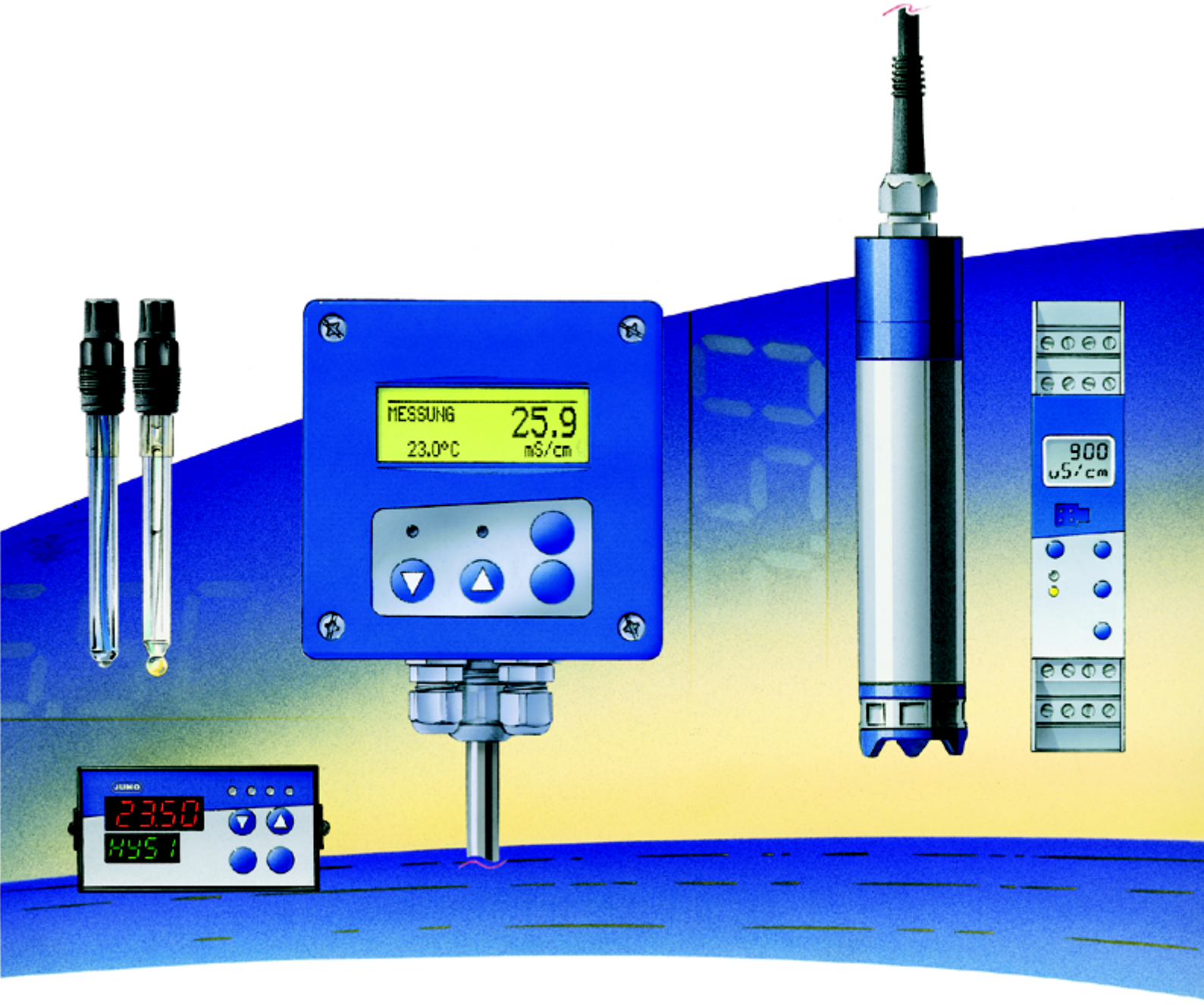

Analytical Measurement

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Contents: Analytical measurement

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Measuring and control instruments for conductivity and high-purity water

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pH and Redox Combination Electrodes JUMO ecoLine / JUMO BlackLine

versions with glass or plastic shaft

201005 Series - pH electrodes
201010 Series - redox electrodes

(1) Version with glass shaft
(2) Version with plastic shaft and push-on protection basket
(3) JUMO BlackLine Version with plastic shaft and integral protection basket

Brief description

Electrodes in the JUMO ecoLine und JUMO BlackLine series are high-quality measuring sensors with an optimum price/performance ratio.
Active pH element: JUMO ecoLine electrodes have been manufactured using the JUMO U glass that has proved itself for many years. JUMO BlackLine electrodes are equipped with the low-resistance JUMO UW glass. This guarantees fast and safe measurement results.
Active redox element: A robust platinum tip ensures reliable measurements and allows simple cleaning of the sensor.
Reference system: The acrylamide-free JUMO gel is used for the glass version and the PEI plastic version. This highly viscous KCl solution lends itself ideally to measurements in general aqueous media. For measurements in media containing few ions, or with high flow rates, the electrolyte can be equipped with an optional “salt reservoir” for a longer operational life. The JUMO BlackLine model employs a polymerized KCl solid electrolyte. The JUMO cartridge-type conduction system – tried and tested for many years – is used as the reference system. So the electrolyte remains free from silver ions and therefore less susceptible to electrode poisons.
In the glass shaft version (1), JUMO ecoLine electrodes feature a ceramic diaphragm. The model with plastic shaft in transparent PEI (2) comes with a glassfiber diaphragm. A push-on proctection basket protects the sensor when used with handheld measuring equipment. The JUMO BlackLine (3) has an open annular-gap diaphragm, the shaft is made from black PPO and features an integral protection basket.
The electrodes can optionally be supplied in a storage receptacle, which is recommended if the sensors are only used sporadically, for refreshing them after lengthy and intensive use, or if stored for an extended period.
All sensors can be supplied as OEM versions to special order.
Special versions are available on request.

Application areas

- Monitoring and treatment of drinking water
- Swimming pools
- Aquariums (also seawater aquariums)
- Greenhouses
- Mildly contaminated domestic/process water, and wastewater
- Rain/pond/surface water
- Handheld meters

Not recommended for:

- Treatment of electroplating-plant water
- Industrial process water, wastewater
- Ultrapure water
- Therapeutic baths
- Biotechnology, sterilizing processes

Additional applications can be found in the data sheets or JUMO tecLine or JUMO labLine pH and redox electrodes.

Technical data

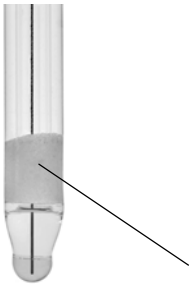
	Version with glass shaft (Fig. 1, page 1/8)	Version with plastic shaft and push-on protection basket (Fig. 2, page1/8)	JUMO BlackLine Version with plastic shaft and integral protection basket (Fig. 3, page 1/8)
Shaft material	glass	PEI[1]	PPO[2]
Diaphragm	ceramic	glass filament	annular gap
Conductive system	plastic cartridge		
Temperature range	0 to +60°C		
Pressure range[3]	0 to 6 bar		
Fitting length	120 mm		
Electrode head	plug cap (S6) plug cap with fixed cable screw cap Pg13.5 (S8) screw cap Pg13.5 with fixed cable		
Active pH element	U glass (pH 0 — 12, briefly pH 14)		UW glass (pH 0 — 12, briefly pH 14)
Active redox element	platinum tip (±2000 mV)		
Electrolyte	gel (highly viscous KCl solution)		solid electrolyte

Extra codes

KCl receptacle, extra code /052

The foot of the KCl receptacle can also be used as a wrench for assembling pH or redox electrodes with a Pg13.5 thread. The recesses on the (removable) foot fit on the hexagon of the electrode head.
When storing the electrodes, the receptacle must be filled with KCl (**not with buffer solution or similar**).

Salt reservoir, extra code /837

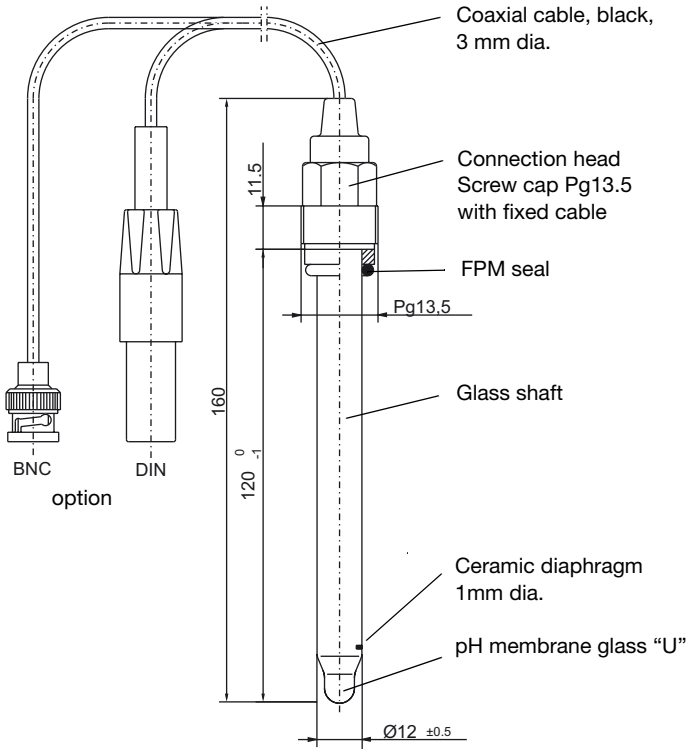


The electrode can optionally be equipped with a salt reservoir in the form of four salt rings (see picture). This reservoir is recommended whenever the electrode is used in media containing few ions, or with high flow rates.
The salt reservoir serves to increase the operational life of the electrode. The rings are not a manufacturing flaw (settling as salt crystals).

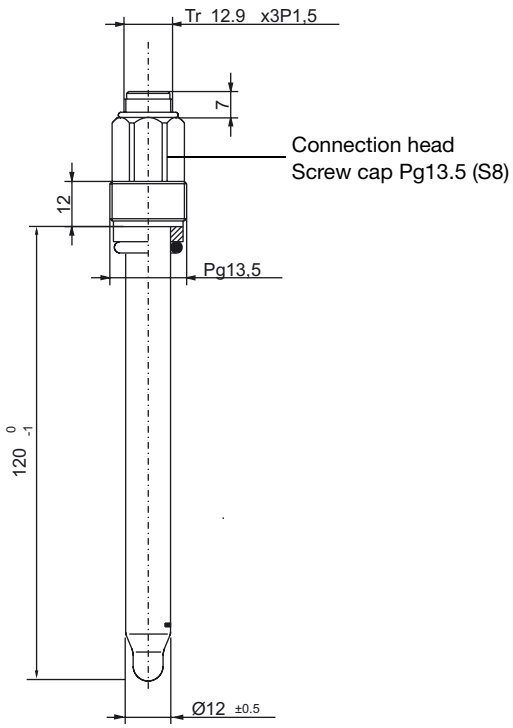
[1] PEI = polyethermide
[2] PPO = polyphenylene oxide
[3] The pressure specified refers to stable conditions at the installation site. Pressure surges or fluctuations should be avoided.

Dimensions

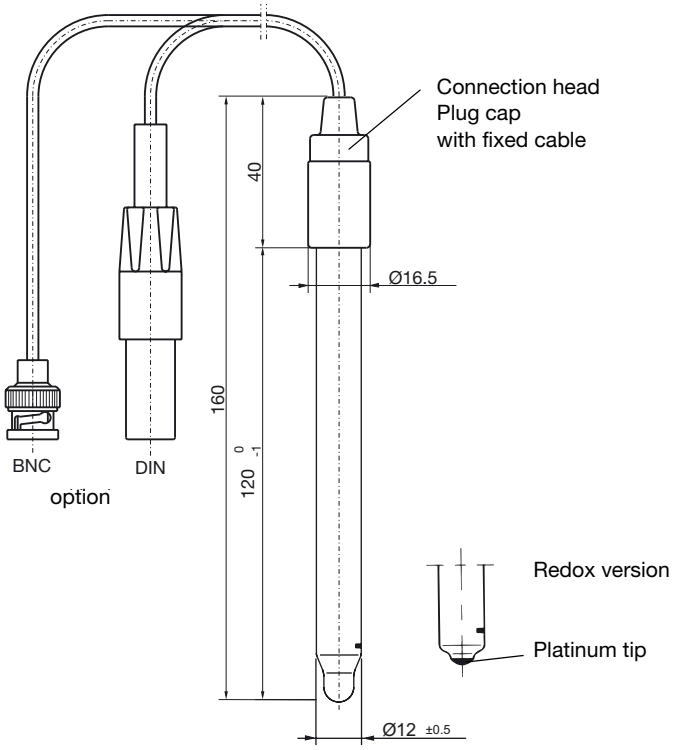
Version with glass shaft



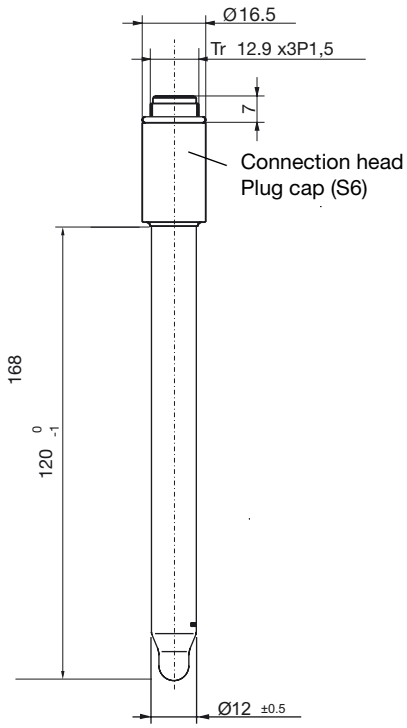
Type 2010xx/51-10-60-xxxx-xx-120/000



Type 2010xx/51-10-22-0000-00-120/000



Type 2010xx/51-10-40-xxxx-xx-120/000



Type 2010xx/51-10-21-0000-00-120/000

Order details:

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

			(1)	**Basic type**
		201005		pH electrodes
		201010		redox electrodes
			(2)	**Basic type extension**
x	x	51		glass version, ceramic diaphragm, gel-sealed, cartridge K
			(3)	**Active element**
x	-	10		U glass (for pH version)
-	x	22		platinum tip (for redox version)
			(4)	**Electrical connection**
o	o	21		plug cap (S6)
o	o	22		screw cap Pg13,5 (S8)
o	o	40		plug cap with fixed cable
o	o	60		screw cap Pg13.5 with fixed cable
			(5)	**Cable length** [1]
o	o	0000		no cable
o	o	xxxx		length in mm (only whole meters, maximum: 10 m), standard length is 1000mm (1 m)
			(6)	**Instrument connector**
o	o	00		none
o	o	76		BNC connector
o	o	78		DIN connector
			(7)	**Fitting length**
x	x	120		120 mm
			(8)	**Extra codes**
x	x	000		none
o	o	052		KCl receptacle
o	o	837		salt reservoir

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		
Order code		/		-		-		-		-		-		/		,	...[2]
Order example	201005	/	51	-	10	-	21	-	1000	-	76	-	120	/	000		

Stock versions

(shipment: 3 working days after receipt of order)

Type	Description	Sales No.
201005/56-10-22-0000-00-120/000	pH, glass shaft, screw cap Pg13.5 (S8)	20/00405532
201010/56-22-22-0000-00-120/000	redox, glass version, screw cap Pg13.5 (S8)	20/00413906

Production version

(shipment: 10 working days after receipt of order)

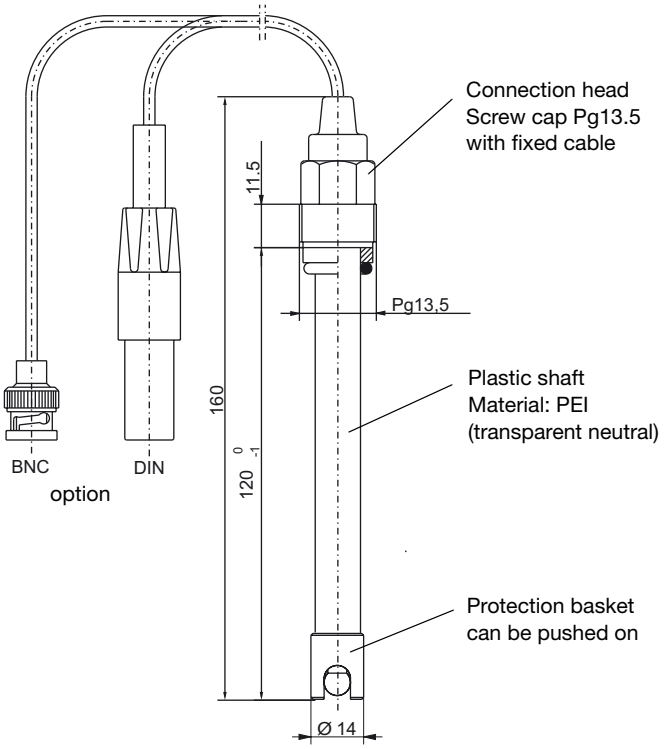
Type	Description	Sales No.
201005/56-10-60-1000-76-120/000	pH, glass shaft, with 1 m fixed cable, screw cap Pg13.5	20/00459671

[1] Only with "electrical connection" 40 or 60.

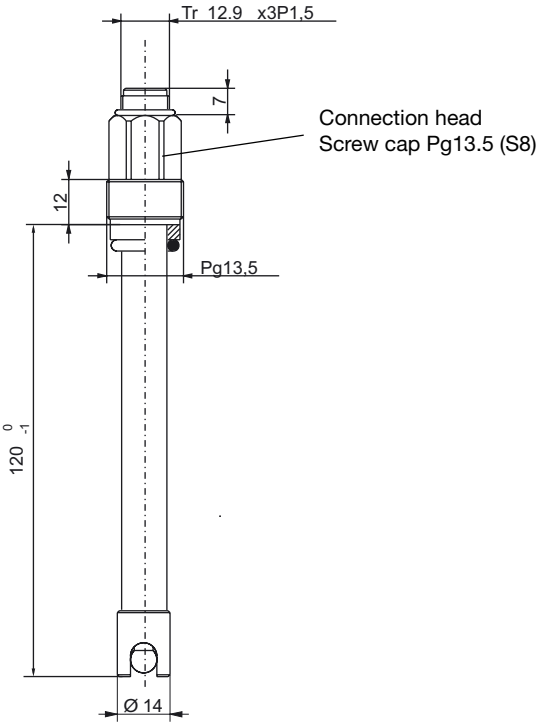
[2] List extra codes in sequence, separated by commas.

Dimensions

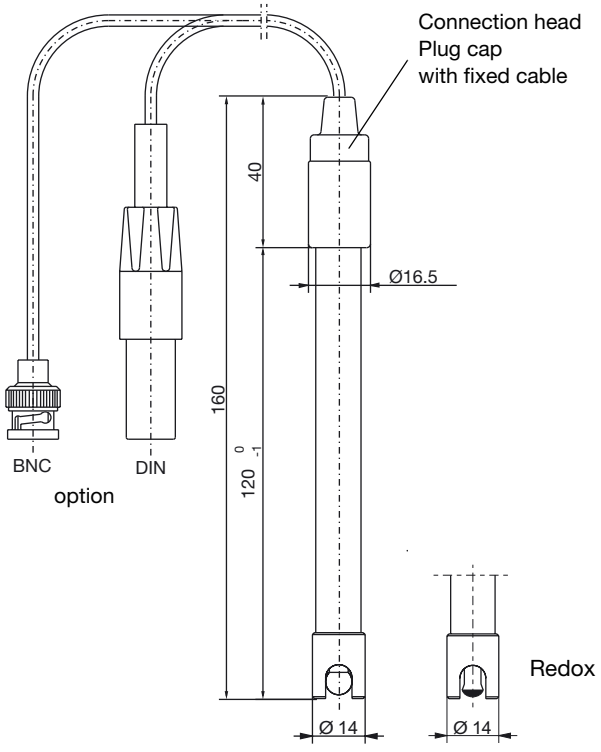
Version with plastic shaft (PEI) and push-on protection basket



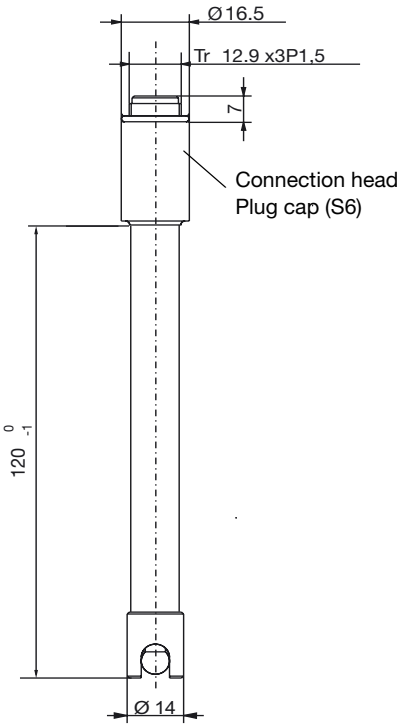
Type 201005/53-10-60-xxxx-xx-120/000 (pH)
Type 201010/53-22-60-xxxx-xx-120/000 (redox)



Type 201005/53-10-22-0000-00-120/000 (pH)
Type 201010/53-22-22-0000-00-120/000 (redox)



Type 201005/53-10-40-xxxx-xx-120/000 (pH)
Type 201010/53-22-40-xxxx-xx-120/000 (redox)



Type 201005/53-10-21-0000-00-120/000 (pH)
Type 201010/53-22-21-0000-00-120/000 (redox)

Order details

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

			(1)	**Basic type**
		201005		pH electrodes
		201010		redox electrodes
			(2)	**Basic type extension**
x	x	53		plastic shaft PEI [1], gel-sealed, glass-filament diaphragm, cartridge K
			(3)	**Active element**
x	-	10		U glass (pH version)
-	x	22		platinum tip (redox version)
			(4)	**Electrical connection**
o	o	21		plug cap (S6)
x	x	22		screw cap Pg13.5 (S8)
o	o	40		plug cap with fixed cable
o	o	60		screw cap Pg13.5 with fixed cable
			(5)	**Cable length [2]**
x	x	0000		no cable
o	o	xxxx		length in mm (only whole meters, maximum: 10 m), standard length 1000mm (1 m)
			(6)	**Instrument connector**
x	x	00		none
o	o	76		BNC connector
o	o	78		DIN connector
			(7)	**Fitting length**
x	x	120		120 mm
			(8)	**Extra codes**
x	x	000		none
o	o	052		KCl receptacle
o	o	837		salt reservoir

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		
Order code		/		-		-		-		-		-		/		,	... [3]
Order example	201005	/	53	-	10	-	21	-	1000	-	76	-	120	/	000		

Stock versions (shipment: 3 working days after receipt of order))

Type	Description	Sales No.
201005/53-10-22-0000-00-120/000	pH, PEI shaft, screw cap Pg13.5 (S8)	20/00357022
201010/51-22-22-0000-00-120/000	redox, PEI shaft, screw cap Pg13.5 (S8)	20/00357020

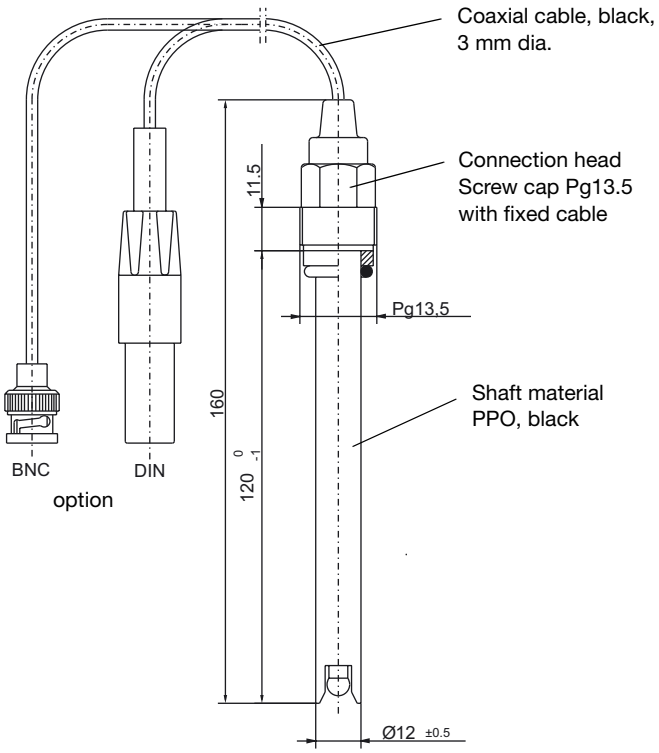
Production versions (shipment: 10 working days after receipt of order)

Type	Description	Sales No.
201005/53-10-40-1000-78-120/000	pH, PEI shaft, 1 m fixed cable, DIN connector	20/00300149
201005/53-10-21-0000-00-120/000	pH, PEI shaft, plug cap (S7)	20/00300192
201005/53-22-40-1000-76-120/000	redox, PEI shaft, 1 m fixed cable, no thread, BNC connector	20/00343525

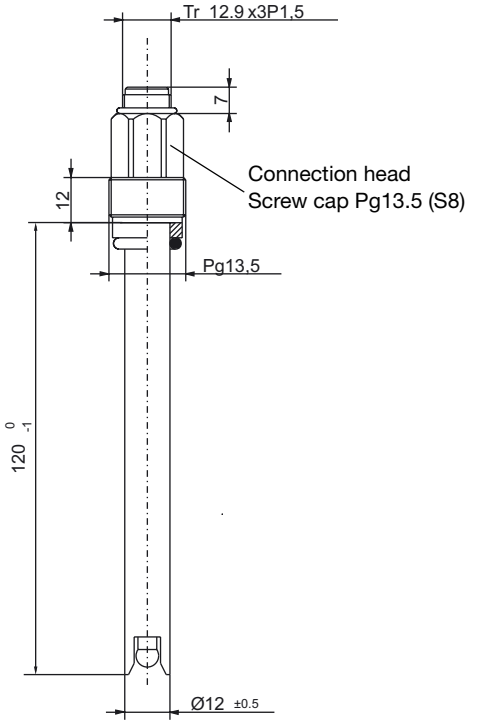
[1] PEI = polyetherimide.
[2] Only with "electrical connection" 40 or 60.
[3] List extra codes in sequence, separated by commas.

Dimensions

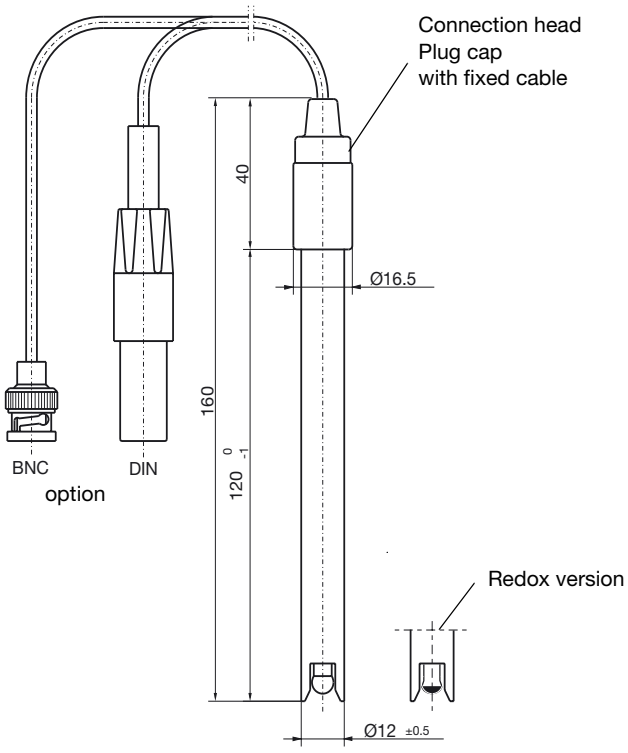
JUMO BlackLine: version with plastic shaft (PPO) and integral protection basket



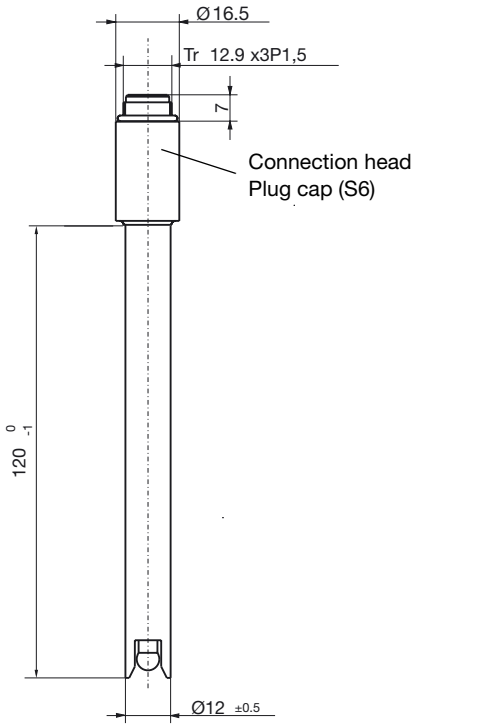
Type 201005/85-18-65-xxxx-xx-120/000 (pH)
Type 201010/85-22-65-xxxx-xx-120/000 (redox)



Type 201005/85-18-22-0000-00-120/000 (pH)
Type 201010/85-22-22-0000-00-120/000 (redox)



Type 201005/85-18-45-xxxx-xx-120/000 (pH)
Type 201010/85-22-45-xxxx-xx-120/000 (redox)



Type 201005/85-18-21-0000-00-120/000 (pH)
Type 201010/85-22-21-0000-00-120/000 (redox)

Order details:

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

			(1)	**Basic type**
		201005		pH electrodes
		201010		redox electrodes
			(2)	**Basic type extension**
x	x	85		BlackLine version, black plastic shaft PPO[1], gel-sealed, annular-gap diaphragm, solid electrolyte, cartridge-style conduction system
			(3)	**Active element**
x	-	18		UW glass (pH version)
-	x	22		platinum tip (redox version)
			(4)	**Electrical connection**
o	o	21		plug cap (S6)
o	o	22		screw cap Pg13.5 (S8)
o	o	45		plug cap with fixed cable
o	o	65		screw cap Pg13.5 with fixed cable
			(5)	**Cable length**[2]
o	o	0000		no cable
o	o	xxxx		length in mm (only whole meters, maximum: 10 m), standard length 1000mm (1 m)
			(6)	**Instrument connector**
o	o	00		none
o	o	76		BNC connector
o	o	78		DIN connector
			(7)	**Fitting length**
x	x	120		120 mm
			(8)	**Extra codes**
x	x	000		none
o	o	052		KCl receptacle
o	o	837		salt reservoir

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		
Order code	[ ]	/	[ ]	-	[ ]	-	[ ]	-	[ ]	-	[ ]	-	[ ]	/	[ ]	,	,,,[3]
Order example	201005	/	54	-	10	-	22	-	2000	-	00	-	120	/	000		

Stock versions

(shipment: 3 working days after receipt of order)

Type	Description	Sales No.
201005/54-18-22-0000-00-120/000	pH, screw cap Pg13.5 (S8), no cable	20/00419812
201005/54-18-45-2000-76-120/000	pH, no thread, 2 m fixed cable, BNC connector	20/00417300
201010/54-22-45-2000-76-120/000	redox, no thread, 2 m fixed cable, BNC connector	20/00417301
201010/54-18-65-2000-76-120/000	pH, with thread Pg13.5, 2 m fixed cable, BNC connector	20/00424828
201010/54-22-65-2000-76-120/000	redox, with thread Pg13.5, 2 m fixed cable, BNC connector	20/00424950

[1] PPO = polyphenylene oxide.
[2] only with "electrical connection" 40 or 60.
[3] List extra codes in sequence, separated by commas.

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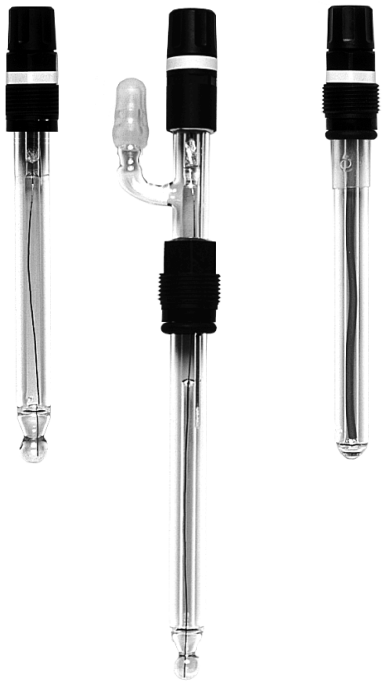
pH and Redox Combination Electrodes JUMO tecLine pH JUMO tecLine Rd

with glass or plastic shaft

201020 Series - pH electrodes

201025 Series - redox electrodes



Brief description

JUMO tecLine electrodes are high-quality sensors for professional application in process and industrial measurement technology. The use of materials and components that meet the highest standards is the distinguishing feature of these electrodes. They are designed as combined electrodes (the glass or metal electrode and the reference electrode are combined in a single shaft). Depending on the type, a temperature probe can additionally be integrated (option). Suitable models are available for the most diverse requirements:

JUMO tecLine

- for industrial and municipal water and wastewater engineering
- for measurement in suspensions and varnishes
- for measurement in low-ion media
- for high-alkaline / high-temperature and sterilization processes
- for media containing fluorides and for low-temperature applications
- PRO version for the toughest operating conditions

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

General notes on the construction of the JUMO tecLine series

All standard electrodes have been manufactured from physiologically safe, FDA-listed materials.

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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
U glass	universal glass	pH 0 — 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 — 14	-5 to +80°C	for highly alkaline media (above pH 12)
HT glass	high-temperature glass	pH 0 — 14	0 to +135°C	for temperatures above 80°C or with highly alkaline media
DS glass	steam-sterilizable glass	pH 0 — 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 — 11	-5 to +50°C	media containing fluoride (hydrofluoric acid) (c(HF) up to 1000 mg/l)
TT glass	low-temperature glass	pH 0 — 12	-30 to +30°C	cooling cycles, low-temperature applications
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

Constructional variations of the reference system (reference electrode)

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

Diaphragm type	Explanation	Possible electrolytes	Typical application / limitations
1 x ceramic diaphragm	high-quality zirconium dioxide diaphragm[1].	highly viscous KCl gel or liquid KCl	general water or wastewater engineering, industrial processes etc.
2 x ceramic diaphragm or 3 x ceramic diaphragm	as above but, due to increased number, more KCl escapes	highly viscous KCl gel or liquid KCl TT glass: low-temperature gel	for polluted or low-ion media (<100 µS/cm); low-temperature applications
Glass fiber diaphragm	glass fiber bundle instead of ceramic diaphragm for electrodes with plastic shaft	highly viscous KCl gel	general water or wastewater engineering (slightly polluted media)
PTFE ring diaphragm	large-area ring diaphragm	highly viscous KCl gel	only with heavily polluted media or e.g. adherent media containing oil
Annular-gap or perforated diaphragm	open transition between solid electrolyte and medium implemented in annular or point form	polymerized solid electrolyte	suspensions, varnishes, media containing solids, heavily polluted media. Not suitable for very pure drinking water and low-ion media
Ground diaphragm	fixed or movable ground element. open transition between electrolyte and medium	liquid KCl	low-ion media (e.g. pure or high-purity water)
Doka types (2-chamber system)	longer diffusion path and double diaphragm separation prevents electrode poisoning	highly viscous gel KCl/KCl bridge	low-ion media (e.g. pure or high-purity water)
		KCl/KNO_3 bridge	in the presence of electrode poisons, cyanides
		solid electrolyte	in the presence of electrode poisons, sulfides

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

Data Sheet 20.1005 JUMO ecoLine pH / Rd
Data Sheet 20.1030 JUMO LabLine or Data Sheet 20.1080 JUMO single sensors

[1] zirconium dioxide diaphragm: high-quality ceramic material of constant porosity. This means optimum diffusion properties.

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JUMO tecLine pH / Rd with ceramic or glass fiber diaphragm for water and process measurement technology

Typical applications

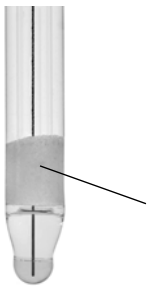
- Industrial and municipal as well as general water and wastewater engineering
- Process measurements, electroplating plant, final checks, neutralization plant
- Drinking and well water, boiler feed water
- Mildly polluted wastewater
- 2-chamber system in the presence of electrode poisons (e.g. sulfides, cyanides, etc.)
- Low-temperature applications (-30 to +30°C), e.g. measurement in cooling plant
- Media containing fluoride (hydrofluoric acid) up to 1000mg/l HF
- High-alkaline applications (reduced alkaline error at pH values > pH 12)

Key features

- High-quality zirconium dioxide diaphragm (glass fiber diaphragm for plastic shaft)
- Cartridge-style conductive system with reference electrolyte (free from silver ions)
- Pressure-resistant versions up to 10 bar (50°C)
- Temperature range: up to -5 to +80°C (+90°C with redox) or -30 to +30°C (with TT version)
- Temperature probes can optionally be integrated
- Optional salt reservoir for extending the operational life in media with low conductivity or in drinking water
- JUMO-HA glass for continuous measurement in the range up to pH 14
- Redox versions with platinum or gold tip up to +/-2000mV

Extra code

Salt reservoir, extra code 837



As an option, the electrode can be provided with a salt reservoir in the form of 4 rings of salt (see diagram). This is recommended if the electrode is used in low-ion media or with high flow-through rates.
The salt reservoir serves to increase the operating life of the electrode. The rings are intentional, and not a manufacturing fault (e.g. crystallization).

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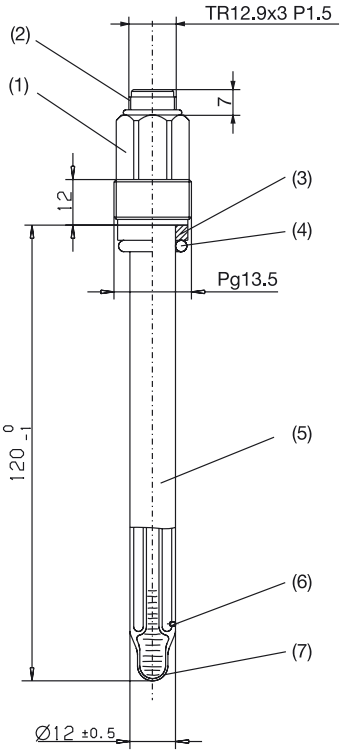
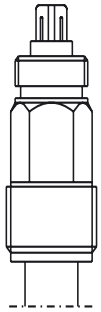
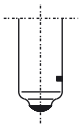
Dimensions





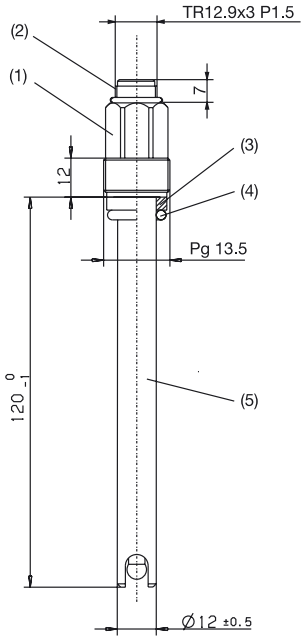
SMEK Pg13.5 threaded cap

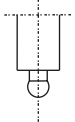


Platinum or gold tip
Type 201025/xx

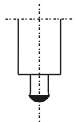
Type 20102x/51

(1) Pg13.5 threaded cap
(2) TR12.9x 3 P1.5 thread
(3) Ring (PSU)
(4) O-ring 10 x 3.5 (FPM70)
(5) Electrode shaft (glass DIN 19 263)
(6) 1 to 3 diaphragm(s) (ceramic / zirconium dioxide 1 mm dia.)
(7) Rounded membrane





pH, without protection basket



Platinum or gold tip
Type 201025/74

Type 20102x/74

(1) Pg13.5 threaded cap
(2) TR12.9x 3 P1.5 thread
(3) Ring (PSU)
(4) O-ring 10 x 3.5 (FPM70)
(5) Electrode shaft (PSU plastic)

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JUMO tecLine pH / Rd
pH / redox combination electrodes
for water and process measurement technology

Order details

			(1)	**Basic type**
		201020		pH combination electrode JUMO tecLine pH
		201025		redox combination electrode JUMO tecLine Rd
			(2)	**Basic type extension**
x	x	51		glass shaft / gel-sealed / cartridge-style conductive system
o	o	72		plastic shaft PEI with protection basket / gel-sealed / glass silk diaphragm / cartridge-style conductive system
o	o	73		PSU plastic shaft, no protection basket / gel-sealed / glass silk diaphragm / cartridge-style conductive system [1]
o	o	74		PSU plastic shaft with protection basket / gel-sealed / glass silk diaphragm / cartridge-style conductive system [1]
			(3)	**Active component**
x	-	10		U glass / pH 0 — 12 (briefly 14) / -5 to +80°C
o	-	11		C glass / pH 0 — 12 / -5 to +50°C / fluoride-resistant
o	-	13		TT glass / pH 0 — 12 / -30 to +30°C / low-temperature[2]
o	-	17		HA glass / pH 0 — 14 / -5 to +80°C / high-alkaline application
-	x	22		platinum tip / redox range +/-2000 mV / -5 to +90°C
-	o	32		gold tip / redox range +/-2000 mV / -5 to +90°C
			(4)	**Diaphragm**
o	o	05		1 x glass silk diaphragm[3]
x	x	07		1 x zirconium dioxide diaphragm (special ceramic)
o	o	08		2 x zirconium dioxide diaphragm (special ceramic)
o	o	09		3 x zirconium dioxide diaphragm (special ceramic)
			(5)	**Connection**
o	-	17		SMEK Pg13.5 threaded cap [4]
x	x	22		Pg 13.5 threaded cap (S8)
			(6)	**Fitting length**
x	x	120		fitting length 120 mm (standard)
o	o	225		fitting length 225 mm
				other lengths on request
			(7)	**Extra codes**
o	o	000		none
x	x	837		salt reservoir
o	o	838		2-chamber system (DOKA) with KCl/KCl bridge
o	o	839		2-chamber system (DOKA) with KCl/KNO_3 bridge[5]
o	-	840		with Pt100 temperature probe
o	-	841		with Pt1000 temperature probe

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		
Order code		/		-		-		-		-		/		.	...[6]
Order example	201020	/	51	-	10	-	07	-	22	-	120	/	837	.	

