screw terminals
Voltage supply DC 12 to 30V	+ -	1 L+ 2 L-
Output 4 to 20mA, two wires Impressed current 4 to 20mA in voltage supply	+ -	1 L+ 2 L-

## Accessories

### Flow-through fitting for sensors according to type sheets 202630, 202631, 202634, 202636

Part no.: 00392611

#### Materials

Case: PVC

Measuring vessel: PC

#### Admissible temperature / pressure

0 to +50 °C; at 1 bar

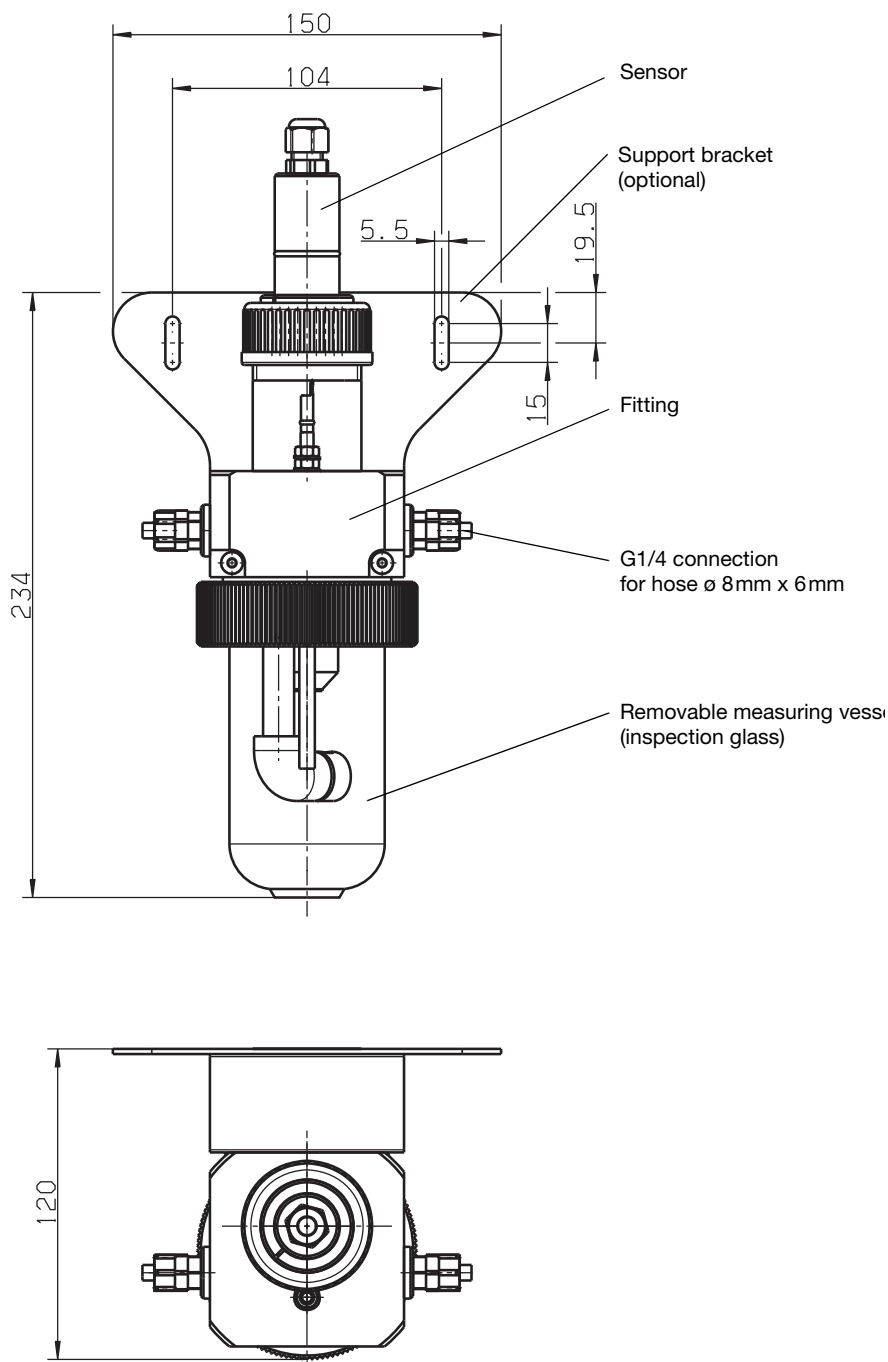
#### Connection

Hose screw connection G 1/4

#### Mounting

Optional: stainless steel support bracket, Mat. no. 1.4571

Part no.: 004557066



**Flow monitoring device**

Consisting of:

**Flow monitor**

Part no.: 00396471

and

**Fitting for flow monitor**

Part no.: 00396470

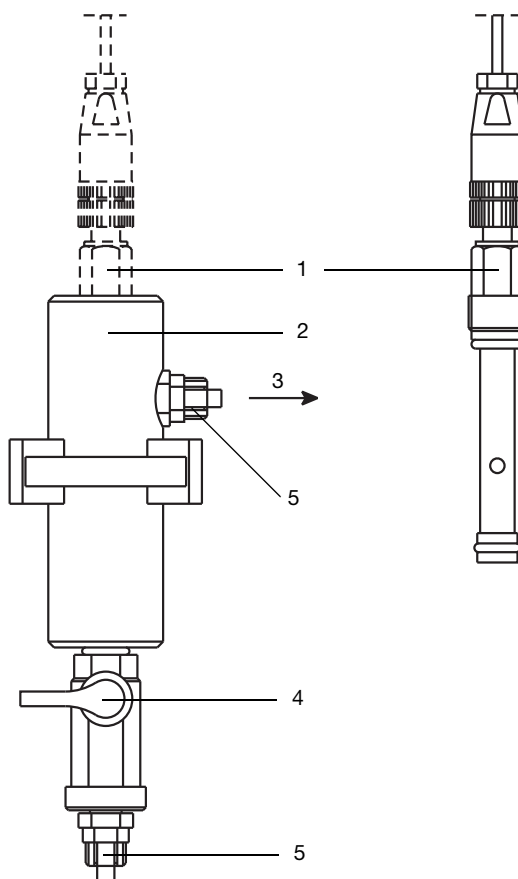
**Function**

For proper operation, the incident flow of the process medium on the sensors must be at least 15cm / s.

Below this minimum incident flow velocity, the sensor will indicate values that are too low. This could result in dangerous overdosing or underdosing in a connected control system. Above the minimum incident flow velocity, the measurement signal is only slightly affected by the incident flow velocity.

The flow monitoring device can be used to monitor the minimum incident flow velocity of 15cm / s.

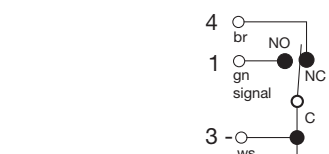
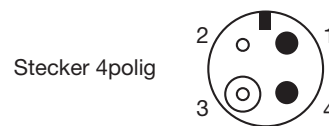
The flow monitoring device consists of a flow monitor and the corresponding fitting. The flow monitoring device is installed in series with the flow-through fitting. If the minimum flow speed is not reached or is exceeded, a contact in the terminal head of the flow monitor switches. The contact can be used, for example, to control a binary input of the indicator/controller for JUMO AQUIS 500 AS standard signals. If the incident flow is too low, the JUMO AQUIS 500 AS is placed in "HOLD". This can prevent imprecise dosing.



- 1 Flow monitor part no.: 00396471
- 2 Fitting for flow monitor part no.: 00396470
- 3 Flow direction
- 4 Shut-off valve
- 5 G1/4 connection (for hose diameter 8mm x 6mm)

**Electrical connection**

of the flow monitor



**Function**

Contact (3 + 4) of the flow monitor is opened at a flow velocity of 15cm / s or greater.

**Options**

**JUMO AQUIS 500 AS**

Indicator/controller for standard signals and temperature  
 (for detailed information, see type sheet 202568)



**JUMO dTRANS AS 02**

Transmitter/controller for standard signals and temperature  
 (for detailed information, see type sheet 202553)





## Order details

	<b>(1) Basic type</b>
202636	Sensor
	<b>(2) Basic type extension</b>
55	for peracetic acid (PAA)
60	for hydrogen peroxide (H <sub>2</sub> O <sub>2</sub> )
	<b>(3) Measuring range</b>
60	0 to 500 mg / l (ppm)
80	0 to 10,000 mg / l (ppm)
81	0 to 20,000 mg / l (ppm)
85	0 to 50,000 mg / l (ppm)

<b>Order code</b>	<b>(1)</b>	<b>(2)</b>	<b>(3)</b>
<b>Order example</b>	202636	/ 60	- 80

**Note:**  
 The type code is an order detail, not a modular system.  
 If possible, choose items listed under "stock versions" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features. In case of doubt, please ask.

## Stock versions (delivery 3 working days after receipt of order)

<b>Type</b>	<b>Part no.</b>
Sensor for hydrogen peroxide, type 202636/60-80	00409343

## Accessories (delivery 10 working days after receipt of order)

<b>Designation</b>	<b>Part no.</b>
Flow-through fitting for sensors according to type sheets 202630, 202631, 202634 and 202636	00392611
Support bracket for flow-through fitting	00455706
Flow monitor	00396471
Fitting for flow monitor	00396470
Special electrolyte for 202636/55	00440821
Special electrolyte for 202636/60	00438126
Spare parts set for 202636/55 and 202636/60, measuring range 0 to 500 mg/l <sup>1</sup> (1x membrane cap, fine abrasive paper)	00409344
Spare parts set for 202636/55 and 202636/60, measuring range 0 to 10,000 mg/l <sup>1</sup> (1x membrane cap, fine abrasive paper)	00438125
Spare parts set for 202636/55 and 202636/60, measuring range 0 to 20,000 mg/l and 0 to 50,000 mg/l <sup>1</sup> (1x membrane cap, fine abrasive paper, device holder)	00572408
Matching indicator/controller: JUMO AQUIS 500 AS, type: 202568/20-888-888-310-310-23/000 (for other versions see type and price sheet 202568)	00528718
Matching transmitter / controller: JUMO dTRANS AS 02, type: 202553/01-8-01-4-0-00-23/000 (for other versions see type and price sheet 202553)	00550842

<sup>1</sup> **Important:** When ordering spare parts sets for measuring cells, always specify the measuring range!

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## 2-wire transmitter

for pH Type 202701/10

for redox Type 202701/20

### General application

The 2-wire transmitter is intended for linking a pH or redox combination electrode with plug connection to indicators/controllers with an active 4–20 mA input. On the output side the 2-wire transmitters have a connection for supply and standard signal. Zero and slope of pH combination electrodes are adjusted at the indicator/controller. No calibration is required for redox electrodes.

The 2-wire transmitter is screwed directly on to the electrode head of the combination electrodes.

This circuit arrangement largely prevents interference from dirt, humidity, or electrical fields from live conductors. A conventional coaxial cable or a 2 wire cable with screen is sufficient as connection between the transmitter and the indicator. This permits trouble-free transmission over larger distances between the transmitter and the indicator.

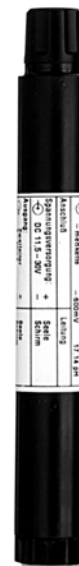
An isolated supply is recommended when operating the transmitters with a PLC.

#### Type 202701 for pH

The 2-wire transmitter converts the high-impedance signal of the pH electrode (up to 1000 MΩ) into a standard 4–20 mA signal.

#### Type 202702 for redox

The 2-wire transmitter converts the signal of the redox electrode into a standard 4–20 mA signal.



### Technical data

#### Type 202701/10 pH

##### Input

The high-impedance voltage signal of the pH electrode in the range +600 to –600 mV is converted to a standard 4–20 mA signal (not isolated).

#### Type 202701/20 redox

##### Input

The voltage signal of the redox electrode in the range of –1000 mV to +1000 mV is converted to a standard 4–20 mA signal (not isolated).

#### General

##### Case

PVC

##### Weight

0.2 kg max.

##### Electrical connection input

coaxial connector suitable for most commercially available electrode connector heads

##### Electrical connection Output

21: coaxial screw-plug connection suitable for cable socket N

32: Harting plug (Harax M12)

83: M12 plug (4 pole)

##### Supply $U_B$

11.5 to 30 V DC  
 nominally 24 V DC

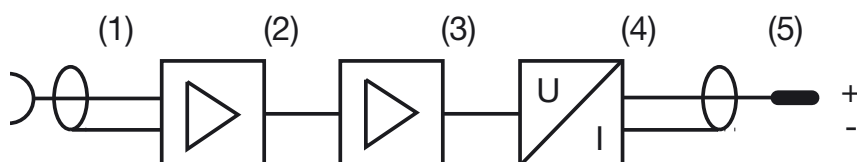
##### Max. current uptake

40 mA approx.

##### Supply voltage error

0.02 %max. of span per Volt deviation from 24 V DC

### Block diagram



### Operation

The combination electrode is connected to the cable socket N (1). The input voltage is passed to the amplifier (2). Stage (3) determines the start and end of the signal assignment. Stage (4) converts the voltage into a proportional 4–20 mA current. The connector (5) connects the 2-wire transmitter to the next instruments.

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**Output signal**

max. burden  $\frac{U_B - 11.5V}{0.02A}$

**Deviation of characteristic**

2.5% max. referred to span

**Ambient temperature error**

0.2% max. per 10°C referred to span

**Burden error**

0.02% max. of span per 100 Ohm burden

**Permitted ambient temperature**

-5 to +55°C

**Protection**

IP 65 to EN 60 529

**CE symbol**

EN 50 081 Part 1

EN 50 082 Part 2

**Dimensions**

diameter 20 mm approx.

length 145 mm approx.

**Connections**

**N cable socket**

**Coaxial plug**

outer sleeve -

inner pin +

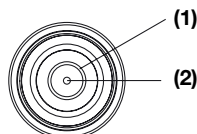
The current 4 – 20 mA in the output circuit provides the supply to the 2-wire transmitter (4mA) and the output signal (4 – 20 mA). 4 ... 20 mA).

**Coaxial cable**

screen -

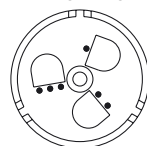
inner conductor +

**Plug**



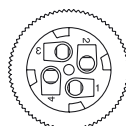
(1) = outer sleeve = -  
 (2) = inner pin = +

**Harting plug**



• = +  
 •• = -  
 ••• = NC

**M12 plug**



1 = +  
 2 = -  
 3 = -  
 4 = +

**Supply units suitable for the 2-wire transmitter:**

e.g. supply units to Data Sheet 40.9750, if no isolation is required, or supply units to Data Sheet 95.6055 when isolation is necessary.

**Order details**

**(1) Basic type**

202701 2-wire transmitter

**(2) Basic type extension**

10 pH  
 20 redox

**(3) Electrical connection - input**

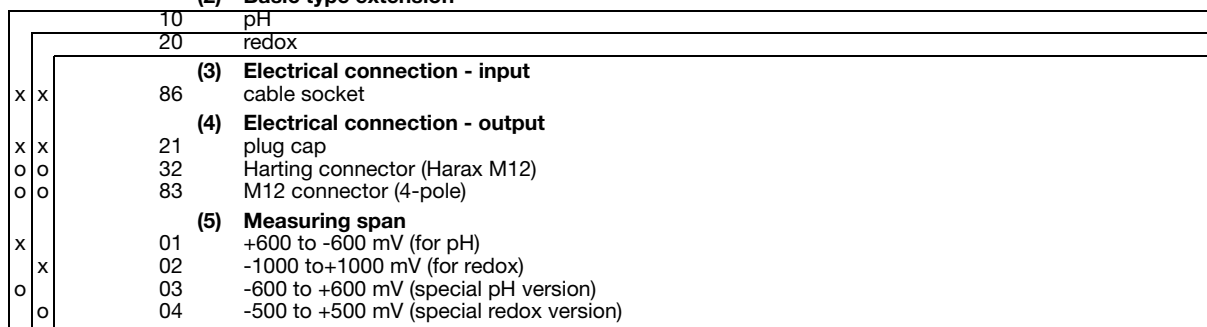
86 cable socket

**(4) Electrical connection - output**

21 plug cap  
 32 Harting connector (Harax M12)  
 83 M12 connector (4-pole)

**(5) Measuring span**

01 +600 to -600 mV (for pH)  
 02 -1000 to +1000 mV (for redox)  
 03 -600 to +600 mV (special pH version)  
 04 -500 to +500 mV (special redox version)



(1) (2) (3) (4) (5)

**Order code** [ ] / [ ] - [ ] - [ ] - [ ]

**Order example** 202701 / 10 - 86 - 21 - 01

**JUMO GmbH & Co. KG**  
 Delivery address: Mackenrodtstraße 14,  
 36039 Fulda, Germany  
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**Stock versions** (shipment: 3 working days after receipt of order)

Type	Description	Sales No.
202701/10-86-21-01	pH	20/00332272
202701/20-86-21-02	Redox	20/00335049

**Production versions** (shipment: 10 working days after receipt of order)

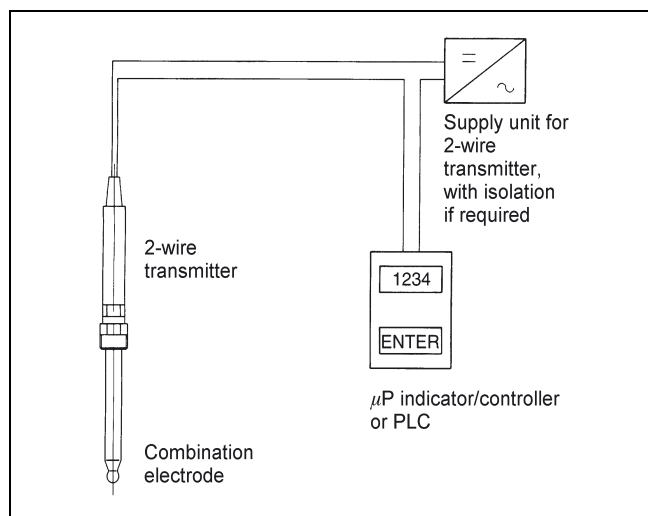
Type	Description	Sales No.
202701/10-86-83-01	pH, M12 connector	20/00409877
202701/10-86-83-03	pH, M12 connector, -600 to +600mV	20/00415579

**Accessories** (shipment: 10 working days after receipt of order)

Type	Description	Sales No.
N cable socket (only for connection 21) Type 2991-00-0 / Ø 5mm		20/00409877
Adapter for checking the signal output of the 2-wire transmitter	matching only to electrical connection 21	20/00332273

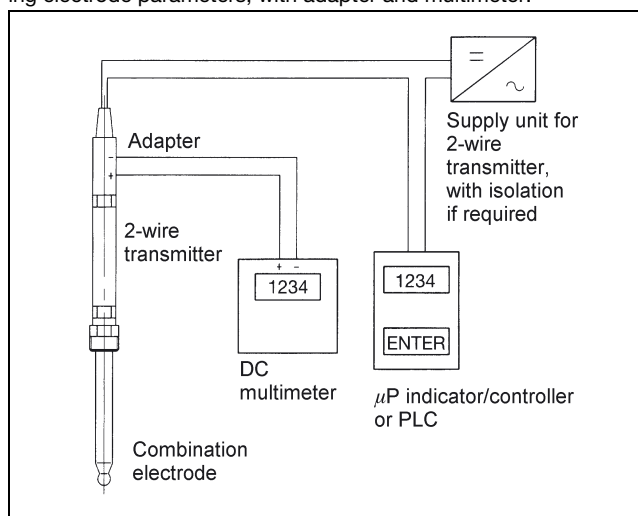
**Example 1:**

Possible arrangement of a complete measurement circuit:



**Example 2:**

Possible arrangement of a complete measurement circuit for determining electrode parameters, with adapter and multimeter:



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# Hand-held Meters for analytical measurement variables

Type 202710

## Brief description

Product Group 202710 instruments are battery-powered hand-held meters for measuring

- pH, redox potential (ORP) and temperature or
- electrolytic conductivity and temperature.

They are used in laboratories, industrial and wastewater plant, in aquaria or fish farms, etc.

The instruments feature a memory for the MIN/MAX value, and a "Hold" function. To increase the operational life of the battery, the instrument can be switched off automatically within the range from 1 minute to 2 hours; continuous measurements can also be performed. The instruments are operated from a membrane keypad.

The 202710/20 version is an instrument for measuring pH, redox potential (ORP) and temperature. It features both manual and automatic temperature compensation of the measurement. The Pt100 temperature probe necessary for this purpose is available as an option. A standard combination electrode can be connected via a BNC socket. The combination electrode is adjusted through a 2-point calibration.

The 202710/30 version is an instrument for measuring electrolytic conductivity and temperature. The pre-assembled conductivity cell incorporates graphite electrodes and has a cell constant of  $1.0 \text{ l/cm}$ . The temperature probe for automatic temperature compensation is integrated in the measuring cell. The hand-held meter always indicates the conductivity, which is compensated for 25°C. Thanks to the automatic range selection, the measurement is always displayed within the optimum range. This function can also be switched off.



Type 202710/20/000



Type 202710/30/000

## Key features

- MIN and MAX memory
- "Hold" function
- Adjustable automatic switch-off
- Easy-to-read, 2-line LC display
- Supply from a 9 V block battery
- Display of battery condition
- Compact design

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## Technical Data

### Device version 202710/20

pH range	0 to 14 pH
Accuracy	±0.01 pH
Redox range	-1999 to +2000 mV
Accuracy	±0.1 mV
Temperature range	-100 to +250 °C
Accuracy	±0.2 °C
Operating temperature	0 to 50 °C
Storage temperature	-20 to +70 °C
Voltage supply	9 V block battery, type IEC 6F22
Current drawn	Approx. 30 mA
Special functions	<ul style="list-style-type: none"> <li>• Segment test at switch-on</li> <li>• Measuring circuit monitoring</li> <li>• "Hold" function (freeze latest measurement)</li> <li>• MIN/MAX memory</li> <li>• Automatic switch-off (can be de-activated)</li> <li>• Battery change display</li> </ul>
Electrode/probe connection for pH/redox combination electrodes for temperature probe	BNC Mini DIN socket
Dimensions	142 mm × 71 mm × 26 mm (L × W × H)
Housing material	ABS
Protection class	IP65 at front
Weight	Approx. 145 g (without sensor)

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**Device version 202710/30**

Conductivity ranges	0 to 200 µS/cm 0 to 2000 µS/cm 0 to 20 mS/cm 0 to 200 mS/cm
Accuracy	±0.5 % of range
Resolution	0.1 µS/cm 1.0 µS/cm 10 µS/cm 0.1 mS/cm
Temperature range	0 to 85 °C
Accuracy	±0.2 °C
Resolution	0.1 °C
Cell constant of sensors	$K = 1.0 \frac{1}{\text{cm}}$
Temperature coefficient of sensors	According to EN 27888 (non-linear compensation)
Temperature compensation	Automatic
Operating temperature	
Device	0 to 50 °C
Sensor	-5 to +80 °C
Storage temperature	-20 to +70 °C
Voltage supply	9 V block battery, type IEC 6F22
Current drawn	Approx. 50 mA
Special functions	<ul style="list-style-type: none"> <li>• Segment test at switch-on</li> <li>• Measuring circuit monitoring</li> <li>• "Hold" function (freeze latest measurement)</li> <li>• MIN/MAX memory</li> <li>• Automatic range changeover</li> <li>• Automatic switch-off (can be de-activated)</li> <li>• Battery change display</li> </ul>
Dimensions	
Hand-held meter	142 mm × 71 mm × 26 mm (L × W × H)
Sensor	Length: 120 mm, diameter: 12 mm Attached connecting cable, approx. 1 m long
Housing material	ABS
Protection class	IP65 at front
Weight	Approx. 225 g (with sensor)

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## Order details

		<b>(1) Basic type</b>
202710/20		Hand-held meters for analytical measurement variables - pH, redox <sup>a</sup> , temperature <sup>b</sup>
202710/30		Hand-held meters for analytical measurement variables - conductivity <sup>c</sup> , temperature <sup>d</sup>
		<b>(2) Extra codes</b>
x	x	000 None
x		070 Including case with calibration solutions pH 4.00 and pH 7.00
x		071 Including case

<sup>a</sup> Combination electrode not included in delivery<sup>b</sup> Temperature sensor Pt100 not included in delivery<sup>c</sup> Including conductivity sensor<sup>d</sup> The temperature sensor is integrated in the sensor.

<b>Order code</b>	<input type="text" value="(1)"/>	/	<input type="text" value="(2)"/>
<b>Order example</b>	202710/20	/	070

## Stock versions

(delivery: 3 working days after receipt of order)

Type	Description	Part no.
202710/20/000	pH, redox, temperature	00453200
202710/20/070	pH, redox, temperature	00460986
202710/30/000	Conductivity, temperature	00454356

## Production versions

(delivery: 10 working days after receipt of order)

Type	Description	Part no.
202710/30/071	Hand-held meter for conductivity/temperature (including cell) in case	00454357

## Accessories

Type	Part no.
Pt100 immersion temperature probe for type 202710/20-000	00453208
JUMO ecoLine/JUMO BlackLine – pH combination electrodes (201005) <sup>a</sup>	
JUMO ecoLine/JUMO BlackLine – Redox combination electrodes (201010) <sup>a</sup>	
Laboratory pH single-rod electrodes (201030) <sup>a</sup>	
Laboratory redox single-rod electrodes (201035) <sup>a</sup>	

<sup>a</sup> Depending on application

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# Simulators and Calibration Adapters for pH, Redox and Conductivity Measurement

## Brief description

Simulators and calibration adapters are used to start up, adjust, monitor and troubleshoot pH, redox and conductivity measuring points.

### Simulator for pH/redox, type 202711/10

The pH simulator is used to check that technical pH and redox measuring instruments are working correctly. Instead of a conventional pH or redox electrode, the simulator is connected to a measurement amplifier. This allows the laid connecting cable and the measurement amplifier to be checked. The simulation of pH values 0 - 14 allows the measurement amplifier outputs (display values, control contacts or analog/digital outputs) to be checked and optimized when the system is dry. Using the simulator with redox measurements simulates a voltage of  $\pm 414$  mV in steps of up to 59 mV.

A switch allows high-resistance checking (1000 MOhm impedance) of the laid connecting cable for shunts or moisture problems. The pH simulator runs on a 9 V battery (included in delivery). There is an integrated test function for checking the battery. Different adapter cables are available as options (see accessories) for connecting to the pH or redox measurement section.



Type 202711/10

### Simulator for electrolytic conductivity, type 202711/20

This simulator is used to check measurement amplifiers and connecting cables for electrolytic conductivity. Different conductivity measurement values can also be simulated to test and optimize display and control behavior, as well as the outputs of measurement amplifiers and downstream systems. The instrument is therefore helpful during dry system startups and when troubleshooting. The simulator can only be used with conductivity measuring instruments based on conductive 2-electrode measuring cells. A printed table shows the conductivity values for the different simulation resistances, which are selected by means of a rotary switch. The table includes the assignment to different cell constants ( $K = 0.01; 0.1; 1.0; 3.0$  and  $10.0$ ). The temperature input of a measuring instrument can be simulated, as well as the conductivity. To do this, a Pt100 is simulated at temperatures of 25 °C and 75 °C. A 1.1 m long connecting cable is included.



Type 202711/20

### Calibration adapter for inductive conductivity measurement, type 202711/21

This adapter allows the adjustment between the measurement amplifier and the inductive conductivity measurement probe to be made during a new installation or when a component has been replaced. The instrument is designed for use with measurement amplifiers JUMO AQUIS 500 Ci as per data sheet 202566 and measuring cells as per data sheet 202941.



Type 202711/21

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## Technical data

### Simulator for pH/redox, type 202711/10

<b>Simulation range</b>	0 to 14 pH in 1 pH steps and +414 mV to -414 mV redox voltage in 59 mV steps
<b>Accuracy</b>	± 1 % of the set pH value
<b>Reference temperature</b>	25 °C
<b>Output resistance</b>	1 kΩ or 1000 MΩ, depending on the switch setting
<b>Power supply</b>	ANSI 1604D PP3 (9 V monobloc battery), included in delivery
<b>Battery test</b>	integrated
<b>1000-MΩ circuit</b>	for testing pH cables
<b>Connection</b>	BNC socket and socket for reference electrode
<b>Permissible ambient temperature</b>	0 to 50 °C
<b>Housing</b>	aluminum
<b>Dimensions</b>	130.5 mm x 73 mm x 59 mm (H x W x D)

### Simulator for electrolytic conductivity, type 202711/20

<b>Simulation range</b> for cell constant K=0.01 to 10.0  The conversion table is located on the base of the instrument housing.  K = cell constant [1/cm] R = resistance [ohms]	in steps form 2 μS/cm to approx. 800 mS/cm					
	<b>R/K</b>	<b>0.01</b>	<b>0.1</b>	<b>1.0</b>	<b>3.0</b>	<b>10.0</b>
	12,5 Ω	800 μS	8 mS	80 mS	240 mS	800 mS
	25 Ω	400 μS	4 mS	40 mS	120 mS	400 mS
	50 Ω	200 μS	2 mS	20 mS	60 mS	200 mS
	125 Ω	80 μS	800 μS	8 mS	24 mS	80 mS
	250 Ω	40 μS	400 μS	4 mS	12 mS	40 mS
	500 Ω	20 μS	200 μS	2 mS	6 mS	20 mS
	1200 Ω	8 μS	80 μS	800 μS	2,4 mS	8 mS
	2500 Ω	4 μS	40 μS	400 μS	1,2 mS	4 mS
	5000 Ω	2 μS	20 μS	200 μS	600 μS	2 mS
	12,5 kΩ	800 nS	8 μS	80 μS	240 μS	800 μS
	25 kΩ	400 nS	4 μS	40 μS	120 μS	400 μS
	50 kΩ	200 nS	2 μS	20 μS	60 μS	200 μS
	125 kΩ	80 nS	800 nS	8 μS	24 μS	80 μS
<b>Accuracy</b>	± 1 % of the set resistance value					
<b>Pt100 simulation</b>	25 °C and 75 °C ± 1 °C					
<b>Connection</b>	5-pin diode socket; one open-ended connecting cable (length 1.1 m) is included with the instrument					
<b>Permissible ambient temperature</b>	0 to 50 °C					
<b>Housing</b>	aluminum					
<b>Dimensions</b>	130.5 mm x 73 mm x 59 mm (H x W x D)					

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## Calibration adapter for inductive conductivity measurement, type 202711/21

Simulation range	Cell constant K	
	4 to 5.9 [1/cm]	6 to 8 [1/cm]
	R [ohms]	R [ohms]
1000 µS/cm	20 k	25 k
10.00 mS/cm	2 k	2.5 k
100.0 mS/cm	200	250
1000 mS/cm	20	25
2000 mS/cm	10	12.5
<b>Accuracy</b>	1000 µS/cm to 100.0 mS/cm ± 1 %	
	1000 µS/cm to 2000 mS/cm ± 1.5 %	
<b>Connection</b>	Measuring lead with 2 mm plug, approx. 36 cm long	
	Measuring lead with 2 mm socket, approx. 18 cm long	
<b>Conductivity simulation</b>	Loop measuring lead with 2 mm plug through the probe twice, and plug it into the measuring lead with 2 mm socket.	
<b>Conductivity calculation</b>	$L_f = K \cdot N^2 / R$	
	L <sub>f</sub> = conductivity value	
	K = cell constant	
	N = number of conductor loops through the probe	
	R = resistance	
<b>Housing</b>	PC polycarbonate	
<b>Dimensions</b>	103 mm x 52 mm x 59 mm (H x W x D)	

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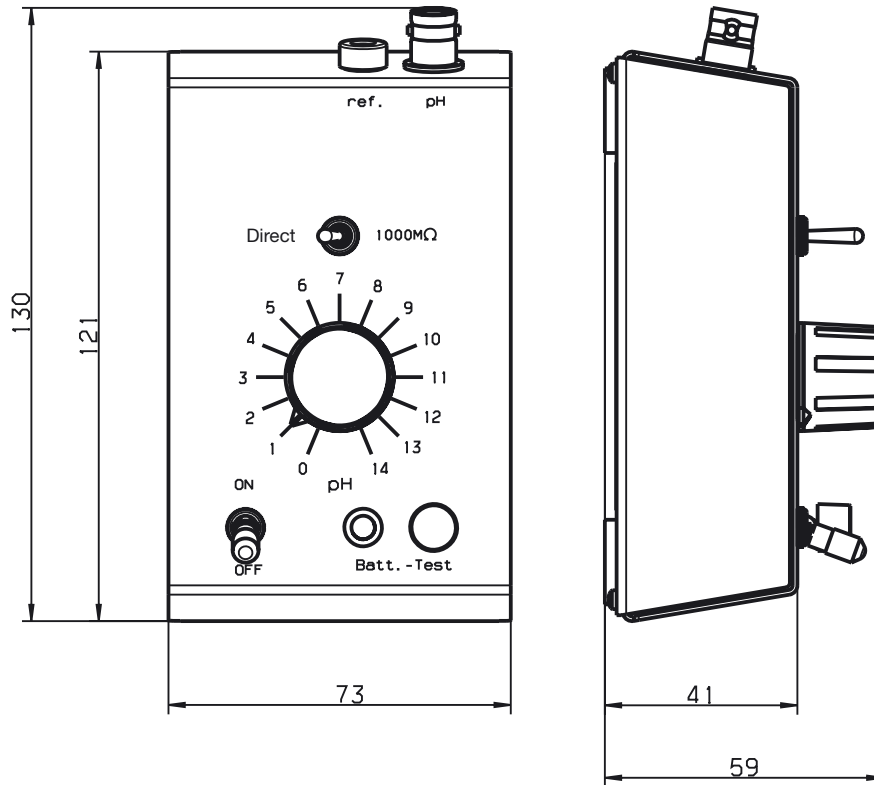
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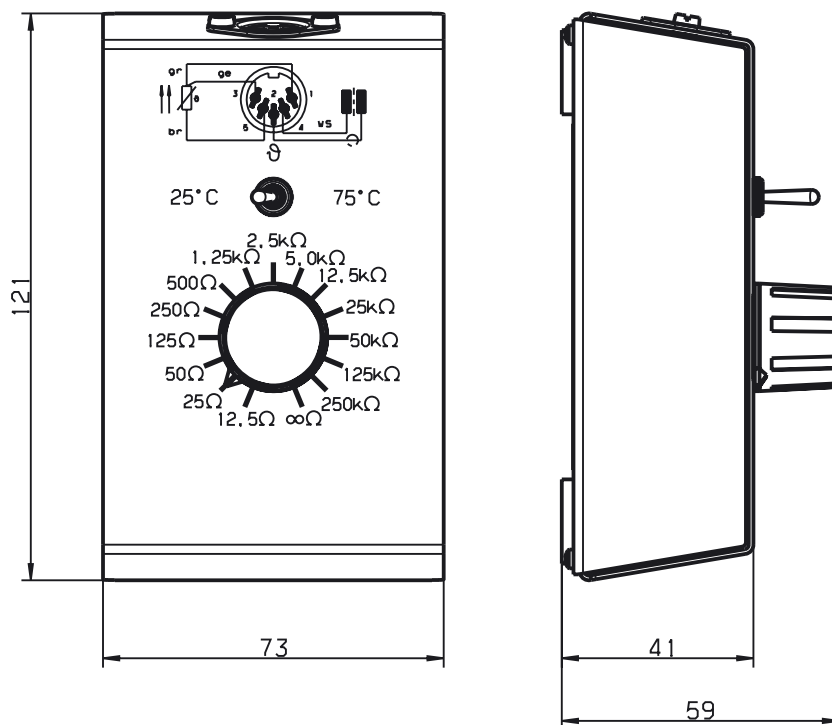


## Dimensions

### Simulator for pH/redox, type 202711/10



### Simulator for electrolytic conductivity, type 202711/20



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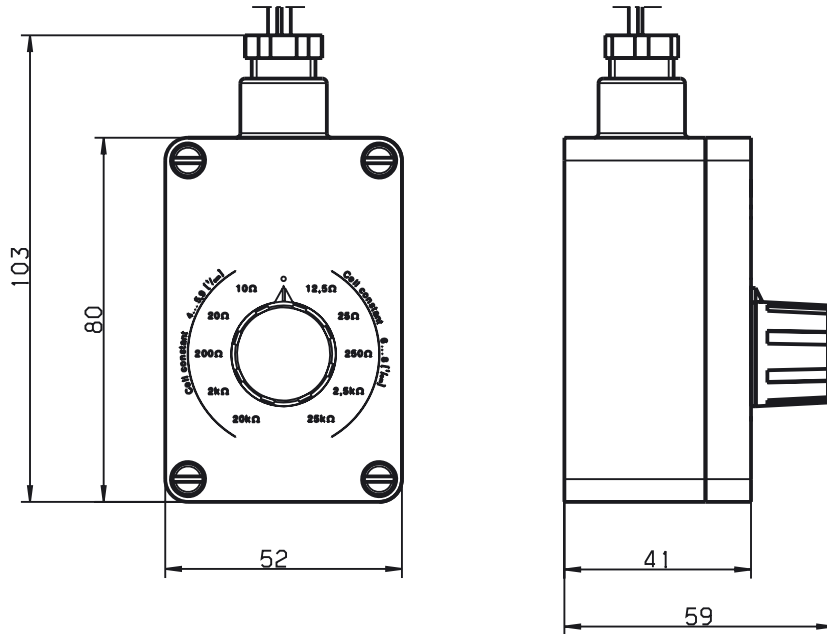
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## Dimensions

### Calibration adapter for inductive conductivity measurement, type 202711/21



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## Order details

**(1) Basic type**

202711	Simulators and calibration adapters
--------	-------------------------------------

**(2) Version**

- |    |   |
|----|---|
| 10 | Simulator for pH/redox  |
| 20 | Simulator for electrolytic conductivity (conductive, 2-electrode measurement) |
| 21 | Calibration adapter for inductive conductivity                                |

<b>Order code</b>	<input type="text" value="(1)"/>	/	<input type="text" value="(2)"/>
<b>Order example</b>	202711	/	10

## Stock versions (delivery 3 working days after receipt of order)

Order code	Sales No.
202711/10	20/00300477
202711/20	20/00300478
202711/21	20/00543395

## Accessories (delivery 3 working days after receipt of order)

Article	Sales No.
Connecting cable for pH simulator 202711/10 BNC plug to BNC plug, length 1.1 m for testing measuring instruments with a BNC socket as the pH input	20/00082906
Connecting cable for pH simulator 202711/10 BNC plug to Shield-Kon® (cable with core-end ferrule), length 1.1 m for testing measuring instruments with screw terminals as the pH input	20/00513412
Connecting cable for pH simulator 202711/10 BNC plug to N plug, length 1.5 m for testing the pH measurement section from the electrode head (for standard electrodes with an N/S7/S8 plug cap); Not suitable for electrodes with integrated temperature sensors!	20/00082908

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# JUMO ecoTRANS pH 03 Microprocessor transmitter/ switching device for pH/Redox voltage and temperature

with a 2-line LCD  
for mounting on a 35 mm DIN rail

## Brief description

Depending on the configuration, the instrument measures and regulates the pH-value or the Redox voltage in aqueous solutions. Typical applications are in general water and wastewater management, measurement of drinking water, process water, surface water and sea water, swimming pool and well water, aquariums, etc.

The transmitter has two analog inputs. The primary analog input is for connection of a pH or Redox electrode. PH or Redox sensors with an isolated reference electrode can also be connected, as well as antimony electrodes. The second analog input is for connection of an RTD temperature probe Pt100 or Pt1000 for temperature compensation.

There are up to two analog outputs and a SPDT relay (changeover contact) available. The analog outputs are galvanically isolated and assigned to the inputs. Either the primary value (pH-value or Redox voltage) or the temperature can be assigned to the relay contact.

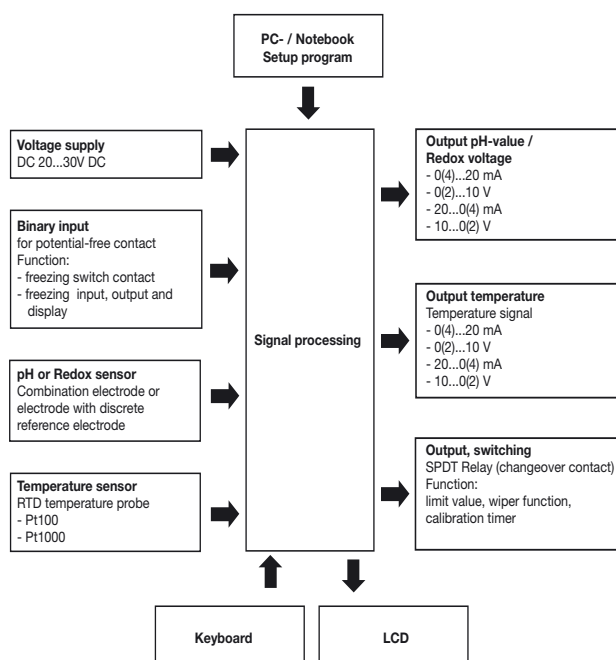
The devices can be operated and configured using the front face buttons and the integrated LCD, or the configuration can also be done very conveniently from a computer using the optional cable and setup program. It is possible to save and print the configuration data from the setup program, thus simplifying plant documentation and allowing for easy downloading of the configuration file to multiple units.

The devices are supplied with a calibration certificate in which the device data and calibration data are documented.



Type 202723/000-...

## Block structure



## Special features

- Can be changed over from pH to mV / ORP (Redox voltage)
- Simple connection of the sensors with screw terminals
- Asymmetric and symmetric connection of the pH-sensors
- 2 galvanically isolated analog outputs 0(4) ... 20mA / 0(2) ... 10V freely configurable as actual value output for pH, Redox or temperature
- Switching output: SPDT relay (changeover contact)
- Monitoring of the medium temperature is possible
- Simple, guided calibration procedure
- 3-way isolation (input, output and supply voltage are galvanically isolated from one another)
- For mounting on a DIN rail
- Calibration timer
- Delivery including calibration certificate

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## Operation

The JUMO ecoTRANS pH 03 can be operated either with the keys of the instrument and the LCD or with the optional setup program via a PC / laptop.

### pH measurement

It is possible to connect both, pH combination electrodes as well as glass electrodes with a separate reference electrode. There are two possible connection types:

- asymmetric high-resistance (the common variant)
- symmetric high-resistance

The symmetric connection can facilitate a more stable measurement in electrically disturbed media (e.g. from insulation problems of electrical operating equipment, pumps etc.).

The temperature compensation of the pH-value is achieved through the automatic measurement of the temperature over the second input or by manually inputting the value.

### Redox measurement

It is possible to connect both - Redox combination electrodes as well as metal electrodes with a separate reference electrode. The display can be either in mV or freely scaled.

## Calibration

### pH-value measurement

- Single-point calibration
- Two-point calibration

### Redox measurement

- Single-point calibration with mV display
- Two-point calibration with display in % (free-scale)

### Calibration timer

The calibration timer indicates when a user-defined routine calibration interval has been reached. The number of days after the timer alarm is triggered is adjustable (plant specification or specification of owner-operator).

## Binary input

The following functions can be invoked by means of the binary input:

- Freezing of switch contact  
Upon activation of this function, the switch contact remains in its current switch position.
- Freezing of the inputs, outputs and display.  
Upon activation of this function, the momentary values are retained.
- Freezing of switch contact and actual value outputs  
Upon activation of this function, the actual value outputs retain their momentary values and the switch contact retains its momentary switch position.

Application:

Avoiding uncontrolled reaction of the outputs e.g. in case of cleaning work at the sensor. If the corresponding connecting terminals are bridged by a potential-free contact (e.g. a relay), the pre-defined function is activated.

## Functions of the outputs of the JUMO ecoTRANS pH 03

### Analog outputs

- One analog actual value output each for pH- (Redox-) value and temperature.
- The analog output signals are freely scalable (measurement range starting and end value)

In case of the measurement range being overshoot or undershoot, the analog outputs can take on the following states:

"Low" corresponds to 0 mA or 4 mA or 3.4 mA / 0 V or 1.4 V or 2 V depending on the selected output signal type.

"High" corresponds to 20 mA or 22 mA / 10 V or 10.7 V depending on the selected output signal type.

These states can be recognized by downstream devices (e.g. a PLC) as "irregular" and used for raising alarms.

- Simulation of the actual value output:

The analog actual value outputs can be freely set in "Manual" mode.

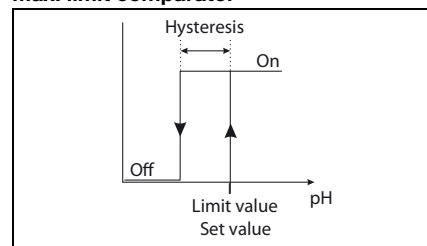
Application: Dry commissioning of the plant (without electrode); Troubleshooting; Service.

### Switch output

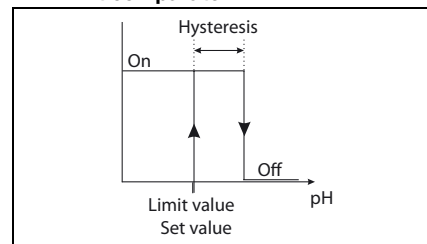
The switch output can be used for monitoring the pH- (Redox-) value or the temperature. The following functions can be assigned to the relay output:

- Process alarms (high or low limits) with programmable hysteresis.

#### Max. limit comparator



#### Min. limit comparator



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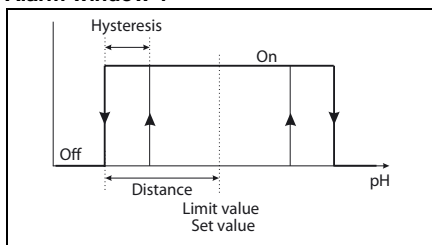
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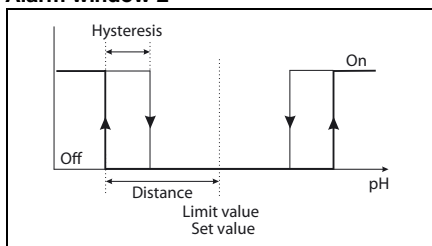


- Deviation band alarm high or low.

**Alarm window 1**

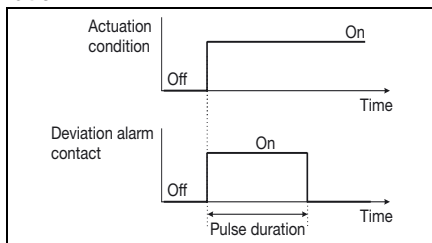


**Alarm window 2**

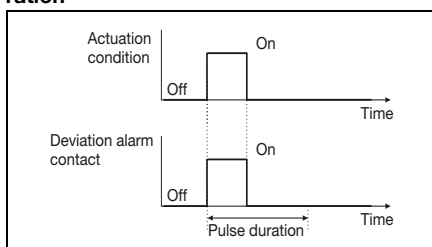


- Deviation alarm (wiper function), output closes briefly when the switching point is reached and then opens again.

**Deviation alarm contact triggering condition longer than pulse duration**



**Deviation alarm contact triggering condition shorter than pulse duration**



- Actuation and dropping delay programmable.
- Window limit comparator.
- Switching outputs can be inverted.
- The behavior of the measurement range overshooting or undershooting is programmable (actuation/ dropping).
- Signaling "elapsed calibration timer".
- Signaling sensor error, out of range.

**Technical data**

**Inputs**

**Analog input 1 (pH / Redox)**

- Combination electrode
- Glass or metal electrodes with separate reference electrode
- Antimony electrode

**Measurement ranges pH / Redox**

-2 ... 16 pH or  
 -1500 ... +1500 mV

**Accuracy pH / Redox**

± 1% of the measurement range

**Analog input 2 (Temperature)**

- Resistance thermometer  
 Pt100 or Pt1000

The RTD temperature sensor can be connected in a 2-wire circuit.

It is possible to toggle the display of the readings between °C / °F.

**Temperature offset analog input 2**

An offset correction of the actual value can be carried out in the range from -20 ... +20°C.

**Temperature, measurement range**

-10 ... +150°C or 14 ... 302°F

**Characteristic curve deviation, temperature**

in case of Pt100 / Pt1000: ≤ 1.5 K of the measurement range

**Outputs**

**Two analog outputs:**

freely configurable:

- 0(2) ... 10V  $R_{Load} \geq 2 \text{ k}\Omega$  or
- 10 ... (2)0V  $R_{Load} \geq 2 \text{ k}\Omega$  or
- 0(4) ... 20mA  $R_{Load} \leq 400 \Omega$  or.
- 20 ... (4)0mA  $R_{Load} \leq 400 \Omega$

galvanically isolated to the inputs:

$\Delta U \leq 30V \text{ AC}$  or  $\Delta U \leq 50V \text{ DC}$

Scaling range minimum 10% of the measurement range

**Characteristic curve deviation of the output signal**

≤ 0.075% of the measurement range

**Relay output:**

SPDT contact

Breaking capacity: 8 A/250V AC or 8 A/24V DC with resistive loads.

Contact life: > 100,000 switching operations at rated load.

**General characteristic values**

**A/D converter**

Resolution 14Bit

**Sampling time**

500ms = 2 measurements / second

**Ambient temperature influence**

≤ 0.6% / 10 K

**Measurement circuit monitoring**

Input 1 (primary value): out-of-range

Input 2 (temperature): out-of-range,

sensor short-circuit, sensor rupture.

The outputs take on a defined (configurable) state in case of a fault.

**Data backup**

EEPROM

**Voltage supply**

20 ... 30V DC, residual ripple <5%,

power drawn ≤ 4 W,

with polarity reversal protection.

Operation only at SELV- or PELV circuits.

**Electrical connections**

Screw terminals up to 2.5 mm<sup>2</sup>

**Operating temperature range**

0 ... 50°C

**Functional temperature range**

-10 ... +60°C

**Permissible storage temperature**

-20 ... +75°C

**Climatic requirements**

rel. humidity ≤ 75% without condensation

**Protection rating**(according to EN 60 529)

IP 20

**Electrical safety**

in accordance with EN 61 010

air gaps and leakage paths for

- overvoltage category II

- degree of fouling 2

**Electromagnetic compatibility**

according to EN 61 326

Immunity to interference: Industrial

requirement

class B

**Housing**

DIN rail mounting made of PC (Polycarbonate)

**Assembly**

on DIN rail 35mm x 7.5mm according to

DIN EN 60 715

**Installation position**

as desired

**Weight**

approx. 150g

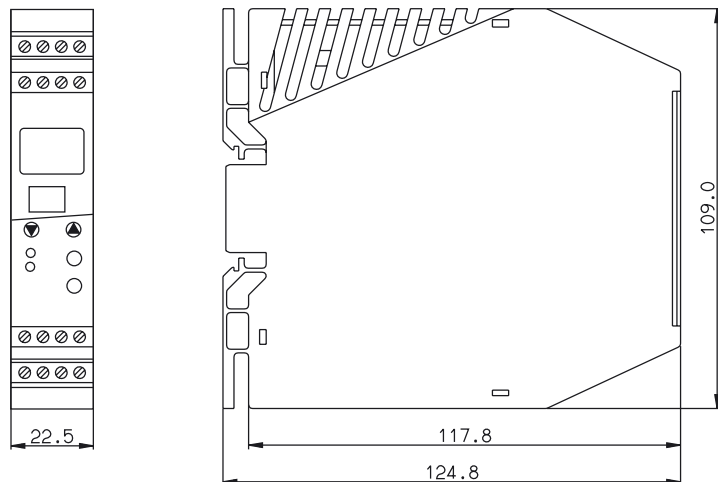
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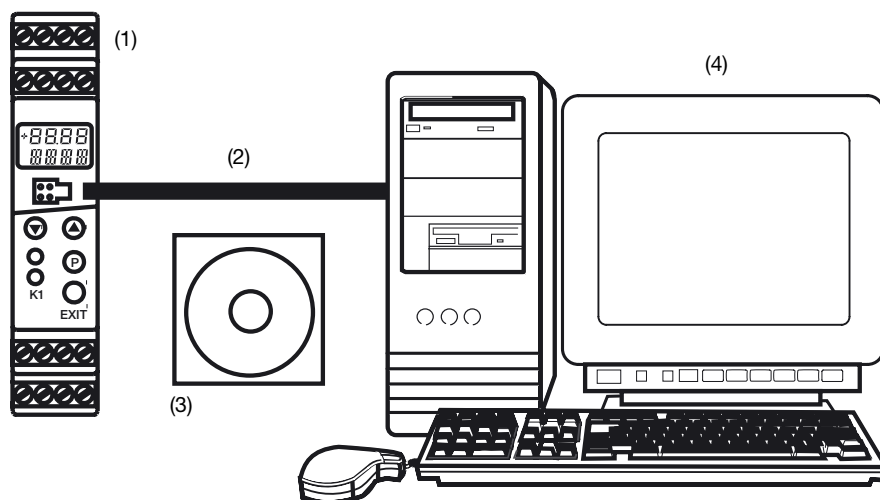
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## Dimensions



## Operation via Setup interface



- (1) JUMO ecoTRANS pH 03
- (2) PC interface cable (optional accessories)
- (3) JUMO PC Setup Software, multi-lingual D / GB / F (optional accessories)
- (4) PC or Notebook with USB port  
Operating system: Windows 2000<sup>®</sup>, Windows XP<sup>®</sup> or Windows NT<sup>®</sup> from 4.0 onwards

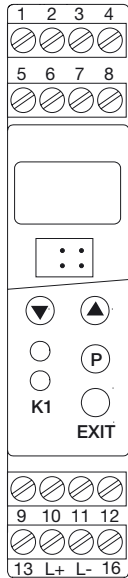
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## Electrical connections



Measurement inputs	Termination assignment	Symbol
pH combination electrode or Redox combination electrode	16 13	Reference system Glass electrode / metal electrode (inner conductor)
pH glass electrode or metal electrode (with separate reference electrode)	13	Glass / metal electrode (inner conductor)
Reference electrode (with separate electrodes)	16	Reference system
Liquid potential (connect only with symmetric connection)	12	
Reference thermometer in two-wire circuit	9 10	
Binary input	11 12	

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Outputs	Termination assignment		Symbol
I analog actual value output pH / Redox (galvanically isolated)	5 6	+ -	
II analog actual value output temperature (galvanically separate)	7 8	+ -	
III Relay	1 3 4	common break (n.c.) make (n.o.)	

Voltage supply	Termination assignment		Symbol
Voltage supply (with polarity reversal protection)		L- L+	

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**Order details:**

**JUMO ecoTRANS pH 03**  
**Microprocessor transmitter/ switching device**  
**for pH-value/ Redox voltage and temperature**

**(1) Basic type**

	202723	JUMO ecoTRANS pH 03 Microprocessor transmitter/ switching device for pH-value/ Redox-voltage and temperature
x	888	<b>(2) Output I (pH-value/ Redox-voltage)</b> Analog actual value output, freely programmable
x	000	<b>(3) Output II (temperature)</b> None
o	888	Analog actual value output, freely programmable
x	000	<b>(4) Output III (switching)</b> None
o	101	1x relay, toggle contact
x	000	<b>(5) Extra codes</b> none
o	024	With PC-Setup software

x = standard  
 o 0 optional  
 - = not possible

	(1)	/	(2)	-	(3)	-	(4)	/	(5)
<b>Order code</b>	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
<b>Ordering example</b>	202723	/	888	-	888	-	101	/	024

**Stock versions** (shipping in 3 working days of receipt of order)

Type	Description	Part No.
202723/888-000-000/000	One analog output for pH / Redox, without relay	20/00508665
202723/888-888-101/000	Two analog outputs, one relay output	20/00508663
202723/888-888-101/024	Two analog outputs, one relay output, with Setup software	20/00508664

**Accessories** (shipping in 3 working days of receipt of order)

Designation	Part No.
PC-Setup software for JUMO ecoTRANS pH 03	20/00513893
PC interface cable with USB / TTL-transducer and two adapters (USB connecting cable)	70/00456352
pH simulator (see Data Sheet 201090)	20/00300477
Connecting cable for pH-simulator, 1.5 m, BNC-plug and stripped cable ends	20/00513412
Switching mode power supply, Type PS5R-A24 for DIN rail assembly; Input voltage 100 ... 240V AC / 50 ... 60Hz, Output voltage 24V DC / 0.3A	20/00374661

For compatible pH or Redox sensors, see Data Sheets 201005, 201020 and 201030.

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# JUMO ecoTRANS Lf 01/02

## Microprocessor Transmitter/Switching Device for Conductivity

Housing for DIN rail mounting (35 mm × 7.5 mm to EN 60715 A.1)

### Brief description

The JUMO ecoTRANS Lf 01/02 conductivity transmitter is used to measure the conductivity of liquids in conjunction with electrolytic conductivity sensors.

The instruments are designed for application in general water engineering.

The JUMO ecoTRANS Lf 01 features a freely configurable analog measurement value output. The instrument can, for example, be used as an economically priced universal transmitter.

The JUMO ecoTRANS Lf 02 is equipped with a changeover relay.

And, using the teach-in connector, the JUMO ecoTRANS Lf 02 can also automatically define the switching point of the integrated relay.

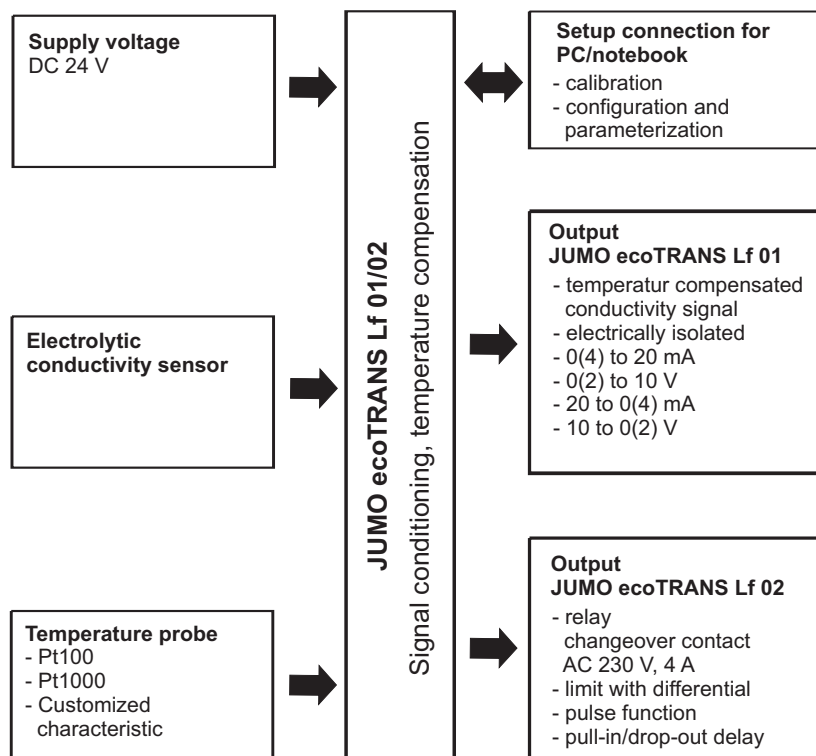
Typical areas of application are freshwater monitoring and water treatment, reverse osmosis plant, ion exchanger plant, condensate monitoring, and cooling water checks.

The instrument is programmed via the setup connection (notebook/PC), using the setup program:

- calibration of the cell constant
- calibration of the temperature coefficient
- configuration of the parameters: range, reference temperature, cell constant, temperature, switching point, analog output, and others.



### Block structure



### Key features

- 3-way isolation (input, output and supply are electrically connected with each other)
- DIN rail mounting
- 1 electrically isolated analog output 0(4) to 20 mA/0(2) to 10 V (Type JUMO ecoTRANS Lf 01)
- 1 relay (Type JUMO ecoTRANS Lf 02)
- Teach-in function (definition of switching point through the teach-in connector) on the JUMO ecoTRANS Lf 02.
- 1 LED, two colors (red/green), for signaling operating states
- Calibration timer
- Customized characteristic for temperature probe can be implemented (e.g. NTC, PTC)
- Reference temperature is settable

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**Operation**

The JUMO ecoTRANS Lf 01 is operated exclusively through the setup program using a PC. The switching point of the JUMO ecoTRANS Lf 02 can be set both through the setup program and the teach-in connector (teach-in function).

**Calibration options**

- Calibration of the cell constant

Subject to manufacturing tolerances, the cell constant of a conductivity sensor may deviate slightly from its nominal (printed) value. In addition, the cell constant may change during operation (due to deposits or wear, for example). This results in a change of the output signal from the cell. The JUMO ecoTRANS Lf 01/02 offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (range 20 to 500 %) or **automatic calibration** of the relative cell constant  $K_{rel}$ .

- Calibration of the temperature coefficient  $\alpha$

The conductivity of almost all solutions depends on the temperature. To ensure correct measurement, it is therefore necessary to know both the temperature and temperature coefficient  $\alpha$  [% per °C] of the solution. The temperature can either be measured automatically with a temperature probe (Pt100/Pt1000/NTC/PTC) or set manually by the user.

The JUMO ecoTRANS Lf 01/02 can determine the temperature coefficient automatically, or the user can enter it manually within the range 0 to 5.5 % per °C.

**Calibration timer**

If required, the integrated calibration timer will draw your attention to an intended calibration (cell constant/temperature coefficient).

**Functions of the JUMO ecoTRANS Lf 01 output**

- The instrument features an analog output for presenting the actual conductivity value.
- The response of the measurement output to over/underrange and active measuring circuit monitoring is programmable.

On underrange or overrange, the analog output can, if required, adopt the "Low" or "High" operational state. These operational states can be recognized as "irregular" by a connected PLC.

Depending on the range,  
"Low" is: 0 mA/0 V /  $\leq 3.4 \text{ mA} / \leq 1.4 \text{ V}$ .  
Depending on the range,  
"High" is: 22 mA/10.7 V

- Simulation of the measurement output

The measurement output (0/2 to 10 V or 0/4 to 20 mA, depending on the setting) can be freely selected in the manual mode.

Application: "Dry-run" commissioning of the plant (without measuring cell; fault search; servicing).

**Functions of the JUMO ecoTRANS Lf 02 output**

- The instrument has a relay output (changeover contact).
- Limit monitoring with differential. Switching function can be reversed. MAX/MIN limit comparator (limit monitor).
- Teach-in function:  
As soon as the teach-in connector is plugged in, the instrument determines the optimum range for the cell constant that was set and defines the switching point for the integrated relay in accordance with the actual measured value.

Limit or pulse functions can be assigned to the relay output of the JUMO ecoTRANS Lf 02.

For each one, the direction of switching (energized on going above, or going below a threshold), pull-in and/or drop-out delay, pulse function and a hysteresis can all be defined.

The response of the relay output to over/underrange and active measuring circuit monitoring is programmable (active or inactive).

**Technical data****Inputs****Analog input 1 (conductivity)**

Electrolytic conductivity cells with the cell constants 0.01; 0.1; 1.0; 10.0  $1/cm$  (2-electrode principle).

The cell constants can be adjusted over a range 20 to 500 %.

**Lead compensation, analog input 1**

With measuring ranges above 20 mS/cm, the effect of long cables can be compensated by entering the lead resistance, within the range 0.00 to 99.99  $\Omega$ .

**Zero-point calibration, analog input 1**

Zero-point errors arising from the system can be compensated.

**Analog input 2 (temperature)**

Resistance thermometer Pt100 or Pt 1000, in 2- or 3-wire circuit, -10 to +250 °C. NTC/PTC as customized characteristic, maximum resistance 4500  $\Omega$

The setup program can be used to enter a customized characteristic for the temperature probe. This means that any temperature probe (NTC or similar) that may already be present can continue to be used.

Measurement display (in setup program) in °C/°F

**Lead compensation, analog input 2**

The lead resistance can be compensated in software in the range 0.00 to 99.99  $\Omega$ .

This is not required if the resistance thermometer is connected in a 3-wire circuit.

The offset can be used to correct the measured value within the range -20 to +20 °C.

**Measuring range**

0 to 5  $\mu\text{S}$  to 0 to 200 mS, depending on the cell constant. Intermediate values are programmable.

Cell constant K	Measuring range
0.01/cm	0 to 5 $\mu\text{S/cm}$
0.01/cm	0 to 20 $\mu\text{S/cm}$
0.1/cm	0 to 200 $\mu\text{S/cm}$
0.1/cm	0 to 1000 $\mu\text{S/cm}$
1/cm	0 to 2 mS/cm
1/cm	0 to 20 mS/cm
10/cm	0 to 100 mS/cm
10/cm	0 to 200 mS/cm

**Deviation from characteristic, conductivity**

on ranges 0 to 5  $\mu\text{S/cm}$  and 0 to 20  $\mu\text{S/cm}$ :  
 $\leq 1.0$  % of range

All other ranges:  
 $\leq 2.0$  % of range

**Reference temperature (for temperature compensation)**

settable from 10 to 40 °C  
(factory setting: 25 °C)

**Temperature range**

-10 to +250 °C (also in °F)

**Deviation from characteristic, temperature**

with Pt100/Pt1000:  $\leq 0.6$  %  
with customized characteristic:  $\leq 5$   $\Omega$ .

**Outputs****JUMO ecoTRANS Lf 01 (analog output):**

freely configurable:

0(2) to 10 V  $R_{load} \geq 2 \text{ k}\Omega$  or  
10 to (2)0 V  $R_{load} \geq 2 \text{ k}\Omega$  or  
0(4) to 20 mA  $R_{load} \leq 400 \Omega$  or  
20 to (4)0 mA  $R_{load} \leq 400 \Omega$

electrically isolated from the inputs:

$\Delta U \leq 30 \text{ V AC}$  or

$\Delta U \leq 50 \text{ V DC}$

minimum scaling span:

10 % of measuring range span.

**Deviation from characteristic of the output signal**

$\leq 0.25$  %  $\pm 50$  ppm per °C

JUMO ecoTRANS Lf 02 (relay output):

changeover contact

contact rating: 4 A, 250 V AC

4 A, 24 V DC

with resistive load

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contact life:  
> 100, 000 operations at rated load

**General characteristics****A/D converter**

resolution 14 bit

**Sampling time**

500 msec = 2 measurements per second

**Ambient temperature drift**

≤ 0.5 % per 10 °C

**Measuring circuit monitoring**

input 1 (conductivity):  
out-of-range  
input 2 (temperature):  
out-of-range, probe short-circuit, probe break  
In fault condition, the outputs adopt a defined  
(configurable) state.

**Data backup**

EEPROM

**Supply**

20 to 30 V DC, ripple < 5 %  
power consumption ≤ 2 W,  
with reverse-polarity protection.  
For operation with SELV or PELV circuits.