[1] available in fitting length 225 only
[2] only in conjunction with diaphragm 09
[3] only with basic type extension 72, 73 or 74
[4] for electrodes with extra code 840 or 841
[5] not in conjunction with active component 11, 13 or 17
[6] List extra codes in sequence, separated by commas

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Stock items for pH (shipment within 3 working days from receipt of order)

Type	Brief description	Sales No.
201020/51-10-07-21-120/837	glass shaft, gel-sealed, zirconium dioxide diaphragm, threaded cap (S8), 120 mm, salt reservoir	20/00300151
201020/51-10-07-22-120/000	glass shaft, gel-sealed, zirconium dioxide diaphragm, threaded cap (S8), 120 mm,	20/00300148
201020/52-10-07-17-120/837, 840	glass shaft, gel-sealed, zirconium dioxide diaphragm, SMEK threaded cap, 120 mm, salt reservoir, integrated Pt100	20/00351265
201020/51-17-07-22-120/837	glass shaft, gel-sealed, zirconium dioxide diaphragm, threaded cap (S8), 120 mm (highly alkaline applications)	20/00408953
201020/74-10-05-22-225/000	plastic shaft PSU with protection basket, gel-sealed, glass silk diaphragm, threaded cap (S8), 225 mm	20/00354295
201020/73-10-05-22-225/000	plastic shaft PSU, no protection basket, gel-sealed, glass silk diaphragm, threaded cap (S8), 225 mm	20/00330857
201020/72-10-05-22-120/837, 838	plastic shaft PEI with protection basket, gel-sealed, glass silk diaphragm, threaded cap (S8), 120 mm, salt reservoir, 2-chamber system	20/00303398

Non-stock items for pH (shipment within 10 working days from receipt of order)

Type	Brief description	Sales No.
201020/51-10-07-22-225/000	glass shaft, gel-sealed, zirconium dioxide diaphragm, threaded cap (S8), 225 mm,	20/00399535
201020/51-11-07-22-120/000	glass shaft, gel-sealed, zirconium dioxide diaphragm, threaded cap (S8), 120 mm	20/00375623
201020/72-10-05-17-120/840	plastic shaft PEI with protection basket, gel-sealed, glass silk diaphragm, SMEK threaded cap (S8), 120mm, integrated Pt100	20/00364282

Stock items for redox (shipment within 3 working days from receipt of order)

Type	Brief description	Sales No.
201025/52-22-07-22-120/837	glass shaft, gel-sealed, platinum tip, zirconium dioxide diaphragm, threaded cap (S8), 120 mm, salt reservoir	20/00300397
201025/52-32-07-22-120/837	glass shaft, gel-sealed, gold tip, zirconium dioxide diaphragm, threaded cap (S8), 120 mm, salt reservoir	20/00300396
201025/74-22-07-22-120/837, 838	plastic shaft PEI no protection basket, gel-sealed, platinum tip, glass silk diaphragm, threaded cap (S8), 120 mm, salt reservoir, 2-chamber version	20/00084011

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JUMO tecLine pH / Rd for wastewater, heavily polluted media, suspensions, varnishes

Typical applications

- Industrial wastewater engineering
- Process measurements, electroplating plant, paper industry, drinks industry
- Wastewater containing oil
- Suspensions, varnishes, media containing solid particles
- 2-chamber system in the presence of electrode poisons
- Media containing fluoride (hydrofluoric acid) up to 1000mg/l HF

Key features

- Dirt-repellent PTFE ring diaphragm with highly viscous KCl solution (gel) or perforated or annular-gap diaphragm with polymerized solid electrolyte - effectively blockage-free
- Cartridge-style conductive system with reference electrolyte (free from silver ions)
- Pressure-resistant versions up to 10 bar (50°C)
- Temperature range: see order details
- Temperature probes can optionally be integrated
- Optional salt reservoir for extending the operational life in low-conductivity media

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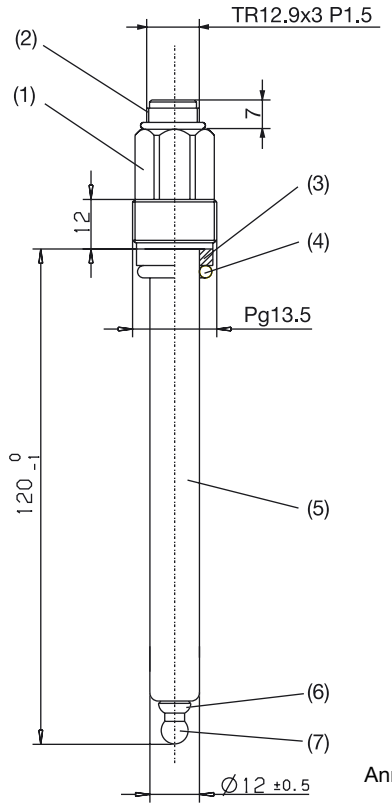
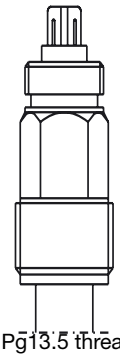
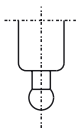
Dimensions

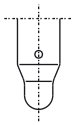




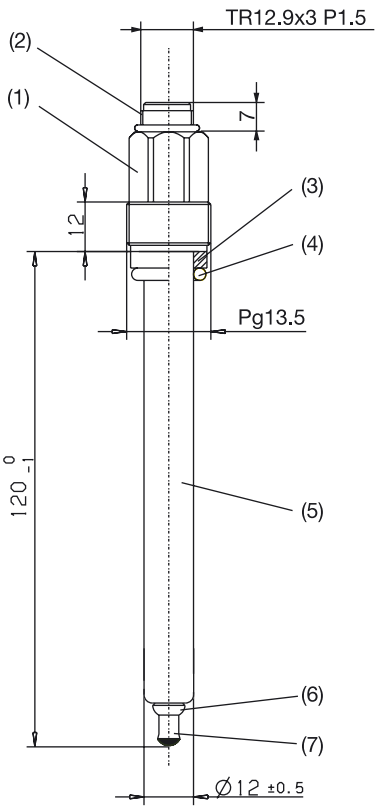
SMEK Pg13.5 threaded cap



Annular-gap diaphragm



Perforated diaphragm



Type 201020/51

(1) Pg13.5 threaded cap
(2) TR12.9x3 P1.5 thread
(3) Ring (PSU)
(4) O-ring 10 x 3.5 (FPM70)
(5) Electrode shaft (glass DIN 19 263)
(6) Ring diaphragm (PTFE)
(7) Rounded membrane

Type 201025/51

(1) Pg13.5 threaded cap
(2) TR12.9x3 P1.5 thread
(3) Ring (PSU)
(4) O-ring 10 x 3.5 (FPM70)
(5) Electrode shaft (glass DIN 19 263)
(6) Ring diaphragm (PTFE)
(7) Platinum or gold tip

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JUMO tecLine pH / Rd
pH / redox combination electrodes for wastewater, heavily polluted media, suspensions, varnishes

Order details

			(1)	**Basic type**
		201020		pH combination electrode JUMO tecLine pH
		201025		redox combination electrode JUMO tecLine Rd
			(2)	**Basic type extension**
x	x	51		glass shaft / gel-sealed / cartridge-style conductive system
			(3)	**Active component**
x	-	10		U glass / pH 0 — 12 (briefly 14) / -5 to +80°C
o	-	11		C glass / pH 0 — 12 / -5 to +50°C / fluoride-resistant
o	-	13		TT glass / pH 0 — 12 / -30 to +30°C
o	-	17		HA glass / pH 0 — 14 / -5 to +80°C / high-alkaline application
-	x	22		platinum tip / redox range +/-2000 mV / -5 to +90°C
-	o	32		gold tip / redox range +/-2000 mV / -5 to +90°C
			(4)	**Diaphragm**
x	x	04		PTFE ring diaphragm
o	o	10		annular-gap diaphragm / gel from polymerized solid electrolyte (“no diaphragm”) [1]
o	o	11		perforated diaphragm / gel from polymerized solid electrolyte (“no diaphragm”) [1]
			(5)	**Connection**
o	-	17		SMEK Pg13.5 threaded cap [1]
x	x	18		VP head, Pg 13.5 threaded cap [1]
x	x	22		Pg 13.5 threaded cap (S8)
			(6)	**Fitting length**
x	x	120		fitting length 120 mm (standard)
o	o	225		fitting length 225 mm [3]
				andere Längen auf Anfrage
			(7)	**Extra codes**
o	o	000		none
x	x	837		salt reservoir [3]
o	o	838		2-chamber system (DOKA) with KCl/KCl bridge [2, 3]
o	o	839		2-chamber system (DOKA) with KCl/KNO_3 bridge [2, 4]
o	-	840		with Pt100 temperature probe [5]
o	-	841		with Pt1000 temperature probe [5]
o	-	842		flat membrane

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Order code		/		-		-		-		-		/		, ...[6]
Order example	201020	/	51	-	10	-	04	-	22	-	120	/	837	

[1] for electrodes with extra code 840 or 841.
[2] not in conjunction with diaphragm 10 or 11.
[3] not in conjunction with active component 17.
[4] not in conjunction with active component 11, 13 or 17.
[5] only with connection 17.
[6] List extra codes in sequence, separated by commas.

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Stock items for pH (shipment within 3 working days from receipt of order)

Type	Brief description	Sales No.
201020/51-10-04-22-120/000	glass shaft, gel-sealed, PTFE diaphragm, threaded cap (S8), 120 mm,	20/00327907
201020/51-10-04-22-120/837	glass shaft, gel-sealed, PTFE diaphragm, threaded cap (S8), 120 mm, salt reservoir	20/00321035
201020/51-10-04-22-225/837	glass shaft, gel-sealed, PTFE diaphragm, threaded cap (S8), 225 mm, salt reservoir	20/00327142
201020/51-17-04-22-120/837	glass shaft, gel-sealed, PTFE diaphragm, threaded cap (S8), 120 mm (highly alkaline applications)	20/00332794

Non-stock items for pH (shipment within 10 working days from receipt of order)

Type	Brief description	Sales No.
201020/51-10-04-17-120/840	glass shaft, gel-sealed, PTFE diaphragm, SMEK threaded cap, 120 mm, integrated Pt100	20/00383865
201020/51-10-04-22-225/000	glass shaft, gel-sealed, PTFE diaphragm, threaded cap (S8), 225 mm	20/00372505
201020/51-10-10-22-120/837	glass shaft, gel-sealed, annular-gap diaphragm and solid electrolyte, threaded cap (S8), 120 mm, salt reservoir	20/00446112
201020/51-10-11-22-120/837	glass shaft, gel-sealed, perforated diaphragm and solid electrolyte, threaded cap (S8), 120mm, salt reservoir	20/00445428
201020/51-10-11-17-120/837, 840	glass shaft, gel-sealed, perforated diaphragm and solid electrolyte, SMEK threaded cap, 120mm, salt reservoir, integrated Pt 100	20/00468525
201020/51-10-10-17-120/837, 840	glass shaft, gel-sealed, annular-gap diaphragm and solid electrolyte, SMEK threaded cap, 120mm, salt reservoir, integrated Pt 100	20/00468524
201020/51-10-04-22-120/837, 842	glass shaft, gel-sealed, PTFE diaphragm, threaded cap, 120 mm, salt reservoir, flat membrane	20/00460412
201020/51-11-04-17-120/840	glass shaft, gel-sealed, PTFE diaphragm, SMEK threaded cap, 120 mm, integrated Pt100	20/00410112
201020/51-11-04-22-120/000	glass shaft, gel-sealed, PTFE diaphragm, threaded cap (S8), 120 mm	20/00376194

Stock items for redox (shipment within 3 working days from receipt of order)

Type	Brief description	Sales No.
201025/52-22-04-22-120/837	glass shaft, gel-sealed, platinum tip, PTFE diaphragm, threaded cap (S8), 120 mm, salt reservoir	20/00321746

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Internet: www.jumo.us

JUMO tecLine pH / Rd for high-temperature and sterilization applications

Typical applications

- Processes with permanently elevated temperatures (up to 135°C max.)
- Sterilization applications
- 2-chamber system in the presence of electrode poisons
- Media containing fluoride (hydrofluoric acid) up to 1000mg/l HF

Key features

- Proven JUMO HT glass (pH high-temperature membrane glass) 0 — 14 pH
- JUMO DS membrane glass for sterilization applications
- Cartridge-style conductive system with reference electrolyte (gel) free from silver ions
- Pressure-resistant versions up to 10 bar (50°C)
- Temperature range: 0 to 135°C [1]
- Temperature probes can optionally be integrated
- Redox versions with platinum or gold tip up to +/-2000 mV

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

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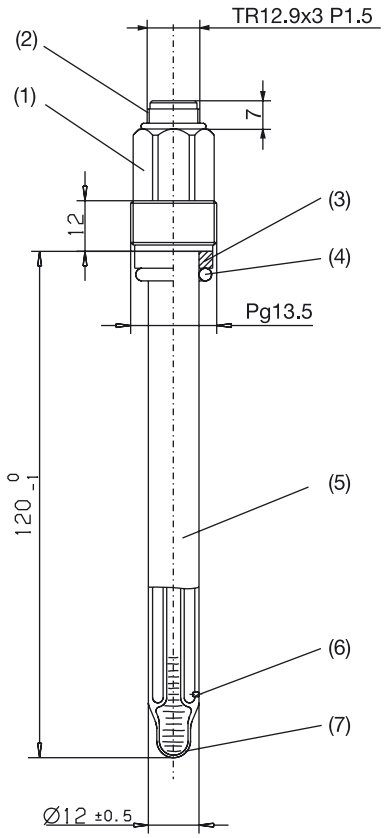
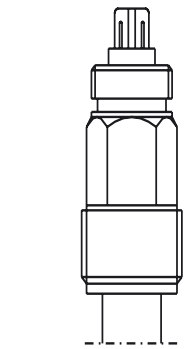
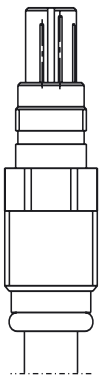
Dimensions

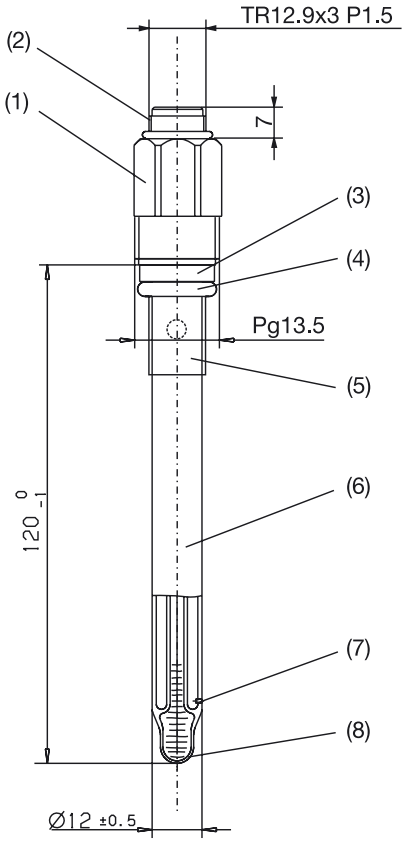


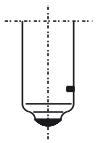


SMEK Pg13.5 threaded cap

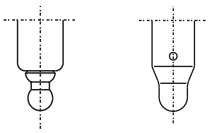


VP Pg13.5 threaded cap





Platinum or gold tip
Type 201025/xx



annular-gap / perforated
diaphragm

Type 20102x/51

(1) Pg13.5 threaded cap
(2) TR12.9x3 P1.5 thread
(3) Ring (PSU)
(4) O-ring 10 x 3.5 (FPM70)
(5) Electrode shaft (glass DIN 19 263)
(6) 1 to 3 diaphragm(s) (ceramic / zirconium dioxide 1 mm dia.)
(7) Rounded membrane

Type 20102x/52

(1) Pg13.5 threaded cap
(2) TR12.9x3 P1.5 thread
(3) Ring (PSU)
(4) O-ring 10 x 3.5 (FPM70)
(5) Tubular seal
(6) Electrode shaft (glass DIN 19 263)
(7) Diaphragm (ceramic / zirconium dioxide 1 mm dia.)
(8) Rounded membrane

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JUMO tecLine pH / Rd
pH / redox combination electrodes
for high-temperature and sterilization applications

Order details

			(1)	**Basic type**
		201020		pH combination electrode JUMO tecLine pH
		201025		redox combination electrode JUMO tecLine Rd
			(2)	**Basic type extension**
x	x	75		glass shaft / HT gel (high-temperature) / sealed / cartridge-style conductive system
			(3)	**Active component**
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 min 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
			(4)	**Diaphragm**
x	x	07		1 x zirconium dioxide diaphragm (special ceramic)
o	o	08		2 x zirconium dioxide diaphragm (special ceramic)
o	o	09		3 x zirconium dioxide diaphragm (special ceramic)
o	o	10		annular-gap diaphragm / gel from polymerized solid electrolyte (“no diaphragm”) [1]
o	o	11		perforated diaphragm / gel from polymerized solid electrolyte (“no diaphragm”) [1]
			(5)	**Connection**
o	-	17		SMEK Pg13.5 threaded cap [1]
o	-	18		VP Pg13.5 threaded cap [1]
x	x	22		Pg 13.5 threaded cap (S8)
			(6)	**Fitting length**
x	x	120		fitting length 120 mm (standard)
o	o	225		fitting length 225 mm
				other lengths on request
			(7)	**Extra codes**
o	o	000		none
o	-	840		with Pt100 temperature probe [2]
o	-	841		with Pt1000 temperature probe [2]

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code		/		-		-		-		-		/	
Order example	201020	/	75	-	12	-	07	-	22	-	120	/	000

[1] for electrodes with extra code 840 or 841
[2] only with connection 17

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Stock items for pH (shipment within 3 working days from receipt of order)

Type	Brief description	Sales No.
201020/75-12-07-22-120/000	glass shaft, gel-sealed, HT gel, zirconium dioxide diaphragm, threaded cap (S8), 120 mm (high-temperature applications)	20/00304030

Non-stock items for pH (shipment within 10 working days from receipt of order)

Type	Brief description	Sales No.
201020/75-14-07-17-120/840	glass shaft, gel-sealed, HT gel, zirconium dioxide diaphragm, SMEK threaded cap, 120 mm (for sterilization processes)	20/00410027
201020/75-14-07-22-120/000	glass shaft, gel-sealed, HT gel, zirconium dioxide diaphragm, threaded cap (S8), 120 mm (for sterilization processes)	20/00430366
201020/75-11-10-22-120/837	glass shaft, gel-sealed, solid electrolyte , perforated diaphragm, threaded cap (S8), 120mm	20/00468301
201020/75-12-11-17-120/840	glass shaft, gel-sealed, solid electrolyte , perforated diaphragm, SMEK threaded cap, 120mm (high-temperature applications)	20/00449510

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JUMO tecLine pH / Rd with liquid KCl filling, refillable

Typical applications

- Low-ion media (including high-purity water)
- 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 or ground diaphragm
- Cartridge-style conductive system. Refillable KCl solution (free from silver ions)
- Temperature range: up to -10 to +135°C [1]
- Redox versions with platinum or gold tip up to +/-2000mV

[1] Depending on the type of glass

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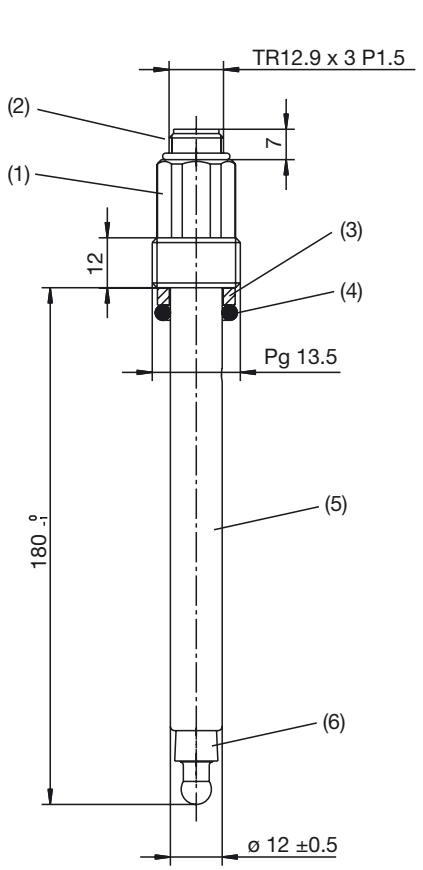
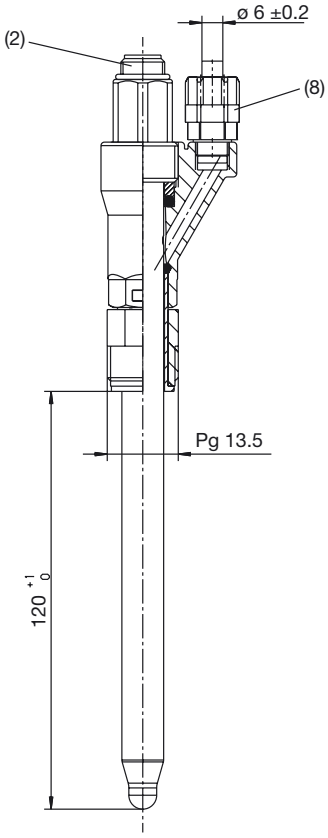
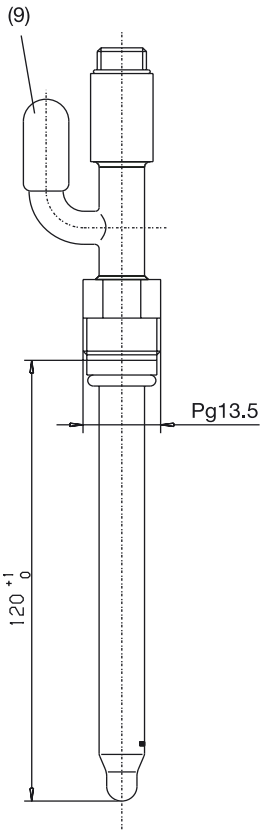
Dimensions

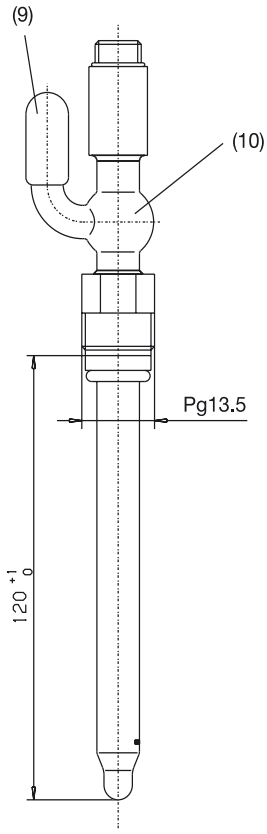


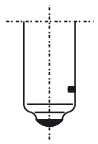
Electrode has a ground diaphragm (fixed element)



Electrode is prepared for pressure head







Platinum or gold tip
Type 201025/xx

Type 201020/xx

(1) Pg13.5 threaded cap
(2) TR12.9x3 P1.5 thread
(3) Ring (PSU)
(4) O-ring 10 x 3.5 (FPM70)
(5) Electrode shaft (glass DIN 19 263)
(6) 1 to 3 diaphragm(s) (ceramic / zirconium dioxide 1 mm dia.)
(7) Rounded membrane (universal glass 40 — 60 MΩ)
(8) Pressure head
(9) Tube nipple
(10) Spherically enlarged shaft

Extra code

KCl connection, extra code 829
Material: PPO (polyphenylene oxide)
Temperature range: 0 to 105°C, briefly to +130°C
Pressure range: max. 10 bar (25°C)

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JUMO tecLine pH / Rd
pH / redox combination electrodes with liquid KCl filling, refillable

Order details

			(1)	**Basic type**
		201020		pH combination electrode JUMO tecLine pH
		201025		redox combination electrode JUMO tecLine Rd
			(2)	**Basic type extension**
x	x	76		glass shaft / KCl liquid electrolyte / cartridge-style conductive system
			(3)	**Active component**
x	-	10		U 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 highly alkaline applications)
o	-	14		DS glass / pH 0 — 12 / 0 to +80°C (up to 135°C for 20 minutes max.)
-	x	22		platinum tip / redox range +/-2000 mV / -5 to +90°C
-	o	32		gold tip / redox range +/-2000 mV / -5 to +90°C
			(4)	**Diaphragm**
x	x	07		1 x zirconium dioxide diaphragm (special ceramic)
o	o	08		2 x zirconium dioxide diaphragm (special ceramic)
o	o	09		3 x zirconium dioxide diaphragm (special ceramic)
o	-	14		ground diaphragm (fixed element)
			(5)	**Connection**
x	x	19		tube nipple, spherically enlarged shaft and Pg 13.5 thread (S8) cemented on
x	x	20		tube nipple and Pg 13.5 thread (S8) cemented on
x	x	22		Pg 13.5 threaded cap (S8)
			(6)	**Fitting length**
x	x	120		fitting length 120 mm (standard)
o	o	180		effective fitting length 120 mm, but glass length 180 mm for use with pressure head (extra code 833)
o	o	225		fitting length 225 mm
			(7)	**Extra codes**
o	o	000		none
o	o	829		KCl connection
o	-	833		prepared for pressure head (select fitting length 180 mm)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)	
Order code		/		-		-		-		-		/		
Order example	201020	/	76	-	10	-	07	-	22	-	120	/	837	000

[1] only in conjunction with extra code 829

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Non-stock items for pH (shipment within 10 working days from receipt of order)

Type	Brief description	Sales No.
201020/76-10-13-22-180/833	KCl liquid electrolyte, ground diaphragm (fixed element), threaded cap (S8), 180 mm, for use with pressure head	20/00373781
201020/76-10-08-22-180/829	replacement electrode for pressure head / KCl connection glass shaft, liquid KCl electrolyte, 2 x zirconium dioxide diaphragm, fitting length 180 mm	20/00373964
201020/76-10-14-22-180/829	replacement electrode for pressure head / KCl connection glass shaft, liquid KCl electrolyte, ground diaphragm (fixed element), fitting length 180 mm	20/00373781
201020/76-12-07-20-120/000	glass shaft, liquid KCl electrolyte, zirconium dioxide diaphragm, tube nipple with cemented-on Pg 13.5 screw fitting, 120 mm	20/00300160

Accessories

Type	Sales No.
KCl connection	20/00475617
pressure head	20/00390360
KCl reservoir, pressure-resistant, for wall mounting.	20/00060254
For setting up an electrolyte bridge or when using KCl-filled electrodes.	
250 ml 3-molar KCl solution, packed in units of 5 (see also Data Sheet 20.2900)	20/00306215

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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-...)

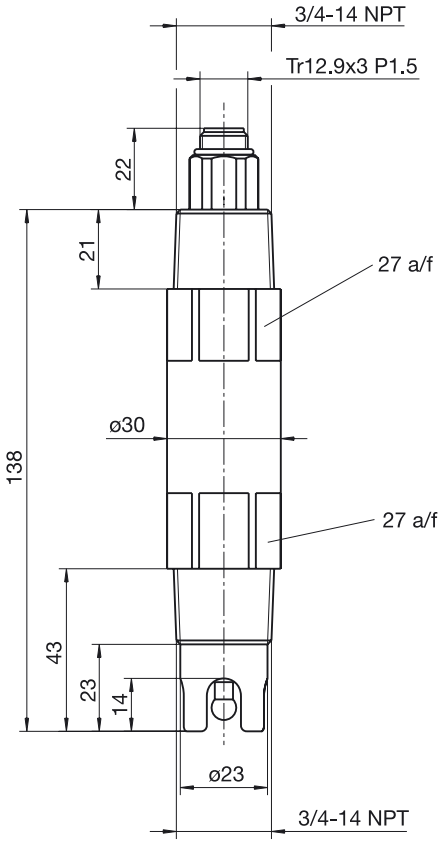
Gernal description

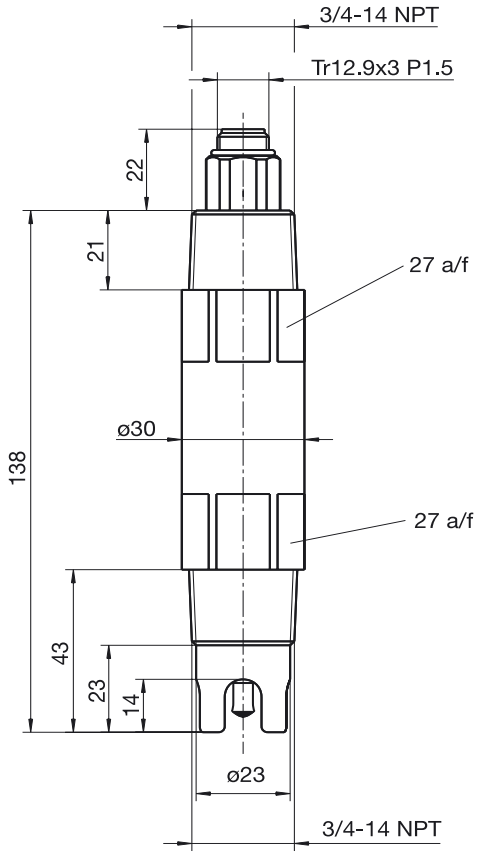
Electrodes in the 201020(25)/79 series are distinguished by high mechanical and chemical resistance. Thanks to the tough PVDF housing, they are practically unbreakable. The electrolyte for the combination electrode guarantees stable measurement, even in critical media containing sulfides.
A Pt1000 temperature sensor is integrated, and the electrodes can be manufactured as pH or redox electrodes, according to the application. An annular-gap diaphragm is used.

Areas of application

- Chemical industry
- Wastewater treatment
- Clarification plant
- Paper industry

Dimensions





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Order details

			(1)	**Basic type**
		201020		JUMO tecLine PRO pH
		201025		JUMO tecLine PRO Redox
			(2)	**Basic type extension**
x	x	79		process electrode
			(3)	**Active component**
x		10		U glass, -5 to +80 °C; pH 0 — 12 (briefly pH 14)
o		12		HT glass, 0 to 110 °C; pH 0 — 14
	x	22		platinum tip, 0 to 110 °C; ±2000 mV
	o	32		gold tip, 0 to 110 °C; ±2000 mV
			(4)	**Diaphragm**
o	o	10		annular-gap diaphragm; gel made from polymerized solid electrolyte (“no diaphragm“)
			(5)	**Electrical connection**
o	o	17		SMEK cap
x	x	22		threaded cap
			(6)	**Extra codes**
x	x	000		none
x		837		salt reservoir
x		841		integrated Pt1000

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code		/		-		-		-		-		/	
Order example	201020	/	79	-	12	-	10	-	22	-	43	/	841

Non-stock items for pH (shipment within 10 working days from receipt of order)

Type	Brief description	Sales No.
201020/79-10-10-17/837, 841	SMEK cap, solid electrolyte, annular-gap diaphragm, salt reservoir, Pt1000	20/00468776
201020/79-10-10-22/837	threaded cap, solid electrolyte, annular-gap diaphragm, salt reservoir	20/00468999
201020/79-12-10-17/837, 841	SMEK cap, solid electrolyte, annular-gap diaphragm, salt reservoir, Pt1000	20/00470258
201020/79-12-10-22/837	threaded cap, solid electrolyte, annular-gap diaphragm, salt reservoir	20/00469853

Accessories

Type	Sales No.
SMEK connecting cable, 5 m, type 2994-10(5)-0	20/00347843
SMEK connecting cable, 10 m, type 2994-10(10)-0	20/00346442

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

JUMO Instrument Co. Ltd.
JUMO House
Temple Bank, Riverway
Harlow, Essex CM 20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.
8 Technology Boulevard
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

pH and Redox Combination Electrodes JUMO labLine pH JUMO labLine Rd

with glass or plastic shaft

201030 Series - pH electrodes

(former type code 2GE-1-...)

201035 Series - redox electrodes

(former type code 2ME-1-...)

Type 201030/51-xx-07-40-...

Type 201035/51-xx-07-21-...

Brief description

JUMO labLine 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.
JUMO labLine electrodes are suitable for all measurements in liquid media. They offer a high degree of measurement accuracy and reliability for all applications.

A special electrode is available for the ion-selective measurement of ammonia, see page 11.

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 sliver 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 and ground diaphragms are available for special applications.

Electrical connection: The electrical connection of the sensors is made through:

- S6 plug cap
- plug cap with attached cable
- SMEK plug cap for electrodes with integrated temperature probe

JUMO labLine 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 the JUMO labLine sensors

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

Area of application

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

Active elements of the pH or redox electrode

Membrane glass or active component	Designation	pH or redox range	Temperature range	Typical application
U 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 c(HF) up to 1000 mg/l
Platinum tip	redox measurement	+/- 2000 mV	-10 to +135°C	general redox measurements
Gold tip	redox measurement	+/- 2000 mV	-10 to +135°C	highly oxidizing redox applications

Constructional variations of the reference system (reference electrode)

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

Diaphragm type	Explanation	Possible electrolytes	Typical application / limitations
1 x ceramic diaphragm	high-quality zirconium dioxide diaphragm[1].	highly viscous KCl gel or liquid KCl	general liquid media
2 x ceramic diaphragm or 3 x ceramic diaphragm	as above, but due to increased number, more KCl escapes	highly viscous KCl gel or liquid KCl with TT glass: low-temperature gel	for polluted or low-ion media; low-temperature applications
Glass fiber diaphragm	glass fiber bundle instead of ceramic diaphragm for electrodes with plastic shaft	highly viscous KCl gel	general liquid media
Ground diaphragm	fixed or movable ground element; open transition between electrolyte and medium	liquid KCl	low-ion media (e.g. pure or high-purity water)
Doka types (2-chamber system)	longer diffusion path and double diaphragm separation prevents electrode poisoning	highly viscous gel KCl/KCl bridge	low-ion media (e.g. pure or high-purity water)
		KCl/KNO_3 bridge	in the presence of electrode poisons, cyanides
		solid electrolyte	in the presence of electrode poisons, sulfides

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

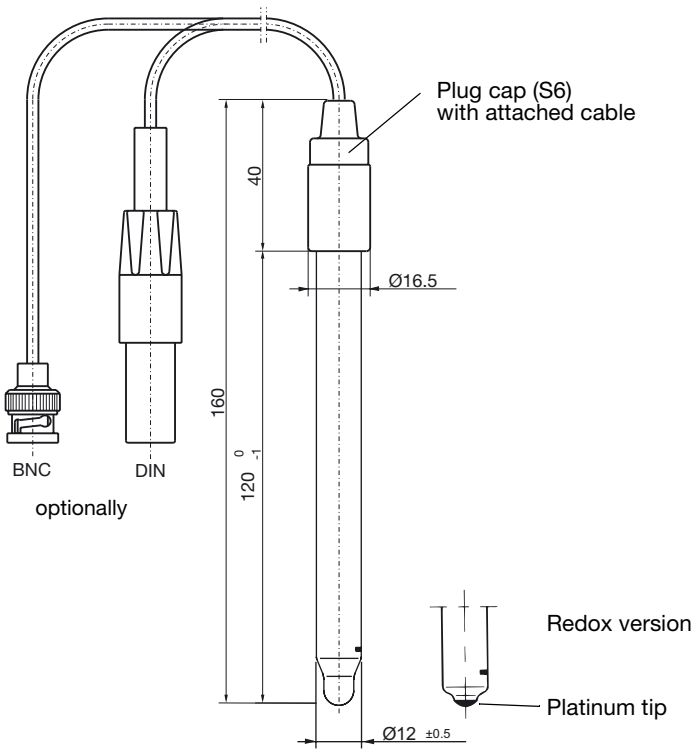
data sheet 20.1005 JUMO ecoLine pH / Rd
data sheet 20.1080 JUMO pH / Rd single sensors, diaphragm tubes, compensation thermometers, multitrode
1 zirconium dioxide diaphragm: high-quality ceramic material of constant porosity. This means optimum diffusion properties.

JUMO labLine pH / Rd with glass or plastic shaft PEI / PSU

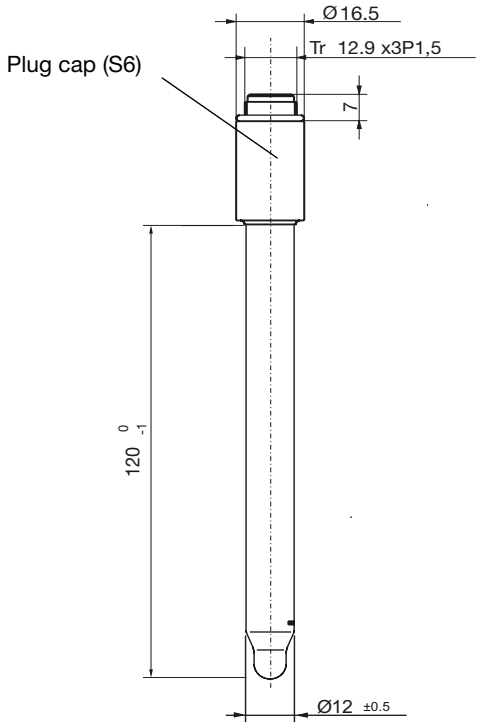
Key features

- 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
- Temperature probes can optionally be integrated
- Optional salt reservoir for extending the operational life in low-conductivity media
- Redox versions with platinum or gold tip up to +/-2000 mV

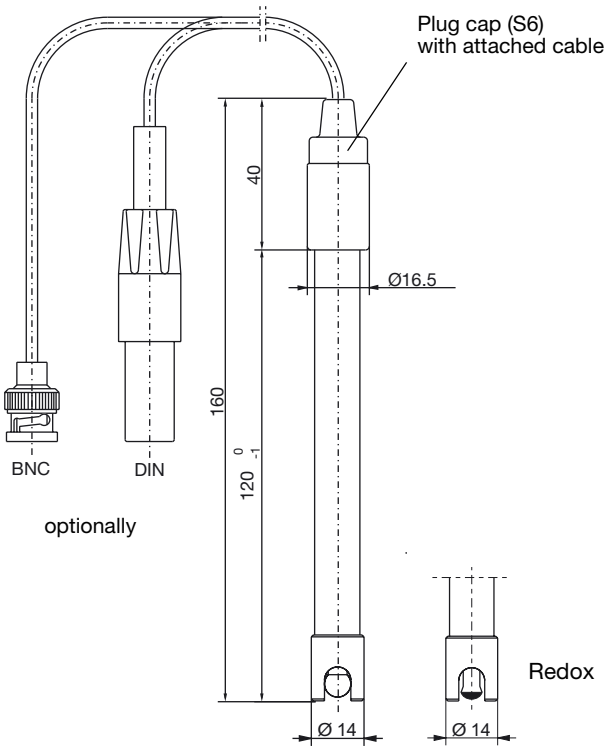
Dimensions



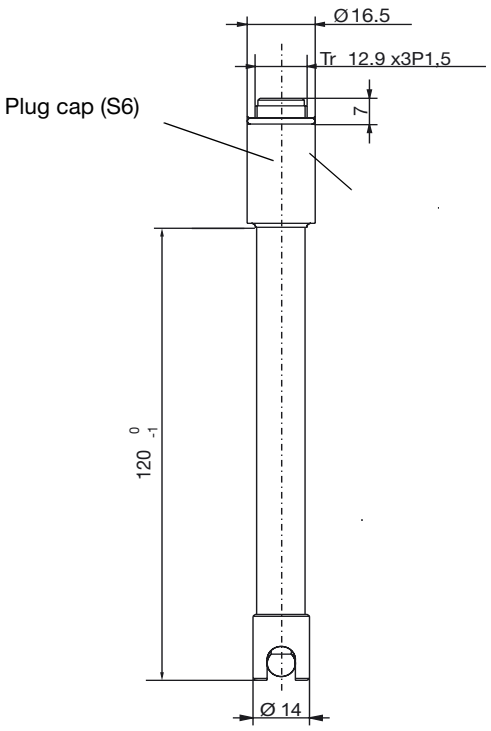
Type 201030/51-10-07-40-xxxx-76-120/000(pH)
Type 201030/51-10-07-40-xxxx-78-120/000(pH)
Type 201035/51-22-07-40-xxxx-76-120/000(redox)
Type 201035/51-22-07-40-xxxx-78-120/000(redox)



Type 201030/51-10-07-21-0000-00-120/000(pH)
Type 201035/51-22-07-21-0000-00-120/000(redox)



Type 201030/53-10-05-40-xxxx-76-120/000(pH)
Type 201030/53-10-05-40-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 201030/53-10-05-21-0000-00-120/000(pH)
Type 201035/53-22-05-21-0000-00-120/000(redox)

Order details

			(1)	**Basic type**
		201030		pH combination electrode JUMO labLine pH
		201035		redox combination electrode JUMO labLine Rd
			(2)	**Basic type extensions**
x	x	51		glass shaft / gel-sealed / cartridge-style conductive system
o	o	53		plastic shaft PEI / gel-sealed / cartridge-style conductive system
			(3)	**Active component**
x		10		U glass / pH 0 — 12 (briefly 14) / -5 to +80°C
x		11		C glass / pH 0 — 11 / -5 to +50°C
o		17		HA glass / pH 0 — 14 / -5 to +80°C
	x	22		platinum tip / +/- 2000 mV
			(4)	**Diaphragm**
o	o	04		PTFE diaphragm[1]
o	o	05		1 x glass silk diaphragm[2]
x	x	07		1 x zirconium dioxide diaphragm (special ceramic)[1]
			(5)	**Connection**
x	x	21		plug cap (S6)
o	o	40		plug cap (S6) with attached cable
			(6)	**Cable length**
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
			(7)	**Instrument connector**
x	x	00		no connector
o	o	76		BNC connector
o	o	78		DIN connector
			(8)	**Fitting length**
x	x	120		fitting length 120 mm (standard)
o		150		fitting length 150 mm [1]
o		225		fitting length 225 mm [1]
			(9)	**Extra codes**
x	x	000		none
o	o	052		KCl reservoir (holder)
o	o	837		salt reservoir[1]
o	o	838		2-chamber system (DOKA) with KCl/KCl bridge [3]

[1] only available with basic type extension /51 (glass shaft...)
[2] only available with basic type extension /53 (plastic shaft...)
[3] not available with basic type extension /53 (plastic shaft...)

X = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)	
Order code		/		-		-		-		-		-		-		/		, ...
Order example	201030	/	51	-	10	-	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 versions (delivery: 10 working days after receipt of order)
pH

Sales No.	Type	Brief description
20/00303347	201030/51-10-07-21-0000-00-120/000	plastic shaft PEI, gel-sealed, U glass, plug cap (S6), 120 mm, 2-chamber system
20/00303348	201030/51-10-07-21-0000-00-120/837	plastic shaft PEI, gel-sealed, U glass, plug cap (S6), 120 mm, 2-chamber system, salt reservoir
20/00303399	201030/53-10-05-21-0000-00-120/837,838 (2GEP-1-GV-Doka-U-S)	plastic shaft PEI, gel-sealed, U glass, plug cap (S6), 120 mm, 2-chamber system, compatible with Mettler Toledo InLab417 / Schott BlueLine 22pH
20/00345114	201030/53-11-05-21-0000-00-120/837,838 (2GEP-1-GV-Doka-C-S)	plastic shaft PEI, gel-sealed, C glass, plug cap (S6), 120 mm, 2-chamber system

Production versions (delivery: 10 working days after receipt of order)
Redox (ORP)

Sales No.	Type	Brief description
20/00300395	201035/51-22-07-21-0000-00-120/837 (2ME-1-GV-AuK-1)	glass shaft, gel-sealed, gold tip, zirconium dioxide diaphragm, plug cap (S6), 120 mm
20/00416919	201035/51-22-07-40-1000-76-120/837 (2ME-4-GV-PtK-1-1-BNC)	glass shaft, gel-sealed, platinum tip, zirconium dioxide diaphragm, attached cable, BNC connector, 120 mm

Note: Former type designations in brackets

JUMO labLine pH for measurements in solids

Typical applications

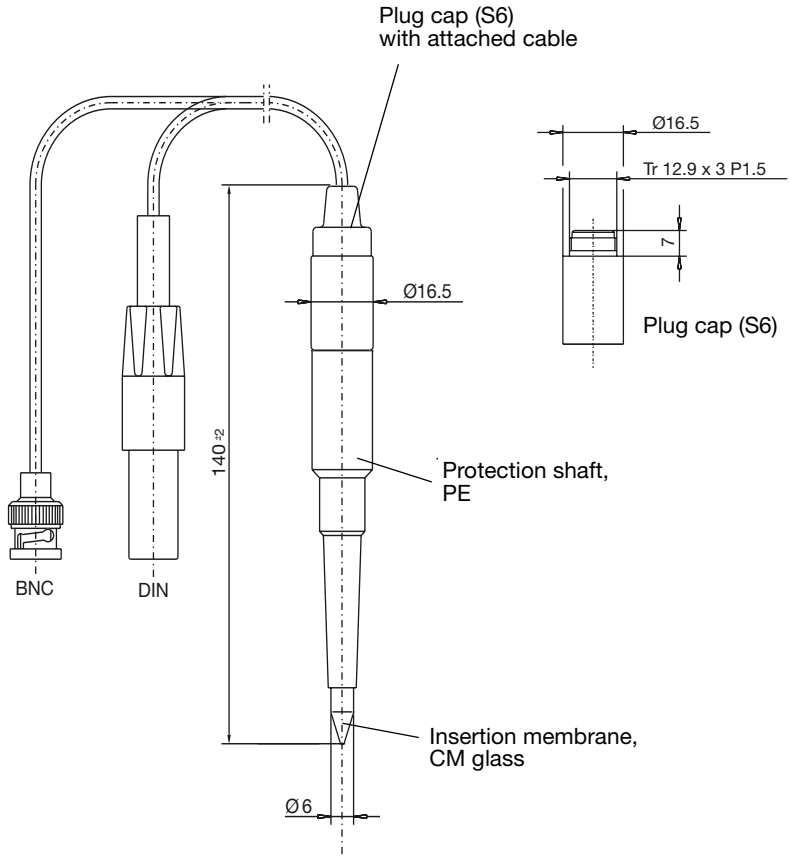
- Food checks (measurements in meat, cheese, vegetables, etc.)
- Soil samples

Key features

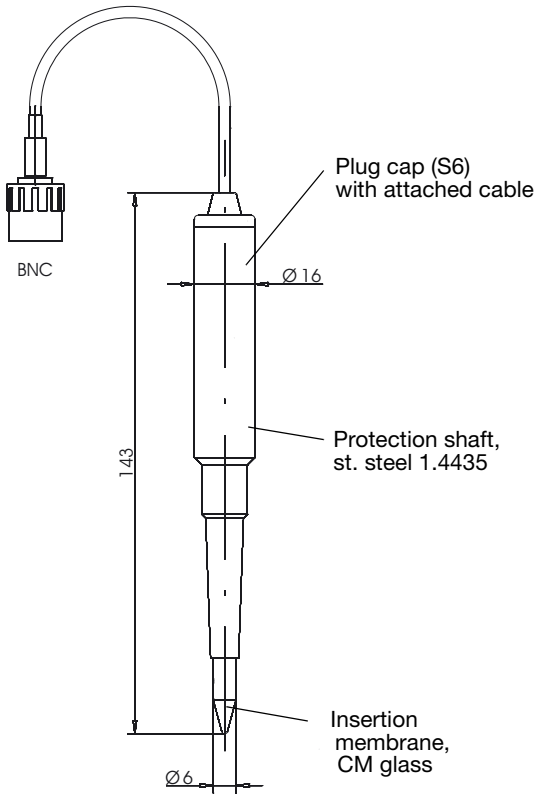
- Insertion probe 6 mm
- Highly viscous KCl solution (gel), double zirconium dioxide diaphragm
- Cartridge-style conductive system with reference electrolyte (free from silver ions)
- pH range: 0 — 11 pH, briefly up to 14 pH
- Temperature range: -5 to +50°C (please refer to the order details)
- Optional salt reservoir for extending the operational life in low-conductivity media
- Protection reinforcement in stainless steel 1.4435, for high stability

Type 201030/60-15-08-21-...

Dimensions



Type 201030/60-15-08-40-xxxx-76-120/000(pH)
Type 201030/60-15-08-40-xxxx-78-120/000(pH)



Type 201030/61-15-08-40-xxxx-76-120/000(pH)

Order details

				(1)	**Basic type**
			201030		pH combination electrode JUMO labLine pH
				(2)	**Basic type extensions**
			60		plastic shaft PE / gel-sealed / cartridge-style conductive system / insertion probe
			61		reinforcement in stainless steel 1.4435 / gel-sealed / cartridge-style conductive system / insertion probe
			62		glass shaft / KCl filling / wire conduction / insertion probe
				(3)	**Active component**
x	x	x	15		CM glass / pH 0 — 11 / -5 to +50°C
				(4)	**Diaphragm**
x	x	x	08		2 x zirconium dioxide diaphragm (special ceramic)
				(5)	**Connection**
x	x	x	21		plug cap (S6)
o	o	o	40		plug cap (S6) with attached cable
				(6)	**Cable length**
o	o	o	0000		no attached cable
x	x	x	xxxx		length in mm / only full meters / up to 10 m / standard length: 1000 mm = 1 m
				(7)	**Instrument connector**
o	o	o	00		no connector
x	x	x	76		BNC connector
o	o	o	78		DIN connector
				(8)	**Fitting length**
x	x	x	120		fitting length 120 mm (standard)
				(9)	**Extra codes**
x	x	x	052		KCl reservoir (holder)

X = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
Order code	201030	/		-	15	-	08	-		-		-		-	120	/	052
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)

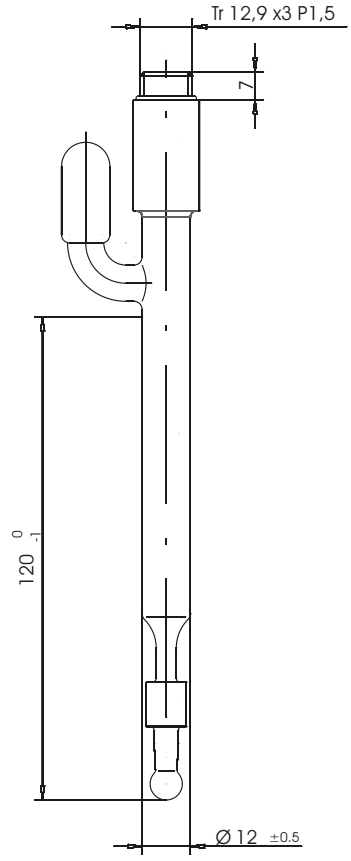
Sales No.	Type	Brief description
20/00432926	201030/60-15-08-21-0000-00-120/052 (2GE-1-GV-CM-2)	gel-sealed, zirconium dioxide diaphragm, plug cap (S6), 120 mm, compatible with Mettler Toledo InLab412 / Schott L7780
20/00448527	201030/60-15-08-40-1000-76-120/052 (2GE-4-GV-CM-2-1-BNC)	gel-sealed, zirconium dioxide diaphragm, plug cap (S6) with attached cable, 120 mm

JUMO labLine pH / Rd
with KCl liquid electrolyte, refillable

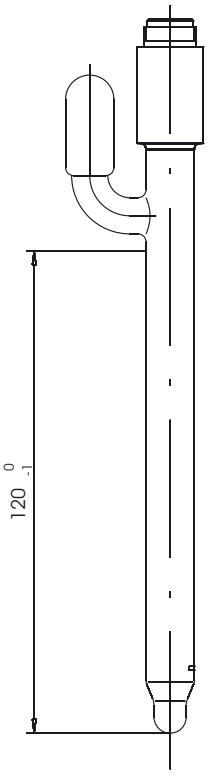
Key features

- 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)
- Temperature probes can optionally be integrated
- Redox versions with platinum or gold tip up to +/-2000 m

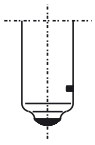
Dimensions



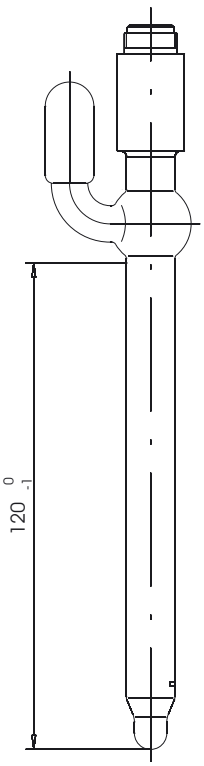
Type 201030/12-10-13-21-0000-00-120/000 (pH)



Type 201030/12-10-07-21-0000-00-120/000 (pH)



Platinum or gold tip
Type 201035/...



Type 201030/13-17-07-21-0000-00-120/000 (pH)

Order details

			(1)	**Basic type**
		201030		pH combination electrode JUMO labLine pH
		201035		redox combination electrode JUMO labLine Rd
			(2)	**Basic type extensions**
o	o	12		glass shaft / KCl/ tube nipple
o	o	13		glass shaft / KCl/ tube nipple / spherically enlarged shaft
x	x	76		glass shaft / KCl liquid electrolyte / cartridge-style conductive system
			(3)	**Active component**
x		10		U glass / pH 0 — 12, briefly pH 14) / -5 to +80°C
x		11		C glass / pH 0 — 12 / -5 to +50°C / fluoride-resistant
o		17		HT glass / pH 0 — 14 / -5 to +130°C / high-alkaline or high-temperature application
	x	22		platinum tip / redox range +/-2000 mV / -5 to +90°C
	o	32		gold tip / redox range +/-2000 mV / -5 to +90°C
			(4)	**Diaphragm**
x	x	07		1 x zirconium dioxide diaphragm (special ceramic)
o	o	08		2 x zirconium dioxide diaphragm (special ceramic)
o	o	09		3 x zirconium dioxide diaphragm (special ceramic)
o		13		ground diaphragm (movable) [1]
			(5)	**Connection**
x	x	21		plug cap (S6)
o	o	40		plug cap (S6) with attached cable
			(6)	**Cable length**
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
			(7)	**Instrument connector**
x	x	00		no connector
o	o	76		BNC connector
o	o	78		DIN connector
			(8)	**Fitting length**
x	x	120		fitting length 120 mm (standard)
			(9)	**Extra codes**
x	x	000		none
o	o	052		KCl reservoir (holder)

[1] only available with extra code /052 (KCl reservoir...)
Other versions on request!

X = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
Order code		/		-		-		-		-		-		-	120	/	
Order example	201030	/	76	-	10	-	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 versions (pH) (delivery: 15 working days after receipt of order)

Sales No.	Type	Brief description
20/00300196	201030/76-10-07-40-1000-76-120/000 (2GE-4-KCl-U-1-1-BNC)	pH electrode, zirconium dioxide diaphragm, 1 m attached cable, BNC connector, 120 mm, compatible with: Mettler Toledo InLab409
20/00300165	201030/76-10-13-21-0000-00-120/052 (2GE-1-KCl-U-Schliff)	pH electrode, ground diaphragm, plug cap (S6), 120 mm, compatible with: Mettler Toledo InLab420 / Schott BlueLine 13pH

Gas-sensitive sensor

for measuring ammonia

Brief description

This sensor can be used to measure ammonia (NH_3) in aqueous solutions. The ammonia sensor consists of a pH glass electrode and a reference electrode. Both electrodes are in an electrolyte. The electrolyte is separated from the sample medium by means of a hydrophobic, gas-permeable membrane. The pH of the electrolyte changes if NH_3 gas diffuses through the membrane. This local change in pH is measured by the pH electrode as a high-resistance value.

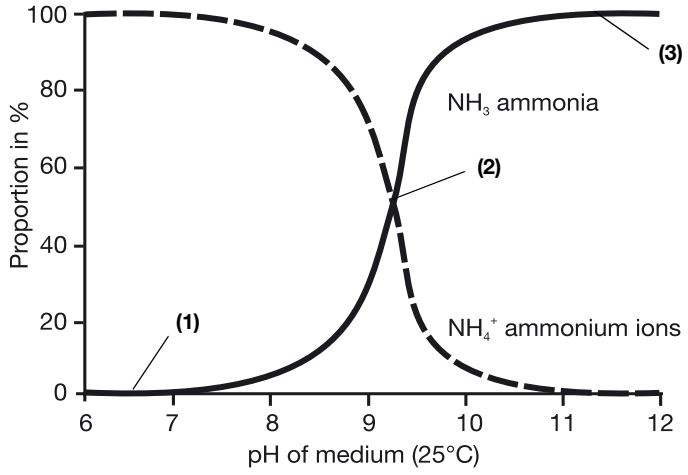
Area of application

- leakage monitoring in cooling systems
- ammonia determination
  in freshwater/seawater
  in coating baths
  in the wastewater of gas scrubbers
  in wastewater checks
  in laboratories

Technical data

Range: 0.01 — 20,000 ppm (= mg/l) NH_3
Temperature range: 0 to 50°C
Accuracy: +/- 2%
Length:120 mm
Diameter: 12 mm
Connection:threaded cap (S8)

Application range

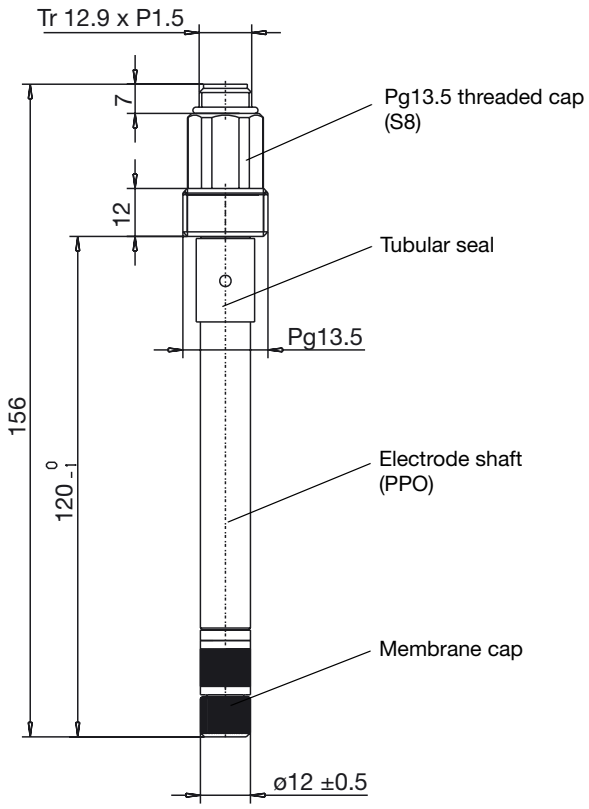


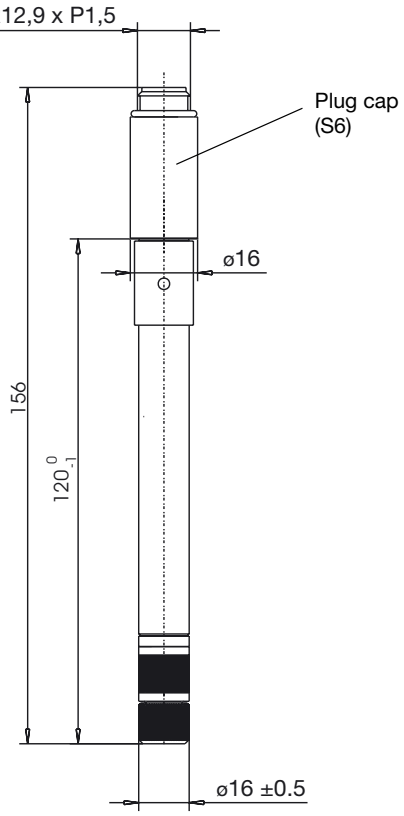
(1) only NH_4^+ ions (ammonium) present
(2) The ratio of NH_4^+ ions (ammonium) and NH_3 (ammonia) is 1:1.
(3) only NH_3 (ammonia) present

Note

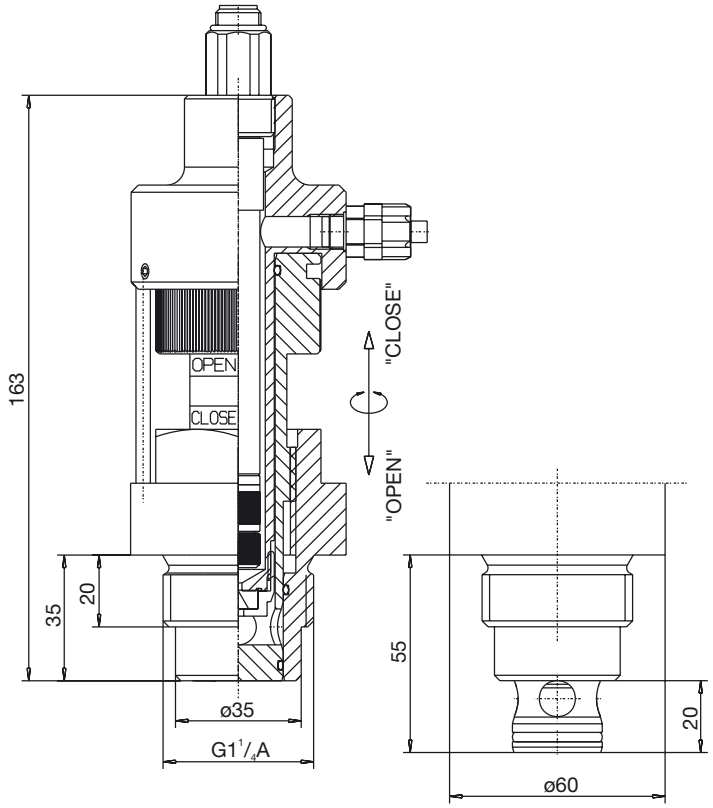
The presence of ammonia in the sample medium is strongly dependent on the pH value of the latter (see graph shown above).
In the acidic range, there will be a predominance of NH_4^+ ions (ammonium) that are **not** detected by the sensor.
With approx. 9.3 pH, the concentration ratio between ammonia (NH_3) and ammonium (NH_4^+) is about 1:1.
Ammonia will dominate the reaction in the strongly alkaline range only.

Dimensions



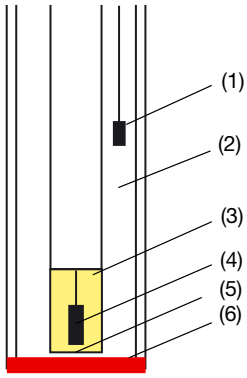


Accessories



Quick-change fitting
Sales No. 20/00379583
optimum operating pressure: 2 – 3 bar
maximum operating pressure: 6 bar
operating temperature range: -5 to 50°C

Design of the gas-sensitive electrode



(1) Conduction of the reference system (Ag/AgCl)
(2) Electrolyte
(3) Internal buffer
(4) Internal conduction (Ag/AgCl)
(5) Glass membrane
(6) Gas-permeable PTFE membrane

The ammonia electrode consists of a reference electrode and a pH glass electrode. Both electrodes are in an electrolyte which is separated from the sample medium by means of a PTFE membrane. The electrolyte has a specific chloride-ion concentration which defines a reference potential for the conduction of the reference electrode (Ag/AgCl) when immersed.

The measuring electrode is a pH glass electrode. If NH_3 diffuses through the PTFE membrane into the thin electrolyte layer between PTFE membrane and pH glass membrane, the pH value of the electrolyte changes according to the NH_3 concentration. The ammonia concentration of the sample liquid can be determined by measuring the pH.

Additional fittings

Type of fitting	Data Sheet
Flow-through fittings	20.2810
Immersion fittings	20.2820

Order details

		(1)	**Basic type**
	201030		JUMO labLine
		(2)	**Basic type extension**
o	65		ammonia sensor
		(3)	**Connection**
o	21		plug cap (S6)
x	22		threaded cap Pg13.5 (S8)
		(4)	**Fitting length**
x	120		fitting length 120 mm (standard)
		(5)	**Extra codes**
x	000		none

X = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)
Order code	201030	/	65	-		-	120	/	000
Order example	201030	/	65	-	22	-	120	/	000

Production versions (delivery: 10 working days after receipt of order)

Sales No.	Type	Brief description
20/00440655	201030/65-22-120/000	Ammonia electrode, threaded cap Pg13.5 (S8), 120 mm

Accessories

Sales No.	Type	Brief description
20/00449637		Maintenance kit for ammonia sensor
20/00379538	202822/107-55/87	Quick-change fitting in PP
20/00442445	202535/10-888-000-23-00/000	Redox transmitter JUMO dTRANS Rd01

JUMO Multitrode

for acquisition of the parameters: pH value, redox potential (ORP) and temperature

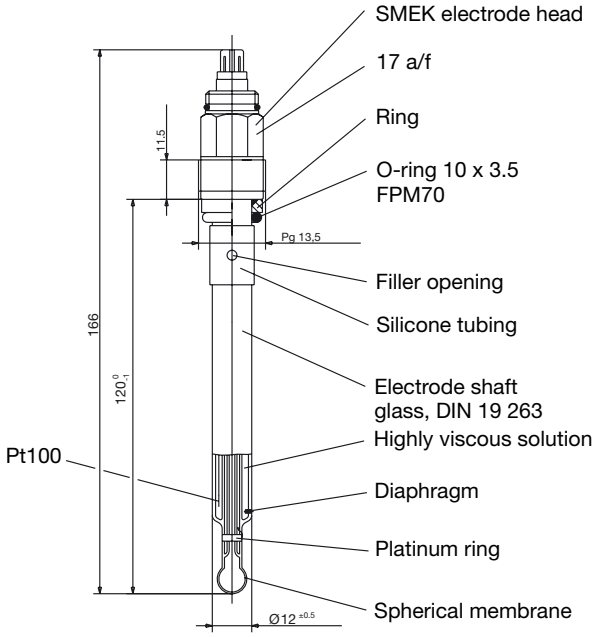
Brief description

Thanks to the JUMO Multitrode, several process parameters can now be obtained from one measurement point. Integrating individual sensors in one electrode means less maintenance effort. Furthermore, the compact design also ensures that the installation costs are kept to a minimum, since there is no need for installing further fittings for additional sensors. In conjunction with suitable transmitters, the individual values for pH, redox potential and temperature can all be acquired at the same time, and indicated. The JUMO Multitrode operates fast and reliably, also under process conditions.

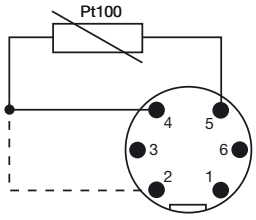
Technical data

Meas. range	pH: U glass 0 — 12 pH (briefly up to 14 pH) DS glass 0 — 12 pH (suitable for steam sterilization) Redox: Platinum ring ± 2000 mV Gold ring ± 2000 mV Temperature: Pt100 -5 to +80°C
Temperature range	U glass -5 to +80°C DS glass 0 to +80°C (briefly up to +120°C during sterilization)
Pressure range	up to 10 bar at 25°C up to 1 bar at 80°C

Dimensions



Pin assignment



Pin	Assignment
1	pH core
2	
3	redox
4	Pt100
5	Pt100
6	screen

Order details

Type designation

(1) Basic type
201030 JUMO labLine Rd electrode

(2) Basic type extensions
80 Multitrode (multi-parameter sensor)

(3) Version
85 glass shaft, gel-sealed, cartridge-style conductive system
86 glass shaft, high-temperature gel, gel-sealed, cartridge-style conductive system

(4) Active component
50 U glass, 0 — 12 pH (briefly 14), -5 to +80°C
platinum ring, ± 2000 mV, -5 to +80°C
51 U glass, 0 — 12 pH (briefly 14), -5 to +80°C
gold ring, ± 2000 mV, -5 to +80°C
52 DS glass, 0 — 12 pH, -5 to +80°C (briefly up to +130°C)
platinum ring, ± 2000 mV, -5 to +80°C

(5) Diaphragm
07 1 x zirconium dioxide diaphragm (special ceramic)
09 3 x zirconium dioxide diaphragm (special ceramic)

(6) Connection
17 SMEK screw cap, Pg13.5

(7) Fitting length
120 120 mm

(8) Extra codes
000 none
840 Pt100 temperature probe
841 Pt1000 temperature probe

	(1)		(2)		(3)	(4)	(5)	(6)		(7)		(8)
Order code		/		-					-		/	
Order example	201030	/	80	-	85	50	07	17	-	-120	/	840

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.

Stock versions (delivery: 3 days after receipt of order)

Sales No.	Type	Description
20/00431380	201030/80-85-50-07-17-120/840	JUMO Multitrode, gel-sealed, U glass, Pt ring, zirconium dioxide diaphragm, 120 mm, Pt100 temperature probe

Production versions (delivery: 10 days after receipt of order)

Sales No.	Type	Description
20/00438431	201030/80-85-50-09-17-120/840	JUMO Multitrode, gel-sealed, U glass, Pt ring, 3 x zirconium dioxide diaphragm, 120 mm, Pt100 temperature probe
20/00438432	201030/80-85-51-09-17-120/840	JUMO Multitrode, gel-sealed, U glass, Au ring, 3 x zirconium dioxide diaphragm, 120 mm, Pt100 temperature probe
20/00438433	201030/80-86-52-09-17-120/840	JUMO Multitrode, gel-sealed, DS glass, Pt ring, 3 x zirconium dioxide diaphragm, 120 mm, Pt100 temperature probe

Accessories

Sales No.	Type
20/00412117	SMEK connecting cable, 5 m, for Multitrode

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

JUMO Instrument Co. Ltd.
JUMO House
Temple Bank, Riverway
Harlow, Essex CM 20 2TT, UK
Phone: +44 1279 635533
Fax: +44 1279 635262
e-mail: sales@jumo.co.uk
Internet: www.jumo.co.uk

JUMO Process Control, Inc.
8 Technology Boulevard
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

JUMO Single Sensors

pH glass electrodes

Redox metal electrodes

Reference electrodes

Diaphragm tubes

Compensation thermometers

Glass conductivity cells

Type 201080/16...

Type 201080/15...

Type 201080/11...

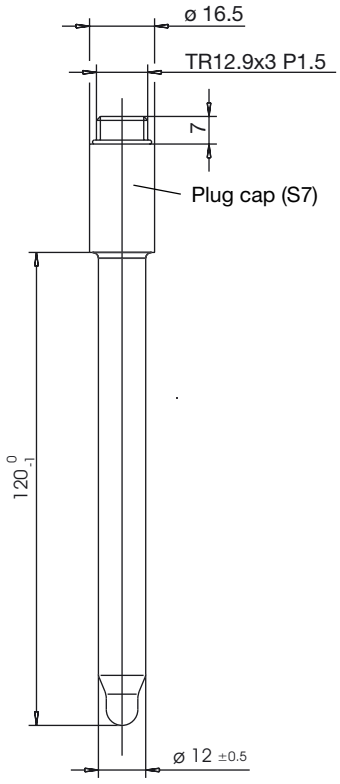
pH glass electrodes

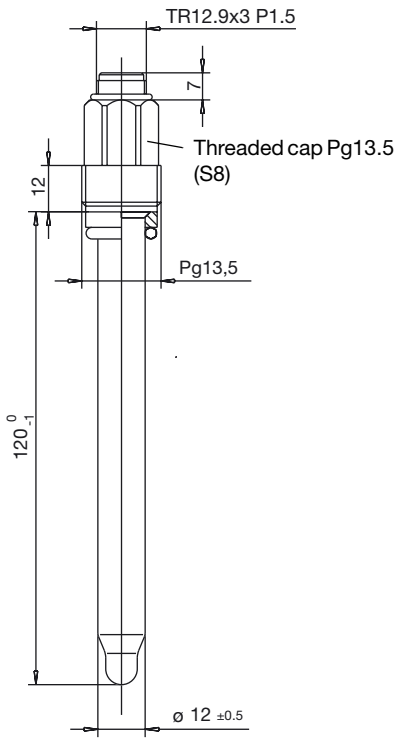
Brief description

pH glass electrodes are used in conjunction with reference electrodes for measuring the pH value. The sensor portion of the pH glass electrode consists of a special pH-sensitive membrane glass. Electrodes with special membrane glasses are available for measurements in various media:

- U glass for general aqueous media
- C glass for media containing fluoride (up to 1000 mg HF/l)
- HT glass for application in temperature ranges above 80°C and in high-alkaline media

Dimensions





Order details

		(1)	**Basic type**
	201080		JUMO single sensors
		(2)	**Basic type extension**
	10		pH glass electrodes
		(3)	**Shaft material**
x	89		glass
		(4)	**Active component**
x	10		U glass / pH 0 — 12 (briefly 14) / -5 to +80°C
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 application
		(5)	**Connection**
o	21		plug cap (S7)
x	22		threaded cap Pg13.5 (S8)
o	40		plug cap (S6) with attached cable
		(6)	**Length of attached cable**
x	0000		none
o	xxxx		length in mm (only full meters / up to 10 m / standard length: 1000 mm = 1 m)
		(7)	**Instrument connector**
o	00		none
o	76		BNC connector
o	78		DIN connector
		(8)	**Fitting length**
x	120		fitting length 120 mm (standard)
o	225		fitting length 225 mm
			other fitting lengths on request

x = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
Order code	201080	/	10	-	89	-		-		-		-		-	
Order example	201080	/	10	-	89	-	10	-	22	-	0000	-	00	-	120

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.

Stock versions (delivery: 3 working days after receipt of order)

Glass electrodes

Sales No.	Type	Brief description
20/00083302	201080/10-89-10-22-0000-00-120 (2G-2-U)	pH electrode, U glass, threaded cap Pg13.5 (S8), 120 mm

Production versions (delivery: 10 working days after receipt of order)

Glass electrodes

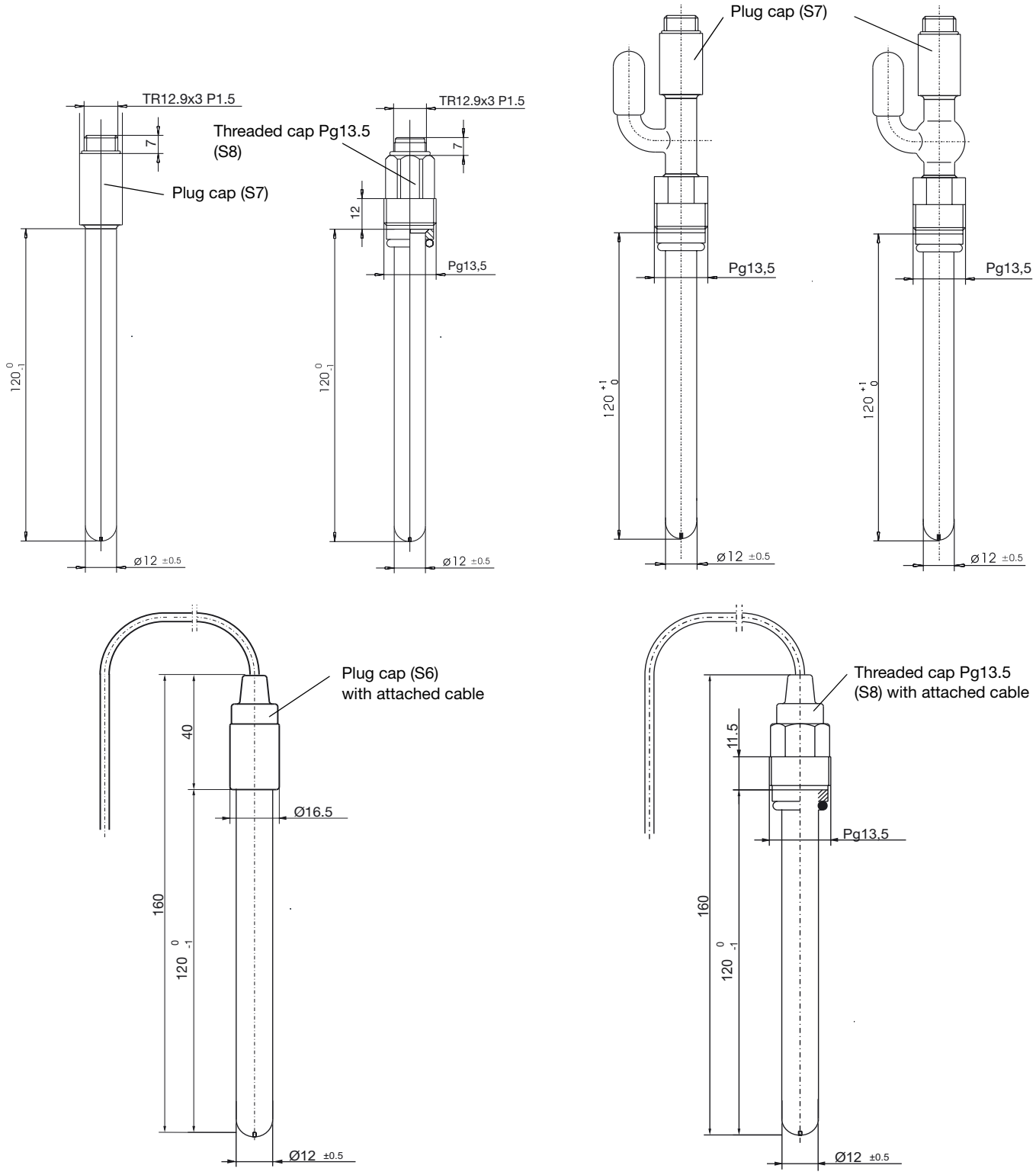
Sales No.	Type	Brief description
20/00083300	201080/10-89-11-21-0000-00-120 (2G-1-C)	pH electrode, C glass, plug cap (S7), 120 mm
20/00083301	201080/10-89-12-21-0000-00-120 (2G-1-HT)	pH electrode, HT glass, plug cap (S7), 120 mm
20/00083303	201080/10-89-11-22-0000-00-120 (2G-2-C)	pH electrode, C glass, threaded cap Pg13.5 (S8), 120 mm
20/00083304	201080/10-89-12-22-0000-00-120 (2G-2-HT)	pH electrode, HT glass, threaded cap Pg13.5 (S8), 120 mm

Reference electrodes

Brief description

Reference electrodes have the task of providing a constant potential for potentiometric measurements. The potential of an indicator electrode (e.g. a pH glass electrode) serves as the counterpoint. Reference electrodes feature a cartridge-style silver/silver chloride conductive system. A gelled 3-molar potassium chloride solution is used as the standard reference electrolyte. The operating temperature range is between 0 and +90°C. As an option, the reference electrode can also be supplied with a liquid KCl electrolyte. In this case, the operating temperature range is between 0 and 135°C, taking into account the maximum working temperature of the glass electrode.

Dimensions



Order details

		(1)	**Basic type**
	201080		JUMO single sensors
		(2)	**Basic type extension**
	11		reference electrodes
		(3)	**Shaft material**
x	89		glass
		(4)	**Electrolyte**
x	04		gel filling
o	05		KCl filling
		(5)	**Diaphragm**
o	04		PTFE diaphragm
x	07		1 x zirconium dioxide diaphragm (special ceramic)
o	08		2 x zirconium dioxide diaphragm (special ceramic)
o	09		3 x zirconium dioxide diaphragm (special ceramic)
		(6)	**Connection**
o	19		tube nipple, spherically enlarged shaft, threaded cap Pg 13.5 (S8/N6) cemented on
o	20		tube nipple, threaded cap Pg13.5 (S8/N6) cemented on
o	21		plug cap (S7)
x	22		threaded cap Pg13.5 (S8)
o	40		plug cap (S6) with attached cable
o	60		threaded cap Pg13.5 (S8) with attached cable
		(7)	**Length of attached cable**
x	0000		none
o	xxxx		length in mm (only full meters / up to 10 m / standard length: 1000 mm = 1 m)
		(8)	**Fitting length**
x	120		fitting length 120 mm (standard)
o	225		fitting length 225 mm
			other fitting lengths on request

x = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
Order code	201080	/	11	-	89	-		-		-		-		-	
Order example	201080	/	11	-	89	-	04	-	07	-	22	-	0000	-	120

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.

Note: Former type designations in brackets

Stock versions (delivery: 3 working days after receipt of order)

Reference electrodes

Sales No.	Type	Brief description
20/00083865	201080/11-89-04-07-22-0000-120 (2B-2-G)	Reference electrode, 1 zirconium diaphragm, gel filling, threaded cap Pg13.5 (S8), 120 mm

Production versions (delivery: 10 working days after receipt of order)

Reference electrodes

Sales No.	Type	Brief description
20/00083861	201080/11-89-04-07-21-0000-120 (2B-1-G)	Reference electrode, 1 zirconium diaphragm, gel filling, plug cap (S7), 120 mm
20/00083862	201080/11-89-05-07-21-0000-120 (2B-1-KCl)	Reference electrode, 1 zirconium diaphragm, KCl filling, plug cap (S7), 120 mm

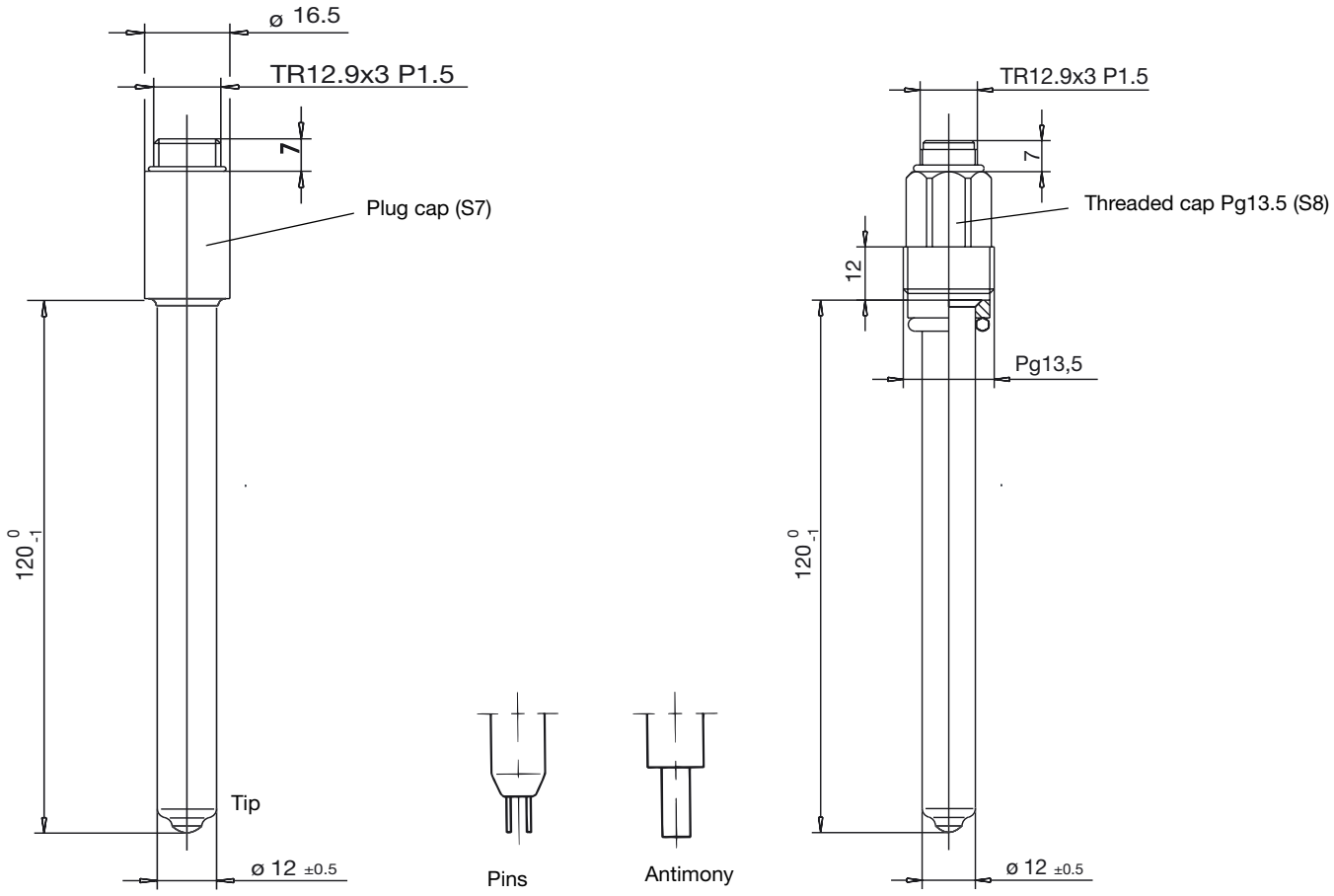
Redox metal electrodes

Brief description

Metal electrodes consist of a glass or plastic shaft that has a metal pin or metal tip fused or glued into the lower end. Metal electrodes are used to determine the redox potential of aqueous media, in conjunction with reference electrodes. Twin metal electrodes are used for measuring the end point in amperometric titrations. The following active components are available:

- gold tip for strongly oxidizing media, for example in cyanide decontamination
- platinum tip for strongly reducing media, for example 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 containing high levels of hydrofluoric acid

Dimensions



Order details

			(1)	**Basic type**
			201080	JUMO single sensors
			(2)	**Basic type extension**
			12	antimony electrode for pH measurement
			13	redox metal electrode
			14	redox twin metal electrode
			(3)	**Shaft material**
	x	x	89	glass
x			85	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 / -10 to +80°C / fluoride concentration larger than 1000 mg HF/l
	o		32	gold tip / redox range +/-2000 mV / -5 to +135°C
			(5)	**Connection**
	o	o	21	plug cap (S7)
x	x	x	22	threaded cap Pg13.5 (S8)
			(6)	**Fitting length**
x	x	x	120	fitting length 120 mm (standard)
	o	o	225	fitting length 225 mm
				other fitting lengths on request

x = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)
Order code	201080	/		-		-		-		-	
Order example	201080	/	13	-	89	-	22	-	22	-	120

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: 10 working days after receipt of order)

Redox metal electrodes

Sales No.	Type	Brief description
20/00300402	201080/13-89-22-21-120 (2M-1-PtK)	Redox metal electrode, platinum tip, plug cap (S7), 120 mm
20/00300403	201080/13-89-22-22-120 (2M-2-PtK)	Redox metal electrode, platinum tip, threaded cap Pg13.5 (S8), 120 mm
20/00325951	201080/12-85-27-22-120 (2MP-2-Sb)	Antimony electrode, threaded cap Pg13.5 (S8), 120 mm

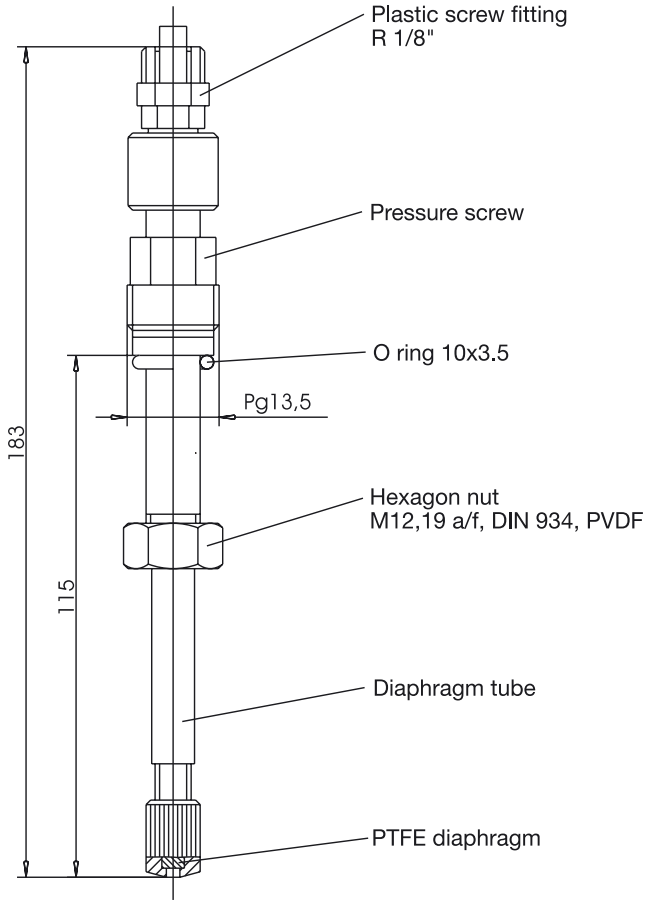
Note: Former type designations in brackets

Diaphragm tubes

Brief description

Due to physical and/or chemical interactions between sample medium and reference system, potentiometric measurements can be disturbed or falsified by electrochemical sensors. In such cases, it is advisable to use an electrolyte bridge, which is set up with the help of a diaphragm tube (see diagram below for the construction principle). Diaphragm tubes can be manufactured from PVDF or PTFE. The diaphragm is made from PTFE and has a diameter of 5 mm.

Dimensions



Order details

		(1)	**Basic type**
	201080		JUMO single sensors
		(2)	**Basic type extension**
	15		diaphragm tube
		(3)	**Shaft material**
x	87		PP (polypropylene)
o	88		PVDF (PolyVinylidene DiFluoride)
		(4)	**Diaphragm**
x	04		PTFE diaphragm
		(5)	**Connection**
x	22		threaded cap Pg13.5
		(6)	**Fitting length**
x	120		fitting length 120 mm (standard)
o	225		fitting length 225 mm
			other fitting lengths on request

x = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)
Order code	201080	/	15	-		-	04	-	22	-	
Order example	201080	/	15	-	87	-	04	-	22	-	120

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: 10 working days after receipt of order)

Diaphragm tubes

Sales No.	Type	Brief description
20/00084582	201080/15-87-04-22-120 (2908-16)	Diaphragm tube, PTFE diaphragm, threaded cap Pg13.5, 120 mm, material: PP
20/00084583	201080/15-88-04-22-120 (2908-26)	Diaphragm tube, PTFE diaphragm, threaded cap Pg13.5, 120 mm, material: PVDF

Accessory

Sales No.	Description
20/00304567	10 spare PTFE diaphragms

Note: Former type designations in brackets

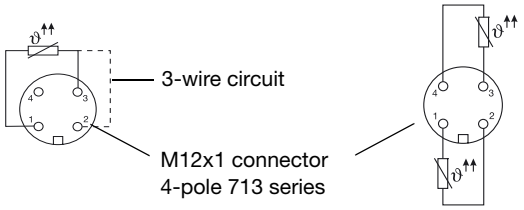
Compensation thermometers

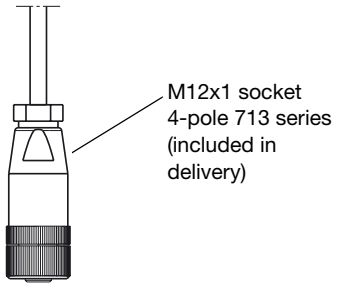
Brief description

Temperature errors may falsify the measurement signal during electrochemical measurements. Measurement errors due to temperature can be compensated by using compensation thermometers. Compensation thermometers acquire the temperature of the sample solution.
The signal that is acquired is transmitted to a connected transmitter. The transmitter then recalculates the measured value for the 25°C reference temperature.

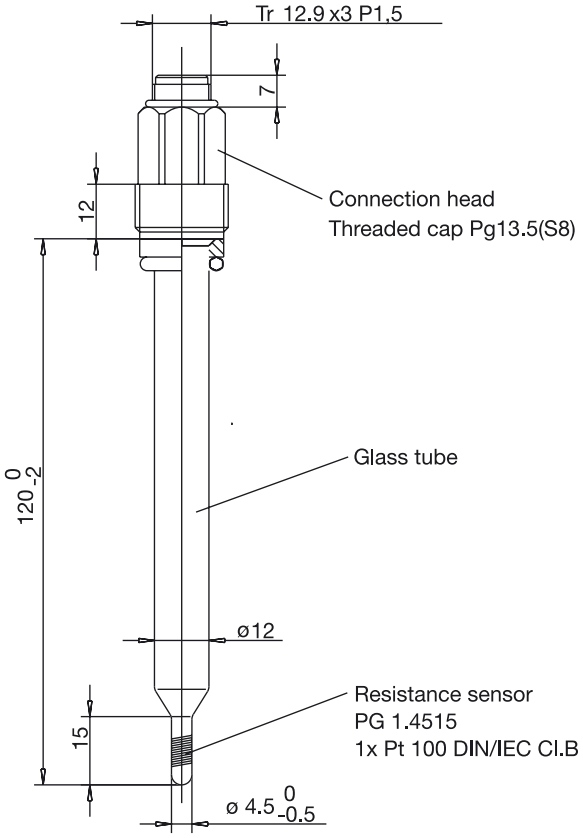
Terminal assignment

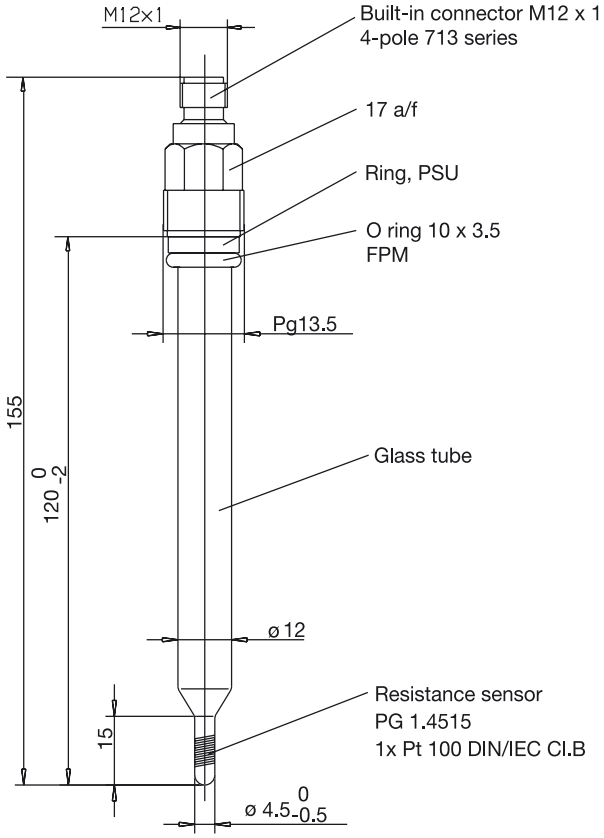
Pt100 **Twin Pt100**





Dimensions





Order details

		(1)	**Basic type**
	201080		JUMO single sensors
		(2)	**Basic type extension**
	16		compensation thermometer
		(3)	**Shaft material**
x	89		glass
		(4)	**Active component**
x	1001		Pt100 in a 3-wire circuit / Class B / 0 to 150°C
x	1003		Pt100 in a 2-wire circuit / Class B / 0 to 150°C
o	1005		Pt1000 in a 2-wire circuit / Class B / 0 to 150°C
o	1006		Pt1000 in a 3-wire circuit / Class B / 0 to 150°C
o	2003		twin Pt100 / Class B / 0 to 150°C [1]
		(5)	**Connection**
o	21		N plug cap (S7)
x	22		threaded cap Pg13.5 (S8)
o	70		threaded cap Pg13.5 with M12 plug connector
		(6)	**Fitting length**
x	120		fitting length 120 mm (standard)

[1] only in conjunction with connection -70

x = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)
Order code	201080	/	16	-	89	-		-		-	120
Order example	201080	/	16	-	89	-	1003	-	22	-	120

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.

Stock versions (delivery: 3 working days after receipt of order)

Sales No.	Type	Brief description
20/00300443	201080/16-89-1003-22-120 (2K-2)	Compensation thermometer, Pt100, threaded cap Pg13.5 (S8), 120 mm

Production versions (delivery: 10 working days after receipt of order)

Sales No.	Type	Brief description
20/00300442	201080/16-89-1003-21-120 (2K-1)	Compensation thermometer, Pt100, plug cap (S7), 120 mm

Note: Former type designations in brackets

Glass conductivity cells

Glass conductivity cells are used to determine the electrolytic conductivity of aqueous solutions.
The cells have the cell constant K = 1.0 $^{1}/_{cm}$.
As an option, the cells can be supplied with an integrated Pt100 temperature probe.
The versions with a Pg13.5 threaded cap can be installed in appropriate fittings
(see data sheets 20.2810, 20.2820, 20,2822 and 20.2825).

Type 201080/17...

Special features

- For electrolytic conductivity measurement in aqueous solutions
- Standard dimensions: 120 x 12 mm (DIN 19 263)
- Special styles on request
- Cell constant: K = 1 +/- 10%
- Integrated Pt100 is possible (version: Pg 13.5 threaded plug cap with M12 plug connector)
- Pressure-resistant up to 10 bar
- Ranges: platinum (raw): 0 — 1 mS/cm
  platinum (platinized): 0 — 100 mS/cm

Order details

	201080	**(1)**	**Basic type** JUMO single sensors
	17	**(2)**	**Basic type extension** glass conductivity cells
		(3)	**Active component**
o	40		platinum (platinized), K=1.0
o	41		platinum (raw), K=1.0
		(4)	**Connection**
o	21		plug cap (S6)
x	22		threaded cap Pg13.5 (S8)
o	70		threaded cap Pg13.5 with M12 plug connector
		(5)	**Fitting length**
x	120		fitting length 120 mm (standard)
		(6)	**Extra codes**
x	000		none
o	840		with integrated Pt100 temperature probe[1]

x = combination is standard
o = combination is optional

	(1)		(2)		(3)		(4)		(5)		(6)
Order code	201080	/	17	-		-		-	120	/	
Order example	201080	/	17	-	40	-	21	-	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.

[1] Only in conjunction with connection 70.