**Electrical connection**

screw terminals up to 2.5 mm<sup>2</sup>

**Permissible****ambient temperature**

-10 to +60 °C

**Permissible storage temperature**

-20 to +75 °C

**Climatic conditions**

rel. humidity ≤ 93 %, no condensation

**Enclosure protection** (to EN 60529)

IP20

**Electrical safety**

to EN 61010  
clearance and creepage distances for  
- overvoltage category II  
- pollution degree 2

**Electromagnetic compatibility**

to EN 61326  
interference immunity:  
to industrial requirements  
interference emission:  
Class B

**Housing**

housing for DIN rail mounting: PC  
(polycarbonate)

**Mounting**

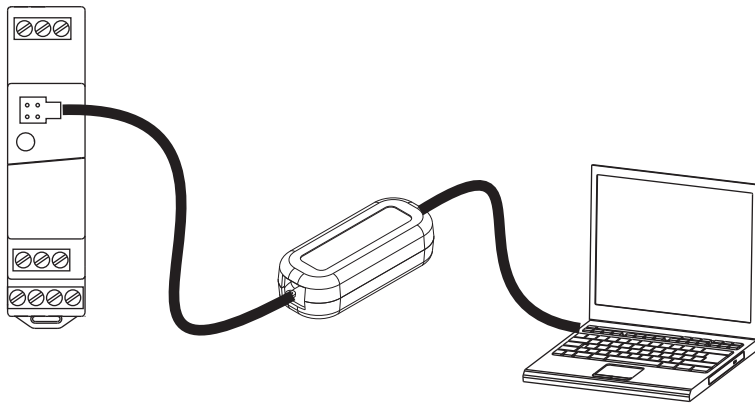
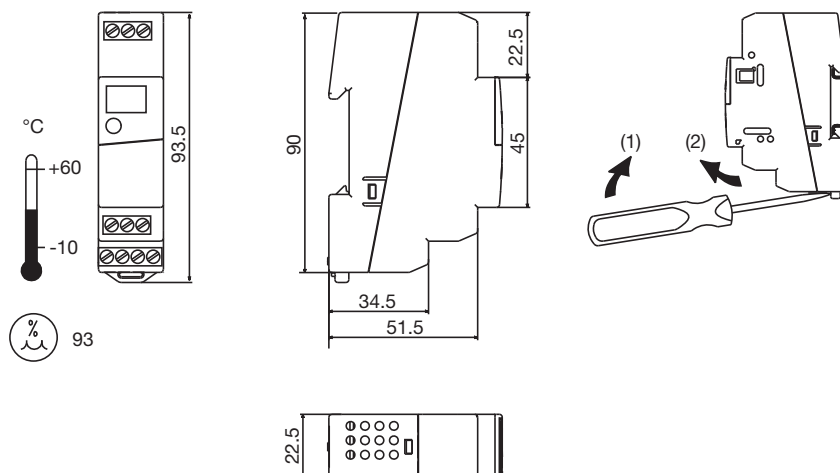
on 35 mm × 7.5 mm DIN rail to  
EN 50022

**Operating position**

unrestricted

**Weight**

approx. 110 g

**Operation via the setup interface****Dimensions**

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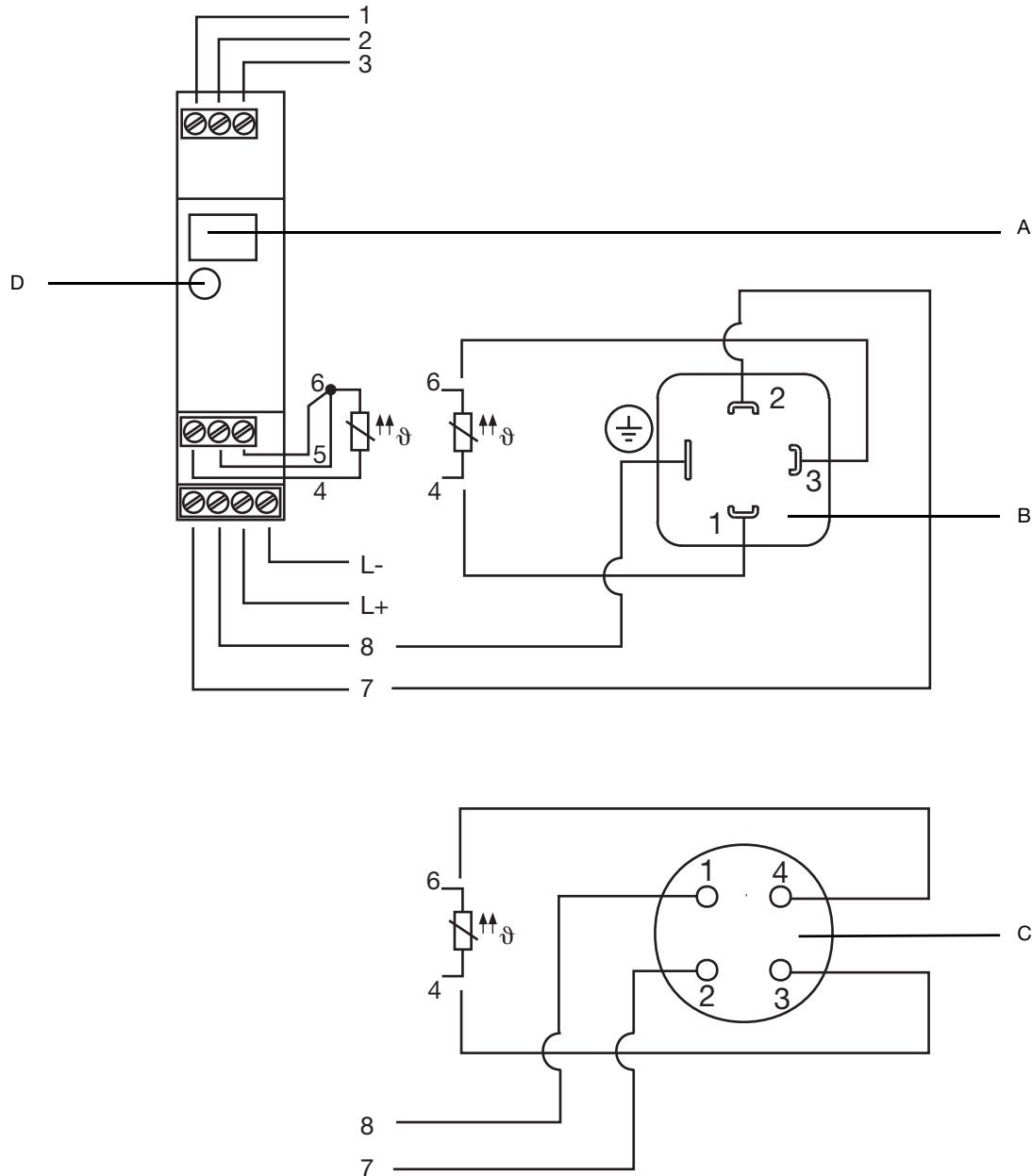
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**Connection diagram**

- A Setup connection and connection for teach-in connector (on the JUMO ecoTRANS Lf 02)
- B Head of a conductivity sensor with Hirschmann connector
- C Head of a conductivity sensor with M12 connector
- D LED for the indication of operating states

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**Connection for conductivity sensors**

	Conductivity sensor (JUMO types)			JUMO ecoTRANS Lf 01/02
	Plug-in head to DIN 43650 (Hirschmann connector)	Fixed cable	M12 connector	
Outer electrode		white	1	8
Inner electrode	2	brown	2	7
Temperature compensation	1	yellow	3	4 <sup>a</sup>
	3	green	4	6 <sup>a</sup>

<sup>a</sup> Type of connection: 2-wire

Outputs	Terminal assignments		Symbol
Analog measurement output (electrically isolated)  on the JUMO ecoTRANS Lf 01 only	1 3	+ -	
Relay  on the JUMO ecoTRANS Lf 02 only	1 2 3	n.c. (break) common n.o. (make)	
<b>Measurement inputs</b>			
Conductivity sensor	8 7	outer electrode, on coaxial cells inner electrode, on coaxial cells	
Resistance thermometers in 3-wire circuit	4 5 6		
Resistance thermometers in 2-wire circuit	4 6		
<b>Supply</b>			
Supply	L- L+		

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**Order details**

<b>(1) Basic type</b>	
202731	JUMO ecoTRANS Lf 01/02 - Microprocessor Transmitter/Switching Device for Conductivity
<b>(2) Output</b>	
01	with analog output
02	with relay output
<b>(3) Measuring range (free programmable)</b>	
011	0 to 5 $\mu\text{S/cm/K} = 0,01 \frac{1}{\text{cm}}$
012	0 to 20 $\mu\text{S/cm/K} = 0,01 \frac{1}{\text{cm}}$
013	0 to 200 $\mu\text{S/cm/K} = 0,1 \frac{1}{\text{cm}}$
014	0 to 1000 $\mu\text{S/cm/K} = 0,1 \frac{1}{\text{cm}}$
015	0 to 2 $\text{mS/cm/K} = 1,0 \frac{1}{\text{cm}}^{\text{a}}$
016	0 to 20 $\text{mS/cm/K} = 1,0 \frac{1}{\text{cm}}^{\text{b}}$
017	0 to 100 $\text{mS/cm/K} = 10,0 \frac{1}{\text{cm}}$
018	0 to 200 $\text{mS/cm/K} = 10,0 \frac{1}{\text{cm}}$
<b>(4) Options</b>	
000	without
024	including PC setup software

<sup>a</sup> The standard measuring range, set in the factory, for type 202731/01

<sup>b</sup> The standard measuring range, set in the factory, for type 202731/02

	<b>(1)</b>	/	<b>(2)</b>	-	<b>(3)</b>	/	<b>(4)</b>
<b>Order code</b>	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	/	<input type="text"/>
<b>Order example</b>	202731	/	01	-	015	/	000

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## Stock versions

(shipment: 3 working days after receipt of order)

Article	Part no.
202731/01-015/000	00421026
202731/01-015/024	00421035
202731/02-016/000	00421032

## Accessories

(available from stock)

Article	Part no.
Conductivity simulator (Data sheet 201090)	00300478
Process connection for conductivity simulator (DIN connection/bare cable ends)	00082901
Switching mode power supply, type PS5R-A-24 for DIN rail mounting, input voltage 100 to 240 V AC	00374661
PC interface (USB/TTL), 2 adapter setup cable	00456352
Simulators and calibration adapters for pH/Redox and conductivity measurement (202711)	-
JUMO BlackLine CR-GT/-EC/-GS - conductive 2-electrode conductivity sensors (202922)	-
JUMO ecoLine CR-PVC - conductive 2-electrode conductivity sensors (202923)	-
JUMO tecLine CR-VA/-VASL/-PK/-PL - conductive 2-electrode conductivity sensors (202924)	-
JUMO tecLine CR-GT - conductive 2-electrode conductivity sensors (202925)	-
Cable and plugs (202990)	-

## Software

Article	Part no.
Setup JUMO ecoTRANS Lf 01/02 (PG 202599)	00432577

### Note:

All stock items can be freely programmed through the PC setup program. The only differences between them are varying presettings with regard to the measurement range and cell constant.

The following presettings are common to all stock versions: automatic temperature compensation with Pt100 (ATC), 4 to 20 mA output (JUMO ecoTRANS Lf 01) or switching point set to max. range (JUMO ecoTRANS Lf 02), temperature coefficient  $\alpha = 2.2 \text{ } \%/^{\circ}\text{C}$ .

It is **not** possible to switch over from type JUMO ecoTRANS Lf 01 to type JUMO ecoTRANS Lf 02 or vice versa.

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# JUMO ecoTRANS Lf 03 Microprocessor Transmitter / Switching Device for conductivity or resistivity and temperature

**Type 202732**  
**Housing for DIN rail mounting**  
 (35 x 7.5 mm to DIN EN 60 715 A.1)

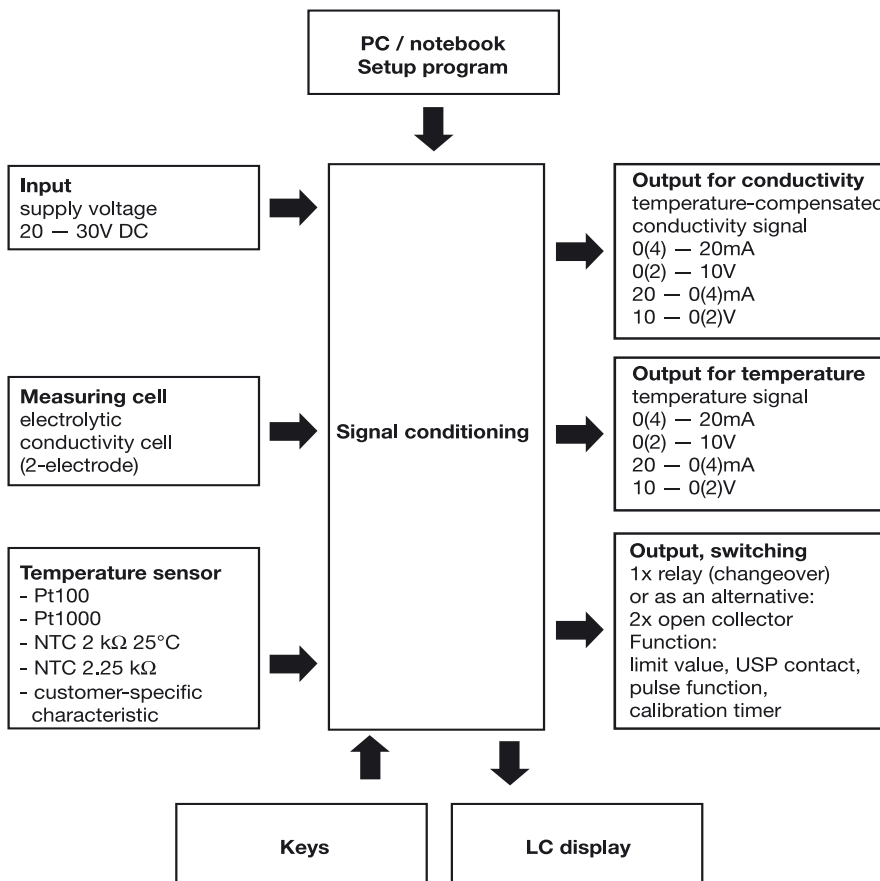
## Brief description

The JUMO ecoTRANS Lf 03 conductivity transmitter is used to measure the conductivity or resistivity of liquids in conjunction with electrolytic conductivity cells. Typical areas of application are freshwater monitoring and water treatment installations, reverse osmosis plant, ion exchanger plant, high-purity water and pharmaceutical applications, condensate monitoring, and checking rinsing baths and cooling water. The instrument can be operated and configured from the keys and via the integrated LC display. Alternatively, this can also be done very conveniently through the setup connection (notebook / PC), using the setup program. The setup program also serves for printing out the configuration data, thus facilitating plant documentation. The instruments are supplied with a calibration certificate which documents the instrument/ calibration data.



**Compliant with  
 USP <645>**

## Block structure



## Key features

- Display units  $\mu\text{S/cm}$ ,  $\text{mS/cm}$ ,  $\text{k}\Omega\text{m}^2\text{cm}$ ,  $\text{M}\Omega\text{m}^2\text{cm}$ ,  $\mu\text{mho/cm}$ ,  $\text{mmho/cm}$
- Two parallel signal outputs for conductivity and process temperature  $0(4) - 20\text{mA}$  /  $0(2) - 10\text{V}$ ; freely programmable
- Switching output (relay changeover contact or, alternatively, two open-collector outputs)
- USP switching function according to USP <645> for use in water installations for pharmaceutical applications
- Temperature compensation is selectable:
  - natural water to EN 27 888
  - ASTM D 1125-95 (high-purity water)
  - linear
- 3-way isolation (input, output and supply are electrically isolated from each other)
- DIN rail mounting
- Calibration timer
- Customer-specific characteristic for temperature probe can be implemented (NTC or PTC)
- Reference temperature can be set (10 - 25 - 40°C)
- Calibration certificate included in delivery

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## Operation

The JUMO ecoTRANS Lf 03 can be operated either via the instrument keys and the LC display or from a PC or laptop through the setup program.

## Calibration options

### ■ Calibration of the cell constant

Subject to manufacturing tolerances, the cell constant of a conductivity cell may deviate slightly from its nominal (printed) value. In addition, the cell constant may change during operation (due to deposits or wear, for example). This results in a change of the output signal from the cell. The JUMO ecoTRANS Lf 03 offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (within the range 20 – 500%) or **automatic calibration** of the relative cell constant  $K_{rel}$ .

### ■ Calibration of the temperature coefficient $\alpha$

The conductivity of almost all solutions depends on the temperature. To ensure correct measurement, it is therefore necessary to know both the temperature and temperature coefficient  $\alpha$  [% per °C] of the solution to be measured. The temperature can either be measured automatically with a temperature probe (Pt100 / Pt1000 / NTC / PTC) or set manually by the user. When using the JUMO ecoTRANS Lf 03, the temperature coefficient can be determined automatically or entered manually, within the range 0 – 5.5% per °C.

## Calibration timer

If required, the integrated calibration timer draws your attention to an intended calibration (cell constant / temperature coefficient).

## High-purity water / USP <645> / Pharmaceutical functions

According to USP <645> (United States Pharmacopoeia), on-line evaluation of water for pharmaceutical applications (Purified Water and WFI (Water For Injection)) is performed by measuring the conductivity. Measurement without temperature compensation is the requirement in this case. The USP<645> regulations include a table that states the permissible conductance of high-purity water at specified temperatures. If the currently measured value remains below the value given in the table, the water quality is satisfactory. By taking these relationships into account, the JUMO ecoTRANS LF 03 is suitable for use in high-purity water installations in the pharmaceutical sector. Further information can be found in the JUMO technical publication "Information on high-

purity water measurement" (FAS 614) (for download at www.jumo.de).

### USP contact / USP<645> function

If this function is activated, the configured contact switches as specified by USP<645>.

### USP<645> pre-alarm

This function is used to determine the level (in % of the table value) at which the pre-alarm signal (contact) is triggered in advance of the table value.

## Functions of the JUMO ecoTRANS Lf 03 outputs

### Analog outputs

- One analog signal output each for conductivity/resistivity and temperature.
- The analog output signals are freely scalable (range start/end values).
- On underrange or overrange, the analog outputs will take on the following states:  
"Low" - corresponds to 0 mA/0V / 3.4mA / 1.4 V, depending on the selected output signal type.  
"High" - corresponds to 22mA/10.7V, depending on the selected output signal type.  
These states can be recognized as "irregular" by a connected device (e.g. a PLC) and used for generating the alarm.
- Simulation of the signal output:  
The analog signal outputs can be freely set in the manual mode.  
Application: "Dry-run" commissioning of the plant (without measuring cell; fault search; servicing).

### Switching outputs

Depending on the order code, either one relay with changeover contact or two open-collector outputs.

The switching outputs can be freely used for monitoring conductivity/resistivity or temperature.

The following functions can be assigned to the switching outputs:

- Limit monitoring (MAX. or MIN. limit comparator) with programmable hysteresis.
- Pulse function (on reaching the switching point, the output switches briefly, then opens again).
- Programmable pull-in and drop-out delay.
- Switching outputs can be inverted.
- Response to overrange/underrange or to activated measuring circuit monitoring is programmable (pull-in / drop-out).
- USP alarm or pre-alarm (for an explanation, see USP<645> pharmaceutical functions).
- "Calibration timer run down" signal.

## Technical data

### Inputs

#### Analog input 1 (conductivity)

Electrolytic conductivity cells, with cell constants: 0.01; 0.1; 1.0; 3.0; 10.0 <sup>1</sup>/<sub>cm</sub> (2-electrode principle). The cell constant can be adjusted within the range 20 – 500%, so that unusual cell constants (e.g. 0.2; 0.5; etc.) can also be set.

#### Lead compensation, analog input 1

The effect of long cables for the measuring ranges above 20 mS/cm can be compensated by entering the lead resistance, within the range 0.00 to 99.99  $\Omega$ .

#### Zero-point calibration, analog input 1

Zero-point errors caused by the system can be compensated.

#### Conductivity ranges

0 – 1  $\mu$ S to 0 – 200 mS, depending on the cell constant.

A table with all the measurement ranges is provided at the end of the Technical data.

#### Analog input 2 (temperature)

- Resistance thermometer  
Pt100 or Pt1000 -10 to +250°C
- NTC 2k $\Omega$ ; 25°C, B=3500 -10 to +150°C
- NTC UUA 32J49; 2.25k $\Omega$  -10 to +150°C
- KTY 11-6; 2000  $\Omega$  -10 to +150°C
- Customer-specific characteristic, maximum resistance 4500 $\Omega$

All temperature probes can be connected in 2-, 3- or 4-wire circuit.

The setup program can be used to enter a customer-specific characteristic for the temperature probe. This means that any temperature probe (NTC or similar) that may already be present can still be used. The measurement display is in °C / °F, switchable.

#### Lead compensation, analog input 2

The offset can be used to correct the measured value in the range -20 to +20°C.

#### Reference temperature (for temperature compensation)

settable from 10 to 40°C (factory setting: 25°C, according to the international standard)

#### Temperature range

-10 to +250°C or +14 to +482°F

#### Deviation from characteristic, temperature

with Pt100 / Pt1000:  $\leq$  0.6%  
NTC 2 k $\Omega$ :  $\leq$  1.5%  
NTC UUA:  $\leq$  2.0%  
KTY11-6:  $\leq$  0.8%  
with customer-specific characteristic:  $\leq$  5  $\Omega$ .

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## Outputs

### Two analog outputs

freely configurable:

0(2) — 10 V  $R_{load} \geq 2 \text{ k}\Omega$  or  
 10 — (2)0 V  $R_{load} \geq 2 \text{ k}\Omega$  or  
 0(4) — 20 mA  $R_{load} \leq 400 \Omega$  or  
 20 — (4)0 mA  $R_{load} \leq 400 \Omega$

electrically isolated from the inputs:

$\Delta U \leq 30 \text{ V AC}$  or

$\Delta U \leq 50 \text{ V DC}$

minimum scaling span: 10% of range span.

### Deviation from characteristic of the output signal

$\leq 0.25\% \pm 50 \text{ ppm per } ^\circ\text{C}$

### Relay output

changeover contact

contact rating:

8 A, 250 V AC or 8 A, 24 V DC

with resistive load

contact life:

> 100, 000 operations at rated load

### Open collector

contact rating: 100 mA, 35 V DC with resistive load, voltage drop in the switched state

$\leq 1.2 \text{ V}$ , not short-circuit-proof

## General characteristics

### A/D converter

resolution 14 bit

### Sampling time

500 msec = 2 measurements per second

### Ambient temperature error

$\leq 0.5\%$  per  $10^\circ\text{C}$

### Measuring circuit monitoring

input 1 (conductivity): out-of-range

input 2 (temperature): out-of-range,

probe short-circuit, probe break.

In fault condition, the outputs adopt a defined (configurable) state.

### Data backup

EEPROM

### Supply voltage

20 — 30V DC, ripple  $< 5\%$

power consumption  $\leq 3 \text{ W}$ ,

with reverse-polarity protection.

For operation with SELC or PELV circuits.

### Electrical connection

screw terminals up to  $2.5 \text{ mm}^2$

### Permissible

**ambient temperature**

-10 to  $+60^\circ\text{C}$

## Permissible storage temperature

-20 to  $+75^\circ\text{C}$

## Climatic conditions

rel. humidity  $\leq 75\%$ , no condensation

## Protection (to EN 60 529)

IP20

## Electrical safety

to EN 61 010

clearance and creepage distances for

- overvoltage category II

- pollution degree 2

## Electromagnetic compatibility

to EN 61 326

interference immunity: to industrial requirements

interference emission: Class B

## Housing

housing for DIN rail mounting:

PC (polycarbonate)

## Mounting

on a  $35 \times 7.5 \text{ mm}$  DIN rail to DIN EN 60 715

## Operating position

unrestricted

## Weight

approx. 150g

Cell constant	Measurement ranges				
	Display span / unit				
$K = 0.01 \frac{1}{\text{cm}}$	0 — 1.000 $\mu\text{S/cm}$	0 — 1.000 $\mu\text{mho/cm}$	1000 — 9999 $\text{k}\Omega^*\text{cm}$	1.00 — 99.99 $\text{M}\Omega^*\text{cm}$	<sup>1</sup>
$K = 0.01 \frac{1}{\text{cm}}$	0 — 2.00 $\mu\text{S/cm}$	0 — 2.00 $\mu\text{mho/cm}$	500 — 9999 $\text{k}\Omega^*\text{cm}$	0.50 — 50.00 $\text{M}\Omega^*\text{cm}$	<sup>1</sup>
$K = 0.01 \frac{1}{\text{cm}}$	0 — 5.00 $\mu\text{S/cm}$	0 — 5.00 $\mu\text{mho/cm}$	200 — 9999 $\text{k}\Omega^*\text{cm}$	0.20 — 2000 $\text{M}\Omega^*\text{cm}$	<sup>1</sup>
$K = 0.01 \frac{1}{\text{cm}}$	0 — 2000 $\mu\text{S/cm}$	0 — 2000 $\mu\text{mho/cm}$	50 — 2500 $\text{k}\Omega^*\text{cm}$	0.05 — 2.50 $\text{M}\Omega^*\text{cm}$	<sup>2</sup>
$K = 0.1 \frac{1}{\text{cm}}$	0 — 5.00 $\mu\text{S/cm}$	0 — 5.00 $\mu\text{mho/cm}$	200 — 9999 $\text{k}\Omega^*\text{cm}$	0.20 — 2000 $\text{M}\Omega^*\text{cm}$	<sup>1</sup>
$K = 0.1 \frac{1}{\text{cm}}$	0 — 2000 $\mu\text{S/cm}$	0 — 2000 $\mu\text{mho/cm}$	50 — 2500 $\text{k}\Omega^*\text{cm}$	0.05 — 2.50 $\text{M}\Omega^*\text{cm}$	<sup>1</sup>
$K = 0.1 \frac{1}{\text{cm}}$	0 — 200.0 $\mu\text{S/cm}$	0 — 200.0 $\mu\text{mho/cm}$	5.0 — 250.0 $\text{k}\Omega^*\text{cm}$	--	<sup>2</sup>
$K = 0.1 \frac{1}{\text{cm}}$	0 — 1000 $\mu\text{S/cm}$	0 — 1000 $\mu\text{mho/cm}$	1.00 — 50.00 $\text{k}\Omega^*\text{cm}$	--	<sup>3</sup>
$K = 1 \frac{1}{\text{cm}}$	0 — 500.0 $\mu\text{S/cm}$	0 — 500.0 $\mu\text{mho/cm}$	2.00 — 99.99 $\text{k}\Omega^*\text{cm}$	--	<sup>1</sup>
$K = 1 \frac{1}{\text{cm}}$	0 — 1000 $\mu\text{S/cm}$	0 — 1000 $\mu\text{mho/cm}$	1.00 — 50.00 $\text{k}\Omega^*\text{cm}$	--	<sup>3</sup>
$K = 1 \frac{1}{\text{cm}}$	0 — 2.00 mS/cm	0 — 2.00 mmho/cm	0.50 — 25.00 $\text{k}\Omega^*\text{cm}$	--	<sup>2</sup>
$K = 1 \frac{1}{\text{cm}}$	0 — 10.00 mS/cm	0 — 10.00 mmho/cm	0.10 — 5.00 $\text{k}\Omega^*\text{cm}$	--	<sup>3,4</sup>
$K = 1 \frac{1}{\text{cm}}$	0 — 2000 mS/cm	0 — 20.00 mmho/cm	--	--	<sup>2</sup>
$K = 1 \frac{1}{\text{cm}}$	0 — 100.0 mS/cm	0 — 100.0 mmho/cm	--	--	<sup>3,4</sup>
$K = 3 \frac{1}{\text{cm}}$	0 — 30.00 mS/cm	0 — 30.00 mmho/cm	--	--	<sup>3,4</sup>
$K = 10 \frac{1}{\text{cm}}$	0 — 100.0 mS/cm	0 — 100.0 mmho/cm	--	--	<sup>3,4</sup>
$K = 10 \frac{1}{\text{cm}}$	0 — 200.0 mS/cm	0 — 200.0 mmho/cm	--	--	<sup>3</sup>

-- -Measurement range cannot be implemented

The following deviations from the characteristic refer to  $\mu\text{S/cm}$  or  $\text{mS/cm}$

<sup>1</sup> Deviation from characteristic  $\leq 1\%$

<sup>2</sup> Deviation from characteristic  $\leq 1.5\%$

<sup>3</sup> Deviation from characteristic  $\leq 2\%$

<sup>4</sup> Above a temperature of  $\geq 85^\circ\text{C}$  and a temperature coefficient  $T_K > 2.2\%/^\circ\text{C}$ , higher deviations from the characteristic may occur

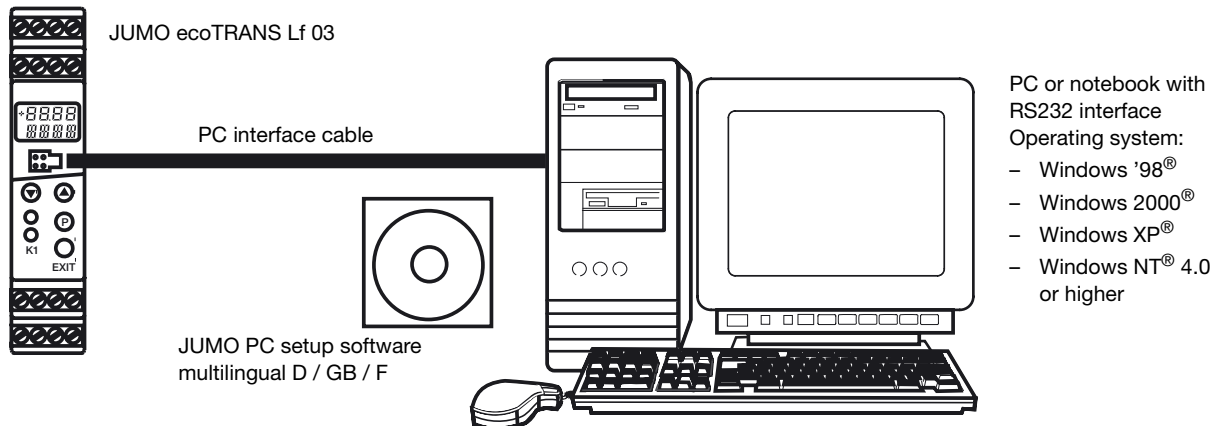
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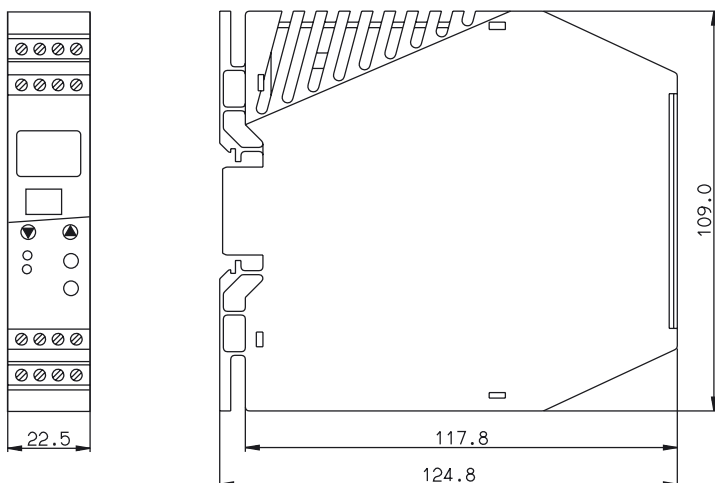
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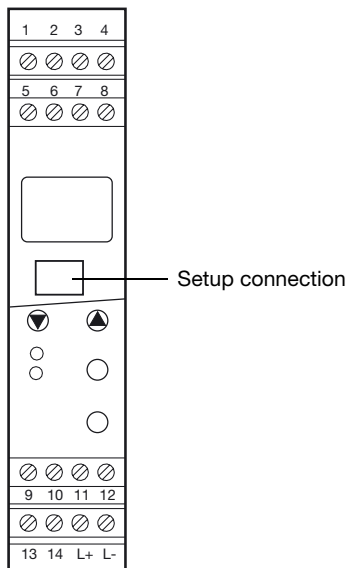
## Operation via the setup interface



## Dimensions



## Connection diagram



### Connection of conductivity cell

	Conductivity cell (JUMO types)			JUMO ecoTRANS Lf 03
	Plug-in head	Fixed cable	M12 plug	
Outer electrode		white	1	14
Inner electrode	2	brown	2	13
Temperature sensor	1	yellow	3	9*
	3	green	4	12*

\* type of connection: 2-wire

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Outputs	Terminal assignment	Symbol
I Analog signal output: conductivity (electrically isolated)	5 + 6 -	
II Analog signal output: temperature (electrically isolated)	7 + 8 -	
III. Relay	1 common 3 n.c. (break) 4 n.o. (make)	
Open-collector output 1 (electrically isolated)	1 GND 3 +	
Open-collector output 2 (electrically isolated)	1 GND 4 +	
Measurement inputs	Terminal assignment	Symbol
Conductivity cell	14 outer electrode, on coaxial cells 13 inner electrode, on coaxial cells	
Resistance thermometer in 2-wire circuit	9 12	
Resistance thermometer in 3-wire circuit	9 11 12	
Resistance thermometer in 4-wire circuit	9 10 11 12	
Supply	Terminal assignment	Symbol
Supply voltage (with reverse-polarity protection)	L- L +	

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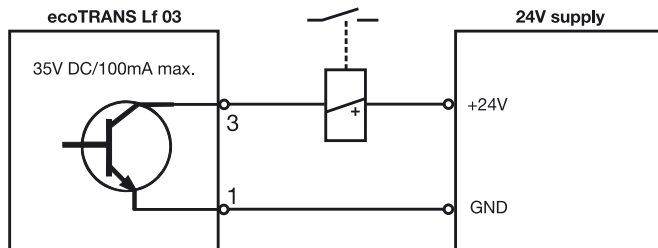
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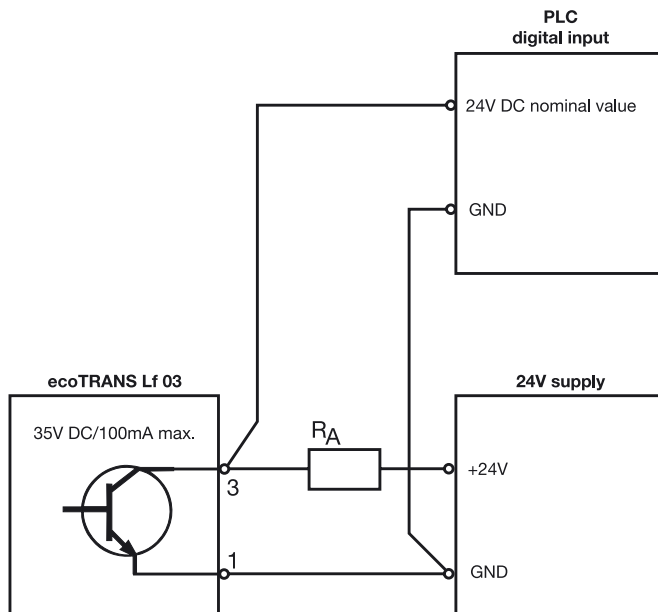


## Connection example for open-collector output

### Connection of a relay



### Connection of a PLC



$R_A$  is a current-limiting resistor  
 for  $I = 100 \text{ mA max.}$

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## Type designation

### (1) Basic type

202732 JUMO ecoTRANS Lf 03,  
 Microprocessor transmitter / switching device for conductivity or resistivity and temperature  
 (freely programmable measurement ranges)

### (2) Output I (conductivity / resistivity)

888 analog signal output, freely programmable

### (3) Output II (temperature)

888 analog signal output, freely programmable

### (4) Output III (switching)

101 1 x relay, changeover contact

177 2 x open collector

### (5) Extra codes

000 none

024 PC setup software included in delivery

	(1)	(2)	(3)	(4)	(5)				
<b>Order code</b>									
<b>Order example</b>	202732	/	888	-	888	-	101	/	000

## Stock items (delivery 3 working days after receipt of order)

Type	Note	Sales No.
202732/888-888-101/000	relay output	20/00441865
202732/888-888-177/000	open collector	20/00441866
202732/888-888-101/024	relay output, including setup software	20/00441867

## Optional accessories (delivery 3 working days after receipt of order)

Designation	Sales No.
PC setup software for JUMO ecoTRANS Lf 03	20/00441961
PC interface cable including TTL / RS232 converter and adapter	95/00350260
PC interface cable including USB / TTL converter and two adapters	95/00456352
conductivity simulator (see Data Sheet 201090)	20/00300478
SMPS for DIN rail mounting	Switched-mode power supply,
input voltage 100 — 240 VAC / 50 — 60 Hz	output voltage 0.3 A 24 VDC
	Type PS5R-A24



# JUMO CTI-500

## Inductive Conductivity/Concentration and Temperature Transmitter with switch contacts

### Type 202755

### Brief description

The instrument is used for the measurement/control of conductivity or concentration in liquid media. It is particularly suitable for application in media where severe deposits of dirt, oil, grease or gypsum/lime precipitates are to be expected. The integrated temperature measurement enables fast and accurate temperature compensation, which is of special importance when measuring conductivity. Additional functions permit the combined changeover of measuring range and temperature coefficient.

Two built-in switching outputs can be freely programmed to monitor conductivity/concentration and/or temperature limits. It is also possible to assign alarm and control functions (dilution).

The instrument is operated either from the membrane keypad and plain-text graphics display (operator language can be changed over) or through the user-friendly PC setup program. The display can be read off by simply rotating the housing cover. This applies to the installation both in horizontally and vertically arranged pipes. By using the setup program, the instrument configuration data can be saved for plant documentation and printed out. To prevent any tampering, the instrument can also be supplied without keypad or display. In this case, the setup program is needed for programming.

The JUMO CTI-500 is available either as a combined unit (transmitter and measuring cell together in one unit) or as a split version (transmitter and cell connected by cable). The split version is particularly suitable for plant subjected to strong vibration and/or significant heat radiation at the measurement point, or for installation on sites that are difficult to access. Immersion models up to 2000 mm are available for application in open containers or sluices.

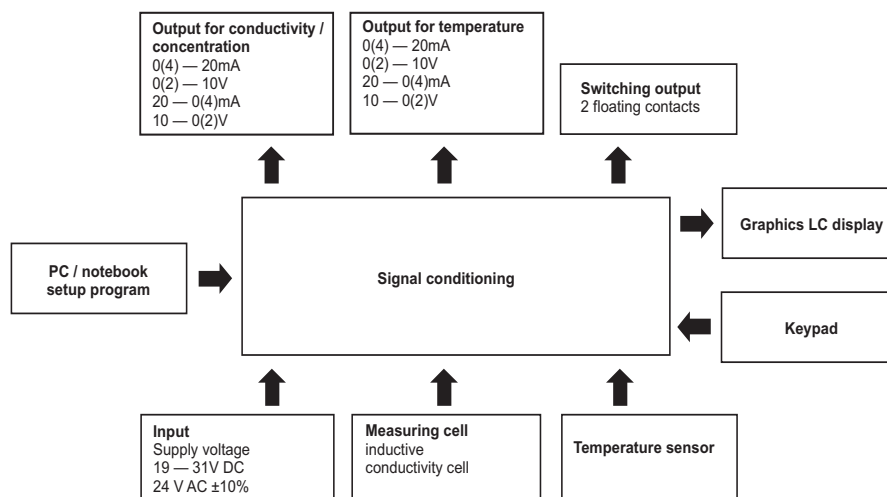
**Typical areas of application:** Freshwater and wastewater engineering, air conditioning systems and cooling tower monitoring (dilution control), rinsing baths (e.g. monitoring electroplating baths), inlet and final checks in factory water treatment plant, concentration monitoring, vehicle wash plant, etc.



### Key features

- Activation of up to four ranges
- Activation of up to four temperature coefficients
- Concentration measurement of
  - caustic soda NaOH
  - nitric acid HNO<sub>3</sub>
  - a freely definable curve (through the setup program)
- Fast-response temperature sensor
- Temperature compensation
  - linear
  - natural water
  - individual characteristic (learning function)
- Operation
  - via keypad and LC display
  - through setup program
- Operator languages: English, French, German, Italian, Dutch, Spanish, Polish, Portuguese, Russian, Swedish
- By using the setup program:
  - user-friendly programming
  - plant documentation
- Learning function for the temperature coefficient
- Individual characteristic for concentration indication
- Dilution control

### Block structure



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## Functional description

The inductive measurement method permits largely maintenance-free acquisition of the specific conductivity, even in the toughest media conditions. As opposed to the conductive measurement method, problems such as electrode decomposition and polarization do not occur.

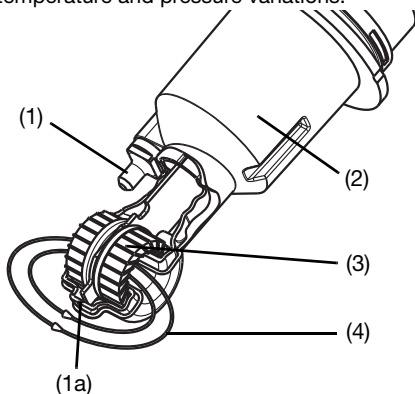
The conductivity is measured using an inductive probe. A sinusoidal a.c. voltage feeds the transmitting coil. Depending on the conductivity of the liquid to be measured, a current is induced in the receiver coil. The current is proportional to the conductivity of the medium.

## Instrument description

### Measuring cell

The measuring cell consists of a hermetically sealed polypropylene (PP) or polyvinylidene fluoride (PVDF) body inside which the two measurement coils are arranged. A bore in the measuring cell enables the medium to flow through. The measurement principle entails an inevitable electrical isolation between the sample medium and the signal output.

The measuring cell is largely unaffected by temperature and pressure variations.



- (1) Temperature sensor, exposed
- (1a) optionally: internal
- (2) Cell body in PP
- (3) Measurement coils
- (4) Liquid loop

### Exposed temperature sensor

The sensor (in a stainless steel sleeve) exhibits a very fast response to temperature variations. This is especially important for CIP processes (phase separation).

### Internal temperature sensor

The sensor is integrated in the PP body. This construction ensures that no metal parts come into contact with the sample medium (important with corrosive media). However, temperature acquisition is somewhat slower here.

## Temperature compensation

Since conductivity largely depends on the temperature of the medium, it is usually necessary to compensate for the temperature effect.

The instrument allows both linear and non-linear temperature compensation.

If required, temperature compensation can be switched off, for example, when the temperature conditions on the measurement site are stable or when temperature compensation is carried out in the software, in external evaluation devices (PLC or similar).

## Process connections

To cover a wide variety of applications, the instrument can be supplied with different process connections (also as an immersion model), see dimensions.

## Installation at the measurement point

The operating position is generally unrestricted. However, it is essential to ensure that there is a continuous exchange of the sample liquid in the flow channel.

## Transmitter

The CTI-500 transmitter has been designed for use on site. A rugged housing protects the electronics and the electrical connections from corrosive environmental conditions (IP67).

A vent screw with a PTFE membrane prevents condensation.

## Operation

The JUMO CTI-500 can be operated either from the instrument keys and the graphics LC display and/or through the setup program from a PC or laptop.

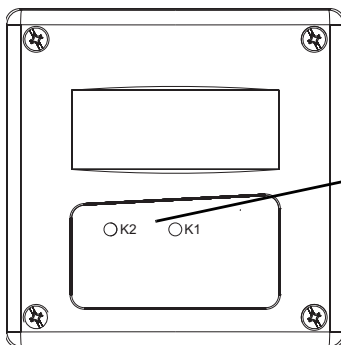
The instrument can be secured against unauthorized alteration by a password.

## Functions of the outputs

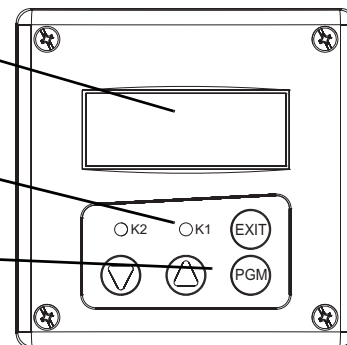
### Analog outputs

- One analog signal output for conductivity/concentration and temperature respectively.
- The analog output signals are freely scalable (range start and end values).
- The response of the analog outputs to over/underrange or alarm can be programmed.
- Simulation of the signal output:  
The analog signal outputs can be freely set in the manual mode.  
Application: "Dry-run" start-up of the plant, trouble-shooting, servicing.

## Displays and controls



Version without a display  
Operation/configuration through the setup program only

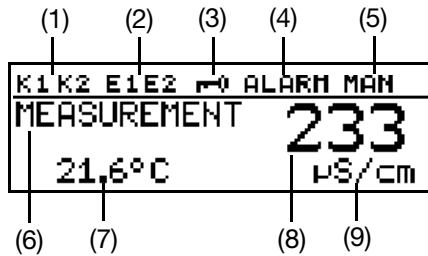


Version with a display  
Operation/configuration from the keys or through the setup program

- (1) Graphics LC display
- (2) LEDs for the switching status indication of the outputs K1 and K2
- (3) Keys



**Graphics LC display**



- (1) Switching output 1 or 2 is active
- (2) Binary input 1 or 2 is operated
- (3) Keypad is inhibited
- (4) Alarm has been activated
- (5) Instrument is in manual mode
- (6) Instrument status
- (7) Temperature of medium
- (8) Conductivity measurement
- (9) Unit of conductivity measurement

**Switching outputs**

The instrument features two floating switching outputs (solid-state relays) as standard.

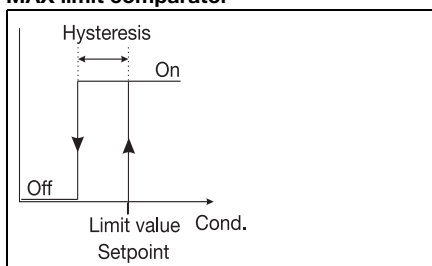
These can be used freely for monitoring the conductivity/concentration or the temperature.

The following functions can be assigned:

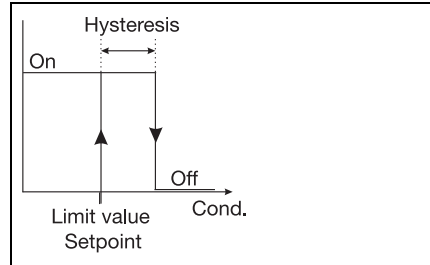
- Limit monitoring (MAX. or MIN. limit comparator) with programmable hysteresis
- Pulse function (the output switches briefly on reaching the switching point, then opens again).
- Pull-in and drop-out delay
- Inverted switching outputs
- Response to overrange/underrange or with activated measuring circuit monitoring (pull-in/drop-out).
- "Calibration timer run down" signal.

**Contact functions**

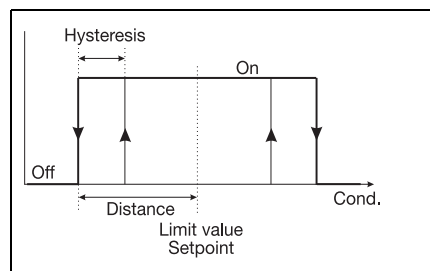
**MAX limit comparator**



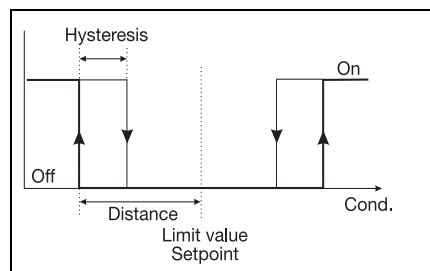
**MIN limit comparator**



**Alarm window 1**

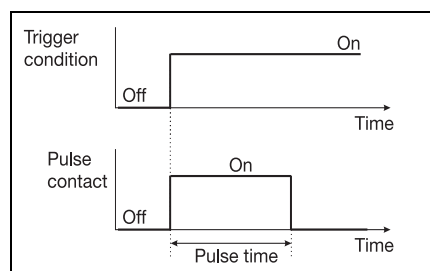


**Alarm window 2**



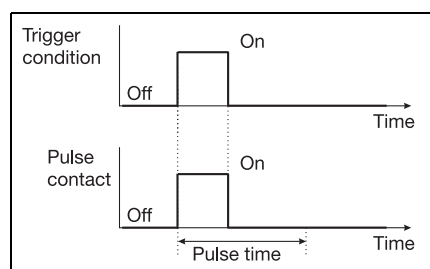
**Pulse contact**

**Trigger conditions longer than pulse time**



**Pulse contact**

**Trigger conditions shorter than pulse time**



**Binary inputs**

The two binary inputs serve to implement the following functions:

- Key inhibit
- HOLD mode
- 4-fold range changeover
- 4-fold temperature coefficient changeover
- Initiation of dilution function and biocide dosing

**Special functions**

- The learning function for the temperature coefficient enables exact measurement of media with a non-linear characteristic. During a temperature change, the instrument "learns" the temperature coefficient of the present medium and stores the profile. The stored values then enable the correct indication of the temperature-compensated conductivity.

- Individual characteristic for concentration indication.

An individual characteristic with 20 interpolation points can be entered through the setup program. This function can be used to generate special characteristics for specific media (e.g. special detergents). This results in correct measurements that contribute to assuring the quality and saving costs.

- Dilution control  
 Various processes that find their application in wet cooling towers are stored as sequence control (biocide dosing and subsequent inhibiting of dilution). Additional information can be found in the operating manual.

- Calibration timer  
 The calibration timer draws your attention to a calibration schedule. This function is activated by entering a number of days, after which recalibration has to be carried out (plant or operator requirement).

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**Function of the binary inputs**

Setting parameters	Binary input 1	Binary input 2
Measuring range/ temperature coefficient changeover	Range1/TC1	open
	Range2/TC2	closed
	Range3/TC3	open
	Range4/TC4	closed
Key inhibit	closed	X
"Hold" function	X	closed
Start dilution function	close (edge 0 - 1)	open
Stop dilution function	open	close (edge 0 - 1)

Meas. ranges Transmitter	Tolerance (in % of range span)
0 – 500 µS/cm	≤0.5 %
0 – 1000 µS/cm	
0 – 2000 µS/cm	
0 – 5000 µS/cm	
0 – 10 mS/cm	
0 – 20 mS/cm	
0 – 50 mS/cm	
0 – 100 mS/cm	
0 – 200 mS/cm	
0 – 500 mS/cm	
0 – 1000 mS/cm	
0 – 2000 mS/cm <sup>a</sup>	

<sup>a</sup> not compensated for temperature

**Note:**

The overall tolerance is made up of the tolerance of the transmitter + the tolerance of the sensor.

**Technical data**

**General**

**A/D converter**

resolution: 15 bit  
 sampling time: 500msec = 2 meas. per sec

**Supply**

For operation with SELV and PELV circuits.  
 As standard:  
 19 – 31 V DC (24 V DC nominal),  
 the instrument incorporates reverse-polarity protection  
 ripple: < 5 %  
 extra code 844:  
 24 V AC ±10 %, 50 – 60 Hz  
 power consumption  
 with display: ≤ 3 W  
 power consumption  
 without display: ≤ 2.6 W

**Rating of the solid-state relays**

U < 50 V AC/DC  
 I ≤ 200 mA

**Electrical connection**

plug-in screw terminals 2.5 mm<sup>2</sup> or M12 plug/socket connectors

**Display (option)**

graphics LCD with background lighting;  
 contrast is adjustable  
 dimensions: 62 x 23 mm

**Permissible ambient temp. (transmitter)**

-5 to +50 °C  
 max. 93 % rel. humidity, no condensation

**Permissible storage temp. (transmitter)**

-10 to +75 °C  
 max. 93 % rel. humidity, no condensation

**Enclosure protection (transmitter)**

IP67

**Housing**

polyamide (PA)

**Weight**

depending on version and process connection  
 approx. 0.3 – 2 kg

**Conductivity/concentration transmitter**

**Concentration measurement**  
 (implemented in the instrument software)

- NaOH (caustic soda)  
 0 – 15 % by weight or 25 – 50 % by weight
- HNO<sub>3</sub> (nitric acid)  
 0 – 25 % by weight or 36 – 82 % by weight
- customer-specific concentration curve,  
 reely programmable through the setup program (see "special functions")

**Calibration timer**

adjustable: 0 – 999 days (0 = off)

**Output signal for conductivity/concentration**

0 – 10 V / 10 – 0 V  
 2 – 10 V / 10 – 2 V  
 0 – 20 mA / 20 – 0 mA  
 4 – 20 mA / 20 – 0.4 mA  
 The output signal is freely scalable.

**Burden**

≤ 500Ω for current output  
 ≥ 2kΩ for voltage output

**Analog output with "Alarm"**

Low (0 mA / 0 V / 3.4 mA / 1.4 V)  
 or  
 High (22.0 mA / 10.7 V)  
 or  
 a fixed setting

**Measuring ranges**

Four ranges can be selected. One of these ranges can be activated via an external switch or a PLC.

**Temperature transmitter**

**Temperature acquisition**

manually -200 to 25.0 to 150 °C/°F  
 or automatically

**Temperature measuring range**

-200 to 150 °C/°F

**Characteristic**

linear

**Accuracy**

≤ 0.5 % of measuring range

**Ambient temperature error**

≤ 0.1 % / °C

**Response time**

with exposed temperature sensor  
 t<sub>09</sub> ≤ 6 sec  
 with internal temperature sensor  
 t<sub>09</sub> ≤ 2 min

**Output signal for temperature**

0 – 10 V / 10 – 0 V  
 2 – 10 V / 10 – 2 V  
 0 – 20 mA / 20 – 0 mA  
 4 – 20 mA / 20 – 0.4 mA  
 The output signal is freely scalable within the range -20 to +200 °C.  
 The sensor can be applied within the range -10 to +100 °C.

**Burden**

≤ 500Ω for current output  
 ≥ 2kΩ for voltage output

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**Analog output for "Alarm"**

Low (0 mA / 0 V / 3.4 mA / 1.4 V)  
 or  
 High (22.0 mA / 10.7 V)  
 or  
 a fixed setting

**Temperature compensation**

**Reference temperature**

15 to 30 °C, adjustable

**Temperature coefficient**

0.0 to 5.5 %/°C, adjustable

**Compensation range**

-20 to 150 °C

**Function**

- linear
- natural water (EN 27 888)
- non-linear (learning function, see special functions)

**Sensor**

**Material**

PP (polypropylene), suitable for foodstuffs

**Note:**

Temperature, pressure and sample medium affect the life of the cell!

**Temperature of the sample medium**

Process-connection	max. temperature
168 706	60 °C
169 607 617 690	80 °C short term 100 °C

**Pressure**

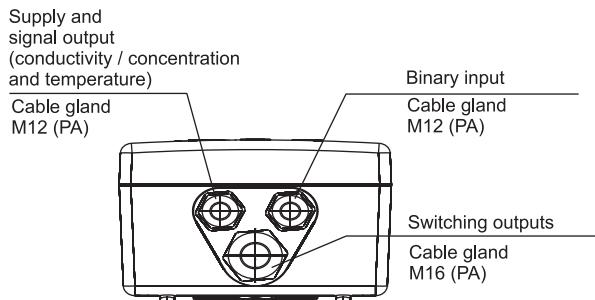
10 bar max. at 20 °C  
 6 bar max. at 60 °C

Measuring range Sensor	Tolerance (in % of range span)
0 – 500 µS/cm	≤0.5%
0 – 1000 µS/cm	
0 – 2000 µS/cm	
0 – 5000 µS/cm	
0 – 10 mS/cm	
0 – 20 mS/cm	
0 – 50 mS/cm	
0 – 100 mS/cm	
0 – 200 mS/cm	
0 – 500 mS/cm	
0 – 1000 mS/cm	≤1%
0 – 2000 mS/cm <sup>a1</sup>	

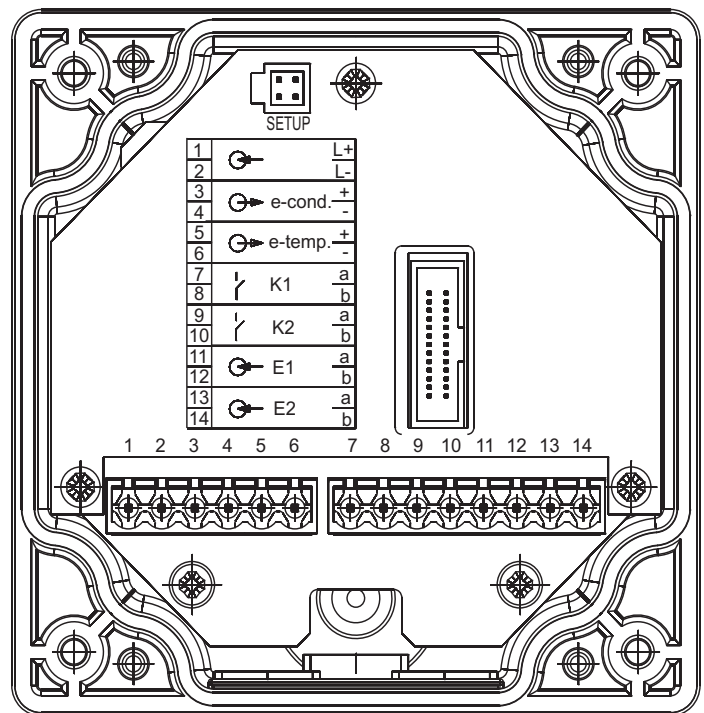
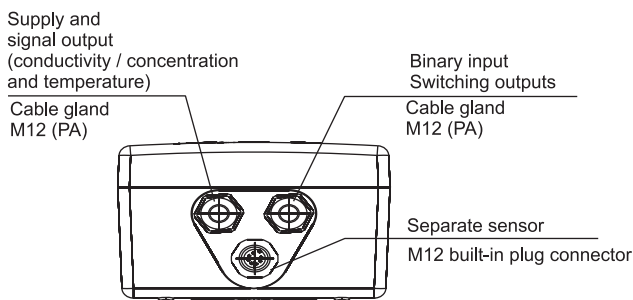
<sup>a</sup> not compensated for temperature.

**Electrical connection - head transmitter (transmitter with cable glands (-82))**

**Wiring recommendation - head transmitter**



**Wiring recommendation - with separate sensor**



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Supply	Terminal assignment	Symbol
Supply (with reverse-polarity protection)	1 L + 2 L -	

Outputs	Terminal assignment	Symbol
Analog signal output: conductivity/ concentration (electrically isolated)	3 + 4 -	
Analog signal output: temperature (electrically isolated)	5 + 6 -	
Switching output K1 (floating)	7 8	
Switching output K2 (floating)	9 10	

Binary inputs	Terminal assignment	Symbol
Binary input E1	11 12	
Binary input E2	13 14	

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## Electrical connection (transmitter with M12 connectors (-83))

### Head transmitter

Connector I

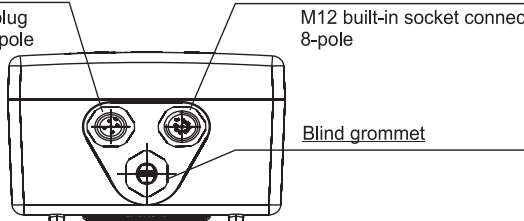
Supply and signal output for conductivity / concentration

M12 built-in plug connector, 5-pole

Connector II

Signal output for temperature and binary input  
Switching outputs

M12 built-in socket connector 8-pole



Blind grommet

### Transmitter with separate sensor

Connector I

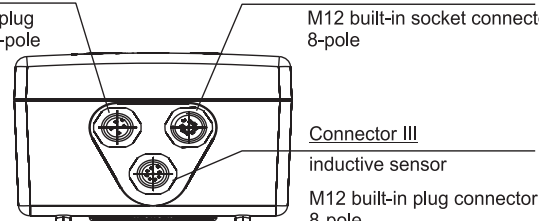
Supply and signal output for conductivity / concentration

M12 built-in plug connector, 5-pole

Connector II

Signal output for temperature and binary input  
Switching outputs

M12 built-in socket connector 8-pole



Connector III

inductive sensor

M12 built-in plug connector 8-pole

Supply	Connector	Assignment	Symbol
Supply (with reverse-polarity protection)	I	L+ L-	

Outputs	Connector	Assignment	Symbol
Analog signal output: conductivity / concentration (electrically isolated)	I		
Analog signal output: temperature (electrically isolated)	II		
Switching output K1 (floating)	II		
Switching output K2 (floating)	II		

Binary inputs	Connector	Assignment	Symbol
Binary input E1	I II		
Binary input E2	I II		

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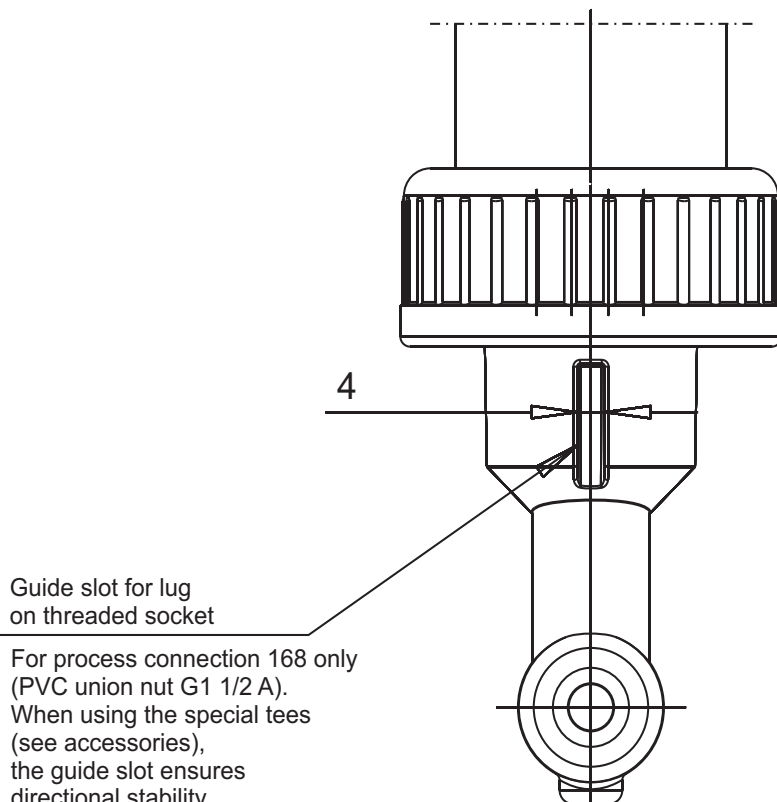
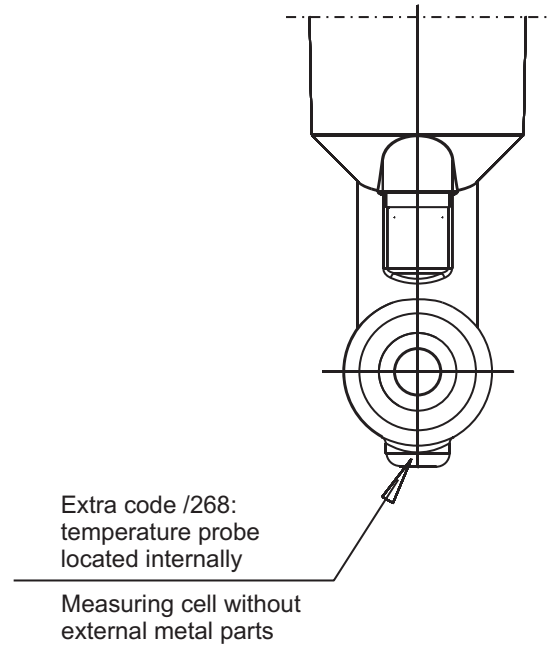
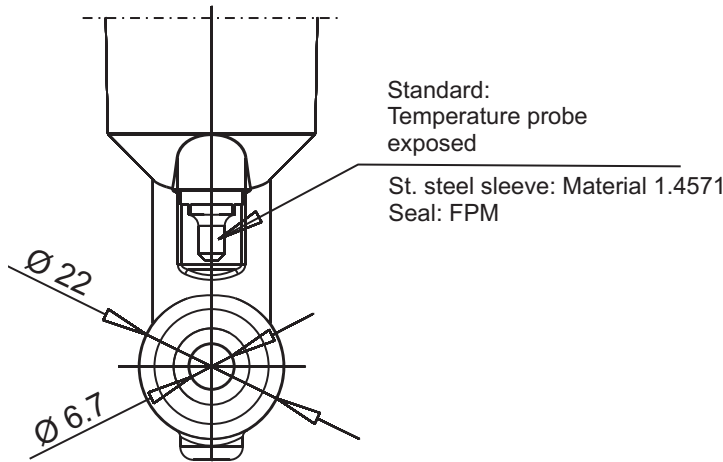
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## Dimensions

### Sensor (detail)



For process connection 168 only  
 (PVC union nut G1 1/2 A).  
 When using the special tees  
 (see accessories),  
 the guide slot ensures  
 directional stability.  
 The cell can only be installed  
 in the correct orientation.

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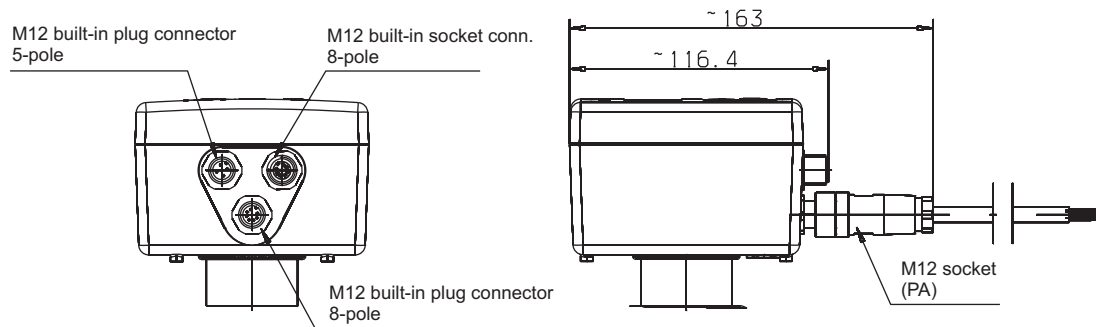
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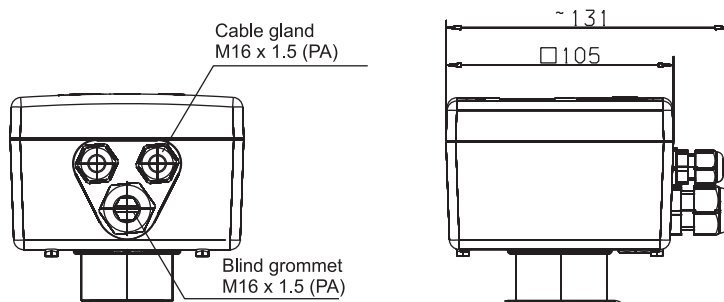
## Dimensions

### Transmitter with M12 plug connectors and M12 socket connectors



### Transmitter with M16 cable gland

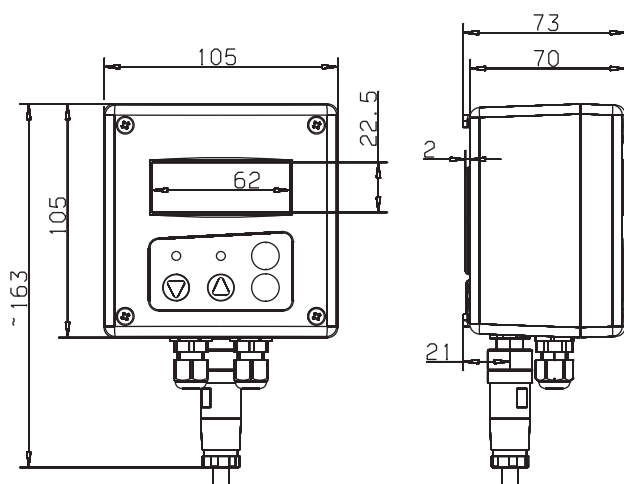
(only for the "head transmitter" model)



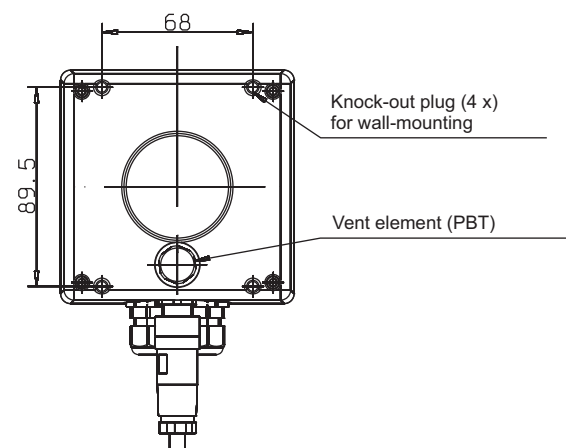
### Version:

### Transmitter with separate sensor (split version)

(basic type extensions /20, /25, /60 or /65)



### Drilling diagram



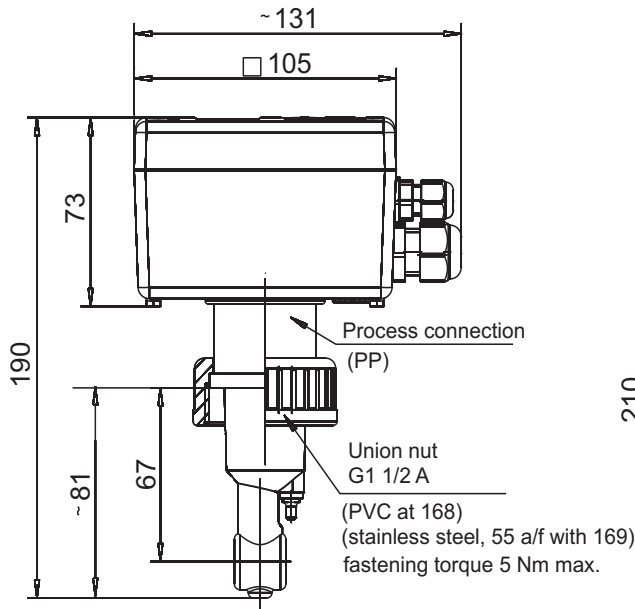
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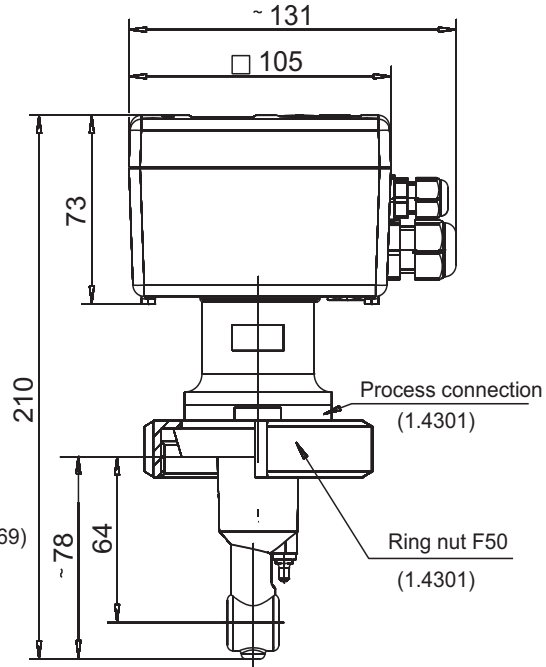
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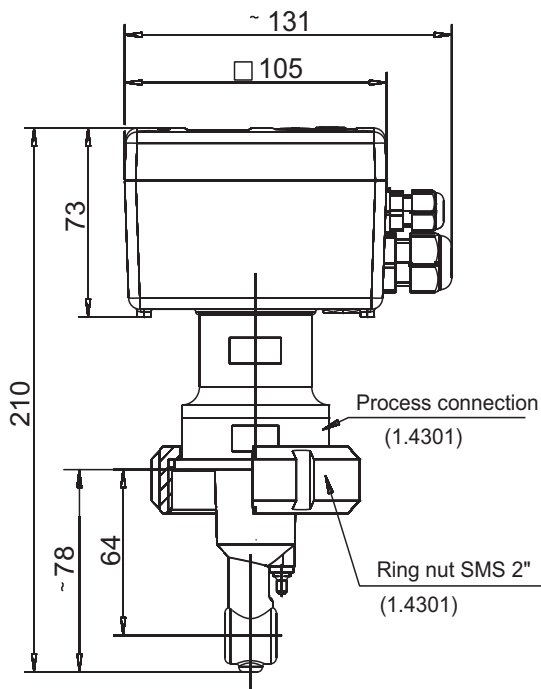
## Dimensions / Process connections (head transmitter)



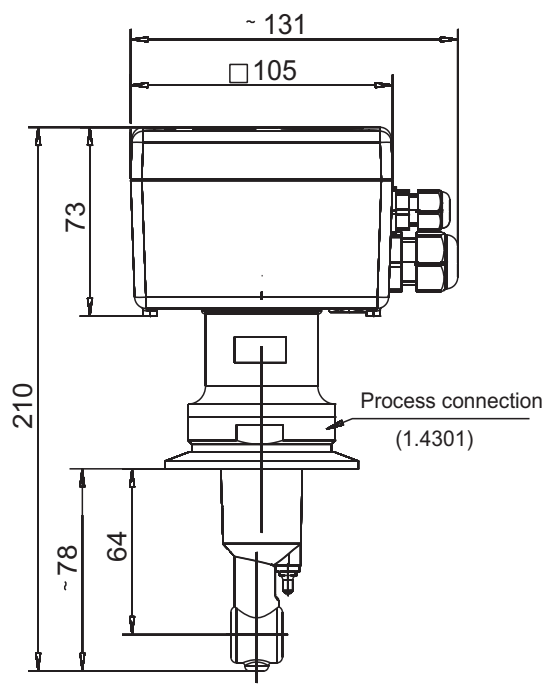
Version with  
 process connection 168  
 DN32 and DN40



Version with  
 process connection 607  
 MK DN40



Version with  
 process connection 690  
 SMS 2"



Version with  
 process connection 617  
 Clamp 2 1/2"  
 (retaining clip is not included  
 in delivery)

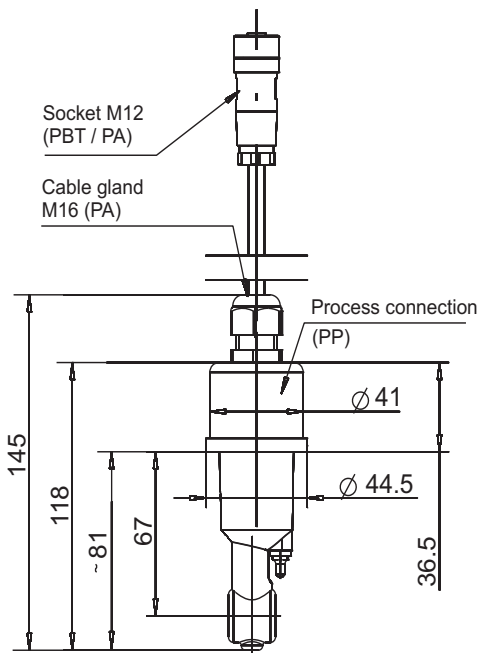
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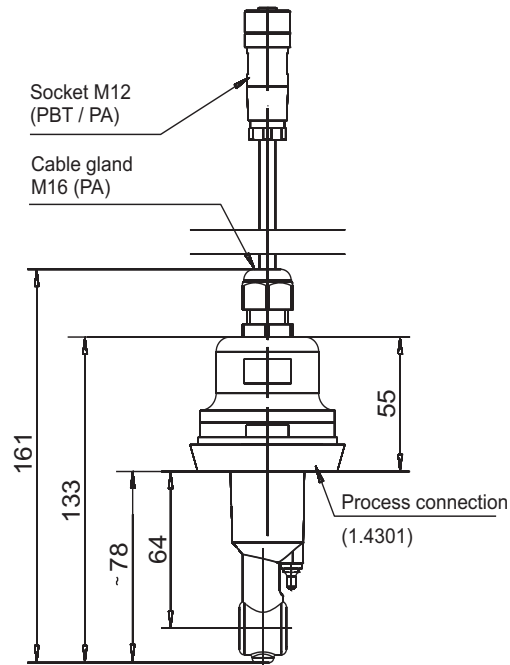
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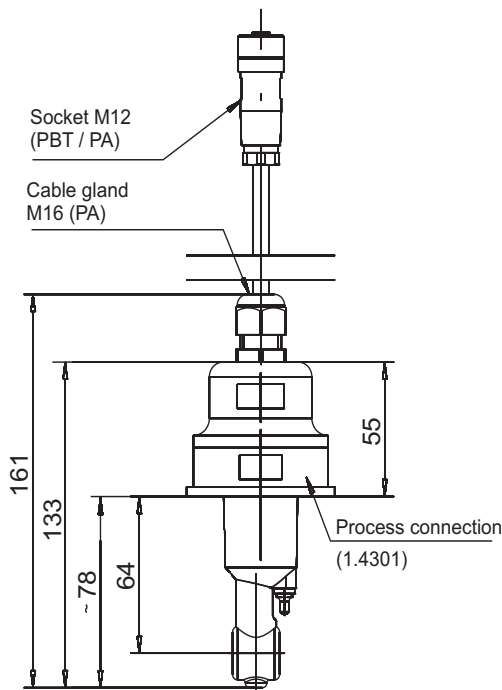
## Dimensions / Process connections (separate sensor)



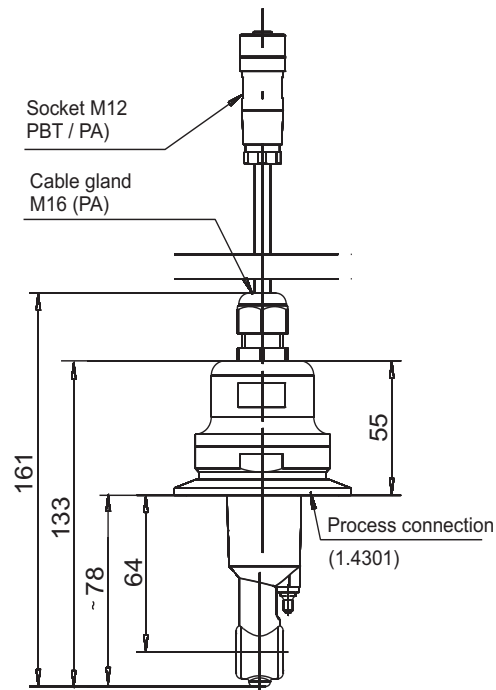
Split version  
 for process connection 168 and 169  
 DN32 and DN40  
 (union nut not included  
 in delivery)



Split version  
 for process connection 607  
 MK DN50  
 (union nut not included  
 in delivery)



Split version  
 for process connection 690  
 SMS 2"  
 (union nut not included  
 in delivery)



Split version  
 for process connection 617  
 Clamp 2 1/2"  
 (retaining clip not included  
 in delivery)

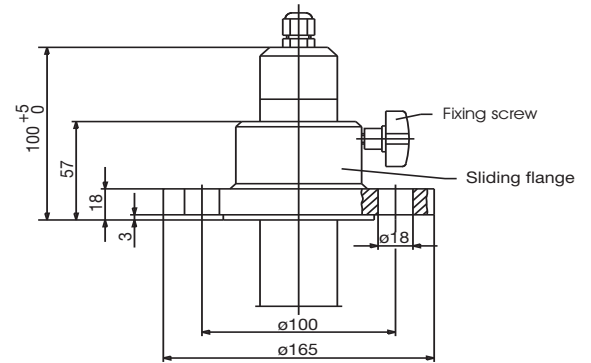
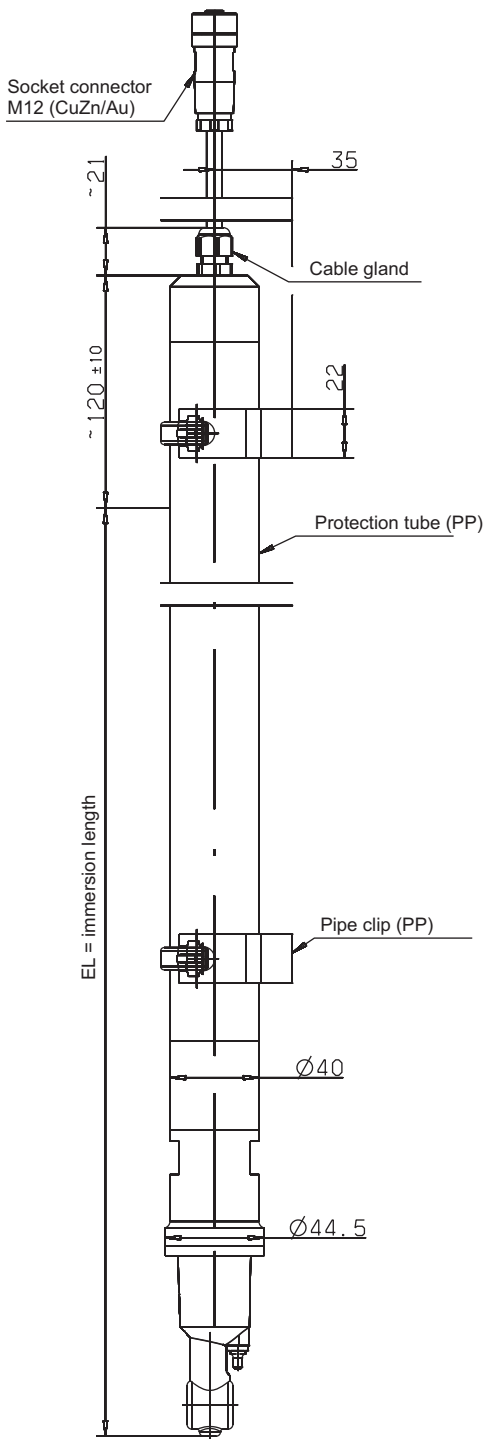
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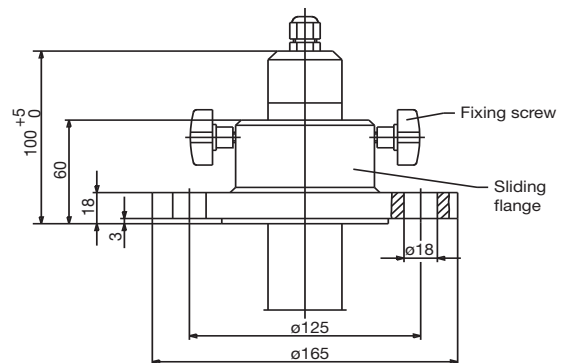
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## Dimensions (separate sensor as immersion model)



Optional accessory:  
 flange DN32, part no. 00083375



Optional accessory:  
 flange DN50, part no. 00083376

Split version  
 for process connection 706  
 immersion model  
 (pipe clips included in delivery)

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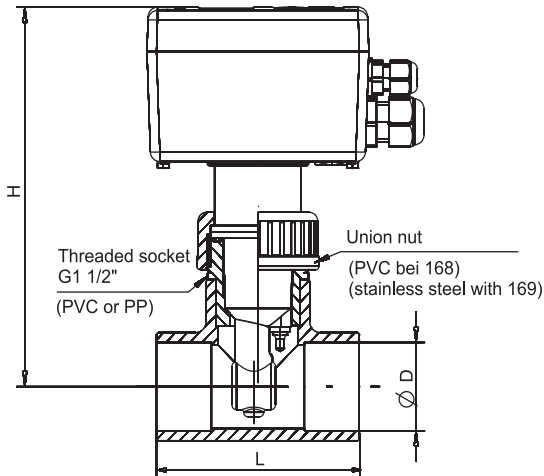
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## Mounting examples

Version with process connection 168 and 169

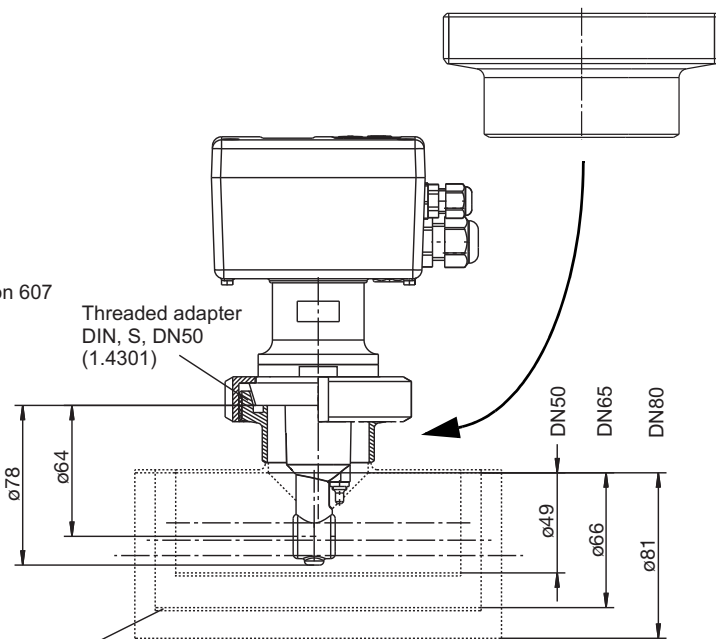
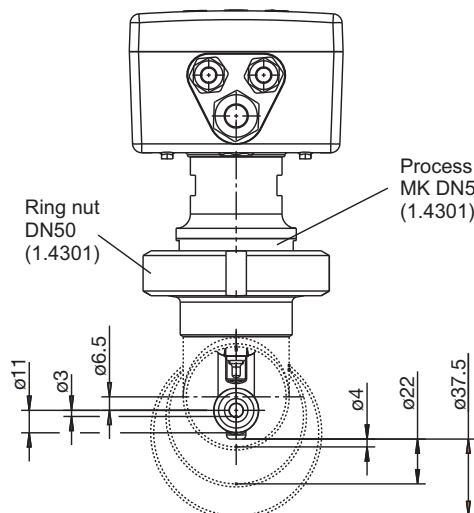


Optional accessory  
 Tee 90° (PVC or PP)

DN	ø D	L	H	Material	Maximum temperature	Part no.
32	40	98	172	PVC	+60 °C	00439247
40	50	118	177			00439249
32	40	88	179	PP	+80 °C	00449511
40	50	102	181			00449514
50	63	124	181			00449516

Weld-on threaded pipe adapter  
 DN50, DIN 11 851  
 (mating component for proc. connection 607),  
 part no. 00085020

Version with process connection 607  
 screwed pipe fitting DN50  
 DIN 11 851 (milk cone)



Reducing tee (to be provided by plant operator; not supplied by JUMO)  
 DIN, short, SSS, DN50/50, DN65/50, DN80/50  
 (1.4301)

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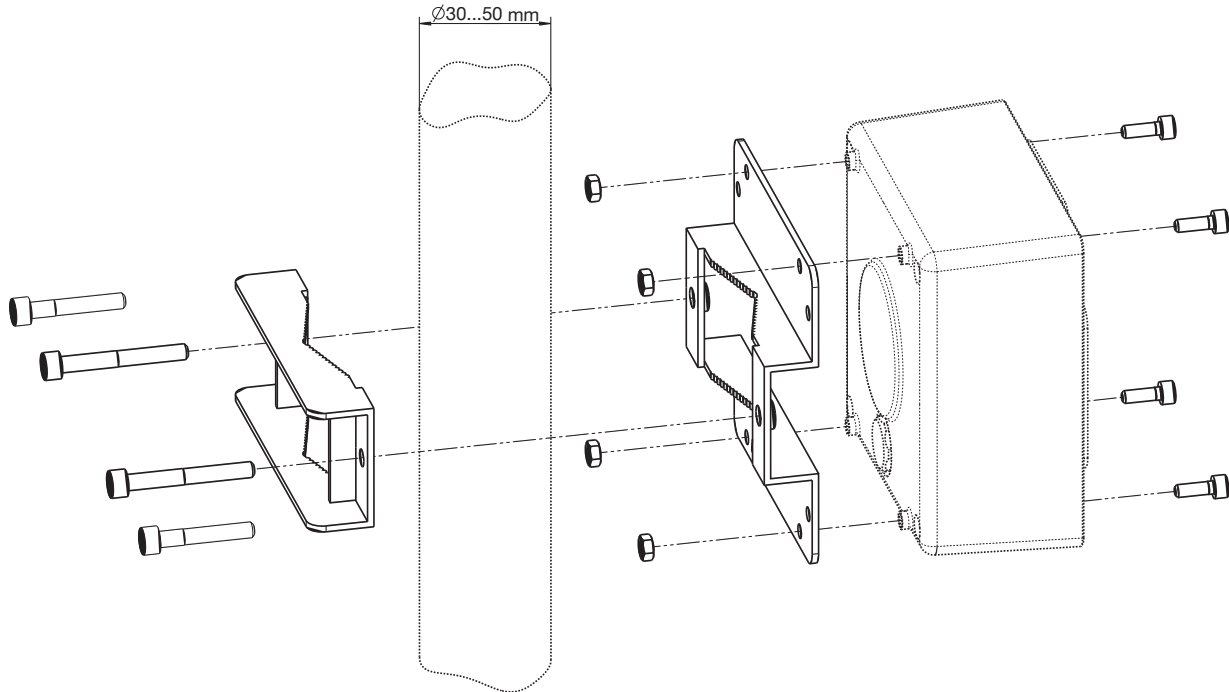
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**Kit for pipe mounting**



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**Order details: CTI-500 as "Head transmitter"**

	<b>(1) Basic type</b>	
	202755	JUMO CTI-500 - Inductive transmitter/switching device for conductivity/concentration and temperature
	<b>(2) Basic type extensions</b>	
	10	head transmitter without display/keypad <sup>a</sup>
	15	head transmitter with display/keypad
	<b>(3) Process connection</b>	
o	168	PVC union nut G1 <sup>1</sup> / <sub>2</sub> A <sup>b,c</sup>
o	169	stainless steel union nut G1 <sup>1</sup> / <sub>2</sub> A <sup>b</sup>
o	607	screwed pipe fitting DN50, DIN 11 851 (MK DN50, milk cone)
o	617	clamp connection 2 <sup>1</sup> / <sub>2</sub> " <sup>d</sup>
o	690	SMS 2"
	<b>(4) Immersion length</b>	
o	000	see dimensions
	<b>(5) Electrical connection</b>	
o	82	cable glands
o	83	M12 plug/socket connectors (instead of the cable glands) <sup>e</sup>
o	84	two M16 cable glands and one blind grommet
	<b>(6) Extra codes</b>	
x	000	no extra code
o	268	internal temperature sensor
o	768	cell material PVDF <sup>f</sup>
o	844	supply 24 AC V ±10%

- <sup>a</sup> The PC setup program is required for programming the instrument, see accessories
- <sup>b</sup> Special tee is not included in delivery, see accessories
- <sup>c</sup> Maximum temperature of medium: 60 °C
- <sup>d</sup> Mounting items (mounting brackets) do not come with delivery. If required, please include in your order (accessories)
- <sup>e</sup> If required, order 1 set M12 plug / socket connectors, see accessories
- <sup>f</sup> Only with process connections 168 and 169, in combination with extra code 268

x = standard  
 o = available as an option

**Order code**                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (6)  
      /  -  -  -  /  ,                    ...<sup>a</sup>  
**Order example**                    202755 / 10 - 108 - 000 - 82 / 000

<sup>a</sup> List extra codes in sequence, separated by commas

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 E-mail: info.us@jumo.net  
 Internet: www.jumousa.com



**Order details: CTI-500 as "Transmitter with separate sensor"**

	<b>(1) Basic type</b>	
	202755	JUMO CTI-500 - Inductive transmitter/switching device for conductivity/concentration and temperature
	<b>(2) Basic type extensions</b>	
	20	transmitter without display/keypad (without sensor) <sup>a,b</sup>
	25	transmitter with display/keypad (without sensor) <sup>b</sup>
	60	transmitter without display/keypad including sensor (cable length: 10 m) <sup>a</sup>
	65	transmitter with display/keypad including sensor (cable length: 10 m)
	80	replacement sensor with a 10 m long cable without transmitter <sup>b,c</sup>
	<b>(3) Process connection</b>	
	000	not available
	168	PVC union nut G1 <sup>1</sup> / <sub>2</sub> A (media temperature: 60 °C max.) <sup>d,e</sup>
	169	stainless steel union nut G1 <sup>1</sup> / <sub>2</sub> A <sup>d</sup>
	607	screwed pipe fitting DN50, DIN 11 851(MK DN50, milk cone)
	617	clamp connection 2 <sup>1</sup> / <sub>2</sub> " <sup>c</sup>
	690	SMS 2"
	706	immersion model
	<b>(4) Immersion length</b>	
	000	not available
	500	500 mm
	1000	1000 mm
	1500	1500 mm
	2000	2000 mm (max. length)
	xxxx	special length (in 250 mm steps; e.g. 0250; 0750; 1250; 1750)
	<b>(5) Electrical connection</b>	
	21	attached cable with M12 socket connector on separate sensor
	82	cable glands on the operating unit
	83	M12 plug/socket connectors on operating unit <sup>f</sup>
	84	two cable glands and one blind grommet
	<b>(6) Extra codes</b>	
	000	no extra code
	268	internal temperature sensor
	768	cell material PVDF <sup>g</sup>
	844	supply voltage 24 V AC

<sup>a</sup> The PC setup program is required for programming the instrument, see accessories  
<sup>b</sup> A calibration kit is absolutely essential for commissioning. If required, please include in your order (accessories)  
<sup>c</sup> Mounting items (union/ring nuts, mounting brackets) do not come with delivery. If required, please include in your order (accessories)  
<sup>d</sup> Special tee is not included in delivery  
<sup>e</sup> Maximum temperature of medium: 60 °C  
<sup>f</sup> If required, order 1 set M12 plug / socket connectors, see accessories  
<sup>g</sup> Only with process connections 168 and 169, in combination with extra code 268

x = standard  
 0 = available as an option  
 - = not available

**Order code**                    **(1)**                    **(2)**                    **(3)**                    **(4)**                    **(5)**                    **(6)**                    **(6)**  
      /  -  -  -  /  ,                    ...<sup>a</sup>  
**Order example**                    202755 / 65 - 108 - 1000 - 21 / 000

<sup>a</sup> List extra codes in sequence, separated by commas

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Internet: www.jumousa.com

**Stock items** (shipment: 3 days after receipt of order)

Type	Part no.
202755/10-168-0000-82/000	00445842
202755/15-168-0000-82/000	00445843
202755/15-607-0000-82/000	00445845

**Production items** (shipment: 10 days after receipt of order)

Type	Part no.
202755/65-607-0000-82/000	00445840

**Accessories**

Type	Part no.	
Weld-on threaded adapter DN50, DIN 11 851 (mating component for process connection -607)	00085020	
Special tee DN32, PVC, including threaded socket <sup>a</sup>	max. 60 °C, mating component for process connection -168	00439247
Special tee DN40, PVC, including threaded socket <sup>a</sup>		00439249
Union nut G1 1/2, PVC	00439199	
Union nut G1 1/2, stainless steel	00452039	
Ring nut DN50, DIN 11 851	00343368	
Ring nut SMS DN2"	00345162	
Flange DN32, material: PP <sup>b</sup>	00083375	
Flange DN50, material: PP <sup>b</sup>	00083376	
Kit for pipe mounting	00459189	
Kit for DIN rail mounting	00459903	
Shackle for CTI-500 sensor and immersion fitting with diameter 40 mm	00453191	
M12 socket connector, 5-pole, straight, for assembly by user	necessary for versions 202755/xx-xxx-xxxx-83/xxx	00444313
M12 plug connector, 8-pole, straight, for assembly by user		00444307
M12 socket connector, 8-pole, straight, for assembly by user	replacement part for sensor 202755/80...	00444312
PC setup software for JUMO CTI-500	00447634	
PC interface cable with TTL / RS232 converter and adapter (serial connection cable)	00350260	
PC interface cable with USB / TTL converter and two adapters (USB connection cable)	00456352	
Switched-mode power supply for DIN rail mounting, Type PSSR-A24	input voltage: AC 100 to 240 V / 50 to 60 Hz output voltage: DC 24 V, 0.3 A	00374661
Cover with LC display and keypad (facilitates the programming of transmitters without display and keypad)	00443725	
Special tee DN32, PP <sup>a</sup>	including threaded socket (max. 80 °C), mating component for process connection -169	00449511
Special tee DN40, PP <sup>a</sup>		00449514
Special tee DN50, PP <sup>a</sup>		00449516
Calibration kit (for calibrating a replacement transmitter or replacement sensor)	00459436	
M12 plug/socket connectors set, suitable for electrical connection 83	00529482	

Additional concentration curves for the usual acids and lyes (20 interpolation points in tabular form), for entry on the CTI-500 through the setup program.	on request
---	------------

<sup>a</sup> with anti-rotation lug - the cell can only be installed in the correct orientation

<sup>b</sup> only in conjunction with a separate sensor in the immersion version 202755/60-706-... or 202755/65-706-... or 202755/80-706-...

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# JUMO CTI-750

## Inductive Conductivity/Concentration and Temperature Transmitter with switch contacts

### Brief description

The instrument is used for the measurement/control of conductivity or concentration in liquid media. It is particularly recommended for use in media where severe deposits of dirt, oil, grease or gypsum/lime precipitates are to be expected. The integrated temperature measurement enables fast and accurate temperature compensation, which is of particular importance when measuring conductivity. Additional functions, such as the combined changeover of measurement range and temperature coefficient, and a particularly robust conductivity probe, enable optimum application in CIP processes.

Two built-in switching outputs can be freely programmed to monitor limits for conductivity/concentration and/or temperature. It is also possible to assign alarm and control functions (dilution).

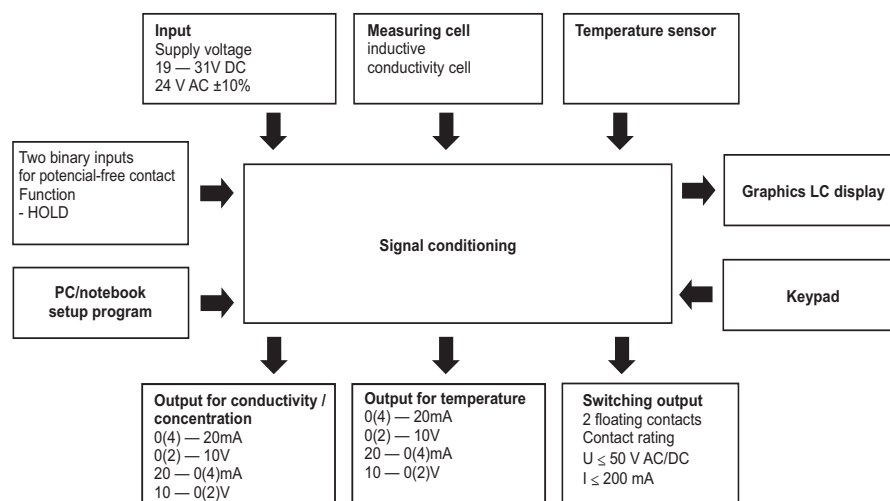
The instrument is operated either from the membrane keypad and plain-text graphics display or through the user-friendly PC setup program. The display can be read in a vertical or horizontal mounting position. The instrument can also be supplied without a keyboard/display. In this case, the setup program is required for programming.

Plastic or stainless steel can be chosen as the housing material, depending on the requirement. The separate sensor design is particularly suitable for systems with powerful vibrations and/or powerful heat emissions at the measuring location.

Typical areas of application: Food/beverage and pharmaceutical industries, product separation in the beverage industry, breweries and dairies, bottle cleaning plant, concentration control in electroplating and chemical processing plant, CIP systems, water and wastewater engineering, dosing of chemicals, leakage indication, in heating and cooling plant, and so on.



### Block structure



### Key features

- Hygienic sensor
- Activation of up to four measuring ranges and temperature coefficients
- Concentration measurement of
  - caustic soda NaOH
  - nitric acid HNO<sub>3</sub>
  - a freely definable curve
- Fast-response temperature sensor
- Temperature compensation
  - linear, natural water or specific characteristic (learning function)
- Operation via keypad and LC display or through setup program
- Operator languages: English, French, German, Italian, Dutch, Polish, Portuguese, Russian, Spanish, Swedish
- By using the setup program:
  - user-friendly programming
  - plant documentation

### Approvals/marks of conformity



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## Functional description

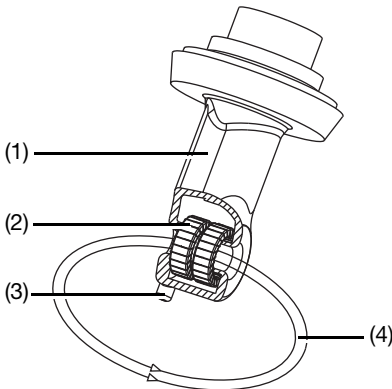
The inductive measurement method permits largely maintenance-free acquisition of the specific conductivity, even in the toughest media conditions. As opposed to the conductive measurement method, problems such as electrode decomposition and polarization do not occur.

Conductivity is measured by using an inductive probe. A sinusoidal a.c. voltage feeds the transmitting coil. Depending on the conductivity of the liquid to be measured, a current is induced in the receiver coil. This current is proportional to the conductivity of the medium.

## Instrument description

### Measuring cell

The measuring cell consists of a hermetically sealed body inside which the two measurement coils are arranged. A bore in the measuring cell enables the medium to flow through. The measurement principle entails an inevitable electrical isolation between the sample medium and the signal output. The measuring cell is largely unaffected by temperature and pressure variations.



- (1) Cell body (PEEK)
- (2) Measuring coils
- (3) Temperature sensor
- (4) Liquid loop

### Exposed temperature sensor

The exposed sensor reacts very quickly to changes in temperature. This is particularly important in CIP processes (phase separation).

### Parts in contact with the medium

Depending on the measuring cell version, the following materials come into contact with the sample medium: PEEK, PVDF, EPDM, stainless steels 1.4301 (AISI 304), 1.4305 (AISI 303) and 1.4404 (AISI 316L); see Dimensions.

## Temperature compensation

Since conductivity depends to a large extent on the temperature of the medium, it is usually necessary to compensate for the temperature effect.

The instrument allows both linear and non-linear temperature compensation. If required, temperature compensation can be switched off, for example, when the temperature conditions on the measurement site are stable or when temperature compensation is carried out in the software, in external evaluation devices (PLC or similar).

## Process connections

To cover a wide variety of applications, the instrument can be supplied with different process connections, see dimensions.

### Installation at the measurement point

The operating position is generally unrestricted. However, it is essential to ensure that there is a continuous exchange of the sample medium in the flow channel and that both air bubbles and dry-running are avoided.

### Transmitter

The type 202756 transmitter has been designed for use on site. A rugged housing protects the electronics and the electrical connections from corrosive environmental conditions (IP67). A vent screw with a PTFE

membrane prevents condensation.

## Operation

The type 202756 can be operated either from the instrument keys and the graphics LC display and/or through the setup program from a PC or laptop.

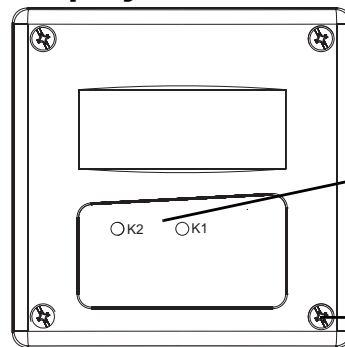
The instrument can be secured against unauthorized alteration by a password.

## Functions of the outputs

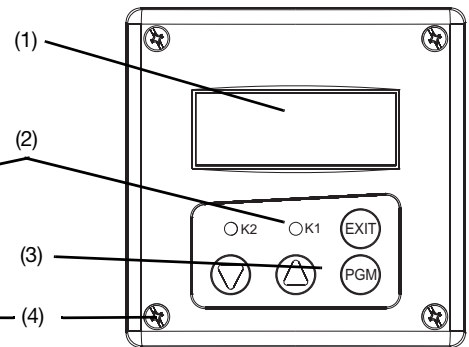
### Analog outputs

- One analog signal output for conductivity/concentration and temperature respectively.
- The analog output signals are freely scalable (range start and end values).
- The response of the analog outputs to over/underrange or alarm can be programmed.
- Simulation of the signal output:  
The analog signal outputs can be freely set in the manual ("Hand") mode.  
Application: "Dry-run" start-up of the plant, trouble-shooting, servicing.

## Displays and controls

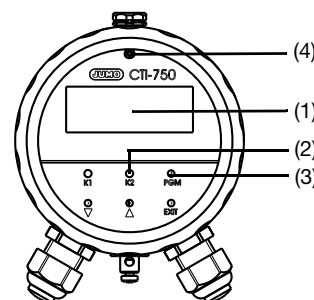


**Version without a display**  
Operation/configuration through the setup program only



**Version with a display**  
Operation/configuration from the keys or through the setup program

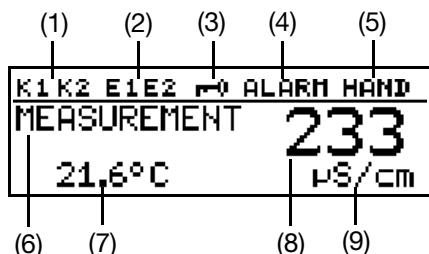
### Version in stainless steel housing



- (1) Graphics LC display
- (2) LEDs for the switching status indication of the outputs K1 and K2
- (3) Keys
- (4) Captive screw



## Graphics display



- (1) Switching output 1 or 2 is active
- (2) Binary input 1 or 2 is operated
- (3) Keypad is inhibited
- (4) Alarm has been activated
- (5) Instrument is in manual mode
- (6) Instrument status
- (7) Temperature of medium
- (8) Conductivity measurement
- (9) Unit of conductivity measurement

## Switching outputs

The instrument features two floating switching outputs (solid-state relays) as standard.

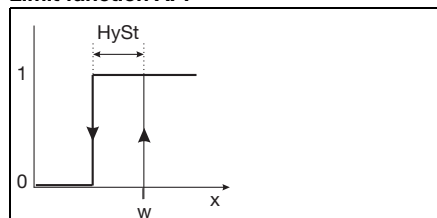
These can be used freely for monitoring the conductivity/concentration or the temperature.

The following functions can be assigned:

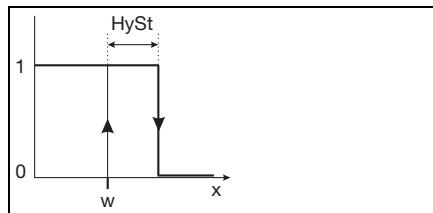
- Limit monitoring (MAX. or MIN. limit comparator) with programmable hysteresis
- Pulse function (the output switches briefly on reaching the switching point, then opens again).
- Pull-in and drop-out delay
- Inverted switching outputs
- Response to overrange/underrange or with activated measuring circuit monitoring (pull-in/drop-out)
- "Calibration timer run down" signal.

## Contact functions

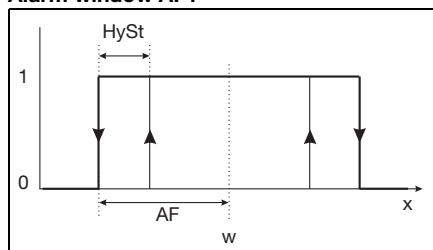
### Limit function AF7



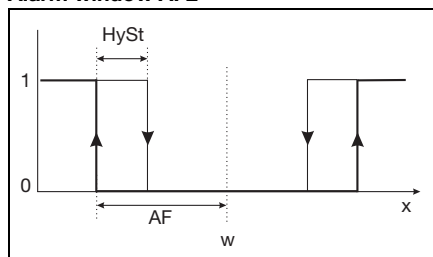
### Limit function AF8



### Alarm window AF1

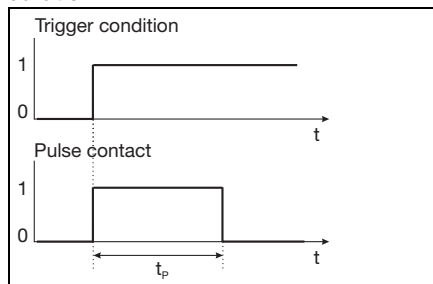


### Alarm window AF2



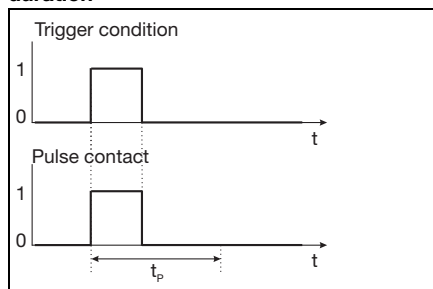
### Pulse contact

#### Trigger conditions longer than pulse duration



### Pulse contact

#### Trigger conditions shorter than pulse duration



## Binary inputs

The two binary inputs serve to implement the following functions:

- Key inhibit
- HOLD mode
- 4-fold range changeover
- 4-fold temperature coefficient changeover
- Initiation of dilution function and biocide dosing

## Special functions

- The **learning function** for the temperature coefficient enables exact measurement of media with a non-linear characteristic. During a temperature change, the instrument "learns" the temperature coefficient of the present medium and stores the profile. The stored values then enable the correct indication of the temperature-compensated conductivity.
- **Individual characteristic** for concentration indication. An individual characteristic with 20 interpolation points can be entered through the setup program. This function can be used to generate special characteristics for specific media (e.g. special detergents). This results in correct measurements that contribute to assuring the quality and saving costs.
- **Dilution control**  
 Various processes that find their application in wet cooling towers are stored as sequence control (biocide dosing and subsequent inhibiting of dilution). Detailed information can be found in the operating manual.
- The **calibration timer** draws your attention to a calibration schedule. This function is activated by entering a number of days, after which recalibration has to be carried out (plant or operator requirement).

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## Function of the binary inputs

Setting parameters	Binary input 1	Binary input 2
Range/temperature coefficient changeover	Range1/TC1	open
	Range2/TC2	closed
	Range3/TC3	open
	Range4/TC4	closed
Key inhibit	closed	X
Hold function	X	closed
Start dilution function	close (0 - 1 edge)	open
Stop dilution function	open	close (0 - 1 edge)

## Technical data

### Conductivity transmitter

<b>A/D converter</b>	
Resolution	15 bits
Sampling time	500 ms = 2 measurements/s
<b>Power supply</b>	For SELV and PELV circuit operation only.
Standard	19 - 31 V DC (24 V DC nominal)
Residual ripple	<5 %
Reverse polarity protection	yes
Extra code 844	24 V DC $\pm$ 10 %, 50 - 60 Hz
Power draw	
with display	$\leq$ 3 W
without display	$\leq$ 2,6 W
<b>Contact rating of the photo MOS relay</b>	
Voltage	$\leq$ 50 V AC/DC
Current	$\leq$ 200 mA
<b>Electrical connection</b>	
82	Cable glands/pluggable screw terminals, 2,5 mm <sup>2</sup>
83	M12 plug/socket (instead of cable glands)
84	Two M16 cable glands and a pluggable screw terminal blanking plug, 2,5 mm <sup>2</sup>
<b>Display</b>	
Basic type extension 10	without display
Basic type extension 15	Backlit graphic LCD; adjustable contrast; dimensions: 62 mm $\times$ 23 mm
Basic type extension 16	Backlit graphic LCD; adjustable contrast; dimensions: 62 mm $\times$ 23 mm
<b>Permissible ambient temperature</b>	5 to +50 °C; max. rel. humidity. 93 %, no condensation
<b>Permissible storage temperature</b>	-10 to +75 °C; max. rel. humidity. 93 %, no condensation
<b>Protection rating<sup>a</sup></b>	IP67
<b>Electromagnetic compatibility<sup>b</sup></b>	
Interference emission	Class B
Interference immunity	to industrial requirements
<b>Housing</b>	
Basic type extensions 10, 15, 20, 25, 60, 65	PA
Basic type extensions 16, 26, 66	Stainless steel 1.4305 (AISI 303)
<b>Weight<sup>c</sup></b>	approx. 0,3 - 2,4 kg

<sup>a</sup> DIN EN 60529

<sup>b</sup> DIN EN 61326

<sup>c</sup> Dependent on version and process connection

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## Measuring ranges

There is a choice of four different measuring ranges. Any one of these ranges can be activated by an external switch or by a PLC.

**Note:** The overall accuracy is composed of transmitter accuracy + sensor accuracy.

Transmitter measuring ranges	Accuracy (as % of measuring range span)
0 - 500 µS/cm	≤ 0,5 %
0 - 1000 µS/cm	
0 - 2000 µS/cm	
0 - 5000 µS/cm	
0 - 10 mS/cm	
0 - 20 mS/cm	
0 - 50 mS/cm	
0 - 100 mS/cm	
0 - 200 mS/cm	
0 - 500 mS/cm	
0 - 1000 mS/cm	
0 - 2000 mS/cm <sup>a</sup>	
<b>Concentration measurement</b>	implemented in the device software
NaOH (caustic soda)	0 - 15 % by weight or 25 - 50 % by weight (0 - 90 °C)
HNO <sub>3</sub> (nitric acid)	0 - 25 % by weight or 36 - 82 % by weight (0 - 80 °C)
Customer-specific concentration curve	freely programmable via the setup program (see "Special functions")
<b>Calibration timer</b>	0 - 999 days (0 = OFF)
<b>Output signal conductivity and concentration<sup>b</sup></b>	0 - 10 V or 10 - 0 V 2 - 10 V or 10 - 2 V 0 - 20 mA or 20 - 0 mA 4 - 20 mA or 20 - 4 mA
<b>Burden</b>	
at current output	≤ 500 Ω
at voltage output	≥ 2k Ω
<b>Ambient temperature effect</b>	≤ 0,1 %/K
<b>Analog output at "Alarm"</b>	
Low	0 mA/0 V/3.4 mA/1.4 V or a fixed value
High	22.0 mA/0.7 V or a fixed value

<sup>a</sup> Not temperature compensated.

<sup>b</sup> The output signal is freely scalable.

## Temperature transmitters

<b>Temperature acquisition<sup>a</sup></b>	Manually, -20.0 to 25.0 to 150 °C or °F, or automatically
<b>Measuring range</b>	-20 - 150 °C or °F
<b>Characteristic</b>	linear
<b>Accuracy</b>	≤ 0.5 % of the measuring range
<b>Ambient temperature effect</b>	≤ 0.1 %/K
<b>Output signal</b>	0 - 10 V or 10 - 0 V 2 - 10 V or 10 - 2 V 0 - 20 mA or 20 - 0 mA 4 - 20 mA or 20 - 4 mA The output signal is freely scalable in the -20 to +200°C range.
<b>Burden</b>	
at current output	≤ 500 Ω
at voltage output	≥ 2k Ω
<b>Analog output at "Alarm"</b>	
Low	0 mA/0 V/3.4 mA/1.4 V or a fixed value
High	22.0 mA/10.7 V or a fixed value

<sup>a</sup> Take the permissible sample medium temperature into consideration!

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Internet: www.jumo.net

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Internet: www.jumo.us

**Temperature compensation**

<b>Reference temperature</b>	15 to 30 °C, adjustable
<b>Temperature coefficient</b>	5.5 %/°C, adjustable
<b>Compensation range</b>	-20 to 150 °C
<b>Function</b>	linear or natural water (EN 27888) or non-linear (learning function, see Special functions)

**Inductive conductivity sensor**

<b>Measuring range</b>	<b>Accuracy</b> (as % of measuring range span)
0 - 500 µS/cm	≤ 1 %
0 - 1000 µS/cm	≤ 1 %
0 - 2000 µS/cm	≤ 0,5 %
0 - 5000 µS/cm	≤ 0,5 %
0 - 10 mS/cm	≤ 0,5 %
0 - 20 mS/cm	≤ 0,5 %
0 - 50 mS/cm	≤ 0,5 %
0 - 100 mS/cm	≤ 0,5 %
0 - 200 mS/cm	≤ 0,5 %
0 - 500 mS/cm	≤ 0,5 %
0 - 1000 mS/cm	≤ 1 %
0 - 2000 mS/cm <sup>a</sup>	≤ 1 %
<b>Material</b>	
for extra code 767	PEEK
for extra code 768	PVDF
<b>Permissible sample medium temperatures<sup>b</sup></b>	-10 - +120 °C, briefly +140 °C (sterilization)
<b>Pressure</b>	max. 10 bar

<sup>a</sup> Not temperature compensated

<sup>b</sup> **Note:** The temperature, pressure and sample medium affect the service life of the measuring cell!

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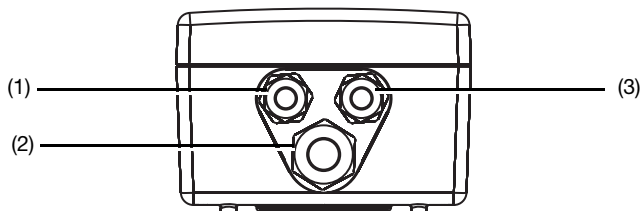
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## Electrical connection

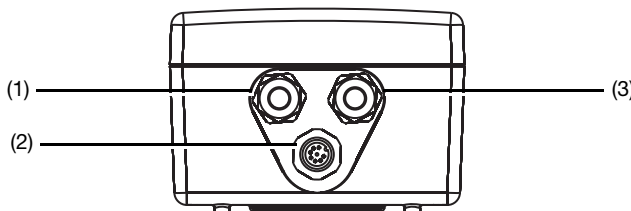
### Transmitter with electrical connection 82 (cable glands)

#### Head transmitter

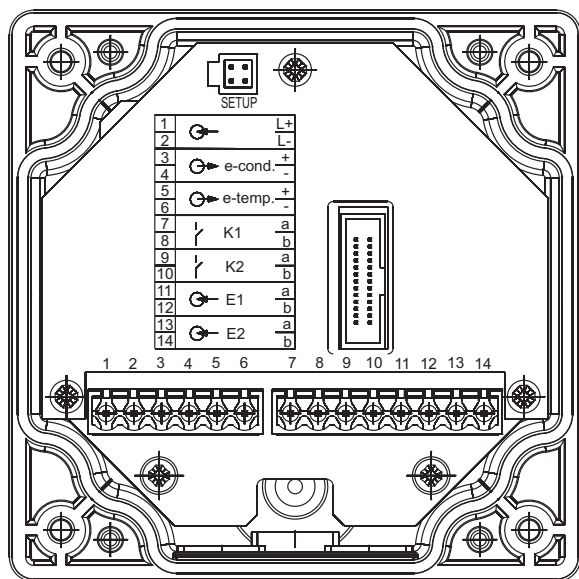


- (1) Power supply and actual value output (conductivity/concentration and temperature) M12 cable gland (PA)
- (2) Switching outputs M16 cable gland (PA)
- (3) Binary input M12 cable gland (PA)

#### Transmitter with separate sensor



- (1) Power supply and actual value output (conductivity/concentration and temperature) M12 cable gland (PA)
- (2) Separate sensor M12 flush-type connector
- (3) Binary input and switching outputs M12 cable gland (PA)



	Terminal assignment		Symbol
<b>Supply</b>			
Supply (with reverse-polarity protection)	1 2	L + L -	
<b>Outputs</b>			
Analog signal output: conductivity/concentration (electrically isolated)	3 4	+ -	
Analog signal output: temperature (electrically isolated)	5 6	+ -	

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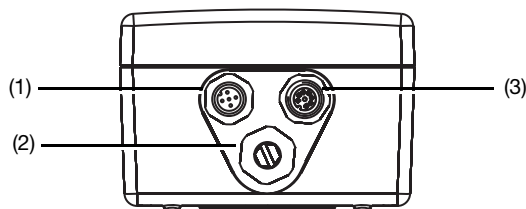


	Terminal assignment	Symbol
Foto-MOS-Relay K1 (floating, no)	7 8	
Foto-MOS-Relay K2 (floating, no)	9 10	

Binary inputs	Terminal assignment	
Binary input E1	11 12	
Binary input E2	13 14	

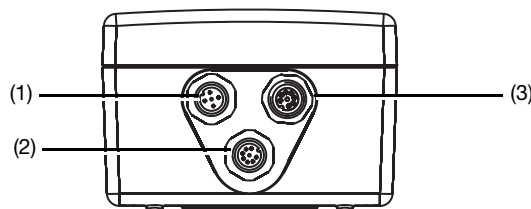
## Transmitter with electrical connection 83 (M12 connectors)

### Head transmitter



- (1) **Connector I**  
Power supply and actual value output for conductivity/concentration  
M12 flush-type connector, 5-pin
- (2) Blanking plug
- (3) **Connector II**  
Actual value output for temperature, and binary input and switching outputs  
M12 flush-type connector, 8-pin

### Transmitter with separate sensor



- (1) **Connector I**  
Power supply and actual value output for conductivity/concentration  
M12 flush-type connector, 5-pin
- (2) **Connector III**  
Inductive conductivity sensor  
M12 flush-type connector, 8-pin
- (3) **Connector II**  
Actual value output for temperature, and binary input and switching outputs  
M12 flush-type connector, 8-pin

Supply	Connector	Assignment	Symbol
Supply (with reverse-polarity protection)	I	L + L -	

Outputs	Connector	Assignment	Symbol
Analog signal output: conductivity/concentration (electrically isolated)	I		
Analog signal output: temperature (electrically isolated)	II		
Switching output K1 (floating)	II		
Switching output K2 (floating)	II		

Binary inputs	Connector	Assignment	Symbol
Binary input E1	I II		
Binary input E2	I II		

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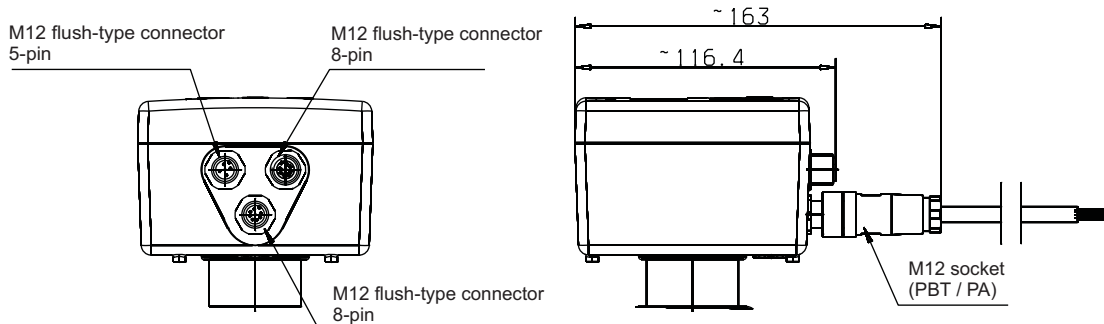
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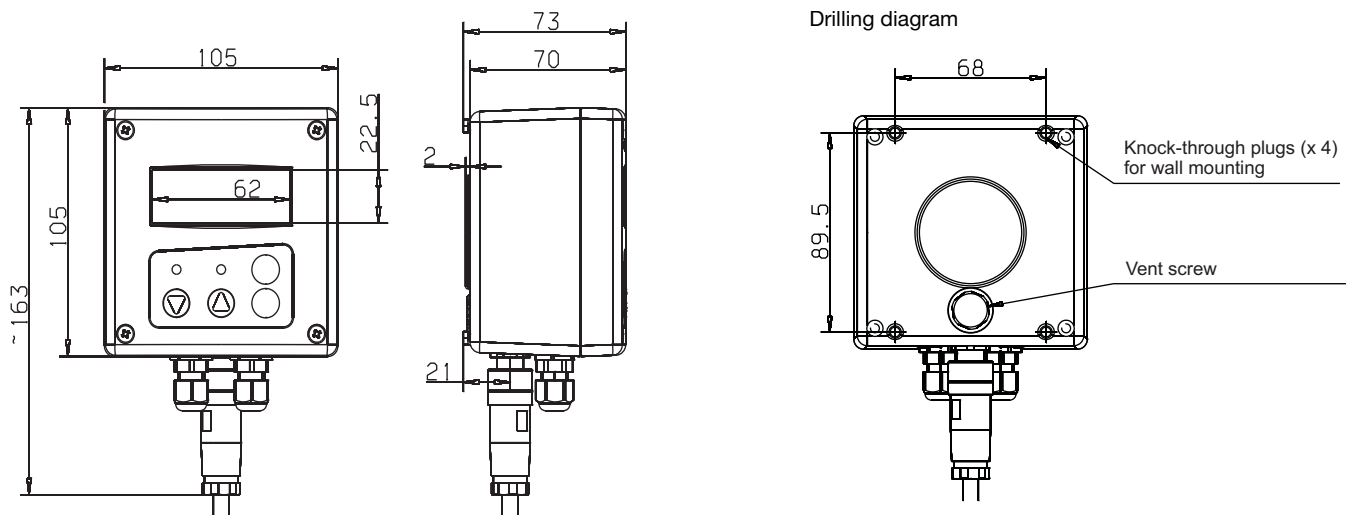


## Dimensions

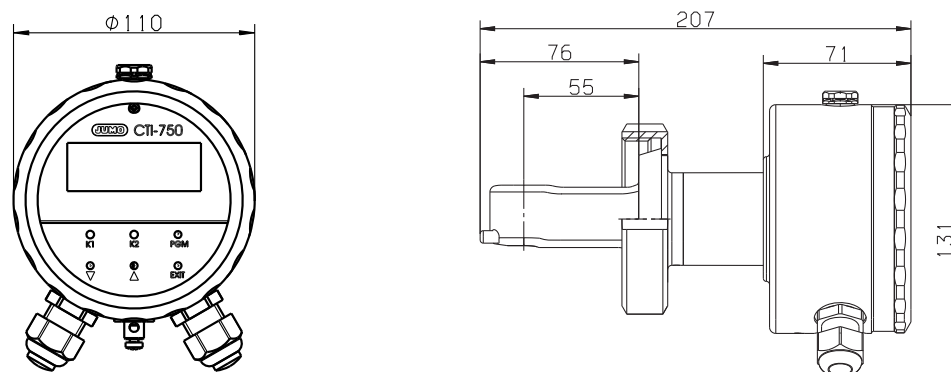
### Operating unit of transmitter (head transmitter in plastic housing) with basic type extension 10 or 15 and electrical connection 83



### Operating unit of transmitter (transmitter with separate sensor, in plastic housing) with basic type extension 20 or 25 and electrical connection 82



### Operating unit of transmitter (head transmitter in stainless steel housing) with basic type extension 16 and electrical connection 84



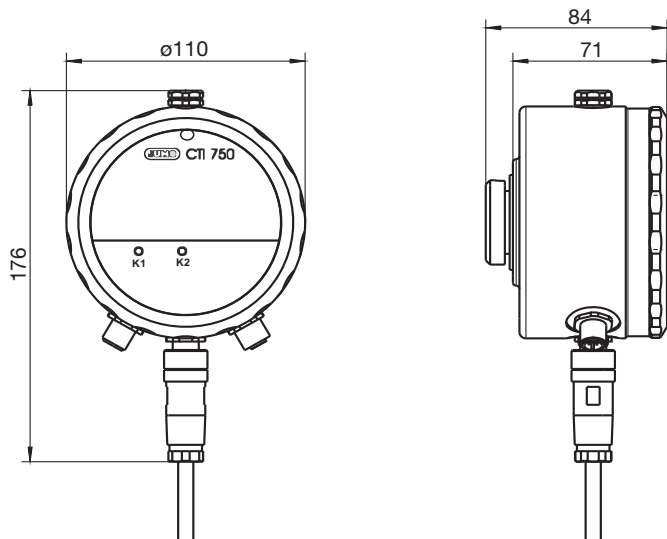
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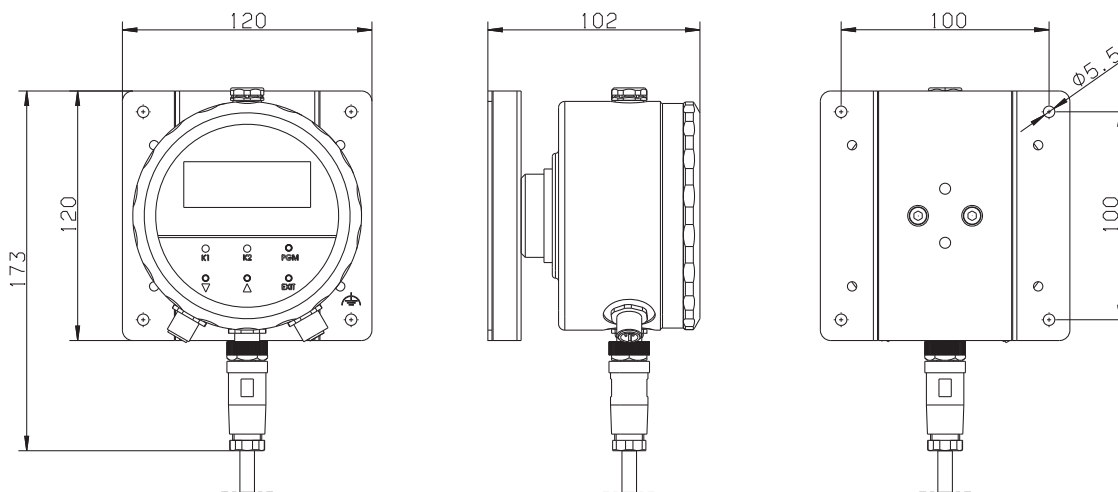
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**Operating unit of transmitter (transmitter with separate sensor, in stainless steel housing)  
 with basic type extension 26 or 66 and electrical connection 83**



**Wall mounting**



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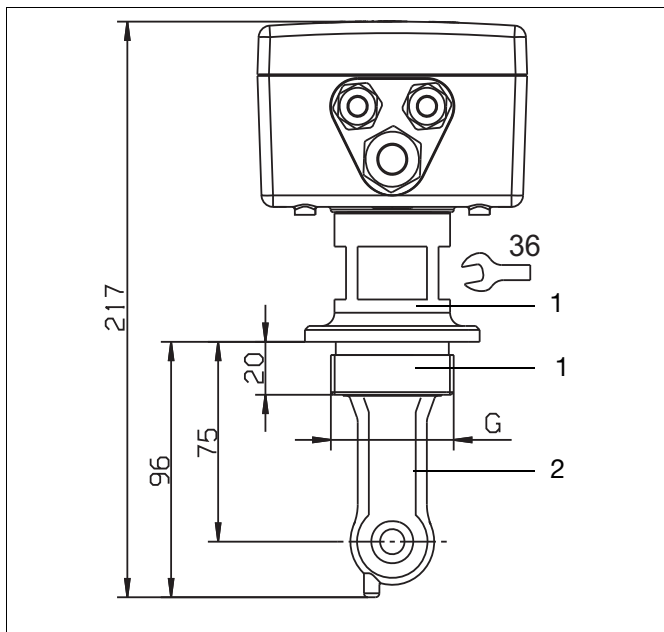
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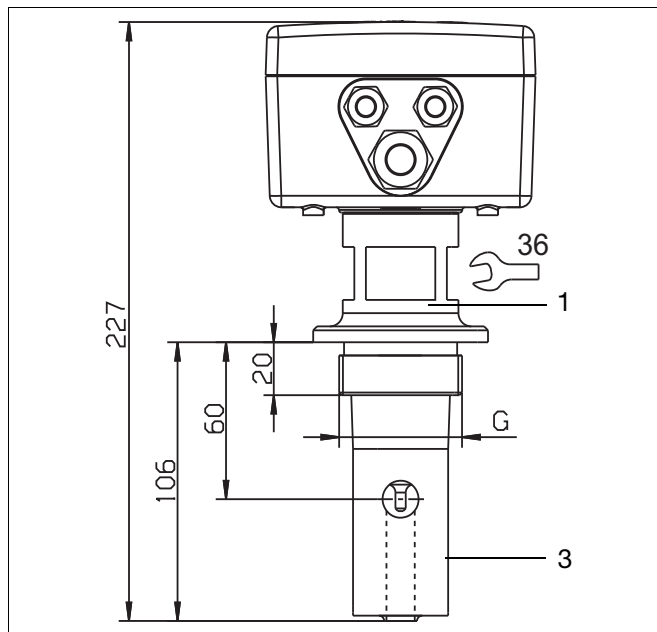


## Dimensions/Process connections

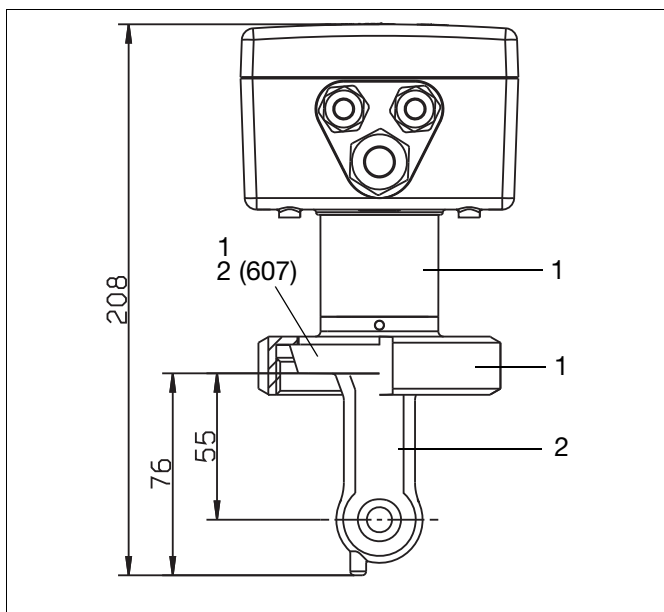
### Head transmitter



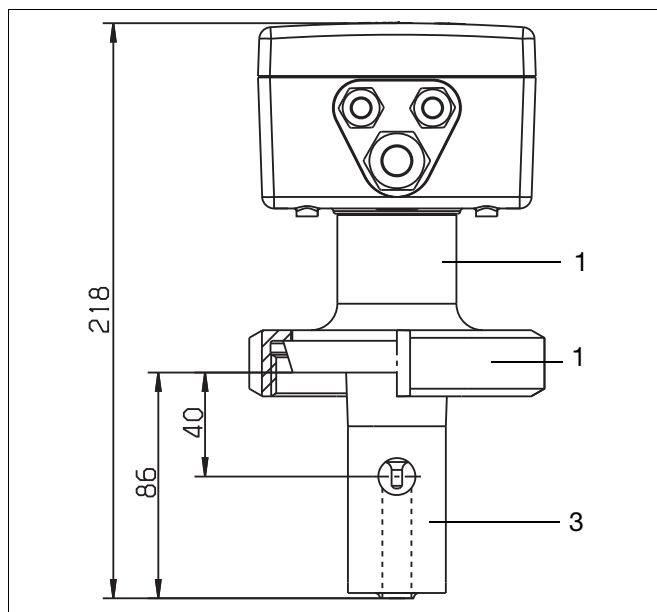
Version with process connection  
 108 = screw-in thread G 1 1/2 A  
 110 = screw-in thread G 2 A  
 and extra code 767



Version with process connection  
 107 = screw-in thread G 1 1/4 A  
 108 = screw-in thread G 1 1/2 A  
 110 = screw-in thread G 2 A  
 and extra code 768