Stock versions (delivery: 3 working days after receipt of order)

Sales No.	Type	Brief description
20/00303396	201080/17-40-22-120/000 (2LF-2-Pt)	Glass conductivity cell, threaded cap Pg13.5 (S8), platinum (platinized), 120 mm, K=1.0

Production versions (delivery: 10 working days after receipt of order)

Sales No.	Type	Brief description
20/00300408	201080/17-41-22-120/000 (2LF-2-Pt)	Glass conductivity cell, threaded cap Pg13.5 (S8), platinum (raw), 120 mm, K=1.0
20/00442442	201080/17-40-70-120/000 (2LF-2-Pt)	Glass conductivity cell, threaded cap Pg13.5 with M12 connection, platinum (platinized), 120 mm, K=1.0

Note: Former type designations in brackets

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Accessories

pH, redox potential and conductivity measurement

Connection cables for pH, redox, conductivity and temperature sensors

Type 201090-2992-2....

Connection cables

Screened coaxial cables must be used for connecting pH and redox electrodes, compensation thermometers and glass conductivity cells. On the sensor side, the cables are equipped with a rotatable cable socket.
No plug or socket is attached on the instrument side, in order to allow the cable to be passed through a cable gland.
The conductivity cells are connected via a 4-core screened control cable that is available in 25 and 50 m rolls.

Order details

(1) Cable end 1 (on sensor side)

2990	no plug connection
2992	N cable socket, rotating
2994	SMEK cable socket

(2) Cable type

2	low-noise coaxial cable	diameter: 5 mm, black	temperature: -25 to +70°C
9	special cable, 4-core, screened (for conductivity)	diameter: 5 mm, gray	temperature: -5 to +80°C
10	coaxial cable (SMEK) + 3 stranded wires and screen	diameter: 5.5 mm, black (for electrodes with integrated Pt100)	temperature: -25 to +70°C

(3) Cable length

xx	length in meters (e.g. 1 = 1 m cable)

(4) Cable end 2 (on device side)

0	no plug connection

	(1)		(2)		(3)		(4)
Order code		-		(		)	
Order example	2990	-	9	(	25	)	0

[1] suitable e.g. for plug cap (S6) or threaded cap Pg13.5 (S8)

Stock items

(shipment: 3 working days from receipt of order)

Standard cables for pH and redox electrodes, compensation thermometers and glass conductivity cells

Sales No.	Type
20/00082672	2992-2(3)-0
20/00082673	2992-2(5)-0
20/00085976	2990-2(100)-0
20/00082659	2992-2(10)-0
20/00082660	2992-2(25)-0
20/00303525	2992-2(50)-0

Assembled connection cables for pH electrodes and glass conductivity cells with integral temperature probe. Preassembled with SMEK cable socket at one end.

Sales No.	Type	
20/00347843	2994-10(5)-0	length 5 m (SMEK universal cable)
20/00346442	2994-10(10)-0	length 10 m (SMEK universal cable)

Special connection cables (in rolls) for conductivity cells to Data Sheet 20.2923-20.2926

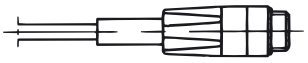
Sales No.	Type	
20/00303681	2990-9(25)-0	length 25 m, 4-pole with screen
20/00304181	2990-9(50)-0	length 50 m, 4-pole with screen

Connection plugs and sockets for coaxial cables

Sales No.	Type		
20/00061202	2990-00-4	N plug	minimum ordering quantity: 5 units
20/00057350	2991-00-0	N cable socket	minimum ordering quantity: 5 units
20/00311905		cable socket wrench	
20/00064222	2990-00-23	BNC angled plug	minimum ordering quantity: 5 units
20/00048842	2990-00-22	BNC straight plug	minimum ordering quantity: 5 units

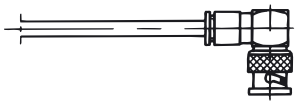
Connection cables and plugs for electrodes

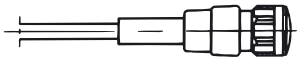
No plug connection



Plug / coupling S6 for 5 mm cable dia.

BNC angled plug for 5 mm cable dia.

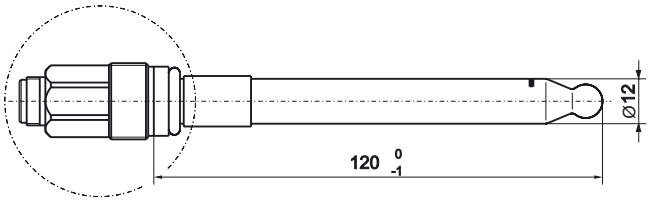


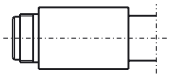


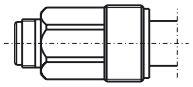
N cable socket, rotatable, suitable for cap (S6) or threaded cap Pg13.5 (S8) (can only be fitted at the factory)

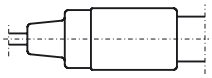
Electrode connection heads

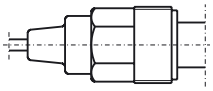
Type of electrode head

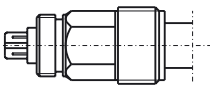


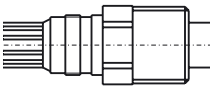
 - Cap (S6)

 - Threaded cap Pg13.5 (S8)

 - Cap (S6) with attached cable

 - Threaded cap Pg13,5 with attached cable

 - SMEK threaded cap Pg13.5 (multi-pole connector)

 - Variopin (VP) threaded cap (multipole connector, metal) with Pg13.5 thread **available on request**

Technical buffer solutions to DIN 19267

- ❑ are used for calibrating pH electrodes and have proved successful – particularly for use in industry and industrial laboratories – because they are relatively unaffected by dilution (high buffering capacity).
- ❑ The effect of the temperature on the pH values of the buffer solutions is shown in the table on the bottle label. The uncertainty is 0.02 pH units.
- ❑ The batch no. and the recommended use-by date are shown on the bottles.
- ❑ The bottle tops are color-coded, for identification.

Sales No.	Designation
20/00309747	250 ml buffer solution pH 3.07 to DIN 19267 at 20°C
20/00344977	250 ml buffer solution pH 4.00 to DIN 19267 at 20°C
20/00301070	250 ml buffer solution pH 4.65 to DIN 19267 at 20°C
20/00301071	250 ml buffer solution pH 6.80 to DIN 19267 at 20°C
20/00338371	250 ml buffer solution pH 7.00 to DIN 19267 at 20°C
20/00301072	250 ml buffer solution pH 9.27 to DIN 19267 at 20°C
20/00345027	250 ml buffer solution pH 10.00 to DIN 19267 at 20°C
20/00301073	250 ml redox-potential test solution +468mV (at 25°C)

Packed in units of 5

Cleaners (for pH /redox electrodes)

Sales No.	Designation
20/00307586	250 ml diaphragm cleaner (thiourea solution)
20/00307114	250 ml electrode cleaner (pepsin hydrochloric acid solution, protein remover)

Packed in units of 5[1]

Auxiliary electrolytes

Sales No.	Designation
20/00306215	250 ml 3-molar KCl solution without AgCl (free from silver ions)
20/00307585	250 ml 3-molar KCl solution with AgCl (for electrodes with wire conductor in reference system)

Packed in units of 5[1]

Conductivity test solutions

Sales No.	Designation
20/00346056	250 ml KCl 0.01 mol/l 1.41 mS/cm
20/00346058	250 ml KCl 0.1 mol/l 12.88 mS/cm
20/00346060	250 ml KCl 1.0 mol/l 111.80 mS/cm

Packed in units of 5[1]
can be supplied within 3 working days after receipt of order

[1] Please state number of units when ordering (5, 10 or 15...)

Product group 202711

Simulators

- ❑ Simulators are connected to the transmitter in place of an electrode or measuring cell, to test connecting cables and/or transmitters/controllers (installation test, commissioning etc.).
- ❑ Simulation of conductive 2-electrode measuring cells (2H-SLF-1).
- ❑ 2 temperatures, switchable to check the temperature compensation (2H-SLF-1).

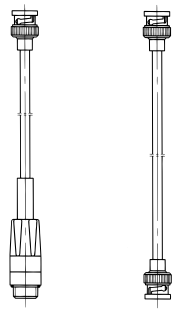
pH simulator

Type 2H-SpH-1
Range
0 — 14pH,
with selector switch in 1pH steps
Output signal
+414mV to 0 to -414mV,
in 59mV steps,
corresponding to 0 — 14pH
Calibration error
±1% of selected pH value
Reference temperature
25 °C
Output resistance
1kΩ (direct) or 1000MΩ (1000M),
depending on switch position
Supply voltage
9V block battery (included in delivery)
integrated battery test

1000MΩ circuit
to check installed pH connection cables for faults
Connection
BNC socket and socket
for separate reference electrode
Permissible ambient temperature
0 to 50 °C
Housing
aluminium
Dimensions
70 x 120 x 45 mm

Available connection cables

Sales No.	Designation
20/00082906	22-2(1,1)-22, adapter cable (Fig. 2) BNC/BNC, length 1.1 m
20/00082908	22-2(1,1)-4, adapter cable (Fig. 1) BNC/N plug, length 1.1 m



(Fig. 1) (Fig. 2)

Product group 202712

Conductivity simulator (conductive)

Type 2H-SLF-1

Simulation range
with cell constant K = 0.01 to 10.0:
conductivity in steps from 2µS/cm to 800mS/cm, (switchable, see table)

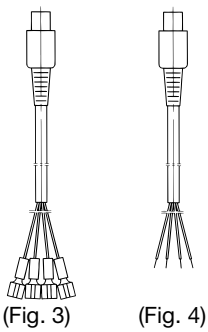
Possible simulations

R / K	0.01	0.1	1.0	3.0	10.0
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
250 kΩ	40 nS	400 nS	4 µS	12 µS	40 µS
•Ω	0	0	0	0	0

Calibration error
±1% of selected resistance
Pt100 simulation:
25 °C and 75 °C ±1°C
in 2- and 3-wire circuit
Permissible ambient temperature
0 to 50 °C
Housing
aluminium
Dimensions
70 x 120 x 45 mm
Connection
5-pole diode socket

Available connection cables

Sales No.	Designation
20/00082901	7-9(1,1)-0 adapter cable (Fig. 4) diode plug/bare wire ends length 1.10 m
20/00082902	7-9(1,1)-6 adapter cable (Fig. 3) diode plug/AMP plug 6.3 mm, length 1.10 m



(Fig. 3) (Fig. 4)

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Internet: www.JumoUSA.com

JUMO dTRANS pH 01
µP Transmitter / Controller for pH or redox potential (ORP)

Type 202530

Type 202530 / …

Type 202530 / …/640

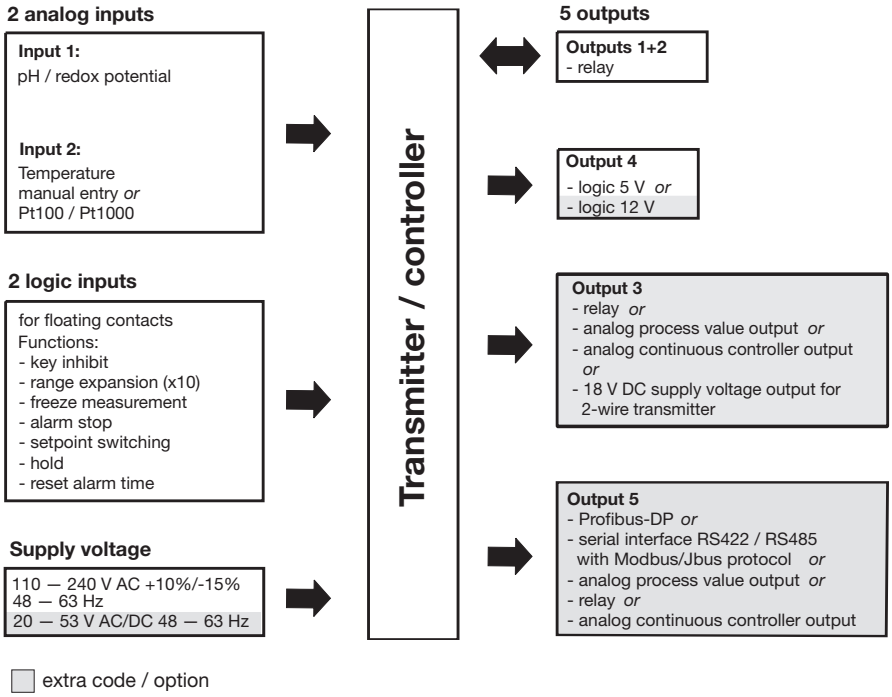
Brief description

This instrument measures and controls (depending on the configuration) the pH value or redox potential of aqueous solutions.
The transmitter features two analog and two logic inputs. The first analog input is suitable for connecting a pH combination electrode, or a glass and reference electrode (also antimony), or a redox combination electrode, or a metal and reference electrode. The second analog input can be used to connect Pt100 or Pt1000 resistance thermometers.
The instrument features two 4-digit 7-segment displays for indicating the pH or redox potential process value (red) and the temperature (green). During programming, the displays provide comments on the inputs.
A great variety of control tasks can be handled by the various output options (relay contacts and/or analog outputs). The two relay "make" contacts that are provided on the instrument as standard can be configured as a limit controller and/or pulse width or pulse frequency controllers, or as a modulating controller. To obtain analog (continuous) controller outputs, the optional analog outputs must be configured accordingly.
All controller outputs can be configured for a P, PI, PD or PID control action.
In the entry-level version, the instrument provides two relay "make" contacts and one logic output (0/5V). Two additional outputs can, according to choice, be fitted with relay changeover contacts and/or analog outputs (process value output or analog controller output) or as a serial interface (Profibus-DP or Modbus/Jbus protocol).

Key features

- Panel-mounting instrument, just 96 x 48 x 110 mm
- Display pH or mV/ORP and temperature
- Switchable from pH to mV/ORP (redox potential)
- 2 relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width/ pulse frequency output or modulating controller
- 2 electrically isolated analog outputs 0(4) — 20 mA / 0(2) — 10 V freely configurable as process value output for pH, redox or temperature, or for continuous controllers (option)
- 2 logic inputs
- Temperature of medium can be monitored
- Simple, step-by-step calibration procedure
- OPTION: Profibus-DP or serial interface RS485/422 with Modbus/Jbus protocol
- Panel-mounting housing to DIN 43 700, front protection IP65.
- Wall-mounting housing: IP67 protection

Block structure



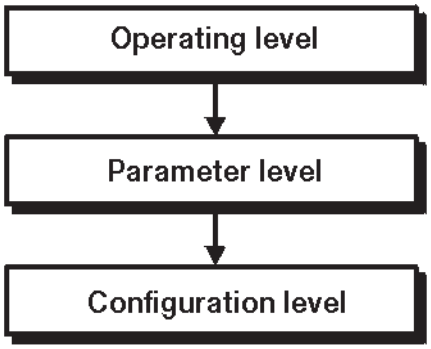
☐ extra code / option

Approvals

c UL us PROFIBUS

Operation

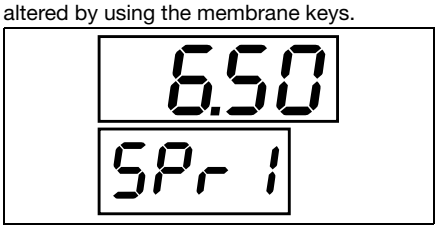
For easy programming and operation, the controller parameter and configuration data are assigned to various levels.



Code words protect the levels from unauthorized access.
Membrane keys ensure simple and user-friendly operation.
The two LED displays show the parameter symbols and the corresponding values.

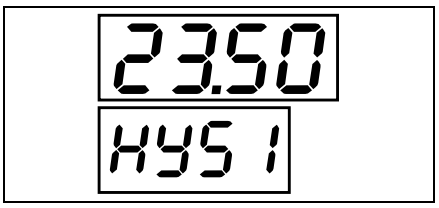
Operating level

The lower display, for example, shows the symbol, the upper display the corresponding value. Setpoints SPr1 and SPr2 can be altered by using the membrane keys.



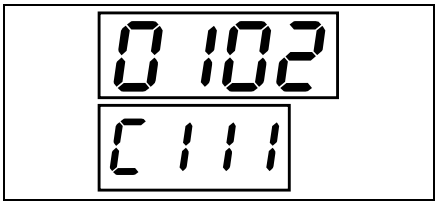
Parameter level

The controller is adapted to the control loop at this level. The appropriate parameters appear here, with symbol and value. Only those parameters will be indicated which correspond to the configuration of the controller (configuration level).

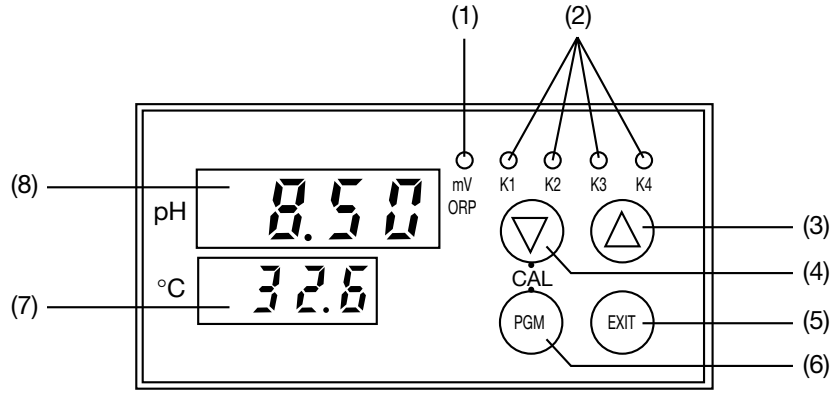


Configuration level

This level is used to adapt the controller to the control task, or for adaptation of the inputs and outputs.



Indications / controls



(1) Display: The instrument has been reconfigured from “pH” to “redox”	(6) PGM key for selection of parameters and confirmation of entries
(2) Status indicators (yellow) for outputs 1 to 4	(7) 4-digit temperature display (LED, green, 8mm high)
(3) Increment key for altering parameters or manual operation of relay K2	(8) 4-digit process value indication (LED, red, 13mm high)
(4) Decrement key for altering parameters or manual operation of relay K1	(4) + (6) “CAL”: Initiating electrode calibration (1-point or 2-point calibration)
(5) EXIT key to leave the levels	(3) + (5) Initiate manual operation or hold

Calibration options

The electrode parameters of a pH or redox combination electrode are subject to manufacturing tolerances and variations depending on usage. To compensate for these changing electrode parameters, the transmitter offers two calibration procedures:

1) 2-point calibration (standard)
   2-point calibration makes a fresh determination of the **electrode zero and slope** using two liquids with known pH values (e.g. buffer solutions).
   This method should be given preference!

2) 1-point calibration
   In 1-point calibration, **only the electrode zero** is freshly determined using a buffer solution (solution with a known pH value).
   Problems arising from an incorrect electrode slope cannot be detected by the user!
   This method should only be adopted in cases where the electrode is not subject to significant chemical or mechanical influences.

In addition to the calibration procedure described above, the transmitter offers the facility of manually entering or adjusting the zero point and slope (as determined by a laboratory, for example),

Additional functions of the JUMO dTRANS pH 01

❏ Programmable response of the process value output to underrange/overrange

On underrange or overrange, the process value output can move to the following operational states:

-4%, 0%, 100% or 110%
freely selectable

Example: The instrument is programmed to 4 — 20 mA
corresponding to 2 — 12 pH

The instrument can be set up so that, on falling below pH 2, the output signal is either held at 4 mA (0%) or drops to 3.84 mA (-4%). The 3.84 mA value can then be recognized as “irregular” by a connected PLC.

❏ The response of the controller relays to “Hold” can be defined

“Hold” is initiated either manually, using the keys, by a logic input, or by an alarm event. The outputs of the relays K1 and K2 can move to the following (programmable) states on “Hold”:

0%	Relay de-energized
50% output	For dynamic controllers, 50% of the maximum pulse width or frequency is produced.

100% output	Relay is energized, or maximum pulse width/ frequency
Output accepted	The present output continues to be produced

❑ **In "Manual" mode, the relays K1 and K2 are operated manually, by using the keys**. Either key or switch operation can be selected, by a setting at the parameter level.

Key operation: The relay is switched as long as the key is pressed (e.g. for manual dosing).

Switch operation: The first key stroke switches the relay on – the second switches it off again (toggle action), e.g. for emptying large tanks.

❑ Simulation of the analog process value output

In the manual mode, the process value output (0/2 — 10 V or 0/4 — 20 mA, depending on the setting) can be switched in 10% steps from 0 — 100%.

Application: "Dry-run" commissioning of the plant (without electrodes), fault-finding, servicing.

❑ Controller output functions

Output 1 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / switched off. Switching function can be reversed.
MAX/MIN limit comparator.

Output 2, relay: Switching, with pulse frequency or pulse width action / limit monitoring / MAX limit comparator for temperature input / MIN limit comparator for temperature input / switched off. Switching function can be reversed.
MAX/MIN limit comparator.

Output 3, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator / MIN limit comparator / output of pH or redox process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Output 4, logic output: "Hold" / alarm pulse contact / alarm steady contact / MAX limit comparator / MIN limit comparator / no function.

Output 5, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator / MIN limit comparator / output of pH or redox process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Limit comparator (limit monitor)

Controller outputs 1 to 5 (depending on the instrument version) can be assigned to a limit-monitoring function.
For each one, the direction of switching (pulled in going above, or going below a limit), pull-in and/or drop-out delay, and a hysteresis can all be defined.

Interface

The microprocessor transmitter/controller can be optionally fitted with an RS422/RS485 interface. This is used for communication with higher-level systems and integration into a data network. The transmission protocol can be either Profibus-DP or Modbus/Jbus.

Technical data

Inputs

Analog input 1
Input resistance ≥ 10^{12} Ω
Insulation resistance of the reference system connection to ground > 10^{7} Ω according to DIN 19 265
For all the usual pH electrodes, pH antimony electrodes, metal electrodes, reference electrodes or combination electrodes.

Analog input 2
Resistance thermometer Pt100 or Pt1000, in 2- or 3-wire circuit
-50 to +250°C
Measurement display in °C (option °F)

Lead compensation, analog input 2
The lead resistance can be compensated in software by a correction of the process value. This is not required if the resistance thermometer is connected in a 3-wire circuit. When a resistance thermometer is connected in a 2-wire circuit, lead compensation can be provided by using an external compensation resistor.

Functional description of logic inputs 1 and 2
The two standard logic inputs can be operated by floating contacts (relays) from a PLC, or by switches. The following functions can be selected and assigned:

Key inhibit: The PLC or a key switch can be used to lock the keys on the transmitter, to prevent unauthorized entries being made.

Setpoint changeover: For comfortable process control. As long as the logic input is not operated, setpoint pair SPr1 and SPr2 is active. If the appropriately configured logic input is operated, then the second setpoint pair is activated. Application: If, for instance, the medium is to be first acidified to pH 4 and then neutralized to pH 7 (2 process steps).

Freeze measurement: The indicated measurement and the process value output no longer change.

"Hold": This function can be used (for instance, by a supervisory PLC) to put the instrument into the secure "Hold" state. The response of the controller to "Hold" is as previously defined.

HOLD reversed The same function as HOLD, but when the logic input is open.

Alarm stop: The alarm generation via the configured output is prevented. The alarm LED (e.g. K4) continues to blink as a warning.

Reset alarm time: The alarm generation via the configured output is prevented. The alarm delay time is set to zero, but is restarted when the logic input becomes inactive and the start conditions are fulfilled once more. The alarm LED (e.g. K4) continues to blink as a warning.

Range expansion (x10): If only a small portion of the measurement range is used, it may be advantageous for the transmitter to react to 0 — 10% of the process value by producing 0 — 100% of the output signal.

Measurement and control range

-1.00 to 14.00 pH or
-1999 to +1999 mV (redox)

Deviation from characteristic
≤ 0.25% of measurement range

Ambient temperature error
≤ 0.15% per 10 °C

Reference temperature
25°C

Temperature display
-50 to +250°C (option °F)

Deviation from characteristic
≤ 0.25% of measurement range

Ambient temperature error
≤ 0.1% per 10 °C

Temperature compensation (pH measurement)
by resistance thermometer on analog input 2
Configurable:
automatic temperature compensation with a Pt100 or Pt1000, or manual temperature compensation.

Compensation range
-20 to +150°C

Outputs

2 relay outputs, 1 logic output, 1 analog process value output or 1 additional relay, and 1 serial interface are available.

1. **Relay, output 1 / 2 (standard)**
   Make contact (n.o., can also be configured as n.c. break contact)
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > $5x10^{5}$ operations at rated load
2. **Logic output, output 4**
   0/5V R_{load} ≥ 250Ω (standard)
   or
   0/12V R_{load} ≥ 650Ω (option)

3. **Process value output, output 3 or 5 (option)**
   freely configurable:
   0(2) — 10V $R_{load} \geq 500\Omega$ or
   0(4) — 20mA $R_{load} \geq 500\Omega$
   electrically isolated from the inputs:
   $\Delta U \leq 30$V AC or
   $\Delta U \leq 50$V AC

   Deviation from characteristic of the output signal
   ≤ 0.25% ± 50 ppm per °C
4. **Relay, output 3 or 5 (option)**
   (only for instruments without a process value output)
   changeover contact
   contact rating: 3A, 250V AC with resistive load
   contact life:
   > $5x10^5$ operations at rated load
5. **Interface RS422 / RS485, output 5 (option)**
   electrically isolated

   Baud rate
   4800 / 9600bps

   Protocol
   Modbus/Jbus or
   Profibus-DP

General controller data

A/D converter
resolution > 15 bit

Controller type
Outputs 1 and 2
limit controller, pulse width or pulse frequency controller, modulating controller. Freely configurable and mixable

K3 / K5:
continuous controller

Control action
configurable as P, PI, PID or PD.

Sampling time
210msec

Measurement circuit monitoring
Input 1:
out-of-range, sensor monitoring
Input 2:
out-of-range, probe short-circuit, probe break
The outputs move to a defined (configurable) status.

Data backup
EEPROM

Supply voltage
110 — 240 V AC +10%/-15%,
48 — 63 Hz or
20 — 53 V AC/DC, 48 — 63/0 Hz

Power consumption
approx. 8V A

Electrical connection
Instrument for switchgear cabinet (basic version)
via gold-plated faston connectors to DIN 46 244/A; 4.8mm x 0.8mm
pH glass electrode or combination electrode or metal electrode via BNC socket.

Wall-mounting housing (extra code /640)
via screw terminals
(wire cross-section up to 2.5 mm^2)
6 cable glands (1 x M16, 5 x M20

Permissible ambient temperature
0 to +50°C

Permissible ambient temperature limits
-10 to +55°C

Permissible storage temperature
-40 to +70°C

Climatic conditions
rel. humidity ≤ 75%, no condensation

Enclosure protection
to EN 60 529
Instrument for switchgear cabinet
front IP65 / rear IP20
Wall-mounting instrument
IP67

Electrical safety
to EN 61 010
clearance and creepage distances for
- overvoltage category II
- pollution degree 2

Electromagnetic compatibility
to EN 61 326
interference emission:Class B
interference immunity:to industrial requirements

Housing
Instrument for switchgear cabinet (basic version)
panel-mounting housing in conductive plastic to DIN 43 700, base material ABS
with plug-in controller module

Wall-mounting housing (extra code /640)
base material PC

Operating position
unrestricted

Weight
Instrument for switchgear cabinet (basic version)
approx. 320g

Wall-mounting housing (extra code /640)
approx. 1400g

Option

Wall-mounting housing
extra code /640
On request, the JUMO dTRANS pH 01 can also be supplied built into in a surface-mounting housing. The housing is suitable for wall-mounting or for mounting on a 35 x 7.5 mm DIN rail to EN 50 022.

The housing is sturdy and provides IP67 protection for the built-in instrument and is fitted with six cable glands. Unused cable glands can be tightly sealed using the blind grommets that are included in the delivery.
The electrical connection is made via screw terminals (wire cross-section up to 2.5 mm^2).

Standard accessories

- 2 mounting brackets (not with extra code / 640 (wall-mounting housing))
- 1 BNC connector (not with extra code /640 (wall-mounting housing))
- 1 seal for panel-mounting (not with extra code /640 (wall-mounting housing))
- sundry items for wall-mounting (only with extra code /640 (wall-mounting housing))
- sundry items for DIN rail mounting (only with extra code /640 (wall-mounting housing))
- 1 Operating Manual B20.2530.0.1
- 1 Operating Manual B20.2535.0.1

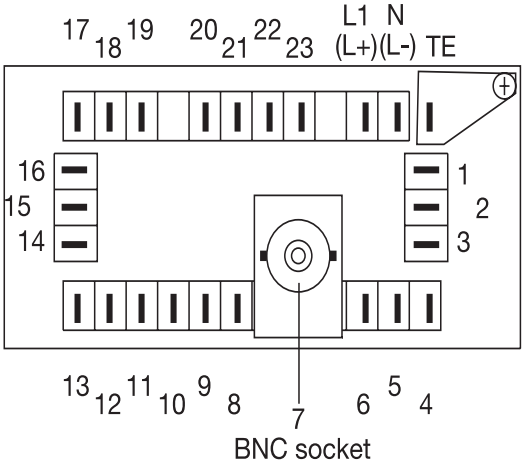
Optional accessories

Interface Description B20.2530.2

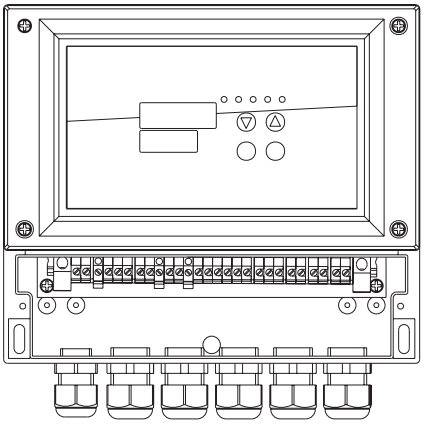
Parameters

Parameter	Display	Value range	Comment
Alarm tolerance pH / redox	AL1	0.00 — 99.99 pH 0000 — 9999 mV	The alarm is only generated when the level (setpoint + alarm tolerance) has been passed, and the alarm delay time has elapsed (only effective for pulse width / pulse frequency controllers). It is internally fixed at 0 for limit controllers.
Alarm delay	AL2	0 — 6000 sec	Delay time before the alarm contact is activated
Proportional band 1 pH / redox	Pb1	0.01 — 99.99 pH 1 — 9999 mV	Influences the P action of the controller
Proportional band 2 pH / redox	Pb2		
Derivative time 1	dt 1	0 — 9999 sec	Influences the D action of the controller If dt = 0, the controller has no D action.
Derivative time 2	dt 2		
Reset time 1	rt 1		Influences the I action of the controller If rt = 0, the controller has no I action.
Reset time 2	rt 2		
Minimum ON time 1 (for limit controller or pulse width controller) or minimum pulse width 1 (for pulse frequency controller)	tr 1	0.2 — 999.9 sec	Determined by the technical data of the dosing device (solenoid valve, dosing pump)
Minimum ON time 2 (for limit controller or pulse width controller) or minimum pulse width 2 (for pulse frequency controller)	tr 2		
Switching differential 1 pH / redox / temperature	HYS1	0.01 — 99.99 pH 1 — 9999 mV 0.0 — 250.0 °C	Defines the switch-off point for the control contact. (Is displayed if pH or temperature-dependent limit comparators have been configured by the corresponding configuration code.)
Switching differential 2 pH / redox / temperature	HYS2		
Switching differential 3 pH / redox / temperature	HYS3		
Switching differential 4 pH / redox / temperature	HYS4		
Switching differential 5 pH / redox / temperature	HYS5		
Pull-in delay 1	Ond1	0.2 — 999.9 sec	Delay time before the contact switches. (This is displayed if pH or temperature-dependent limit comparators have been configured by the corresponding configuration code.)
Pull-in delay 2	Ond2		
Pull-in delay 3	Ond3		
Pull-in delay 4	Ond4		
Pull-in delay 5	Ond5		
Drop-out delay 1	Ofd1	0.2 — 999.9 sec	Delay time until the contact moves back to the initial position. (This is displayed if pH or temperature-dependent limit comparators have been configured by the corresponding configuration code.)
Drop-out delay 2	Ofd2		
Drop-out delay 3	Ofd3		
Drop-out delay 4	Ofd4		
Drop-out delay 5	Ofd5		
Maximum pulse frequency 1	Fr 1	0 — 150 pulse/min	Maximum frequency of pulses (operating a dosing pump, for instance)
Maximum pulse frequency 2	Fr 2		
Pulse period 1	Cy 1	1.0 — 999.9 sec	The period in which a pulse is modulated
Pulse period 2	Cy 2		
Output level limit, relay 1	Y 1	0 — 100%	The maximum output level for a pulse width / pulse frequency controller.
Output level limit, relay 2	Y 2		
Actuator time	tt	15 — 3000 sec	For modulating controller

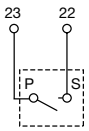
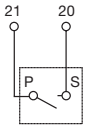
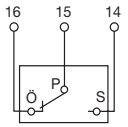
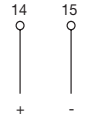
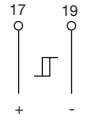
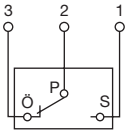
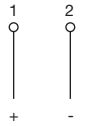
Connection diagram

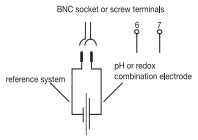
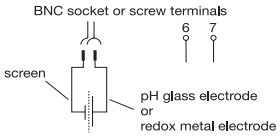
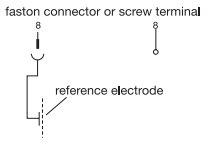
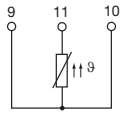
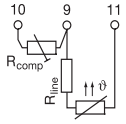


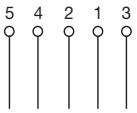
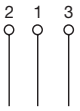
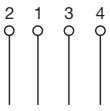
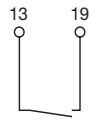
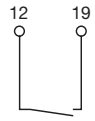
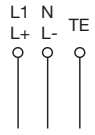
Rear view with faston connector and BNC socket.



Wall-mounting housing (extra code /640) with terminal strip

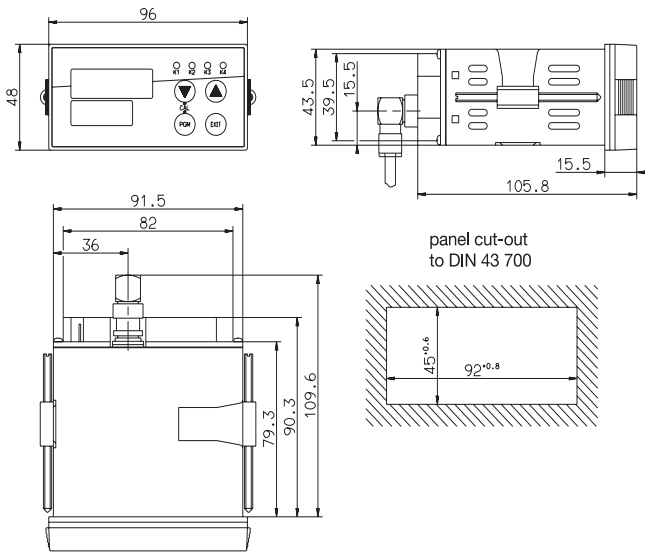
Outputs	K	Terminal assignments	Symbol
Relay 1 (K1) Status indication LED K1	1	23 common 22 make	
Relay 2 (K2) Status indication LED K2	2	21 common 20 make	
Relay 3 (K3) Status indication LED K3 **or** analog process value output (electrically isolated)	3	16 break 15 common 14 make	
		15 – 14 +	
Logic output 1 (K4) Status indication LED K4	4	19 – 17 +	
Relay 4 (K5) no status indication **or** analog process value output (electrically isolated)	5	3 break 2 common 1 make	
		2 – 1 +	

Inputs		Terminal assignments	Symbol
pH combination electrode or redox combination electrode		with switchgear cabinet version: BNC socket with wall-mounting housing (extra code /640): screw terminal 6: reference system (braiding) screw terminal 7: glass / metal electrode (inner conductor)	
pH glass electrode or metal electrode (with separate reference electrode)		with switchgear cabinet version: BNC socket with wall-mounting housing (extra code /640): screw terminal 6: braiding screw terminal 7: glass / metal electrode (inner conductor)	
Reference electrode (with separate electrodes)		8 reference system (inner conductor)	
Resistance thermometer in 3-wire circuit		9 10 11	
Resistance thermometer in 2-wire circuit		9 10 11	

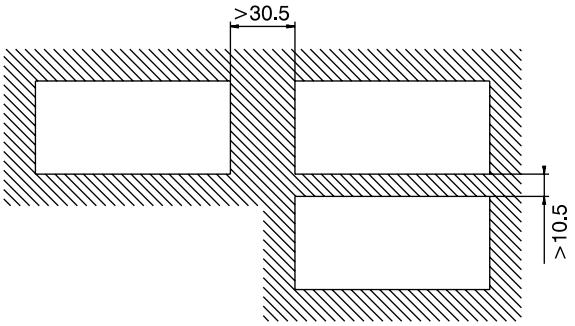
Serial interface RS422 (option)	RxD	5 4	RxD + RxD –	Receive data	
	TxD	2 1	TxD + TxD –	Transmit data	
	GND	3	GND		
Serial interface **RS485** (option)	+ -	2 1	TxD/RxD + TxD/RxD –	Receive data / transmit data	
	GND	3	GND		
Serial interface **Profibus-DP** (option)	VP	4	supply voltage positive (P5V)		
	RxD/TxD-P	2	receive/transmit data positive, B conductor		
	RxD/TxD-N	1	receive/transmit data negative, A conductor		
	DGND	3	ground for data transmission		
Logic input 1		13 19			
Logic input 2		12 19			
Supply voltage see nameplate	AC/ DC	AC: L1 N TE	 phase/line neutral technical earth	DC: L + L –	

Dimensions

Type 202530 / …

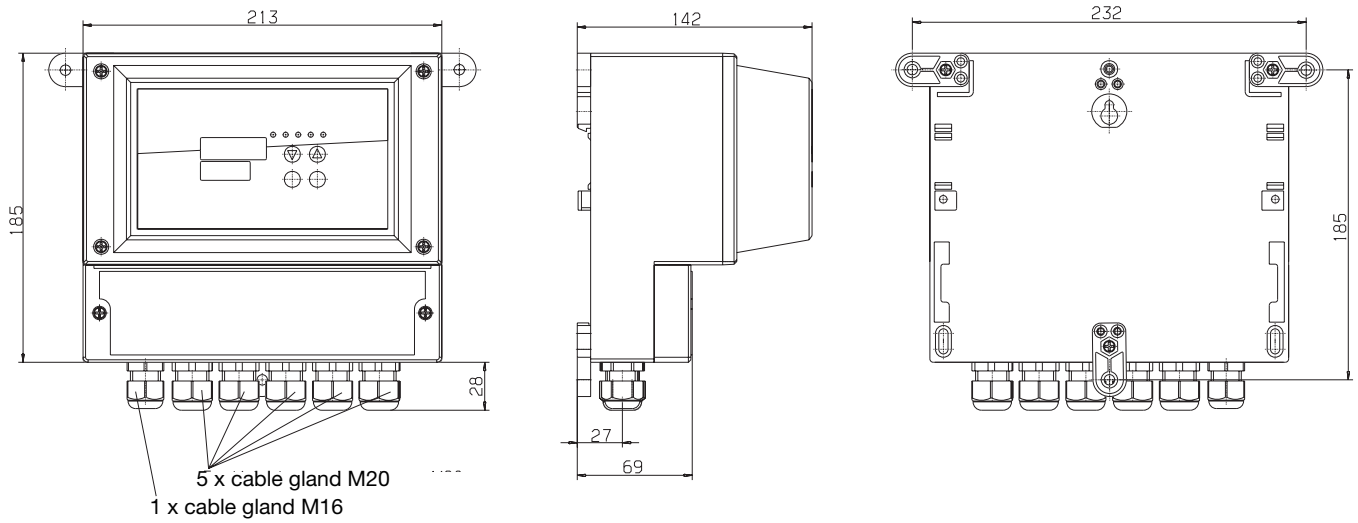


Panel cut-out to DIN 43 700
close mounting (minimum dimensions)



Option

Surface-mounting housing, extra code /640, IP67 protection



Type designation

(1) Basic type

202530 JUMO dTRANS pH 01,
Microprocessor transmitter/controller for pH
(can be changed over to redox potential)

(2) **Basic type extensions**

10 Limit controller*

(3) Output I

000 no output
310 relay, changeover contact
888 process value output, freely configurable

(4) Output II

000 no output
310 relay, changeover contact[1]
888 process value output, freely configurable[1]

(5) Supply voltage

22 20 — 53 V AC/DC, 48 — 63/0 Hz
23 110 — 240 V AC +10%/-15%, 48 — 63 Hz

(6) Interface

00 no serial interface
54 serial interface RS422/485[1]
64 serial interface Profibus-DP[1]

(7) Extra codes

000 no extra codes
015 logic output 0/12 V DC,
instead of standard 0/5 V DC
640 surface-mounting housing for mounting on wall or DIN rail, IP67 protection

	(1)		(2)		(3)		(4)[1]		(5)		(6)[1]		(7)
Order code	202530	/	10	-		,		-		-		-	
Order example	202530	/	10	-	888	,	000	-	23	-	00	-	000

*Generally

on **all** controllers of the 202530 series, the user can freely select the following configurations:

- ❏ Controller off
- ❏ Limit controller
- ❏ Pulse width controller with P, PI, PD, PID control action
- ❏ Pulse frequency controller with P, PI, PD, PID control action
- ❏ Modulating controller

[1] If output II (4) = "310" or "888" then the interface option (6) is not possible (or the other way round)!

Available ex-stock

Type	Sales No.
202530/10-888,000-23-00/000	20/00377252
202530/10-888,000-22-00/000	20/00377474

Not available ex-stock

Type	Sales No.
202530/10-888,000-23-00/640	20/00431434

Optional accessories 1 (switchgear cabinet version)

Designation	Sales No.
Bracket for C-rail	70/00375749
Blank cover 96 x 48 mm	70/00069680

Optional accessories 2 (wall-mounting version)

Designation	Sales No.
Pole clamp, 60 mm dia. (clamping area: 50 - 70 mm dia.)	20/00437485
Pole clamp, 120 mm dia. (clamping area: 100 - 120 mm dia.)	20/00437486

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Internet: www.JumoUSA.com

JUMO dTRANS Rd 01
µP Transmitter / Controller for redox potential (ORP)

Type 202535

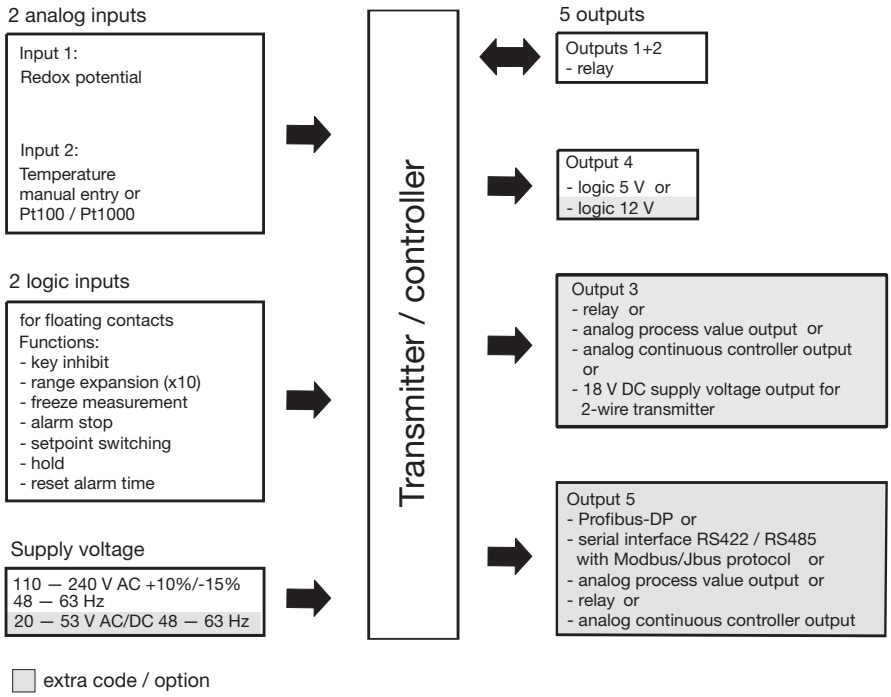
Type 202535 / …

Type 202535 / …/640

Brief description

The instrument measures and controls the redox potential of aqueous solutions.
The transmitter has two analog and two logic inputs. The first analog input is suitable for connecting a redox combination electrode or a metal/reference electrode. The second analog input can be used to connect Pt100 or Pt1000 resistance thermometers.
The instrument features two 4-digit 7-segment displays for indicating the **temperature-independent** redox-potential process value (red) and the temperature (green). The instrument is delivered as standard with the temperature display switched off. A separate temperature sensor (Pt100 or Pt1000) can be attached to the second analog input, and used to indicate the temperature of the medium being measured and to monitor it through a limit comparator (limt switch), if required. During programming, the displays provide comments on the inputs.
A great variety of control tasks can be handled by the various output options (relay contacts and/or analog outputs). The two relay “make” contacts that are provided on the instrument as standard can be configured as a limit controller and/or pulse width or pulse frequency controllers, or as a modulating controller. To obtain analog (continuous) controller outputs, the optional analog outputs must be configured accordingly.
All controller outputs can be configured for a P, PI, PD or PID control action.
In the entry level version, the instrument provides two relay “make” contacts and one logic output (0/5V). Two additional outputs can, according to choice, be fitted as relay changeover contacts and/or analog outputs (process value output or analog controller output) or as a serial interface (Profibus-DP or Modbus/Jbus protocol).

Block structure



☐ extra code / option

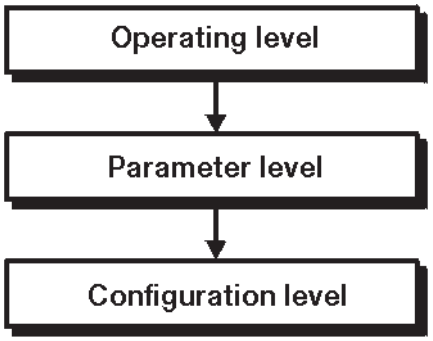
Key features

- ❏ Panel-mounting instrument, just 96 x 48 x 110 mm
- ❏ Display in mV
- ❏ 2 relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width/pulse frequency output or modulating controller
- ❏ 2 electrically isolated analog outputs 0(4) — 20 mA / 0(2) — 10 V freely selectable and scalable for redox
- ❏ 2 logic inputs
- ❏ Monitoring and displaying temperature of medium is possible
- ❏ Simple, step-by-step calibration procedure
- ❏ OPTION: Profibus-DP or serial interface RS485 / 422 with Modbus/Jbus protocol
- ❏ Surface-mounting housing to DIN 43 700, front protection IP65.
- ❏ Wall-mounting housing protected to IP67

Approvals

Operation

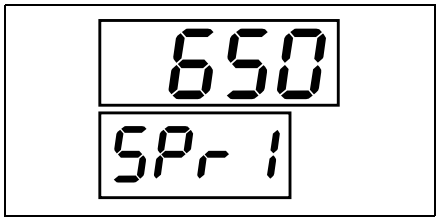
For easy programming and operation, the controller parameter and configuration data are assigned to various levels.