Version with process connection  
 607 = MK DN 50  
 608 = MK DN 65  
 609 = MK DN 80  
 and extra code 767



Version with process connection  
 606 = MK DN 40  
 607 = MK DN 50  
 608 = MK DN 65  
 609 = MK DN 80  
 and extra code 768

1 = 1.4301

2 = PEEK

3 = PVDF

**JUMO GmbH & Co. KG**

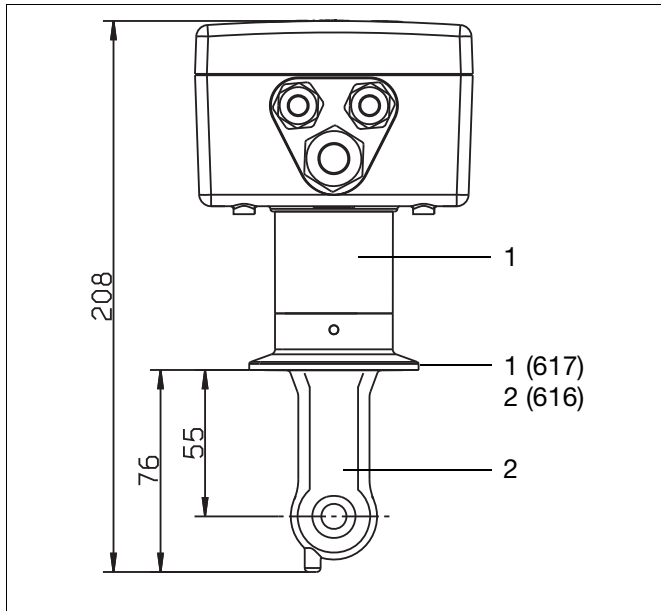
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Internet: www.jumo.net

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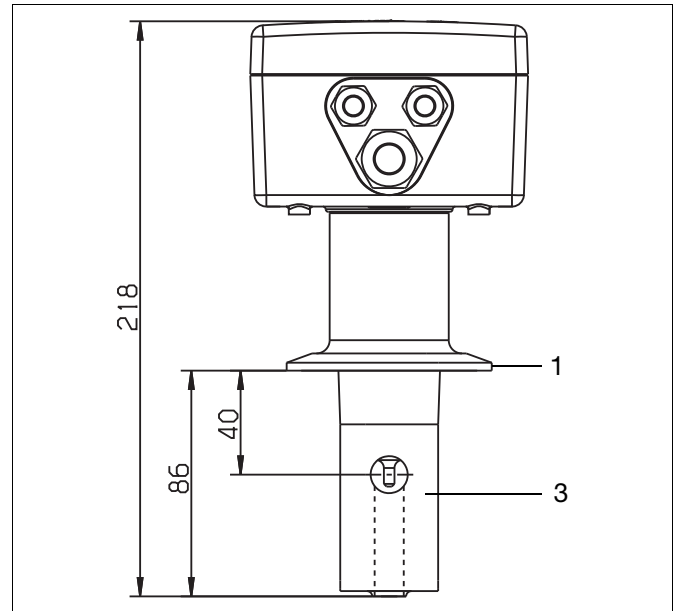
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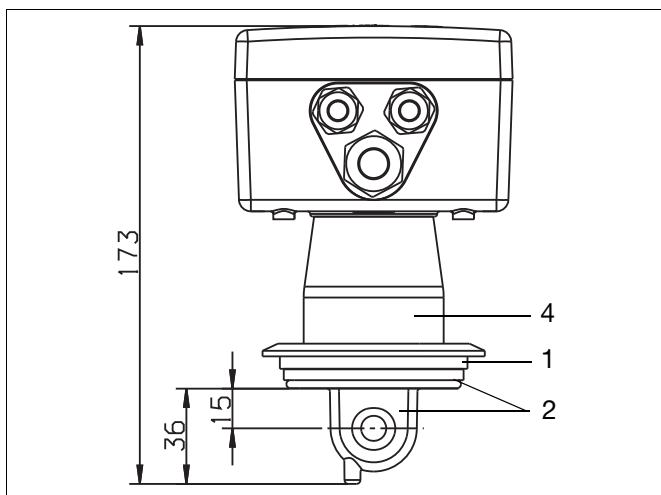
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Fax: 315-697-5867  
E-mail: info@jumo.us  
Internet: www.jumo.us



Version with process connection  
616 = Clamp 2"  
617 = Clamp 2 1/2"  
and extra code 767 and 941  
(retaining clip not included in delivery)



Version with process connection  
617 = Clamp 2 1/2"  
and extra code 768  
(retaining clip not included in delivery)



Version with process connection  
686 = VARIVENT® DN 40/50  
and extra code 767 and 941

1 = 1.4301

2 = PEEK

3 = PVDF

4 = PPS GF 40

**JUMO GmbH & Co. KG**

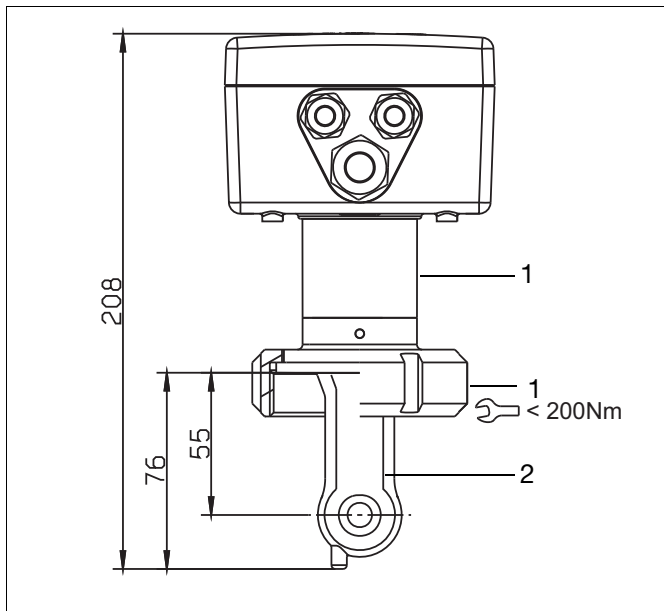
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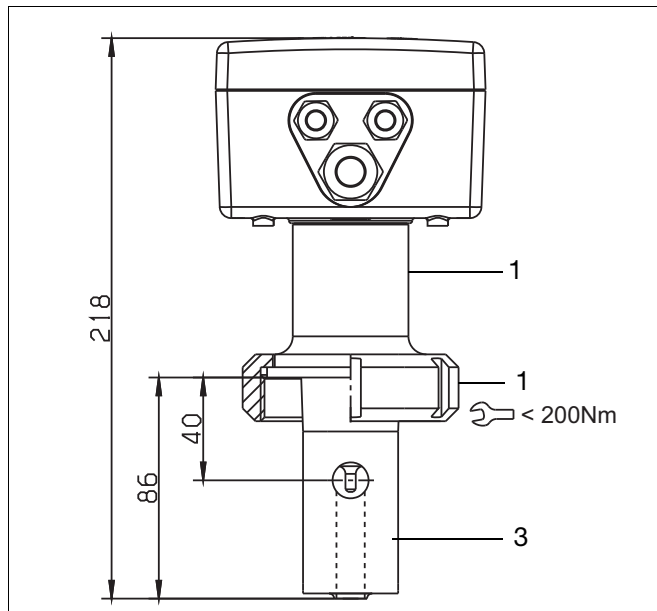
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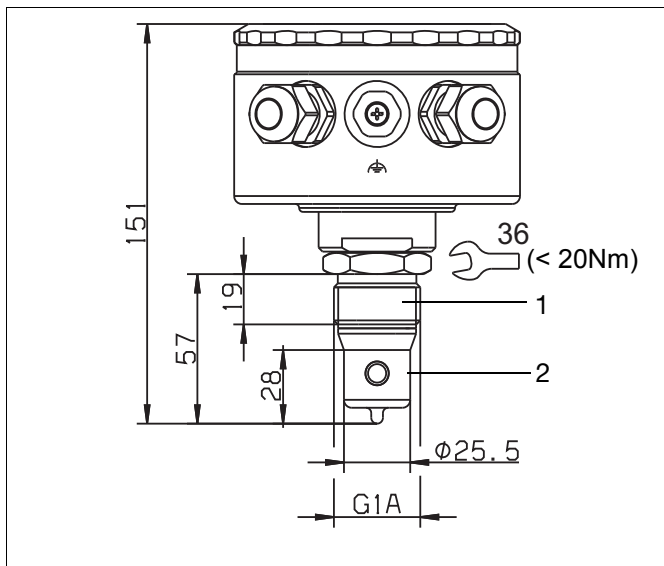
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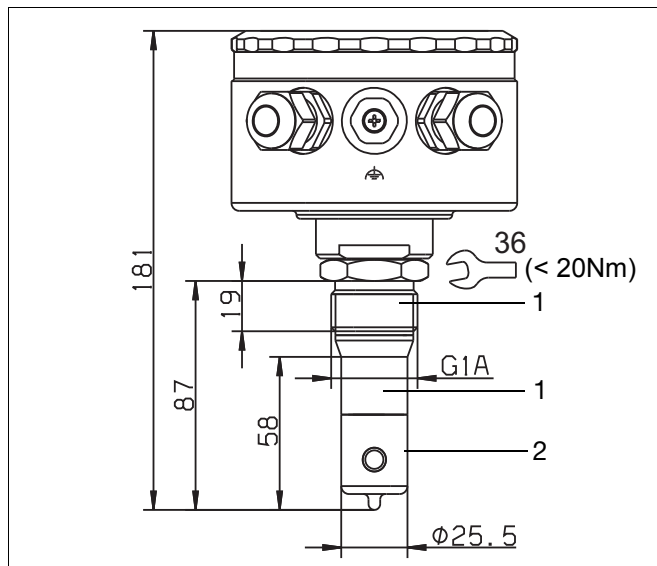
Version with process connection  
690 = SMS 2" ( $\hookrightarrow < 200\text{Nm}</math>)  
and extra code 767 and 941$



Version with process connection  
690 = SMS 2" ( $\hookrightarrow < 200\text{Nm}</math>)  
and extra code 768$



Version with process connection  
955 = Pressing screw G 1" ( $\hookrightarrow < 20\text{Nm}</math>)  
EL = 57 mm$



Version with process connection  
956 = Pressing screw G1" ( $\hookrightarrow < 20\text{Nm}</math>)  
EL = 87 mm$

1 = 1.4301

2 = PEEK

3 = PVDF

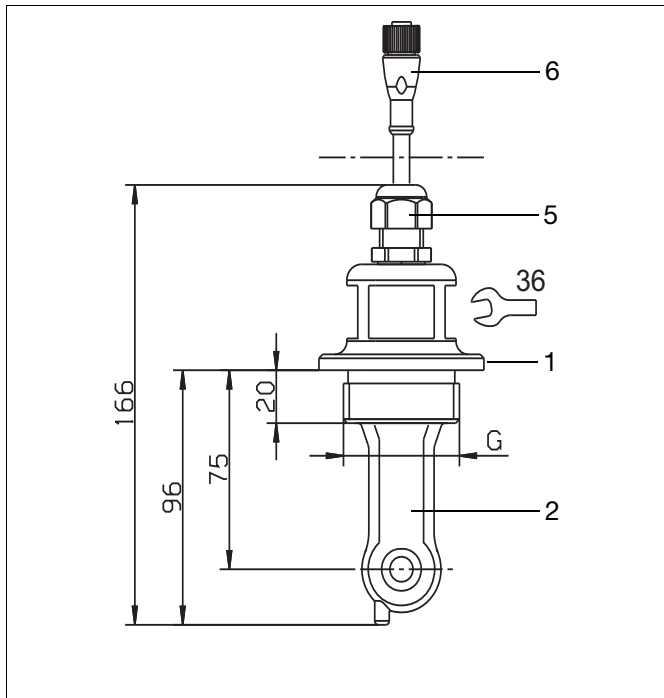
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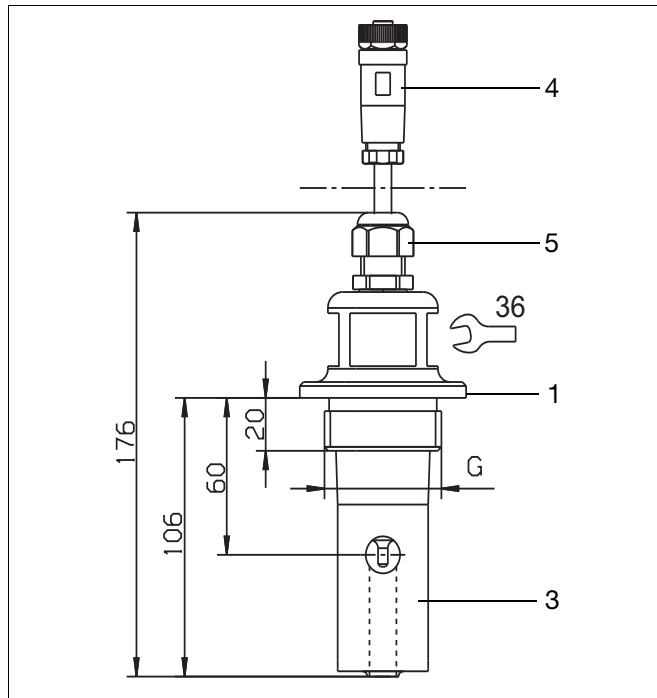
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**Separate sensor**



Version with process connection  
 108 = screw-in thread G 1 1/2 A  
 110 = screw-in thread G 2 A  
 and extra code 767



Version with process connection  
 107 = screw-in thread G 1 1/4 A  
 108 = screw-in thread G 1 1/2 A  
 110 = screw-in thread G 2 A  
 and extra code 768

1 = 1.4301

2 = PEEK

3 = PVDF

4 = PBT

5 = PA

6 = TPU

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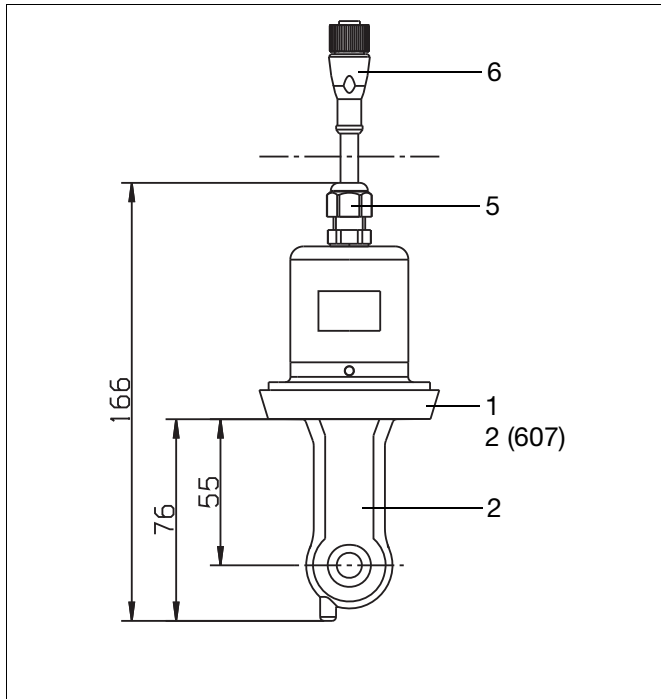
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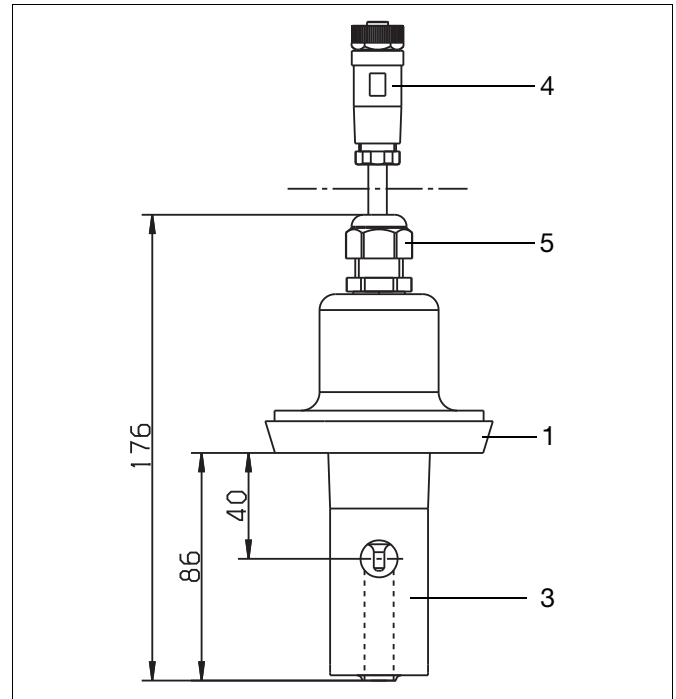
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Split version with process connection  
607 = MK DN 50  
608 = MK DN 65  
609 = MK DN 80  
and extra code 767  
(retaining clip not included in delivery)



Split version with process connection  
606 = MK DN40  
607 = MK DN50  
608 = MK DN65  
609 = MK DN80  
and extra code 768  
(retaining clip not included in delivery)

1 = 1.4301

2 = PEEK

3 = PVDF

4 = PBT

5 = PA

6 = TPU

**JUMO GmbH & Co. KG**

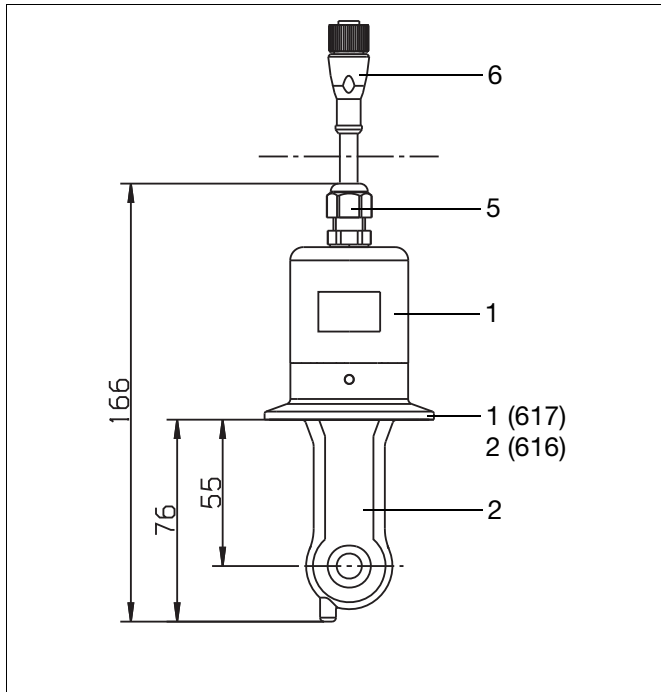
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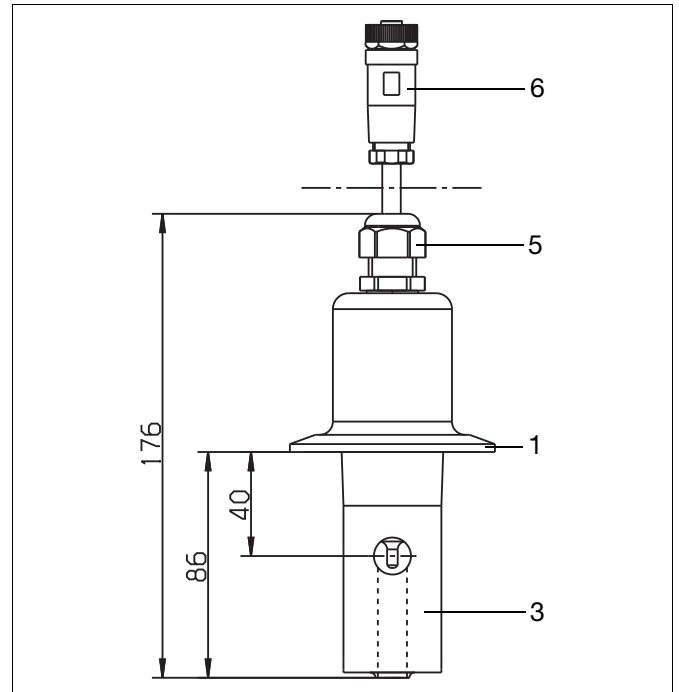
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617 = Clamp 2 1/2"  
and extra code 767  
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Split version with process connection  
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1 = 1.4301

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6 = TPU

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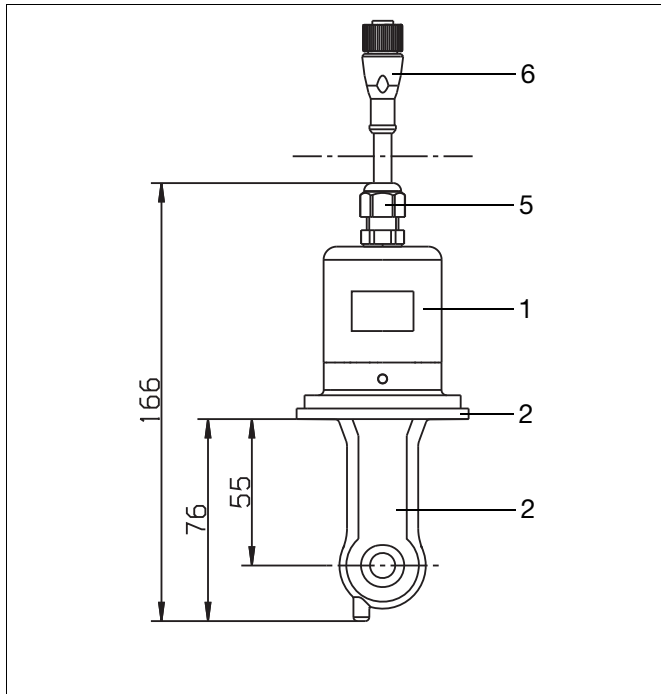
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Canastota, NY 13032, USA  
Phone: 315-697-JUMO  
1-800-554-JUMO  
Fax: 315-697-5867  
E-mail: info@jumo.us  
Internet: www.jumo.us

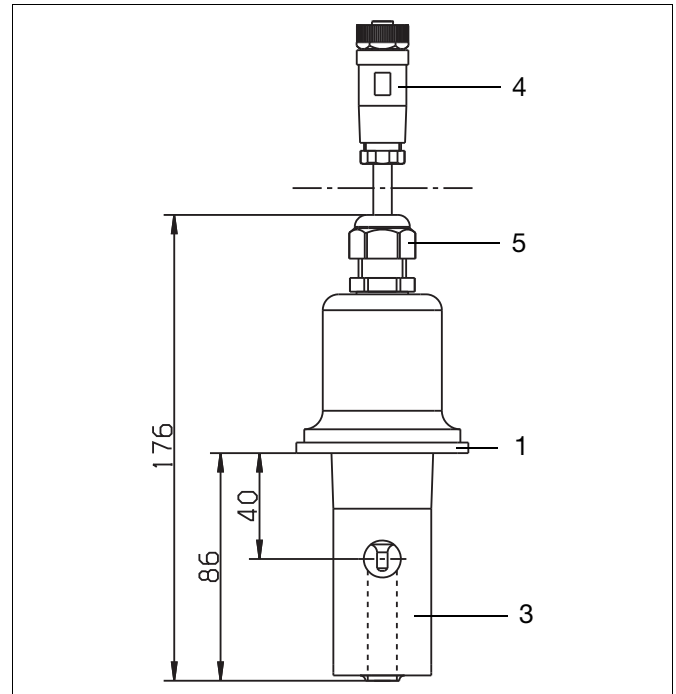


Split version with process connection  
690 = SMS 2"  
and extra code 767  
**(Union nut (⚙) < 200Nm) not included in delivery)**

1 = 1.4301

2 = PEEK

3 = PVDF



Split version with process connection  
690 = SMS 2"  
and extra code 768  
**(Union nut (⚙) < 200Nm) not included in delivery)**

4 = PBT

5 = PA

6 = TPU

**JUMO GmbH & Co. KG**

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Internet: www.jumo.net

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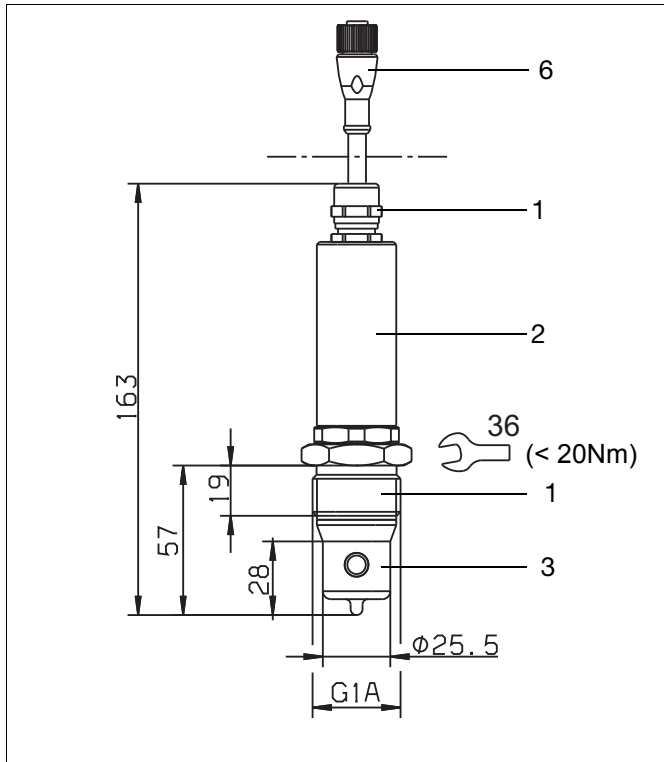
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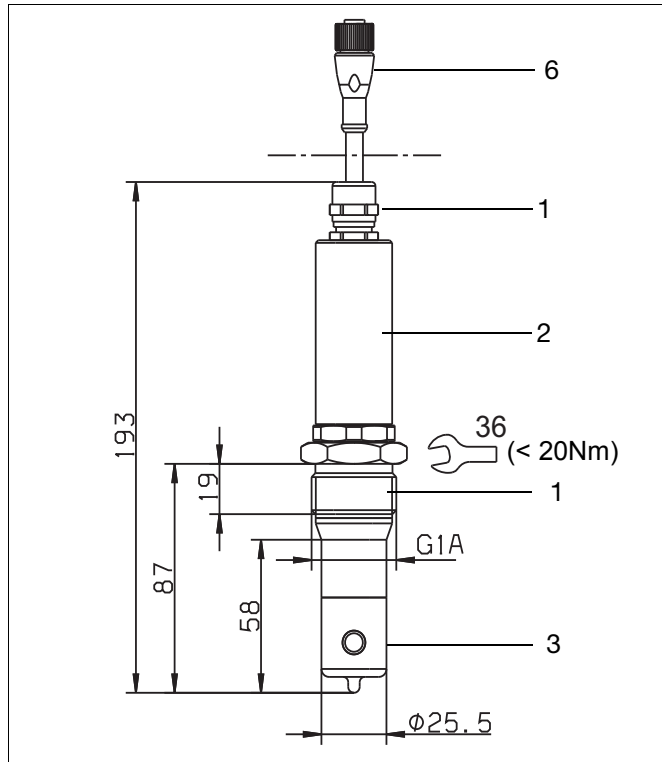
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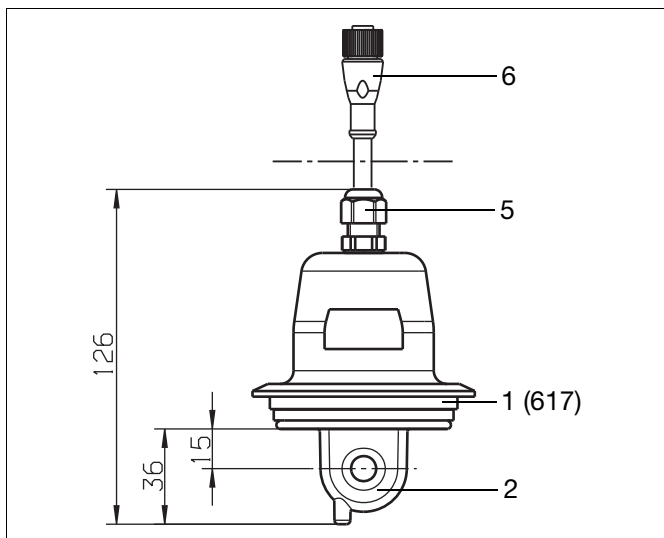
**Varivent®**



Split version with process connection  
955 = Pressing screw G 1" ( $\hookrightarrow$  < 20Nm)  
EL = 57 mm  
and extra code 767



Split version with process connection  
956 = Pressing screw G 1" ( $\hookrightarrow$  < 20Nm)  
EL = 87 mm  
and extra code 767



Split version with process connection  
686 = VARIVENT® DN 40/50  
and extra code 767 and 941  
(retaining clip not included in delivery)

1 = 1.4301

2 = PEEK

3 = PVDF

4 = PBT

5 = PA

6 = TPU

**JUMO GmbH & Co. KG**

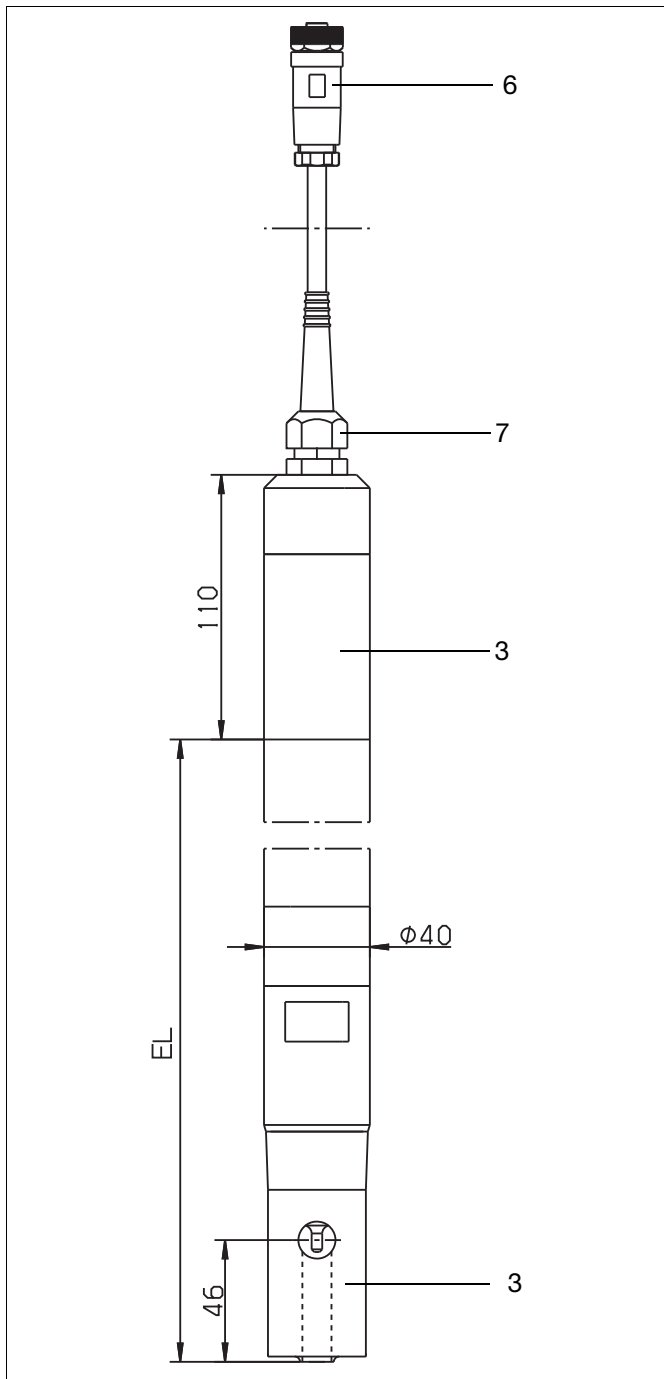
Delivery address: Mackenrodtstraße 14,  
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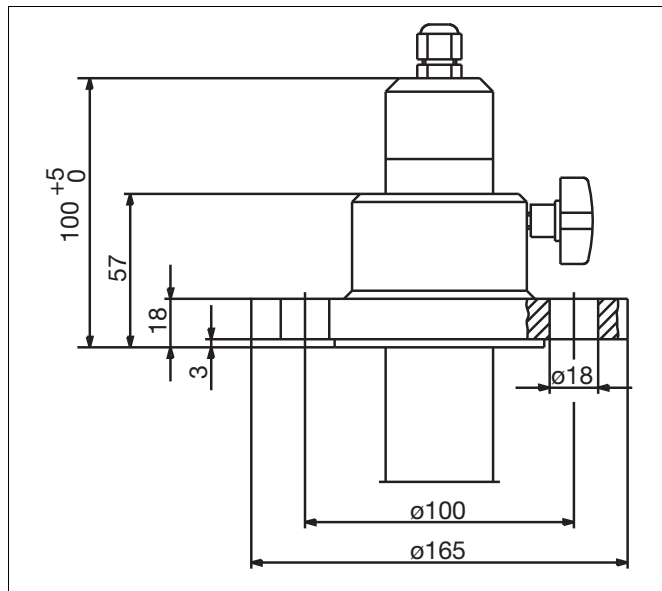


Split version with process connection 706  
immersion model  
(pipe clips not included in delivery)

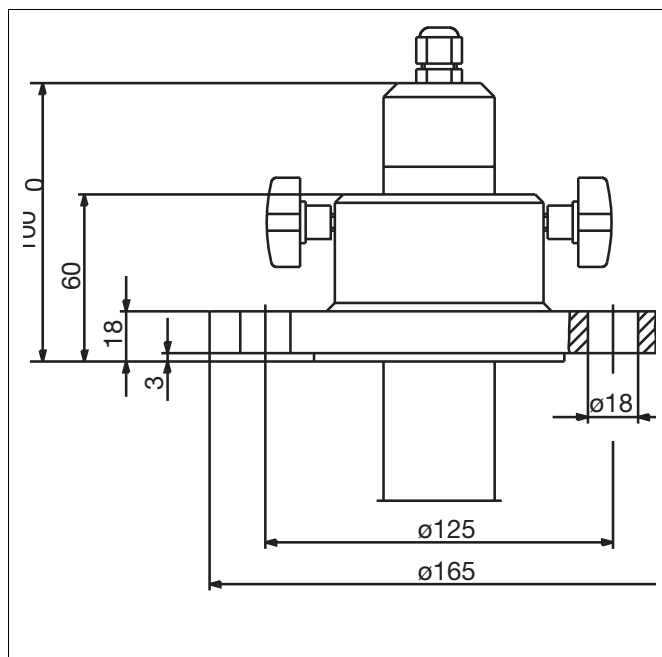
3 = PVDF

6 = PBT

7 = brass nickel plated EPDM



Optional accessory  
DN 32 Flange  
Part no. 00083375



Optional accessory  
DN 50 Flange  
Part no. 00083376

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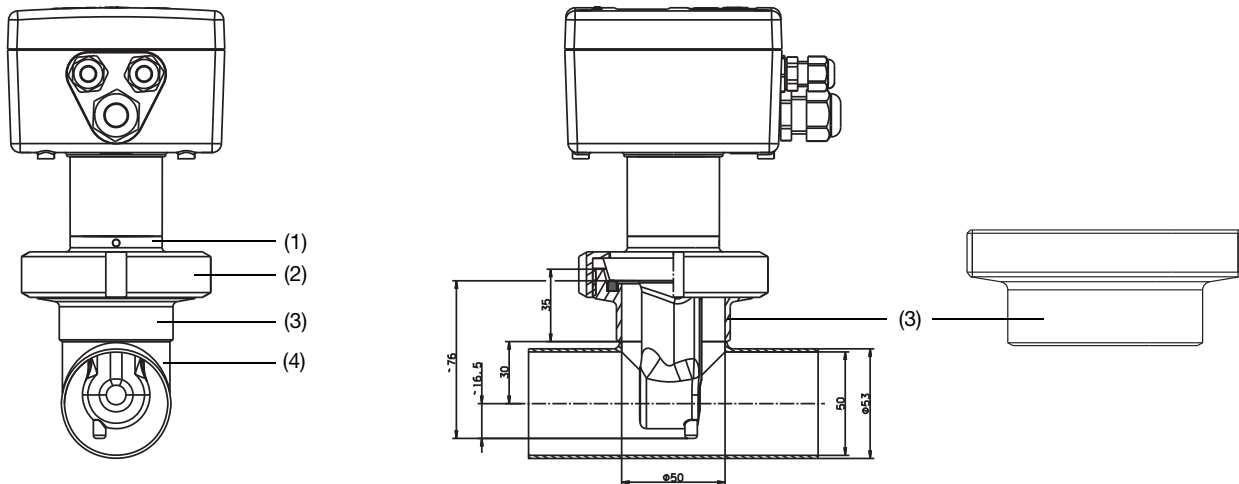
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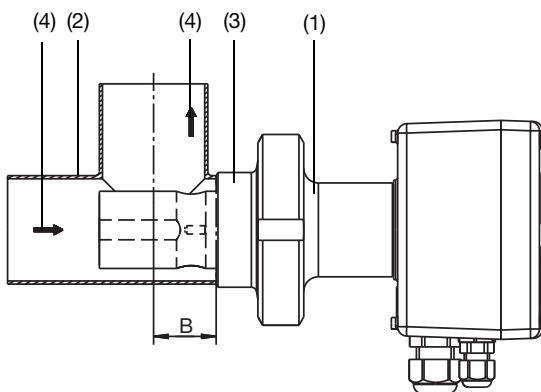


## Mounting examples

### Threaded pipe adapter



- (1) Process connection 607, screwed pipe fitting DN 50, DIN 11851 (MK DN 50, milk cone), PEEK
- (2) Ring nut DN 50, 1.4301
- (3) Weld-on threaded pipe adaptor DN 50, DIN 11851, 1.4301 (matching part for process connection 607)
- (4) Tee DIN 11852, short, DN50, 1.4301 (to be provided by the plant operator; **not** supplied by JUMO)



- (1) Process connection 607, screwed pipe fitting DN 50, DIN 11851 (MK DN 50, milk cone), 1.4301
- (2) Tee DIN 11852, SSS DN50, 1.4301, Dim. B shortened to 30 mm (to be provided by the plant operator; **not** supplied by JUMO)
- (3) Weld-on threaded pipe adaptor DN 50, DIN 11851, 1.4301 (matching part for process connection 607)
- (4) Flow direction

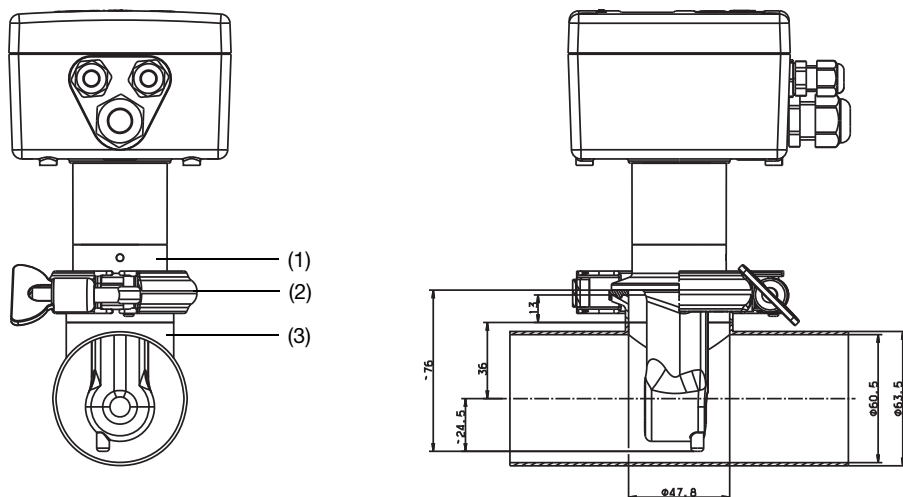
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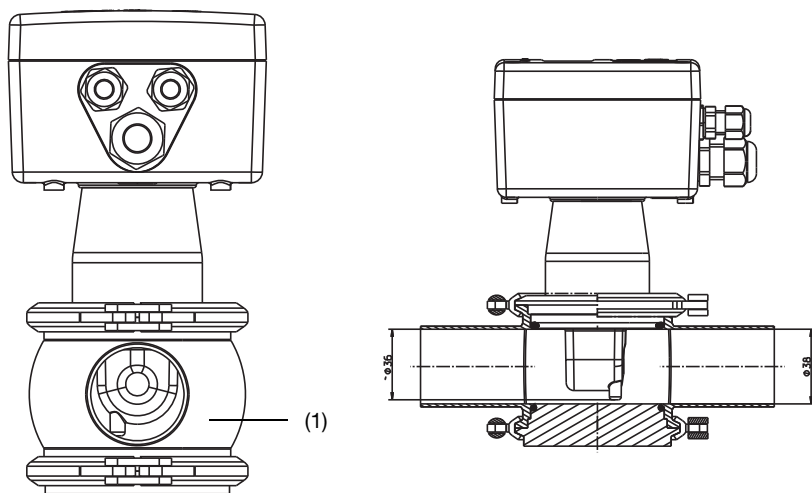


**Clamp**



- (1) Process connection 617, Clamp 2 1/2", PEEK
- (2) Clamping ring, 1.4301,
- (3) Tee, short, 2.5" - 2" similar to DIN 11852, and 2" clamp adapter, 1.430 (to be provided by the plant operator; **not** supplied by JUMO)

**Varivent®**



- (1) Tee, VARIVENT®, DN 50, 1.4404 (to be provided by the plant operator; **not** supplied by JUMO)

**JUMO GmbH & Co. KG**

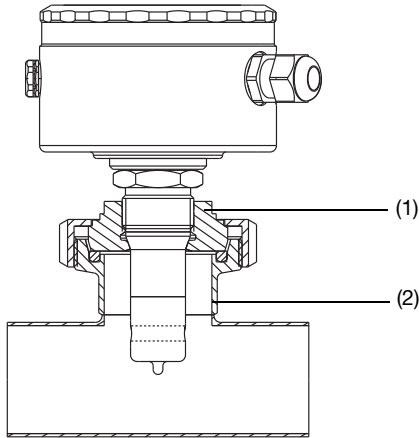
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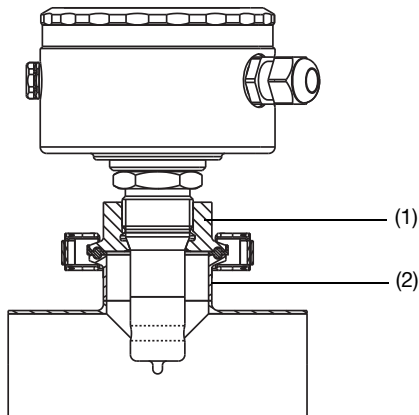
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**Pressing screw G 1 A to threaded pipe adapter DN 50**

- (1) Process connection adapter Pressing screw G 1 A to threaded pipe adapter DN 50, DIN 11851
- (2) Tee DIN, short, SSS DN 65/50, 1.4301 (to be provided by the plant operator; **not** supplied by JUMO)

**Pressing screw G 1 A to Clamp 1" and 1.5"**

- (1) Process connection adapter Pressing screw G 1 A to Clamp 1" and 1.5"
- (2) Tee DIN, short, SSS DN 65/50, 1.4301 (to be provided by the plant operator; **not** supplied by JUMO)

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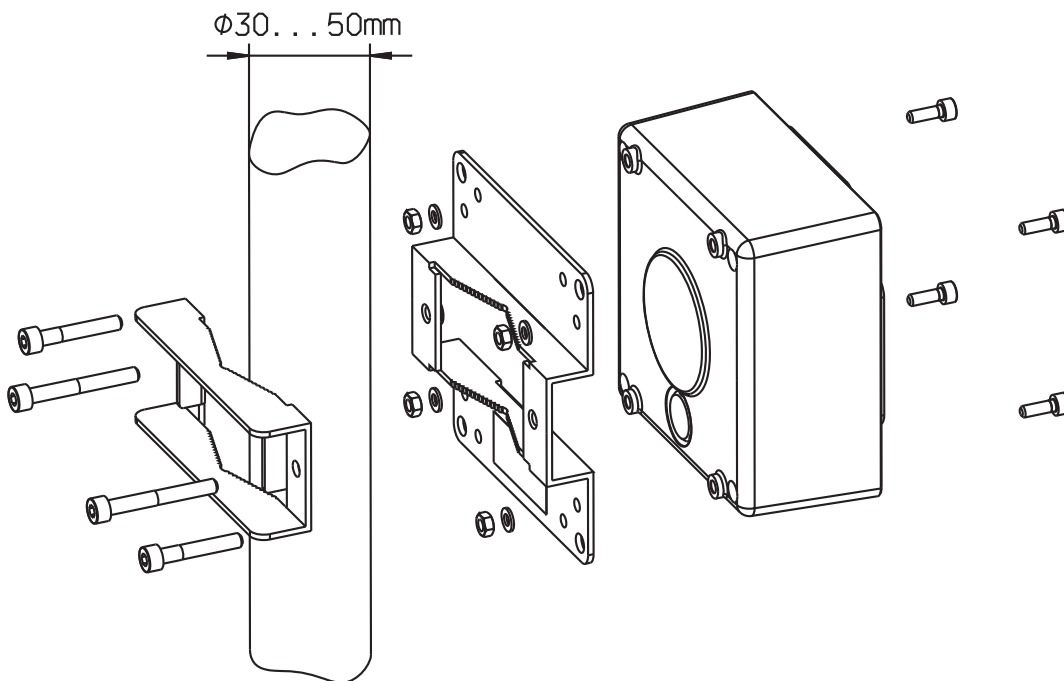
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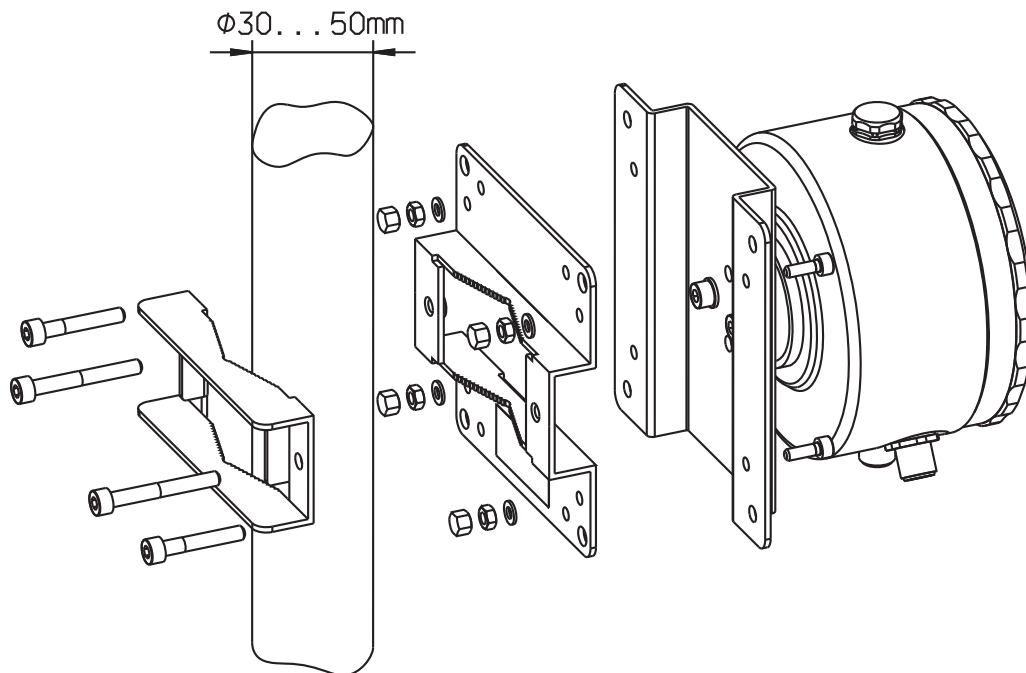


### Kit for pipe mounting

for type 202756, part no. 00515128



for type 202756, part no. 00515128



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## Order details

### JUMO CTI-750 as "Head transmitter"

	<b>(1) Basic type</b>
202756	JUMO CTI-750 - Inductive transmitter/switching device for conductivity/ concentration and temperature
	<b>(2) Basic type extension</b>
10	Head transmitter in plastic housing, without display/keypad <sup>a</sup>
15	Head transmitter in plastic housing, with display/keypad
16	Head transmitter in stainless steel housing, with display/keypad
	<b>(3) Process connection</b>
107	Thread G 1 1/4 A
108	Thread G 1 1/2 A
110	Thread G 2 A
606	DN 40 screwed pipe fitting, DIN 11 851 (MK DN 40, milk cone) <sup>b</sup>
607	DN 50 screwed pipe fitting, DIN 11851 (MK DN 50, milk cone)
608	DN 65 screwed pipe fitting, DIN 11851 (MK DN 65, milk cone)
609	DN 80 screwed pipe fitting, DIN 11851 (MK DN 80, milk cone)
617	Clamp 2 1/2" <sup>c</sup>
686	VARIVENT <sup>®</sup> DN 40/50 <sup>c, d, e</sup>
690	SMS 2"
955	Pressing screw G 1 A, EL= 57 mm <sup>d, f</sup>
956	Pressing screw G 1 A, EL= 87 mm <sup>d, f</sup>
	<b>(4) Immersion length</b>
0000	See "Dimensions for head transmitter"
	<b>(5) Electrical connection</b>
82	Cable glands
83	M12 plug/socket connectors (instead of the cable glands) <sup>g</sup>
84	Two M16 cable glands and one blanking plug <sup>h</sup>
	<b>(6) Extra code</b>
268	Internal temperature sensor
767	Cell material PEEK <sup>i</sup>
768	Cell material PVDF <sup>j</sup>
844	Supply voltage 24 V AC
941	Hygienic design

<sup>a</sup> The PC setup program is required for programming the instrument, see accessories.

<sup>b</sup> Only in conjunction with extra code 768 (cell material PVDF)

<sup>c</sup> Mounting items (mounting brackets) not included in delivery.

<sup>d</sup> Only in conjunction with extra code 767 (cell material PEEK)

<sup>e</sup> EHEDG-certified

<sup>f</sup> Only in conjunction with extra code 268 (internal temperature sensor) and 767 (cell material PEEK).

Installation only in conjunction with process connection adapter, part no. 00530354 or 00530355!

<sup>g</sup> If required, order 1 set M12 plug/socket connectors, part no. 00529482.

<sup>h</sup> Standard on basic type extension 16

<sup>i</sup> Temperature sensor always internal

<sup>j</sup> Not in combination with extra code 941

Order code                    **(1)**                    /                    **(2)**                    -                    **(3)**                    -                    **(4)**                    -                    **(5)**                    /                    **(6)**                    , ...<sup>a</sup>

Order example                    202756                    /                    10                    -                    607                    -                    0000                    -                    82                    /                    767

<sup>a</sup> List extra codes in sequence, separated by commas.

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**CTI-750 as "Transmitter with separate sensor"**

	<b>(1) Basic type</b>
202756	JUMO CTI-750 - Inductive transmitter/switching device for conductivity/ concentration and temperature
	<b>(2) Basic type extension</b>
20	Transmitter in plastic housing, without display/keypad (without sensor) <sup>a, b</sup>
25	Transmitter with display/keypad (without sensor) <sup>b</sup>
26	Transmitter in stainless steel housing, with display/keypad (without sensor) <sup>b</sup>
60	Transmitter without display/keypad including sensor (cable length 10 m) <sup>a</sup>
65	Transmitter with display/keypad including sensor (cable length 10 m)
66	Transmitter in stainless steel housing, with display/keypad including sensor (cable length 10 m)
80	Replacement sensor with a 10 m long cable for transmitter in plastic housing (without transmitter) <sup>b, c</sup>
85	Replacement sensor with a 10 m long cable for transmitter in stainless steel housing (without transmitter) <sup>b, c</sup>
	<b>(3) Process connection</b>
000	Without process connection
107	Thread G 1 1/4 A
108	Thread G 1 1/2 A
110	Thread G 2 A
606	DN 40 screwed pipe fitting, DIN 11851(MK DN 40, milk cone) <sup>d</sup>
607	DN 50 screwed pipe fitting, DIN 11851(MK DN 50, milk cone)
608	DN 65 screwed pipe fitting, DIN 11851(MK DN 65, milk cone)
609	DN 80 screwed pipe fitting, DIN 11851(MK DN 80, milk cone)
617	Clamp 2 1/2" <sup>c</sup>
686	VARIVENT <sup>®</sup> DN 40/50 <sup>c, e, f</sup>
690	SMS 2"
706	Immersion model <sup>d</sup>
955	Pressing screw G 1", EL = 57 mm <sup>e, 9</sup>
956	Pressing screw G 1", EL = 87 mm <sup>e, 9</sup>
	<b>(4) Immersion length (see "Dimensions for separate sensor")<sup>d</sup></b>
0000	Not available
0500	500 mm
1000	1000 mm
1500	1500 mm
2000	2000 mm
xxxx	Special length (in 250 mm increments, e.g. 0250, 0750, 1250, 1750)
	<b>(5) Electrical connection</b>
21	Fixed cable with M12 socket connector on separate sensor
82	Cable glands on the operating unit
83	M12 plug/socket connectors on operating unit
84	Two M16 cable glands and a blind grommet <sup>h</sup>
	<b>(6) Extra code</b>
000	No extra code
268	Internal temperature sensor
767	Cell material PEEK <sup>l</sup>
768	Cell material PVDF <sup>l</sup>
844	Supply voltage 24 V AC
941	Hygienic design

<sup>a</sup> The PC setup program is required for programming the instrument, see accessories.

<sup>b</sup> A calibration kit is absolutely essential for commissioning. If not available, please include in your order (see accessories).

<sup>c</sup> Mounting items (mounting brackets) not included in delivery.

<sup>d</sup> Only in conjunction with extra code 768 (cell material PVDF)

<sup>e</sup> Only in conjunction with extra code 767 (cell material PEEK)

<sup>f</sup> EHEDG-certified, Certificate No. 22/2011

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<sup>g</sup> Only in conjunction with extra code 268 (internal temperature sensor) and 767 (cell material PEEK).

Installation only in conjunction with process connection adapter, part no. 00530354 or 00530355!

<sup>h</sup> Standard on basic type extension 66

<sup>i</sup> Temperature sensor always internal

<sup>j</sup> Not in combination with extra code 941

**Order code**                    (1)                    /                    (2)                    -                    (3)                    -                    (4)                    -                    (5)                    /                    (6)                    , ...<sup>a</sup>

**Order example**                    202756                    /                    65                    -                    607                    -                    0000                    -                    82                    /                    000

<sup>a</sup> List extra codes in sequence, separated by commas.

## Stock items

(shipment: 3 working days after receipt of order)

Type	Part No.
202756/10-607-0000-82/767/941	00553551
202756/15-607-0000-82/767/941	00544540
202756/15-607-0000-82/768	00470099
202756/15-617-0000-82/767/941	00551874
202756/65-607-0000-82/767/941	00547023

## Non-stock items

(shipment: 10 working days after receipt of order)

Type	Part No.
202756/15-108-0000-82/767/941	00547143
202756/15-690-0000-82/767/941	00554889
202756/65-607-0000-82/767/941	00547023

## Accessories

Type	Part No.
Flange DN 32, material: PP	00083375
Flange DN 50, material: PP	00083376
Weld-on threaded adapter DN 50, DIN 11851	00085020
Adapter Clamp 1" - 1,5" to G 1	00530354
Adapter MK DN 50 to G 1	00530355
Ring nut DN 50, DIN 11851	00343368
Ring nut SMS DN 2", Mutter	00345162
M12 plug connector, 8-pole, straight, for assembly by user	00444307
M12 socket connector, 8-pole, straight, for assembly by user	00486503
M12 socket connector, 8-pole, straight, for assembly by user	00444312
M12 socket connector, 5-pole, straight, for assembly by user	00444313
Connector set (TN 00444307 and TN 00444313) for 202755/202756 (PG209791)	00529482
Cover with LC-display and keyboard CTI-500/750	00443725
Cover with LC-display and keyboard for VA-version	00525488
DIN rail mounting set	00459903
Pipe installation kit for CTI-750	00515128
Switching mode power supply, type PS5R-A24 for DIN rail mounting; Input voltage 100 ... 240 V AC	00374661
Adjustment set (for calibrating a replacement transmitter)	00459436
PC interface (USB/TTL), 2 adapter setup cable	00456352

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## Software

Type	Part No.
Setup CTI-750	00454710

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## Flow-through fittings

### Brief description

Flow-through fittings are used for holding electrochemical sensors (e.g. pH and redox combination electrodes, glass conductivity cells, compensation thermometers etc.) with a Pg13.5 screw-in thread and 120 mm mounting length. Fitting types for 1 to 3 sensors are available.

The fittings are mounted directly in the liquid flow lines, or in a bypass pipe. They protect the built-in sensors against breakage and, because of their special style, enable the correct flow that is required to avoid measurement errors.

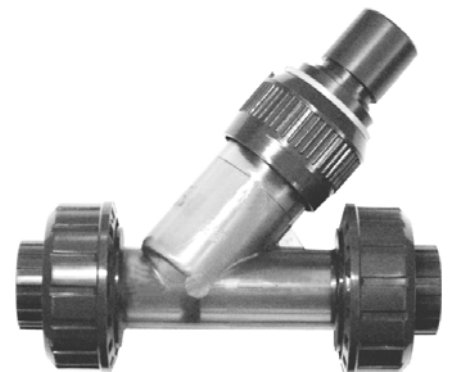
A variety of mounting options and materials are available, but different versions and materials can also be supplied on request.

When planning the pipelines, the following points have to be taken into account:

- The fittings must be readily accessible so that the sensors, or the fitting itself, can be easily serviced or cleaned at regular intervals.
- Bypass measurements should be given preference; stopcocks should be provided to enable the removal of the sensor.
- Since pH and redox electrodes must not remain dry for a prolonged period during down-times, constructional provision has to be made to ensure that there is residual liquid in the fitting.
- For systems with raised pressure and temperature levels, the appropriate versions of the fittings and the sensors that are used must be selected.
- The suitability of the materials (e.g. their chemical compatibility) has to be checked by the system designer.



Type 202810/03-104-87-80/000



Type 202810/01-970-86

#### Additional fittings in our range

Type of fitting	Data Sheet
Flow-through fittings	202810
Immersion fittings	202820
Quick-change fittings	202822
Process fittings	202825

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## Type 202810/03-...

Suitable for mounting 1 to 3 sensors with a Pg13.5 thread and 120 mm mounting length.

The "earthing rod" option enables the grounding of undesirable electric and electrostatic potentials, such as can occur in complex systems and would lead to measurement errors.

The version with the sample vessel in PP is used in cases where the transparent material polycarbonate (PC) (standard) is unsuitable, such as for processes with strong (sudden) temperature fluctuations, for example.



Type 202810/03-104-87-80/000,  
 part no. 00327603

## Technical data

Materials	
Housing	Polypropylene (PP)
Sample vessel	Polycarbonate (PC) or polypropylene (PP)
Seals	FPM
Permissible temperature	0 to 90 °C Please also note the maximum operating data for the sensor used.
Safe pressure	1 bar at 90 °C, 6 bar at 25 °C
Electrode holder	Pg 13.5 thread for 1 to 3 sensors (blind grommets are included)
Connection	1/2" pipe A
Protection	IP65, EN 60529
Weight	Approx. 400 g

## Order details

	<b>(1) Basic type</b>
	202810 Flow-through fitting
	<b>(2) Basic type extension</b>
x	03 for up to 3 sensors
	<b>(3) Process connection</b>
x	104 Connection 1/2" pipe
	<b>(4) Material of body</b>
x	87 Polypropylene (PP)
	<b>(5) Material of sample vessel</b>
x	80 Polycarbonate (PC)
x	87 Polypropylene (PP)
	<b>(6) Extra codes</b>
x	000 no extra code
x	055 Earthing rod

Order code       /  -  -  -  /   
 Order example    202810 / 03 - 104 - 87 - 080 / 000

### Note:

The type code is a type designation, not a modular system.

If at all possible, please choose the items listed under "Stock items" or "Production items" when ordering.

Any free combination of individual code features must be technically checked by us and released.

Please ask us in case of doubt.

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## Stock versions

(delivery: 3 working days after receipt of order)

Type	Designation	Part no.
202810/03-104-87-80/000	2DA-G1/2-PP, sample vessel "transparent", material polycarbonate (PC)	00327603
202810/03-104-87-87/000	2DA-G1/2-PP/PP, sample vessel "not transparent", material polypropylene (PP)	00351404

## Production versions

(delivery: 10 working days after receipt of order)

Type	Designation	Part no.
202810/03-104-87-80/055	2DA-G1/2-PP, sample vessel "transparent", material polycarbonate (PC)	00362345
202810/03-104-87-87/055	2DA-G1/2-PP/PP, sample vessel "not transparent", material polypropylene (PP)	00378117

## Accessories and spare parts

(delivery: 3 working days after receipt of order)

Type	Part no.
Replacement vessel; polycarbonate (PC); including O ring; for type 202810/03, version <b>since</b> september 2005	00417498
Replacement vessel; polypropylene (PP); including O ring; for type 202810/03, version <b>since</b> september 2005	00463367
KCl reservoir, pressure-tight, to set up an electrolyte bridge, or when using electrodes filled with KCl, for wall mounting	00060254
Mounting angle, stainless steel 1.4571	00455706

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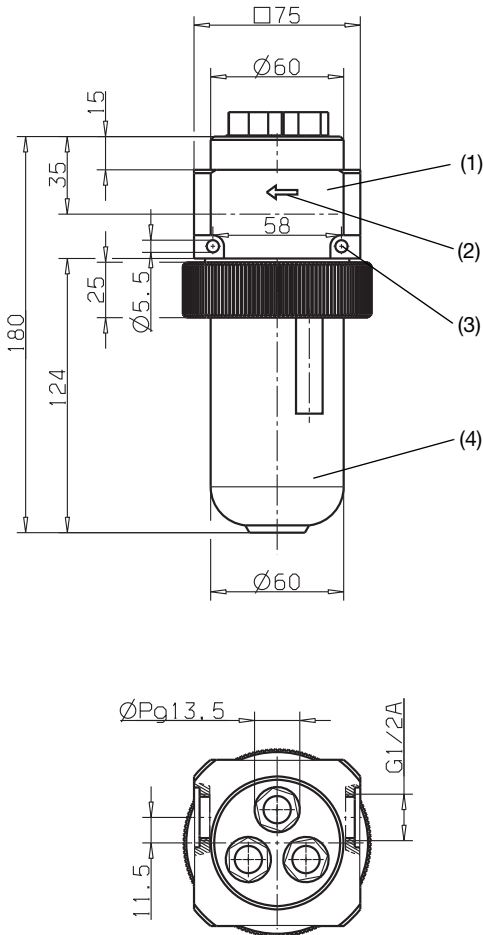
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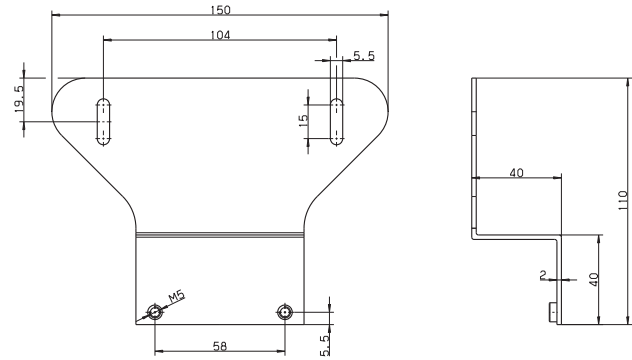
## Dimensions

Flow-through fitting,  
 type 202810/03-104-87-80/000

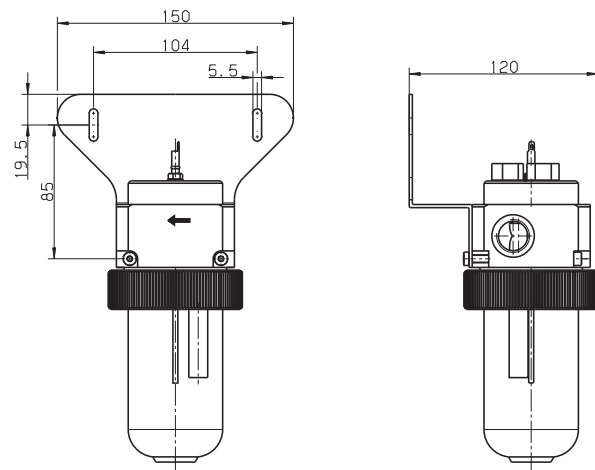


- (1) Housing
- (2) Flow direction
- (3) Mounting hole
- (4) Sample vessel

Mounting angle, stainless steel 1.4571,  
 part no. 00455706



Flow-through fitting, fixed on mounting angle



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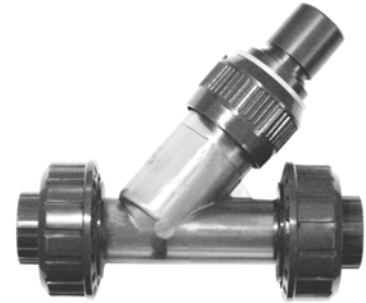
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## Type 202810/01 in PVC

Suitable for mounting one sensor with a Pg 13.5 thread and a mounting length of 120 mm.



Type 202810/01-970-86

## Technical Data

Materials	
Flow-through body	PVC
Electrode holder	PVC
Permissible temperature of liquid	0 to 60°C
Electrode holder	Pg 13.5 for 1 sensor
Process connection	Solvent-weld sockets
Protection	IP65, EN 60529
Weight	Approx. 340 g



Type 202810/01-968-86

## Order details

	<b>(1) Basic type</b>	
	202810	Flow-through fitting
	<b>(2) Basic type extension</b>	
x	01	for 1 sensor
	<b>(3) Process connection</b>	
x	965	Angled seat, DN 20
x	966	Angled seat, DN 25
x	970	Angled seat, DN 20, with screwed butt joint
x	971	Angled seat, DN 25, with screwed butt joint
x	967	T-piece, DN 32
x	968	T-piece, DN 40
x	969	T-piece, DN 50
	<b>(4) Material of body</b>	
x	86	Polyvinylchloride (PVC)

Order code                     /  -  -   
 Order example                202810 / 01 - 970 - 86

### Note:

The type code is a type designation, not a modular system.

If at all possible, please choose the items listed under "Stock items" or "Production items" when ordering.

Any free combination of individual code features must be technically checked by us and released.

Please ask us in case of doubt.

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## Stock versions

(delivery: 3 working days after receipt of order)

Type	Designation	Part no.
202810/01-965-86	Angled seat fitting, DN 20, PVC	00056390
202810/01-966-86	Angled seat fitting, DN 25, PVC	00056389
202810/01-970-86	Angled seat fitting, DN 20, with screwed butt joint, PVC	00416456
202810/01-971-86	Angled seat fitting, DN 25, with screwed butt joint, PVC	00416457
202810/01-967-86	T-piece fitting, DN 32, PVC	00069106
202810/01-968-86	T-piece fitting, DN 40, PVC	00069105
202810/01-969-86	T-piece fitting, DN 50, PVC	00069104

## Accessories

(delivery: 3 working days after receipt of order)

Type	Part no.
KCl reservoir, pressure-tight, to set up an electrolyte bridge, or when using electrodes filled with KCl, for wall mounting	00060254

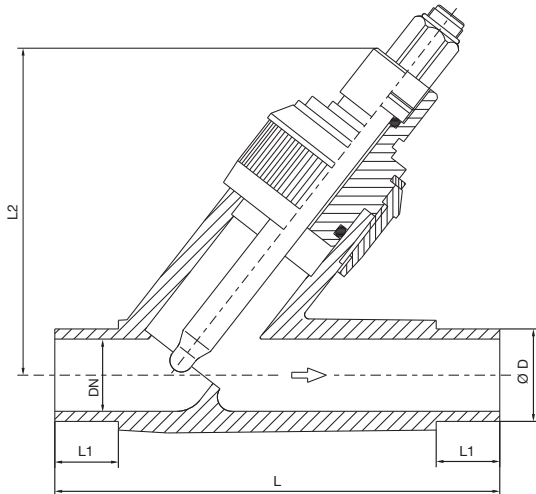
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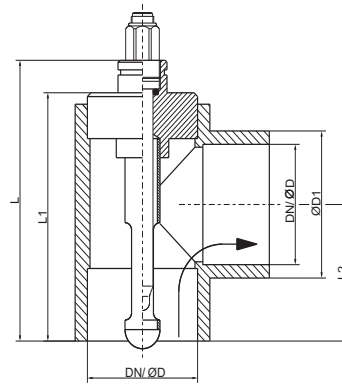


## Dimensions



**Angled seat version**

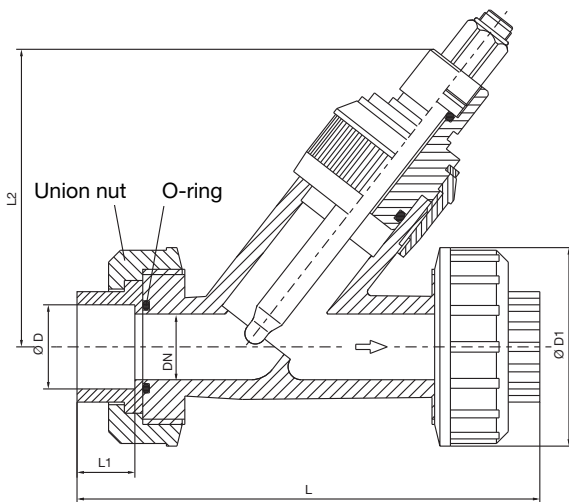
Type	DN	Ø D	L	L <sub>1</sub>	L <sub>2</sub>
202810/01-965-86	20	25	144	19	110
202810/01-966-86	25	32	154	22	115



Vertical mounting position

**T-piece version**

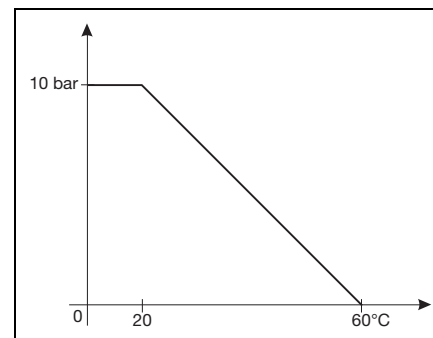
Type	DN	Ø D	Ø D <sub>1</sub>	L	L <sub>1</sub>	L <sub>2</sub>
202810/01-967-86	32	40	51	129	112	47
202810/01-968-86	40	50	62	137	120	59
202810/01-969-86	50	63	77	147	130	72



**Angled seat version and with screwed butt joint**

Type	DN	Ø D	Ø D <sub>1</sub>	L	L <sub>1</sub>	L <sub>2</sub>
202810/01-970-86	20	25	66	158	19	110
202810/01-971-86	25	32	75	176	22	115

## Permitted pressure



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## Stock versions

(delivery: 3 working days after receipt of order)

Type	Designation	Part no.
202810/03-104-87-80/000	2DA-G1/2-PP, sample vessel "transparent", material polycarbonate (PC)	00327603
202810/03-104-87-87/000	2DA-G1/2-PP/PP, sample vessel "not transparent", material polypropylene (PP)	00351404
202810/01-965-86	Angled seat fitting, DN 20, PVC	00056390
202810/01-966-86	Angled seat fitting, DN 25, PVC	00056389
202810/01-970-86	Angled seat fitting, DN 20, with screwed butt joint, PVC	00416456
202810/01-971-86	Angled seat fitting, DN 25, with screwed butt joint, PVC	00416457
202810/01-967-86	T-piece fitting, DN 32, PVC	00069106
202810/01-968-86	T-piece fitting, DN 40, PVC	00069105
202810/01-969-86	T-piece fitting, DN 50, PVC	00069104

## Production versions

(delivery: 10 working days after receipt of order)

Type	Designation	Part no.
202810/03-104-87-80/055	2DA-G1/2-PP, sample vessel "transparent", material polycarbonate (PC), with earthing rod	00362345
202810/01-966-86	2DA-G1/2-PP/PP, sample vessel "not transparent", material polypropylene (PP), with earthing rod	00056389

## Accessories and spare parts

Type	Part no.
Replacement vessel; polycarbonate (PC); including O ring; for type 202810/03, version <b>since</b> september 2005	00417498
Replacement vessel; polypropylene (PP); including O ring; for type 202810/03, version <b>since</b> september 2005	00463367
KCl reservoir, pressure-tight, to set up an electrolyte bridge, or when using electrodes filled with KCl, for wall mounting	00060254
Mounting angle, stainless steel 1.4571	00455706

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## Immersion fittings

### Series 202820

### Brief description

Immersion fittings are used for holding electrochemical sensors (e.g. pH and redox electrodes, glass conductivity cells, compensation thermometers etc.) with a Pg13.5 screw-in thread and a fitting length of 120mm.

Fitting types for up to 3 sensors are available.

The fittings are mounted in open sluices or containers. They protect the installed sensor from breaking and enable measurement in different immersion depths. Thanks to various options and accessories, the fittings can be optimally adjusted to the conditions on site. Two pipe clips for wall mounting are provided for the standard versions, but sliding flanges, which are available as an option, also permit installation in container lids, for example.

#### The following points have to be taken into account:

- The fittings must be readily accessible, to ensure that the sensor can be cleaned and serviced at regular intervals.
- pH and redox electrodes must not be allowed to remain dry for a prolonged period - this can be prevented by using a wetting cup.
- The suitability of the materials (e.g. chemical compatibility) has to be tested by the system designer.

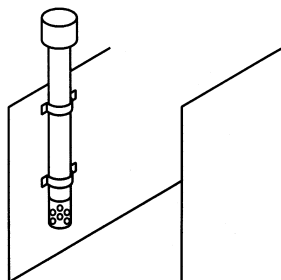


202820/063...

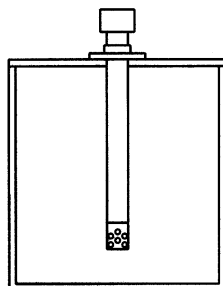
202820/040...

### Installation options

#### Standard

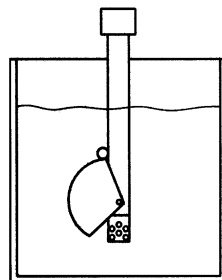


Fixing with pipe clips in the inlet channel

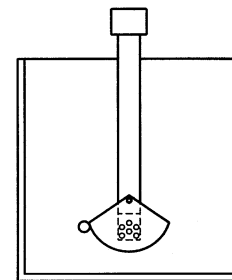


Fixing with a flange on a container

#### Use of a wetting cup



with the container filled



with empty container (residual liquid in the cup prevents the sensor from running dry)

## Type 202820/40-...

For installing one sensor with a Pg13.5 thread. An impedance converter Type 2AMZ-20 (see Data Sheet 202995), or a 2-wire transmitter Type 202701 (see Data Sheet 202701) can be incorporated.

### Technical data

<b>Material</b>	polypropylene (PP), seals FPM. Others to special order.
<b>Permissible temperature</b>	0 to +95°C
<b>Safe pressure</b>	1 bar, up to +90°C
<b>Electrode holder</b>	Pg13.5 thread
<b>Immersion tube length</b>	normally 500mm and 1000mm. up to 2000mm can be implemented standard lengths 500, 800, 1000, 1300, 1500 and 2000mm.
<b>Mounting</b>	normally with pipe clips other mounting forms (flange, etc.) are optionally available
<b>Protection</b>	IP65, EN 60 529
<b>Weight</b>	depending on length

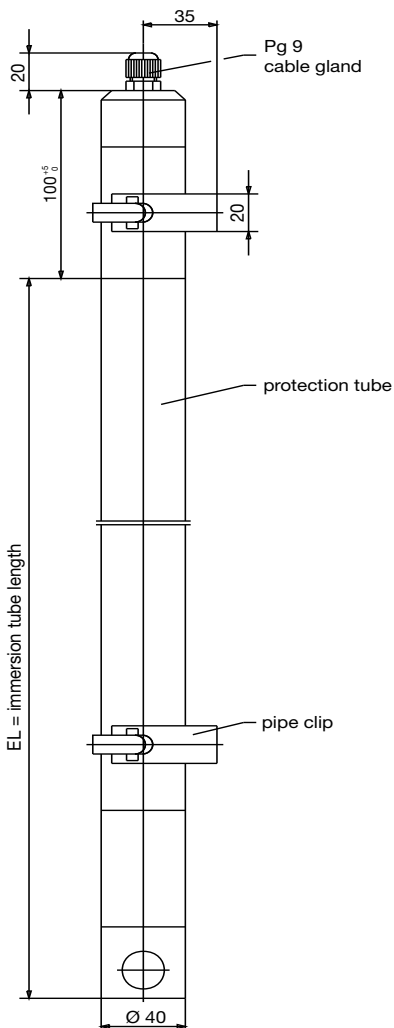


202820/40-0500-87

**Note:**

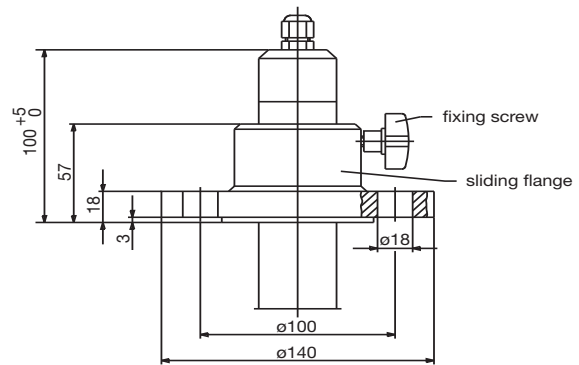
An external KCl reservoir can be used with all immersion fittings.

### Dimensions

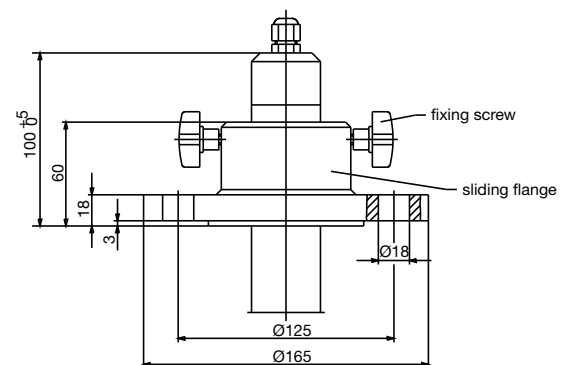


Immersion fitting 202820/40-...

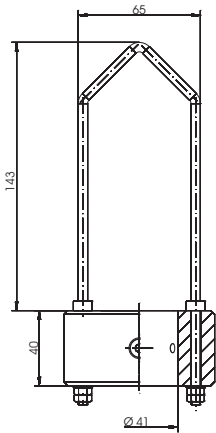
### Extra codes / accessories



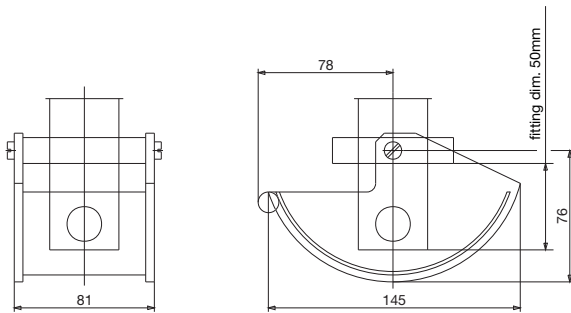
Flange DN32, Sales No. 20/00083375



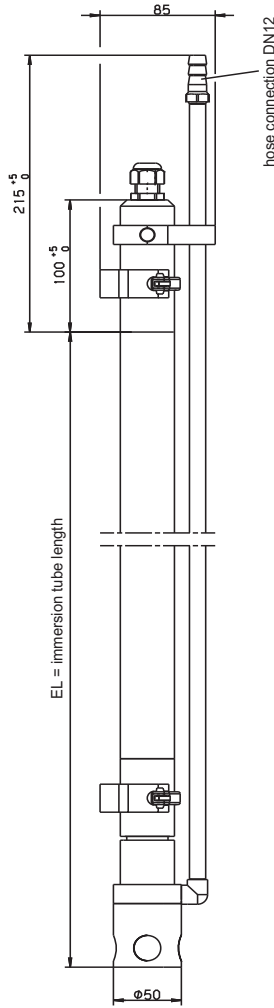
Flange DN50, Sales No. 20/00083376



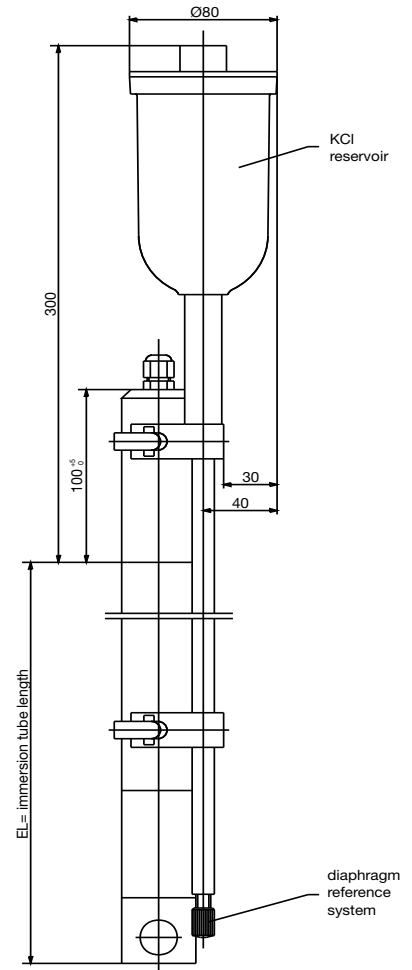
Shackle  
Sales No. 20/00453191



Wetting cup, Sales No. 20/00083372



Cleaning nozzle,  
code 078



KCI reservoir with diaphragm tube,  
code 082

## Order details

**(1) Basic type**

202820 immersion fitting

**(2) Tube diameter**

40 40 mm

**(3) Fitting length**

- 0500 length EL = 500 mm, see dimensions
- 0800 length EL = 800 mm, see dimensions
- 1000 length EL = 1000 mm, see dimensions
- 1300 length EL = 1300 mm, see dimensions
- 1500 length EL = 1500 mm, see dimensions
- 2000 length EL = 2000 mm, see dimensions

**(4) Material of wetted components**

87 polypropylene (PP)

**(5) Extra codes**

- 078 cleaning nozzle
- 082 KCI reservoir with diaphragm tube

**Note:**

The type code is a type designation, not a modular system. If at all possible, please choose the items listed under "Available ex-stock" or "Not available ex-stock" when ordering.

Any free combination of individual code features must be technically checked by us and released.

Please ask us in case of doubt !

	(1)	(2)	(3)	(4)	(5)
Order code	202820	/ 40	- ...	- 87	- ...
Order example	202820	/ 40	- 1500	- 87	- 082

## Available accessories and spare parts

Sales No.	Designation
20/00083375	flange DN32 <sup>1</sup> , material PP
20/00083376	flange DN50 <sup>1</sup> , material PP
20/00083372	wetting cup <sup>1</sup> , material PP, clamping screws in polyamide
20/00453191	Shackle

<sup>1</sup> not possible together with codes /78 or /82. Please ask if required!

## Type 202820/63-...

For installing up to 3 sensors with a Pg13.5 thread.  
 An impedance converter Type 2AMZ-20 (see Data Sheet 202995), or a 2-wire transmitter Type 202701 (see Data Sheet 202701) can be incorporated.

### Technical data

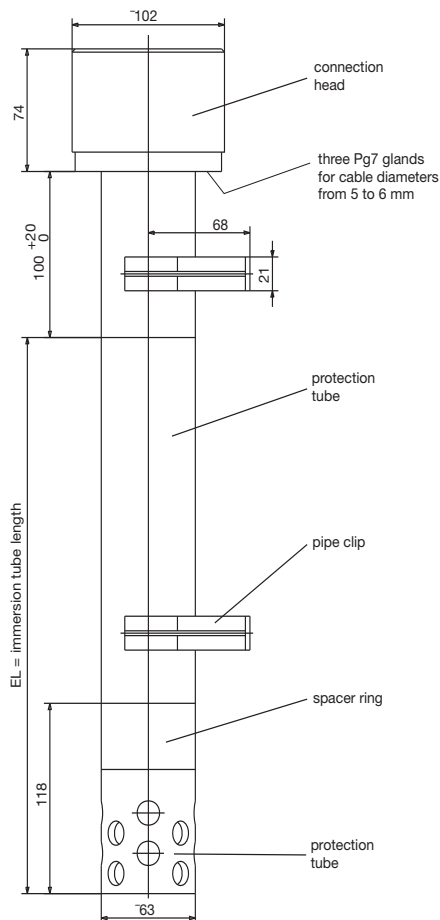
<b>Material</b>	polypropylene (PP), seals FPM.
<b>Permissible temp.</b>	0 to +95°C
<b>Safe pressure</b>	1 bar, up to +90°C
<b>Electrode holder</b>	Pg 13.5 threads for 1 to 3 electrodes (blind grommets are included)
<b>Immersion tube length</b>	ex-stock 500 mm up to 2000 mm can be implemented standard lengths 500, 800, 1000, 1300, 1500 and 2000 mm.
<b>Mounting</b>	normally with pipe clips other mounting forms (flange, etc.) are optionally available
<b>Protection</b>	IP65, EN 60 529
<b>Weight</b>	depending on length



202820/63-0500-87

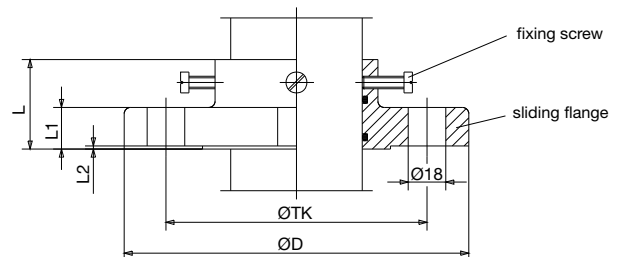
**Note:**  
 An external KCl reservoir can be used for all immersion fittings.

### Dimensions



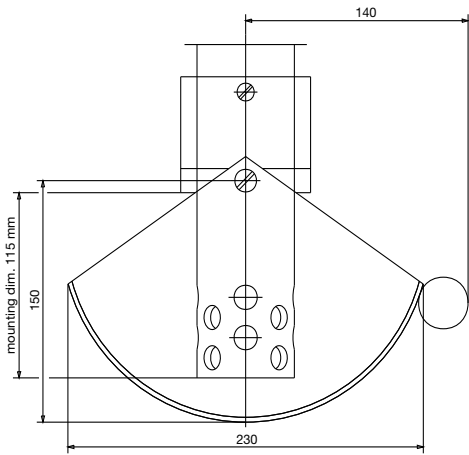
Immersion fitting 202820/63-...

### Extra codes / accessories

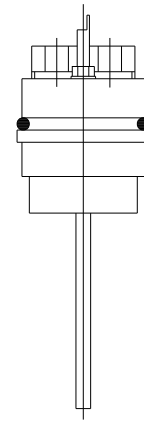
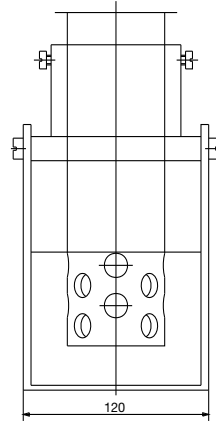


Flange DN50, Sales No. 20/00056544  
 Flange DN65, Sales No. 20/00056545

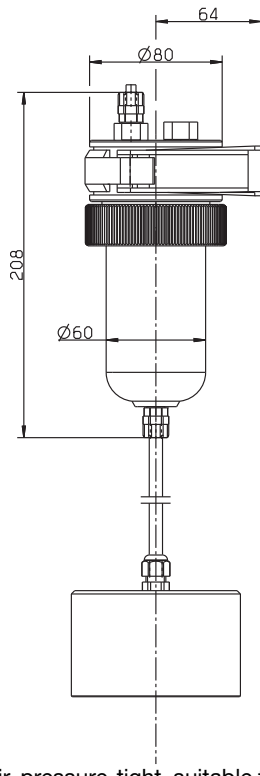
DN	D	TK	L	L <sub>1</sub>	L <sub>2</sub>
50	165	125	43	20	1.5
65	185	145	49	22	2



Wetting cup, Sales No. 20/00057581



Earthing rod, code 055  
for equipotential bonding,  
e.g. in insulated plastic containers



KCl reservoir, pressure-tight, suitable for wall mounting  
Sales No. 20/00060254;  
to set up an electrolyte bridge or when using KCl-filled  
electrodes

## Order details

- (1) Basic type**  
202820 immersion fitting
- (2) Tube diameter**  
63 63 mm
- (3) Fitting length**  
0500 length EL = 500 mm, see dimensions  
0800 length EL = 800 mm, see dimensions  
1000 length EL = 1000 mm, see dimensions  
1300 length EL = 1300 mm, see dimensions  
1500 length EL = 1500 mm, see dimensions  
2000 length EL = 2000 mm, see dimensions
- (4) Material of wetted components**  
87 polypropylene (PP)
- (5) Extra codes**  
055 earthing rod

	(1)	(2)	(3)	(4)	(5)
Order code	202820	/ 63	- ....	- 87	- ...
Order example	202820	/ 63	- 1500	- 87	- 055

**Note:**

The type code is a type designation, not a modular system.

If at all possible, please choose the items listed under “Available ex-stock” or “Not available ex-stock” when ordering.

Any free combination of individual code features must be technically checked by us and released.

Please ask us in case of doubt !

## Available accessories and spare parts

Sales No.	Designation
20/00056544	flange DN50
20/00056545	flange DN65
20/00057581	wetting cup
20/00060254	KCI reservoir, pressure-tight, suitable for wall mounting

### Additional fittings

Type of fitting	Data Sheet
Flow-through fittings	T 202810
Immersion fittings	T 202820
Quick-change fittings	T 202822
Process fittings	T 202825

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# JUMO Process Immersion Fitting

Type 202821

## Brief description

Process immersion fittings are used to securely install electrochemical sensors in containers. The fittings of the 202821 series are specifically designed for use in harsh ambient conditions. These fittings are particularly used in heavily polluted media or in media which could cause a coating to build up. The fitting is suitable for inserting filled sensors with mounting dimensions 120 x 12 mm, and a Pg 13.5 thread. The fitting is integrated into the particular process by a flange (standard) or by a retainer. In the standard version, the fitting is supplied in 1.4404/316L stainless steel, suitable for pharmaceutical use. Other materials are available on request. The different fitting lengths available to the user range from 500 to 2500 mm (always in 500 mm steps). Typical installations are from above, into the container, or into the channel.

A rinsing function, available as an option, makes it easy to clean the sensors. A downstream pH transmitter with washing contact can be used to enable a valve (rinsing liquid or compressed air). A separate controller is not necessary in this case.

## Operating principle of the sensor rinsing option

An integrated rinsing device is available as an option, and uses inflowing air, or a suitable rinsing liquid, to achieve effective, mechanical cleaning of the sensor. This ensures reliable measurement, even in critical media. A cleaning or washing contact on the pH transmitter can be used to activate a time switch, a valve, or a separate controller. The following components must be provided and made available by the user:

- Cleaning solution (e.g. water supply)
- Chemicals, if necessary
- Compressed air supply

The rinsing line is integrated in the fitting. It exits via the cable gland at the top of the fitting. The line projects approx. 1 meter from the fitting and can be connected to the supply line by a standard commercial screw-fitting (e. g. Festo, Swagelock, etc.). The screw-fitting is not included in delivery.

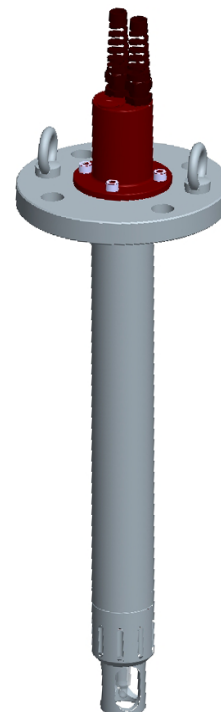
The sensor is then cleaned with compressed air or with a suitable rinsing liquid, in accordance with the set rinsing period. The ring-shaped arrangement of the spray nozzles ensures optimum cleaning.

### Note:

**It is the responsibility of the user to check the chemical compatibility of the fitting material and the sample medium with the cleaning solution.**

## Key features

- Suitable for all 120 x 12 mm sensors with a Pg 13.5 thread
- Sturdy design
- Increases sensor service life
- Reduces maintenance expenditure
- Simple installation and sensor mounting
- Rinsing device option



Type 202821...

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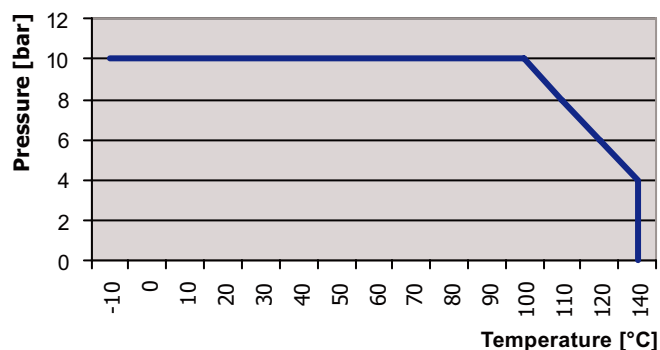
## Technical data

<b>Material in contact with the medium</b>	1.4404 / 316L stainless steel
<b>Hose connection</b>	4 mm and 6 mm diameter, PTFE
<b>Sensor holder</b>	Suitable for 1 sensor: 120 x 12 mm with Pg 13.5 thread. Not suitable for electrodes with a <b>liquid</b> KCl electrolyte!
<b>Fitting length<sup>1</sup></b>	500 to 2500 mm (in 500 mm steps)
<b>Operating temperature<sup>2</sup></b>	-10 to +140 °C
<b>Process connection</b> 733 flange DN50 944 retainer	Stainless steel PP
<b>Rinsing connection</b> (extra code 921)	Tube connection external ø 6 mm, internal 4 mm, integrated rinsing line, PTFE hose
<b>Operating pressure<sup>1,2</sup></b> at -10 to +100°C at +140°C	10 bar 4 bar
<b>Rinsing pressure</b>	1 to 6 bar

<sup>1</sup> Fittings with a fitting length up to 1500 mm are sent out by DPD; longer fittings are delivered by carrier.

<sup>2</sup> Comply with the maximum permissible sensor pressure and temperature!

### Permissible pressure and temperature (flange connection version)



**Note:** Comply with the technical data of the sensor used!

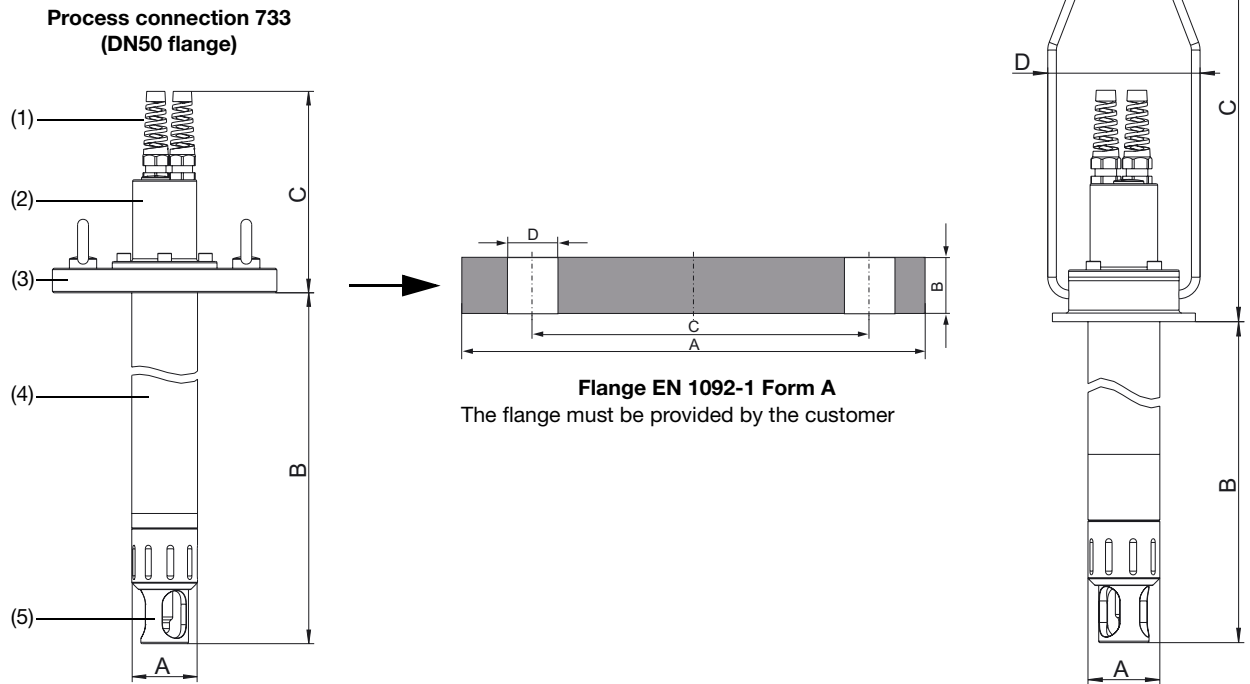
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## Dimensions



Dimension	Process connection 733 (DN50 flange)		Process connection 944 (PP retainer)
	Diagram on left	Diagram on right	
A	50 mm	165 mm	50 mm
B	500 mm to 2500 mm	20 mm	500 mm to 2500 mm
C	161 mm	125 mm	302 mm
D	-	4 x 18 mm holes	108 mm

### Materials

(1)	PA
(2)	PA
(3)	1.4404 / 316L stainless steel <sup>1</sup>
(4)	1.4404 / 316L stainless steel <sup>1</sup>
(5)	1.4404 / 316L stainless steel <sup>1</sup>

<sup>1</sup> In contact with sample medium

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**Order details:**      **Process immersion fitting**

**(1) Basic type**

202821      JUMO process immersion fitting

**(2) Material**

24      1.4404 / 316L stainless steel

**(3) Process connection**

733      DN50 flange, EN 1092-1 Form A

944      PP retainer

**(4) Fitting length**

0500      500 mm

1000      1000 mm

1500      1500 mm

2000      2000 mm

2500      2500 mm

**(5) Seal**

600      EPDM

601      FPM

**(6) Extra codes**

000      none

921      Integrated spray nozzle

x = standard  
 o = option

**Order code**      (1) / (2) - (3) - (4) - (5) / (6) ,      ...

**Order example**      202821 / 24 - 733 - 0500 - 600 / 921

**Note:**

The type code is not a modular system.  
 If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features.

**Production versions** (delivery approx. 3 weeks after receipt of order)

Type	Brief description	Sales No.
202821/24-733-0500-600/921	Process immersion fitting, 1.4404/316L, DN50 flange, fitting length 500 mm, EPDM seal, integrated spray nozzle	20/00543920
202821/24-733-1000-600/921	Process immersion fitting, 1.4404/316L, DN50 flange, fitting length 1000 mm, EPDM seal, integrated spray nozzle	20/00543923
202821/24-733-2000-600/921	Process immersion fitting, 1.4404/316L, DN50 flange, fitting length 2000 mm, EPDM seal, integrated spray nozzle	20/00543924

**Spare parts** (delivery approx. 3 weeks after receipt of order)

Type	Brief description
EPDM seal kit	For 1.4404/316L stainless steel version
FPM seal kit	For 1.4404/316L stainless steel version

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# Manual quick-change fittings

## Brief description

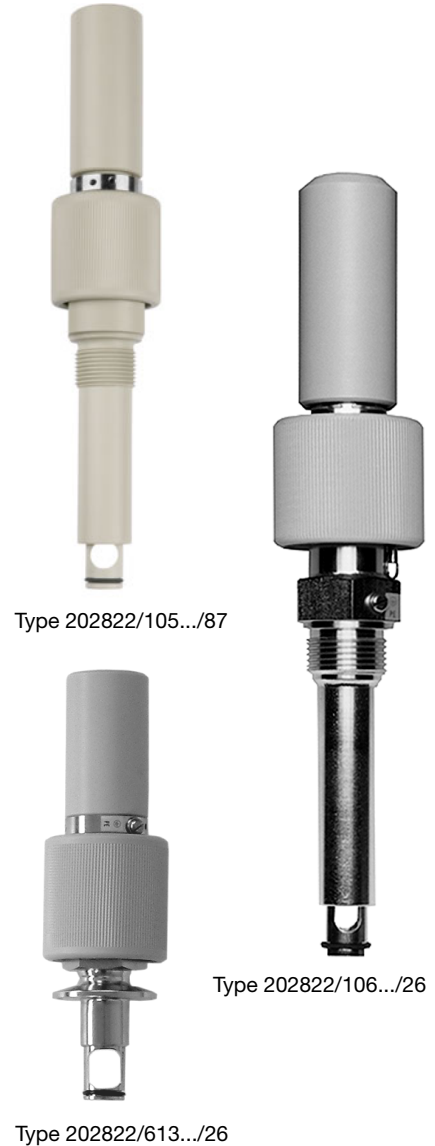
The quick-change fittings, which can be operated manually, permit sensor mounting and removal under process conditions, which means that the liquid cycle concerned, or the main flow, need not be interrupted.

Quick-change fittings are mainly used for pH measurements in closed cycles, or for measurements in the inflow and outflow of water purification plants. The quick-change fitting can also be installed at the side of the tank, which allows the sensor to be removed without previously emptying the tank.

The fitting enables the mounting of one sensor with a Pg 13.5 thread and a mounting length of 120 or 225 mm.

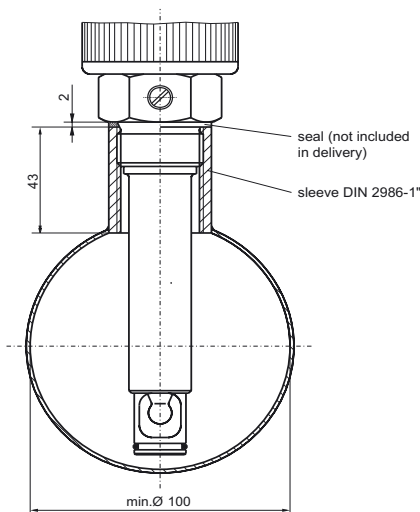
## Applications

- measurements in closed liquid cycles, e.g. pH measurement in cooling and water purification plants
- measurements in closed containers and tanks
- final pH check in outflow, if a bypass is not possible
- Type 202822/106-135-.. fitting with screw-in thread G1A, for installing one sensor with a Pg 13.5 thread and a mounting length of 225 mm
- Type 202822/105-62-.. fitting with screw-in thread G3/4A, for installing one sensor with a Pg 13.5 thread and a mounting length of 120 mm
- Type 202822/613-48-26: fitting with clamp connection, for fitting one sensor with a Pg 13.5 thread and a mounting length of 120 mm

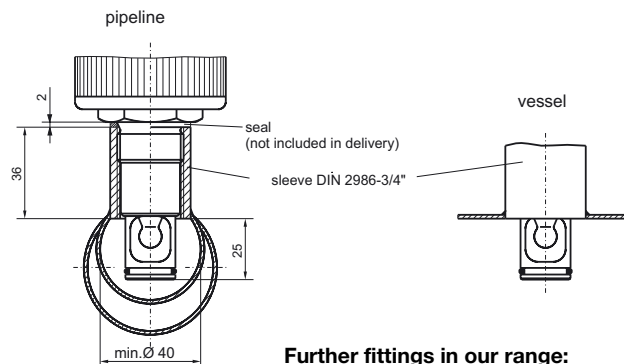


## Mounting options

Type 202822/106-135-..



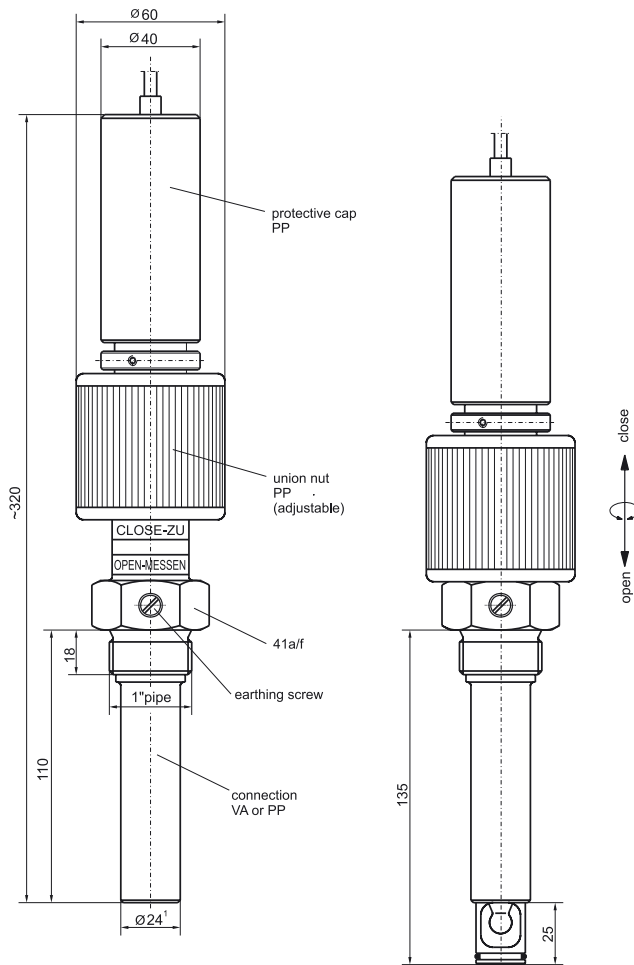
Type 202822/105-062-26



### Further fittings in our range:

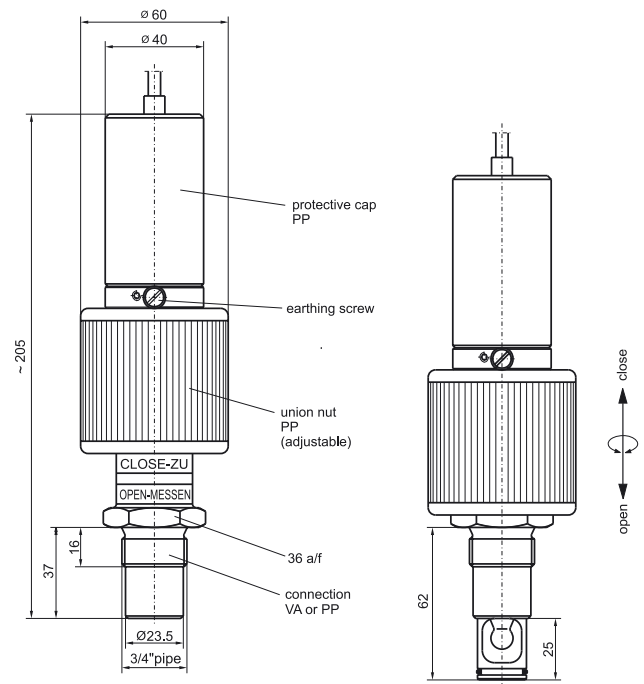
Fittings type:	Data Sheet
Flow-through fittings	T 202810
Immersion fittings	T 202820
Quick-change fittings	T 202822
Process fittings	T 202825

# Dimensions

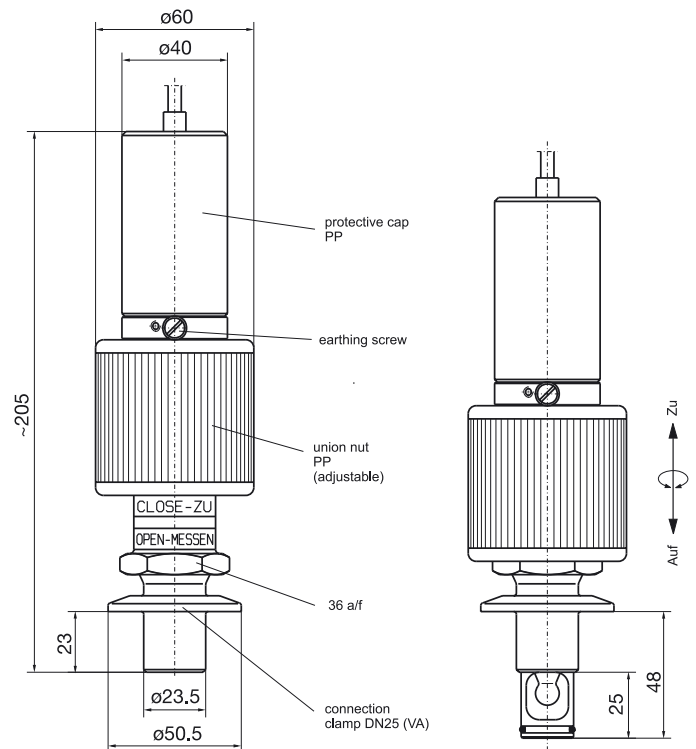


Type 202822/106-135-26, Type 202822/106-135-87

<sup>1</sup> with material PP: 29 mm dia.



Type 202822/105-062-26, Type 202822/105-062-87



Type 202822/613-048-26

<sup>1</sup> Bei Werkstoff PP  $\varnothing$  29 mm

## Technical data

<b>Parts in contact with medium</b>	stainless steel 1.4571 and FPM or PP and FPM
<b>Permissible temperature <sup>1</sup></b>	-30 to +135°C stainless steel -10 to + 60°C PP
<b>Safe pressure at 25°C</b>	up to 10bar for stainless steel up to 6bar for PP
<b>Seal</b>	FPM
<b>Protection</b>	IP65
<b>Mounting position</b>	please observe the mounting instructions for the sensor that is used
<b>Electrode holder</b>	Pg 13.5 thread A type 202995 impedance converter or a type 202701 two-wire transmitter can be incorporated.
<b>Weight</b>	Type 202822/105-062-260.8 kg Type 202822/106-135-261.0 kg Type 202822/613-048-261.2 kg

## Order details

	<b>(1) Basic version</b>
202822	Manual quick-change fitting
	<b>(2) Process connection</b>
105	screw-in thread G3/4A (3/4" pipe) for electrodes with a mounting length of 120 mm
106	screw-in thread G1A (1" pipe) for electrodes with a mounting length of 225 mm
613	clamp connection DN25 for electrodes with a mounting length of 120 mm
	<b>(3) Mounting length</b>
x 048	048 mm
x 062	062 mm
x 135	135 mm
	<b>(4) Material</b>
x 26	parts in contact with medium: stainless steel 1.4571
x 87	polypropylene (PP)

x = available

<b>Order code</b>	(1)	(2)	(3)	(4)
<b>Order example</b>	202822	/ 105	- 062	- 26

The type code is a type designation, not a modular system.

If at all possible, please choose the items listed under "Stock items" or "Production items".

Any free combination of individual code features must be technically checked by us and released.

Please ask us in case of doubt.

## Stock items (delivery: 3 working days after receipt of order)

<b>Type</b>	<b>Sales No.</b>
202822/105-062-26	20/00366915
202822/106-135-26	20/00345780
202822/613-048-26	20/00348649

## Production items (delivery: 10 working days after receipt of order)

<b>Type</b>	<b>Sales No.</b>
202822/106-135-87	20/00375339
202822/105-062-87	20/00381650

## Optional accessories

<b>Description</b>	<b>Sales No.</b>
KCl reservoir, wall-mounted; to set up an electrolyte bridge or when using KCl-filled electrodes	20/00060254
Spare part kit for manual quick-change fitting (o-ring set and mounting wrench)	20/00420614

<sup>1</sup> Please also note the maximum operating data for the sensor used!  
It is **not** possible to remove the sensor at maximum temperature!

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# Pneumatic Retractable Assembly

Type 202823

## Brief description

Pneumatic retractable assemblies are used wherever sensors are exposed to exceptional loadings. These can be applications with heavy contamination or precipitation, as well as special process conditions (such as sterilizability, hygienic applications, etc.). The regular, automated cleaning of the sensor can significantly increase its service life in problematic medium conditions. The type 202823 pneumatic retractable assembly can hold all standard commercial sensors that are 12 mm in diameter and 225 mm long. In order to cope with the diverse process properties, the process fitting is supplied in stainless steel (1.4404 / 316L). Different seal materials are also available.

The fitting can be adapted to containers or pipelines by a flange or relevant flow-through vessel. A version with (EHEDG/3A) certified process connections is available for use in pharmaceutical applications.

The JUMO 202823 pneumatic retractable assembly can be operated in any position. But to obtain reliable measurements, the properties of the sensor being used must be considered.

## Advantages

- Suitable for all standard commercial sensors that are 225 mm long, 12 mm in diameter and with a Pg 13.5 thread
- Sturdy design
- Increases sensor service life
- Reduces maintenance expenditure
- Safety lock for when sensor is removed
- Integrated positional feedback
- Simple installation and sensor mounting
- Can be used up to 10 bar and +140 °C (version-dependent)
- Wide choice of process connections and seal materials
- Maintenance-free drive unit
- EHEDG and 3A certified version available available

## Areas of application

- Harsh process conditions (precipitation, heavy contamination)
- Water and wastewater engineering
- Pharmaceutical industry
- Chemical industry
- Food technology



Type 202823...

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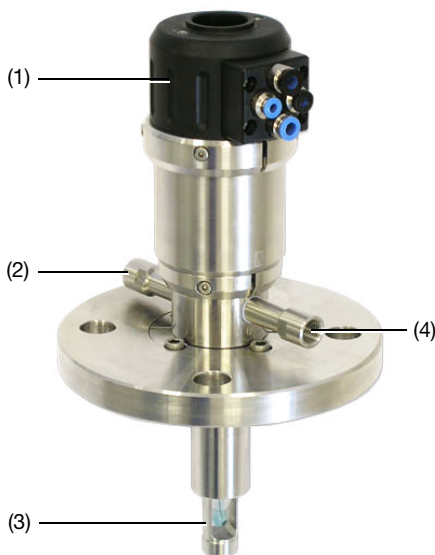
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## Functional description of the fitting

The fitting can either be operated by an external (PLC) controller, or by the control unit that is available as an option. To start measurement, compressed air is supplied to the fitting via the pneumatic connections of the drive unit (1). The pneumatic drive unit inserts the immersion tube (3) into the process medium to the maximum immersion depth. A safety device prevents the immersion tube being inserted when there is no sensor installed. When the "Measure" end position is reached, the controller receives pneumatic positional feedback. In this position, the terminal head of the sensor is concealed in the drive unit, making it impossible to remove the sensor. Now the process liquid measurements are taken. If it is necessary to clean the sensor, the sensor can be withdrawn from the medium without interrupting the process. To do this, move the fitting to the "Service" position. Positional feedback from the controller also indicates when this position is reached. The rinsing chamber is protected by seals in the "Service" position, so that no process liquid can escape.



- (1) Drive unit with connections
- (2) "IN" rinsing connection
- (3) Immersion tube (in "Measure" position)
- (4) "OUT" rinsing connection

The complete cleaning sequence comprises the following components:

- EXmatic 460 control unit or PLC (provided by customer)
- 202823 pneumatic retractable assembly
- Flow-through vessel (T-piece)
- pH combination electrode
- Electrode cable
- pH transmitter with washing contact
- Valves

The following components must be provided and made available by the customer:

- Power supply
- Cleaning solutions / chemicals
- Rinsing liquid (water, or similar)
- Compressed air

The process fitting is connected to the control unit by color-coded connecting cables. This prevents the cables getting mixed up.

## Functional description of the EXmatic 460

The EXmatic 460 fitting controller can control and monitor the measuring and cleaning cycles of the pneumatic retractable assembly totally automatically. Cleaning cycles, measuring intervals and start times can be parameterized and adapted to a particular requirement. The controller monitors all the positional feedback from the retractable assembly via the integrated inputs. Automatic cleaning can be started via an additional input. The respective states of the retractable assembly and the controller can be forwarded to a higher-level process control system. The retractable assembly and cleaning valves to control the cleaning solutions are connected to the fitting controller by means of pneumatic hoses. The automatic cleaning cycle can basically be started using 3 different programs.

It is also possible to combine the cycles.

- **Loop**  
Recurring cycle
- **Real-Time Event**  
At certain times, e.g. every day
- **External Trigger**  
Start via external contact
- **Loop + Trigger**  
When system is at a standstill, for example, to avoid dry periods
- **Event + Trigger**  
For wetting when sensor is at a standstill, for example

When the retractable assembly is moved to the "Cleaning" position, or back to the "Measure" position, there is a connection between the product and the rinsing chamber for a brief moment, when the measuring window passes the sealing element. A seal water function can be activated so that as little product as possible gets into the rinsing chamber, and so that the sealing element is

also rinsed at the same time.

When the cleaning program is started, the following program steps are run (depending on the setting):

- **Cleaning I/1**  
Pre-cleaning, e.g. with water
- **Cleaning II**  
Cleaning with second solution, e.g. acid
- **Cleaning II RT**  
Reaction time for second solution; skipped when value "0"
- **Cleaning I/2**  
Cleaning with first solution, e.g. water
- **Pause**  
Sensor stays in rinsing chamber, cleaning solution not blown out; skipped when value "0"
- **Measure**  
Sensor back to measuring position

## Cleaning sequence via pH transmitter with washing contact

The cleaning process is started by the pH transmitter using the washing contact. The external EXmatic 460 must be programmed to the "External Trigger" function.

Compressed air is supplied to the fitting via the pneumatic connections of the drive unit (1). The pneumatic drive unit withdraws the immersion tube (3) from the medium. When the "Service" position is reached, positional feedback is given to the controller. The rinsing chamber is protected by seals in this position, so that no process liquid can escape. Now the actual cleaning process can be run in accordance with the selected program. When the relevant valves are activated, fresh rinsing liquid is carried to the sensor through the "IN" rinsing input (2). The polluted rinsing liquid is removed via the "OUT" rinsing connection (4). Once all the cleaning steps have been executed, and subject to the program selected, the rinsing chamber is rinsed and the sensor is moved back to the "Measure" position by the drive unit.

## Periodic measuring mode

With highly aggressive media, or media that is susceptible to precipitation, and which could therefore impair the functionality of the sensor, the controller can be programmed so that the sensor is only immersed in the process in time-limited phases. In this case, the liquid (cleaning solution 1) is left in the rinsing chamber. The remaining liquid is used to keep the sensor moist and to stop it drying out.

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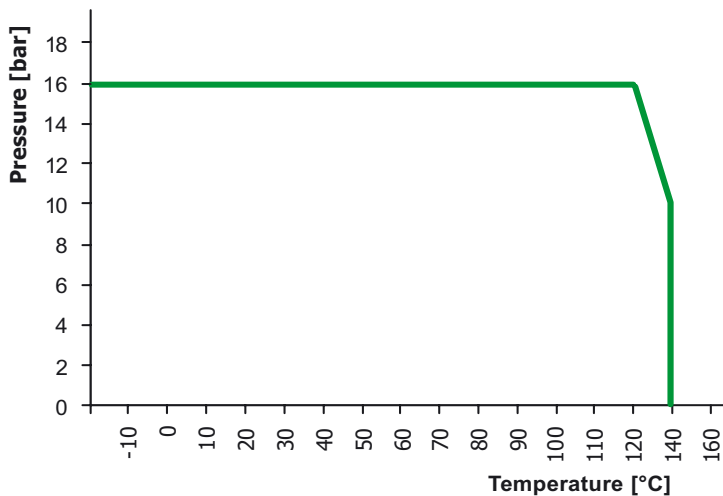
## Technical data

### 202823 pneumatic retractable assembly

<b>Materials</b>	
- Parts in contact with the medium for material 24 (stainless steel)	1.4404 / 316L stainless steel
- Drive unit	1.4404 / 316L stainless steel, PA66 GF30
- Seals	EPDM (standard)
<b>Operating temperature<sup>1</sup></b>	
- Max. permissible temperature	+140 °C
<b>Pressure resistance<sup>1</sup></b>	
- Max. permissible pressure	16 bar
<b>Rinsing pressure<sup>1</sup></b>	1 to 4 bar
<b>Suitable for 1 sensor</b>	225 mm long, 12 mm in diameter and with a Pg 13.5 thread
<b>Process connection</b>	DN50 flange; Other versions on request
<b>Rinsing connection</b>	G 1/8" or G 1/4" (internal)
<b>Pneumatic connection</b>	
- Control air	Compressed air hoses
- Positional feedback	external ø 6 mm, internal 4 mm external ø 4 mm, internal 2 mm

<sup>1</sup> Comply with the maximum permissible sensor temperature and pressure!

### Permissible pressure and temperature



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## Technical data

### EXmatic 460 controller for the pneumatic retractable assembly

<b>Material</b> Housing Control unit	GFRP or stainless steel (option) GFRP, PMMA
<b>Enclosure protection</b> to EN 60529 Housing Control unit	IP54 IP54
<b>Dimensions</b>	300 mm x 400 mm x 200 mm for both versions
<b>Ambient conditions</b> Ambient temperature Transport and storage temperature Relative humidity	0 to +55 °C -10 to +60 °C 10 to 95 %, non-condensing
<b>Electrical ratings</b> Power supply Power consumption Power draw Input external contact pneumatic valve control Output external contact cleaning pump I cleaning pump II status contact alarm contact	24 V DC ≤ 0.65 A ≤ 30 VA  24 V DC internal power supply for floating contact 24 V DC, ≤ 80 mA  24 V DC, ≤ 80 mA 24 V DC, ≤ 80 mA 24 V DC, ≤ 80 mA 24 V DC, ≤ 100 mA 24 V DC, ≤ 100 mA
<b>EMC</b> Interference emission Interference immunity	Radio-interference-suppressed to 61000-6-4 Noise-immune to EN 61000-6-2
<b>Pneumatics</b> (compressed air) Connection for control air external diameter internal diameter Connection for positional feedback external diameter internal diameter Pressure Quality Consumption	Compressed air hose ø 6 mm ø 4 mm Compressed air hose ø 4 mm ø 2 mm 4 to 6 bar Filtered ≤ 40 µm; water and oil free No continuous air consumption

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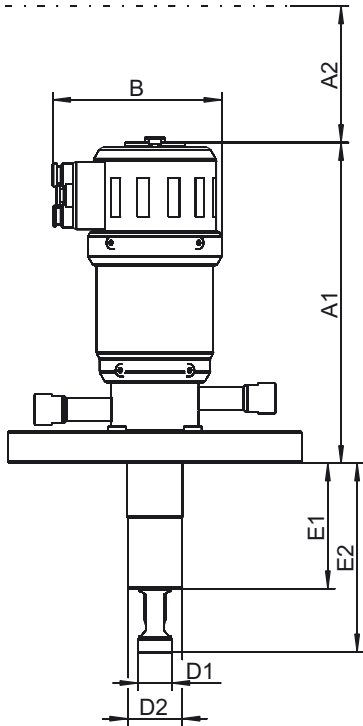
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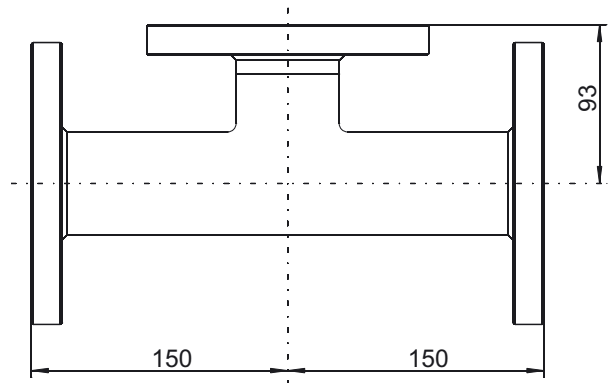
## Dimensions

### Pneumatic retractable assembly

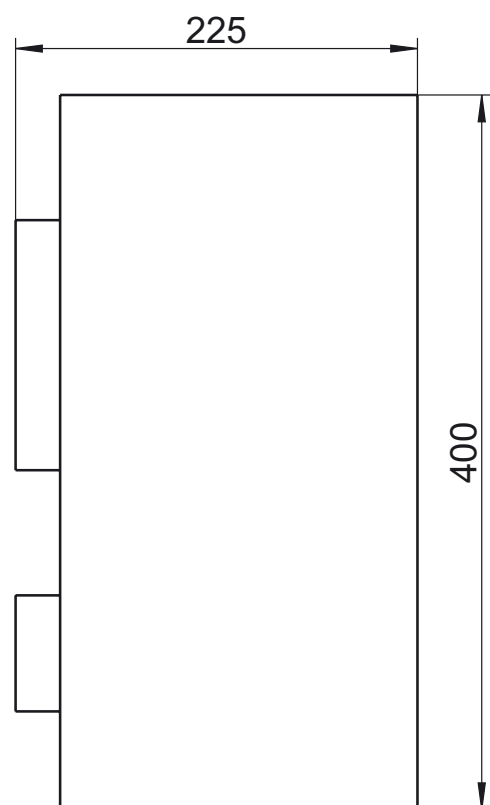
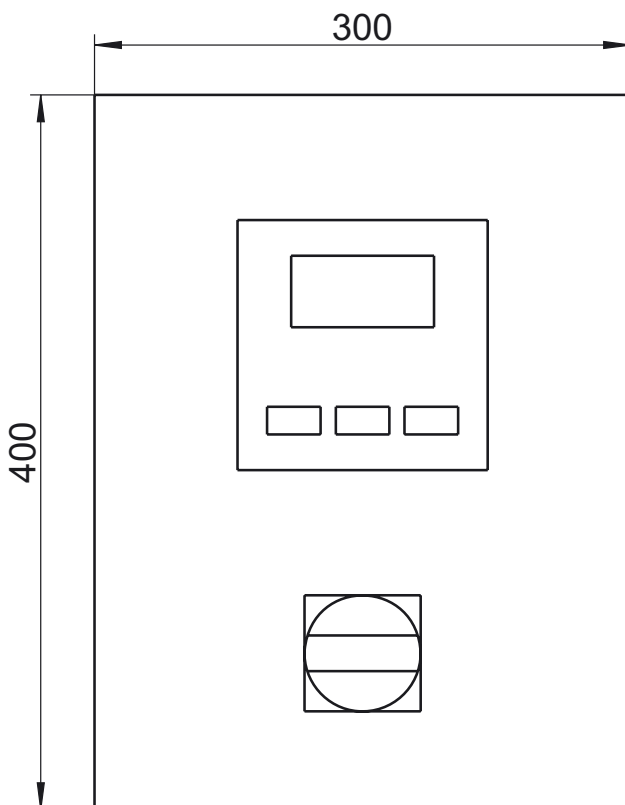


Dimension	Process connection 733
A1	180 mm
A2	350 mm
B	95 mm
D1	19 mm
D2	31 mm
E1	71 mm
E2	107 mm

### Flow-through vessel (T-piece) Sales No.: 20/00542773



### EXmatic 460 controller



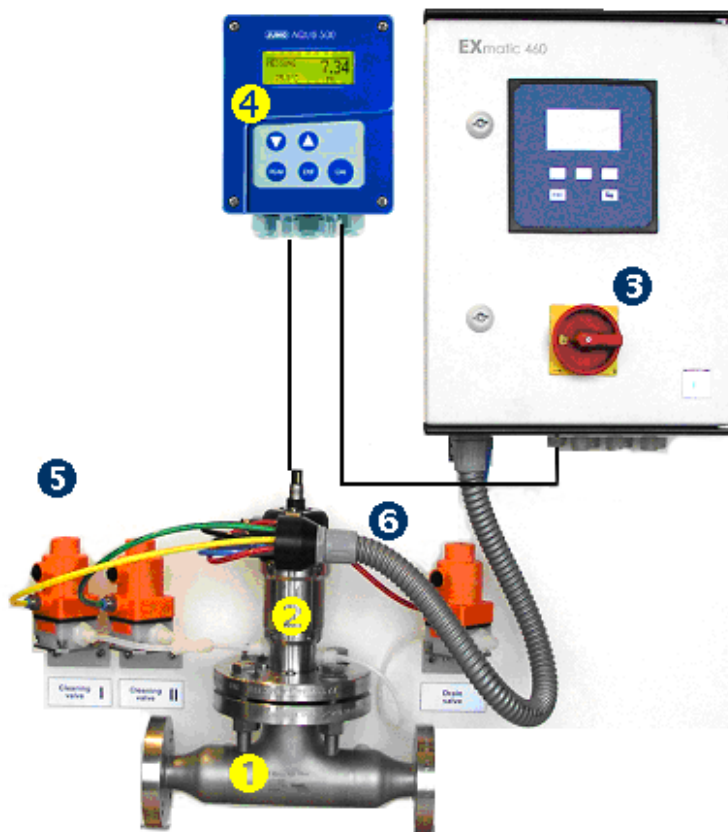
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Complete measurement section

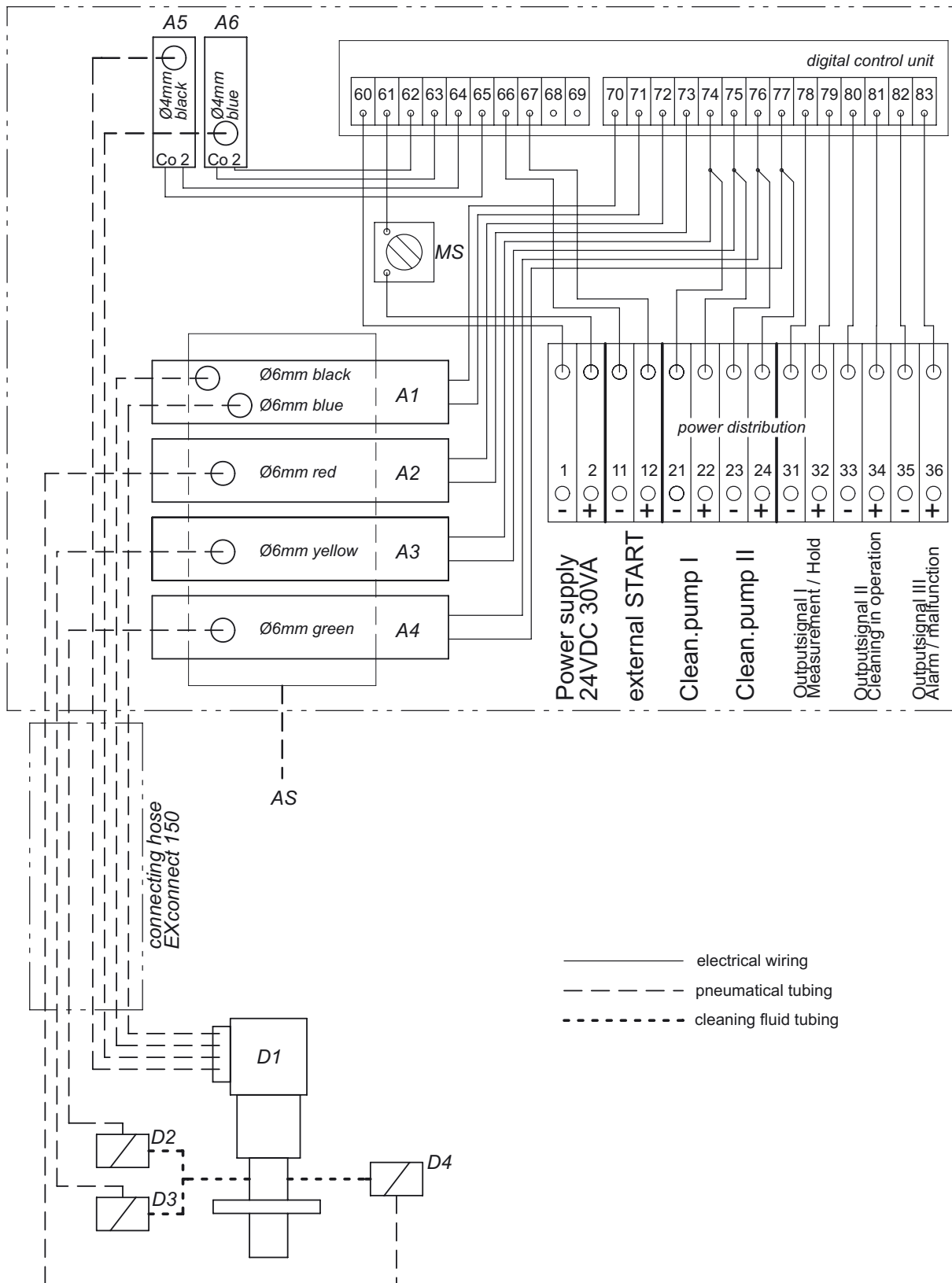


(1)	T-piece mounting (20/00542773)
(2)	Type 202823 pneumatic retractable assembly
(3)	Type EXmatic 460 controller for the pneumatic retractable assembly
(4)	Transmitter/controller for pH value, e. g. JUMO AQUIS 500 pH type
(5)	Pneumatic valves for cleaning
(6)	Pneumatic valves for draining



## Connection diagram

### EXmatic460



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**Order details:**      **Process immersion fitting**

**(1) Basic type**

	202823	Pneumatic retractable assembly
	<b>(2) Material</b>	
x	24	1.4404 / 316L stainless steel
	<b>(3) Process connection<sup>1</sup></b>	
x	733	DN50 flange, EN 1092/1 Form A
	<b>(4) Cleaning connection</b>	
x	101	internal G 1/8"
o	102	internal G 1/4"
	<b>(5) Seal</b>	
x	600	EPDM seal
o	601	FPM seal
	<b>(6) Extra codes</b>	
o	000	none
x	920	Pneumatic positional feedback

x = standard  
 o = option  
 - = not available

<b>Order code</b>	(1)	-	(2)	-	(3)	-	(4)	-	(5)	/	(6)
<b>Order example</b>	202823	-	24	-	733	-	102	-	600	/	920

<sup>1</sup> Other process connections on request.

**Note:**

The type code is not a modular system.  
 If possible, choose items listed under "**stock versions**" or "**production versions**" for your orders.  
 We will have to technically inspect and approve a free combination of individual key features.

**Production versions** (delivery approx. 3 weeks after receipt of order)

Type	Brief description	Sales No.
202823/24-733-101-600/920	Pneumatic retractable assembly, 1.4404 /316L stainless steel, DN50 flange, internal G 1/4" cleaning connection, EPDM seals, pneumatic positional feedback	20/00542770

**Accessories** (delivery approx. 4 weeks after receipt of order)

Type	Brief description	Sales No.
EXmatic 460 controller	Plastic housing, prepared for 2 cleaning solutions, drain valve controller, 5 m connecting cable	20/00542772
T-piece mounting	1.4571 / 316Ti stainless steel material, 180 ° flow, DN25 process connection flange, DN50 fitting connection flange	20/00542773
Cleaning valve kit	2 cleaning valves and 1 drain valve, incl. fixing bracket and connection hoses	20/00542776

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# Stainless steel process fittings

- Installation in pipe systems
- Installation in tanks and vessels
- Hygienic version
- FDA conformity of materials
- Probe length 120 mm × 120 mm
- Availability of various process connections

## Brief description

These fittings are used for holding and protecting sensors. They can either be fitted directly into existing stainless steel pipe systems or onto container walls.