Code words protect the levels from unauthorized access.
Membrane keys ensure simple and user-friendly operation.
The two LED displays show the parameter symbols and the corresponding values.

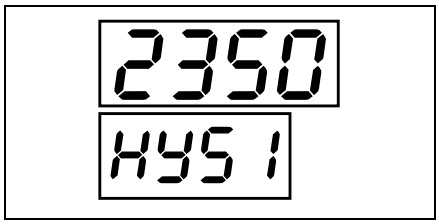
Operating level

The lower display, for example, shows the symbol, the upper display shows the corresponding value. Setpoints SPr1 and SPr2 can be altered by using the membrane keys.



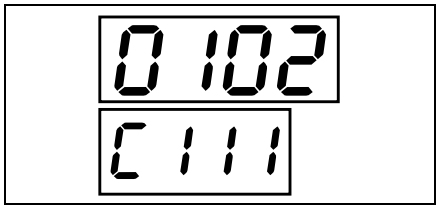
Parameter level

The controller is adapted to the control loop at this level. The appropriate parameters appear here, with symbol and value.
Only those parameters will be indicated which correspond to the configuration of the controller (configuration level).

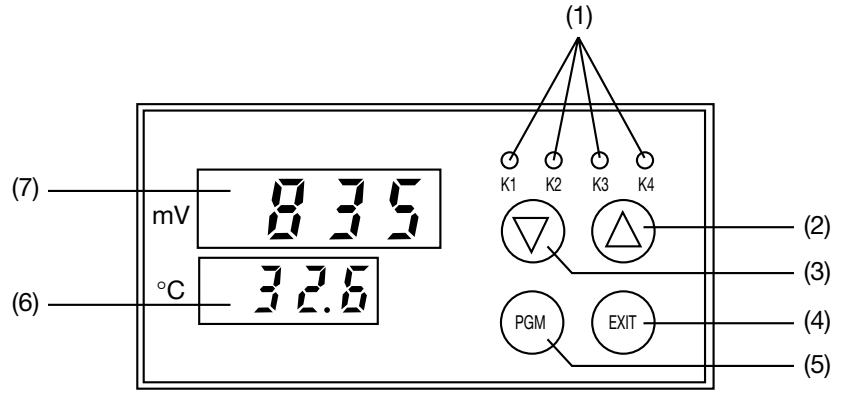


Configuration level

This level is used to adapt the controller to the control task, or for adaptation of the inputs and outputs.



Indications / controls



(1) Status indicators (yellow) for outputs 1 to 4	(6) 4-digit temperature display (LED, green, 8mm high)
(2) Increment key for altering parameters or manual operation of relay K2	(7) 4-digit process value indication (LED, red, 13mm high)
(3) Decrement key for altering parameters or manual operation of relay K1	(3) + (5) "CAL": Initiating electrode calibration (single-point calibration)
(4) EXIT key to leave the levels	(2) + (4) Initiate manual operation or hold
(5) PGM key for selection of parameters and confirmation of entries	

Calibration options

The electrode zero point of a redox combination electrode is subject to manufacturing tolerances and variations depending on usage.

The transmitter offers the feature of using a step-by-step calibration procedure – the 1-point calibration – to make a fresh determination of the zero point of the electrode by using a buffer solution or a solution with a known redox potential.

The transmitter also offers the facility of manually entering or adjusting the zero point (as determined by a laboratory, for example).

Additional functions of the JUMO dTRANS Rd 01

❑ **Programmable response of the process value output to underrange/overrange**

On underrange or overrange, the process value output can move to the following operational states:

-4%, 0%, 100% or 110% freely selectable

Example: Instrument is programmed to
4 — 20 mA corresponding to
100 — 500 mV

The instrument can be set up so that, on falling below 100, the output signal is either held at 4 mA (0%) or drops to 3.84 mA (-4%). The 3.84 mA value can then be recognized as "irregular" by a connected PLC.

❑ **The response of the controller relays to "Hold" can be defined**

"Hold" is initiated either manually, using the keys, by a logic input, or by an alarm event. The outputs of the relays K1 and K2 can move to the following (programmable) states on "Hold":

0%	Relay de-energized
50% output	For dynamic controllers, 50% of the maximum pulse width or frequency is produced
100% output	Relay is energized, or maximum pulse width / frequency
Output accepted	The present output continues to be produced

❑ **In "Manual" mode, the relays K1 and K2 are operated manually, by using the keys**. Either key or switch operation can be selected, by a setting at the parameter level.

Key operation: The relay is switched as long as the key is pressed (e.g. for manual dosing).

Switch operation: The first key stroke switches the relay on – the second switches it off again (toggle action), e.g. for emptying large tanks.

❑ **Simulation of the analog process value output**

In the manual mode, the process value output (0/2 — 10 V or 0/4 — 20 mA, depending on the setting) can be switched in 10% steps from 0 — 100%.

Application: "Dry-run" commissioning of the plant (without electrodes), fault-finding, servicing.

❑ **Controller output functions**

Output 1 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / switched off. Switching function can be reversed.
MAX / MIN limit comparator.

Output 2 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / MAX/MIN limit comparator for temperature input / switched off. Switching function can be reversed.
MAX/MIN limit comparator.

Output 3, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX/MIN limit comparator / output of redox potential (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Output 4, logic output: "Hold" / alarm pulse contact / alarm steady contact / MAX/MIN limit comparator / no function.

Output 5, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX/MIN limit comparator / output of redox potential (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Limit comparator (limit monitor)

Controller outputs 1 to 5 (depending on the instrument version) can be assigned to limit-monitoring functions.
For each one, the direction of switching (pulled in going above, or going below a limit), pull-in and/or drop-out delay, and a hysteresis can all be defined.

Interface

The µP transmitter/controller can be optionally fitted with an RS422 /RS485 interface. This is used for communication with higher-level systems and integration into a data network. The transmission protocol can be either Profibus-DP or Modbus/Jbus.

Technical data

Inputs

Analog input 1
Input resistance ≥ 10^{12} Ω
Insulation resistance of the reference system connection to ground > 10^{7} Ω according to DIN 19 265
For all the usual metal combination electrodes or metal/reference electrodes.

Analog input 2
Resistance thermometer Pt100 or Pt 1000, in 2- or 3-wire circuit
-50 to +250°C
Measurement display in °C (option °F)

Lead compensation, analog input 2
The lead resistance can be compensated in software by a correction of the process value. This is not required if the resistance thermometer is connected in a 3-wire circuit. When a resistance thermometer is connected in a 2-wire circuit, lead compensation can be provided by using an external compensation resistor.

Functional description of logic inputs 1 and 2
The two standard logic inputs can be operated by floating contacts (relays) from a PLC, or by switches. The following functions can be selected and assigned:

Key inhibit: The PLC or a key switch can be used to lock the keys on the transmitter, to prevent unauthorized entries being made.

Setpoint changeover: For comfortable process control. As long as the logic input is not operated, setpoint pair SPr1 and SPr2 is active. If the appropriately configured logic input is operated, then the second setpoint pair is activated.

Freeze measurement: The indicated measurement and the process value output no longer change.

"Hold": This function can be used (for instance, by a supervisory PLC) to put the instrument into the secure "Hold" state. The response of the controller to "Hold" is as previously defined.

"Hold reversed": The same function as HOLD, but when the logic input is open.

Alarm stop: The alarm generation via the configured output is prevented, but the alarm LED (e.g. K4) continues to blink as a warning.

Reset alarm time: The alarm generation via the configured output is prevented. The alarm delay time is set to zero, but is restarted when the logic input becomes inactive and the start conditions are fulfilled once more. The alarm LED (e.g. K4) continues to blink as a warning.

Range expansion (x10): If only a small portion of the measurement range is used, it may be advantageous for the transmitter to react to 0 — 10% of the process value by producing 0 — 100% of the output signal.

Measurement and control range
-1999 to +1999 mV

Deviation from characteristic
≤ 0.25% per 10 °C

Ambient temperature error
≤ 0.15% per 10 °C

Temperature display
-50 to +250°C (option °F)

Deviation from characteristic
≤ 0.25% of measurement range

Ambient temperature error
≤ 0.1% per 10 °C

Outputs

2 relay outputs, 1 logic output, 1 analog process value output or 1 additional relay, and 1 serial interface are available.

1. **Relay, output 1 / 2 (standard)**
   Make contact (n.o., can also be configured as n.c. break contact)
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > $5x10^{5}$ operations at rated load
2. **Logic output, output 4**
   0/5V $R_{load} \geq 250\,\Omega$
   or
   0/12V $R_{load} \geq 650\,\Omega$ (option)
3. **Process value output, output 3 or 5 (option)**
   freely configurable:
   0(2) — 10V $R_{load} \geq 500\,\Omega$ or
   0(4) — 20mA $R_{load} \geq 500\,\Omega$
   electrically isolated from the inputs:
   ΔU ≤ 30V AC or
   ΔU ≤ 50V DC
   Deviation of output signal from characteristic
   ≤ 0.25%, ± 50 ppm per °C
4. **Relay, output 3 or 5 (option)**
   (only for instruments without a process value output)
   changeover contact
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > $5x10^{5}$ operations at rated load
5. **Interface RS422 / RS485, Output 5 (option)**
   electrically isolated

   Baud rate
   4800/ 9600bps

   Protocol
   Modbus / Jbus or
   Profibus-DP

General controller data

A/D converter
resolution > 15 bit

Controller type
Outputs 1 and 2
limit controller, pulse width or pulse frequency controller, modulating controller. Freely configurable and mixable
K3 / K5:
continuous controller

Control action
configurable as P, PI, PID or PD.

Sampling time
210 msec

Measurement circuit monitoring
Input 1: out-of-range
Input 2: out-of-range, probe short-circuit, probe break
The outputs move to a defined (configurable) status.

Data backup
EEPROM

Supply voltage
110 — 240 V AC +10%/-15%,
48 — 63 Hz
or
20 — 53 V AC/DC, 48 — 63/0 Hz,

Power consumption
approx. 8 V A

Electrical connection
via gold-plated faston connectors to DIN 46 244/A; 4.8 mm x 0.8 mm
redox combination electrode or metal electrode via BNC socket.

Wall-mounting housing (extra code /640)

via screw terminals
(wire cross-section up to 2.5 mm^2)
6 cable glands (1 x M16, 5 x M20)

Permissible ambient temperature
0 to +50 °C

Permissible ambient temperature limits
-10 to +55 °C

Permissible storage temperature
-40 to +70 °C

Climatic conditions
rel. humidity ≤ 75 %, no condensation

Enclosure protection
to EN 60 529
Instrument for switchgear cabinet
fron IP65 / rear IP20
Wall-mounting instrument
IP67

Electrical safety
to EN 61 010
clearance and creepage distances for
- overvoltage category II
- pollution degree 2

Electromagnetic compatibility
to EN 61 326
interference emission:Class B
interference immunity:to industrial requirements

Housing
Instrument for switchgear cabinet (basic version)
panel-mounting housing in conductive plastic to DIN 43 700, base material ABS
with plug-in controller module.
Wall-mounting housing (extra code /640)
base material PC

Operating position
unrestricted

Weight
Instrument for switchgear cabinet (basic version)
approx. 320 g
Wall-mounting housing (extra code /640)
approx. 1400 g

Standard accessories

- 2 mounting brackets
- 1 seal (housing/panel)
- 1 Operating Manual B 20.2535.0.1

Option

Wall-mounting housing
extra code /640

Housing with door at front
Type 2 FGE-150-2/185

On request, the JUMO dTRANS Rd 01 can also be supplied built into a surface-mounting housing. The housing is suitable for wall-mounting or for mounting on a 35 x 7.5 mm DIN rail to EN 50 022.

The housing is sturdy and provides IP67 protection for the built-in instrument and is fitted with six cable glands. Unused cable glands can be tightly sealed using the blind grommets that are included in the delivery.
The electrical connection is made via screw terminals (wire cross-section up to 2.5 mm^2).

Standard accessories

- 2 mounting brackets (not with extra code / 640 (wall-mounting housing))
- 1 BNC connector (not with extra code /640 (wall-mounting housing))
- 1 seal for panel mounting (not with extra code /640 (wall-mounting housing))
- sundry items for wall-mounting (only with extra code /640 (wall-mounting housing))
- sundry items for DIN rail mounting (only with extra code /640 (wall-mounting housing))
- 1 Operating Manual B 20.2535.0.1

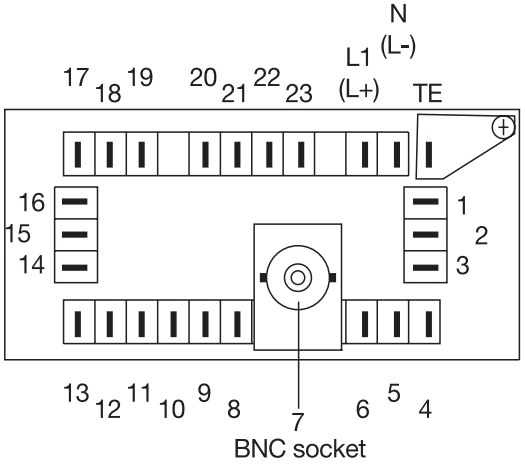
Optional accessory

Interface Description B 20.2530.2

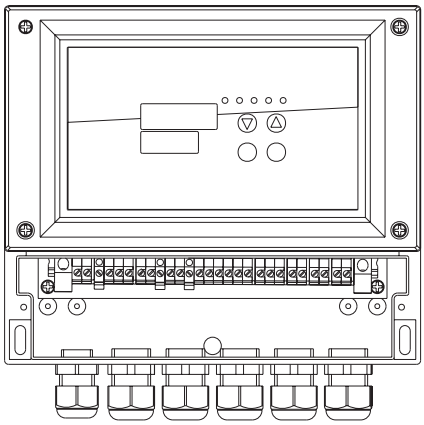
Parameters

Parameter	Display	Value range	Comment
Alarm tolerance	AL1	0000 — 9999 mV	The alarm is only generated when the level (setpoint + alarm tolerance) has been passed, and the alarm delay time has elapsed (only effective for pulse width / pulse frequency controllers. It is internally fixed at 0 for limit controllers).
Alarm delay	AL2	0 — 6000 sec	Delay time before the alarm contact is activated
Proportional band 1	Pb1	1 — 9999 mV	Influences the P action of the controller
Proportional band 2	Pb2	1 — 9999 mV	
Derivative time 1	dt1	0 — 9999 sec	Influences the D action of the controller If dt = 0, the controller has no D action.
Derivative time 2	dt2		
Reset time 1	rt1		Influences the I action of the controller If rt = 0, the controller has no I action.
Reset time 2	rt2		
Minimum ON time 1 (for limit controller or pulse width controller) or minimum pulse width 1 (for pulse frequency controller)	tr1	0.2 — 999.9 sec	Determined by the technical data of the dosing device (solenoid valve, dosing pump)
Minimum ON time 2 (for limit controller or pulse width controller) or minimum pulse width 2 (for pulse frequency controller)	tr2	0.2 — 999.9 sec	
Switching differential 1	HYS1	1 — 9999 mV	Defines the switch-off point for the control contacts
Switching differential 2	HYS2		
Switching differential 3	HYS3		
Switching differential 4	HYS4		
Switching differential 5	HYS5		
Pull-in delay 1	Ond1	0.0 — 999.9 sec	Delay time before the contact is activated
Pull-in delay 2	Ond2		
Pull-in delay 3	Ond3		
Pull-in delay 4	Ond4		
Pull-in delay 5	Ond5		
Drop-out delay 1	Ofd1	0.2 — 999.9 sec	Delay time until the contact moves back to the initial position
Drop-out delay 2	Ofd2		
Drop-out delay 3	Ofd3		
Drop-out delay 4	Ofd4		
Drop-out delay 5	Ofd5		
Pulse frequency 1	Fr1	0 — 150 pulse/min	Maximum frequency of pulses (operating a dosing pump, for instance)
Pulse frequency 2	Fr2		
Pulse period 1	Cy1	2.0 — 999.9 sec	The period in which a pulse is modulated
Pulse period 2	Cy2		
Output level limit, output 1	Y1	0 — 100%	The maximum output level for a pulse width / pulse frequency controller
Output level limit, output 2	Y2	0 — 100%	
Actuator time	tt	15 — 3000 sec	For modulating controller

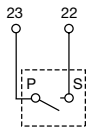
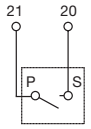
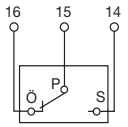
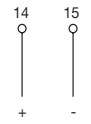
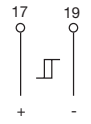
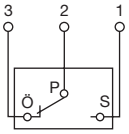
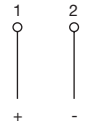
Connection diagram

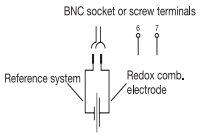
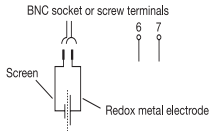
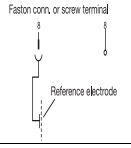
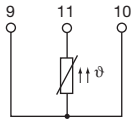
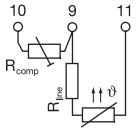


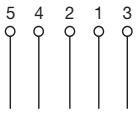
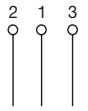
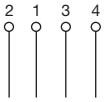
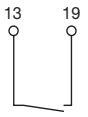
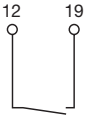
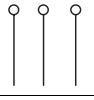
Rear view with faston connectors



Wall-mounting housing (extra code /640) with terminal strip

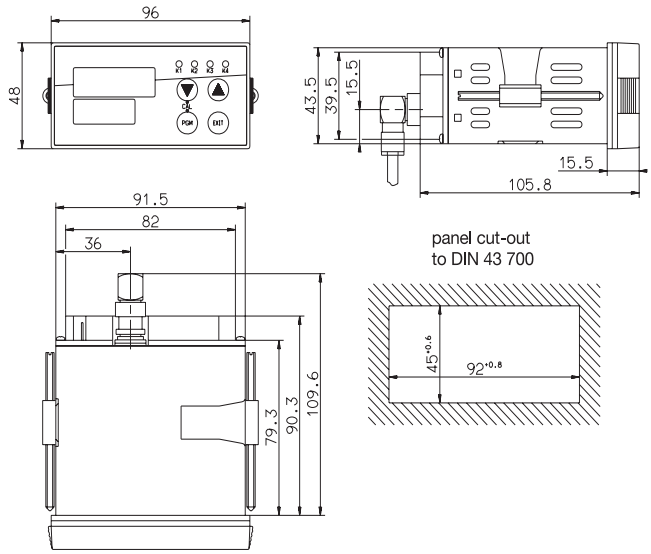
Outputs	K	Terminal assignments	Symbol
Relay 1 (K1) Status indication LED K1	1	23 common 22 make	
Relay 2 (K2) Status indication LED K2	2	21 common 20 make	
Relay 3 (K3) Status indication LED K3	3	16 break 15 common 14 make	
or analog process value output (electrically isolated)		15 – 14 +	
Logic output 1 (K4) Status indication LED K4	4	19 – 17 +	
Relay 4 (K5) no status indication	5	3 break 2 common 1 make	
or analog process value output (electrically isolated)		2 – 1 +	

Inputs		**Terminal assignments**	**Symbol**
Redox combination electrode		with switchgear cabinet instrument: BNC socket with wall-mounting housing (extra code /640): screw terminal 6: reference system (braiding) screw terminal 7: metal electrode (inner conductor)	
Metal electrode with separate reference system		with switchgear cabinet instrument: BNC socket with wall-mounting housing (extra code /640): screw terminal 6: braiding screw terminal 7: metal electrode (inner conductor)	
Reference electrode		8 reference system (inner conductor)	
Resistance thermometer in 3-wire circuit		9 10 11	
Resistance thermometer in 2-wire circuit		9 10 11	

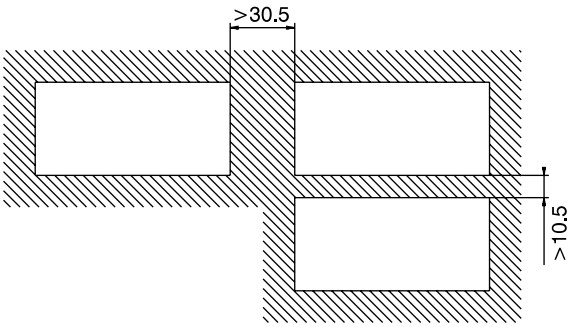
Serial interface RS422 (option)	RxD	5 4	RxD + RxD –	Receive data	
	TxD	2 1	TxD + TxD –	Transmit data	
	GND	3	GND		
Serial interface RS485 (option)	+ -	2 1	TxD/RxD + TxD/RxD –	Receive data / transmit data	
	GND	3	GND		
Serial interface **Profibus-DP** (option)	VP	4	supply voltage positive, (P5V)		
	RxD/TxD-P	2	receive/transmit data positive, B conductor		
	RxD/TxD-N	1	receive/transmit data negative, A conductor		
	DGND	3	GND		
Logic input 1		13 19			
Logic input 2		12 19			
Supply voltage see nameplate	AC/ DC	AC: L1 N TE	 phase/line neutral technical earth	DC: L + L –	

Dimensions

Type 202535/...

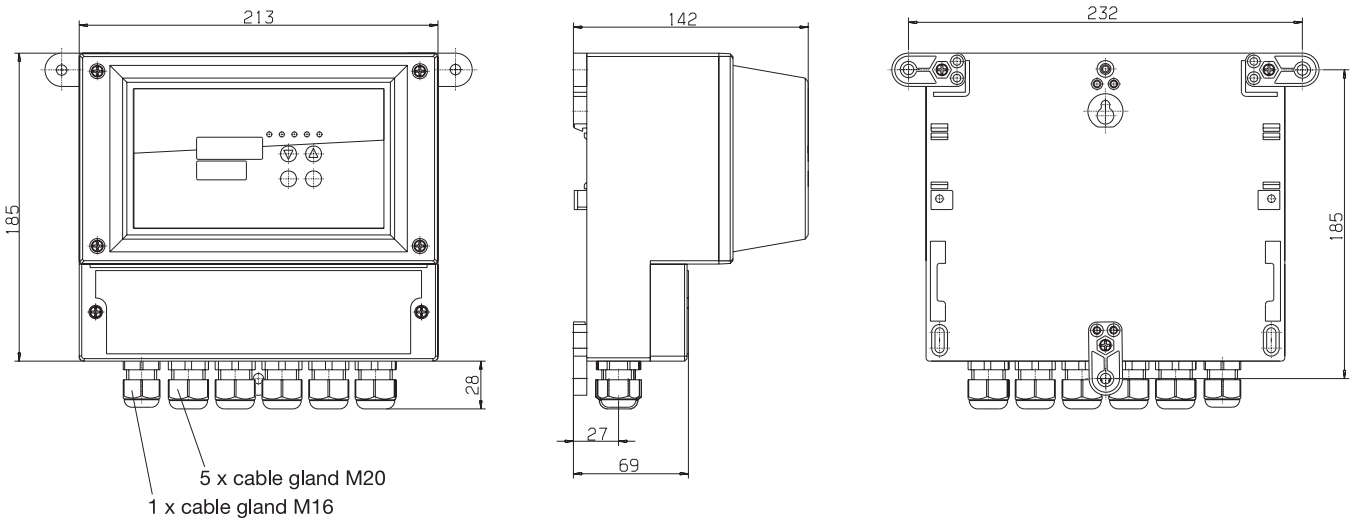


Panel cut-out to DIN 43 700
Close mounting (minimum dimensions)



Option

Surface-mounting housing, extra code /640, Protection IP67



Type designation

(1) Basic type

202535 JUMO dTRANS Rd 01,
µP transmitter / controller for redox potential (ORP)

(2) **Basic type extensions**

10 Limit controller*

(3) Output I

000 no output
310 relay, changeover contact
888 process value output, freely configurable

(4) Output II

000 no output
310 relay, changeover contact[1]
888 process value output, freely configurable[1]

(5) Supply voltage

22 20 — 53 V AC/DC, 48 — 63/0 Hz
23 110 — 240 V AC +10%/-15%, 48 — 63 Hz

(6) Interface

00 no serial interface
54 serial interface RS422/485[1]
64 serial interface Profibus-DP[1]

(7) Extra codes

000 no extra codes
015 logic output 0/12 V DC,
instead of standard 0/5 V DC
640 surface-mounting housing for mounting on wall or DIN rail, IP67 protection

	(1)		(2)		(3)		(4)[1]		(5)		(6)[1]		(7)
Order code	202535	/		-		,		-		-		-	
Order example	202535	/	10	-	888	,	000	-	23	-	00	-	000

*Generally

on **all** controllers of the 202535 series, the user can freely select the following configurations:

- ❏ Controller off
- ❏ Limit controller
- ❏ Pulse width controller with P, PI, PD, PID control action
- ❏ Pulse frequency controller with P, PI, PD, PID control action
- ❏ Modulating controller

[1] If output II (4) = "310" or "888" then the interface option (6) is not possible (or the other way round)!

Stock items

Type	Sales No.
202535/10-888,000-23-00/000	20/00377254

Non stock items

Type	Sales No.
202535/10-888,000-23-00/640	20/00448166

Optional accessories 1 (switchgear cabinet instrument)

Designation	Sales No.
Bracket for C-rail	70/00375749
Blind cover 96 x 48 mm	70/00069680

Optional accessories 2 (wall-mounting instrument)

Designation	Sales No.
Pole clamp, 60 mm dia. (clamping area: 50 — 70 mm dia.)	20/00437485
Pole clamp, 120 mm dia. (clamping area: 100 — 120 mm dia.)	20/00437486

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JUMO dTRANS Lf 01
µP Transmitter / Controller for electrolytic conductivity

Type 202540

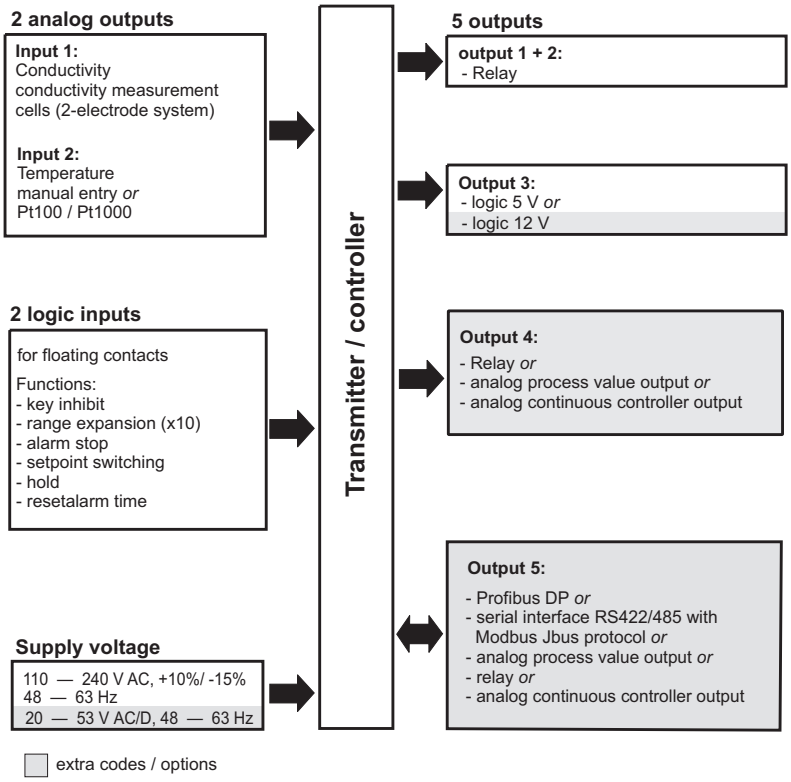
Type 202540 / …

Type 202540 / …/640

Brief description

This instrument measures and controls the conductivity of aqueous solutions.
The transmitter has two analog and two logic inputs. The first analog input is suitable for the connection of conductivity electrodes with cell constants of 0.01, 0.1, 1.0, 3.0 or 10.0 [1/cm]. The second analog input can be used to connect Pt100 or Pt1000 resistance thermometers.
The instrument features two 4-digit 7-segment displays for indicating the conductivity process value (red) and the temperature (green). During programming, the displays provide comments on the inputs.
A great variety of control tasks can be handled by the various output options (relay contacts and / or analog outputs). The two relay “make” contacts that are provided on the instrument as standard can be configured as a limit controller and / or pulse width or pulse frequency controllers, or as a modulating controller. To obtain analog (continuous) controller outputs, the optional analog outputs must be configured accordingly.
All controller outputs can be configured for a P, PI, PD or PID control action.
In the entry level version, the instrument provides two relay “make” contacts and one logic output (0/5V). Two additional outputs can, according to choice, be fitted as relay changeover contacts and / or analog outputs (process value output or analog controller output) or as a serial interface (Profibus-DP or Modbus / Jbus protocol).

Block structure



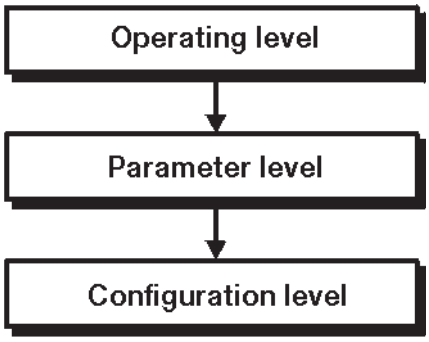
Key features

- Panel-mounting instrument, just 96 x 48 x 110 mm
- Conductivity display (in µS/cm or mS/cm) and temperature
- 2 relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width/pulse frequency output or modulating controller
- 2 electrically isolated analog outputs 0(4) — 20 mA / 0(2) — 10 V freely selectable and scalable for conductivity or temperature (option)
- 2 logic inputs
- Monitoring the temperature of the medium is possible
- Calibration procedure for the relative cell constant and temperature coefficient of solution being measured
- OPTION: Profibus-DP or serial interface RS485/422 with Modbus/Jbus protocol
- Measurement ranges from 0 — 0.5 µS to 0 — 200 mS **in one instrument**

Approvals

Operation

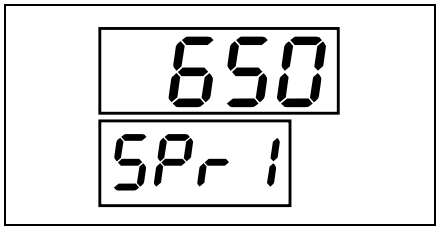
For easy programming and operation, the controller parameter and configuration data are assigned to various levels.



Code words protect the levels from unauthorized access.
Membrane keys ensure simple and user-friendly operation.
The two LED displays show the parameter symbols and the corresponding values.

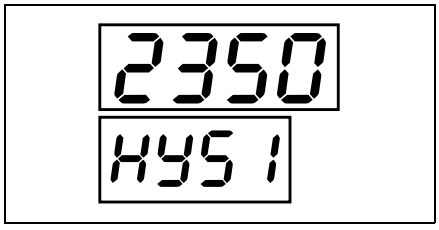
Operating level

The lower display, for example, shows the symbol, the upper display shows the corresponding value. Setpoints SPr1 and SPr2 can be altered by using the membrane keys.



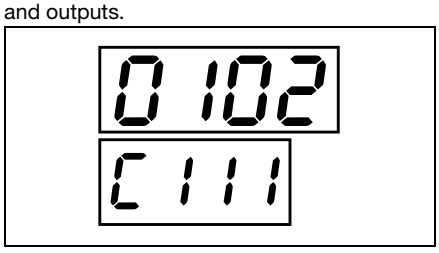
Parameter level

The controller is adapted to the control loop at this level. The appropriate parameters appear here, with symbol and value.
Only those parameters will be indicated which correspond to the configuration of the controller (configuration level).

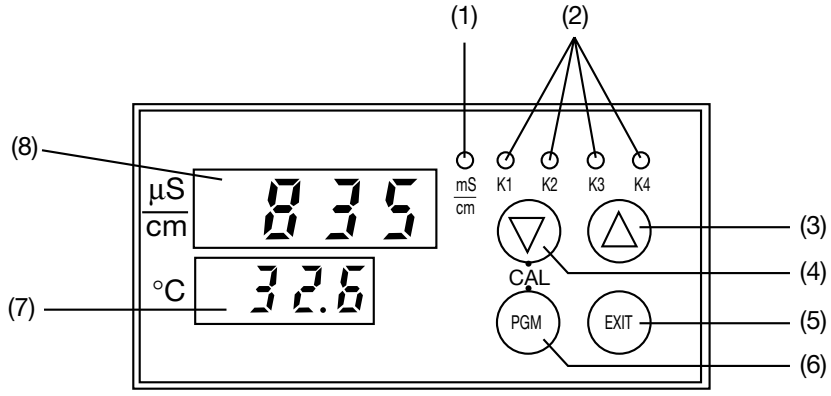


Configuration level

This level is used to adapt the controller to the control task, or for adaptation of the inputs and outputs.



Indications / controls



(1) LED display in mS/cm	(6) PGM key for selection of parameters and confirmation of entries
(2) Status indicators (yellow) for outputs 1 to 4	(7) 4-digit temperature display (LED, green, 8mm high)
(3) Increment key for altering parameters or manual operation of relay K2	(8) 4-digit process value indication (LED, red, 13mm high)
(4) Decrement key for altering parameters or manual operation of relay K1	(4) "CAL": Initiates calibration + (relative cell constant K_{rel} (6) or temperature coefficient α)
(5) EXIT key to leave the levels	(3) + Initiate manual operation or hold (5)

Calibration options

❑ **Calibration of the cell constant**

Subject to manufacturing tolerances, the cell constant of the conductivity measuring cell may deviate slightly from its nominal (printed) value. In addition, the cell constant may change during operation (due to deposits or wear). This results in a change of the output signal from the cell. The dTRANS Lf 01 offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (range 80 — 120%) or **automatic calibration** of the relative cell constant K_{rel}.

❑ **Calibration of the temperature coefficient α**

The conductivity of almost all solutions is temperature-dependent. To ensure correct measurement, it is therefore necessary to know both the temperature and temperature coefficient α [% per °C] of the measuring solution. The temperature can either be measured automatically, with a Pt100 or Pt1000 temperature probe, or set manually by the user.
When using a dTRANS Lf 01, the temperature coefficient can be determined automatically or entered manually, within the range 0 — 5.5 % per °C.

Additional functions of the JUMO dTRANS Lf 01

❑ **Programmable response of the process value output to underrange / overrange**

On underrange or overrange, the process value output can move to the following operational states:

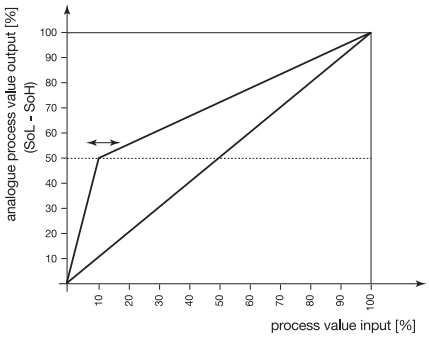
-4%, 0%, 100% or 110% freely selectable

Example: The instrument is programmed to
4 — 20 mA corresponding to
0 — 30 mS/cm

The instrument can be set up so that, on exceeding 30 mS/cm, the output signal is either held at 20 mA (100%) or will jump to 22 mA (110%). The 22 mA value can then be recognized as "irregular" by a connected PLC.

❑ **Bilinear output**

This function divides the signal for the analog process value output into two linear portions (0 — 50% and 50 — 100% of the output signal), with a knee-point at 50% of the output signal. The knee-point of the characteristic can be shifted along the dotted 50% line. The 50% factory setting produces a straight-line characteristic.



The bilinear characteristic is used when the "normal" measurement range is likely to be frequently exceeded.

Example: The normal measurement range spans 0 — 20 µS/cm.
However, measurements of up to 80 µS/cm can also occur.
In this case, the range 0 — 100 µS/cm will be selected, and the knee-point set at 20% of this range (20% of 100 µS/cm corresponds to 20 µS/cm).
This results in measurements in the range 0 — 20 µS/cm being converted into an output signal 0 — 10 mA.
Measurements in the range 20 — 100 µS/cm will be converted into an output signal 10 — 20 mA.

❑ **The response of the controller relays to "Hold" can be defined**

"Hold" is initiated either manually, using the keys, by a logic input, or by an alarm event. The outputs of the relays K1 and K2 can move to the following (programmable) states on "Hold":

0%	Relay de-energized
50% output	For dynamic controllers, 50% of the maximum pulse width or frequency is produced
100% output	Relay is energized, or maximum pulse width / frequency
Output accepted	The present output continues to be produced

❑ **In "Manual" mode, the relays K1 and K2 are operated manually, by using the keys**. Either key or switch operation can be selected, by a setting at the parameter level.

Key operation: The relay is switched as long as the key is pressed (e.g. for manual dosing).

Switch operation: The first key stroke switches the relay on – the second switches it off again (toggle action), e.g. for emptying large tanks.

❑ **Simulation of the process value output**

In the manual mode, the process value output (0/2 — 10 V or 0/4 — 20 mA, depending on the setting) can be switched in 10% steps from 0 — 100%, .

Application: "Dry-run" commissioning of the plant (without measuring cell, fault search, servicing).

❑ **Controller output functions**

Output 1 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / switched off. Switching function can be reversed.
MAX / MIN limit comparator.

Output 2 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / MAX / MIN limit comparator for temperature / switched off. Switching function can be reversed.
MAX / MIN limit comparator.

Output 3, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX / MIN comparator for temperature input / output of conductivity process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Output 4, logic output: "Hold" / alarm pulse contact / alarm steady contact / MAX limit comparator for temperature input / MIN limit comparator for temperature input / no function.

Output 5, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX / MIN limit comparator / output of conductivity process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Limit comparator (limit monitor)

Controller outputs 1 to 5 (depending on the instrument version) can be assigned to a limit-monitoring function.
For each one, the direction of switching (pulled in on going above, or going below a limit), pull-in and/or drop-out delay, and a hysteresis can all be defined.

Interface

The microprocessor/controller can be optionally fitted with an RS422/RS485 interface. This is used for communication with higher-level systems and integration into a data network. The transmission protocol can be either Profibus-DP or Modbus/Jbus.

Technical data

Inputs

Analog input 1
Electrolytic conductivity cell, with cell constants: 0.01, 0.1, 1.0, 3.0, 10.0 [1/cm] (2-electrode principle).
The cell constants can be adjusted over a range 80 — 120%.

Lead compensation, input 1
The influence of long cables in the measuring ranges above 20 mS/cm can be compensated by entering the lead resistance, in the range 0.00 to 9.99 Ω.

Analog input 2
Resistance thermometer Pt100 or Pt 1000, in 2- or 3-wire circuit
-50 to +250°C
Measurement display in °C or °F

Lead compensation, analog input 2
The lead resistance can be compensated in software by a correction of the process value. This is not required if the resistance thermometer is connected in a 3-wire circuit. When a resistance thermometer is connected in a 2-wire circuit, lead compensation can be provided by using an external compensation resistor.

Functional description of logic inputs 1 and 2
The two standard logic inputs can be operated by floating contacts (relays) from a PLC, or by switches. The following functions can be selected and assigned:

Key inhibit: The PLC or a key switch can be used to lock the keys on the transmitter, to prevent unauthorized entries being made.

Setpoint changeover: For comfortable process control. As long as the logic input is not operated, setpoint pair SPr1 and SPr2 is active. If the appropriately configured logic input is operated, then the second setpoint pair is activated (setpoint switching).

Freeze measurement: The indicated measurement and the process value output no longer change.

"Hold": This function can be used (for instance, by a supervisory PLC) to put the instrument into the secure "Hold" state. The response of the controller to "Hold" is as previously defined.

"Hold reversed": The same function as for HOLD, but when the logic input is open.

Alarm stop: The alarm generation via the configured output is reset or prevented, but the alarm LED (e.g. K4) continues to blink as a warning.

Reset alarm time: The alarm generation via the configured output is prevented. The alarm delay time is set to zero, but is restarted when the logic input becomes inactive and the start conditions are fulfilled once more. The alarm LED (e.g. K4) continues to blink as a warning.

Range expansion (x10): If only a small portion of the measurement range is used, it may be advantageous for the transmitter to react to 0 — 10% of the process value by producing 0 — 100% of the output signal.

Measurement and control range

0 — 0.5 µS to 0 — 200 mS, depending on the cell constant, see table on page 5.

Deviation from characteristic
≤ 1.0% of measurement range

Ambient temperature error
≤ 0.25% per 10 °C

Reference temperature
25°C

Temperature display
-50 to +250°C (can be switched to °F)

Deviation from characteristic
≤ 0.25% of measurement range

Ambient temperature error
≤ 0.1% per 10 °C

Outputs

2 relay outputs, 1 logic output, 1 analog process value output or 1 additional relay, and 1 serial interface are available.

1. **Relay, output 1 / 2 (standard)**
   Make contact (n.o., can also be configured as n.c. break contact)
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > $5x10^5$ operations at rated load
2. **Logic output, output 4**
   0/5V $R_{load} \geq 250\Omega$ (standard)
   or
   0/12V $R_{load} \geq 650\Omega$ (option)
3. **Process value output, output 3 or 5 (option)**
   freely configurable:
   0(2) — 10V $R_{load} \geq 500\Omega$ or
   0(4) — 20mA $R_{load} \geq 500\Omega$
   electrically isolated from the inputs:
   $\Delta U \leq 30$V AC or
   $\Delta U \leq 50$V DC.

   Deviation from characteristic of the output signal
   ≤ 0.25% ± 50 ppm per °C
4. **Relay, output 3 or 5 (option)**
   (only for instruments without a process value output)
   changeover contact
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > $5x10^5$ operations at rated load
5. **Interface RS422 / RS485, Output 5 (option)**
   electrically isolated

   Baud rate
   4800 / 9600bps

   Protocol
   Modbus / Jbus or
   Profibus-DP

General controller data

A/D converter
resolution > 15 bit

Controller type
Outputs 1 and 2
limit controller and / or pulse width or pulse frequency controller, modulating controller.
Freely configurable and mixable

K3 / K5:
continuous controller

Control action
configurable as P, PI, PID or PD.

Sampling time
210 msec

Measuring circuit monitoring
Input 1:
out-of-range, sensor monitoring
Input 2:
out-of-range, probe short-circuit, probe break
The outputs move to a defined (configurable) status.

Data backup
EEPROM

Supply voltage
110 — 240 V AC +10%/-15%,
48 — 63 Hz or
20 — 53 V AC/DC, 48 — 63 / 0 Hz,

Power consumption
approx. 8V A

Electrical connection

Instrument for switchgear cabinet (basic version)
via gold-plated faston connectors to DIN 46 244/A; 4.8mm x 0.8mm

Wall-mounting housing (extra code /640)
via screw terminals
(wire cross-section up to 2.5 mm^2)
6 cable glands (1 x M16, 5 x M20

Permissible ambient temperature
0 to +50°C

Permissible ambient temperature limits
-10 to +55°C

Permissible storage temperature
-40 to +70°C

Climatic conditions
rel. humidity ≤ 75%, no condensation

Enclosure protection
to EN 60 529

Instrument for switchgear cabinet
front IP65 / rear IP20

Wall-mounting instrument
IP67

Electrical safety
to EN 61 010
clearance and creepage distances for
- overvoltage category II
- pollution degree 2

Electromagnetic compatibility
to EN 61 326

interference emission:	Class B
interference immunity:	to industrial requirements

Housing
Instrument for switchgear cabinet (basic version)
panel-mounting housing in conductive plastic to DIN 43 700, base material ABS
with plug-in controller module.

Wall-mounting housing (extra code /640)
base material PC

Operating position
unrestricted

Weight
Instrument for switchgear cabinet (basic version)
approx. 320g

Wall-mounting housing (extra code /640)
approx. 1400 g

Option

Wall-mounting housing
extra code /640
On request, the JUMO dTRANS Lf 01 can be supplied built into a surface-mounting housing. The housing is suitable for wall-mounting or for mounting on a 35 x 7.5 mm DIN rail to EN 50 022.

The housing is sturdy and provides IP67 protection for the built-in instrument and is fitted with six cable glands. Unused cable glands can be tightly sealed using the blind grommets that are included in the delivery.
The electrical connection is made via screw terminals (wire cross-section up to 2.5 mm^2).