Type 202825 fittings are mainly installed in industrial plants with increased hygienic requirements. The wetted components and the sealing material used are approved by the FDA (Food and Drug Administration).

Type 202831 fittings are predominantly used in water management and in process engineering. Both types of fittings are intended to accommodate sensors of 120 mm length. Other lengths to special order.

### Additional fittings

Type of fitting	Data Sheet
Flow-through fittings	202810
Immersion fittings	202820, 202821
Quick-change fittings	202822
Pneumatic retractable assembly	202823



Type 202825/...



Type 202831/...

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## Installation options

	<b>Cone nipple</b>			
	<b>DN 15</b>	DN (pipe)	L (fitting dim.)	
		DN 40	65 mm	
		DN 50	65 mm	
		DN 65	57 mm	
		DN 80	65 mm	
		DN 100	75 mm	
		DN 125	88 mm	
		<b>DN 50</b>	DN (pipe)	L (fitting dim.)
		DN 50	63 mm	
		DN 65	52 mm	
		DN 80	63 mm	
		DN 100	75 mm	
		DN 125	90 mm	

	<b>Clamp connection</b>			
	<b>DN 25</b>	DN (pipe)	L (fitting dim.)	
		DN 40	58 mm	
		DN 50	50 mm	
		DN 65	50 mm	
		DN 80	58 mm	
		DN 100	68 mm	
		DN 125	81 mm	
		<b>DN 50</b>	DN (pipe)	L (fitting dim.)
		DN 50	51 mm	
		DN 65	40 mm	
		DN 80	51 mm	
		DN 100	63 mm	
		DN 125	77 mm	

## Technical data

<b>Materials</b>	Wetted components in stainless steel 1.4571 Electropolished, Ra ≤ 0.80 (on type 202825/...) Seal: silicone O-rings (FDA approved)
<b>Permissible temperature<sup>a</sup></b>	0 to 135 °C
<b>Safe pressure at 25 °C</b>	Up to 10 bar
<b>Electrode holder</b>	Pg 13.5 gland An impedance converter (202995) or a 2-wire transmitter (202701) can be incorporated.
<b>Fitting length</b>	See installation options for the appropriate process connection
<b>Protection</b>	IP65, EN 60529
<b>Weight</b>	Depending on the process connection

<sup>a</sup> Please also note the maximum operating data for the sensor used.

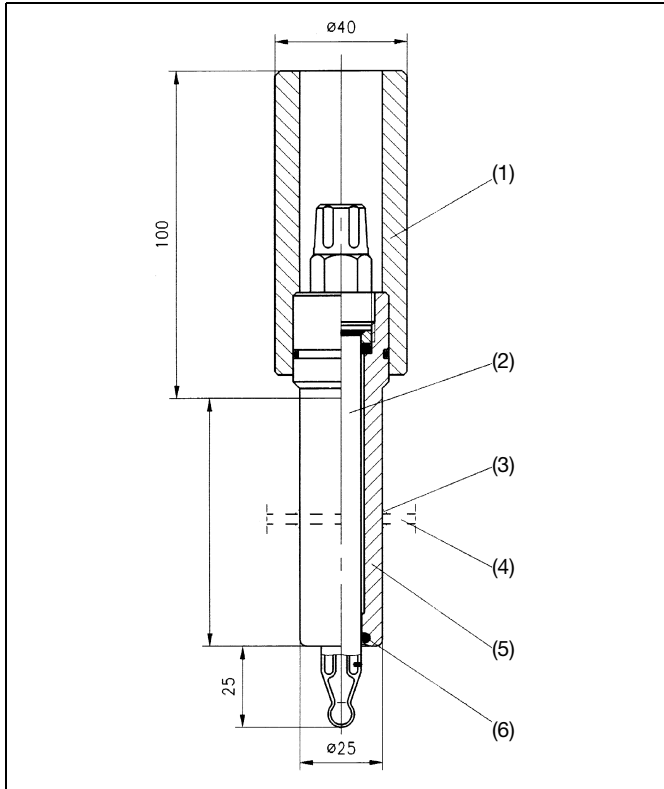
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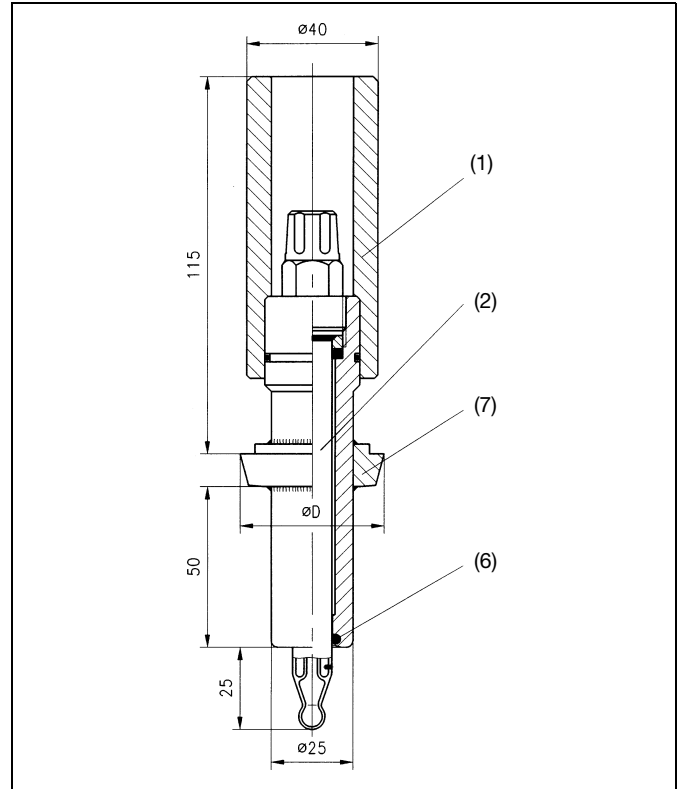
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## Dimensions



**Type 202825/000**



**Type 202825/607-26, type 202825/604-26**

Cone nipple: DN 50, Ø D = 68.5 mm dia., DN 25, Ø D = 44.0 mm dia.

- (1) Protective cap PP polypropylene
- (3) Weld seam
- (5) Connection
- (7) Process connection cone nipple, DIN 11851-SD

- (2) Electrode
- (4) Container wall
- (6) O-ring, silicone, FDA approved material

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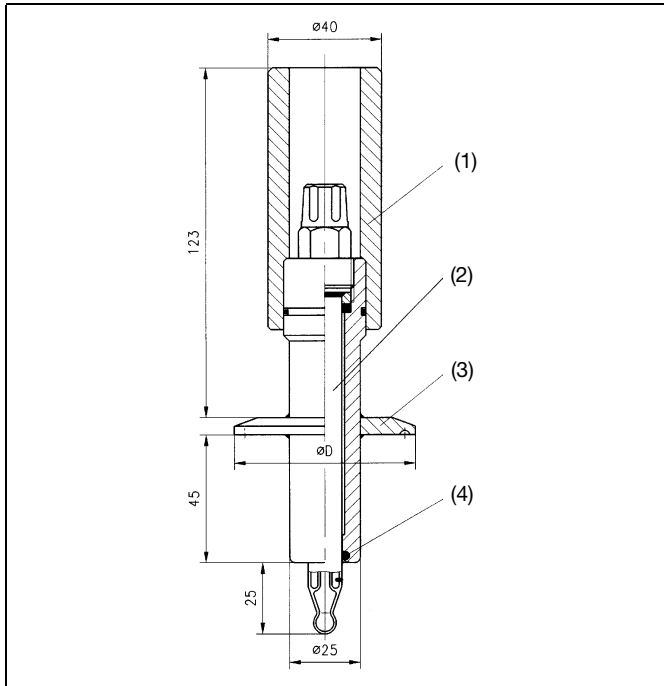
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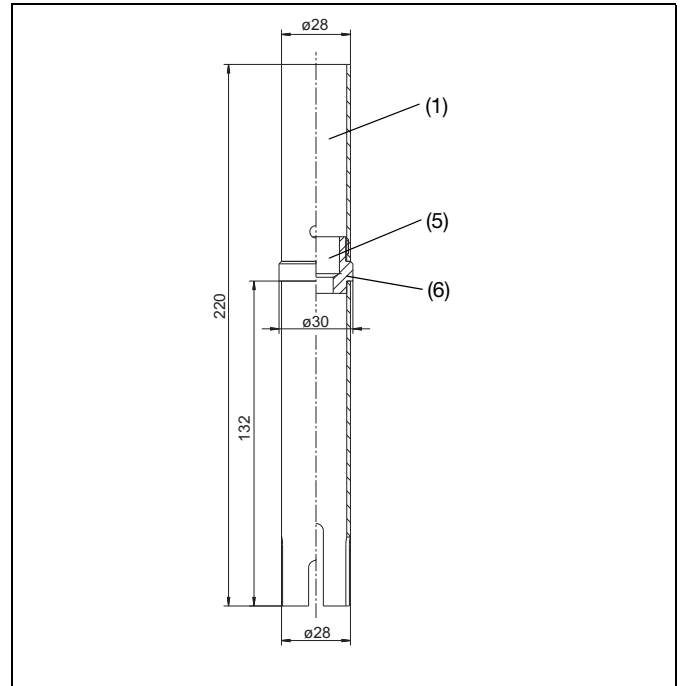
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**Type 202825/616-26, type 202825/613-26****Clamp connection:****DN 50, Ø D = 64.0 mm dia., L = 45 mm,****DN 25, Ø D = 50.5 mm dia., L = 45 mm**

- (1) Protective cap PP polypropylene
- (3) Process connection clamp connection DN
- (5) Holder Pg13.5 for one sensor

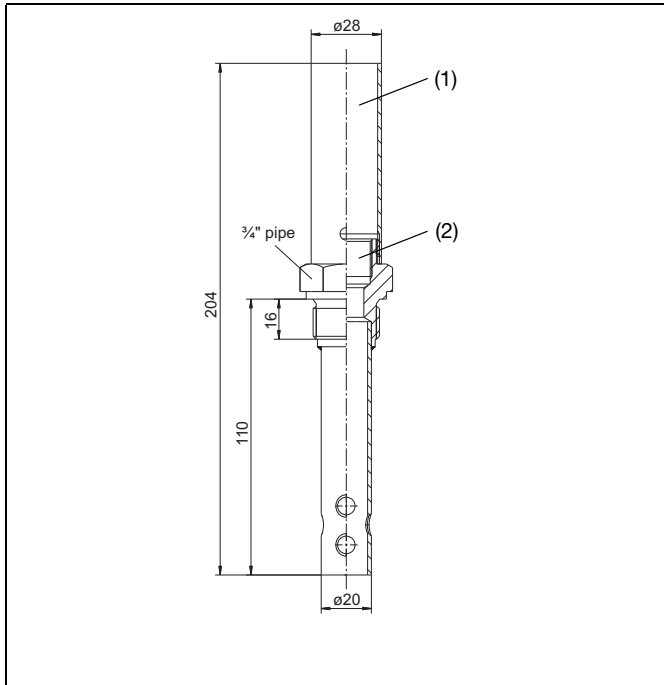
**Type 202831/000-26**

- (2) Electrode
- (4) O-ring, silicone, FDA approved material
- (6) Welding shoulder

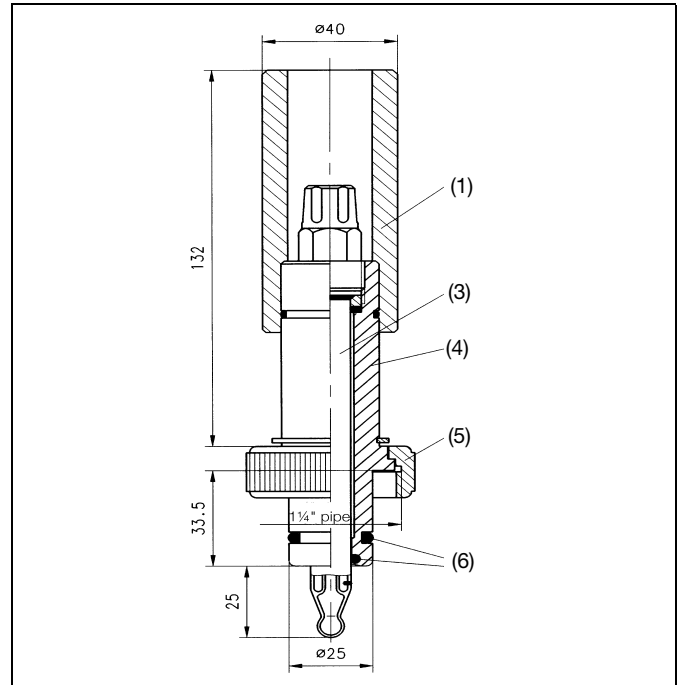
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Type 202831/105-26

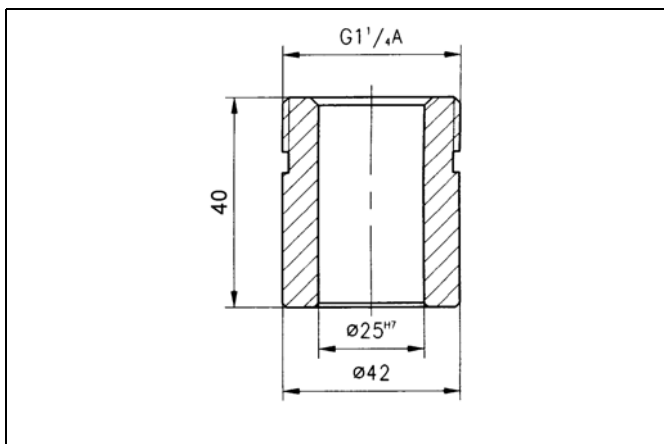


Type 202825/688-26  
 Ingold connection: 1 1/4" pipe thread, 33.5 mm fitting length (together with nipple 3)

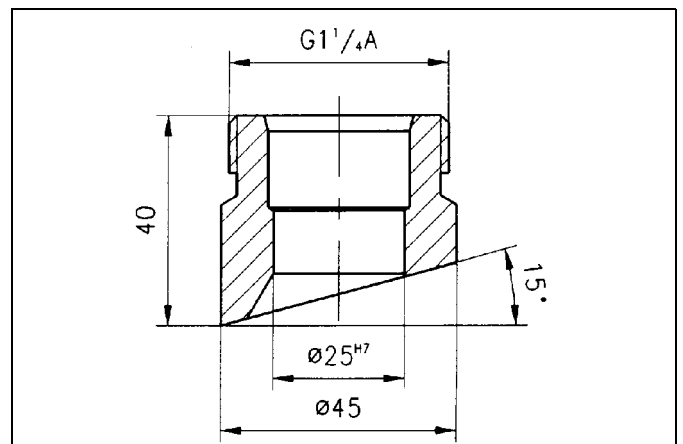
- (1) Protective cap against mechanical damage to sensor
- (3) Electrode
- (5) Union nut

- (2) Holder Pg13.5 for one sensor
- (4) Connection
- (6) O-rings, silicone, FDA approved material

**Available weld-in nipples for connection 688**



**Nipple 1**  
 Part no. 00489164



**Nipple 3**  
 Part no. 00378208

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## Order details

	(1)	<b>Basic type</b>
	202825	Process fittings, suitable for media with increased hygienic requirements
	202831	Process fittings, suitable for use in water management and process engineering
	(2)	<b>Process connection</b>
x	x	000 Weld seam
	x	105 Thread 3/4" pipe male
x		604 Cone nipple with union nut DIN 11851-DN 25 (milk cone)
x		607 Cone nipple with union nut DIN 11851-DN 50 (milk cone)
x		613 Clamp DN 25
x		616 Clamp connection (clamp) DIN 32676/2" ISO 2852-DN 50
x		688 Thread 1 1/4" pipe male (Ingold connection)
	(3)	<b>Material</b>
x		24 Wetted components in stainless steel 1.4404 (AISI 316L) (special version)
x	x	26 Wetted components in stainless steel 1.4571 (standard material)

Order code  /  -   
 Order example 202825 / 607 - 26

## Stock versions

Type	Process connection	Material	Part no.
202831/000-26	without	Wetted components in stainless steel 1.4571 (standard material)	00302472
202831/105-26	Thread 3/4" pipe male	Wetted components in stainless steel 1.4571 (standard material)	00302474

## Production versions

Type	Part no.
202825/000-26	00358137
202825/604-26	00358132
202825/607-26	00357679
202825/613-26	00358134
202825/616-26	00358133

## Accessories

Type	Teile-Nr.
KCI reservoir, pressure-resistant (PG209791)	00060254
Mounting bracket for flow-through fitting (PG209791)	00455706

**Note:**

The type code is a type designation, not a modular system.

If at all possible, please choose the items listed under "**Stock versions**" or "**Production versions**" when ordering.

Any free combination of individual code features must be technically checked by us and released.

Please ask us in case of doubt !

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# JUMO BlackLine CR-GT/-EC/-GS Conductive 2-Electrode Conductivity Sensor

Cell constants  $K = 0.01 - 1.0$

## 202922 Series

- for universal application, e.g. drinking and surface water monitoring, ion exchangers and reverse osmosis plant, construction of air conditioning and cooling systems, horticultural technology, sea water and fresh water aquaculture, mildly contaminated industrial rinse and process water, high-purity water monitoring, etc.
- compact style for universal application
- manufactured from physiologically safe materials

### JUMO BlackLine CR-GT with the cell constants $K = 1.0$

The GT version features a special graphite as the electrode material. The graphite has been especially treated to achieve - in conjunction with suitable evaluation devices - measuring ranges up to 100 mS/cm and above.

A temperature probe can optionally be integrated. The conductivity sensor with 120 mm fitting length and a shaft diameter of 12 mm can be used in combination with standard pH or redox electrodes in suitable built-in fittings. The sensor is also ideally suited for linking with handheld or laboratory measuring equipment. When used as an online sensor, suitable flow-through fittings must be employed (see JUMO data sheets 202810, 202820, 202822).

### JUMO BlackLine CR-EC with the cell constants $K = 0.01$ , $K = 0.1$ and $K = 1.0$

The principal features of the EC version are its very compact construction and the Pt100 that is integrated as standard. With a fitting length of just 40 mm (or 63 mm), the sensors can also be screwed into pipelines with a small nominal diameter. To this end, the conductivity sensors either have a G 1/2A or 1/2"-14 thread.

The version with  $K = 1.0$  achieves a measuring range of 0.1 to about 5000  $\mu\text{S/cm}$  (5mS/cm). Titanium pins function as the measuring electrodes here. The version with  $K=1.0$  has been implemented as a coaxial cell and can be used to about 1000  $\mu\text{S/cm}$ . Sensors with  $K = 0.01$  cover ranges from 0.05 to 20  $\mu\text{S/cm}$ . They are therefore extremely suitable for pure and high-purity water applications. The electrode material for these sensors is stainless steel 1.4571.

### JUMO BlackLine CR-GS glass conductivity sensors $K = 1.0$

Glass conductivity sensors are used to conductively determine the electrolytic conductivity of aqueous solutions. The cell constant of the sensor is  $K = 1.0 \text{ 1/cm}$ . These sensor can be supplied with an integrated Pt100 temperature sensor, as an option.

Versions with a Pg13.5 threaded cap can be incorporated in suitable fittings (see data sheets 202810, 202820, 20,2822 and 202825).

## Operating principle

The sensors in the 202922 series are 2-electrode conductivity sensors. A transmitter applies an AC voltage to the sensors. The current flowing through the liquid and the electrodes is determined by the conductivity of the liquid.



JUMO BlackLine CR-GT (left),  
JUMO BlackLine CR-EC (middle),  
JUMO BlackLine CR-GS (right)

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## Technical data

### JUMO BlackLine CR-GT

Cell constant <sup>a</sup>	K=1.0
Typical measuring range <sup>b</sup>	0.1 to approx. 10 mS/cm (with the appropriate evaluation equipment: up to 100 mS/cm)
Temperature compensation	none/Pt100/Pt1000
Process connection	Pg13.5 screw-in thread
Electrode material	special graphite
Body material	PPE, PS
Operating temperature	-5 to +80 °C
Maximum pressure	6 bar (at 25 °C)
Electrical connection	attached cable (free cable ends) or M12 connector

a. Depending on the production conditions, the cell constant can deviate by  $\pm 10\%$  from the nominal value. This deviation can be compensated at the transmitter.

b. The measuring ranges also depend on the transmitter used. When used for wider ranges than the "typical" ones, measurement errors may be caused by polarization.

### JUMO BlackLine Lf-EC

Cell constant <sup>a</sup>	K = 0.01	K = 0.1	K = 1.0
Typical measuring range <sup>b</sup>	0.05 to approx. 20 $\mu$ S/cm	0.1 to approx. 1000 $\mu$ S/cm	0.1 to approx. 5000 $\mu$ S/cm
Temperature compensation	Pt100	Pt100	Pt100
Process connection	G 1/2A or 1/2"-14 NPT screw-in thread	G 1/2A or 1/2"-14 NPT screw-in thread	G 1/2A or 1/2"-14 NPT screw-in thread
Electrode material	stainless steel 1.4571	stainless steel 1.4571	titanium
Body material	PEI	PEI	PEI
Operating temperature	-5 to +90 °C	-5 to +90 °C	-5 to +90 °C
Maximum pressure	6 bar (at 25 °C)	6 bar (at 25 °C)	6 bar (at 25 °C)
Electrical connection	attached cable (free cable ends) or M12 connector	attached cable (free cable ends) or M12 connector	attached cable (free cable ends) or M12 connector

a. Depending on the production conditions, the cell constant can deviate by  $\pm 10\%$  from the nominal value. This deviation can be compensated at the transmitter.

b. The measuring ranges also depend on the transmitter used. When used for wider ranges than the "typical" ones, measurement errors may be caused by polarization.

### JUMO BlackLine CR-GS

Cell constant <sup>a</sup>	K = 1.0
Typical measuring range <sup>b</sup>	0 to 1 mS/cm (platinum raw) 0 to 100 mS/cm (platinum platinized)
Temperature compensation <sup>c</sup>	Pt100
Process connection	threaded cap Pg13,5 or plug cap
Electrode material	platinum
Body material	glass
Operating temperature	-10 to +160 °C
Maximum pressure	0 to 6 bar with threaded cap Pg13,5 unpressurized with plug cap
Electrical connection	N-connector or M12 connector

a. Depending on the production conditions, the cell constant can deviate by  $\pm 10\%$  from the nominal value. This deviation can be compensated at the transmitter.

b. The measuring ranges also depend on the transmitter used. When used for wider ranges than the "typical" ones, measurement errors may be caused by polarization.

c. option

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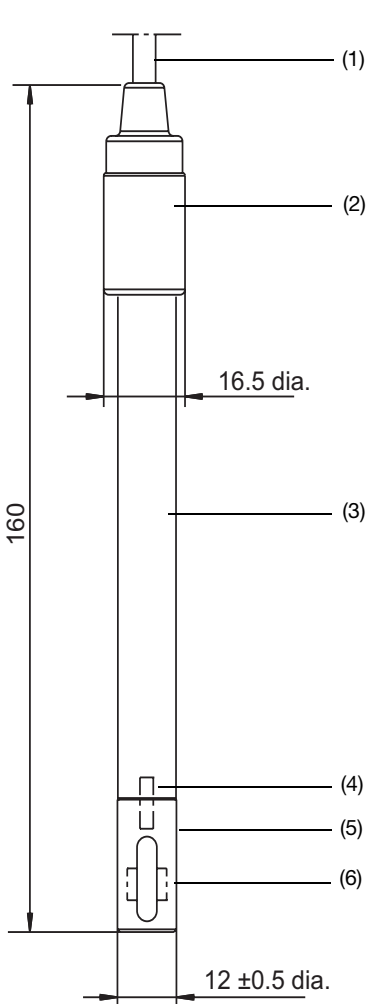
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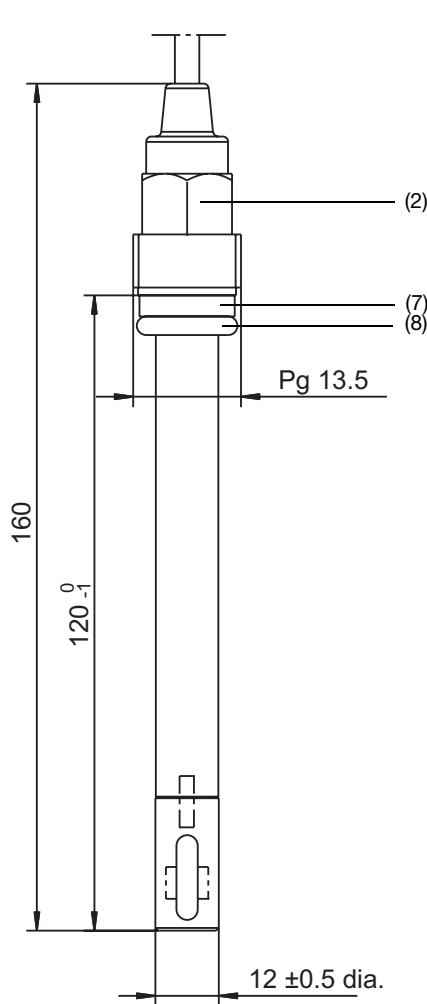
## Dimensions

### JUMO BlackLine CR-GT



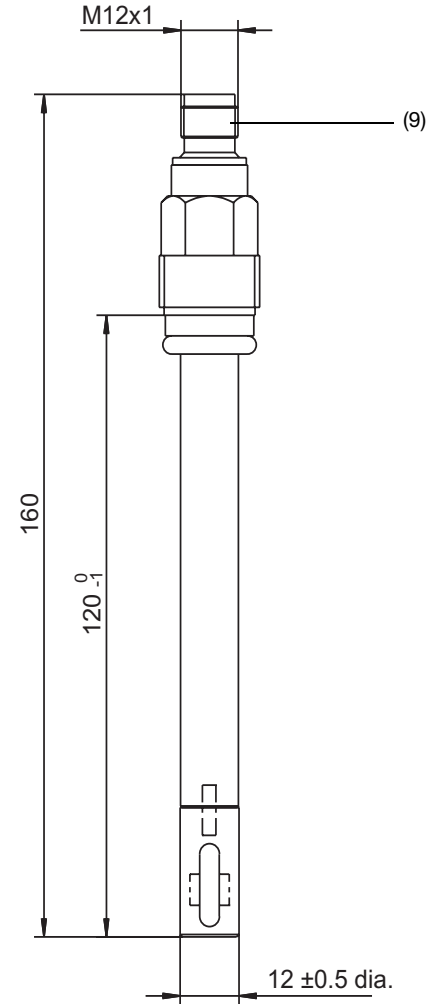
**Type 202922/10-...  
 plug cap with attached cable**

- 1 Connecting cable 5 mm dia.
- 4 Temperature sensor
- 7 Ring, PSU



**Type 202922/10-...  
 threaded cap with attached cable**

- 2 Electrode head, PC
- 5 Electrode holder, PPO
- 8 O-ring 10 x 3,5, FPM



**Type 202922/10-...  
 threaded cap with M12 connector**

- 3 Electrode shaft, PPO
- 6 Graphite electrodes
- 9 Built-in connector M12 x 1, 4-pole, 713 series

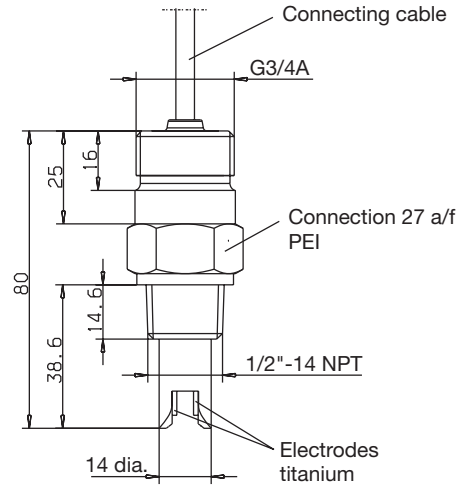
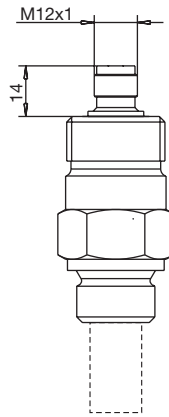
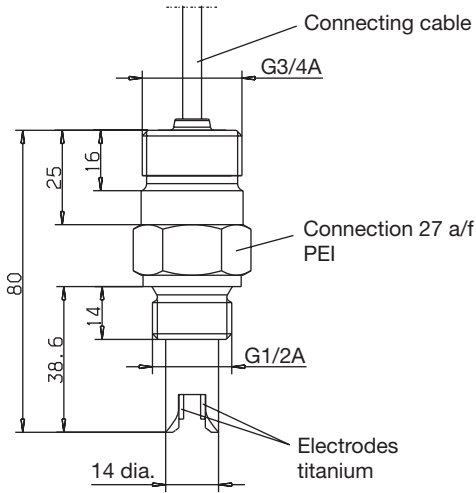
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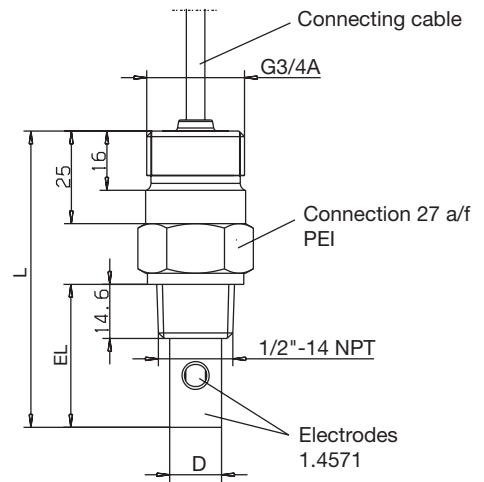
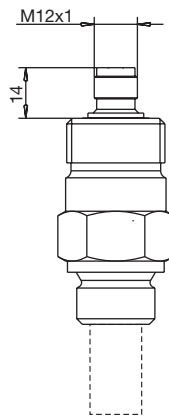
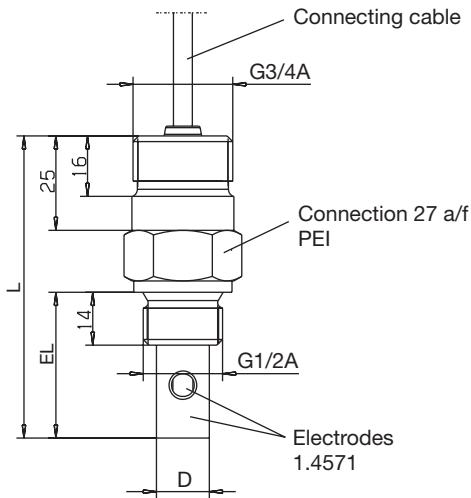
**JUMO BlackLine CR-EC**



**Type 202922/20-0100-1003-60-104-20-5000-040**  
 Cell constant K = 1.0

**Type 202922/20-... with M12 connector**

**Type 202922/20-0100-1003-60-144-20-5000-040**  
 Cell constant K = 1.0



**Type 202922/20-0010-1003-26-104-20-5000-040**  
 Cell constant K = 0.1  
**Type 202922/20-0001-1003-26-104-20-5000-063**  
 Cell constant K = 0.01

**Type 202922/20-... with M12 connector**

**Type 202922/20-0010-1003-60-144-20-5000-040**  
 Cell constant K = 0.1  
**Type 202922/20-0001-1003-26-144-20-5000-063**  
 Cell constant K = 0.01

Type	Fitting length EL mm	L mm	D mm
202922/20-0010-...	38.6	80	Ø 14
202922/20-0001-...	63	105	Ø 16

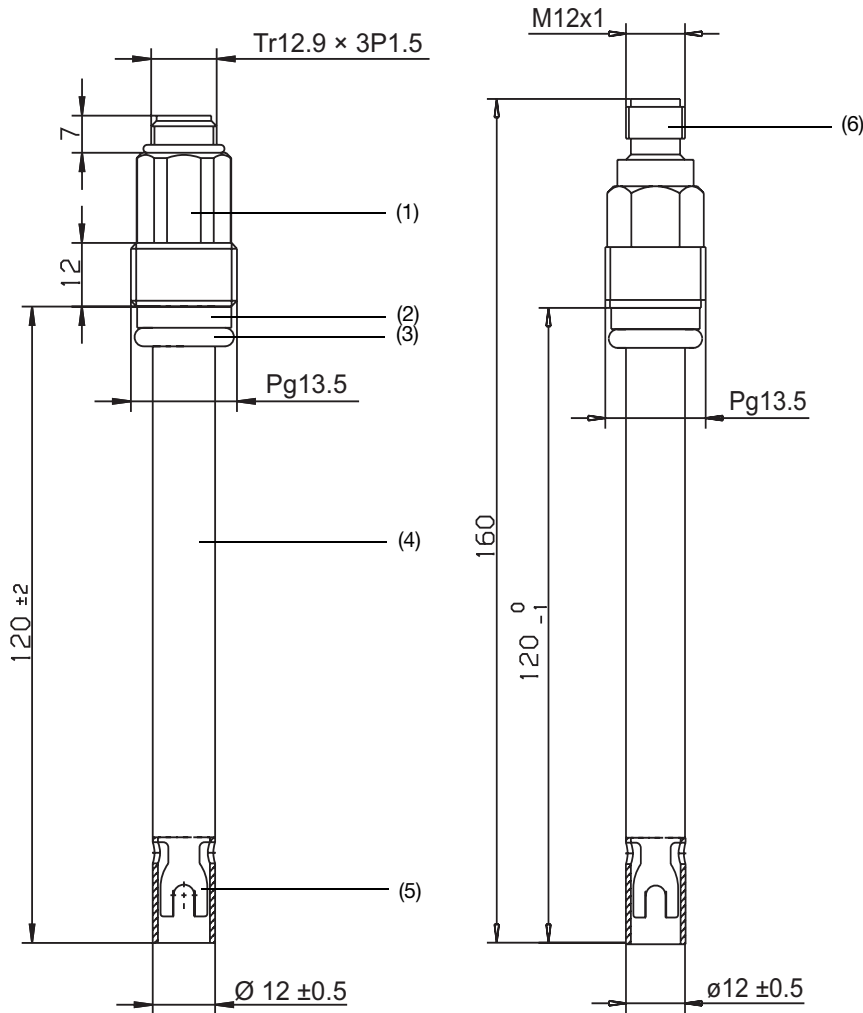
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**JUMO BlackLine CR-GS**



**Type 202922/30-...  
 threaded cap Pg13.5**

**Type 202922/30-...  
 threaded cap with M12 connector**

- 1 Electrode head, PC Ø 5 mm
- 4 Electrode shat, glass

- 2 Ring, PSU
- 5 Measuring surface, platinum

- 3 O-Ring 10 × 3.5, FPM
- 6 Built-in connector M12 × 1, 4-pole, 713 series

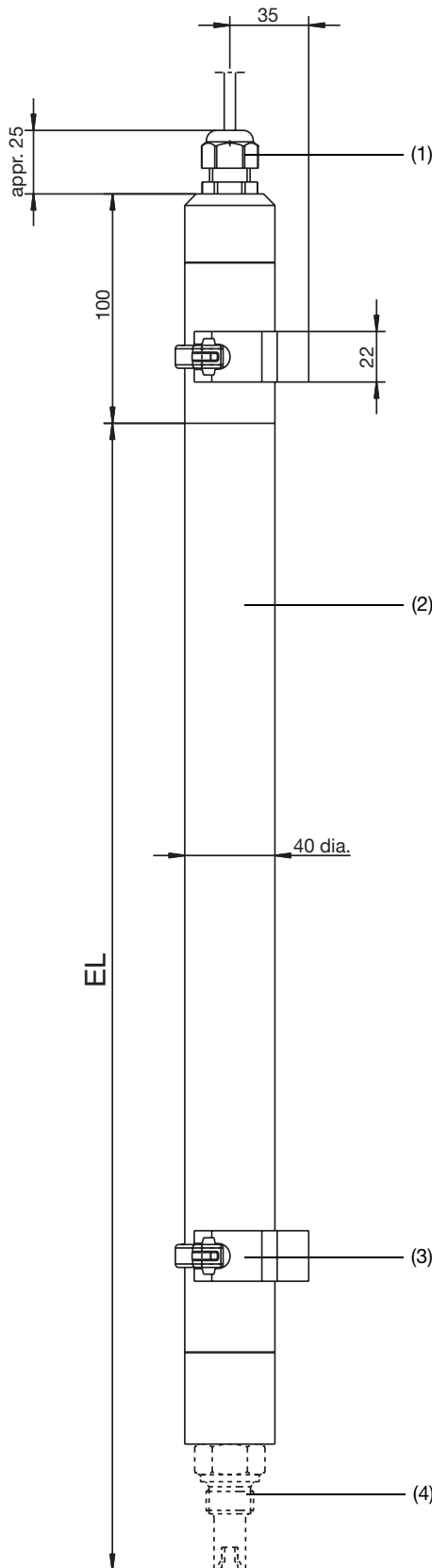
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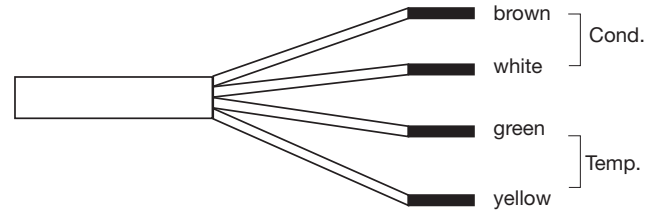


## Accessories for JUMO BlackLine CR-EC

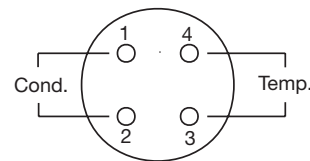


## Electrical connection

### Connection for cable



### Connection for M12 connector



EL Immersion length 500 mm or 1000 mm

- 1 Cable gland, protection class IP68 (up to 0.2 bar)
- 2 Protection tube
- 3 Pipe clip
- 4 Conductivity sensor JUMO BlackLine CR-EC



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**Stock items**

Type	Brief description	Sales No.
202922/10-0100-0000-84-413-20-5000-120	K = 1.0, without Pt100, attached cable, Pg13.5, 120 mm	00430769
202922/10-0100-1003-84-413-20-5000-120	K = 1.0, with Pt100, attached cable, Pg13.5, 120 mm	00430770
202922/20-0100-1003-60-104-20-5000-040	K = 1.0, with Pt100, attached cable, G 1/2A, 40 mm	00437646
202922/20-0100-1003-60-144-20-5000-040	K = 1.0, with Pt100, attached cable, 1/2"-14 NPT, 40 mm	00437647
202922/20-0010-1003-26-104-20-5000-040	K = 0.1, with Pt100, attached cable, G 1/2A, 40 mm	00418069
202922/20-0010-1003-26-144-20-5000-040	K = 0.1, with Pt100, attached cable, 1/2"-14 NPT, 40 mm	00441398
202922/20-0010-1003-26-104-83-0000-040	K = 0.1, with Pt100, M12 connector, G 1/2A, 40 mm	00457199
202922/20-0001-1003-26-104-20-5000-063	K = 0.01, with Pt100, attached cable, G 1/2A, 63 mm	00448986
202922/30-0100-0000-61-413-22-0000-120	K = 1.0, Pg13.5, 120 mm	00303396

**Non-stock items**

Type	Brief description	Sales No.
202922/10-0100-1003-84-413-83-0000-120	K = 1.0, with Pt100, M12 connector, Pg13.5, 120 mm	00442432
202922/20-0001-1003-26-104-83-5000-063	K = 0.01, with Pt100, M12 connector, G 1/2A, 63 mm	00457197

Other versions on request!

**Accessories for version with M12 connector**

Brief description	Sales No.
4-pole cable connector M12 × 1, 713 series, angled (supplied without cable), gold-plated contacts	00318906
25 m connecting cable, for self-assembly, 4-pole + screen	00303681
Connecting cable incl. (straight) M12 cable socket, length 10 m, 4-pole + screen	00458513
Connecting cable incl. (straight) M12 cable socket, length 25 m, 4-pole + screen	00458514

**Accessories for JUMO BlackLine CR-EC**

Brief description	Sales No.
Immersion fitting, EL = 500 mm	00452567
Immersion fitting, EL = 1000 mm	00452571
Retainer for CTI-500 sensor or immersion fitting with 40 mm diameter	00453191

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# JUMO ecoLine CR-PVC Conductive 2-Electrode Conductivity Sensor

## 202923 Series (former 2EL5... Series)

- 2-electrode principle
- proven versions for industrial application
- measuring ranges 0 — 1 mS/cm (K = 0.1) or 0.01 — 15 mS/cm (K = 1.0)
- temperature range up to 55 °C, maximum pressure 6 bar at 25 °C

### Brief description

Conductivity sensors in the 202923 series are used, for instance, in general water engineering, air conditioning and refrigeration, drinking and bathing water, and in industrial rinsing and process water circulation. The PVC body material restricts their application to media temperatures up to 55 °C. Two variants with the cell constants  $K = 0.1$  or  $1.0$  can be supplied. Versions with the popular thread sizes G 3/4" or G 1" as well as a pluggable style are available for installation. The pluggable version is appropriate for use, for instance, with suitable PVC tees in the nominal sizes DN 25, 32 and 40. It enables fast de-installation of the sensor for cleaning and maintenance. According to choice, the electrical connection is made either by a detachable connector or an attached cable.

The overall construction and the wetted components are physiologically harmless. Stainless steel ( $K = 0.1$ ) or special graphite ( $K = 1.0$ ) is used as the electrode material. The temperature probe, which can optionally be integrated, simultaneously acquires the temperature of the medium, for temperature compensation in connected instrumentation amplifiers.

#### Stainless steel variant $K = 0.1$

The sensor features 3 metallic pin electrodes. The two outer pins are electrically connected and form one pole of the 2-electrode conductivity sensor. The stainless steel pin in the middle is the counter electrode. This arrangement ensures highly accurate measurement with narrow stray fields. A temperature probe can be integrated into the middle pin.

#### Graphite variant $K = 1.0$

Physical requirements necessitate using a special graphite as electrode material for high conductance measurement. The two graphite electrodes are completely integrated in the electrode shaft. The optional temperature probe is housed in a stainless steel sleeve that is immersed in the solution under test.

### Principle of operation

The 202923 series conductivity sensors are 2-electrode conductivity sensors. An a.c. voltage is applied by means of a transmitter. The current flowing through the liquid and the electrodes is determined by the conductivity of the liquid.



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## Technical data

Cell constant <sup>a</sup>	K = 0.1 or K = 1.,0
Typical measuring ranges <sup>b</sup>	0 – 1,0 mS/cm (with K = 0.1) 0,01 – 15 mS/cm (with K = 1.0)
Temperature compensation	optionally with Pt100
Process connection	screw-in thread G 3/4A, G 1A, union nut DN 25 1 1/2" for PVC tees
Body material	PVC
Cell material	stainless steel 1.4571 with K = 0.1 graphite with K = 1.0
Operating temperature	up to +55 °C
Maximum pressure	6 bar at 25 °C
Electrical connection	instrument connector (Hirschmann) to DIN 43650, IP65 protection or 5 m attached cable, other cable lengths on request

a. Depending on the production conditions, the cell constant can deviate by  $\pm 10\%$  from the nominal value. This deviation can be compensated at the transmitter.

b. The measuring ranges also depend on the transmitter that is used.

When used for wider ranges than the "typical" ones, measurement errors caused by polarization may occur.

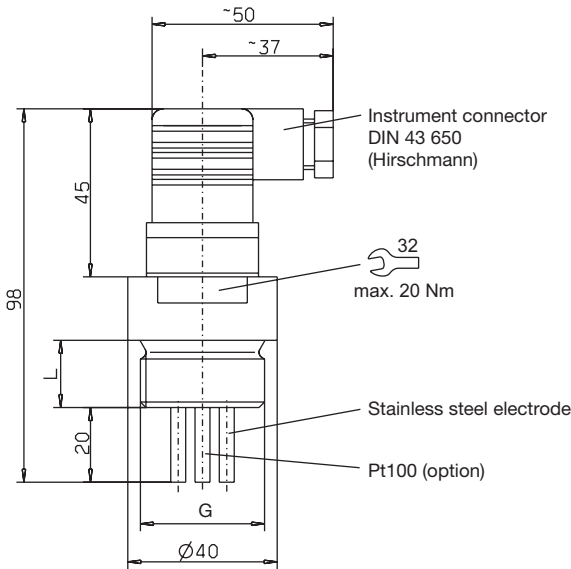
**JUMO GmbH & Co. KG**  
 Delivery address: Mackenrodtstraße 14  
 36039 Fulda, Germany  
 Postal address: 36035 Fulda, Germany  
 Phone: +49 661 6003-0  
 Fax: +49 661 6003-607  
 E-mail: mail@jumo.net  
 Internet: www.jumo.net

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 Fax: +44 1279 635262  
 E-mail: sales@jumo.co.uk  
 Internet: www.jumo.co.uk

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 1-800-554-JUMO  
 Fax: 315-697-5867  
 E-mail: info@jumo.us  
 Internet: www.jumo.us

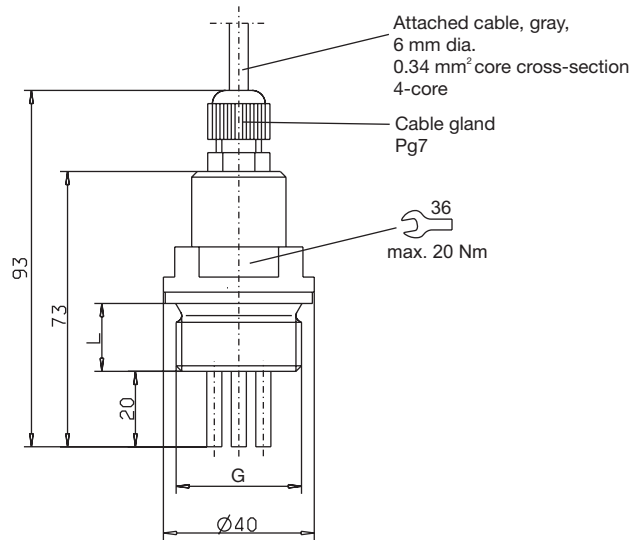


## Dimensions/installation options

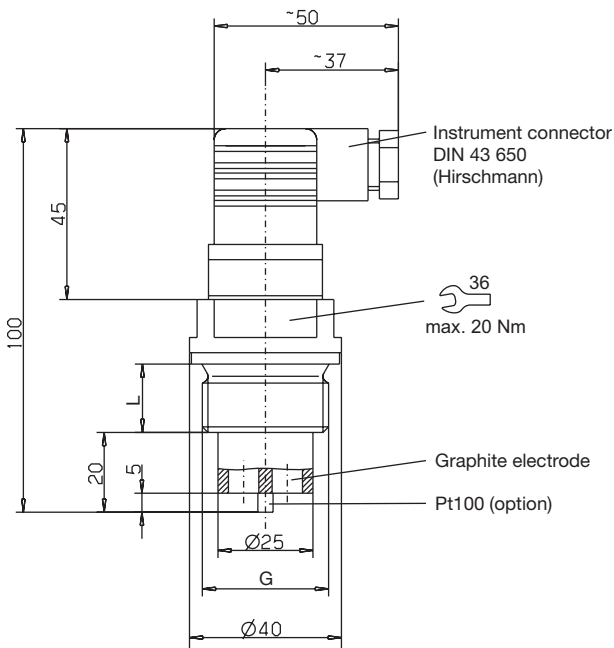


**Type 202923/0010-1003-xxx-37-86-26**  
 Cell constant K = 0.1

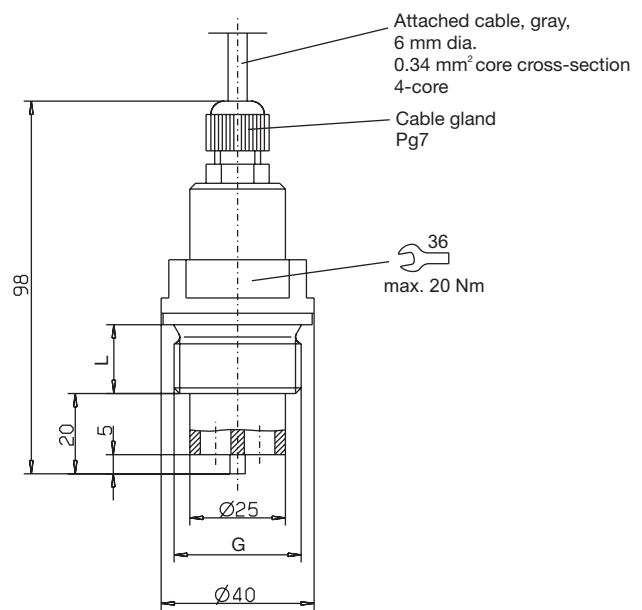
Process connection	G	L
-105	G 3/4	16
-106	G 1	18



**Type 202923/0010-1003-xxx-17-86-26**  
 Cell constant K = 0.1



**Type 202923/0100-1003-xxx-37-86-88**  
 Cell constant K = 1.0



**Type 202923/0100-1003-xxx-17-86-88**  
 Cell constant K = 1.0

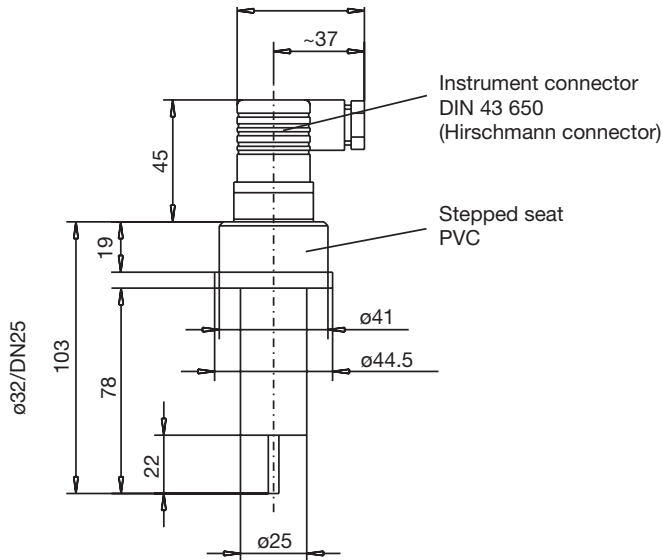
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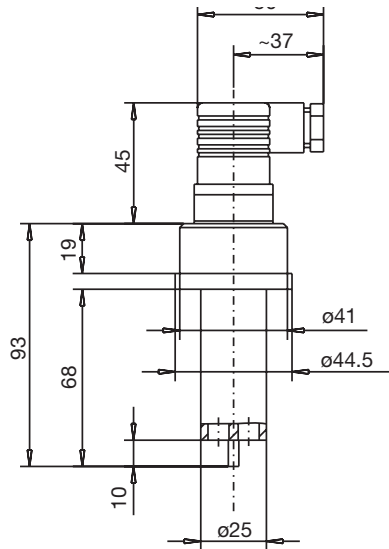
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**Pluggable version**

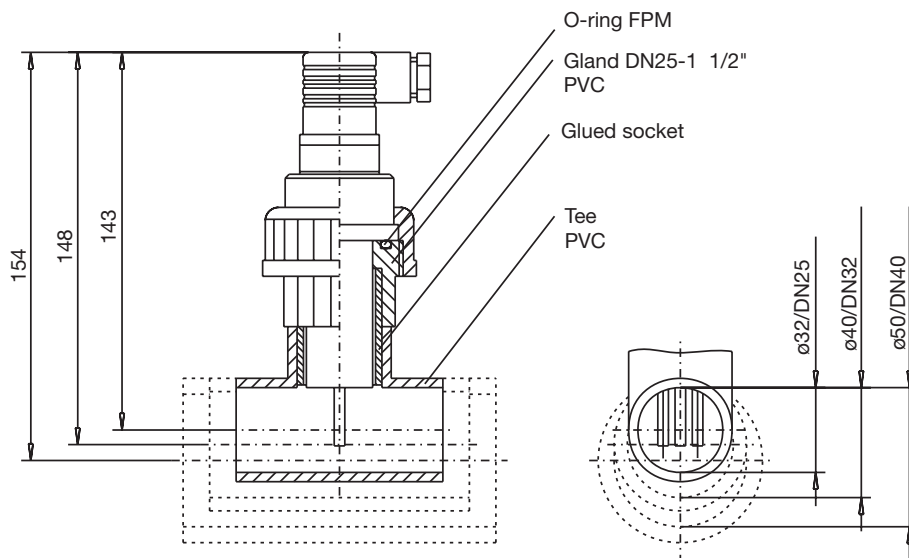


**Type 202923/0010-1003-687-37-86-26**  
 Cell constant K = 0.1  
 Note: supplied without union nut!



**Type 202923/0100-1003-687-37-86-84**  
 Cell constant K = 1.0  
 Note: supplied without union nut!

**Accessories for für pluggable version**



**Tee DN 25**  
**Tee DN 32**  
**Tee DN 40**

**JUMO GmbH & Co. KG**  
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## Electrical connection

Connection for	Connector	Attached cable
Outer electrode		white
Inner electrode	2	brown
Temperature com (option)	1 3	yellow green

## Order details

### (1) Basic type

202923 JUMO ecoLine CR-PVC - Conductive 2-Electrode Conductivity Sensor

### (2) Cell constant

0010 K = 0.1 (Messbereich 0 – 1.0 mS/cm)

0100 K = 1.0 (Messbereich 0.01 – 15 mS/cm)

### (3) Temperature sensor

0000 none

1003 Pt100

### (4) Process connection

687 stepped seat PVC Ø 32/DN 25 (supplied **without** union nut)

105 screw-in thread G 3/4"A

106 screw-in thread G 1"A

### (5) Electrical connection

17 attached cable with Pg gland, cable length 5 m

37 instrument connector to DIN 43650 (Hirschmann connector)

### (6) Body material

86 PVC

### (7) Cell material

26 stainless steel 1.4571

84 graphite

x = standard  
 o = optional  
 - = not possible

	(1)	(2)	(3)	(4)	(5)	(6)	(7)						
Order code	<input type="text"/>	/	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>		
Order example	202923	/	0010	-	1003	-	196	-	17	-	86	-	26

Additional versions on request!

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## Stock items

Type	Brief description	Sales No.
202923/0010-1003-105-37-86-26	K = 0,1/ Pt100/G 3/4A	00303793

## Non-stock items

Type	Brief description	Sales No.
202923/0010-1003-106-37-86-26	K = 0,1/Pt100/G 1A	00089411
202923/0010-1003-105-17-86-26	K = 0,1/ Pt100/G 3/4A/5 m attached cable	00319402
202923/0010-1003-106-17-86-26	K = 0,1/Pt100/G 1A/5 m attached cable	00402638
202923/0100-1003-105-37-86-84	K = 1,0/Pt100/G 3/4A	00437032
202923/0100-1003-106-37-86-84	K = 1,0/Pt100/G 1A	00409610
202923/0100-1003-687-17-86-84	K = 1,0/Pt100/stepped seat PVC/ 5 m attached cable	00437034

## Accessories

Brief description	Sales No.
for version with mit instrument connection	
Connecting cable 25 m (4-core + screen)	00303681
Connecting cable 50 m (4-core + screen)	00304181
for pluggable version	
PVC tee DN 25 (incl. union nut, O-ring, glued socket)	00437035
PVC tee DN 32 (incl. union nut, O-ring, glued socket)	00437037
PVC tee DN 40 (incl. union nut, O-ring, glued socket)	00437038

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# JUMO tecLine CR

## Electrolytic Conductivity Cells

### in stainless steel or titanium

#### 202924 Series (formerly 2 EL6... Series)

- 2-electrode system
- for ranges from 0.05  $\mu\text{S}/\text{cm}$  to 1  $\text{mS}/\text{cm}$
- large variety of process connections
- rugged construction
- version for pharmaceutical requirements can be supplied
- shaft diameter 16 mm (with version 202924/20-...)

#### Brief description

Conductivity cells are used in conjunction with conductivity transmitters for determining the electrolytic conductivity in liquids. The materials used for the cells are physiologically safe and conform to FDA requirements.

JUMO conductivity cells in the 202924 series can be used in areas such as: pure and high-purity water applications, pharmaceutical and chemical industries, food processing technology, chip manufacture, ion exchangers or reverse osmosis plants.

Conductivity cells that **meet pharmaceutical requirements** can be delivered with a surface roughness of  $<0.8\mu$ , if so requested. A standard factory test certificate to EN10 204-3.1B is included in the delivery. The electrodes are individually packed in film.

A special conductivity cell is available for **high-temperature applications**. This cell can be operated at media temperatures up to 200°C and a maximum pressure of 17 bar.

#### Principle of operation

The measuring cells in the 292924 series are 2-electrode cells. An a.c. voltage is applied through a transmitter. The current flowing through the liquid and the electrodes is determined by the conductivity of the liquid.



Type 202924/10-XXXX-1003-105-37-88-26



Type 202924/20-XXXX-1003-613-83-31-31



Type 202924/30-00XX-1005-997-83-31-31

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## Technical data

<b>Cell constant<sup>a</sup>:</b>	K = 0.01 cm <sup>-1</sup> or K = 0.1 cm <sup>-1</sup>
<b>Typical measuring ranges<sup>b</sup>:</b>	0.1 to 20 MΩcm or 0.05 to 10 μS/cm (for K = 0.01) or 1 μS to 1 mS/cm (for K = 0.1)
<b>Temperature compensation:</b>	with Pt100 or Pt1000 or 2× Pt100 (twin Pt100)
<b>Process connection:</b>	thread G 1/2, G 3/4", G 1", NPT 3/4, NPT1/2, milk cone DN 25, clamp DN 25, clamp DN 50
<b>Body material:</b>	PVDF (standard); stainless steel 1.4435 (optional), stainless steel 1.4571 (optional), stainless steel 1.4404 for high-temperature version, PEEK (optional)
<b>Cell material:</b>	stainless steel 1.4571 (standard), stainless steel 1.4435 (optional), stainless steel 1.4404 for high-temperature version, titanium (optional)
<b>Operating temperature:</b>	Type 202924/10: up to 135 °C; high-temperature version: up to 200 °C Type 202924/20: up to 135 °C Type 202924/30 ... 31: up to 135 °C (standard operation) Type 202924/30 ... 31: up to 150 °C (sterilization, max. 45 min.)
<b>Maximum pressure:</b>	Type 202924/10: 16 bar at 25 °C or 9 bar at 60 °C; high-temperature version: 40 bar at 25 °C or 17 bar at 200 °C Type 202924/20: 16 bar at 25 °C or 1 bar at 135 °C Type 202924/30 ... 31: 9 bar at 25 °C or 5 bar at 150 °C, max. 45 min.
<b>Optional certificates:</b>	factory certificate to EN 10204 2.1, EN 10204 2.2, EN 10204 3.1 (material, roughness)
<b>ASTM test certificate:</b>	determination of the precisely measured cell constant according to ASTM D1125-95 and ASTM D5391-99 (1-point calibration)
<b>FDA approved:</b>	the plastic materials used (insulator and O-rings) are FDA-listed

a. Depending on the production conditions, the cell constant can deviate by ±10 % from the nominal value. This deviation can be compensated at the transmitter.

b. The measuring ranges also depend on the transmitter used.

When used for wider ranges than the "typical" ones, measurement errors caused by polarization may occur.



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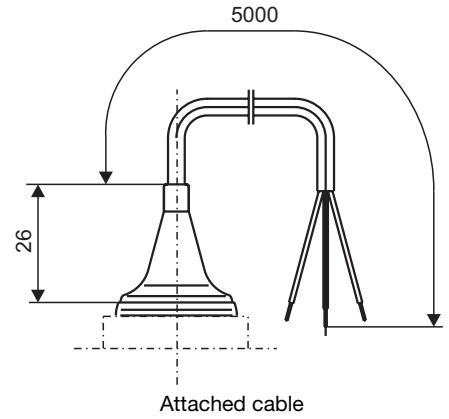
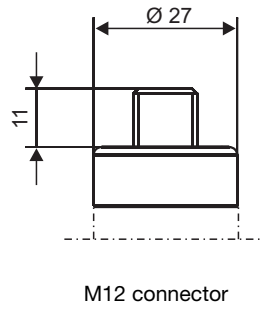
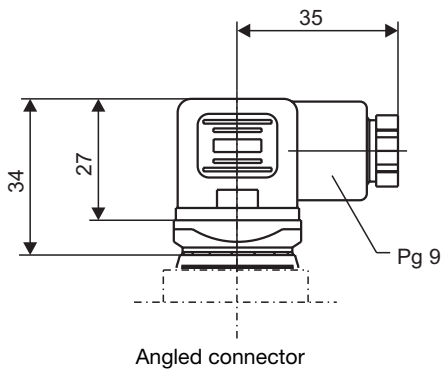
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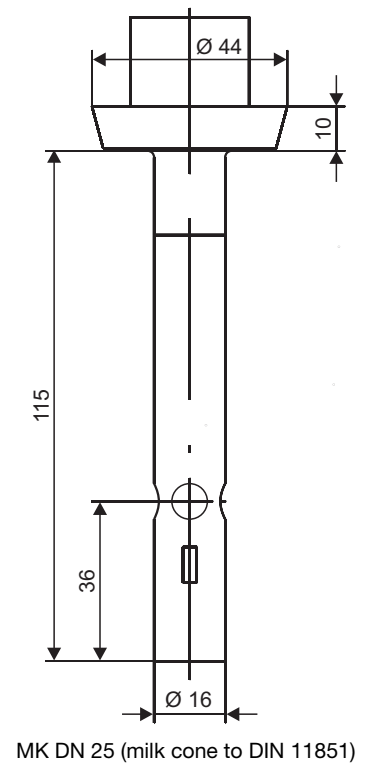
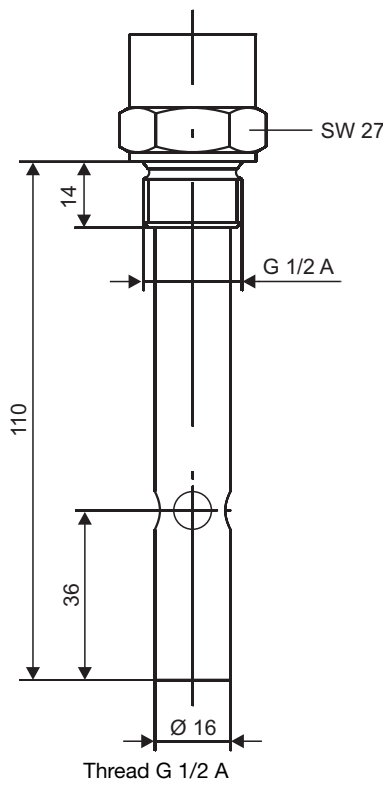
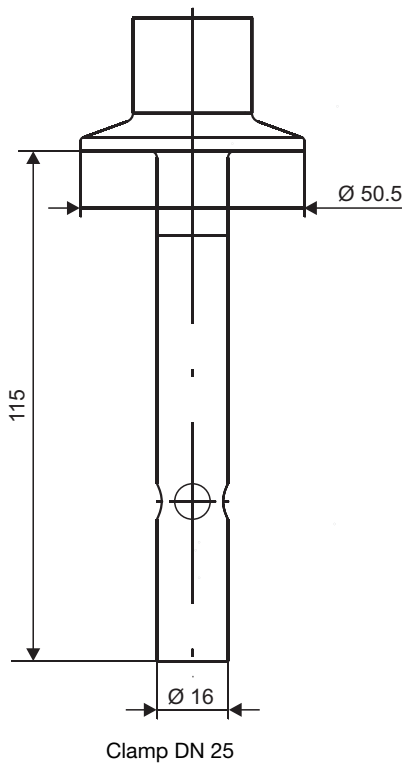
**Type 202924/20... (16 mm dia.)**

All process connections shown here can be combined w the electrical connections.

**Electrical connections**



**Process connections**



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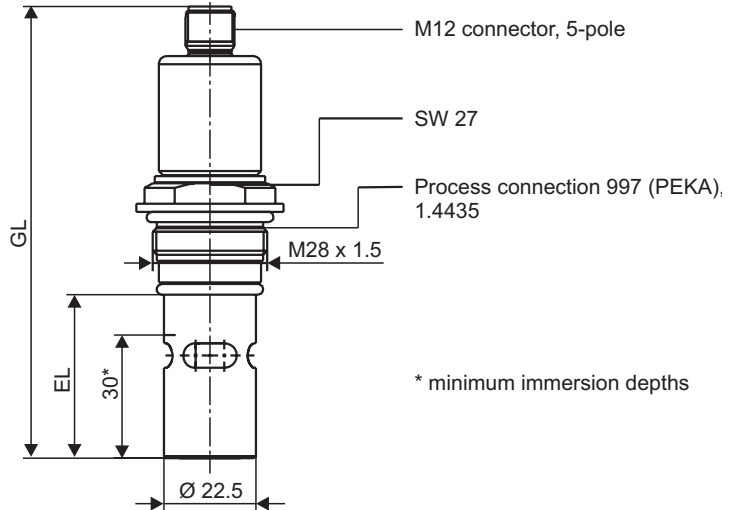


**Type 202924/30... and Type 202924/31...**

Choose the immersion length (EL) according to the installation situation

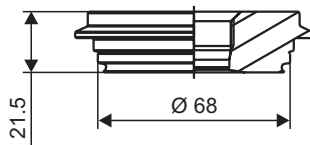
EL (fitting length)	Total length GL	Type
40	110	00562982
40	110	00562983
70	140	00562984
70	140	00562985

The customer must provide the tee shorts.

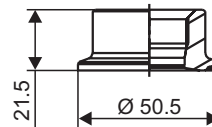


\* minimum immersion depths

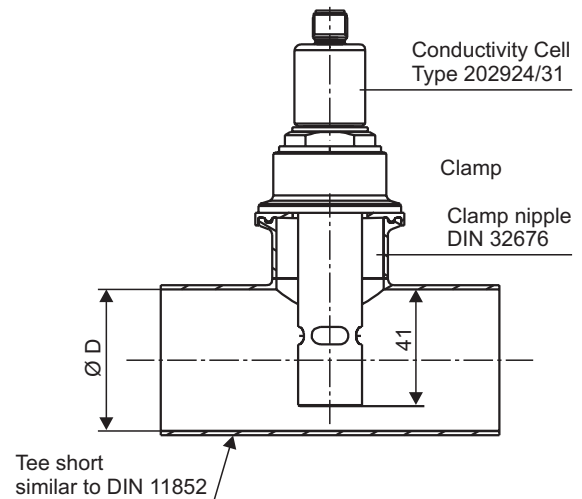
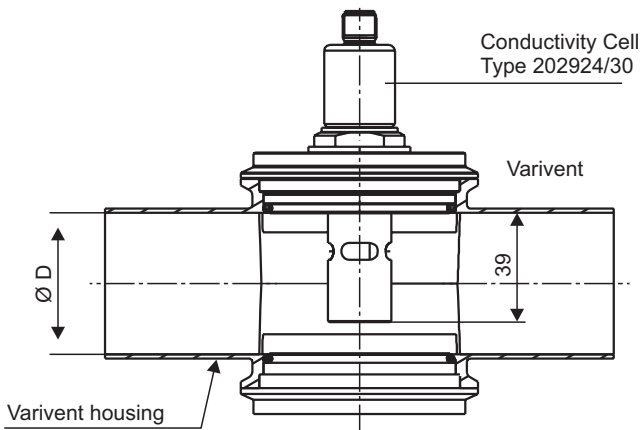
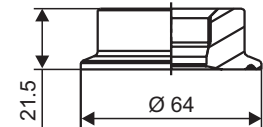
Varivent DN 50 - 150  
 TN 00577961



Clamp DN 25/32/40  
 TN 00577998



Clamp DN 50  
 TN 00577997



Case DN	ØD	Measuring cell type preferred	Measuring cell type alternatively
50	50	202924/30	nicht möglich
65	70		nicht möglich
80	81		202924/31
100	100		
125	125		
150	150		

Clamp nipple DN	Tee DN	ØD	Measuring cell type
25/32/40	50 - 25/32/40	50	202924/31
	65 - 25/32/40	70	
	80 - 25/32/40	81	
	100 - 25/32/40	100	
	125 - 25/32/40	125	
	150 - 25/32/40	150	
50	50 - 50	50	
	65 - 50	70	
	80 - 50	81	
	100 - 50	100	
	125 - 50	125	
	150 - 50	150	

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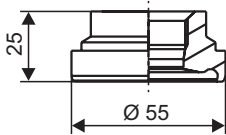
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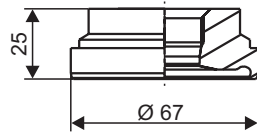


**Type 202924/31...**

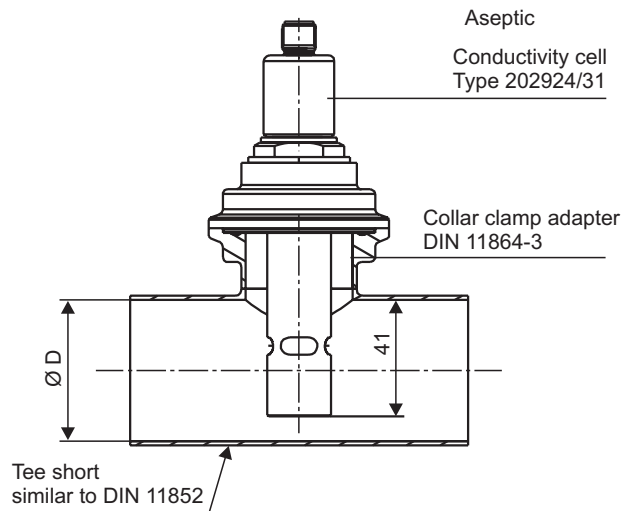
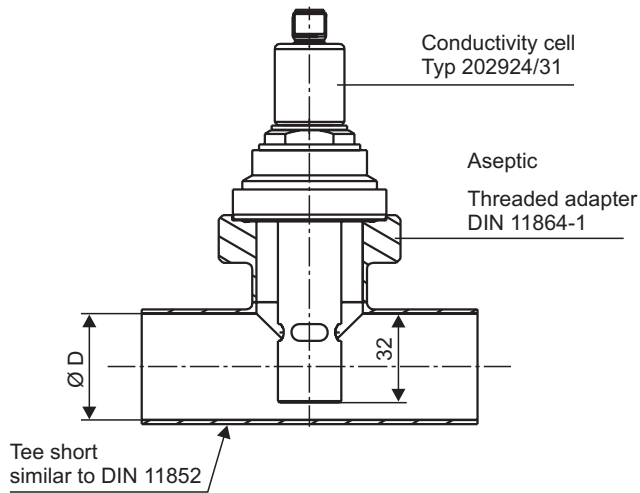
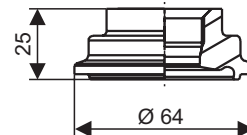
Aseptic DN 40  
 TN 00577995



Aseptic DN 50  
 TN 00577979



Aseptic DN 50  
 TN 00577979



Threaded adapter DN	Tee DN	ØD	Measuring cell type
40	40 - 40	38	202924/31
	50 - 40	50	
	65 - 40	70	
	80 - 40	81	
	100 - 40	100	
	125 - 40	125	
	150 - 40	150	
50	50 - 50	50	202924/31
	65 - 50	70	
	80 - 50	81	
	100 - 50	100	
	125 - 50	125	
	150 - 50	150	

Collar clamp adapter	Tee DN	ØD	Measuring cell type
NKS DN 40 Form A	50 - 40	50	202924/31
	65 - 40	70	
	80 - 40	81	
	100 - 40	100	
	125 - 40	125	
	150 - 40	150	

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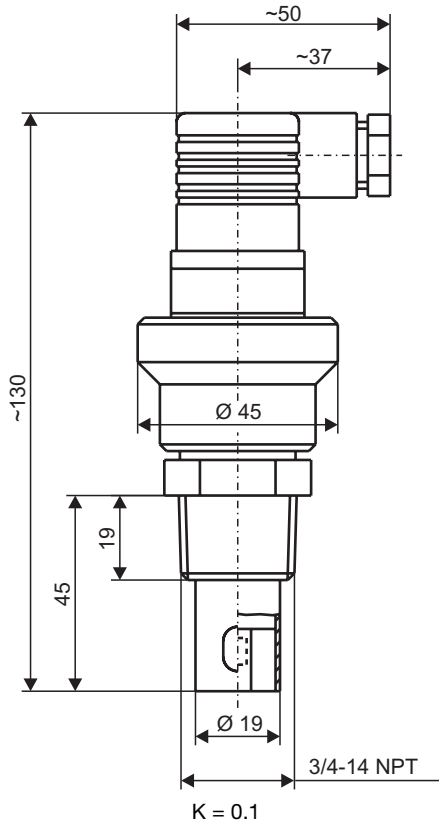
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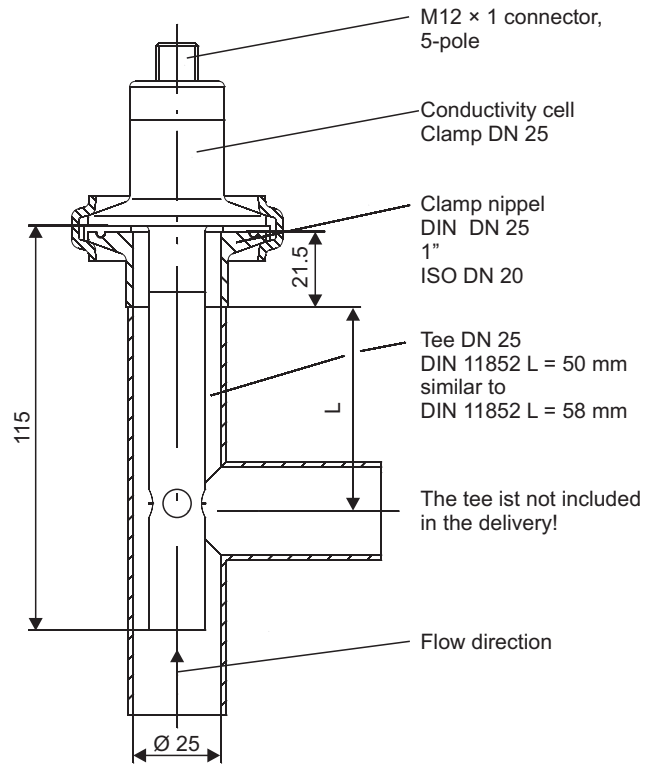


**Extra code 765 (high-temperature version)**

(only available for process connection 145 (3/4-14NPT))



**Installation example type 202924/20...**



**Elektrical connection**

Connection for	Connector	M12 connector	Attached cable
Outer electrode		1	white
Inner electrode	2	2	brown
Temperature compensation (optional)	1	3	yellow
	3	4	green
3-wire circuit		5	

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## Order details

(1) **Basic type**  
 202924 Conductivity cells

(2) **Basic type extensions**

10	JUMO tecLine CR-VA
20	JUMO tecLine CR-VA SL (16 mm dia.)
30	JUMO tecLine CR-PEKA S
31	JUMO tecLine CR-PEKA L

(3) **Cell constant**

x	x	x	x	0001	K = 0.01 (Messbereich 0.1 to 20 MΩcm or 0.05 to 10 μS/cm)
x	x	x	x	0010	K = 0.1 (Messbereich 1 μS to 1 mS/cm)

(4) **Temperature sensor**

o	o	0000	none
o	o	1003	Pt100
o	o	1005	Pt1000

(5) **Process connection**

o	o	104	thread G 1/2 A	
x		105	thread G 3/4 A	
o		106	thread G 1 A	
	o	144	1/2"-14 NPT	
o		145	3/4"-14 NPT	
o	o	604	taper connection DIN 11851-DN 25 (milk cone)	
o	x	613	clamp DN 25	
		x	997	JUMO-PEKA <sup>1</sup>

(6) **Elektrical connection**

o	o	17	attached cable connection, cable length 5 m
x		37	angled connector to DIN 43650
	x	83	M12 connector

(7) **Body material**

o		24	stainless steel 1.4404 only with extra code 765
o		26	stainless steel 1.4571
	x	31	stainless steel 1.4435 (similar to 316 L, pharmaceutical version)
x		88	PVDF (standard)

(8) **Cell material**

o		24	stainless steel 1.4404 only with extra code 765
x		26	stainless steel 1.4571 (standard)
	x	31	stainless steel 1.4435 (similar to 316 L, pharmaceutical version)
o		60	titanium <sup>2</sup>

(9) **Extra codes**

x	x	000	non
o		765	high-temperature version <sup>3</sup>

x = standard  
 o = optional  
 - = not possible

<b>Order code</b>	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Order example</b>	202924	/ 10	- 0010	- 1003	- 105	- 37	- 88	- 26	/ 000

**Note:**

The type code is a type designation, not a modular system.

If at all possible, please choose the items listed under "Stock items" or "Production items".

Any free combination of individual code features must be technically checked by us and released.

Please ask us in case of doubt.

<sup>1</sup> PEKA adapter must be ordered separately, see accessories

<sup>2</sup> only available with body material 88 (PVDF)

<sup>3</sup> only available with process connection 145 (3/4-14 NPT)

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## Stock items

Delivery: 3 working days after receipt of order

Order code	Brief description	Sales No.
202924/10-0010-0000-105-37-88-26/000	K = 0.1/G 3/4A	00300203
202924/10-0010-1003-105-37-88-26/000	K = 0.1/Pt100/G 3/4A	00300202
202924/10-0010-1003-104-37-88-26/000	K = 0.1/Pt100/G 1/2A	00338487
202924/10-0001-0000-105-37-88-26/000	K = 0.01/G 3/4A	00300204
202924/10-0001-1003-105-37-88-26/000	K = 0.01/Pt100/G 3/4A	00300079
202924/10-0001-1003-106-37-88-26/000	K = 0.01/Pt100/G 1A	00089393
202924/20-0010-1003-104-83-31-31/000	K = 0.1/Pt100/G 1/2A/Ø 16 mm	00456809
202924/20-0001-1003-104-83-31-31/000	K = 0.01/Pt100/G 1/2A/Ø 16 mm	00452527

## Stock items, pharmaceutical versions (incl. certificates)

Order code	Brief description	Sales No.
202924/10-0010-1003-613-37-31-31/000	K = 0.1/Pt100/class A/clamp DN 25 and body material 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00405886
202924/10-0001-1003-613-37-31-31/000	K = 0.01/Pt100/class A/clamp DN 25 and body material 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00420617
202924/20-0001-1003-613-83-31-31/000	K = 0.01/Pt100/class A/clamp DN 25 and body material 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00456810
202924/20-0010-1003-613-83-31-31/000	K = 0.1/Pt100/class A/clamp DN 25 and body material 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00456812
202924/30-0001-1005-997-83-31-31 <sup>a</sup>	K = 0.01/Pt1000/class A/JUMO PEKA/process connection 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00562982
202924/30-0010-1005-997-83-31-31 <sup>a</sup>	K = 0.1/Pt1000/class A/JUMO PEKA/process connection 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00562983
202924/31-0001-1005-997-83-31-31 <sup>a</sup>	K = 0.01/Pt1000/class A/JUMO PEKA/process connection 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00562984
202924/31-0010-1005-997-83-31-31 <sup>a</sup>	K = 0.1/Pt1000/class A/JUMO PEKA/process connection 1.4435/airtight film packaging/including ASTM test certificate, FDA approval for insulator and O-rings, 3.1 certificate for material and roughness < 0,8 µ	00562986

a. PEKA adapter must be ordered separately, see accessories

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## Production items

Delivery: 10 working days after receipt of order

Order code	Brief description	Sales No.
202924/10-0001-0000-105-37-26-26/000	K = 0.01/G 3/4A/process connection 1.4571	00353041
202924/10-0001-1003-604-37-88-26/000	K = 0.01/Pt100/milk cone	00089395
202924/10-0010-1003-106-37-88-26/000	K = 0.1/Pt100/G 1A	00089389
202924/10-0010-0000-105-37-26-26/000	K = 0.1/G 3/4A/process connection 1.4571	00350627
202924/10-0010-1003-613-37-26-26/000	K = 0.1/Pt100/clamp DN 25/process connection 1.4571	00322533

## Certifiable conductivity cells

Order code	Brief description	Sales No.
202924/10-0001-1003-105-37-88-26/000	certifiable version - certificates must be ordered separately	00392030
202924/10-0010-1003-105-37-88-26/000	certifiable version - certificates must be ordered separately	00392031

## Certificates (optional)

Type	Sales No.
Materials test certificate to EN 10204 3.1 (when ordering, please specify in plain text: "material" and/or "roughness")	00365727
ASTM test certificate for precisely measured cell constant (1-point calibration)	00359893
FDA approval for insulator and O-rings	00423913

## High-temperature version

Order code	Brief description	Sales No.
202924/10-0010-1003-145-37-24-24/765	K = 0.1/Pt100/NPT3/4-14	00397615

## Accessories

Type	Sales No.
Connection cable, length 25 m, for self-assembly, 4-pole + screen	00303681
Connection cable, length 50 m, for self-assembly, 4-pole + screen	00304181
Connection cable including M12 cable socket (straight), cable length 10 m, 4-pole + screen	00458513
Connection cable including M12 cable socket (straight), cable length 25 m, 4-pole + screen	00458514
Cable box M12 x 1, 4-pole, 713 series, angled (supplied without cable), gold-plated contacts	00318906
Process connection JUMO PEKA for Varivent DN 40 - 125, stainless steel 1.4435/316 L with APZ 3.1, Ra < 0,8 µ	00577961
Process connection JUMO PEKA for clamp DN 25/32/40, stainless steel 1.4435/316 L with APZ 3.1, Ra < 0,8 µ	00577998
Process connection JUMO PEKA for clamp DN 50, stainless steel 1.4435/316 L with APZ 3.1, Ra < 0,8 µ	00577997
Process connection JUMO PEKA for Aseptic DN 40, stainless steel 1.4435/316 L with APZ 3.1, Ra < 0,8 µ	00577995
Process connection JUMO PEKA for Aseptic DN 50, stainless steel 1.4435/316 L with APZ 3.1, Ra < 0,8 µ	00577979
Process connection JUMO PEKA for Aseptic NKS DN 40, stainless steel 1.4435/316 L with APZ 3.1, Ra < 0,8 µ	00577999

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# JUMO tecLine CR-GT

## Conductive 2-Electrode Conductivity Sensor Industrial Version with graphite electrodes

Series 202925 (former 2 EL6... Series)

- 2-electrode system
- cell constant  $K = 1.0, 3.0$  or  $10.0$
- for ranges up to  $200 \text{ mS/cm}$
- different process connections enable optimal adaption to process conditions

### Brief description

Conductivity sensors are used in conjunction with conductivity transmitters to determine the electrolytic conductivity of liquids.

JUMO 202925 Series conductivity sensors can be employed in areas such as:

- $K = 1.0/3.0$   
media separation, drinking water purification, wastewater checks/treatment
- $K = 10.0$   
wastewater checks/treatment, concentrate monitoring, domestic water treatment

The versions  $K = 3.0$  and  $K = 10.0$  are discontinued types and are only recommended for existing plants that need spare-parts.

When conductivity measurements are required in ranges above  $10 \text{ mS/cm}$ , we recommend use of the state-of-the-art 4-pole measuring technique or inductive conductivity measurement technology.

### Principle of operation

202925 Series conductivity cells are 2-electrode conductivity sensors. An a.c. voltage is applied through the transmitter. The current flowing through the liquid and the electrodes is determined by the conductivity of the liquid.



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**Technical data**

Cell constant <sup>a</sup>	K = 1.0 or K = 3.0 or K = 10.0
Typical measuring ranges <sup>b</sup>	10 µS/cm – 15 mS/cm (for K = 1.0) 0,1 – 30 mS/cm or 200 mS/cm (for K = 3.0 or 10.0)
Temperature compensation	with Pt100 or Pt1000
Process connection	standard: G 3/4A optional: G 1A oder NPT3/4-14 or taper connection DIN 11851 - DN 25 (milk cone)
Body material	PVDF for K = 1.0 and K = 3.0 PP for K = 10.0
Cell material	graphite/PES
Maximaler pressure	Cell constant K = 1.0: 16 bar at 25 °C or 9 bar at 60 °C; at 130 °C max. 1 bar Cell constant K = 3.0: 8 bar at 25 °C or 1 bar at 130 °C Cell constant K = 10.0: 6 bar at 25 °C or 1 bar at 80 °C
Maximale temperature	PVDF 130 °C PP 80 °C
Electrical connection	angled connector (Hirschmann connector) to DIN 43650, protected to IP65, 10 m fixed cable 10 m, other cable lengths on request

<sup>a</sup> Depending on the production conditions, the cell constant can deviate by  $\pm 10\%$  from the nominal value. This deviation can be compensated at the transmitter.

<sup>b</sup> The measuring ranges also depend on the transmitter used.

When used for wider ranges than the typical ones, measurement errors caused by polarization may occur.

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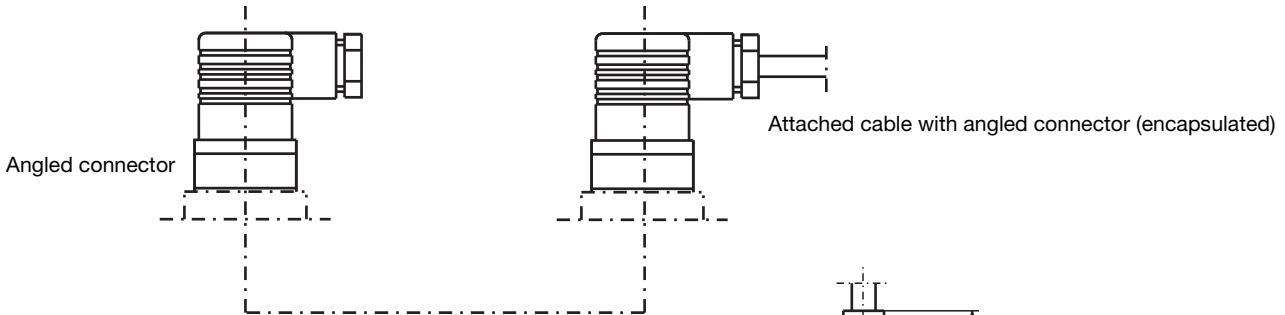
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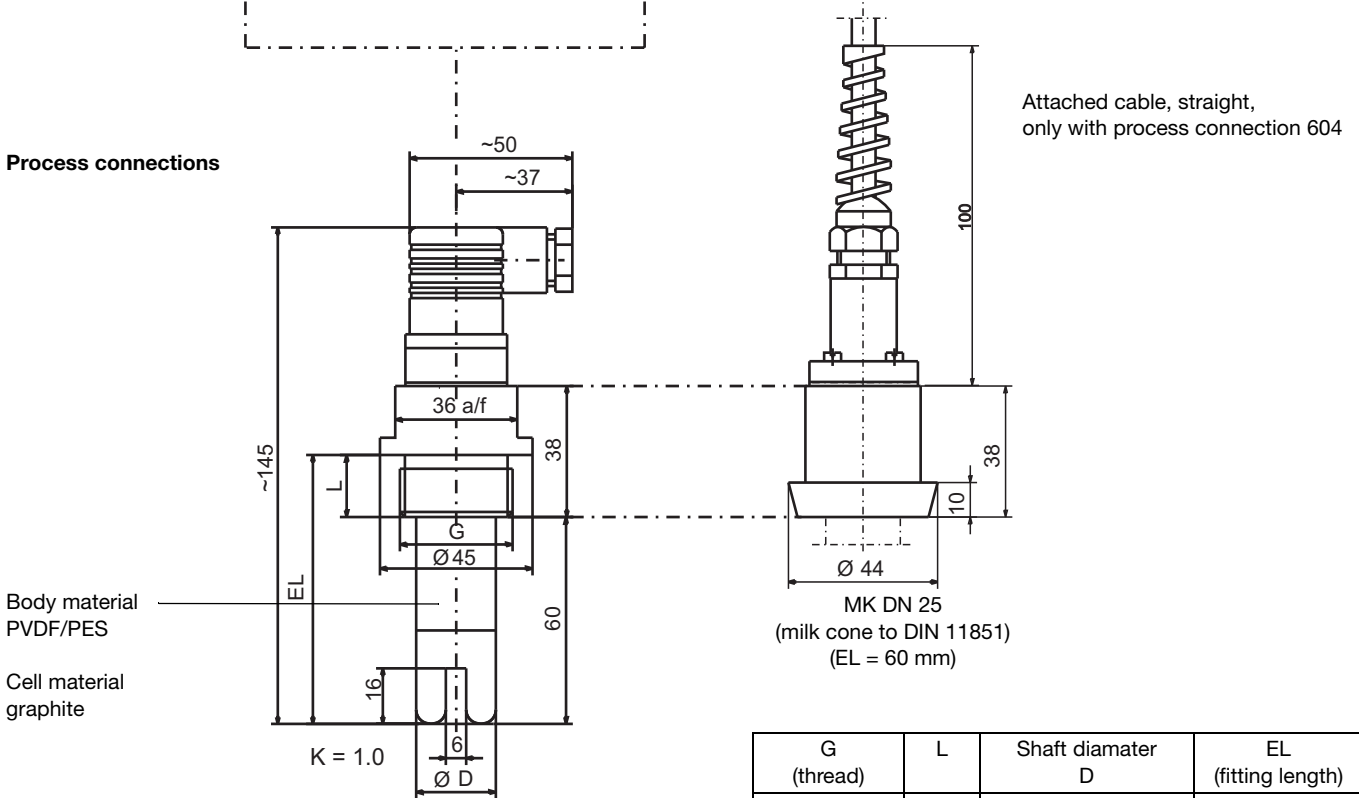


## Dimensions/overview of types

### Electrical connections

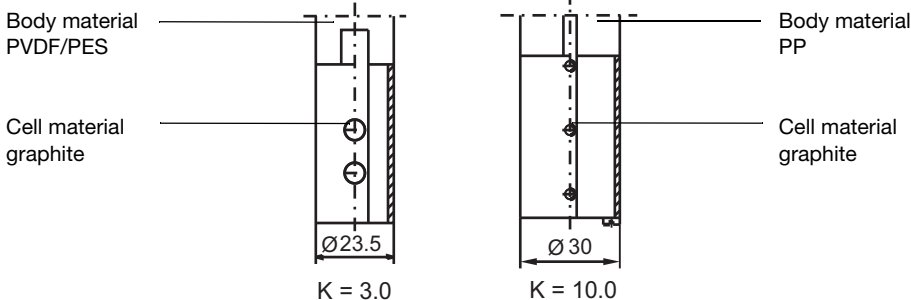


### Process connections



G (thread)	L	Shaft diameter D	EL (fitting length)
NPT3/4-14	20	23.5	80
G 1A <sup>a</sup>	18		78
G 3/4A	16		76

<sup>a</sup> with K = 10.0 shaft diameter is 30 mm



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## Electrical connection

Connection for	Connector	Attached cable
Outer electrode		white
Inner electrode	2	brown
Temperature compensation (option)	1 3	yellow green

## Order details

**(1) Basic type**  
 202925 JUMO tecLine CR-GT - Conductive 2-Electrode Conductivity Sensor with Graphite Electrodes

**(2) Cell constant**

0100 K = 1.0 (range 10 µS/cm – 15 mS/cm)  
 0300 K = 3.0 (range 0.1 mS/cm – 30 mS/cm)  
 1000 K = 10.0 (range 0.1 mS/cm – 200 mS/cm)

**(3) Temperature sensor**

x o o 0000 none  
 x o o 1003 Pt100  
 o - - 1005 Pt1000

**(4) Process connection**

x x - 105 thread G 3/4A  
 o o x 106 thread G 1A  
 o - - 145 3/4-14 NPT  
 o - - 604 taper connection DIN 11851 - DN 25 (milk cone)

**(5) Electrical connection**

x x x 37 angled connector to DIN 43650 (Hirschmann connector)  
 o o o 17 attached cable connection, cable length 10 m

**(6) Body material**

- - x 87 PP  
 x x - 88 PVDF (standard)

**(7) Cell material**

x x x 84 graphite (standard)

x = standard  
 o = optional  
 - = not available

**Order code**                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (7)  
 Order example            202925 / 0100 - 1003 - 105 - 37 - 88 - 84

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**Stock items**

Type	Brief description	Part no.
202925/0100-1003-105-37-88-84	K = 1.0/Pt100/G 3/4A	00300200
202925/0100-0000-105-37-88-84	K = 1.0/G 3/4A	00300201
202925/0100-1003-106-37-88-84	K = 1.0/Pt100/G 1A	00089385
202925/1000-1003-106-37-87-84	K = 10.0/Pt100/G 1A	00305206

**Non-stock-items**

Type	Brief description	Part no.
202925/0300-1003-105-37-88-84	K = 3.0/Pt100/G 3/4A	00089381



# JUMO tecLine CR-4P Conductive 4-Electrode Conductivity Sensor

## Brief description

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

Four-pin technology makes it possible to cover a very wide measuring range from about 1  $\mu\text{S}/\text{cm}$  to 600  $\text{mS}/\text{cm}$ , with just one conductivity sensor.

The hygienic design of the sensor and the EHEDG-certified 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 conductivity 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 conductivity sensor is available in three fitting lengths, for optimum installation in different pipe diameters. The conductivity 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 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.



Typ 202930  
 with JUMO PEKA adapters

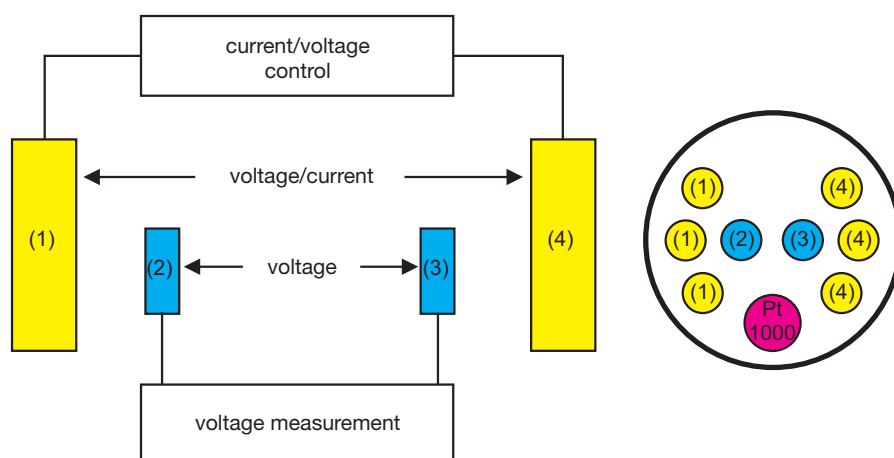
## Key features

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

## Function

The conductivity 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, in conjunction with the given current, to calculate the electrolytic conductivity value. Functionally, excitation and measurement are kept separate. This has some advantages compared to 2-electrode conductivity 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.

## Block diagram



## Approvals/marks of conformity (see Technical data)



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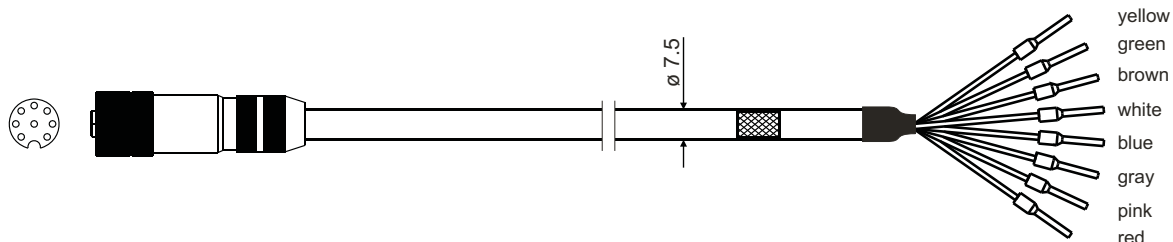
## Technical data

Typical measuring range <sup>a</sup>	1 µS/cm to approx. 600 mS/cm
Accuracy <sup>b</sup>	≤ 5 %
Cell constant <sup>c</sup>	typically, K = 0.3 - 0.4 cm <sup>-1</sup>
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 <sup>d</sup>	M12 connector
Enclosure protection	IP65
Fitting length	18 mm 38 mm 48 mm (see "Dimensions")
Materials in contact with the measuring medium	FDA compliant PEEK Stainless steel 1.4435 (316L) Stainless steel 1.4435 (316L) EPDM (other material on request)
Process connection	JUMO PEKA <sup>e</sup> (EHEDG-certified) Available process connection adapters: <ul style="list-style-type: none"> <li>• Varivent DN 40-125, stainless steel 1.4435 (316L)</li> <li>• Clamp DN 25/32/40 and DN50, stainless steel 1.4435 (316L)</li> <li>• Aseptic DN 40 and DN50, stainless steel 1.4435 (316L)</li> <li>• Aseptic NKS DN 40, stainless steel 1.4435 (316L)</li> </ul>
Sensor installation	Only possible in conjunction with JUMO PEKA adapters! <sup>e</sup>
Surface quality (roughness)	Stainless steel components ≤ 0.6 µm Plastic components ≤ 0.8 µm
Mark of conformity	The JUMO PEKA process connection is EHEDG-tested

- <sup>a</sup> Measuring ranges are also dependent on the transmitter being used.  
<sup>b</sup> Accuracy across the entire measuring range. It is possible to achieve considerably better accuracy by adjusting to the later working range.  
<sup>c</sup> See the nameplate for a measured cell constant. A cell constant deviation can be adjusted at the transmitter.  
<sup>d</sup> The CR-4P cable is required for connection (see Accessories)!  
<sup>e</sup> See data sheet 409711 and "Dimensions" on the following pages.

## Connecting cable (accessory)

JUMO CR-4P cable, type 202990/20-53-00-xx/000



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 oder 10 m <sup>a</sup>

<sup>a</sup> For metrological reasons, the maximum cable length is limited to 10 m!

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 Internet: www.jumo.co.uk

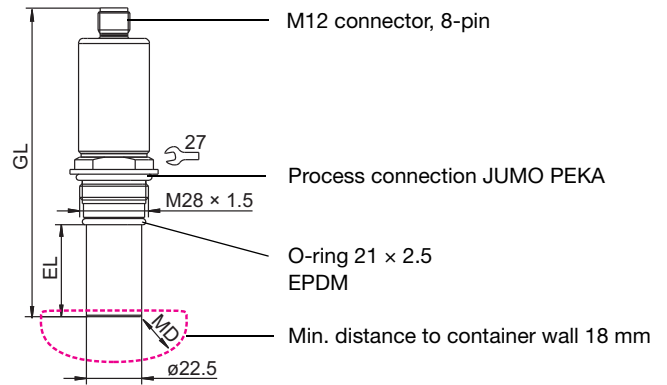
**JUMO Process Control, Inc.**  
 6733 Myers Road  
 East Syracuse, NY 13057, USA  
 Phone: 315-437-5866  
 1-800-554-5866  
 Fax: 315-437-5860  
 E-mail: info.us@jumo.net  
 Internet: www.jumousa.com



## Dimensions

Choose the immersion length (EL) according to the installation situation.

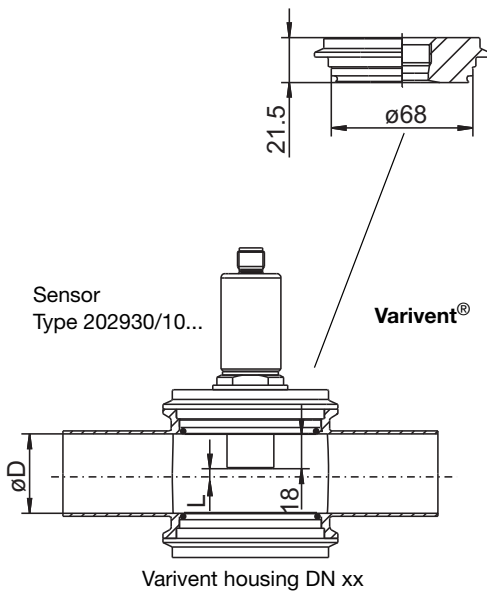
Immersion length EL	Total length GL	Type
18	126	202930/10
38	146	202930/20
48	156	202930/30



## Mounting suggestions

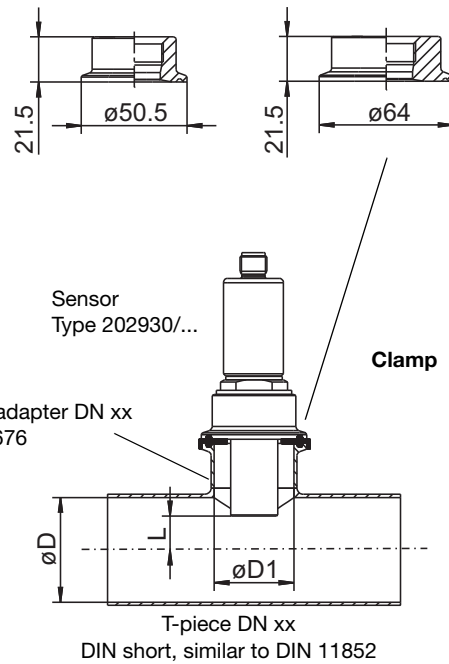
The customer must provide the T-pieces!

Process connection adapter JUMO PEKA  
 Varivent DN 40-125  
 Part no.: 00577961; Ra < 0.8 µm



Process connection adapter JUMO PEKA  
 Clamp DN 25/32/40  
 Part no.: 00577998; Ra < 0.8 µm

Clamp DN 50  
 Part no.: 00577997; Ra < 0.8 µm



Varivent housing DN	Ø D	L	Sensor Type
40	38	3	202930/10
50	50	9	
65	66	18	
80	81	24,5	
100	100	34	

Clamp adapter DN	T-piece DN	Ø D	Ø D1	L	Sensor Type
25	32-25	32 <sup>a</sup>	26	5	202930/20
	40-25	38 <sup>a</sup>		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	

<sup>a</sup> It is recommended to control the cell constant with the calibration procedure of the transmitter.

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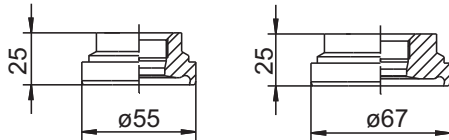
**JUMO Process Control, Inc.**  
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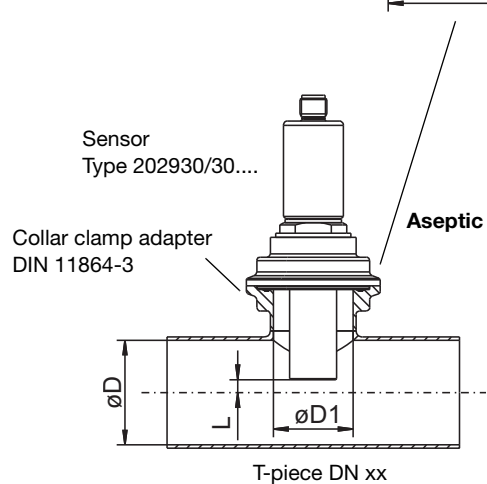
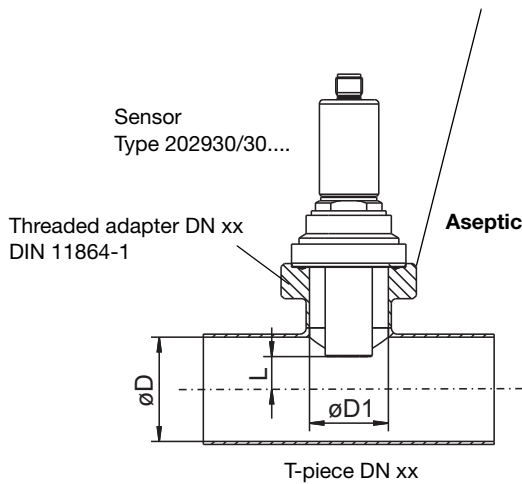
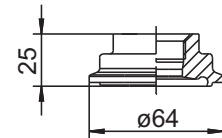
**Mounting suggestions**

The customer must provide the T-pieces!

Process connection adapter JUMO PEKA  
 Aseptic DN 40 Part no.: 00577995; R < 0.8 µm  
 Aseptic DN 50 Part no.: 00577979; Ra < 0.8 µm



Process connection adapter JUMO PEKA  
 Aseptic NKS DN 40 Part no.: 00577999; Ra < 0.8 µm



Threaded adapter DN	T-piece DN	Ø D	Ø D1	L	Sensor 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	

Collar clamp adapter DN	T-piece DN	Ø D	Ø D1	L	Sensor Type
NKS DN 40 Form A	50-40	50	38	3	202930/30
	65-40	66		13	
	80-40	81		25	
	100-40	100		35	

**Electrical connection**

Connection for		M12 sensor connection		CR-4P cable
		Pin	Assignment	Color
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				

**Warning:** The shielding of the cable has to be connected to the transmitter only – not to the sensor!

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**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<sup>a</sup>**

997 JUMO PEKA

**(6) Electrical connection<sup>b</sup>**

83 M12 connector

**(7) Extra code**

000 none

<sup>a</sup> Process connection adapters (see "Accessories") must be ordered separately!

<sup>b</sup> The CR-4P cable is required for electrical connection (see "Accessories")!

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

Other versions on request!

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## Stock versions

Type	Brief description	Part no.
202930/10-1005-31-997-83/000	4-Electrode Conductivity Sensor; short design	00531113
202930/20-1005-31-997-83/000	4-Electrode Conductivity Sensor; medium design	00531048
202930/30-1005-31-997-83/000	4-Electrode Conductivity Sensor; long design	00531114

## Accessories

Designation	Part no.
CR-4P cable, 5 m, made up, with M12 connector	00528699
CR-4P cable, 10 m, made up, with M12 connector	00528700

Process connection adapter JUMO PEKA for	Material	Part no.
Varivent DN 40-125	Stainless steel 1.4435/316L	00445046
Varivent DN 40-125	Stainless steel 1.4435/316L; Ra < 0.8 µm 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 µm 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 µm 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 µm 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 µm 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 µm with certificate EN 10204-3.1	00577999

# JUMO tecLine Ci

## Inductive conductivity and temperature sensor for hygienic applications

### Brief description

The sensor detects the electrolytic conductivity of a process liquid. The sensor uses the inductive principle of measurement. An integrated, fast-response (Pt1000) temperature probe detects the process temperature at the same time. The overall construction of the sensor conforms to EHEDG standards. The joint and gap-free design and the high quality of the finish meet the highest standards for hygienic processes. The quality of the PEEK (polyetheretherketone) body material is approved for food use. Certain versions can be supplied with an EHEDG certificate.

A vast number of process connections are available to ensure flexibility in systems, and can even be used as spare equipment for older instruments.

The sensor is primarily designed for use in food and drink installations. But where the body material is suitable, it can also be used in other industries. Customized variants (OEM versions) are available on request.

Because it measures inductively, the sensor is practically maintenance-free, compared with the conductive method; deposits and grease or oil film on the surface of the sensor have virtually no effect on measuring accuracy. The JUMO tecLine Ci sensor is designed for connection to the JUMO AQUIS 500 Ci transmitter, as per data sheet 202566.

### Typical areas of application:

Dairies, breweries, soft drinks manufacturing/bottling, mineral springs, drinking water, liquid food production, CIP/SIP systems, other rinsing and cleaning processes, measuring the concentration of acids, lyes and cleaning chemicals, etc.

### Product advantages:

- EHEDG-compliant sensor design enhances hygiene safety
- Materials are FDA/food-use approved
- A variety of process connection variants
- A fast-response, internal temperature sensor
- Constructed without seals (parts coming into contact with the medium)



Type 202941/10-686-...



Type 202941/10-607-...

## Approvals/marks of conformity





## Technical data

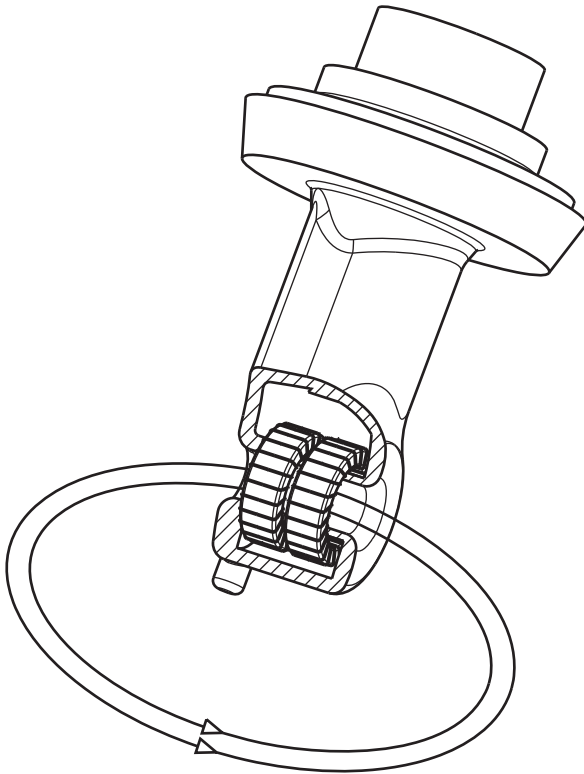
<b>Conductivity measurement principle</b>	Inductive
<b>Conductivity measuring range</b>	0 - 500 µS/cm to 0 - 2000 mS/cm (depending on connected transmitter)
<b>Conductivity accuracy</b> for measuring range:	
0 - 500 µS/cm	≤ 1%
0 - 1000 µS/cm	≤ 1%
0 - 2000 µS/cm	≤ 0.5%
0 - 10 mS/cm	≤ 0.5%
0 - 20 mS/cm	≤ 0.5%
0 - 50 mS/cm	≤ 0.5%
0 - 100 mS/cm	≤ 0.5%
0 - 200 mS/cm	≤ 0.5%
0 - 100 mS/cm	≤ 0.5%
0 - 500 mS/cm	≤ 0.5%
0 - 1000 mS/cm	≤ 1%
0 - 2000 mS/cm	≤ 1%
<b>Cell constant</b>	dependent on design: k = 5.0 1/cm or k = 5.15 1/cm
<b>Temperature sensor</b>	Pt1000, Class A
<b>t<sub>90</sub> temperature<sup>1</sup></b>	≤ 26 s
<b>Permissible ambient temperature</b>	-10 to +60°C
<b>Permissible storage temperature</b>	-20 to +75°C
<b>Enclosure protection<sup>2</sup></b>	IP67
<b>Permissible medium temperature<sup>3</sup></b> In operation For short periods (sterilization)	-10 to +125°C ≤ 150°C (≤ 60 min, ≤ 5 bar)
<b>Permissible process pressure<sup>3</sup></b> at +20°C at +80°C at +125°C at +150°C at -10 to +150°C	12 bar 10 bar 8 bar 5 bar (≤ 60 min) min. -0.1 bar
<b>Sensor material</b> in contact with medium not in contact with medium	dependent on design: PEEK, 1.4301 stainless steel, AISI 304, EPDM dependent on design: 1.4301 stainless steel, AISI 304, PA6.6 GF30, PUR, FPM, CuZn
<b>Process connection</b>	see order details / dimensions
<b>Electrical connection</b>  Connection type Socket Socket material Cable material Cable lengths Permissible temperature	JUMO tecLine Ci type conductivity sensors are suitable for connection to JUMO AQUIS 500 Ci type inductive conductivity transmitters/controllers! fixed connection cable M12 socket CuZn, PA6.6 GF30, PUR outer sleeve: PUR 5 m; 10 m (standard); 15 m; 20 m; 25 m; 30 m (no other lengths available) -20 to +75°C
<b>Approvals/marks of conformity</b>	EHEDG (for type 202941/10-686-...)

<sup>1</sup> EN 60751

<sup>2</sup> EN 60529

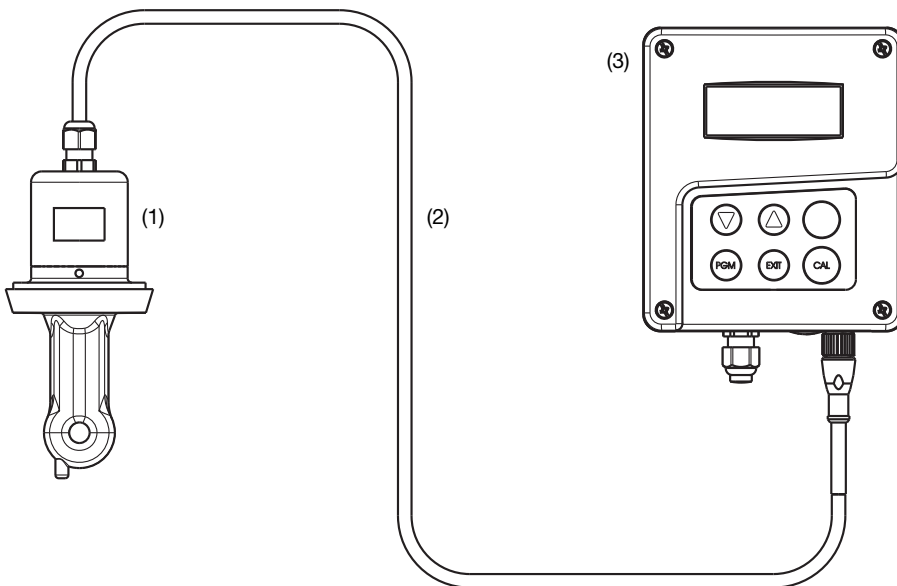
<sup>3</sup> Note: Temperature, pressure and sample medium affect the life of the cell!

## Principle of measurement



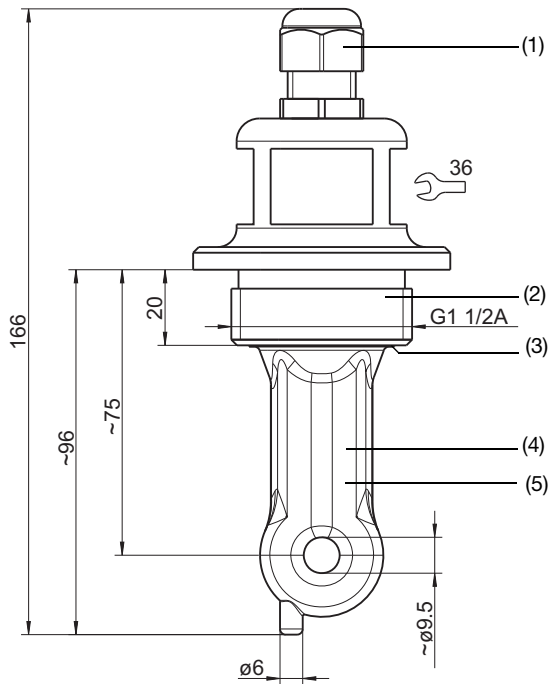
Conductivity is measured by an inductive probe. Sinusoidal AC voltage supplies the transmitter coil. Current is induced in the receiver coil, subject to the conductivity of the liquid to be measured. The current is proportional to the conductivity of the medium. The cell constant of the inductive probe depends on the geometry. The cell constant can also be affected by the parts in close proximity to it. Use the "installation factor" parameter on the transmitter to correct this effect.

## Measurement section setup

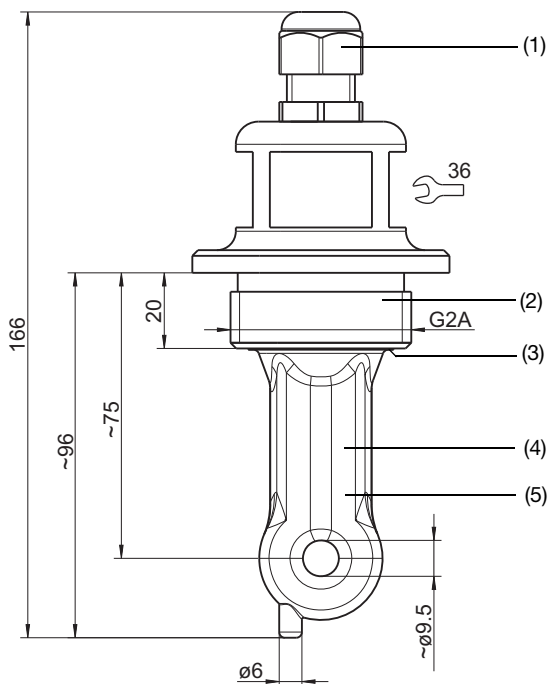


- (1) JUMO tecLine Ci, hygienic inductive conductivity and temperature sensor
- (2) Cable (JUMO tecLine Ci component)
- (3) JUMO AQUIS 500 Ci, transmitter/controller for conductivity, concentration and temperature

## Dimensions

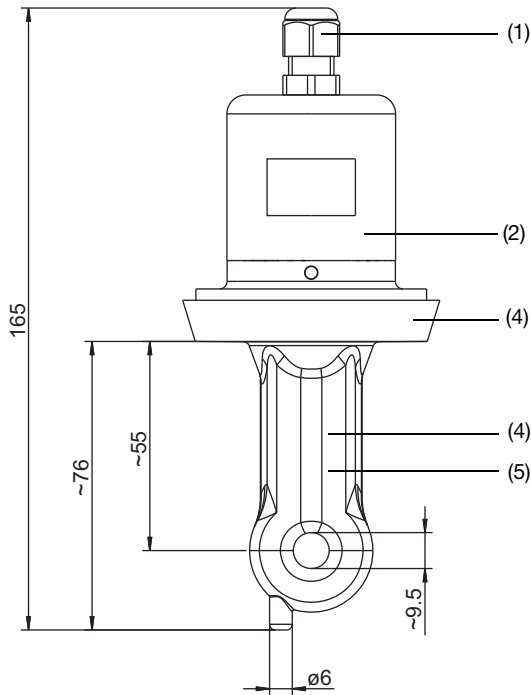


**Type 202941/10-108-...**  
**G1 1/2" thread**

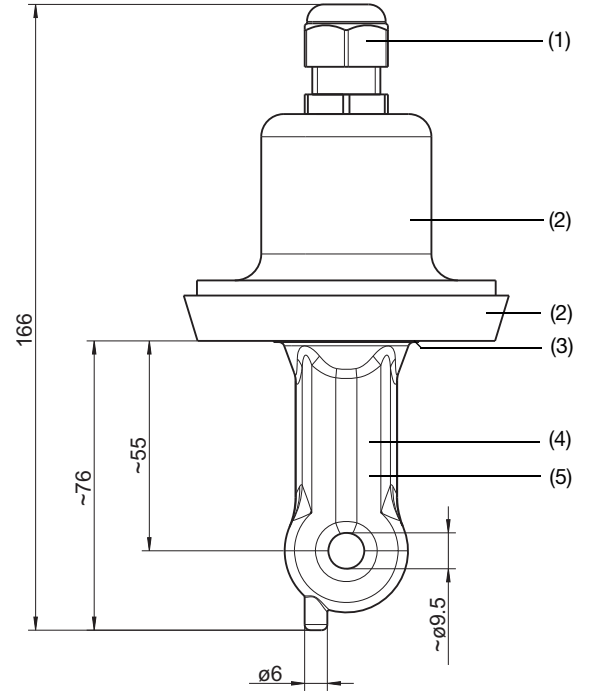


**Type 202941/10-110-...**  
**G2 thread**

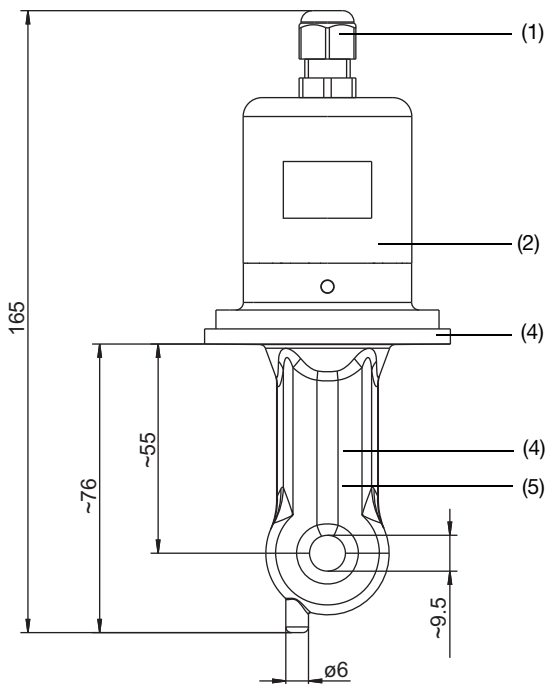
- (1) PA6, CR, NBR
- (2) 1.4301 stainless steel, AISI 304
- (3) EPDM
- (4) PEEK
- (5) Cell constant  $k = 5.0^{1/cm}$



**Type 202941/10-607-...  
 MK DN50 milk cone**



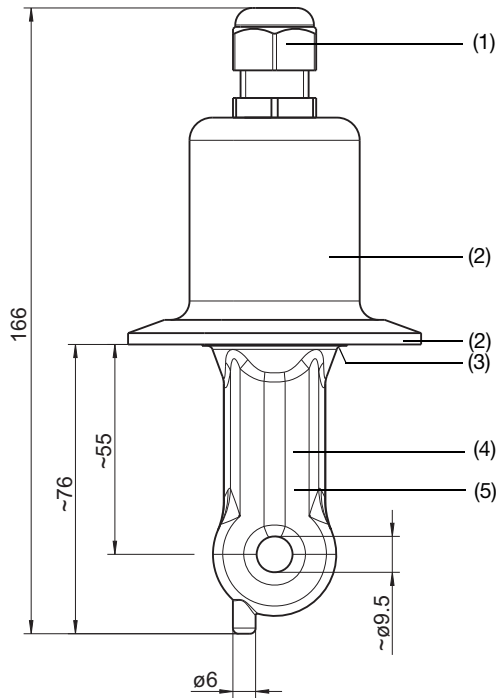
**Type 202941/10-608-...  
 MK DN65 milk cone**



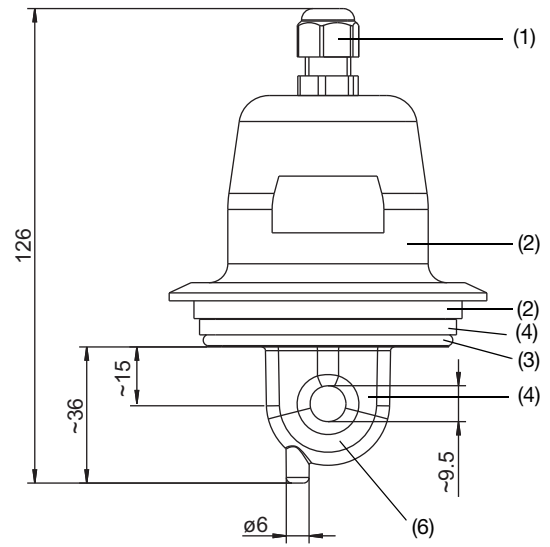
**Type 202941/10-690-...  
 2" SMS**

**(Union nut (🔧) < 200Nm) not included in delivery)**

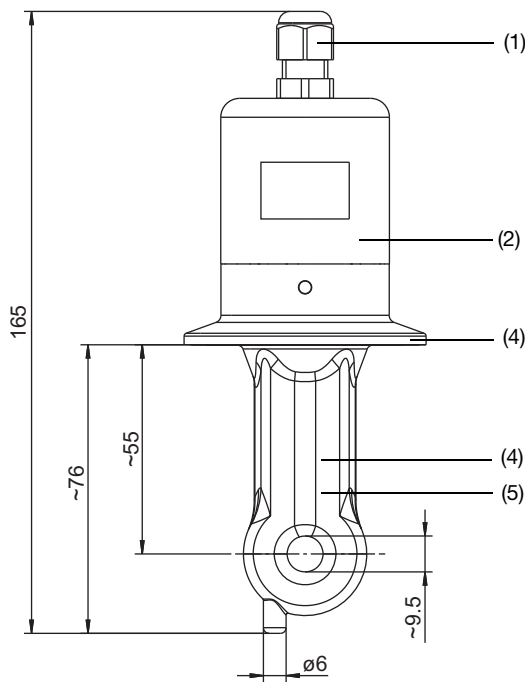
- (1) PA6, CR, NBR
- (2) 1.4301 stainless steel, AISI 304
- (3) EPDM
- (4) PEEK
- (5) Cell constant  $k = 5.0^{1/cm}$



Type 202941/10-617-...  
 2 1/2" clamp



Type 202941/10-686-...  
 DN40/125 Varivent®



Type 202941/10-616-...  
 2" clamp

- (1) PA6, CR, NBR
- (2) 1.4301 stainless steel, AISI 304
- (3) EPDM
- (4) PEEK
- (5) Cell constant  $k = 5.0^{1/cm}$
- (6) Cell constant  $k = 5.15^{1/cm}$



**Order details:**

**JUMO tecLine Ci  
 Hygienic inductive conductivity and temperature sensor**

**(1) Basic type**

202941 JUMO tecLine Ci

**(2) Basic type extension**

10 Hygienic design, internal Pt1000 temperature sensor

**(3) Process connection**

- 108 G1 1/2" thread
- 110 G2" thread
- 607 MK DN50 milk cone<sup>1, 4</sup>
- 608 MK DN65 milk cone<sup>1, 4</sup>
- 616 2" clamp<sup>2, 3, 4</sup>
- 617 2 1/2" clamp<sup>2, 4</sup>
- 686 DN40/125 Varivent<sup>®</sup> (hygienic version)<sup>4</sup>
- 690 2" SMS<sup>4</sup>

**(4) Immersion length**

0000 none

**(5) Electrical connection**

21 M12 socket on fixed cable

**(6) Length of fixed cable**

- 10 10 m (standard length)
- 20 20 m
- 30 30 m

**(6) Extra codes**

000 none

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
<b>Order code</b>		/		-		-		-		-		/	...
<b>Order example</b>	202941	/	10	-	607	-	0000	-	21	-	10	/	000

<sup>a</sup> DIN 11851  
<sup>b</sup> ISO 2852  
<sup>c</sup> DIN 32676  
<sup>d</sup> Installation material (ring nut, retaining clamp, etc.) not included in delivery!

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## Stock versions (delivery 3 working days after receipt of order)

Type	Designation	Sales No.
202941/10-108-0000-21-10/000	JUMO tecLine Ci, G1 1/2" thread, 10 m fixed cable	20/00544059
202941/10-110-0000-21-10/000	JUMO tecLine Ci, G2" thread, 10 m fixed cable	20/00544060
202941/10-607-0000-21-10/000	JUMO tecLine Ci, MK DN50 milk cone, 10 m fixed cable	20/00543048
202941/10-617-0000-21-10/000	JUMO tecLine Ci, 2 1/2" clamp, 10 m fixed cable	20/00544062
202941/10-686-0000-21-10/000	JUMO tecLine Ci, DN40/125 Varivent <sup>®</sup> , 10 m fixed cable	20/00544063
202941/10-690-0000-21-10/000	JUMO tecLine Ci, 2" SMS, 10 m fixed cable	20/00544064

## Accessories (delivery 3 working days after receipt of order)

Designation	Sales No.
Weld-on threaded adapter DN50, DIN 11 851 (mating component for process connection -607), (PG 209791)	20/00085020
Ring nut DN50, DIN 11 851 (PG 209791)	20/00343368
Ring nut DN65 DIN 11 851 (PG 209791)	20/00362956
Ring nut SMS DN2" (PG 209791)	20/00345162
Calibration adapter for inductive conductivity measurement, type 202711/21 (PG 202711)	20/00543395

## Note

The following are required for the initial commissioning of the sensor and transmitter/controller or when replacing components:

- Transmitter/controller e. g. JUMO AQUIS 500 Ci, data sheet 202566
- JUMO tecLine Ci inductive conductivity and temperature sensor
- Calibration adapter for inductive conductivity measurement, type 202711/21, data sheet 202711

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# JUMO tecLine Ci-S

## Inductive conductivity and temperature sensor for general process engineering

### Brief description

The sensor detects the electrolytic conductivity of a process liquid. The sensor uses the inductive principle of measurement. An integrated (Pt1000) temperature sensor acquires the process temperature at the same time.

The sensors in this data sheet add some generally established variants in different engineering versions to the wide range of inductive JUMO conductivity sensors. The variants are made from different materials (PVDF or PEEK) and have different sensor geometries.

PEEK sensors with process connections /955 and /956 are installed in the process via process adapters (e.g. clamp, SMS, milk cone) using a sealing cone system. The really small design also allows them to be used in small cross-section pipes.

The PVDF variants have a larger sensor body and a choice of an exposed temperature sensor (in a stainless steel pocket) or an internal temperature sensor. The PVDF versions are used when it is not possible to use other measuring cell materials for chemical reasons.

All the sensors are made from hygienically safe materials and have proved to be reliable in typical food and drinks industry cleaning processes (e.g. CIP).

A vast number of process connections are available to ensure flexibility in systems, and can even be used as spare equipment for older instruments. There is an immersion variant that can be used in open tanks and channels.

Because it measures inductively, the sensor is practically maintenance-free, compared with the conductive method; deposits and grease or oil film on the surface of the sensor have virtually no effect on measuring accuracy.

JUMO tecLine Ci-S sensors are designed for connection to the JUMO AQUIS 500 Ci transmitter, as per data sheet 202566.

### Typical areas of application:

Liquid foodstuffs, CIP/SIP systems, other rinsing and cleaning processes, measuring the concentration of acids, lyes and cleaning chemicals, etc.

### Product advantages:

- Different mounting dimensions allow a variety of applications
- Materials are FDA/food-use approved
- Numerous process connection variants
- Fast-response temperature sensor
- Different body materials, depending on the requirement



Type 202942/10-690-...



Type 202942/20-955-...

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## Technical data

Type	202942/10-...	202942/20-...
<b>Conductivity measurement principle</b>	Inductive	
<b>Conductivity measuring range</b>	0 - 1000 µS/cm to 0 - 2000 mS/cm (depending on connected transmitter)	
<b>Conductivity accuracy</b> for measuring range:		
0 - 1 mS/cm	≤ 1%	
0 - 10 mS/cm	≤ 0.5%	
0 - 100 mS/cm	≤ 0.5%	
0 - 1000 mS/cm	≤ 1%	
0 - 2000 mS/cm	≤ 1%	
<b>Cell constant</b>	k = 5.45 1/cm	k = 6.1 1/cm (for process connection 955) k = 6.0 1/cm (for process connection 956)
<b>Temperature sensor</b>	Pt1000, Class A	
<b>t<sub>90</sub> temperature<sup>1</sup></b>	≤ 6 s	≤ 36 s
<b>Permissible ambient temperature</b>	-10 to +60°C	-10 to +60°C
<b>Permissible storage temperature</b>	-20 to +75°C	-20 to +75°C
<b>Enclosure protection<sup>2</sup></b>	IP67	IP67
<b>Permissible medium temperature</b> In operation Briefly (max. 15 min)	<b>Note:</b> the temperature, pressure and sample medium affect the service life of the measuring cell! -10 to +125°C ≤140°C	
<b>Permissible process pressure</b> at +20°C at +60°C at +125°C at +140°C (max. 15 min) at -10 to +140°C	10 bar 6 bar 2 bar unpressurized min. -0.1 bar	
<b>Sensor material</b> in contact with medium	dependent on design: PVDF, stainless steel 1.4301, AISI 304, stainless steel 1.4435, AISI 316L, EPDM	dependent on design: PEEK, stainless steel 1.4301, AISI 304, EPDM
not in contact with medium	dependent on design: stainless steel 1.4301, AISI 304, PA6.6 GF30, PUR, FPM, CuZn	dependent on design: stainless steel 1.4301, AISI 304, stainless steel 1.4305, AISI 303, CuZn, PA6, CR/NBR, PUR, FPM
<b>Process connection</b>	see Order details / Dimensions	
<b>Electrical connection</b> Connection type Socket Socket material Cable material Cable lengths Permissible temperature	JUMO tecLine Ci-S type conductivity sensors are suitable for connection to JUMO AQUIS 500 Ci type inductive conductivity transmitters/controllers! fixed connection cable M12 socket CuZn, PA6.6 GF30, PUR outer sleeve: PUR see Order details -20 to +75°C	
<b>Approvals/marks of conformity</b>	Materials in contact with the medium are approved for food use, are physiologically safe and are listed by the FDA.	

<sup>1</sup> EN 60751

<sup>2</sup> EN 60529

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## Principle of measurement

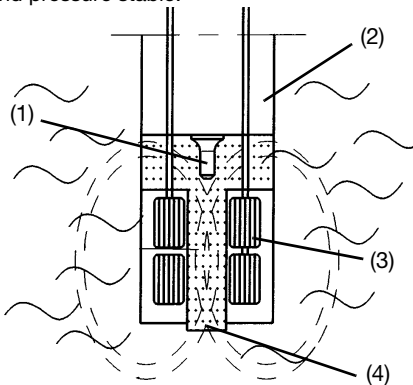
The inductive method of measurement allows largely maintenance-free acquisition of specific conductivity, even in the toughest media conditions. Compared with the conductive method of measurement, problems such as electrode decomposition and polarization are practically non-existent. Conductivity is measured by an inductive probe. Sinusoidal AC voltage supplies the transmitter coil. Current is induced in the receiver coil, subject to the conductivity of the liquid to be measured. The current is proportional to the conductivity of the medium.

## Instrument description

### Measuring cell

The measuring cell consists of a hermetically sealed polypropylene (PP) or polyvinylidene fluoride (PVDF) body, with two measuring coils arranged inside it. A flow-through opening in the measuring cell allows the sample medium to pass through. Electrical isolation between the sample medium and the actual value output is inevitable, because of the principle of measurement.

The measuring cell is extremely temperature and pressure stable.