Standard accessories

- 2 mounting brackets (not with extra code / 640 (wall-mounting housing))
- 1 seal for panel-mounting (not with extra code /640 (wall-mounting housing))
- sundry items for wall-mounting (only with extra code /640 (wall-mounting housing))
- sundry items for DIN rail mounting (only with extra code /640 (wall-mounting housing))
- 1 Operating Manual B 20.2540.0.1

Optional accessory

Interface Description B 20.2530.2

Cell constants and measurement ranges

Cell constant K [B]	Meas. range [B]	Display with configured measurement (C111)		Range (rAng)
		µS	mS	
0.01	0 — 0.500 µS/cm	0.500	– –[A]	1
0.01	0 — 2.000 µS/cm	2.000	– –[A]	2
0.01	0 — 10.00 µS/cm	10.00	– –[A]	3
0.1	0 — 5.000 µS/cm	5.000	– –[A]	4
0.1	0 — 20.00 µS/cm	20.00	– –[A]	5
0.1	0 — 100.0 µS/cm	100.0	– –[A]	6
0.1	0 — 1.000 mS/cm	1000	1.000	7
0.1	0 — 5.000 mS/cm	5000	5.000	8
1.0	0 — 50.00 µS/cm	50.00	– –[A]	9
1.0	0 — 100.0 µS/cm	100.0	– –[A]	10
1.0	0 — 1.000 mS/cm	1000	1.000	11
1.0	0 — 5.000 mS/cm	5000	5.000	12
1.0	0 — 20.00 mS/cm	– –[A]	20.00	13
1.0	0 — 100.0 mS/cm	– –[A]	100.0	14
3.0	0 — 1.000 mS/cm	1000	1.000	15
3.0	0 — 5.000 mS/cm	5000	5.000	16
3.0	0 — 30.00 mS/cm	– –[A]	30.00	17
10.0	0 — 30.00 mS/cm	– –[A]	30.00	18
10.0	0 — 200.0 mS/cm	– –[A]	200.0	19

[A] These settings are not permissible – they would cause an incorrect display
[B] The selection of the measurement range and cell constant is made through the code number “Range”

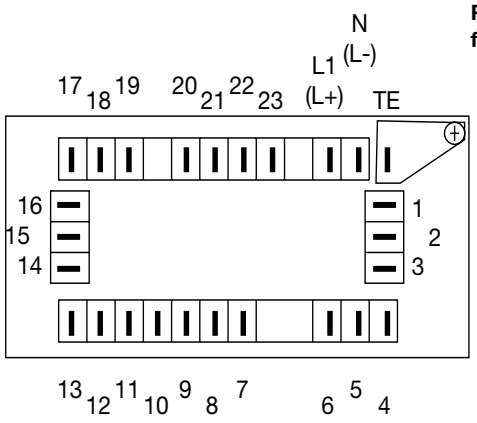
Parameters

Parameter	Display	Value range	Comment
Alarm tolerance	AL1	0.000 — 9999*	The alarm is only generated when the level (setpoint + alarm tolerance) has been passed, and the alarm delay time has elapsed
Alarm delay	AL2	0 — 6000 sec	Delay time before the alarm contact is activated
Proportional band 1	Pb1	1 — 9999*	Influences the P action of the controller
Proportional band 2	Pb2		
Derivative time 1	dt1	0 — 9999 sec	Influences the D action of the controller If dt = 0, the controller has no D action.
Derivative time 2	dt2		
Reset time 1	rt1		Influences the I action of the controller If rt = 0, the controller has no I action.
Reset time 2	rt2		
Minimum ON time 1 (for limit controller or pulse width controller) or minimum pulse width 1 (for pulse frequency controller)	tr1	0.2 — 999.9 sec	Determined by the technical data of the dosing device (solenoid valve, dosing pump)
Minimum ON time 2 (for limit controller or pulse width controller) or minimum pulse width 2 (for pulse frequency controller)	tr2		
Switching differential 1	HYS1	1 — 9999*	Defines the switch-off point for the control contacts
Switching differential 2	HYS2		
Switching differential 3	HYS3		
Switching differential 4	HYS4		
Switching differential 5	HYS5		

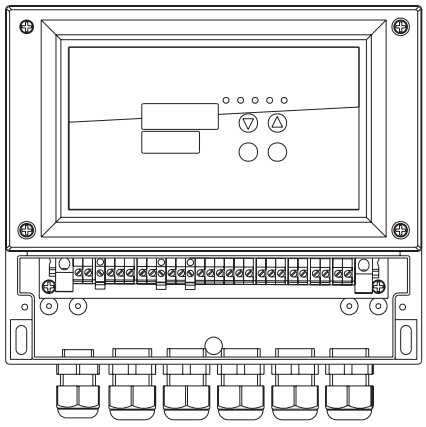
Parameter	Display	Value range	Comment
Pull-in delay 1	Ond1	0.0 — 999.9 sec	Delay time before the contact is activated
Pull-in delay 2	Ond2		
Pull-in delay 3	Ond3		
Pull-in delay 4	Ond4		
Pull-in delay 5	Ond5		
Drop-out delay 1	Ofd1	0.2 — 999.9 sec	Delay time until the contact moves back to the initial position
Drop-out delay 2	Ofd2		
Drop-out delay 3	Ofd3		
Drop-out delay 4	Ofd4		
Drop-out delay 5	Ofd5		
Pulse frequency 1	Fr1	0 — 150 pulses/min	Maximum frequency of pulses (operating a dosing pump, for instance)
Pulse frequency 2	Fr2		
Pulse period 1	Cy1	2.0 — 999.9 sec	The period in which a pulse is modulated
Pulse period 2	Cy2		
Output level limit, output 1	Y1	0 — 100%	The maximum output level for a pulse width / pulse frequency controller
Output level limit, output 2	Y2		
Actuator time	tt	15 — 3000 sec	For modulating controller

* Decimal point and dimensional unit corresponding to chosen range

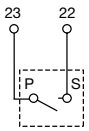
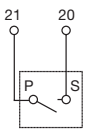
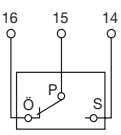
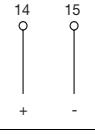
Connection diagram

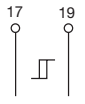
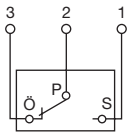
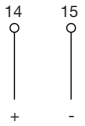


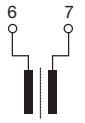
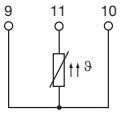
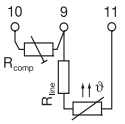
Rear view with faston connectors

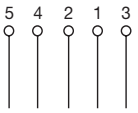
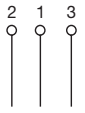
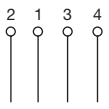
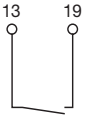
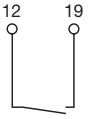
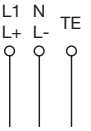


Wall-mounting housing (extra code /640) with terminal strip

Outputs	K	Connections	Symbol
Relay 1 (K1) Status indication LED K1	1	23 common 22 make	
Relay 2 (K2) Status indication LED K2	2	21 common 20 make	
Relay 3 (K3) Status indication LED K3 **or** analog process value output (electrically isolated)	3	16 break 15 common 14 make	
		15 – 14 +	

Logic output 1 (K4) Status indication LED K4	4	19 – 17 +	
Relay 4 (K5) No status indication **or** analog process value output (electrically isolated)	5	3 break 2 common 1 make	
		2 – 1 +	

Meas. inputs		**Connections**	**Symbol**
Conductivity cell		6 Outer electrode, on coaxial cells 7 Inner electrode, on coaxial cells	
Resistance thermometer in 3-wire circuit		9 10 11	
Resistance thermometer in 2-wire circuit		9 10 11	

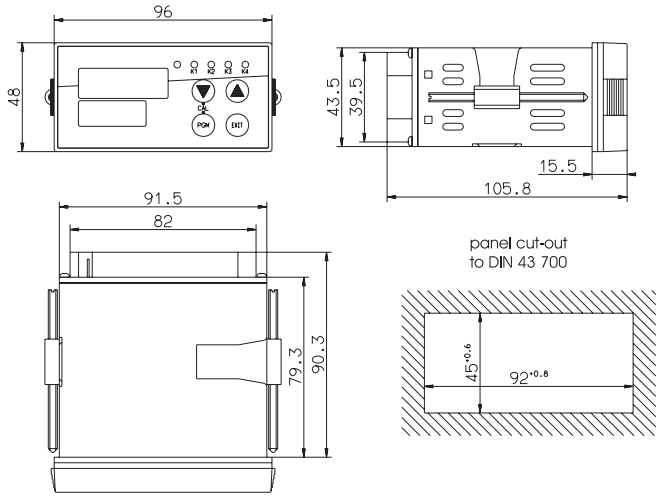
Meas. inputs		**Connections**			**Symbol**
Serial interface RS422 (option)	RxD	5 4	RxD + RxD –	Receive data	
	TxD	2 1	TxD + TxD –	Transmit data	
	GND	3	GND		
Serial interface RS485 (option)	+ -	2 1	TxD/RxD + TxD/RxD –	Receive data / transmit data	
	GND	3	GND		
Serial interface **Profibus-DP** (option)	VP	4	supply voltage positive, (P5V)		
	RxD/TxD-P	2	receive / transmit data positive, B conductor		
	RxD/TxD-N	1	receive / transmit data negative, A conductor		
	GND	3	GND		
Logic input 1		13 19			
Logic input 2		12 19			
Supply voltage see nameplate	AC/ DC	AC: L1 phase/line N neutral TE technical earth		DC: L + L –	

Connection for conductivity cell

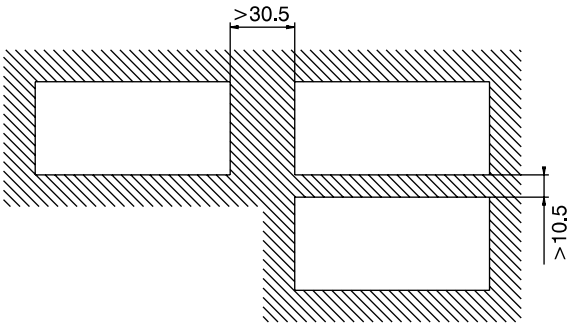
	Conductivity cell (JUMO types)		dTRANS Lf 01
	Cap	Fixed cable	
Outer electrode	⏚	white	6
Inner electrode	2	brown	7
Temperature compensation	1 3	yellow green	11 10
Link			10 + 9

Dimensions

Type 202540 / …

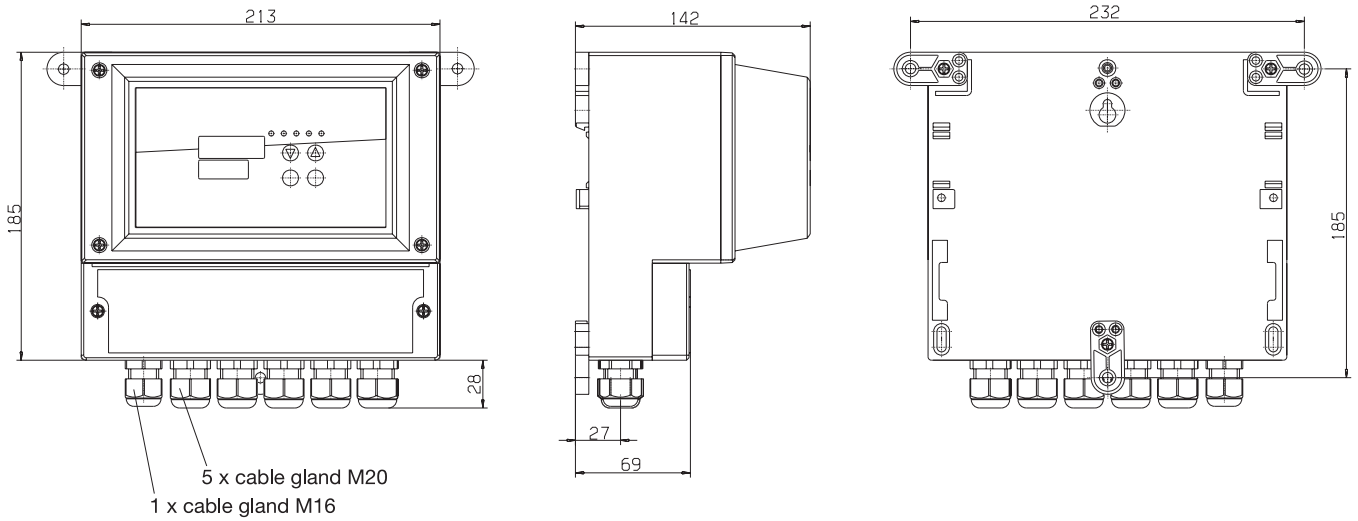


Panel cut-out to DIN 43 700
close mounting (minimum dimensions)



Option

Surface-mounting housing, extra code /640, IP67 protection



Type designation

(1) Basic type

202540 JUMO dTRANS Lf 01,
microprocessor transmitter/controller for conductivity

(2) **Basic type extensions**

10 Limit controller*

(3) Output I

000 no output
310 relay, changeover contact
888 process value output, freely configurable

(4) Output II

000 no output
310 relay, changeover contact[1]
888 process value output, freely configurable[1]

(5) Supply voltage

22 20 — 53 V AC/DC, 48 — 63/0 Hz
23 110 — 240 V AC +10%/-15%, 48 — 63 Hz

(6) Interface

00 no serial interface
54 serial interface RS422/485[1]
64 serial interface Profibus-DP[1]

(7) Extra codes

000 no extra codes
015 logic output 0/12 V DC,
instead of standard 0/5 V DC
640 surface-mounting housing for mounting on wall or DIN rail, IP67 protection

	(1)		(2)		(3)		(4)[1]		(5)		(6)[1]		(7)
Order code	202540	/	10	-		,		-		-		-	
Order example	202540	/	10	-	888	,	000	-	23	-	00	-	000

*Generally

on **all** controllers of the 202540 series, the user can freely select the following configurations:

- ❏ Controller off
- ❏ Limit controller
- ❏ Pulse width controller with P, PI, PD, PID control action
- ❏ Pulse frequency controller with P, PI, PD, PID control action
- ❏ Modulating controller

[1] If output II (4) = "310" or "888" then the interface option (6) is not possible (or the other way round)!

Stock items

Type	Sales No.
202540/10-888,000-23-00/000	20/00377231
202540/10-888,000-23-00/640	20/00431436

Non stock items

Type	Sales No.
202540/10-888,000-22-00/000	20/00401180

Optional accessories 1 (switchgear cabinet instrument)

Designation	Sales No.
Bracket for C-rail	70/00375749
Blind cover 96 x 48 mm	70/00069680

Optional accessories 2 (wall-mounting instrument)

Designation	Sales No.
Pole clamp, 60 mm dia. (clamping area: 50 — 70 mm dia.)	20/00437485
Pole clamp, 120 mm dia. (clamping area: 100 — 120 mm dia.)	20/00437486

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JUMO dTRANS Rw 01
µP transmitter / controller for high-purity water

Type 202545
Panel-mounting housing to DIN 43 700

Type 202545 / …

Type 202545 / …/640

Brief description

This instrument, with a 96mm x 48mm bezel size and a plug-in controller module, measures and controls the resistance / conductivity of high-purity water.
The instrument has been designed to meet the special requirements of high-purity water measurement.
The transmitter has two analog and two logic inputs. The first analog input is suitable for connecting 2-electrode measuring cells with cell constants of 0.01 or 0.1 [1/cm]. The second analog input can be used to connect Pt100 or Pt1000 resistance thermometers.
The instrument features two 4-digit 7-segment displays for indicating the resistance / conductivity (red) and the temperature (green). During programming, the displays provide comments on the inputs.
A great variety of control tasks can be handled by the various output options (relay contacts and / or analog outputs). The two relay "make" contacts that are provided on the instrument as standard can be configured as a limit controller and / or pulse width or pulse frequency controllers, or as a modulating controller. To obtain analog controller outputs, the optional analog outputs must be configured accordingly.
All controller outputs can be configured for a P, PI, PD or PID control action.
In the basic version, the instrument provides two relay "make" contacts and one logic output (0/5V). Two additional outputs can be, according to choice, fitted as relay changeover contacts and / or analog outputs (process value output or analog controller output) or as a serial interface (Profibus-DP or MODbus / Jbus protocol).

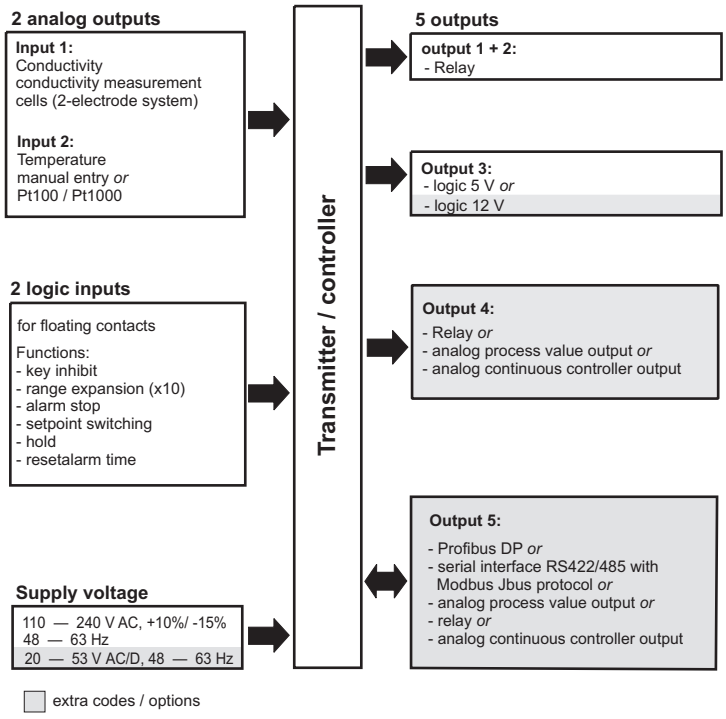
For further information on "De-ionized and high-purity water" see page 7.

Special features

- ❏ Temperature compensation as per **ASTM D-1125-95*.**
- ❏ Fulfils the requirements of **USP.**
- ❏ Additional linear compensation is possible.
- ❏ Display of uncompensated conductivity is possible.
- ❏ Compact design, only 96 x 48 x 110 mm.
- ❏ Monitoring of the medium temperature is possible.
- ❏ 2 electrically isolated analog process outputs 0(4) — 20 mA / 0(2) — 10 V, freely selectable and scalable for conductivity or temperature (option).
- ❏ 2 relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width / pulse frequency output or modulating controller.
- ❏ 1 logic output (alarm contact or temperature limit contact).
- ❏ Front protection IP 65.
- ❏ IP65 surface mounting or site housing on request.

* see page 7.

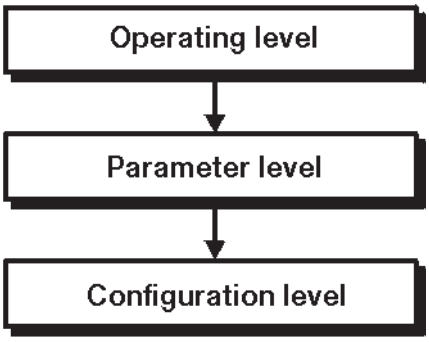
Block structure



Approvals

Operation

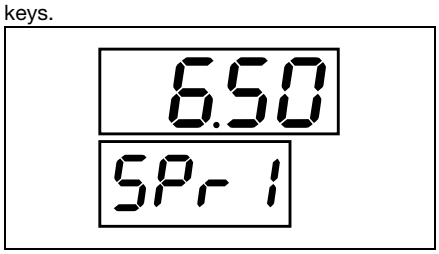
For easy programming and operation, the controller parameter and configuration data are assigned to various levels.



Code words protect the levels from unauthorized access.
Membrane keys ensure simple and user-friendly operation.
The two LED displays show the parameter symbols and the corresponding values.

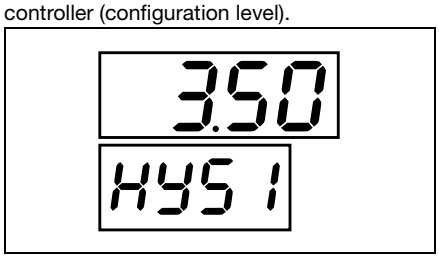
Operating level

The lower display, for example, shows the symbol, the upper display shows the corresponding value. Setpoints SPr1 and SPr2 can be altered by using the membrane keys.



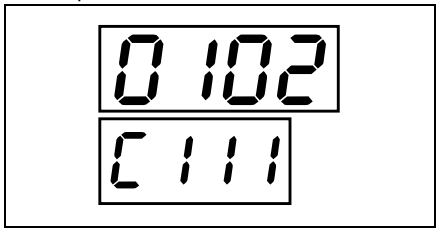
Parameter level

The controller is adapted to the control loop at this level. The appropriate parameters appear here, with symbol and value. Only those parameters will be indicated which correspond to the configuration of the controller (configuration level).

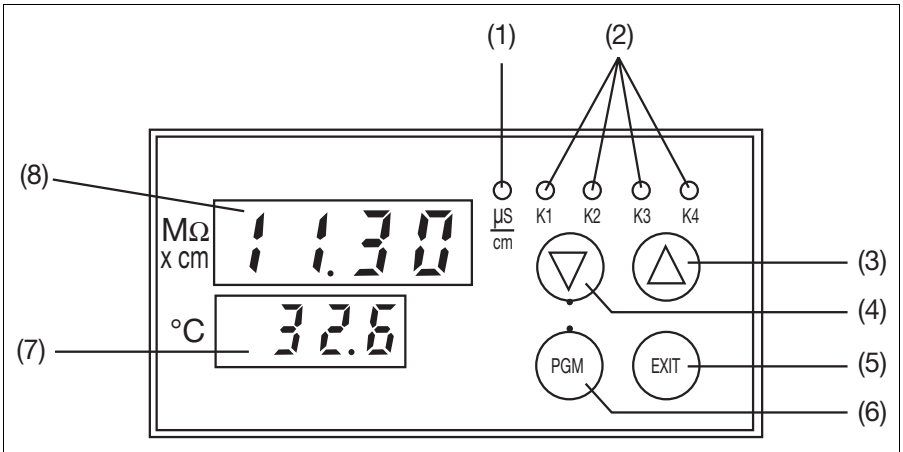


Configuration level

This level is used to adapt the controller to the control task, or for adaptation of the inputs and outputs.



Indications / controls



(1) LED display in µS/cm	(6) PGM key for selection of parameters and confirmation of entries
(2) Status indicators (yellow) for outputs 1 to 4	(7) 4-digit temperature display (green), 8 mm high
(3) Increment key for altering parameters or manual operation of relay K2	(8) 4-digit process value indication (red) 13 mm high
(4) Decrement key for altering parameters or manual operation of relay K1	(4) + (6) "CAL": Initiates calibration (relative cell constant K_{rel} or temperature coefficient α)
(5) EXIT key to leave the levels	(3) + (5) Initiate manual operation or hold

Additional functions of the JUMO dTRANS Rw 01

❑ **Calibration of the cell constant**

Subject to manufacturing tolerances, the cell constant of the measuring cell may deviate slightly from its nominal (printed) value. In addition, the cell constant may change during operation (due to deposits, for example). This results in a change of the output signal from the cell. The dTRANS Rw 01 offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (range 80 — 120%) or **automatic calibration** of the relative cell constant K_{rel}.

For enhanced requirements

High-purity water measuring cells can be supplied together with a test report which states the precise cell constant that was measured. This value is set on the transmitter (**manual entry**). The combination high-purity water transmitter and measuring cell has thus been harmonized and is ready for operation.

❑ **Calibrating the temperature coefficient α**

The conductivity of high-purity water is strongly dependent on the temperature. To ensure correct measurement, it is therefore necessary to know both the temperature and temperature coefficient α [% per °C] of the measuring solution. The temperature can either be measured automatically, with a Pt100 or Pt1000 temperature probe, or set manually by the user. The transmitter provides various possibilities for compensating the temperature:

- according to ASTM D-1125-95 (standard setting)
  - •automatic temperature compensation
  - •choice of either "neutral contamination with NaCl" (standard)
  - •or "alkaline contamination with NaOH"
  - •or "acidic contamination with HCl"
- linear temperature compensation
  - •automatic determination of the temperature coefficient
  - •or manually, within the range (0 — 20% per °C)

❑ **Programmable response of the process value output to underrange / overrange**

On underrange or overrange, the process value output can move to the following operational states:

-4%, 0%, 100% or 110% freely selectable

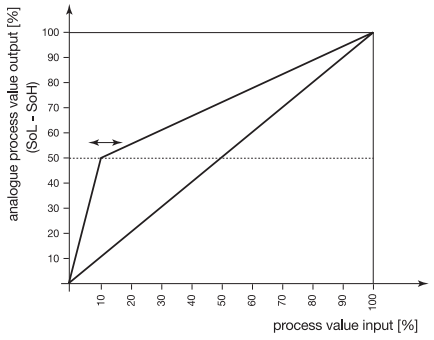
Example: The instrument is program-med to 4 — 20 mA, corresponding to 0 — 2 µS/cm

The instrument can be set up so that, on exceeding 2 µS/cm, the output signal 20 mA (100 %) is either maintained or will jump to 22 mA (110 %). The 22 mA value can then be recognized as "irregular" by a connected PLC.

❑ **Bilinear output**

This function divides the signal for the analog process value output into two linear portions (0 — 50% and 50 — 100% of the output

signal), with a knee-point at 50% of the output signal. The knee-point of the characteristic can be shifted along the dotted 50% line.
The factory setting of 50% produces a straight-line characteristic.



The bilinear characteristic is used when the "normal" measurement range is likely to be frequently exceeded.

Example: The normal measurement range spans 0 — 2 µS/cm.
However, measurements of up to 8.0 µS/cm can also occur.
In this case, the range 0 — 10 µS/cm will be selected, and the knee-point set at 20% of this range (20% of 10 µS/cm corresponds to 2 µS/cm).
This results in measurements in the range 0 — 2 µS/cm being converted into an output signal 0 — 10 mA. Measurements in the range 2 — 10 µS/cm will be converted into an output signal 10 — 20 mA.

❑ **The response of the controller relays to "Hold" can be defined**
"Hold" is initiated either manually, using the keys, by a logic input, or by an alarm event. The outputs of the relays K1 and K2 can move to the following (programmable) states on "Hold":

0%	Relay de-energized
50% output	For dynamic controllers, 50% of the maximum pulse width or frequency is produced
100% output	Relay is energized, or maximum pulse width / frequency
Output accepted	The present output continues to be produced

❑ **In "Manual" mode, the relays K1 and K2 are operated manually, by using the keys**. Either key or switch operation can be selected, by a setting at the parameter level.

Key operation: The relay is switched as long as the key is pressed (e.g. for manual dosing).

Switch operation: The first key stroke switches the relay on – the second switches it off again (toggle action), e.g. for emptying large tanks.

❑ **Simulation of the analog process value output**

In the manual mode, the process value output (0/2 — 10 V or
0/4 — 20 mA, depending on the setting) can be switched in 10% steps from
0 — 100%.

Application: "Dry-run" commissioning of the plant (without measuring cell, fault search, servicing).

❑ **Controller output functions**

Output 1 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / switched off. Switching function can be reversed.
MAX / MIN limit comparator.

Output 2 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / MAX / MIN limit comparator for temperature / switched off. Switching function can be reversed.
MAX / MIN limit comparator.

Output 3, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator for temperature input / MIN limit comparator for temperature input / output of resistance process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Output 4, logic output: "Hold" / alarm pulse contact / alarm steady contact / MAX / MIN limit comparator for temperature input / no function.

Output 5, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator for temperature input / MIN limit comparator for temperature input / output of resistance process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Limit comparator (limit monitor)

Controller outputs 1 to 5 (depending on the instrument version) can be assigned to a limit-monitoring function.
For each one, the direction of switching (i.e. on going above, or going below a limit), pull-in and / or drop-out delay, and a hysteresis can all be defined.

Interface

The microprocessor / controller can be optionally fitted with an RS422 /RS485 interface. This is used for communication with higher-level systems and integration into a data network. The transmission protocol can be either Profibus-DP or MODbus/Jbus.

Technical data

Inputs

Analog input 1
Measuring cells with cell constants 0.01 or 0.1 [1/cm] (2-electrode principle).
The cell constants can be adjusted over a range 80 — 120%.

Lead compensation, input 1
The influence of long cables can be compensated by entering the lead resistance, in the range 0.00 to 9.99 Ω.

Analog input 2
Resistance thermometer Pt100 or
Pt 1000, in 2- or 3-wire circuit
-50 to +250°C
Measurement display in °C or °F (option)

Lead compensation, analog input 2
The lead resistance can be compensated in software by a correction of the process value. This is not required if the resistance thermometer is connected in a 3-wire circuit. When a resistance thermometer is connected in a 2-wire circuit, lead compensation can be provided by using an external compensation resistor.

Functional description of logic inputs 1 and 2
The two standard logic inputs can be operated by floating contacts (relays) from a PLC, or by switches. The following functions can be selected and assigned:

Key inhibit: The PLC or a key switch can be used to lock the keys on the transmitter, to prevent unauthorized entries being made.

Setpoint changeover: For comfortable process control. As long as the logic input is not operated, setpoint pair SPr1 and SPr2 is active. If the appropriately configured logic input is operated, then the second setpoint pair is activated (setpoint switching).

Freeze measurement: The indicated measurement and the process value output no longer change.
"Hold": This function can be used (for instance, by a supervisory PLC) to put the instrument into the secure "Hold" state. The response of the controller to "Hold" is as previously defined.

"Hold reversed": The same function as for HOLD, but when the logic input is open.

Alarm stop: The alarm generation via the configured output is reset or prevented, but the alarm LED (e.g. K4) continues to blink as a warning.

Reset alarm time: The alarm generation via the configured output is prevented. The alarm delay time is set to zero, but is restarted when the logic output becomes inactive and the start conditions are fulfilled once more. The alarm LED (e.g. K4) continues to blink as a warning.

Range expansion (x10): If only a small portion of the measurement range is used, it may be advantageous for the transmitter to react to 0 — 10% of the process value by producing 0 — 100% of the output signal.

Measurement and control range

for cell constant 0.01:
0.5 µS/cm, 2.0 µS/cm, 10.0 µS/cm, 20 MΩcm

for cell constant 0.1:
5.0 µS/cm, 20.0 µS/cm

Deviation from characteristic*
≤ 0.25% of measurement range

Ambient temperature error*
≤ 0.15% per 10 °C

Reference temperature
25°C

Temperature display
-50 to +250°C (can be switched to °F)

Deviation from characteristic
≤ 0.25% of measurement range.

Ambient temperature error
≤ 0.1% per 10 °C

Outputs

2 relay outputs, 1 logic output, 1 analog process value output or 1 additional relay, and 1 serial interface are available.

1. **Relay, output 1 / 2 (standard)**
   Make contact (can also be configured as break contact)
   contact rating: 3A, 250V AC
   with resistive load.
   contact life
   > $5x10^5$ operations at rated load
2. **Logic output, output 4**
   0/5V $R_{load} \geq 250\Omega$ (standard)
   0/12V $R_{load} \geq 650\Omega$ (option)
3. **Process value output, output 3 or 5 (option)**
   freely configurable:
   0(2) — 10V $R_{load} \geq 500\Omega$ or
   0(4) — 20mA $R_{load} \geq 500\Omega$
   electrically isolated from the inputs:
   $\Delta U \leq 30$V AC or
   $\Delta U \leq 50$V DC.

   Deviation from characteristic of the output signal
   ≤ 0.25% ± 50 ppm per °C
4. **Relay, output 3 or 5 (option)**
   (only for instruments without a process value output)
   changeover contact
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > 5 x 10^5 operations at rated load
5. **Interface RS422 / RS485, Output 5 (option)**
   electrically isolated

   Baud rate
   4800 / 9600bps

   Protocol
   MODbus/Jbus or Profibus-DP

General controller data

A/D converter
resolution > 15 bit

Controller type
Outputs 1 and 2
limit controller, pulse width or pulse frequency controller, modulating controller. Freely configurable and mixable

K3 / K5:
proportional controller

Control action
configurable as P, PI, PID or PD.

Sampling time
210msec

Measurement circuit monitoring
Input 1: out-of-range
Input 2: out-of-range, probe short-circuit, probe break
The outputs move to a defined (configurable) status.

Data backup
EEPROM

Supply voltage
110 — 240 V AC +10%/-15%,
48 — 63 Hz or
20 — 53 V AC/DC, 48 — 63 /0 Hz

Power consumption
approx. 8V A

Electrical connection
via gold-plated faston connectors to DIN 46 244/A;
4.8mm x 0.8mm

Permissible ambient temperature
0 to +50°C

Permissible ambient temperature limits
-10 to +55°C

Permissible storage temperature
-40 to +70°C

Climatic conditions
rel. humidity ≤ 75%, no condensation

Enclosure protection
to EN 60 529
front IP65 / rear IP20

Electrical safety
to EN 61 010
clearance and creepage distances for
- overvoltage category II
- pollution degree 2

Electromagnetic compatibility
to EN 61 326
radiated interference: Class B
interference immunity: to industrial requirements

Housing
Panel-mounting housing in conductive plastic to DIN 43 700, base material ABS
with plug-in controller module.

Operating position
unrestricted

Weight
approx. 320g

Wall-mounting housing (extra code /640)
approx. 1400 g

Option

Wall-mounting housing
extra code /640
On request, the JUMO dTRANS Lf 01 can be supplied built into a surface-mounting housing. The housing is suitable for wall-mounting or for mounting on a 35 x 7.5 mm DIN rail to EN 50 022.

The housing is sturdy and provides IP67 protection for the built-in instrument and is fitted with six cable glands. Unused cable glands can be tightly sealed using the blind grommets that are included in the delivery.
The electrical connection is made via screw terminals (wire cross-section up to 2.5 mm^2).

Standard accessories

- 2 mounting brackets (not with extra code / 640 (wall-mounting housing))
- 1 seal for panel-mounting (not with extra code /640 (wall-mounting housing))
- sundry items for wall-mounting (only with extra code /640 (wall-mounting housing))
- sundry items for DIN rail mounting (only with extra code /640 (wall-mounting housing))
- 1 Operating Manual B 20.2545.0.1

Optional accessory

Interface Description B 20.2530.2

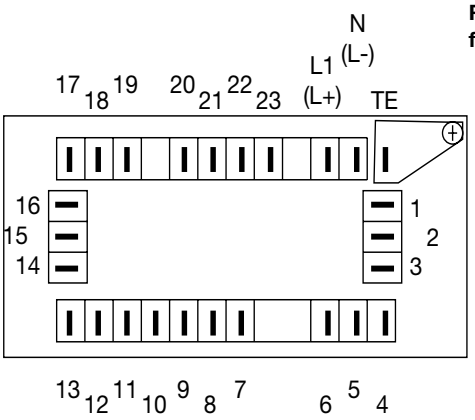
* The errors quoted refer to the specific conductivity

Parameter

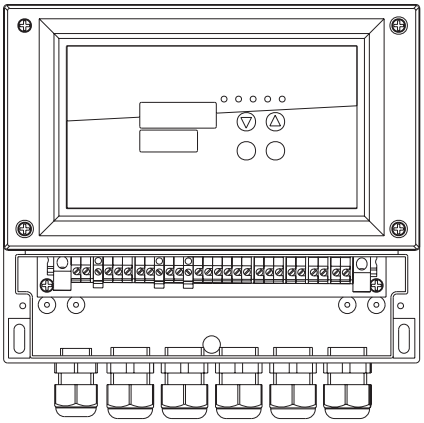
Parameter	Display	Value range	Comments
Alarm tolerance	AL1	0.000 — 9999*	The alarm is only generated when the level (setpoint + alarm tolerance) has been passed, and the alarm delay time has elapsed
Alarm delay	AL2	0 — 6000 sec	Delay time before the alarm contact is activated
Proportional band 1 – Lf	Pb1	1 — 9999*	Influences the P action of the controller
Proportional band 2 – Lf	Pb2		
Derivative time 1	dt1	0 — 9999 sec	Influences the D action of the controller If dt = 0, the controller has no D action.
Derivative time 2	dt2		
Reset time 1	rt1	0 — 9999 sec	Influences the I action of the controller If rt = 0, the controller has no I action.
Reset time 2	rt2		
Minimum ON time 1 (for limit controller or pulse width controller) or minimum pulse width 1 (for pulse frequency controller)	tr1	0.2 — 999.9 sec	Determined by the technical data of the dosing device (solenoid valve, dosing pump)
Minimum ON time 2 (for limit controller or pulse width controller) or minimum pulse width 2 (for pulse frequency controller)	tr2		
Switching differential 1	HYS1	1 — 9999*	Defines the switch-off point for the control contacts
Switching differential 2	HYS2		
Switching differential 3	HYS3		
Switching differential 4	HYS4		
Switching differential 5	HYS5		
Pull-in delay 1	Ond1	0.0 — 999.9 sec	Delay time before the contact is activated
Pull-in delay 2	Ond2		
Pull-in delay 3	Ond3		
Pull-in delay 4	Ond4		
Pull-in delay 5	Ond5		
Drop-out delay 1	Ofd1	0.2 — 999.9 sec	Delay time until the contact moves back to the initial position
Drop-out delay 2	Ofd2		
Drop-out delay 3	Ofd3		
Drop-out delay 4	Ofd4		
Drop-out delay 5	Ofd5		
Maximum pulse frequency 1	Fr1	0 — 150 pulses/min	Maximum frequency of pulses (operating a dosing pump, for instance)
Maximum pulse frequency 2	Fr2		
Cycle time 1	Cy1	2.0 — 999.9 sec	The period in which a pulse is modulated
Cycle time 2	Cy2		
Output level limit, relay 1	Y1	0 — 100%	The maximum output level for a pulse width / pulse frequency controller
Output level limit, relay 2	Y2		
Actuator time	tt	15 — 3000 sec	Modulating controller

* Decimal point and dimensional unit corresponding to chosen range

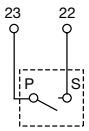
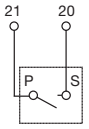
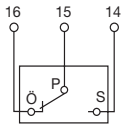
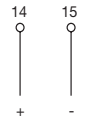
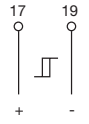
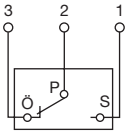
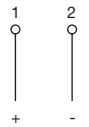
Connection diagram

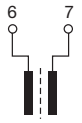
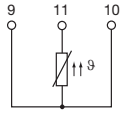
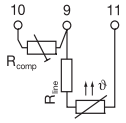


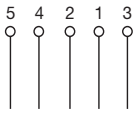
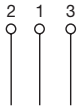
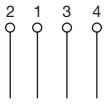
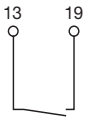
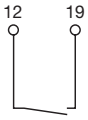
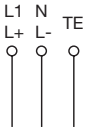
Rear view with faston connectors



Wall-mounting housing (extra code /640) with terminal strip

Outputs	K	Terminal assignments	Symbol
Relay 1 (K1) Status indication LED K1	1	23 common 22 make (n.o.)	
Relay 2 (K2) Status indication LED K2	2	21 common 20 make (n.o.)	
Relay 3 (K3) Status indication LED K3 **or** analog process value output (electrically isolated)	3	16 break (n.c.) 15 common 14 make (n.o.)	
		15 – 14 +	
Logic output 1 (K4) Status indication LED K4	4	19 – 17 +	
Outputs	**K**	**Terminal assignments**	**Symbol**
Relay 4 (K5) no status indication **or** analog process value output (electrically isolated)	5	3 break (n.c.) 2 common 1 make (n.o.)	
		2 – 1 +	

Inputs		Terminal assignments	Symbol
Conductivity cell		6 Outer electrode, on coaxial cells 7 Inner electrode, on coaxial cells	
Resistance thermometer in 3-wire circuit		9 10 11	
Resistance thermometer in 2-wire circuit		9 10 11	

Inputs		Terminal assignments			Symbol
Serial interface RS422 (option)	RxD	5 4	RxD + RxD –	Receive data	
	TxD	2 1	TxD + TxD –	Transmit data	
	GND	3	GND		
Serial interface RS485 (option)	+ -	2 1	TxD/RxD + TxD/RxD –	Transmit data / receive data	
	GND	3	GND		
Serial interface Profibus-DP (option)	VP	4	supply voltage, positive (P5V)		
	RxD/TxD-P	2	receive/transmit data positive, B conductor		
	RxD/TxD-N	1	receive/transmit data negative, A conductor		
	DGND	3	ground for data transmission		
Logic input 1		13 19			
Logic input 2		12 19			
Supply voltage see nameplate	AC/ DC	AC: L1 N TE	phase/line neutral technical earth	DC: L + L –	

Connection for conductivity cell

	Conductivity cell (JUMO types)		dTRANS Rw 01
	Plug-in head	Fixed cable	
Outer electrode	⏚	white	6
Inner electrode	2	brown	7
Temperature compensation	1	yellow	11
	3	green	10
Link			10 + 9

Additional information on “De-ionized and high-purity water”

De-ionized water

The term “distilled water” is also used in this connection. These terms refer to the production methods that are used. The specific conductivity of de-ionized water lies in the range from approx. 2 to 10 µS/cm at 25°C.

High-purity water

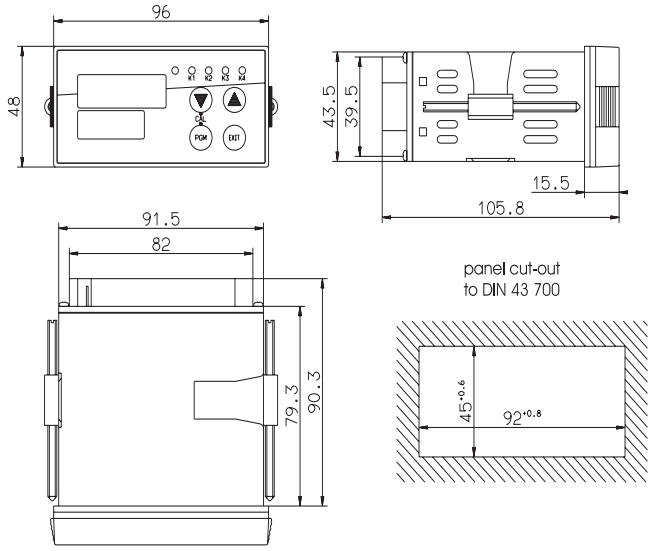
High-purity water is produced from de-ionized water, using special process steps, and has a specific conductivity of about 0.055 to 2 µS/cm at 25°C. Because of the non-linear characteristic of high-purity water, a specially adapted temperature compensation should be used during measurement. Automatic temperature acquisition or a constant temperature is indispensable for correct temperature compensation.

Standards and guidelines

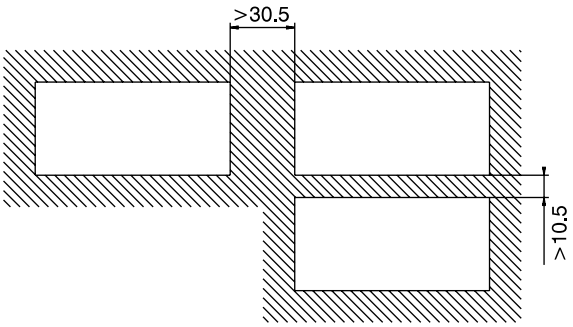
In the German-speaking world these include the DIN ISO standard, VDE guidelines, and the “Europäsche Arzneibuch” (Ph. Eur.).
Frequently cited standards in the English-speaking world are: the ASTM standard (ASTM = **A**merican **S**ociety for **T**esting and **M**aterials) and the USP (The **U**nited **S**tates **P**harmacopeia).

Dimensions

Type 202540 / …

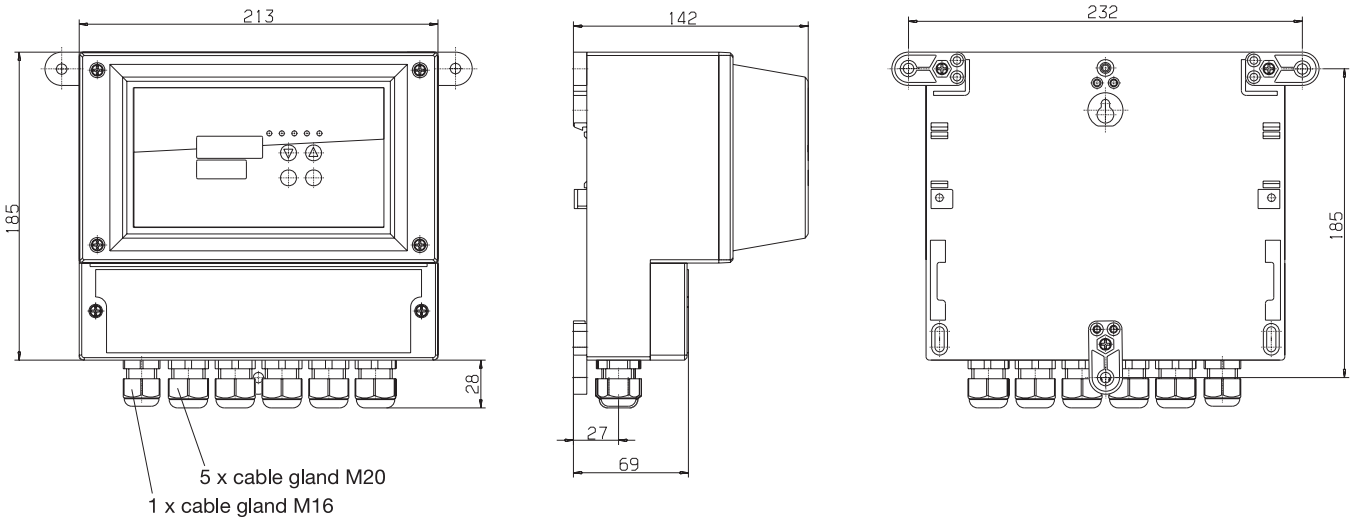


Panel cut-out to DIN 43700
close mounting (minimum dimensions)



Option

Surface-mounting housing, extra code /640, IP67 protection



Type designation

(1) Basic type

202545 JUMO dTRANS Rw 01,
microprocessor transmitter/controller for high-purity water

(2) **Basic type extensions**

10 Limit controller*

(3) Output I

000 no output
310 relay, changeover contact
888 process value output, freely configurable

(4) Output II

000 no output
310 relay, changeover contact[1]
888 process value output, freely configurable[1]

(5) Supply voltage

22 20 — 53 V AC/DC, 48 — 63/0 Hz
23 110 — 240 V AC +10%/-15%, 48 — 63 Hz

(6) Interface

00 no serial interface
54 serial interface RS422/485[1]
64 serial interface Profibus-DP[1]

(7) Extra codes

000 no extra codes
015 logic output 0/12 V DC,
instead of standard 0/5 V DC
640 surface-mounting housing for mounting on wall or DIN rail, IP67 protection

	(1)		(2)		(3)		(4)[1]		(5)		(6)[1]		(7)
Order code	202545	/	10	-		,		-		-		-	
Order example	202545	/	10	-	888	,	000	-	23	-	00	-	000

*Generally

on **all** controllers of the 202545 series, the user can freely select the following configurations:

- ❏ Controller off
- ❏ Limit controller
- ❏ Pulse width controller with P, PI, PD, PID control action
- ❏ Pulse frequency controller with P, PI, PD, PID control action
- ❏ Modulating controller

[1] If output II (4) = "310" or "888" then the interface option (6) is not possible (or the other way round)!

Stock items

Type	Sales No.
202545/10-888,000-23-00/000	20/00377256

Non stock items

Type	Sales No.
202545/10-888,000-23-00/640	20/00446471

Optional accessories 1 available ex-stock

Designation	Sales No.
Surface-mounting housing, no door at front, Type 2 FGE-125-2/125	20/00361257
Surface-mounting housing, door at front, Type 2 FGE-150-2/185	20/00361259

Optional accessories 2

Designation	Sales No.
Fixing for DIN rail	70/00375749
Blank cover 96 x 48 mm	70/00069680

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Fax: 610-380-8009
E-mail: info@JumoUSA.com
Internet: www.JumoUSA.com

JUMO dTRANS Az 01
µP Indicator/Controller for analytical measurement

Type 202550
Panel-mounting housing to DIN 43 700

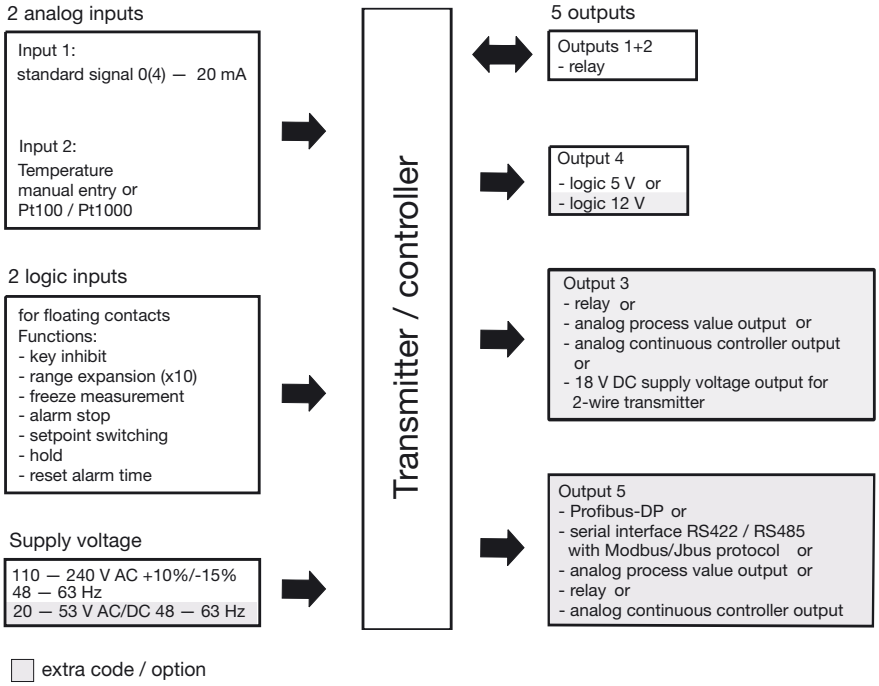
Type 202550 / …

Type 202550 / …/640

Brief description

The instrument with 96mm x 48mm bezel and plug-in controller module visualizes and controls variables in analytical measurement (pH value, redox voltage, conductivity, high-purity water, oxygen, free chlorine, chlorine dioxide, ozone etc.).
The indicator has two analog and two logic inputs. The first analog input is suitable for connecting a 0(4) — 20 mA signal, which can be provided by any type of transmitter (including 2-wire types). The input signal is conditioned, as determined by the configuration, and displayed. One special feature of the instrument is that the calibration procedures for pH, redox and conductivity are internally programmed. The second analog input can be used to connect Pt100 or Pt1000 resistance thermometers.
The instrument features two 4-digit 7-segment displays for indicating the main variable (red) and the temperature (green). The temperature display is switched off in the default setting. A separate temperature sensor (Pt100 or Pt1000) can be connected to the second analog input. This can then be used to display the temperature of the medium and, if required, monitor it by means of a limit switch. During programming, the displays provide comments on the inputs. A great variety of control tasks can be handled by the various output options (relay contacts and / or analog outputs). The two relay “make” contacts that are provided on the instrument as standard can be configured as a limit controller and / or pulse width or pulse frequency controllers, or as a modulating controller. To obtain analog (continuous) controller outputs, the optional analog outputs must be configured accordingly. All controller outputs can be configured for a P, PI, PD or PID control action. In the basic version, the instrument provides two relay “make” contacts and one logic output (0/5V). Two additional outputs can be, according to choice, fitted with relay changeover contacts and / or analog outputs (process value output or analog controller output), or with a serial interface (Profibus-DP or MODbus / Jbus protocol) and / or a supply for 2-wire transmitters.

Block structure



☐ extra code / option

Special features

- ❏ Panel-mounting unit, just 96 x 48 x 110 mm
- ❏ Display of pH, mV, µS/cm, mS/cm, mg/l, etc.
- ❏ 2 isolated process value outputs 0(4) — 20 mA / 0(2) — 10 V, freely selectable and scalable for the main variable or temperature, or proportional controller (option)
- ❏ 2 relays as standard, freely programmable as limit controller or P, PI, PID, PD controller with pulse width or pulse frequency output, or as modulating controller
- ❏ 2 logic inputs
- ❏ OPTION: Profibus-DP or serial interface RS485 / 422 with MODbus /Jbus protocol
- ❏ Protection IP65
- ❏ Wall-mounting housing, Protection IP65

Indicator/controller for pH value or redox voltage

- ❏ Simple, guided calibration procedure
- ❏ Temperature compensation is possible

Indicator/controller for conductivity

- ❏ Calibration procedure for the relative cell constant
- ❏ Calibration procedure for the temperature coefficient of the measuring solution
- ❏ Temperature compensation is possible

Indicator/controller for free chlorine, chlorine dioxide, ozone

- ❏ Connection of a sensor (according to Data Sheet 20.2630, for example)
- ❏ Integrated calibration procedure

Universal indicator/controller

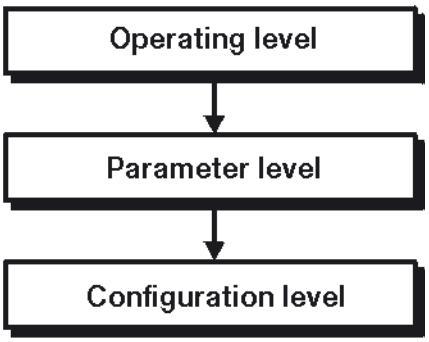
- ❏ Display range is freely scalable from -1999 to 9999 digit
- ❏ Different calibration procedures

Approvals

c UL us PROFIBUS

Operation

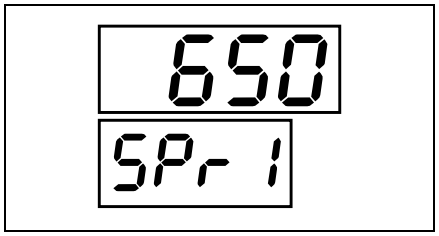
For easy programming and operation, the controller parameters and configuration data are assigned to various levels.



Code words protect the levels from unauthorized access.
Membrane keys ensure simple and user-friendly operation.
The two LED displays show the parameter symbols and the corresponding values.

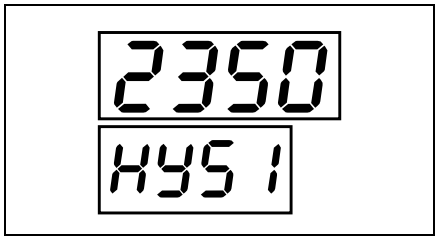
Operating level

The lower display, for example, shows the symbol, the upper display the corresponding value. Setpoints SPr1 and SPr2 can be altered from the membrane keys.



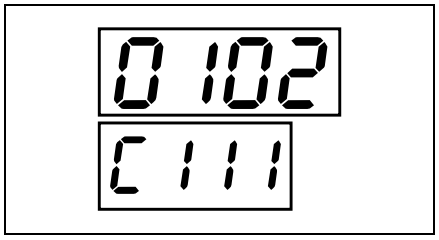
Parameter level

The controller is adapted to the control loop at this level. The appropriate parameters appear here, with symbol and value. Only those parameters will be indicated which correspond to the configuration of the controller (configuration level).

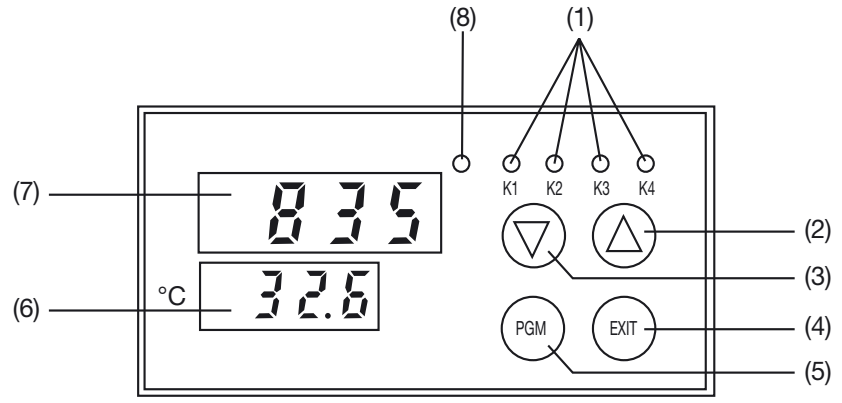


Configuration level

This level is used to adapt the controller to the control task, or for adaptation of the inputs and outputs.



Indications / controls



(1) Status indicators (yellow) for outputs 1 to 4	(6) 4-digit temperature display (LED, green, 8mm high)
(2) Increment key for altering parameters or manual operation of relay K2	(7) 4-digit process value indication (LED, red, 13mm high)
(3) Decrement key for altering parameters or manual operation of relay K1	(3) + (5) "CAL": Initiating electrode calibration (1-point or 2-point calibration)
(4) EXIT key to leave the levels	(2) + (4) Initiate manual operation or "hold"
(5) PGM key for selection of parameters and confirmation of entries	

Calibration options

If a transmitter / sensor without integral calibration function is used as a signal source (standard current signal), the dTRANS Az 01 can be configured accordingly, as indicator / controller (for the pH value, for example). It will then offer one of the following calibration options, in accordance with the configuration.

Indicator / controller for pH value

The electrode parameters of a pH combination electrode are subject to manufacturing tolerances and variations depending on usage. To compensate for these changing electrode parameters, the instrument offers two guided calibration procedures:

1) 2-point calibration (standard)
   This method of calibration makes a fresh determination of the **electrode zero and slope** using two solutions with known pH values (e.g. buffer solutions).
   It should be given preference!
2) 1-point calibration
   In 1-point calibration, **only the electrode zero** is freshly determined using a solution with a know pH value (buffer solution).
   Problems arising from an incorrect electrode slope will not be detected by the user!
   This method should only be adopted in cases where the electrode is not subject to significant chemical and mechanical influences.

In addition to the calibration procedures described above, the instrument offers the facility of manually entering and adjusting the zero point and slope (as determined by a laboratory, for example).

Indicator / controller for redox voltage

The electrode zero of a redox combination electrode is subject to manufacturing tolerances and variations depending on usage.

The instrument provides the facility for a guided calibration procedure – the 1-point calibration – for the fresh determination of the electrode zero, using a buffer solution or a solution with a known redox voltage.

In addition, the instrument offers the facility of manually entering or adjusting the electrode zero (as determined by a laboratory, for example).

Indicator / controller for electrolytic conductivity

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 instrument offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (range 80 — 120%) or **automatic calibration** of the relative cell constant K_{rel}.

Calibration of the temperature coefficient α

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 α [% per °C] of the measuring solution. The temperature can either be measured automatically, with a Pt100 or Pt1000 temperature probe, or set manually by the user. The temperature coefficient can be determined automatically by the instrument or entered manually, in the range from 0 to 5.5 %/°C

Indicator/controller for free chlorine, chlorine dioxide and ozone (as per Data Sheet 20.2630)

The sensor slope is subject to manufacturing tolerances and changes that develop during operation.
The instrument offers the facility for a guided calibration procedure - the 1-point calibration - to freshly determine the sensor slope through comparative measurement.

Additional functions of the JUMO dTRANS Az 01

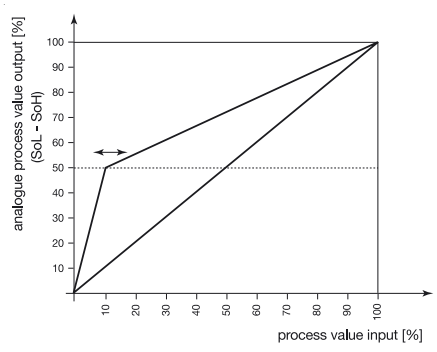
❏ **Programmable response of the process value output to underrange/overrange**

On underrange or overrange, the process value output can move to the following operational states:
-4%, 0%, 100% or 110% freely selectable

Example: The instrument is programmed to 4 — 20 mA corresponding to
100 — 500 mV.
It can be set up so that, on falling below 100, the output signal 4 mA (0%) is either maintained or will jump to 3.84 mA (-4%). The 3.84 mA value can then be recognized as "irregular" by a connected PLC.

❏ **Bilinear output**

This function divides the signal for the analog process value output into two linear portions (0 — 50% and 50 — 100% of the output signal), with a knee-point at 50% of the output signal. The knee-point of the characteristic can be shifted along the dotted 50% line. The factory setting of 50% produces a straight-line characteristic.



The bilinear characteristic is used when the "normal" measurement range is likely to be frequently exceeded.

Example: The normal measurement range spans 0 — 20 µS/cm.
However, measurements of up to 80 µS/cm can also occur.
In this case, the range 0 — 100 µS/cm will be selected, and the knee-point set at 20% of this range (20% of 100 µS/cm corresponds to 20 µS/cm).
This results in measurements in the range 0 — 20 µS/cm being converted into an output signal 0 — 10 mA.
Measurements in the range 20 — 100 µS/cm will be converted into an output signal 10 — 20 mA.

❏ **The response of the controller relays to "Hold" can be defined**

"Hold" is initiated either manually, using the keys, by a logic input, or by an alarm event. The outputs of the relays K1 and K2 can move to the following (programmable) states on "Hold":

0%	Relay de-energized
50% output	For dynamic controllers, 50% of the maximum pulse width or frequency is produced
100% output	Relay is energized, or maximum pulse width / frequency
Output accepted	The present output continues to be produced

❏ **In "Manual" mode, the relays K1 and K2 are operated manually, by using the keys.** Either key or switch operation can be selected, by a setting at the parameter level.

Key operation: The relay is switched as long as the key is pressed (e.g. for manual dosing).
Switch operation: The first key stroke switches the relay on, the second switches it off again (toggle action), e.g. for emptying large tanks.

❏ **Simulation of the analog process value output**

The process value output (0/2 — 10 V or 0/4 — 20 mA, depending on the setting) can be switched in 10% steps from 0 — 100%, in the manual mode.
Application: "Dry-run" commissioning of the plant (without electrodes, fault search, servicing).

❏ **Controller output functions**

Output 1 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / switched off. Switching function can be reversed.
MAX / MIN limit comparator.

Output 2 (relay): Switching, with pulse frequency or pulse width action / limit monitoring / MAX limit comparator for temperature input / MIN limit comparator for temperature input / switched off. Switching function can be reversed.
MAX / MIN limit comparator.

Output 3, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator / MIN limit comparator / output of process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Output 4, logic output: "Hold" / alarm pulse contact / alarm steady contact / MAX limit comparator / MIN limit comparator / no function.

Output 5, relay or analog process value output: "Hold" / alarm pulse contact; alarm steady contact / MAX limit comparator / MIN limit comparator / output of process value (only for analog process value output) / output of temperature process value (only for analog process value output) / analog controller output (only for analog process value output) / no function.

Limit comparator (limit monitor)

A limit-monitoring function can be assigned to the controller outputs 1 to 5 (depending on the instrument version).
For each one, the direction of switching (pulled in on going above/below a limit), pull-in and/or drop-out delay, and a hysteresis can all be defined.

Interface

The microprocessor indicator/controller can be optionally fitted with an RS422/RS485 interface. This is used for communication with higher-level systems and integration into a data network. The transmission protocol can be either Profibus-DP or MODbus/Jbus.

Technical data

Inputs

Analog input 1
Input resistance approx. 40 Ω

Analog input 2
Resistance thermometer Pt100 or Pt1000, in 2- or 3-wire circuit
-50 to +250•C
Measurement display in •C or •F (option)

Lead compensation, analog input 2
The lead resistance can be compensated in software by a correction of the process value. This is not required if the resistance thermometer is connected in a 3-wire circuit. When a resistance thermometer is connected in a 2-wire circuit, lead compensation can be provided by using an external compensation resistor.

Functional description of logic inputs 1 and 2
The two standard logic inputs can be operated by floating contacts (relays) from a PLC, or by switches. The following functions can be selected and assigned:

Key inhibit: The PLC or a key switch can be used to lock the keys on the instrument, to prevent unauthorized entries being made.

Setpoint switching: For comfortable process control. As long as the logic input is not operated, setpoint pair SPr1 and SPr2 is active. If the appropriately configured logic input is operated, then the second setpoint pair is activated.

Freeze measurement: The indicated measurement and the process value output no longer change.

Hold: This function can be used (for instance, by a supervisory PLC) to put the instrument into the secure "Hold" state. The response of the controller to "Hold" is as previously defined.

Hold reversed: The same function as for "Hold", but when the logic input is open.

Alarm stop: The alarm generation via the configured output is reset or prevented, but the alarm LED (e.g. K4) continues to blink as a warning.

Reset alarm time: The alarm generation via the configured output is prevented. The alarm delay time is set to zero, but is restarted when the logic input becomes inactive and the start conditions are fulfilled once more.

Range expansion (x10): If only a small portion of the measurement range is used, it may be advantageous for the instrument to react to 0 — 10% of the process value by producing 0 — 100% of the output signal.

Display and control range
pH value
-1.00 to 14.00 pH

Redox voltage
-1999 to +1999 mV

Conductivity
0 — 9999 mS/cm or µS/cm
0 — 9.999 mS/cm or µS/cm
0 — 99.99 mS/cm or µS/cm
0 — 999.9 mS/cm or µS/cm

Universal display
-1999 to 9999 digit
-1.999 to 9.999 digit
-19.99 to 99.99 digit
-199.9 to 999.9 digit

Deviation from characteristic
≤ 0.15% per 10 °C

Temperature display
-50 to +250•C (can be switched to •F)

Deviation from characteristic
≤ 0.1% per 10 °C

Outputs

2 relay outputs, 1 logic output, 1 analog process value output or 1 additional relay, and 1 serial interface are available.

1. **Relay, output 1 / 2 (standard)**
   Make contact (n.o., can also be configured as n.c. break contact)
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > $5x10^5$ operations at rated load

2. **Logic output, output 4**
   0/5V $R_{load} \geq 250\Omega$
   0/12V $R_{load} \geq 650\Omega$ (option)

3. **Process value output, output 3 or 5 (option)**
   freely configurable:
   0(2) — 10V $R_{load} \geq 500\Omega$ or
   0(4) — 20mA $R_{load} \geq 500\Omega$
   electrically isolated from the inputs:
   $\Delta U \leq 30$V AC or
   $\Delta U \leq 50$V DC

   Deviation from characteristic of output signal
   ≤ 0.25%, ± 50 ppm per °C

4. **Relay, output 3 or 5 (option)**
   (only for instruments without a process value output)
   changeover contact
   contact rating: 3A, 250V AC
   with resistive load
   contact life:
   > $5x10^5$ operations at rated load

5. **Interface RS422 / RS485, output 3 or 5 (option)**
   electrically isolated

   Baud rate
   4800/ 9600bps

   Protocol
   MODbus/Jbus or Profibus-DP

6. **Supply for 2-wire transmitter (output 5, option)**
   18 V DC, max. 30 mA

General controller data

A/D converter
resolution > 15 bit

Controller type
Limit controller and / or pulse width or pulse frequency controller, proportional controller or modulating controller, freely configurable and selectable

Control action
configurable as P, PI, PID or PD.

Sampling time
210msec

Measurement circuit monitoring
Input 1: out-of-range
Input 2: out-of-range, probe short-circuit, probe break
The outputs move to a defined (configurable) status.

Data backup
EEPROM

Supply voltage
110 — 240 V AC +10%/-15%,
48 — 63 Hz or
20 — 53VAC/DC, 0 — 63/0 Hz

Power consumption
approx. 8V A

Electrical connection
via gold-plated faston connectors to DIN 46 244/A; 4.8mm x 0.8mm

Permissible ambient temperature
0 to +50°C

Permissible ambient temperature limits
-10 to +55°C

Permissible storage temperature
-40 to +70°C

Climatic conditions
rel. humidity ≤ 75%, no condensation

Enclosure protection
to EN 60 529
front IP65 / rear IP20

Electrical safety
to EN 61 010
clearance and creepage distances for
- overvoltage category II
- pollution degree 2

Electromagnetic compatibility
to EN 61 326
radiated interference: Class B
interference immunity: to industrial requirements

Housing
Panel-mounting housing in conductive plastic to DIN 43 700, base material ABS
with plug-in controller module

Operating position
unrestricted

Weight
Switchgear cabinet unit (basic version)
approx. 320g

Wall-mounting housing (extra code /640)
approx. 1400g

Option

Wall-mounting housing
extra code /640
On request, the JUMO dTRANS Az 01 can be supplied built into a surface-mounting housing. The housing is suitable for wall-mounting or mounting on a DIN rail as per EN 50 022, 35 x 7.5 mm.

The housing is sturdy and provides IP67 protection for the built-in instrument. It is fitted with six cable glands. Unused cable glands can be tightly sealed using the blind grommets that are included in the delivery.
The electrical connection is made via screw terminals.

(wire cross-section up to 2.5 mm^2).

Standard accessories

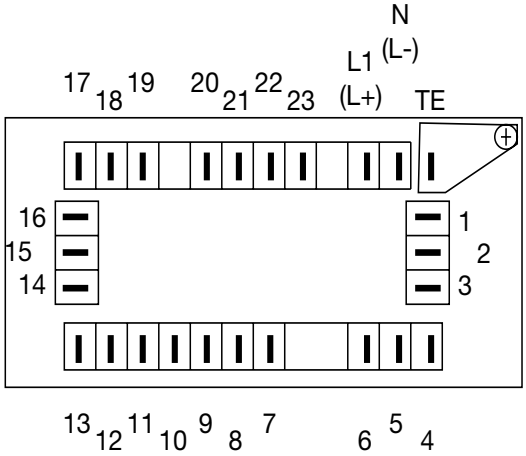
- 2 fixing items (not with extra code /640 (wall-mounting housing))
- 1 Operating Instructions B20.2550.0.1

Parameters

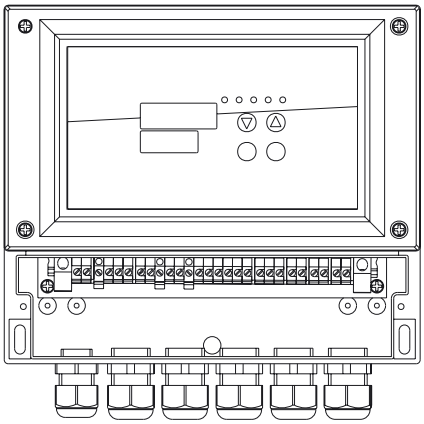
Parameter	Display	Value range	Comments
Alarm tolerance pH / redox / conductivity[1]	AL1	0.00 — 99.99 pH 0000 — 9999 mV 0.000 — 9999[2]	The alarm is only generated when the level (setpoint + alarm tolerance) has been passed, and the alarm delay time has elapsed (only effective for pulse width/pulse frequency controllers. It is internally fixed at 0 for limit controllers.
Alarm delay	AL2	0 — 6000 sec	Delay time before the alarm contact is activated
Proportional band[1] pH / redox / conductivity[1]	Pb1	0.01 — 99.9 pH 1 — 9999 mV 1 — 9999[2]	Influences the P action of the controller
Proportional band 2 pH / redox / conductivity[1]	Pb2	0.01 — 99.9 pH 1 — 9999 mV 1 — 9999[2]	
Derivative time 1	dt1	0 — 9999 sec	Influences the D action of the controller If dt = 0, the controller has no D action.
Derivative time 2	dt2		
Reset time 1	rt1		Influences the I action of the controller If rt = 0, the controller has no I action.
Reset time 2	rt2		
Minimum ON time 1 (for limit controller or pulse width controller) or minimum pulse width 1 (for pulse frequency controller)	tr1	0.2 — 999.9 sec	Determined by the technical data of the dosing device (solenoid valve, dosing pump)
Minimum ON time 2 (for limit controller or pulse width controller) or minimum pulse width 2 (for pulse frequency controller)	tr2		
Switching differential 1 pH / redox / conductivity[1]	HYS1	0.01 — 99.9 pH 1 — 9999 mV 1 — 9999*	Defines the switch-off point for the control contacts
Switching differential 2 pH / redox / conductivity[1]	HYS2		
Switching differential 3 pH / redox / conductivity[1]	HYS3		
Switching differential 4 pH / redox / conductivity[1]	HYS4		
Switching differential 5 pH / redox / conductivity[1]	HYS5		
Pull-in delay 1	Ond1	0.2 — 999.9 sec	Delay time before the contact is activated
Pull-in delay 2	Ond2		
Pull-in delay 3	Ond3		
Pull-in delay 4	Ond4		
Pull-in delay 5	Ond5		
Drop-out delay 1	Ofd1	0.2 — 999.9 sec	Delay time until the contact moves back to the initial position
Drop-out delay 2	Ofd2		
Drop-out delay 3	Ofd3		
Drop-out delay 4	Ofd4		
Drop-out delay 5	Ofd5		
Maximum pulse frequency 1	Fr1	0 — 150 pulse/min	Maximum frequency of pulses (operating a dosing pump, for instance)
Maximum pulse frequency 2	Fr2		
Pulse period 1	Cy1	1.0 — 999.9 sec	The period in which a pulse is modulated
Pulse period 2	Cy2		
Output level limit, output 1	Y1	0 — 100%	The maximum output level for a pulse width / pulse frequency controller
Output level limit, output 2	Y2		
Actuator time	tt	15 — 3000 sec	For modulating controller

[1] according to dimensional unit
[2] unit as per configuration

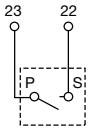
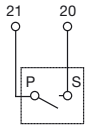
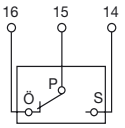
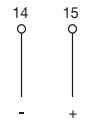
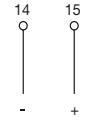
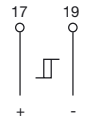
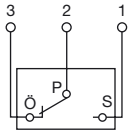
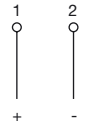
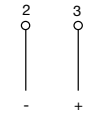
Connection diagram

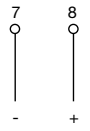
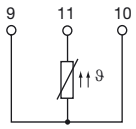
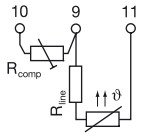


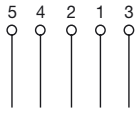
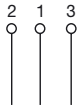
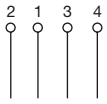
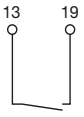
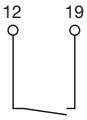
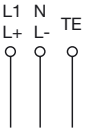
Rear view with faston connectors



Wall-mounting housing (extra code /640) with terminal strip

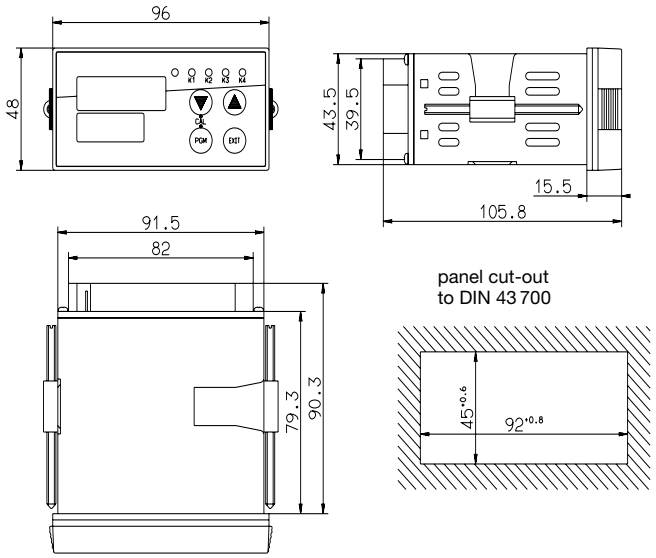
Outputs	K	Terminal assignments	Symbol
Relay 1 (K1) Status indication LED K1	1	23 common 22 make (n.o.)	
Relay 2 (K2) Status indication LED K2	2	21 common 20 make (n.o.)	
Relay 3 (K3) Status indication LED K3 **or** analog process value output (electrically isolated)	3	16 break (n.c.) 15 common 14 make (n.o.)	
		15 + 14 –	
Supply for 2-wire transmitter	3	15 – 14 +	
Logic output 1 (K4) Status indication LED K4	4	19 – 17 +	
Relay 4 (K5) No status indication **or** analog process value output (electrically isolated)	5	3 break (n.c.) 2 common 1 make (n.o.)	
		2 – 1 +	
Supply for 2-wire transmitter	5	2 – 3 +	

Inputs		Terminal assignments	Symbol
Input for standard signal I_x (0(4) — 20 mA)		7 - 8 +	
Resistance thermometer in 3-wire circuit		9 10 11	
Resistance thermometer in 2-wire circuit		10 9 11	

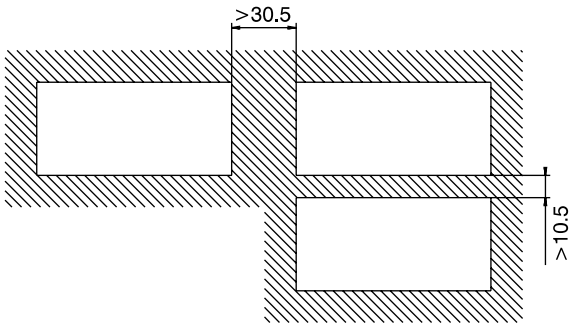
Serial interface RS422 (option)	RxD	5 4	RxD + RxD –	receive data	
	TxD	2 1	TxD + TxD –	transmit data	
	GND	3	GND		
Serial interface RS485 (option)	+ -	2 1	TxD/RxD + TxD/RxD –	receive data / transmit data	
	GND	3	GND		
Serial interface **Profibus-DP** (option)	VP	4	supply voltage-plus (P5V)		
	RxD/TxD-P	2	receive/transmit data-positive, B conductor		
	RxD/TxD-N	1	receive/transmit data-negative, A conductor		
	DGND	3	ground for data transmission		
Logic input 1		13 19			
Logic input 2		12 19			
Supply voltage **see nameplate**	AC/ DC	AC: L1 N TE	 phase/line neutral technical earth	DC: L + L –	

Dimensions

Type 202550/...

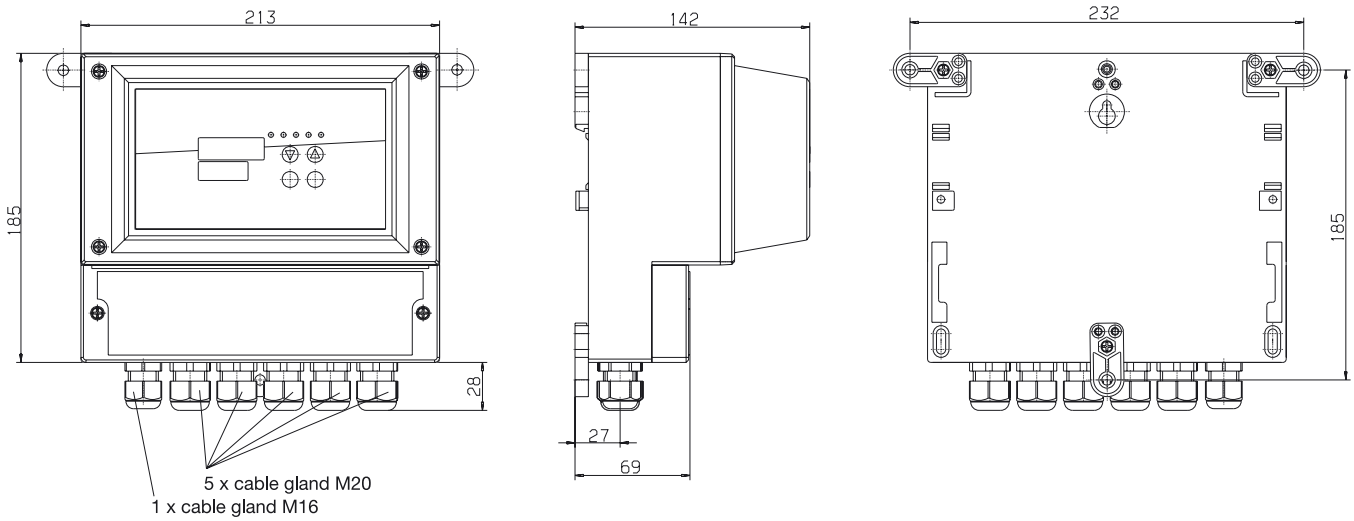


Panel cut-out to DIN 43 700
close mounting (minimum dimensions)



Option

Surface-mounting housing, extra code /640, Protection IP67



Type designation

(1) Basic type

202550 JUMO dTRANS Az 01
Microprocessor indicator / controller for analytical measurement

(2) **Basic type extensions**

10 Limit controller*

(3) Inputs

660 0/4 — 20 mA front panel print: pH and mV, °C
661 0/4 — 20 mA front panel print: mV, °C
662 0/4 — 20 mA front panel print: mS/cm and µS/cm, °C
664 0/4 — 20 mA front panel print: none, °C
665 0/4 — 20 mA front panel print: mg/l, °C

(4) Output I

000 no output
140 supply for 2-wire transmitter
310 relay, changeover contact
888 process value output, freely configurable

(5) Output II

000 no output or interface
140 supply for 2-wire transmitter[1]
310 relay, changeover contact[1]
888 process value output, freely configurable[1]

(6) Supply voltage

22 20 — 53 V AC/DC ±0%, 48 — 63/0 Hz
23 110 — 240 V AC +10%/-15%, 48 — 63 Hz

(7) Interface

00 no serial interface
54 serial interface RS422/485[1]
64 serial interface Profibus-DP[1]

(8) Extra codes

000 no extra codes
015 logic output 0/12 V DC,
instead of standard 0/5 V DC
640 surface-mounting housing for wall-mounting or DIN rail mounted, Protection IP67

	(1)		(2)		(3)		(4)		(5)[1]		(6)		(7)[1]		(8)
Order code	202550	/	10	-		-		,		-		-		/	
Order example	202550	/	10	-	660	-	888	,	310	-	23	-	00	/	000

*Generally

on **all** controllers of the 202550 series, the user can freely select the following configurations:

- ❏ Controller off
- ❏ Limit controller
- ❏ Pulse width controller with P, PI, PD, PID control action
- ❏ Pulse frequency controller with P, PI, PD, PID control action
- ❏ Modulating controller

[1] If output II (4) = "310" “140” or "888", then the interface option (6) is not possible (or the other way round)!

Optional accessories 1 (switchgear cabinet units)

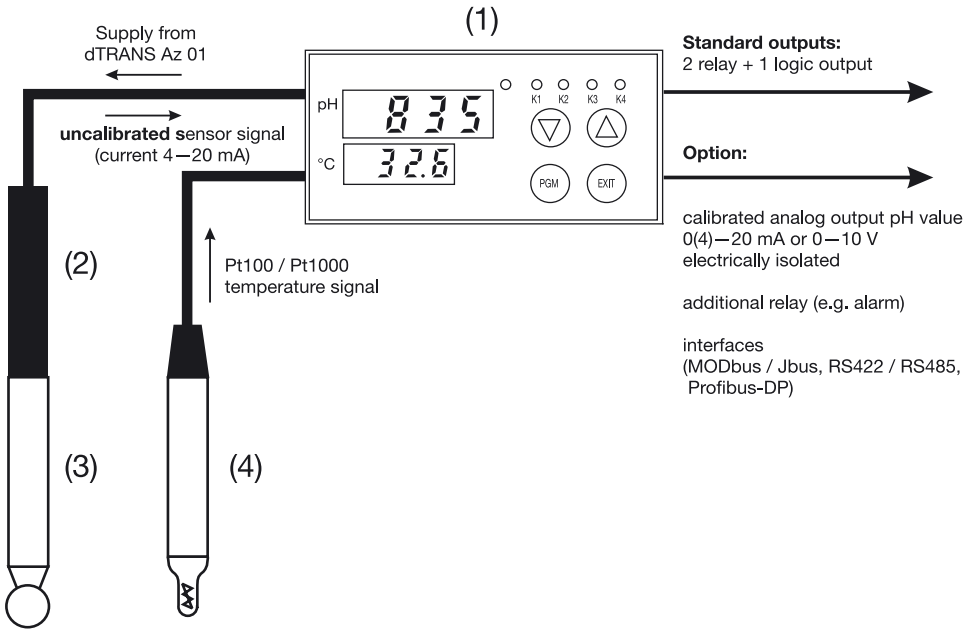
Designation	Sales No.
Bracket for C-rail	70/00375749
Blank cover 96 x 48 mm	70/00069680

Optional accessories 2 (wall-mounting units)

Designation	Sales No.
Pole clamp, 60 mm dia. (clamping area: 50 - 70 mm dia.)	20/00437485
Pole clamp, 120 mm dia. (clamping area: 100 - 120 mm)	20/00437486

Application example

Indicator for pH

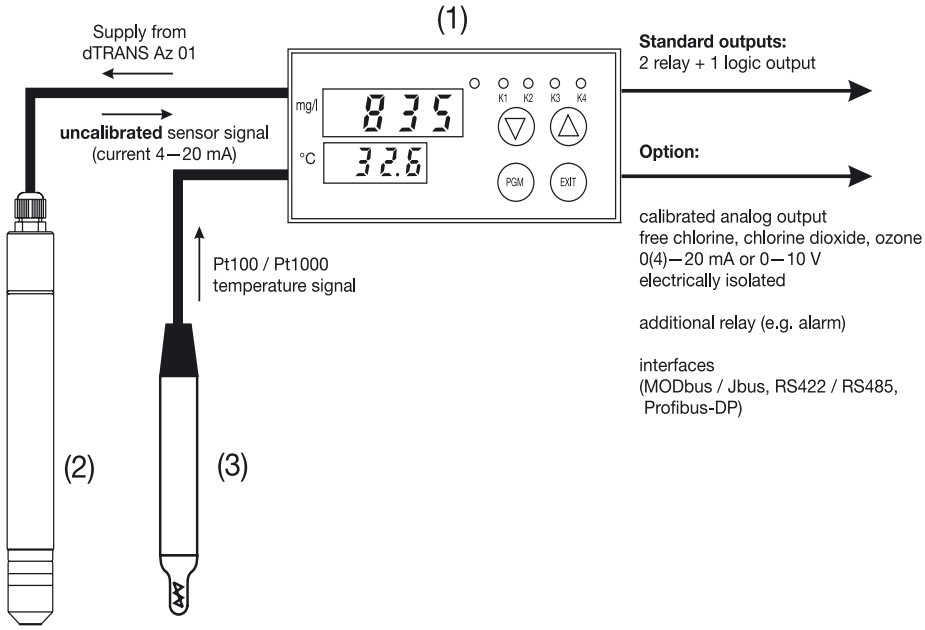


(1)Indicator / controller for pH, type 202550 with integrated supply for a 2-wire transmitter
(2)2-wire transmitter, type 202701
(3)pH combination electrode, e.g. type 2GE-2G-U-1
(4)Compensation thermometer, type 2K-2

Advantages:

- long cable lengths can be covered, with low interference
- reduced wiring requirements, since supply for 2-wire transmitter is integrated in indicator
- calibration facility in indicator
- humidity problems reduced to a minimum during calibration

Indicator for free chlorine, chlorine dioxide or ozone



(1)Universal indicator / controller, type 202550 with integrated supply for a 2-wire transmitter
(2)Measuring cell for free chlorine, type 202630
(3)Compensation thermometer, type 2K-2

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JUMO AQUIS 500 pH

Transmitter/Controller for pH, ORP, NH_3 (ammonia) concentration and temperature

Type 202560

Brief description

The instrument is used for measuring/controlling the pH, ORP or NH_3 (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_3 variables.

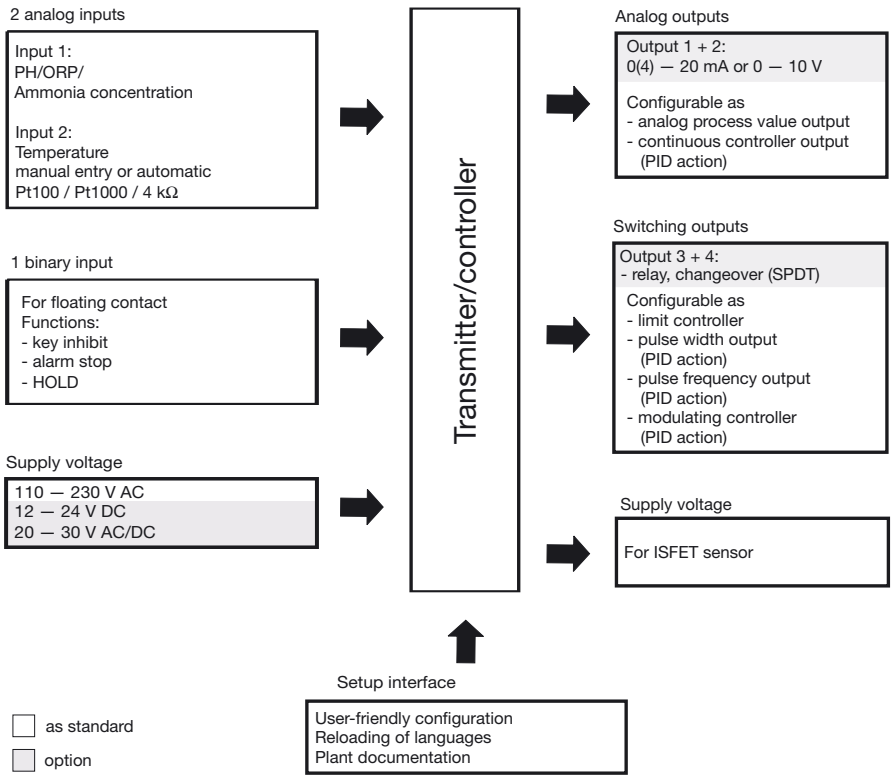
The instruments are operated using unambiguous keys and a large LC graphics display on which the measurements are clearly legible. The plain-text presentation of the parameters makes it easier for the user to configure the instrument, and also helps in programming it correctly.

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



Key features

- Directly switchable to pH, ORP or NH_3 (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 wall-mounting 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

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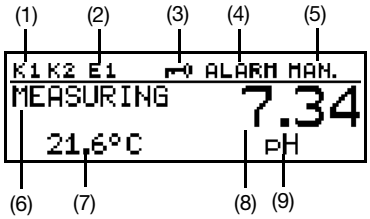
Functional description

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

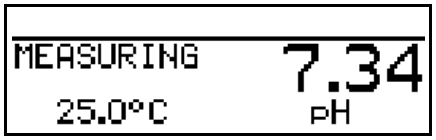
For easy programming and operation, all parameters are arranged in clearly structured levels and shown in plain text. Operation is protected by a code word. This facilitates individual adaptation of the operation, since parameters can be generally enabled or assigned to the protected area.

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

Display modes

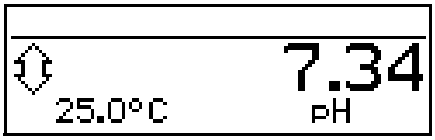
Three display modes are available:

Large digits



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

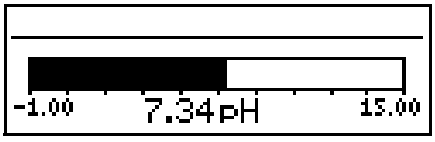
Trend display



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_3 (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_3 (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.

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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.

Analog outputs

One or two analog outputs are available.

The following functions can be chosen:

- analog process value output
- continuous controller output

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

Relay outputs

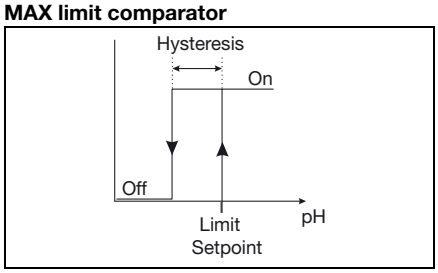
One or two relay changeover (SPDT) contacts are available.

The following functions can be programmed:

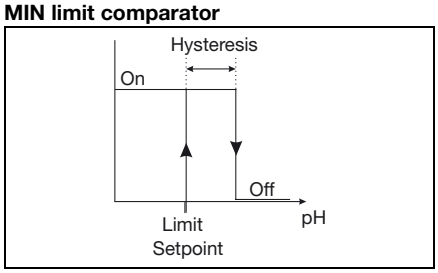
- Switching direction
  (min/max)
- Limit controller
  (pull-in/drop-out delay, hysteresis)
- Pulse width output
  (see control functions)
- Pulse frequency output
  (see control functions)
- Modulating controller function
  (see control functions)
- Limit comparators
  (pull-in/drop-out delay, hysteresis)
- Pulse function
  The output switches on in a defined way when reaching the switching point and then switches off again.
- Alarm
- Sensor or range error
- Response to alarm, over/underrange, calibration and HOLD

Contact functions

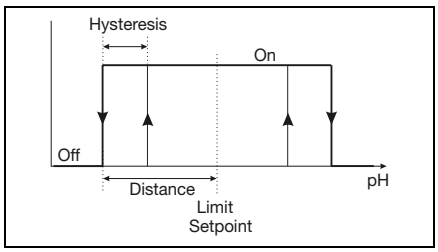
MAX limit comparator



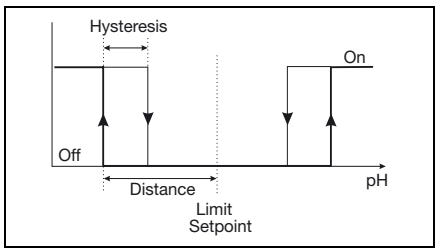
MIN limit comparator



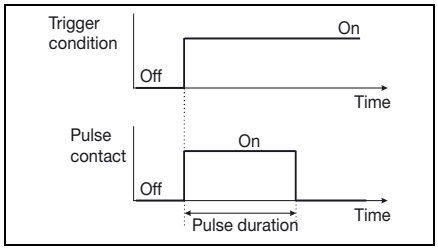
Alarm window 1



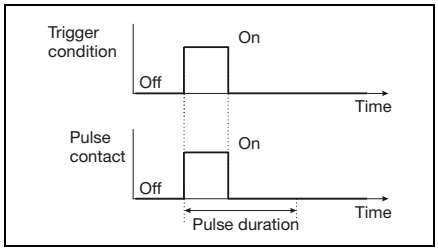
Alarm window 2



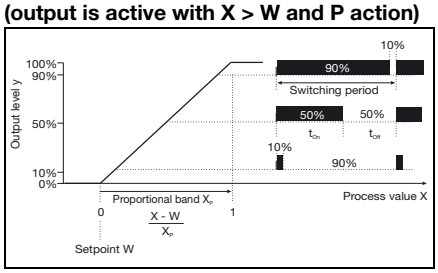
Pulse contact
Trigger condition longer than pulse duration



Pulse contact
Trigger condition shorter than pulse duration

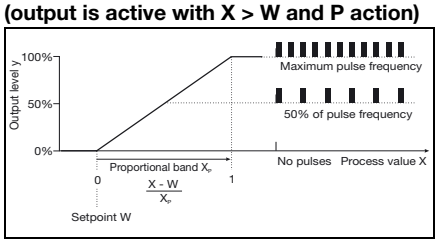


Pulse width controller
(output is active with X > W and P action)



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_3 (ammonia)	0 to 9999 ppm	≤ 0.3%	0.2%/10°C
Secondary input			
Temperature Pt100/1000 (automatic detection)	-10 to 150°C[1]	≤ 0.5°C	0.05%/10°C
Temperature NTC/PTC	4 kΩ max. Entry via table with 20 value pairs	≤ 0.3%	0.05%/10°C

Temperature compensation

Measurement variable	Compensation	Range[2]
pH	yes	-10 to 150°C
ORP	no	not applicable
NH_3 (ammonia)	yes	-10 to 150°C

Measuring circuit monitoring

Inputs	Over/underrange	Short-circuit	Cable break
pH	yes	yes[3]	yes[3]
ORP	yes	no	no
NH_3 (ammonia)	yes	no	no
Temperature	yes	yes	yes

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

Activation	Through floating contact
Function	Key inhibit HOLD Alarm suppression

Controller

Controller type	Limit comparators, limit controller, pulse width controller, pulse frequency controller, modulating controller, continuous controller
Controller action	P / PI / PD / PID
A/D converter	Dynamic resolution up to 14-bit
Sampling time	500 msec

[1] Switchable to °F.
[2] Please note operating temperature range of sensor.
[3] For pH measurement, the sensor can be monitored for short-circuit and cable break by activating the impedance measurement.