- (1) external temperature sensor
- (2) PEEK or PVDF cell body
- (3) measuring coils
- (4) liquid loop

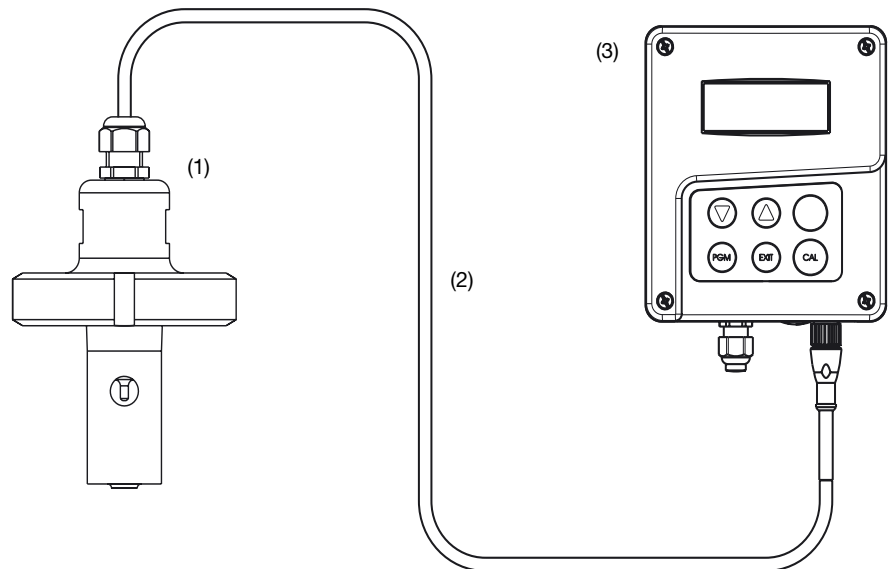
### Exposed temperature sensor:

The sensor in its stainless steel pocket reacts very quickly to changes in temperature.

### Internal temperature sensor:

The sensor is integrated in the cell body. No metal comes into contact with the sample medium in this version (important for aggressive media). However, temperature acquisition is slower.

## Measurement section setup



- (1) JUMO tecLine Ci-S, inductive conductivity and temperature sensor
- (2) Cable (component part of JUMO tecLine Ci-S), standard length 10 m
- (3) JUMO AQUIS 500 Ci, transmitter/controller for conductivity, concentration and temperature

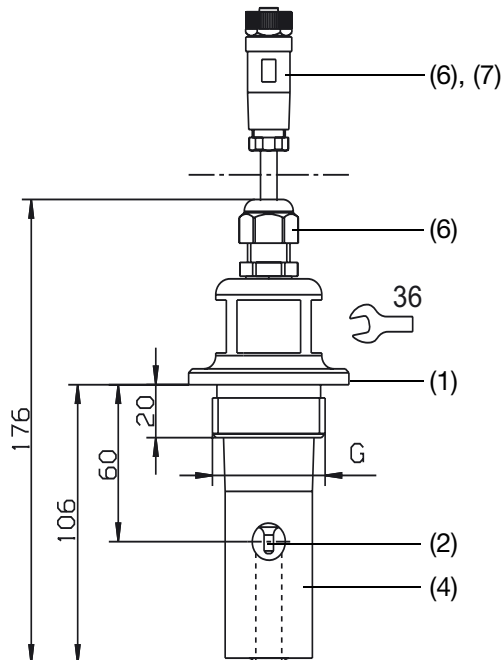
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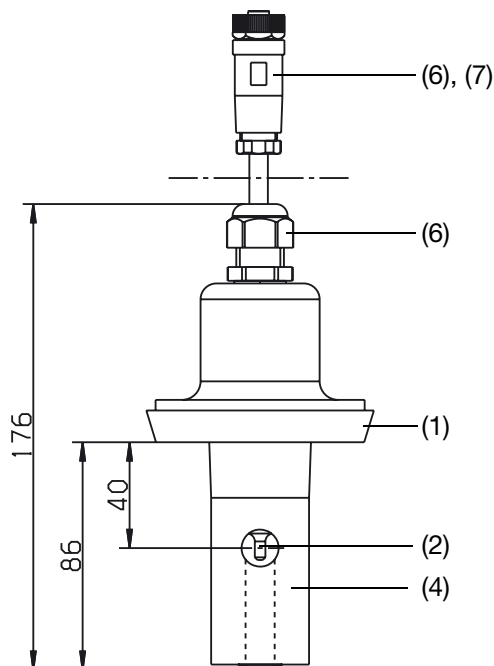
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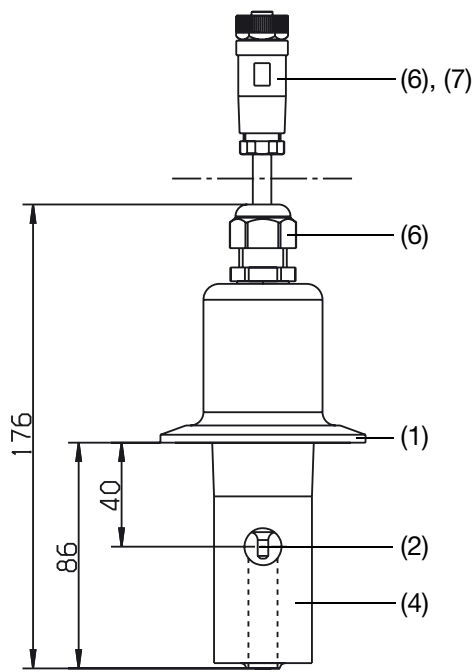
**Dimensions/process connections (separate sensor)**



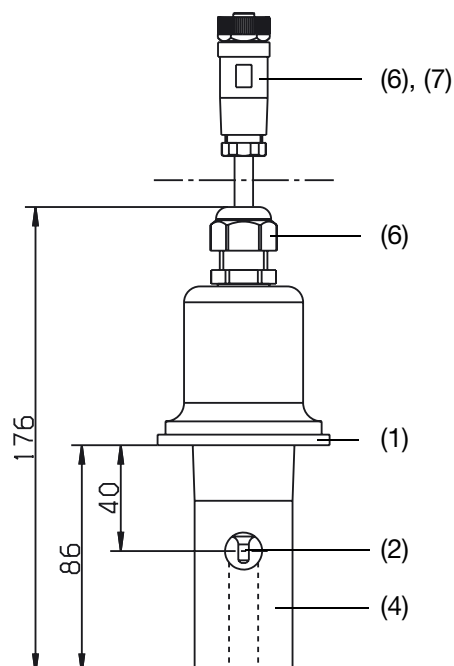
Version with process connection  
 107 = engaged thread G1 1/4A  
 108 = engaged thread G1 1/2A  
 110 = engaged thread G2A  
 and extra code 768



Remote version with process connection  
 606 = MK DN40  
 607 = MK DN50  
 608 = MK DN65  
 609 = MK DN80  
 and extra code 768  
 (union nut not included among the items supplied)



Remote version with process connection  
 617 = 2 1/2" clamp  
 and extra code 768  
 (retaining clamp not included among the items)



Remote version with process connection  
 690 = 2" SMS  
 and extra code 768  
 (union nut not included among the items supplied)

(1) = stainless steel 1.4301 (2) = stainless steel 1.4435 (4) = PVDF

(6) = PA6

(7) = PPS GF40

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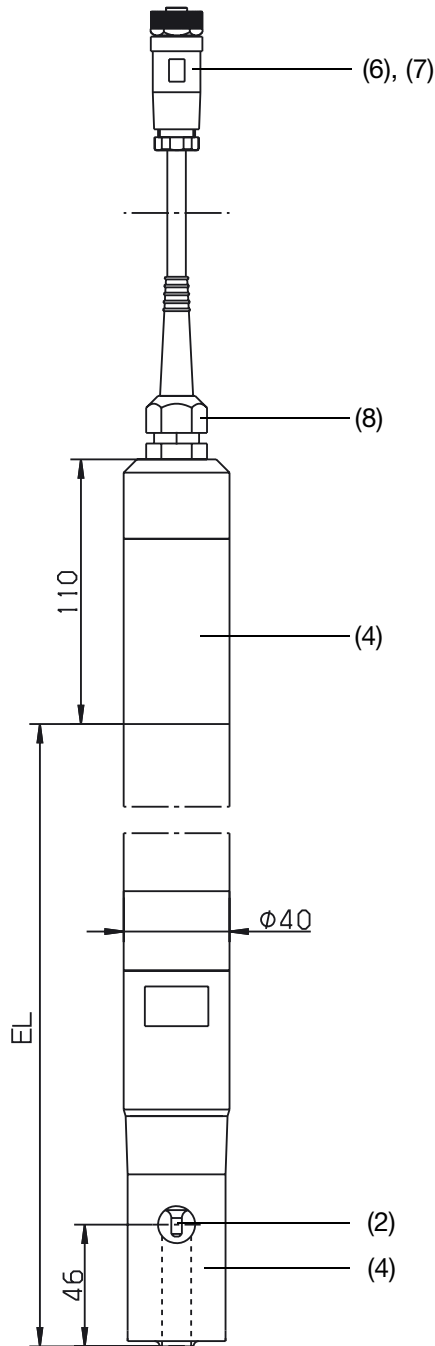
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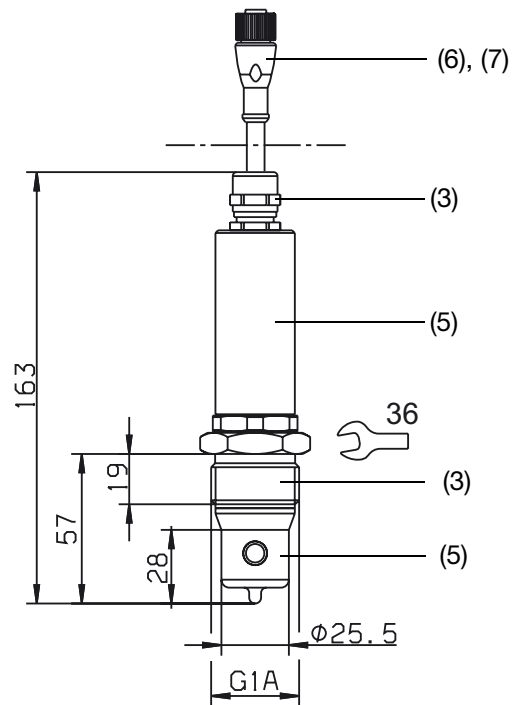
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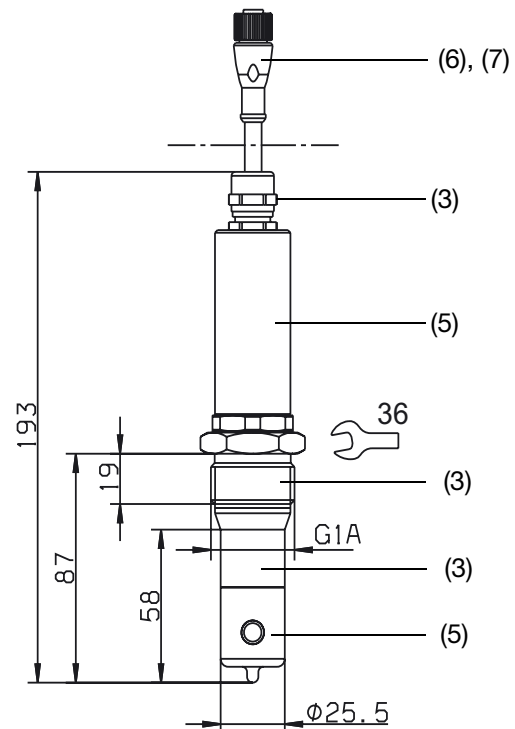
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Remote version with process connection 706  
Immersion version  
(pipe clamps not included among the items supplied)



Remote version with process connection  
955 = pressure screw G1", maximum immersion depth  
(EL) = 57 mm



Remote version with process connection  
956 = pressure screw G1", maximum immersion depth (EL) = 87 mm  
and extra code 767

(2) = stainless steel 1.4435    (3) = stainless steel 1.4305    (4) = PVDF    (5) = PEEK    (6) = PA6    (7) = PPS GF40    (8) = nickel-plated brass and EPDM

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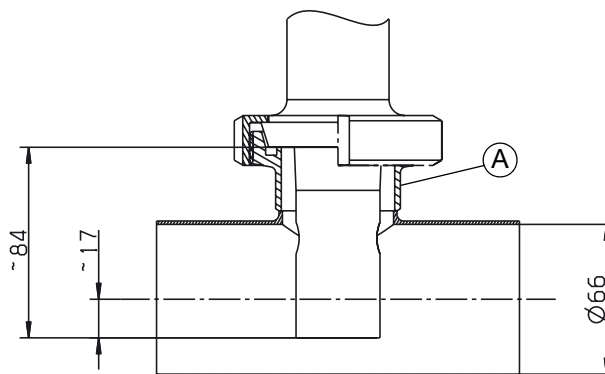
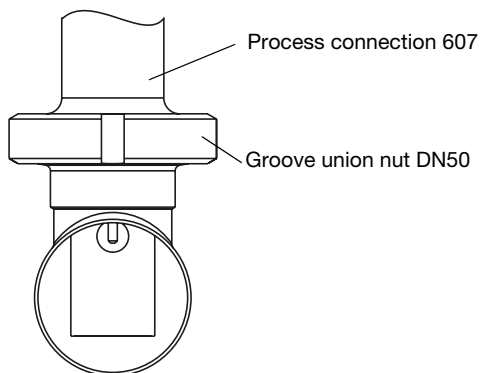
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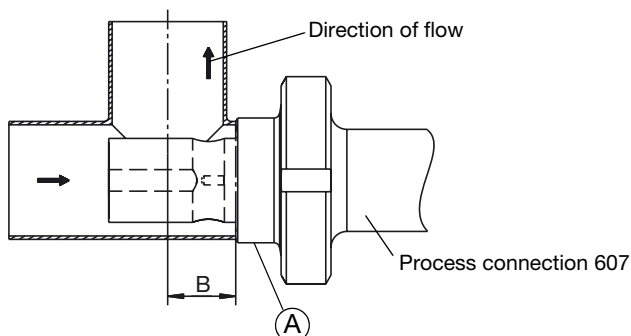


## Mounting examples

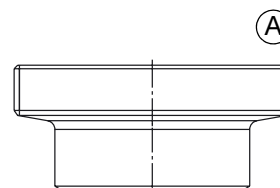
### Weld-on threaded adapter



Reducing T-piece, DIN, short, SSS DN65/50  
 (to be provided by customer; not supplied by JUMO)

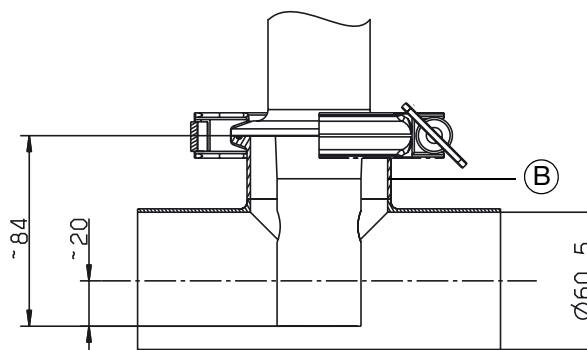
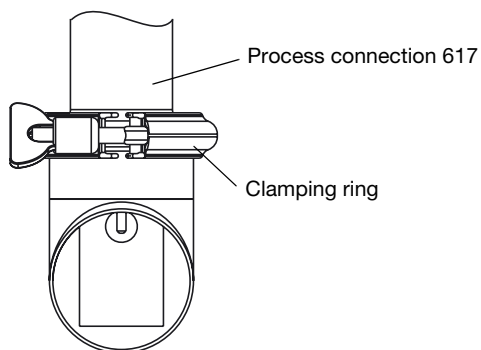


T-piece, DIN 11852, SSS DN50  
 Dimension B reduced to 30 mm  
 (to be provided by customer; not supplied by JUMO)



Weld-on threaded adapter  
 DN50, DIN 11 851  
 (mating piece for process connection 607)  
 Sales no.: 20/00085020

### Clamp



T-piece, short, SSS DN2.5"  
 (to be provided by customer; not supplied by JUMO)

(B) "inch" threaded adapter, SSS DN2.5"

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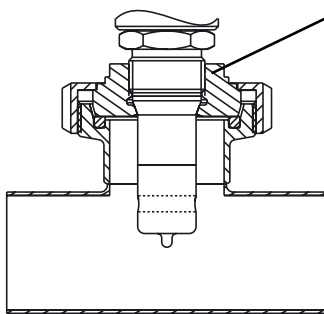
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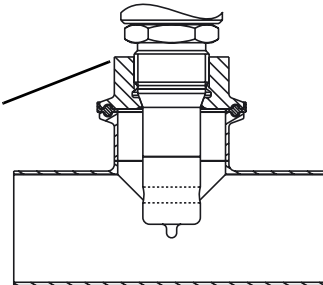
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**Pressure screw G1**

Process connection adapter  
Pressure screw G1A on pipe union DN50  
Sales No.: 20/00530355

Reducing T-piece, DIN, short, SSS DN65/50  
(to be provided by customer; not supplied by JUMO)

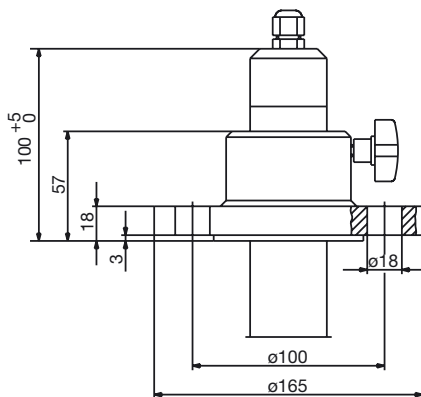
Process connection adapter  
Pressure screw G1A on 1" and 1.5" clamp  
Sales No.: 20/00530354



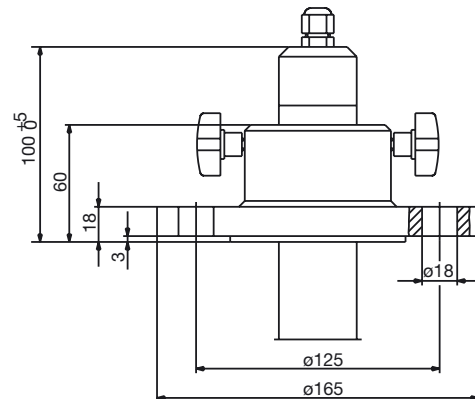
Reducing T-piece, DIN, short, SSS DN65/50  
(to be provided by customer; not supplied by JUMO)

**DN32 flange**

suitable for process connection 706  
Sales No. 20/00083375  
Material: PP

**DN50 flange**

suitable for process connection 706  
Sales No. 20/00083376  
Material: PP



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**Order details:** **JUMO tecLine Ci-S**  
**Inductive conductivity and temperature sensor**

**(1) Basic type**

202942 JUMO tecLine Ci-S  
 Inductive conductivity and temperature sensor for general process engineering

**(2) Basic type extension**

10 PVDF sensor body  
 20 PEEK sensor body (internal temperature sensor)

**(3) Process connection**

107 G1 1/4A thread<sup>1</sup>  
 108 G1 1/2A thread<sup>1</sup>  
 110 G2A thread<sup>1</sup>  
 606 Pipe union DN40, DIN 11 851(MK DN40, milk cone)<sup>1,3</sup>  
 607 Pipe union DN50, DIN 11 851(MK DN50, milk cone)<sup>1,3</sup>  
 608 Pipe union DN65, DIN 11 851(MK DN65, milk cone)<sup>1,3</sup>  
 617 2 1/2" clamp<sup>1,3</sup>  
 690 2" SMS<sup>1,3</sup>  
 706 Immersion version<sup>1,3</sup>  
 955 Pressure screw G1A, maximum immersion depth (EL) = 57 mm<sup>2</sup>  
 956 Pressure screw G1A, maximum immersion depth (EL) = 87 mm<sup>2</sup>

**(4) Immersion depth**

0000 without  
 0500 maximum immersion depth (EL) = 500 mm<sup>1,3,4</sup>  
 1000 maximum immersion depth (EL) = 1000 mm<sup>1,3,4</sup>  
 1500 maximum immersion depth (EL) = 1500 mm<sup>1,3,4</sup>  
 2000 maximum immersion depth (EL) = 2000 mm<sup>1,3,4</sup>

**(5) Electrical connection**

21 Fixed cable with M12 cable socket

**(6) Length of fixed cable**

10 10 m (standard)  
 20 20 m  
 30 30 m

**(7) Extra codes**

000 none  
 268 Internal temperature sensor

<sup>1</sup> For basic type extension 10 only (PVDF sensor body).  
<sup>2</sup> For basic type extension 20 only (PEEK sensor body).  
<sup>3</sup> Without mounting material (union nuts, retaining clamps, etc.)!  
<sup>4</sup> For process connection 706 only.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Order code</b>	<input type="text"/>	/ <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	- <input type="text"/>	/ ...
<b>Order example</b>	202942	/ 10	- 607	- 0000	- 21	- 10	/ 000

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**Stock versions** (delivery 3 working days after receipt of order)

Type	Designation	Sales No.
202942/10-607-0000-21-10/000	PVDF, pipe union DN50, DIN 11 851 (MK DN50, milk cone), 10 m fixed cable	20/00558364
202942/10-690-0000-21-10/000	PVDF, 2" SMS, 10 m fixed cable	20/00558365

**Accessories** (delivery 3 working days after receipt of order)

Designation	Sales No.
Weld-on threaded adapter DN50, DIN 11851 (mating piece for process connection 607)	(PG 209791) 20/00085020
Groove union nut DN50, DIN 11851	(PG 209791) 20/00343368
Groove union nut DN65, DIN 11851	(PG 209791) 20/00362956
Groove union nut SMS DN2"	(PG 209791) 20/00345162
DN32 flange <sup>1</sup> , PP material	(PG 202820) 20/00083375
DN50 flange <sup>1</sup> , PP material	(PG 202820) 20/00083376
Process connection adapter pressure screw G1A on pipe union DN50, DIN 11851 (MK DN50, milk cone)	(PG 209791) 20/00530355
Process connection adapter pressure screw G1A on 1" and 1.5" clamp	(PG 209791) 20/00530354
Calibration adapter for inductive conductivity measurement, type 202711/21	(PG 202711) 20/00543395

<sup>1</sup> In conjunction with sensor with process connection 706 (immersion version) only.

**Note**

The following are required for the initial commissioning of the sensor and transmitter/controller or when replacing components:

- Transmitter/controller e. g. JUMO AQUIS 500 Ci, data sheet 202566
- JUMO tecLine Ci-S inductive conductivity and temperature sensor
- Calibration adapter for inductive conductivity measurement, type 202711/21, data sheet 202711

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# JUMO ecoLine Ci

## Inductive conductivity and temperature sensor for general water engineering

### Brief description

The sensor detects the electrolytic conductivity of a process liquid. It uses the inductive principle of measurement. Because it uses the inductive method of measurement rather than the conductive 2-pin or 4-pin measurement method, the sensor is virtually maintenance-free. The measuring accuracy is practically unaffected by accumulations and grease or oil film on the surface of the sensor.

A (Pt1000) temperature sensor acquires the process temperature at the same time. The temperature sensor can either be exposed in a stainless steel pocket (ultra-fast response) or be located right inside the plastic body (with PVDF, only the internal option is possible). Internal installation is advisable if the sample media could chemically attack the stainless steel pocket.

The standard sensor body material is polypropylene (PP). PVDF is also available as an alternative.

A vast number of process connections are available to ensure system flexibility, even to provide spare equipment for older instruments.

The JUMO ecoLine Ci sensor is designed for connection to the JUMO AQUIS 500 Ci transmitter, as per data sheet 20.2566.

### Typical areas of application:

The sensor is primarily designed for use in water engineering systems. Typical areas of application include general water engineering (drinking water and wastewater), air-conditioning and cooling plants, dilution monitoring in cooling towers, flushing tanks, carwashes, sea water desalination (inlet), monitoring swimming pool water, etc. There is an immersion variant that can be used in open channels and containers.

### Product advantages:

- Practically maintenance-free conductivity measurement
- Materials are FDA/food-use approved
- A variety of process connection variants
- A fast-response temperature sensor
- A compact, proven sensor



Type 20.2943/10-...

Type 202943/10-... with  
T-piece made from PVC

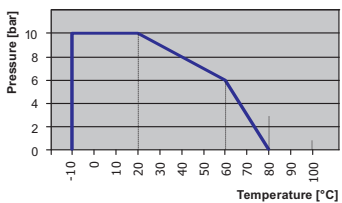
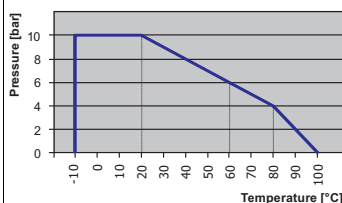
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 Internet: www.jumo.us



## Technical data

Type	202943/10-...	202943/20-...	202943/30-...
<b>Conductivity measurement principle</b>	Inductive		
<b>Conductivity meas. range</b>	0 ... 1000 µS/cm to 0 ... 2000 mS/cm (depending on connected transmitter)		
<b>Conductivity accuracy</b> for measuring range:			
0 - 1 mS/cm	≤ 1 %		
0 - 10 mS/cm	≤ 0.5 %		
0 - 50 mS/cm	≤ 0.5 %		
0 - 100 mS/cm	≤ 0.5 %		
0 - 1000 mS/cm	≤ 1 %		
0 - 2000 mS/cm	≤ 1 %		
<b>Cell constant</b>	k = 6.25 1/cm		k = 4.65 1/cm
<b>Temperature sensor</b>	Pt1000, Class A		
<b>t<sub>90</sub> temperature<sup>a</sup></b>	≤ 6 s	≤ 2 min	≤ 10 min
<b>Permissible ambient temperature</b>	-10 to +60 °C		
<b>Permissible storage temperature</b>	-20 to +75 °C		
<b>Enclosure protection<sup>b</sup></b>	IP68		
<b>Permissible medium temperature<sup>c</sup></b> In operation Momentary with process connection 706 (immersion fitting)	-10 to +80 °C ≤ +100 °C (≤ 15 min) -10 to +60 °C (pressureless)		-10 to +100 °C ≤ +110 °C (≤ 15 min)
<b>Permissible process pressure<sup>c</sup></b> at +20 °C at +60 °C at +80 °C at -10 to +100 °C	10 bar 6 bar 0 bar min. -0.1 bar 		10 bar 6 bar 4 bar min. -0.1 bar 
<b>Sensor material</b> in contact with medium  not in contact with medium	dependent on design: stainless steel 1.4301 (304), stainless steel 1.4571 (316ti), PP, EPDM dependent on design: stainless steel 1.4301 (304), PA6, PUR, FPM, PBT/PA, CR/NBR, CuZn	dependent on design: stainless steel 1.4301 (304), PP dependent on design: stainless steel 1.4301 (304), PA6, PUR, FPM, PBT/PA, CR/NBR, CuZn	PVDF  dependent on design: stainless steel 1.4408, PA6, PUR, PBT/PA, CR/NBR, CuZn
<b>Process connection</b>	see Order details / Dimensions		
<b>Electrical connection</b>  Connection circuit Socket Socket material Cable material Cable lengths Permissible temperature	JUMO ecoLine Ci type inductive conductivity sensors are suitable for connection to JUMO AQUIS 500 Ci type inductive conductivity transmitters/controllers! non-detachable cable M12 socket, 8-pin CuZn, PA6.6 GF30, PUR outer sleeve: PUR see Order details -20 to +75 °C		
<b>Approvals/marks of conformity</b>	Materials in contact with the medium are approved for food use, are physiologically safe and are listed by the FDA.		

<sup>a</sup> EN 60751

<sup>b</sup> EN 60529

<sup>c</sup> **Note:** Temperature, pressure and sample medium affect the life of the cell!

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## Principle of measurement

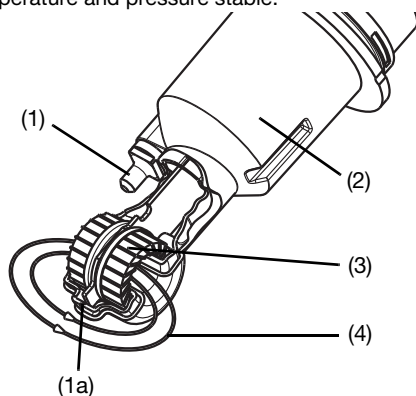
The inductive method of measurement allows largely maintenance-free acquisition of specific conductivity, even in the toughest media conditions. Compared with the conductive method of measurement, problems such as electrode decomposition and polarization are practically non-existent.

Conductivity is measured by an inductive probe. Sinusoidal AC voltage supplies the transmitter coil. Current is induced in the receiver coil, subject to the conductivity of the liquid to be measured. The current is proportional to the conductivity of the medium.

## Instrument description

### Sensor

The sensor consists of a hermetically sealed polypropylene (PP) or polyvinylidene fluoride (PVDF) body, with two measuring coils arranged inside it. A flow-through opening in the sensor allows the sample medium to pass through. Electrical isolation between the sample medium and the actual value output is inevitable, because of the principle of measurement. The sensor is extremely temperature and pressure stable.



- (1) exposed temperature sensor
- (1a) option: internal
- (2) PP cell body
- (3) measuring coils
- (4) liquid loop

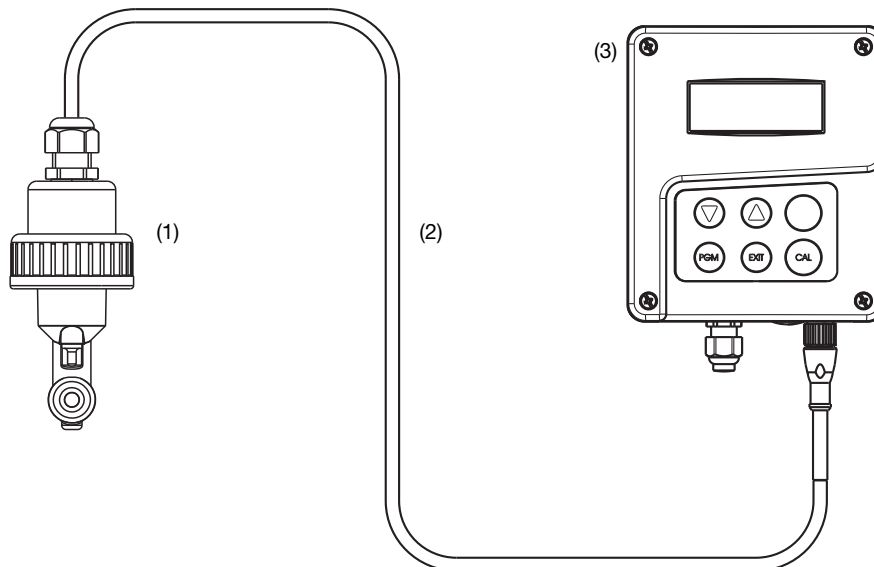
### Exposed temperature sensor:

The sensor in its stainless steel pocket reacts very quickly to changes in temperature.

### Internal temperature sensor:

The sensor is integrated in the cell body. No metal comes into contact with the sample medium in this version (important for aggressive media). However, temperature acquisition is slower.

## Measurement section setup



- (1) JUMO ecoLine Ci, inductive conductivity and temperature sensor
- (2) Cable (component part of JUMO ecoLine Ci), standard length 10 m
- (3) JUMO AQUIS 500 Ci, transmitter/controller for conductivity, concentration and temperature

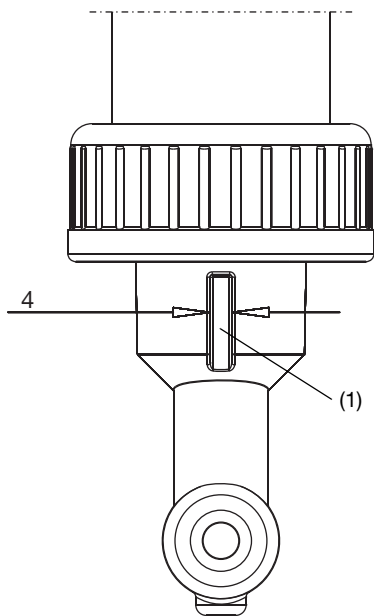
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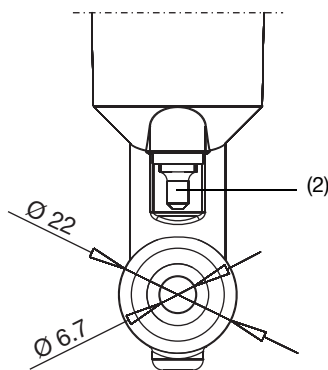


## Sensor details



### Guide slot

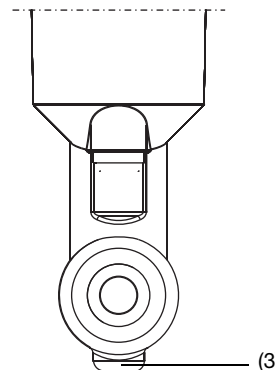
A lug on the T-piece (see Accessories) fits into the 4 mm wide guide slot (1), thus ensuring that the sensor is correctly aligned to the direction of flow.



### Exposed temperature sensor (2)

This is the standard version.

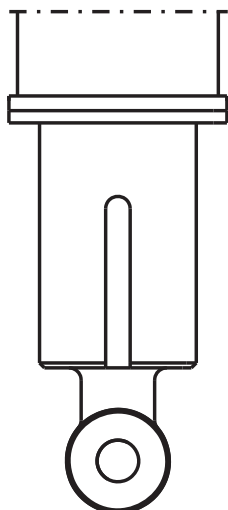
Material in contact with sample medium:  
 stainless steel 1.4571 AISI 316ti and FPM.



### Internal temperature sensor (3)

Extra code 268.

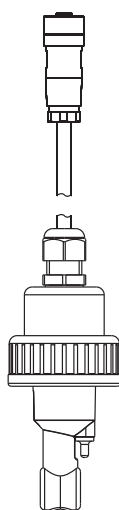
Material in contact with sample medium:  
 PP, suitable for food use.



### PVDF sensor body

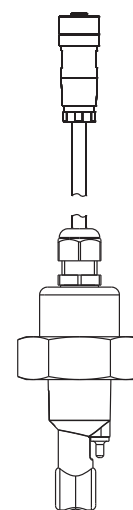
Cell constant 4.65 1/cm.

Not available for process connection 706 (immersion version).



### Process connection 168

for T-piece installations,  
 PVC union nut (included among the items supplied)



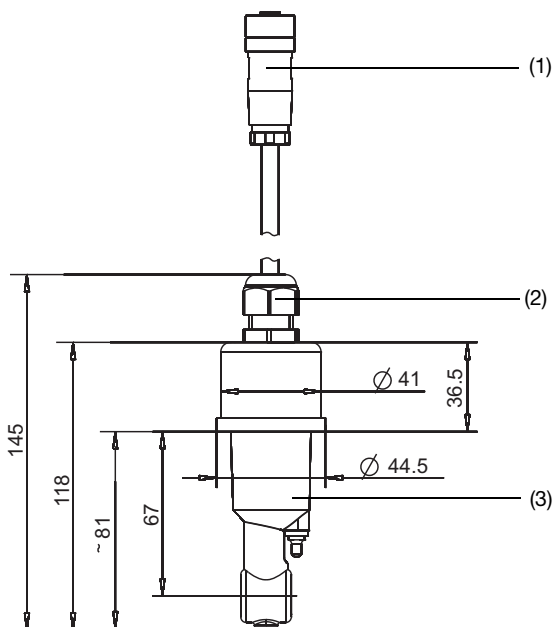
### Process connection 169

for T-piece installations,  
 stainless steel union nut (included among the items supplied)

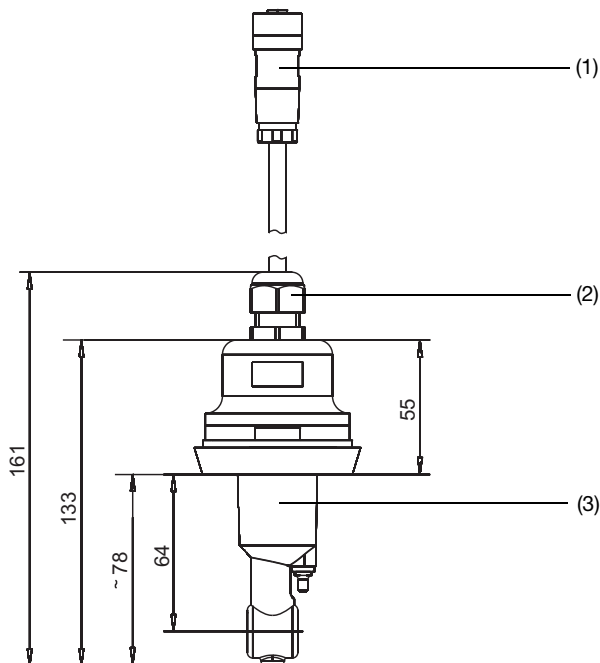
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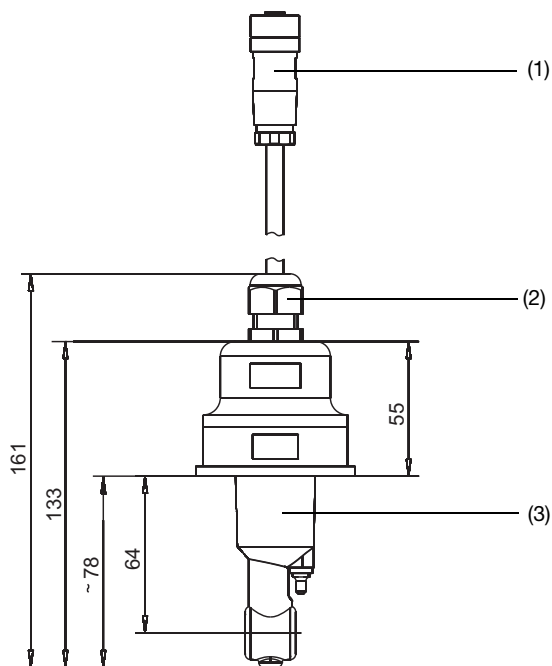
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**Type 202943/10-168... or -169...  
 DN32 or DN40**



**Type 202943/10-607-...  
 MK DN50**



**Type 202943/10-690-...  
 2" SMS**

- (1) M12 socket, PBT / PA
- (2) M16 screw-type cable gland  
 IP68 protection (to 0.2 m), PBT / PA
- (3) PP
- (4) 1.4301 stainless steel, AISI 304

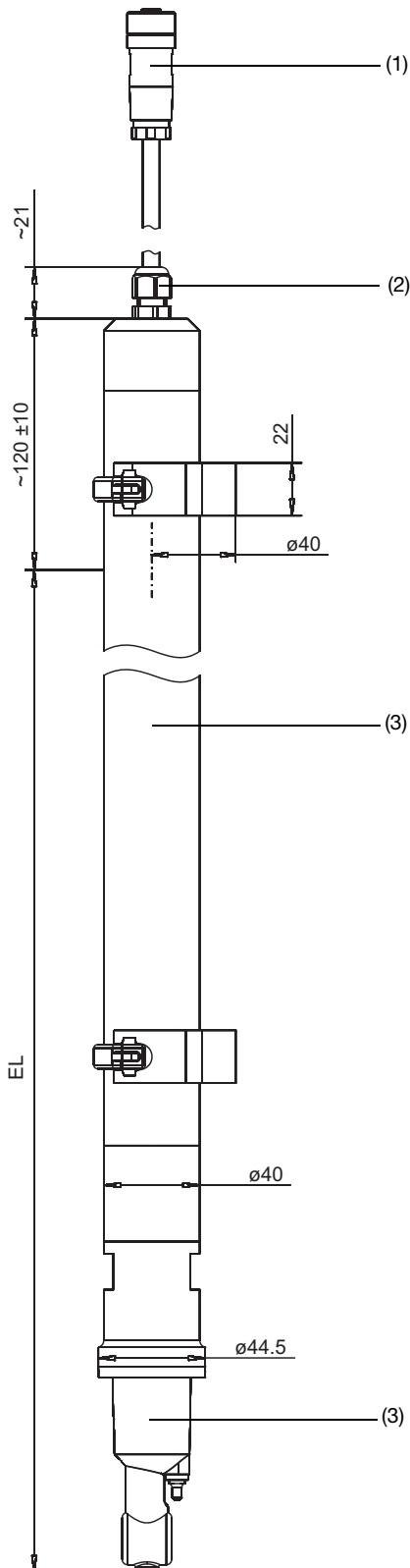
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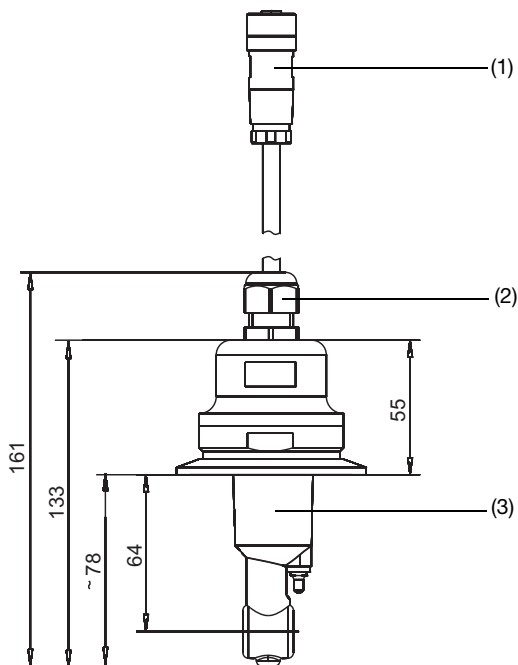
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## Dimensions



**Type 202943/10-706-...**  
**Immersion version**



**Type 202943/10-617-... or -616-...**  
**2" clamp or 2 1/2" clamp**

- (1) M12 socket, PBT / PA
- (2) M16 screw-type cable gland  
IP68 protection (to 0.2 m), PBT / PA
- (3) PP
- (4) 1.4301 stainless steel, AISI 304

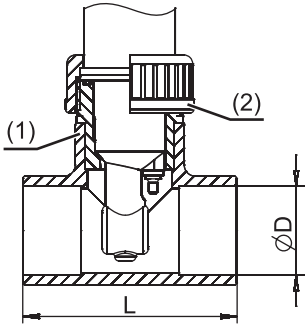
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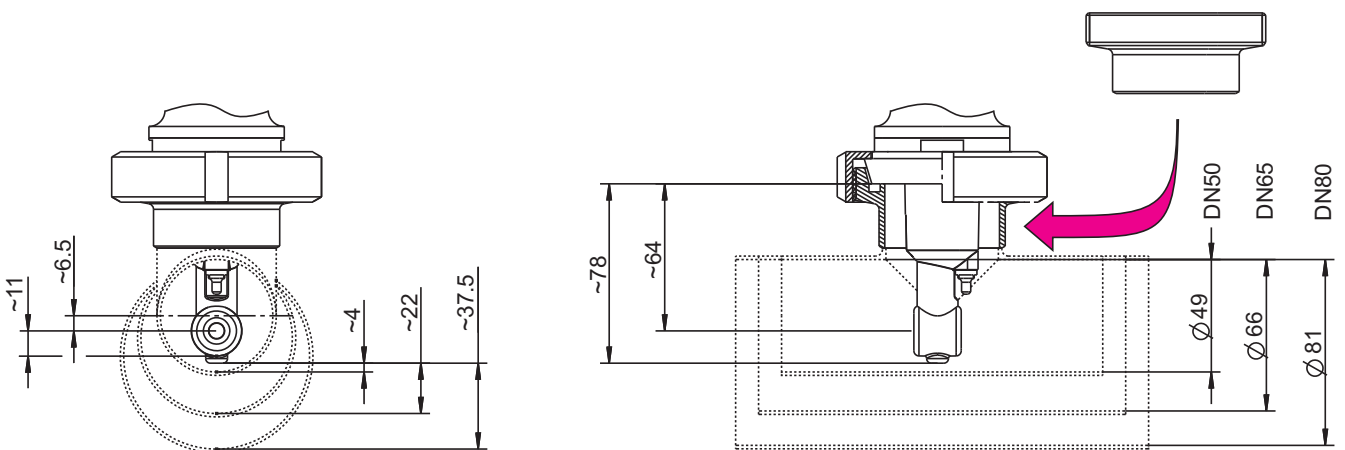
**Accessories / Mounting examples**



- (1) Threaded socket  
 G 1 1/2"  
 (PVC or PP)
- (2) Union nut  
 (PVC with 168)  
 (Stainless steel  
 with 169)

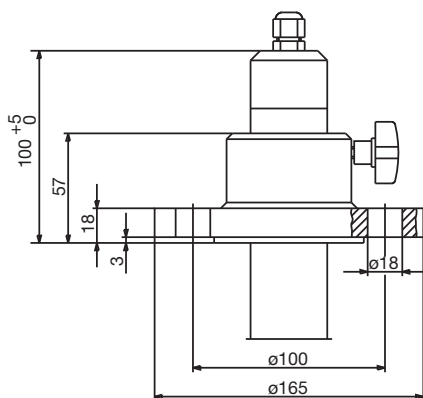
DN	ø D	L	Material	Maximum temperature	Part no.
32	40	98	PVC	60°C	00439247
40	50	118			00439249
32	40	88	PP	80°C	00449511
40	50	102			00449514
50	63	124			00449516

**T-piece made from PVC or PP**  
 suitable for process connections 168 and 169

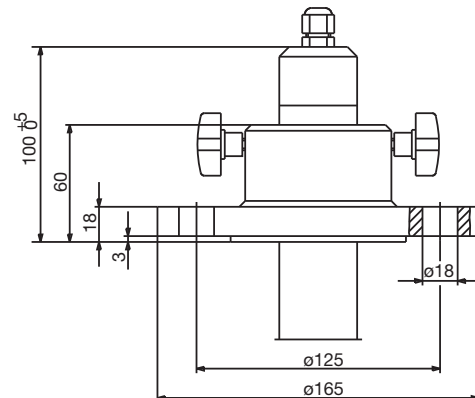


**Weld-on threaded adapter DN50, DIN 11851**  
 Part no. 00085020

suitable for process connection 607  
 The reducing T-piece shown, DIN, short, SSS, DN50/50, or DN65/50 or DN80/50, must be provided by the customer (not supplied by JUMO)!



**DN32 flange**  
 suitable for process connection 706  
 Part no. 00083375  
 Material: PP



**DN50 flange**  
 suitable for process connection 706  
 Part no. 00083376  
 Material: PP

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**Order details:** **JUMO ecoLine Ci**  
**Inductive conductivity and temperature sensor**

<b>(1) Basic type</b>	
202943	JUMO ecoLine Ci Inductive conductivity and temperature sensor for general water engineering
<b>(2) Basic type extension</b>	
10	PP sensor body, external temperature sensor (standard)
20	PP sensor body, internal temperature sensor
30	PVDF sensor body, internal temperature sensor
<b>(3) Process connection</b>	
168	for T-piece installations, with PVC union nut
169	for T-piece installations, with stainless steel union nut
607	MK DN50 milk cone <sup>a</sup>
616	2" clamp <sup>a</sup>
617	2 1/2" clamp <sup>a</sup>
690	2" SMS <sup>a</sup>
706	Immersion version <sup>b</sup>
<b>(4) Immersion length (EL)</b>	
0000	without
0500	EL = 500 mm <sup>c</sup>
1000	EL = 1000 mm <sup>c</sup>
1500	EL = 1500 mm <sup>c</sup>
2000	EL = 2000 mm (max. value) <sup>c</sup>
<b>(5) Electrical connection</b>	
21	Fixed cable with M12 cable socket
<b>(6) Length of fixed cable</b>	
10	10 m (standard)
20	20 m
30	30 m
<b>(7) Extra codes</b>	
000	none

<sup>a</sup> Without mounting material (union nuts, retaining clamps, etc.)

<sup>b</sup> For basic type extension 10 or 20 only.

<sup>c</sup> For process connection 706 only.

**Order code**                    (1)                    (2)                    (3)                    (4)                    (5)                    (6)                    (6)  
 [ ] / [ ] - [ ] - [ ] - [ ] - [ ] - [ ] / [ ]  
**Order example**            202943 / 10 - 168 - 0000 - 21 - 10 / 000

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**Stock versions** (delivery 3 working days after receipt of order)

Type	Description	Part no.
202943/10-168-0000-21-10/000	PP, external temperature sensor, with PVC union nut, 10 m fixed cable	00548189
202943/20-168-0000-21-10/000	PP, internal temperature sensor, with PVC union nut, 10 m fixed cable	00556950

**Production versions** (delivery 10 working days after receipt of order)

Type	Description	Part no.
202943/10-607-0000-21-10/000	PP, external temperature sensor, MK DN50, 10 m fixed cable	00550665
202943/10-706-1000-21-10/000	PP, external temperature sensor, immersion version 1 m, 10 m fixed cable	00556316

**Accessories** (delivery 3 working days after receipt of order)

Description	Part no.
Weld-on threaded adapter DN50, DIN 11 851(mating piece for process connection 607)	00085020
PVC DN32 T-piece, including threaded insert (mating piece for process connection 168 or 169)	00439247
PVC DN40 T-piece, including threaded insert (mating piece for process connection 168 or 169)	00439249
PP T-piece, DN32 <sup>a</sup> (mating piece for process connection 168 or 169)	00449511
PP T-piece, DN40 <sup>a</sup> (mating piece for process connection 168 or 169)	00449514
PP T-piece, DN50 <sup>a</sup> (mating piece for process connection 168 or 169)	00449516
G1 1/2 union nut, PVC	00439199
G1 1/2 union nut, stainless steel	00452039
DN50 grooved union nut, DIN 11 851	00343368
SMS DN2" grooved union nut	00345162
DN32 flange <sup>b</sup> , PP material	00083375
DN50 flange <sup>b</sup> , PP material	00083376
Calibration adapter for inductive conductivity measurement, type 202711/21	00543395

<sup>a</sup> With rotation protection - the sensor can only be installed in the correct alignment.

<sup>b</sup> In conjunction with sensor with process connection 706 (immersion version) only.

**Note**

The following are required for the initial commissioning of the sensor and transmitter/controller or when replacing components:

- Transmitter/controller e. g. JUMO AQUIS 500 Ci, data sheet 20.2566
- JUMO ecoLine Ci inductive conductivity and temperature sensor
- Calibration adapter for inductive conductivity measurement, type 202711/21, data sheet 20.2711

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## Technical buffer and cleaning solutions

### Brief description

#### pH buffer solution

Technical buffer solutions as defined by DIN 19267 are used to calibrate (adjust) technical pH measuring instruments (sensors, cables and measurement amplifiers). Buffer solutions are available with different pH values and colored bottle seals make it easy to tell them apart. Temperature can easily be read in a table on the bottle. Typical accuracy is +/-0.02 pH units. JUMO buffer solutions can be traced to standard reference material of NIST (National Institute of Standards and Technology). A use-by date and batch number appear on the label.

#### Test solution for redox potential

The redox test solution as defined by ASTM D 1498 is used to verify technical redox measuring instruments (sensors, cables and transmitters). The output signal may drift in older redox sensors. The test solution can then be used to readjust the display values in the measurement amplifier. The three anticipated voltage values are then printed for sensors with different reference electrodes and electrolyte concentrations (Pt against Ag/AgCl; Pt against Ag/AgCl in saturated KCl and Pt against calomel). A use-by date and batch number appear on the label.

#### Reference solutions for electrolytic conductivity

These reference solutions are used to calibrate (adjust) and verify conductive and inductive conductivity measurement instruments in technical systems. The solutions can be retraced to PTB and NIST. They consist of a potassium chloride solution with various dilutions. A use-by date and batch number appear on the label.

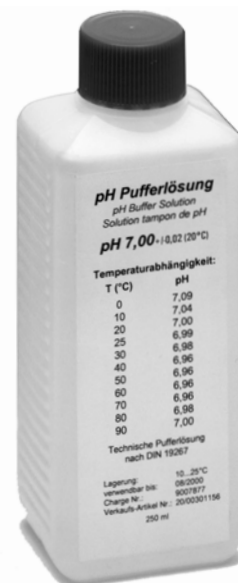
#### Auxiliary electrolyte (replacement electrolyte KCl)

pH and redox sensors lose electrolytes through the diaphragm when in use. This is intentional and indispensable for functionality. Electrodes with a liquid reference electrolyte (auxiliary electrolyte) can generally be refilled by the user. A potassium chloride solution (KCl) is required for this purpose. A silver-ion-free solution of KCl is used for sensors with a cartridge-style conduction system (without silver chloride (AgCl)). Sensors with wire conduction require a KCl solution with AgCl. Both types are available from JUMO. The KCl solution can also be used for storing and activating the pH electrodes that are used. The KCl solution neutralizes or dilutes contamination from the electrodes in the area of the diaphragm and regenerates the pH-sensitive swelling layer of the pH membrane glass.

#### Cleaning solutions

*Diaphragm cleaner:* consists of an aqueous thiourea solution. This cleaner dissolves silver sulfide, which is not readily soluble, from the diaphragms of pH, redox and reference electrodes.

*Electrode cleaner:* consists of a solution of pepsin and hydrochloric acid. It helps to remove proteins and calcification on electrochemical sensors.





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**Cleaner for pH/redox electrodes (packaging unit contains 5 pieces)**

Type	Designation	Sales No.
202950/50001-250/000	250 ml diaphragm cleaner (thiourea solution)	20/00307586
202950/50002-250/000	250 ml electrode cleaner (solution of pepsin and hydrochloric acid, protein remover)	20/00307114

**Auxiliary electrolyte (packaging unit contains 5 pieces)**

Type	Designation	Sales No.
202950/40300-250/000	250 ml 3-molar KCl solution without AgCl (silver-ion free)	20/00306215
202950/40300-50/000	50 ml 3-molar KCl solution without AgCl (silver-ion free)	20/00452495
202950/40300-250/000	250 ml 3-molar KCl solution with AgCl (for electrodes with wire conduction in the reference system)	20/00307585

**Reference solutions for electrolytic conductivity (packaging unit contains 5 pieces)**

Type	Designation	Sales No.
202950/30141-250/000	250 ml KCl 0.01 mol/l 1.41 mS/cm	20/00346056
202950/31288-250/000	250 ml KCl 0.1 mol/l 12.88 mS/cm	20/00346058
202950/31118-250/000	250 ml KCl 1.0 mol/l 111.80 mS/cm	20/00346060

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# Lines, plugs and sockets for pH, redox, conductivity and temperature sensors

## Brief description

The use of electrochemical sensors for liquid analysis requires special connection lines and connectors. JUMO offers a selection of tried and tested versions for this application. They are available either as a finished preassembled connection line, as loose material by the roll or as individual plugs/sockets for self-assembly.

### As a general rule:

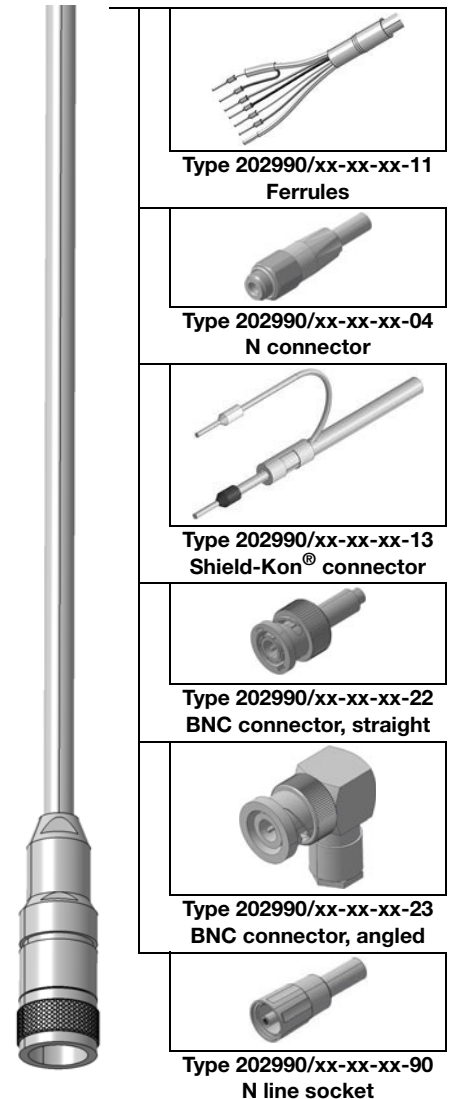
The measuring lead selected between an electrochemical sensor and the transmitter/indicator/controller should be as short as possible. Typical line lengths in this case are 5 to 10 m with high functional reliability. If longer line lengths must be selected in some cases, the technical documentation of the sensors and measuring instruments must be observed. The line between the sensor and evaluation instrument must be laid directly and without interruption (for example terminal strips) or cable extensions.

### pH and redox measurement

Specially designed coaxial lines are used for pH and redox measurements. In these measurements direct voltages of a lower level are generated by the sensor and transferred to the evaluation instrument. These measurements, some of which are high-resistive measurements (potentiostatic measurement principle, internal resistors up to several gigaohms) are sensitive to electrical faults and radiation. Even a movement of the line can falsify measurement values in unfavorable conditions. An additional layer of insulation in JUMO coaxial line increases the insulation resistance of the line, thereby ensuring a reliable connection from the sensor to the transmitter. Other coaxial lines of the type used for antennas and computers are not suitable and could damage the sensors. This could also result in immediate failure of the sensor or reduced service life. For multiple sensors, for example with integrated temperature sensors, coax lines with individual core wires are available (Variopin, etc.).

### Conductive conductivity measurement

Connecting cables for conductive conductivity probes as per data sheets 202922 to 202930 are also specially optimized and selected for the application. Alternating voltages of low amplitude in the range of a few Hertz to several Kilohertz are transferred. Accordingly these measuring leads are normally equipped with shielding. The shielding itself must be designed according to applicable technical rules and the relevant application. The individual core wires must be twisted for increased "twisted pair" signal reliability.



Type 202990/11-95-xx-xx-xx  
with VP line socket

## Key features

- High-quality preassembled connection lines
- Highest possible protection type with factory assembly
- Wide range of connectors/sockets and special selection
- Customer-specific versions on request

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## Order details

<b>(1) Basic type</b>	
202990	Lines, plugs and sockets for pH, redox, conductivity and temperature sensors
<b>(2) Type of line</b>	
00	Without
02	Line for pH and redox, Ø 5 mm, 75 °C
09	Line for conductive conductivity probes, 4-core
11	VP coaxial line
<b>(3) Connection end 1 (sensor side)</b>	
00	Without
92	N line socket, rotating
95	VP line socket, 6-pin, for lines Ø 5 mm
<b>(4) Line length</b>	
<b>for line type 02</b>	
1,5	1.5 m
3	3 m
5	5 m
10	10 m
25	25 m
50	50 m
100	100 m
<b>for line type 09</b>	
25	25 m
50	50 m
<b>for line type 11</b>	
5	5 m
10	10 m
15	15 m
20	20 m
<b>(5) Connection end 2 (device side)</b>	
00	Without
04	N connector
11	Ferrules
13	Shield-Kon® connector
22	BNC connector, straight, for lines Ø 5 mm
23	BNC connector, angled, for lines Ø 5 mm
90	N line socket, for lines Ø 5 mm

Order code                    **(1)**                    **(2)**                    **(3)**                    **(4)**                    **(5)**  
 Order example            202990            /            02            -            92            -            10            -            00

**Minimum order quantity:** Plugs and sockets, 5 pieces per type, deviating and preassembled line 10 pieces per type

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**Stock versions** (delivery 3 days after receipt of order)

**Preassembled lines**

**Coaxial lines, Ø 5 mm for pH and redox electrodes, compensation thermometer and glass conductivity cells**

Line end 1 (sensor side)	Type of line	Type	Old type	Line end 2 (device side)	Part no.
92 N-line socket, rotating	02 Low-noise coaxial line, temperature: -25 to +75, PVC, black Length 3 m: Length 5 m: Length 10 m: Length 25 m: Length 50 m:	202990/02-92-3-00 202990/02-92-5-00 202990/02-92-10-00 202990/02-92-25-00 202990/02-92-50-00	2992-2(3)-0 2992-2(5)-0 2992-2(10)-0 2992-2(25)-0 2992-2(50)-0	0 Without plug, without socket	00082672 00082673 00082659 00082660 00303525

**Coaxial lines, Ø 5 mm for pH and redox electrodes, compensation thermometer and glass conductivity cells**

Line end 1 (sensor side)	Type of line	Type	Old type	Line end 2 (device side)	Part no.
92 N line socket, rotating	02 Low-noise coaxial line, temperature: -25 to +75, PVC, black Length 1 m:	202990/02-92-1-22	-	22 BNC connector, straight	00328997

**Coaxial lines, Ø 5 mm for pH and redox electrodes, compensation thermometer and glass conductivity cells**

Line end 1 (sensor side)	Leitungsart	Type	Old type	Line end 2 (device side)	Part no.
92 N line socket, rotating	02 Low-noise coaxial line, temperature: -25 to +75, PVC, black Length 1,5 m: Length 5 m: Length 10 m:	202990/02-92-1,5-13 202990/02-92-5-13 202990/02-92-10-13	- - -	13 Shield-Kon® connector	00085154 00307298 00082649

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**Connecting cables for pH and redox electrodes and glass conductivity cells and multisensors with integrated temperature sensor; VP terminal head**

Line end 1 (sensor side)	Type of line	Type	Old type	Line end 2 (device side)	Part no.
95 VP (Variopin)-line socket, 6-pin	11 VP (Variopin) coaxial line with shield +4 stranded wire and cable shield, temperature: -30 to +70, PVC, black Length 5 m: Length 10 m: Length 15 m:	202990/11-95-5-11 202990/11-95-10-11 202990/11-95-15-11	- - -	11 Ferrules	00372919 00373029 00451481

Contact assignment: (1) pH glas (2) pH reference (3) Pt100/1000 (3-wire) (4) free  
 (5) Pt100/1000 (6) Pt100/1000 (7) Shield

**Lines (by the roll without plugs or sockets)**

**Coaxial lines, Ø 5 mm for pH and redox measurements**

Line end 1 (sensor side)	Type of line	Type	Old type	Line end 2 (device side)	Part no.
0 Without plug, without socket	02 Low-noise coaxial line, temperature: -25 to +75, PVC, black Length 100 m:	202990/02-00-100-00	2990-2(100)-0	0 Without plug, without socket	00085976

**Connecting cables, Ø 5.7 mm for conductive conductivity probes (2-electrode system)**

Line end 1 (sensor side)	Type of line	Type	Old type	Line end 2 (device side)	Part no.
0 Without plug, without socket	09 4 stranded wire and shield temperature: -5 to +80 PVC, grey Length 25 m: Length 50 m:	202990/09-00-25-00 202990/09-00-50-00	2990-9(25)-0 2990-9(50)-0	0 Without plug, without socket	00303681 00304181

Color coding to DIN IEC 757:

BU = Blue GN = Green GN/YE = Green/Yellow GY = Grey RD = Red TR = Transparent WH = White YE = Yellow

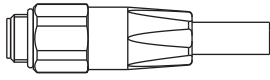

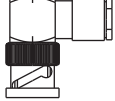
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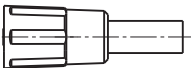
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**Plugs<sup>1</sup> (for self-assembly on coaxial line)**

Designation/illustration	Type	Old type	for line type	Part no.
N connector for line diameter Ø 5 mm: 	202990/00-00-000-04	2990-00-4	02	00061202
BNC connector, straight for line diameter Ø 5 mm: 	202990/00-00-000-22	2990-00-22	02	00068842
BNC connector, angled for line diameter Ø 5 mm: 	202990/00-00-000-23	2990-00-23	02	00064222

**Sockets<sup>1</sup> (for self-assembly on coaxial line)**

Designation/illustration	Type	Old type	for line type	Part no.
N line socket for line diameter Ø 5 mm: 	202990/00-00-000-90	2991-00-0	02	00057350

<sup>1</sup> **Minimum order quantity:** Plugs and sockets, 5 pieces per type, deviating and preassembled line 10 pieces per type

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# Impedance converter for combination electrodes

- independent of mains supply
- retrofitting is possible
- enables longer cable distances
- stabilizes signal

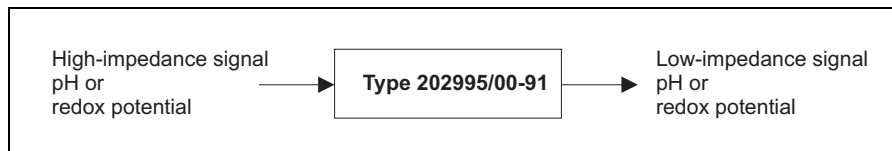
## Brief description

The impedance converter converts the high-impedance signal of a pH electrode (up to 1,000 MΩ) into a low-impedance signal (< 1 kΩ). The use of an impedance converter can also be advantageous in conjunction with a metal electrode.

The impedance converter is screwed directly onto the electrode head. This largely eliminates interference caused by dirt, moisture or electrical fields from power cables. A conventional coaxial cable is sufficient as a connecting cable between impedance converter and transmitter. Long distances between sensor and transmitter can be covered easily. Thanks to its built-in lithium battery, the impedance converter does not depend on an external power supply.



## Block diagram



## Technical data

Input	
Input impedance	$R_e \geq 5 \times 10^{11} \Omega$
Input current	$i_e \leq 2 \text{ pA at } 25^\circ \text{C}$
Input voltage	$U_e \pm 1000 \text{ mV } \pm 10 \%$
Output	
Offset voltage	$U_0 \leq 6 \text{ mV (typ.)}$
Temperature drift	$15 \mu\text{V}/^\circ\text{C}$
Permissible ambient temperature	-10 to +60 °C
Permissible storage temperature	-10 to +60 °C
Internal impedance	$R_i \leq 5 \Omega$
Amplification (ph or redox potential)	1:1
Linearity error	$\leq 0.5 \%$ , if the input impedance of the subsequent amplifier is $\geq 20 \text{ M}\Omega$
Voltage supply	Internally from lithium battery (can be replaced), CR-1/3N-P (or equivalent) Service life: at least 5 years (at 25 °C) The life expectancy of the battery can be negatively affected by external factors, such as strongly fluctuating temperatures during operation or storage.
Housing	PC (polycarbonate)
Weight	35 g

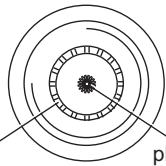
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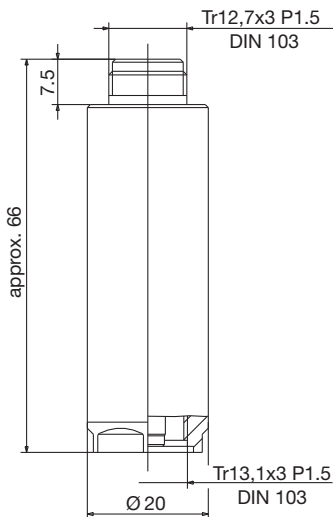


## Electrical connection

<p>The assignment of input and output is identical.</p> <p>Plug connector matches the JUMO electrode caps with cable socket N (data sheet 202900) and most of the usual electrode caps (S7, S8).</p>	<p><b>N cap</b> -91 (standard)</p> 
--	--

## Dimensions

Type 202995/00-91



## Order details

<b>(1) Basic type</b>	
202995	Impedance converter
<b>(2) Basic type extension</b>	
00	none
<b>(3) Connection</b>	
91	N cap, matching the N connector

Order code             /  -   
 Order example        202995 / 00 - 91

## Available from stock

(delivery 3 days after receipt of order)

Type 202995/00-91, Impedance converter with N cap	<b>Part no.</b> 00300455
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