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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.)

Rated load	3 A/250 VAC (resistive load)
Contact life	>2x10^5 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

Supply voltage	110 — 230 V AC -15/+10%, 48 — 63 Hz 20 — 30 V AC/DC, 48 — 63 Hz 12 — 24 V DC +/-15% (permissible only for connection to SELV/PELV circuits)
Power consumption	approx. 11 VA
Electrical safety	EN 61 010, Part 1 overvoltage category III[1], pollution degree 2
Data backup	EEPROM
Electrical connection	pluggable screw terminals conductor cross-section up to 2.5 mm^2 (supply, relay outputs, sensor inputs) conductor cross-section up to 1.5 mm^2 (analog outputs; ISFET supply)

Housing

Material	PA (polyamide)
Cable entry	cable glands, 3xM16 and 2xM12 max.
Special feature	venting device to prevent condensation
Ambient temperature range (the accuracy specified is adhered to within this range)	-10 to 50°C
Operating temperature range (instrument is operational)	-15 to 65°C
Storage temperature range	-30 to 70°C
Climatic conditions	rel. humidity ≤ 90% annual mean, no condensation (following EN 60721 3-3 3K3)
Enclosure protection as per EN 60529	in wall-mounting housing: IP67 for panel mounting: IP65 front, IP20 rear
Vibration strength	as per EN 60068-2-6
Weight	in wall-mounting housing: approx. 900 g for panel mounting: approx. 480 g
Dimensions	see dimensioned drawings on page 8.

Standard accessories

Cable glands
Internal mounting material
Operating Instructions

[1] Not valid with protective extra-low voltage of power supply variant 12 — 24 V DC.

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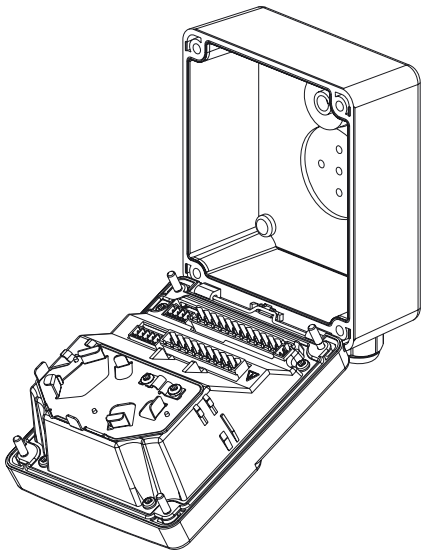
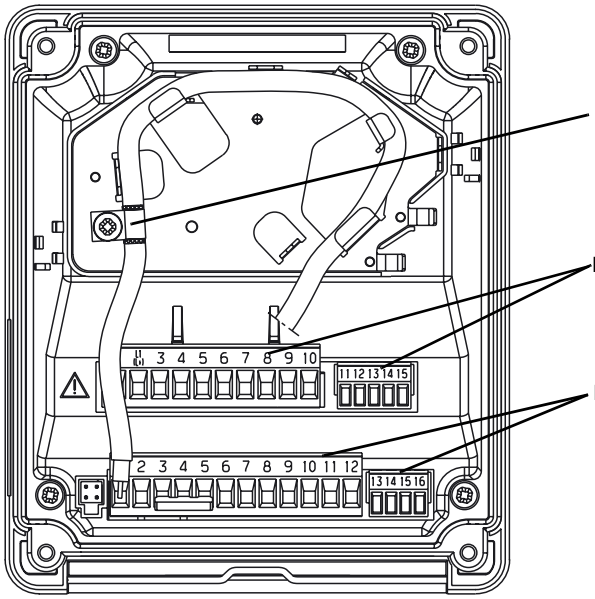
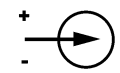
Electrical connection



The electrical connection for the “in wall-mounting 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
Supply for transmitter/controller				
as standard: Supply voltage (25): 20 — 30 V AC/DC Supply voltage (30): 110 — 230 V AC Supply voltage (23): 12 — 24 V DC			1 N (L-) 2 L1 (L+)	1
NC			3	
Supply voltage for ISFET sensor				
Supply voltage ± 5 V DC, 5 mA			11 L+ 12 ⊥ 13 L-	1
NC			14	
NC			15	

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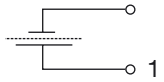
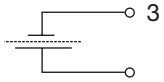
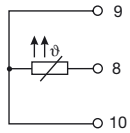
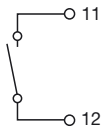
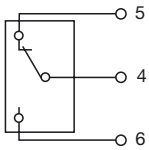
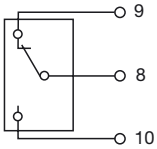
Connection		Terminal	Row
Inputs			
Glass/metal electrode		1	2
NC		2	
Reference electrode		3	
NC		4	
GND Link terminal 3 and terminal 5 (asymmetrical connection only)		5	
FP (liquid potential) For connection with symmetrical connection only		6	
NC		7	
RTD in 3-wire circuit, Pt100 or Pt1000		8 9 10	
Binary input		11 12	
Outputs			
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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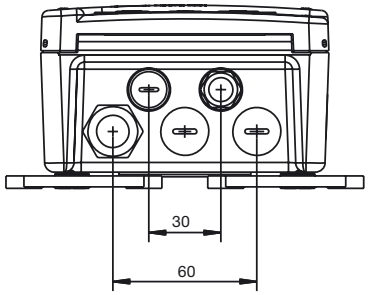
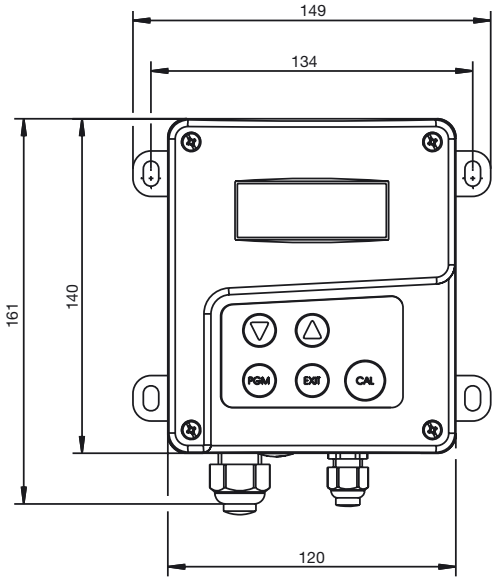
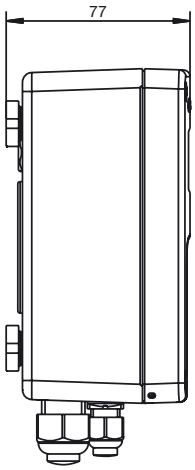
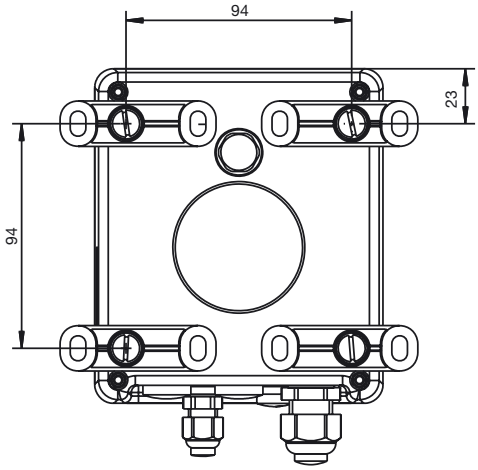
Dimensions

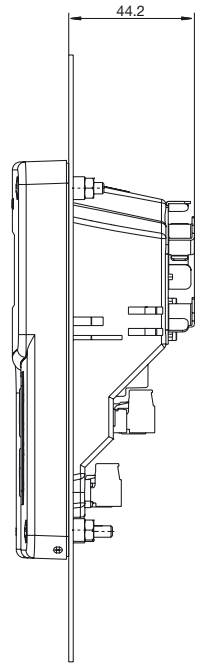


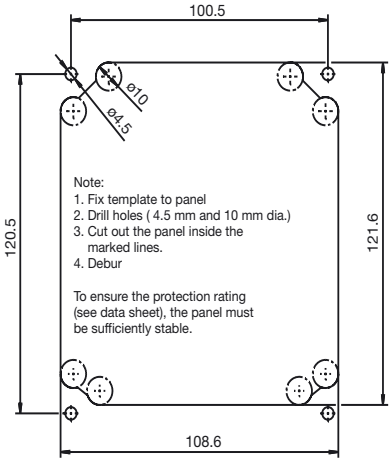






Panel-mounting/drilling diagram





Note:
The drilling template (in actual size) is shown in the Operating Instructions B 20.2560.0.

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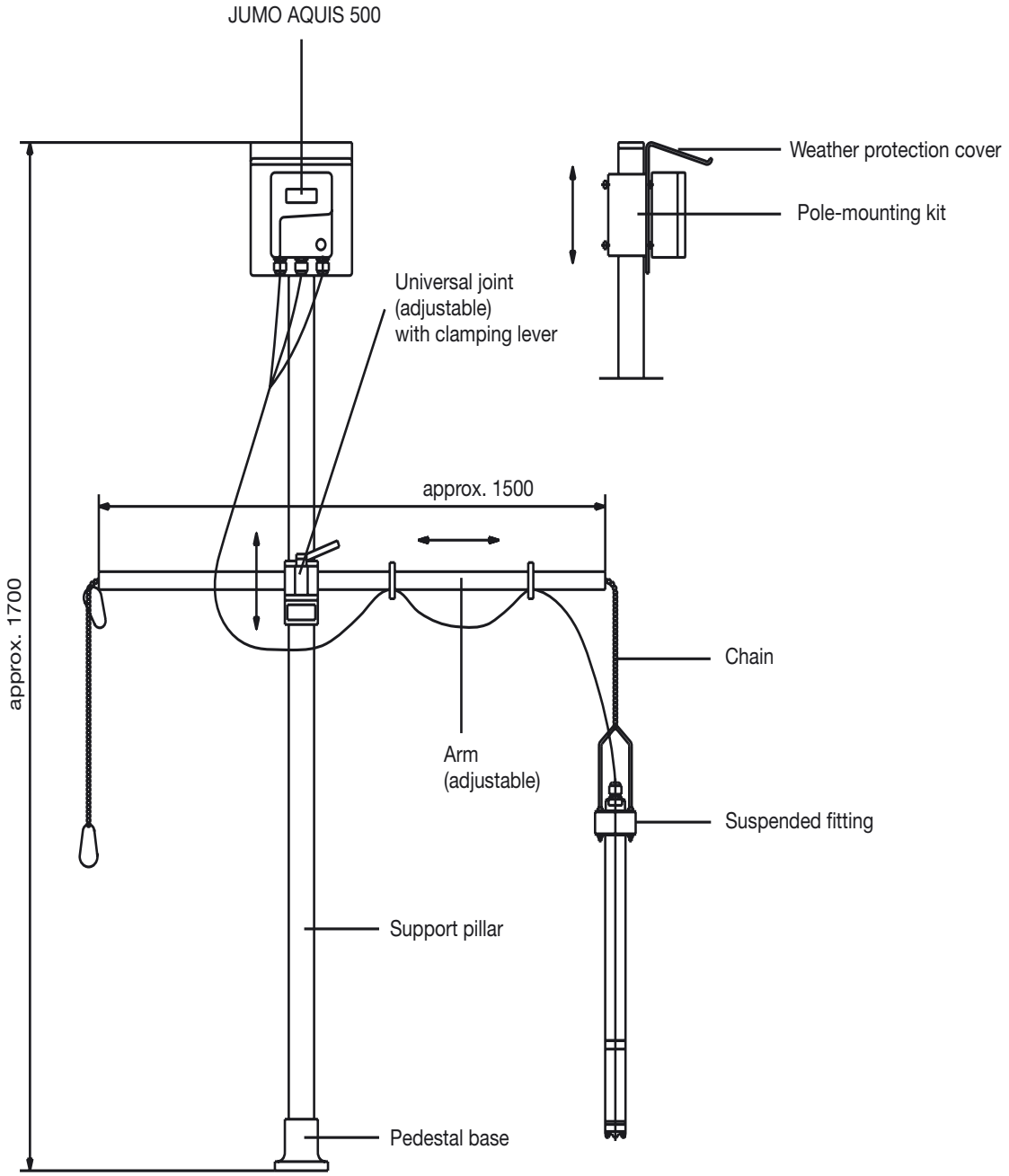
Accessories



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Order details: JUMO AQUIS 500 pH

(1) Basic type
JUMO AQUIS 500 pH
202560 Transmitter/controller for pH, ORP, NH_3 (ammonia) concentration and temperature

(2) Basic type extensions
10 for panel mounting
20 in wall-mounting housing

(3) Output 1
000 no output
888 analog output 0(4) — 20 mA or 0(2) — 10 V

(4) Output 2
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[1]
23 110 — 230 V AC + 10% / -15%, 48 — 63 Hz
30 12 — 24 V DC ± 15%[1]

(8) Extra codes
000 none

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
Order code		/		-		-		-		/		-		/		, ...[2]
Order example	202560	/	20	-	888	-	000	-	310	/	000	-	23	/	000	

Stock items (shipment: 3 working days after receipt of order)

Type	Sales No.
202560/20-888-888-310-310-23/000	20/00480051
202560/20-888-000-310-000-23/000	20/00480050

Production items (shipment: 10 days after receipt of order)

Type	Sales No.
202560/10-888-888-310-310-23/000	20/00480048
202560/10-888-000-310-000-23/000	20/00480044
202560/20-888-888-310-310-25/000[1]	20/00480049

Accessories (shipment: 10 days after receipt of order)

Type	Sales No.
Protection cover for JUMO AQUIS 500 [3]	20/00398161
Pole-mounting kit for JUMO AQUIS 500 [4]	20/00398162
Support pillar with pedestal base, arm and chain	20/00398163
PC setup software	20/00483602
PC interface cable including USB/TTL converter and adapter (USB connection cable)	70/00456352

[1] Can be supplied from about the 3rd quarter of 2007.
[2] List extra codes in sequence, separated by commas.
[3] The pole-mounting kit is needed for mounting the protection cover.
[4] Using the pole-mounting kit, the JUMO AQUIS 500 can be fitted to a pole (e. g. support pillar or railing).

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JUMO AQUIS 500 CR

Transmitter/Controller for conductivity, TDS, resistivity and temperature

Compliant with USP<645>

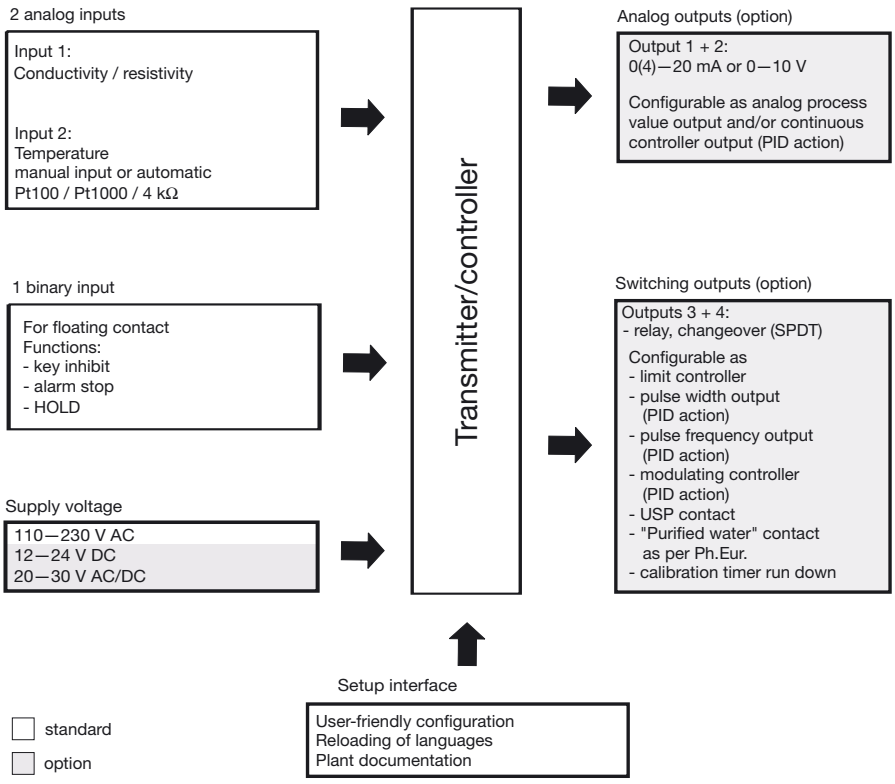
Type 202565

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 wall-mounting 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

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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

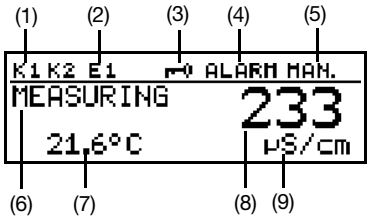
Two-electrode cells (standard) as well as four-electrode cells can be used for measurement.

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

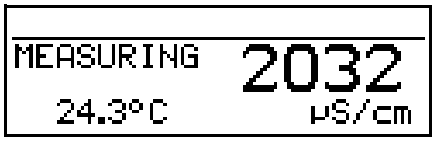
For easy programming and operation, all parameters are arranged in clearly structured levels and shown in plain text. Operation is protected by a code word. This facilitates individual adaptation of the operation, since parameters can be generally enabled or specifically assigned to the protected area.

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

Display modes

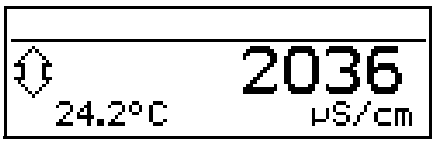
Three display modes are available:

Large numbers



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

Trend display

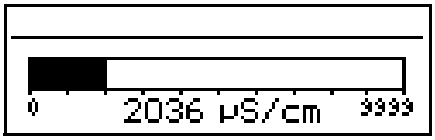


The numerical value is supplemented by a symbol which indicates the change direction and change speed of the measurement.
This can, for instance, be very useful during controller optimization.

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 µS/cm or mS/cm.

Resistivity (high-purity water)

Display/control, unit kΩ x cm or MΩ x 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 [%/°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.

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.

Analog outputs

Up to two analog outputs are available, configurable as analog process value output or continuous controller. The “analog process value output” function can be assigned to the principle measurement variable or to the temperature. The “continuous controller” function can only be assigned to the principle measurement variable. Both functions can be combined.
With the analog process value output, the range start and end values are freely selectable.

The response of the outputs to over/underrange, HOLD 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

Relay outputs

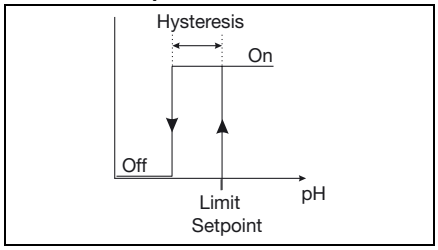
Two relay changeover contacts are available for the principle measurement variable and/or temperature.

The following functions can be programmed:

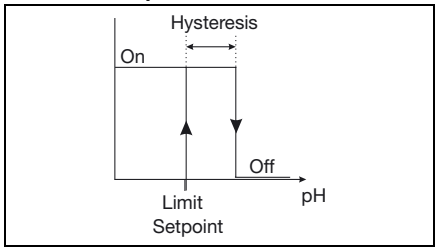
- Switching direction
  (min/max)
- Limit controller
  (pull-in/drop-out delay, hysteresis)
- Pulse width output
  (see control functions)
- Pulse frequency output
  (see control functions)
- Modulating controller function
  (see control functions)
- Limit comparators
  (pull-in/drop-out delay, hysteresis)
- 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

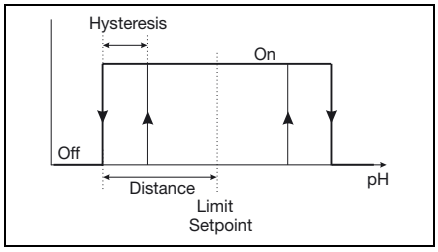
MAX limit comparator



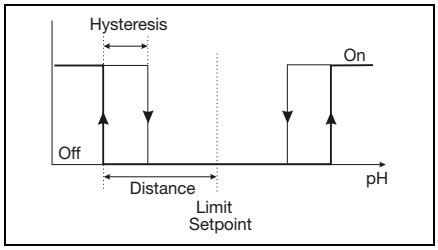
MIN limit comparator



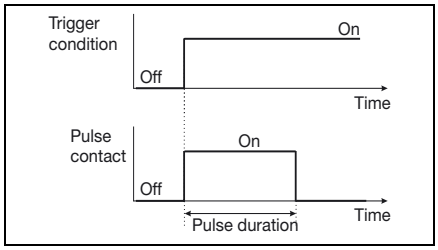
Alarm window 1



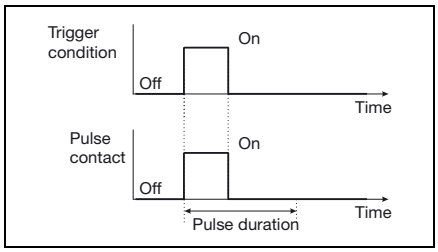
Alarm window 2



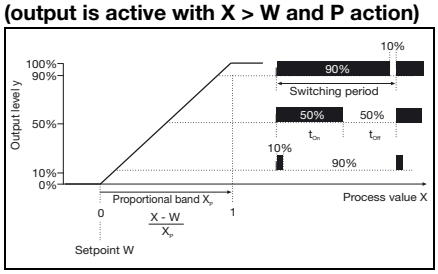
Pulse contact
Trigger condition longer than pulse duration



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).

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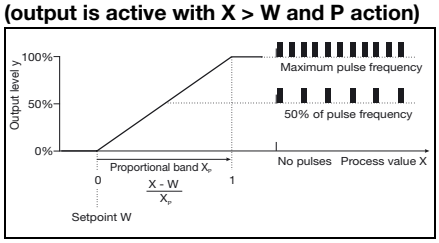
Pulse frequency controller
(output is active with X > W and P action)



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 — 20 µs/cm
0.1 1/cm	1 µS/cm — 1000 µs/cm
1.0 1/cm	0.01 mS/cm — 100 ms/cm
3.0 1/cm	0.1 mS/cm — 30 ms/cm
10.0 1/cm	0.1 mS/cm — 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 = 0.1µs/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 = 0.1µs/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 — 1.25 ms/cm
0.1	0.01 µS/cm — 12.5 ms/cm
1.0	0.1 µS/cm — 125 ms/cm
3.0	0.3 µS/cm — 375 ms/cm
10.0	0.1 mS/cm — 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 = 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 — 9.999 00.00 — 99.99 000.0 — 999.9 0000 — 9999	≤ 0.6% of range + 0.3 µS x cell constant (K)	0.2%/10°C
mS/cm	0.000 — 9.999 00.00 — 99.99 000.0 — 999.9 0000 — 9999	≤ 0.6% of range + 0.3 µS x cell constant (K)	0.2%/10°C
kΩ x cm	0.000 — 9.999 00.00 — 99.99 000.0 — 999.9 0000 — 9999	≤ 0.6% of range + 0.3 µS x cell constant (K)	0.2%/10°C
MΩ x cm	0.000 — 9.999 00.00 — 99.99 000.0 — 999.9 0000 — 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[1]	≤ 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%[2]	0.05%/10°C

Temperature compensation

Type of compensation	Range[3]
Linear 0 — 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)	

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 — 500%	0.002 — 0.05
0.1		0.02 — 0.5
1.0		0.2 — 5
3.0		0.6 — 15
10.0		2.0 — 50

[1] Switchable to °F.
[2] Depending on interpolation points.
[3] Please note operating temperature range of sensor.

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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 — 150%	0.1 — 0.75
1.0		0.2 — 1.5

Binary input

Activation	through floating contact
Function	key inhibit HOLD alarm suppression

Controller

Controller type	limit comparators, limit controller, pulse width controller, pulse frequency controller, modulating controller, continuous controller
Controller action	P / PI / PD / PID
A/D converter	dynamic resolution up to 14-bit
Sampling time	500 msec

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 in accordance with the recommendation as per NAMUR NE43. They are electrically isolated, 30 V AC / 50 V DC.				

Switching outputs (two changeover (SPDT) max.)

Rated load	3 A/250 VAC (resistive load)
Contact life	>2x10^5 operations at rated load

Setup interface

Interface for configuring the instrument through the optionally available setup program (for instrument configuration only).

Electrical data

Supply voltage	110 — 230 V AC; -15/+10%; 48 — 63 Hz 20 — 30 V AC/DC; 48 — 63 Hz 12 — 24 V DC +/-15% (permissible only for connection to SELV/PELV circuits)
Power consumption	approx. 11 VA
Electrical safety	EN 61 010, Part 1 overvoltage category III[1], pollution degree 2
Data backup	EEPROM
Electrical connection	pluggable screw terminals conductor cross-section up to 2.5 mm^2 (supply, relay outputs, sensor inputs) conductor cross-section up to 1.5 mm^2 (analog outputs)

Display

Graphics LC display	120 x 32 pixels
Background lighting	programmable: - off - on for 60 seconds during operation

[1] Please note operating temperature range of sensor.

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Housing

Material	PA (polyamide)
Cable entry	cable glands, 3xM16 and 2xM12 max.
Special feature	venting device to prevent condensation
Ambient temperature range (the specified accuracy is adhered to within this range)	-10 to 50°C
Operating temperature range (instrument is operational)	-15 to 65°C
Storage temperature range	-30 to 70°C
Climatic conditions	rel. humidity ≤ 90% annual mean, no condensation (following EN 60721 3-3 3K3)
Enclosure protection as per EN 60529	in wall-mounting housing: IP67 for panel mounting: IP65 front, IP20 rear
Vibration strength	as per EN 60068-2-6
Weight	wall-mounting housing: approx. 900 g for panel mounting: approx. 480 g
Dimensions	see dimensioned drawings on page 10.

Standard accessories

Cable glands
Internal mounting material
Operating Instructions

[1] Not valid with protective extra-low voltage (PELV) of power supply variant 12 — 24 V DC.

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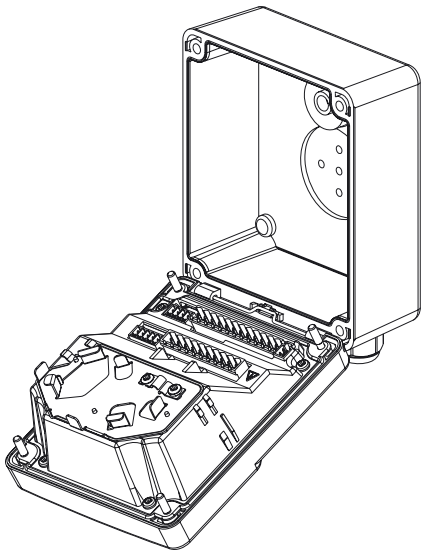
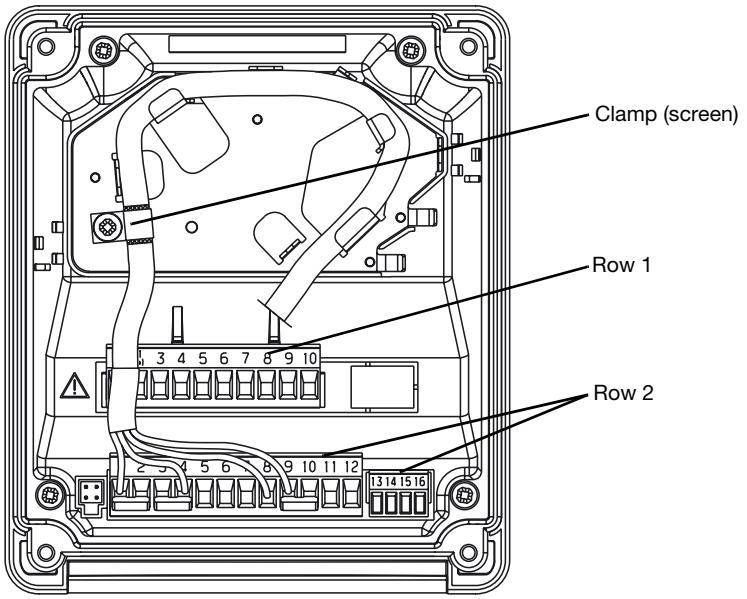
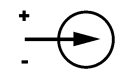
Electrical connection



The electrical connection for the “wall-mounting 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
Supply for transmitter/controller				
as standard: Supply voltage (25): Supply voltage (23): Supply voltage (30):	 20 — 30 V AC/DC 110 — 230 V AC 12 — 24 V DC		1 N (L-) 2 L1 (L+)	1
NC			3	

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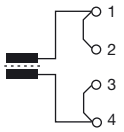
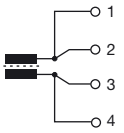
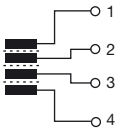
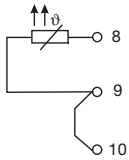
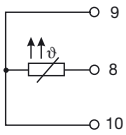
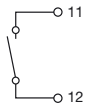
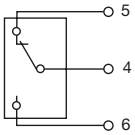
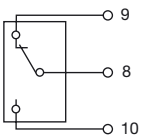
Connection		Terminal	Row
Inputs			
Conductivity cell (2-electrode system) Terminals 1+2 and 3+4 are linked in the instrument; 2-wire cable routed to the head of the conductivity cell. For concentric cells, terminal 1 is connected to the outer electrode.		1 2 3 4	2
Conductivity cell (2-electrode system) 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	
Outputs			
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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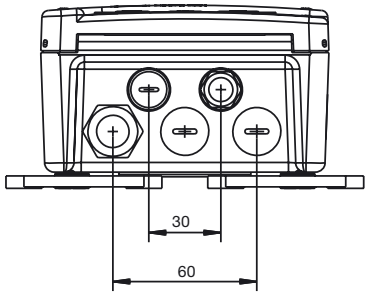
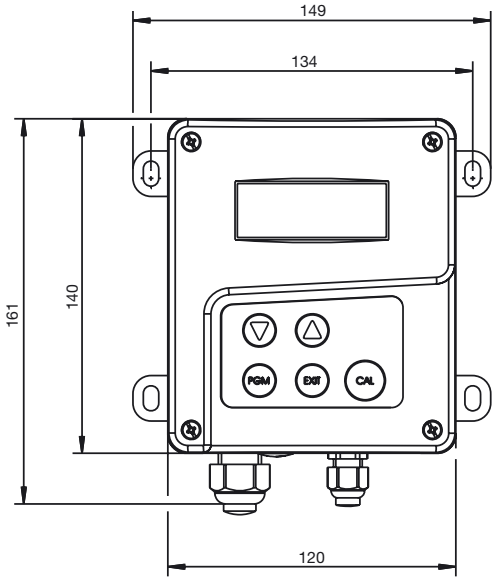
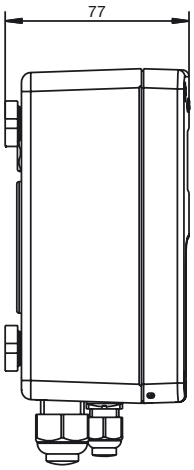
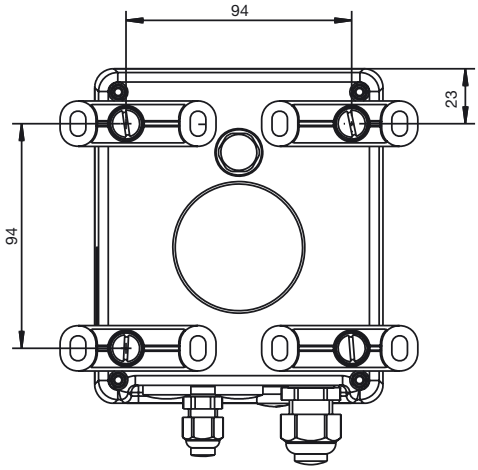
Dimensions

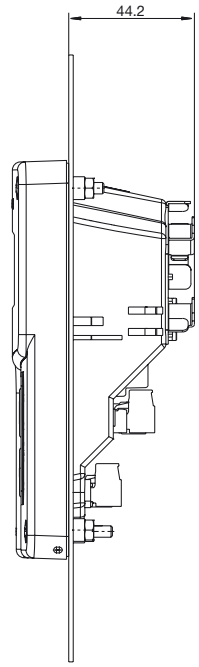


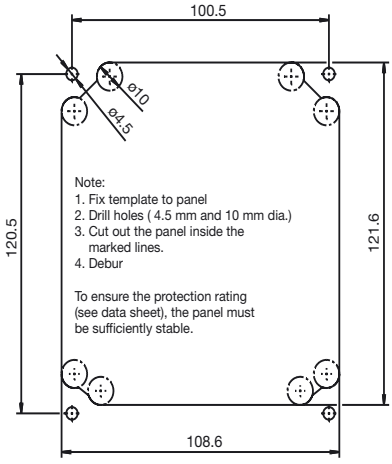






Panel-mounting/drilling diagram





Note:
The drilling template is shown in its actual size in the Operating Instructions B 20.2565.0.

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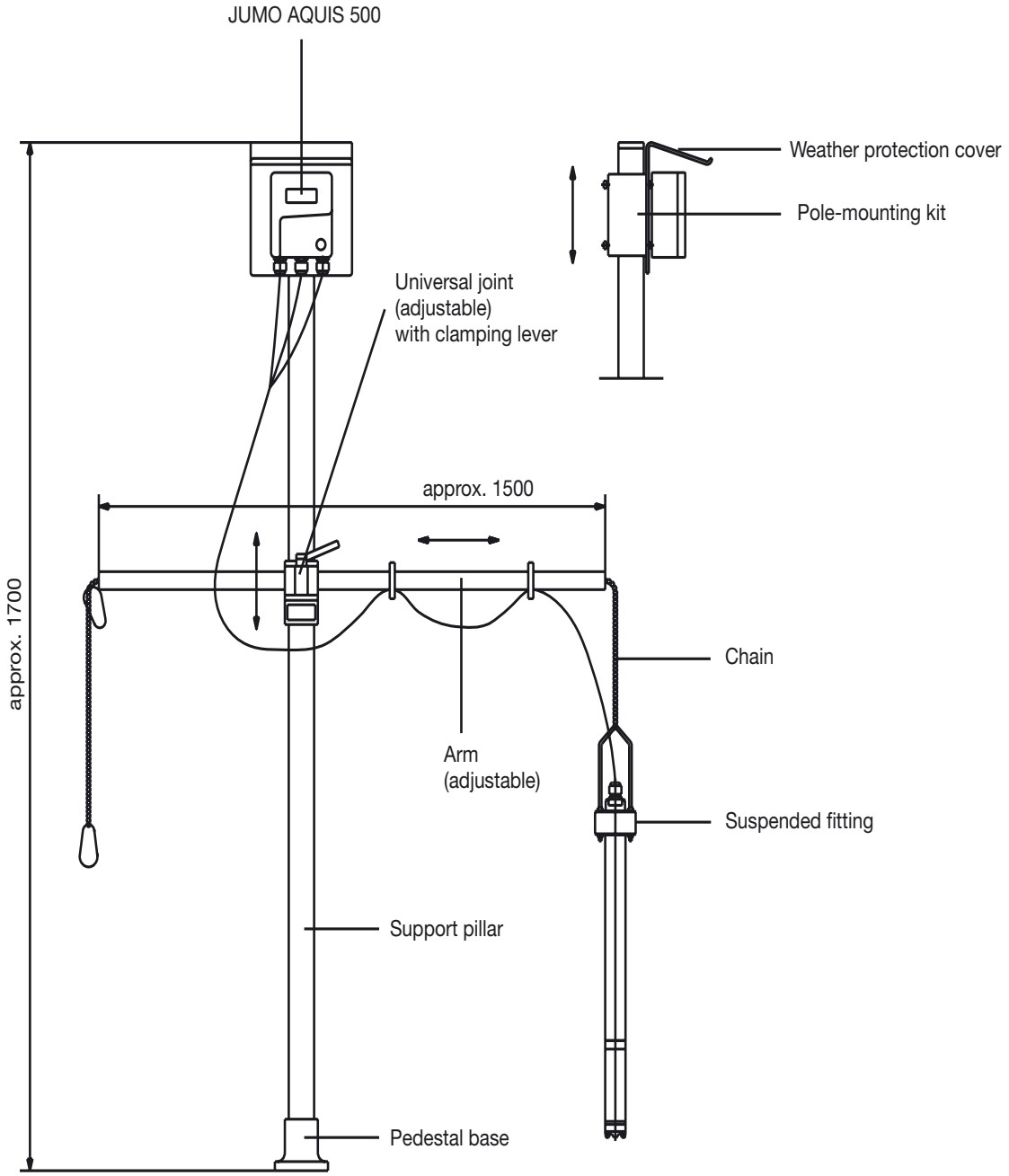
Accessories



[1] The suspended fitting consists of a fixing 20/00453191 (see accessories) and a cell with a suitable fitting (see data sheet 20.2922, for example).

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Order details: JUMO AQUIS 500 CR

(1) Basic type
202565 JUMO AQUIS 500 CR
Transmitter/controller for conductivity, TDS, resistivity and temperature

(2) Basic type extensions
10 for panel mounting
20 in wall-mounting housing

(3) Output 1
000 no output
888 analog output 0(4) — 20 mA or 0 — 10 V

(4) Output 2
000 no output
888 analog output 0(4) — 20 mA or 0 — 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
23 110 — 230 V AC + 10% / -15%, 48 — 63 Hz
25 20 — 30 V AC/DC, 48 — 63 Hz[1]
30 12 — 24 V DC ± 15%[1]

(8) Extra codes
000 none

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
Order code		/		-		-		-		/		-		/		, ...[2]
Order example	202565	/	20	-	888	-	000	-	310	/	000	-	23	/	000	

Stock items (shipment: 3 working days after receipt of order)

Type	Sales No.
202565/20-888-888-310-310-23/000	20/00480055
202565/20-888-000-310-000-23/000	20/00480054

Production items (shipment: 10 days after receipt of order)

Type	Sales No.
202565/10-888-888-310-310-23/000	20/00480053
202565/10-888-000-310-000-23/000	20/00480052
202565/10-888-888-310-310-25/000[1]	20/00484566

Accessories (shipment: 10 days after receipt of order)

Type	Sales No.
Protection cover for JUMO AQUIS 500 [3]	20/00398161
Pole-mounting kit for JUMO AQUIS 500 [4]	20/00483664
Support pillar with pedestal base, arm and chain	20/00398163
PC setup software	20/00483602
PC interface cable including USB/TTL converter and adapter (USB connection cable)	70/00456352
Fixing for suspended fitting	20/00453191

[1] Can be supplied from about the 3rd quarter of 2007.
[2] List extra codes in sequence, separated by commas.
[3] The pole-mounting kit is needed for mounting the protection cover.
[4] Using the pole-mounting kit, the JUMO AQUIS 500 can be fitted to a pole (e. g. support pillar or railing).

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JUMO dTRANS O2 01
Two-wire Transmitter for dissolved oxygen (DO)

with optional terminal box or operating unit

Type 202610

Two-wire transmitter
JUMO dTRANS O2 01

Optional operating unit

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 — 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 — 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 95.6024.
The JUMO dTRANS Az 01 (Data Sheet 20.2550), with bezel size 96 x 48mm, 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 95.6024. 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 — 20 mA) for temperature, and two freely programmable relays for alarm functions and limit control. This version features a backlit display.

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

Accessories available

- Setup software
- PC interface cable
- Replacement sensor modules (set)
- Fittings

Technical data

General

Supply
Basic version Type 202610/80 and
Standard version Type 202610/81
19 — 31 V DC; nominal 24 V DC

Maximum version Type 202610/82
110 — 240 V AC +10%/-15%, 48 — 63Hz
or 20 — 30 V AC/DC, 48 — 63Hz

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 61 326

Oxygen transmitter

Range
0 — 2 to 0 — 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 — 1500 hPa (mbar) or
indirect via height a.m.s.l.:
0 — 3000 m

Salinity (salt content compensation)
0 — 40 g/kg

Output signal
4 — 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 60 529

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 60 529

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:
≤ 500 Ω

Display resolution
0.01 mg/l and 0.1%;
0.1 °C

Temperature measurement

Range
0 — 50°C (fixed)

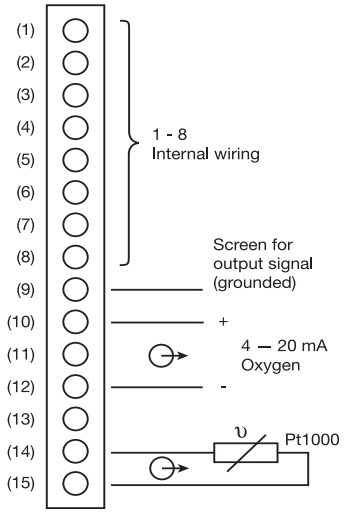
Accuracy
Basic version
Type 202610/80-500-2000-08-28
Sensor: Pt1000, Class B
Display: n/a
Output signal: n/a

Standard version
Type 202610/81-500-2000-08-28
Sensor: Pt1000, Class B
Display: 0.25% of range
Output signal: n/a

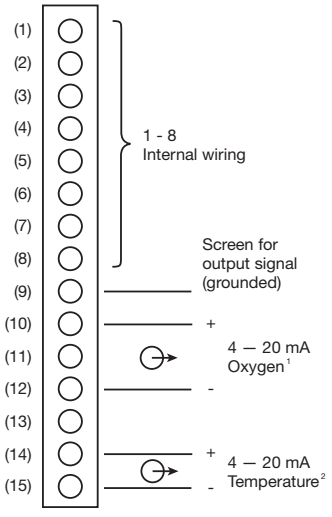
Standard version
Type 202610/81-405-2000-08-28
Display: 0.25% of range
Output signal: 1% of range

Maximum version
Type 202610/82-006-2000-08-23
Display: 0.25% of range
Output signal: 1% of range

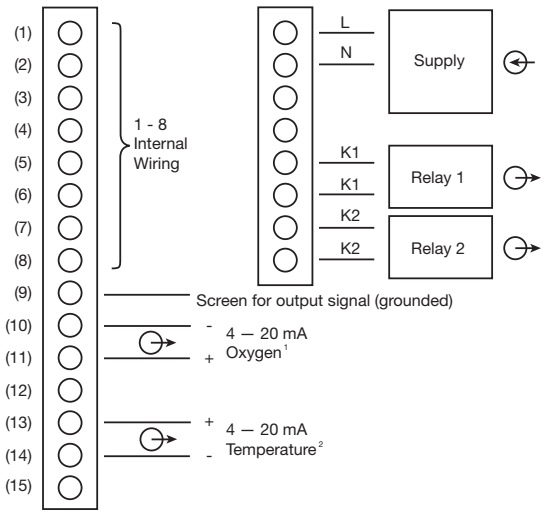
Electrical connection



Type 202610/80-500-2000-08-28
Type 202610/81-500-2000-08-28



Type 202610/81-405-2000-08-28

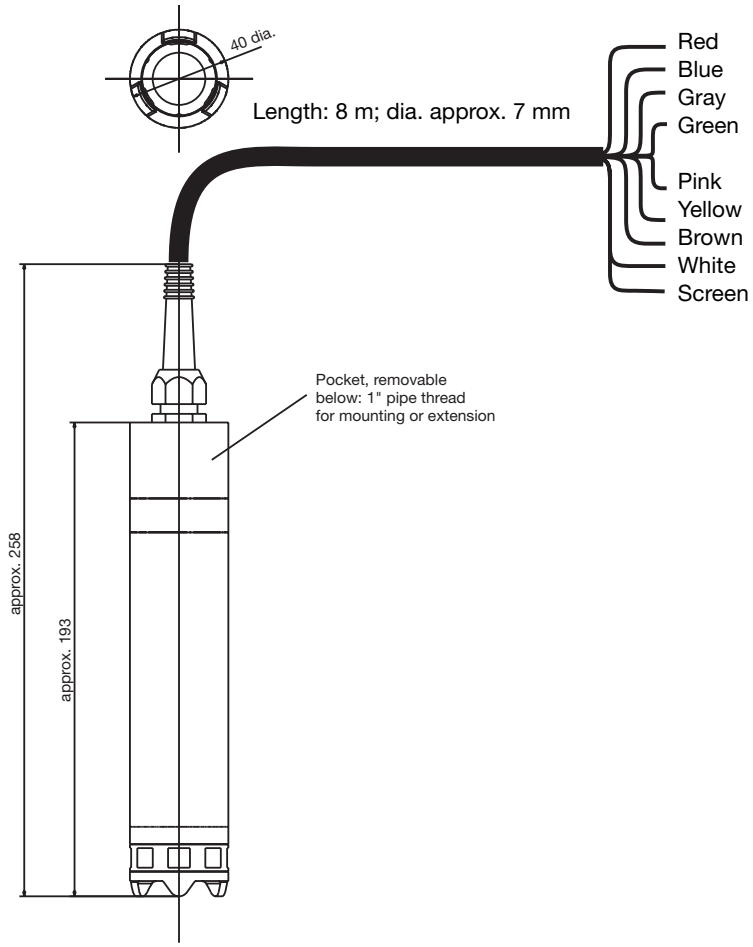


Type 202610/82-006-2000-08-23
Type 202610/82-006-2000-08-25

[1] freely scalable
[2] fixed setting: 10 to 50°C corresponding to 4 - 20 mA

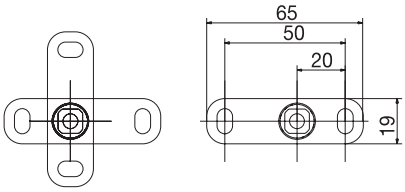
Dimensions

Oxygen transmitter



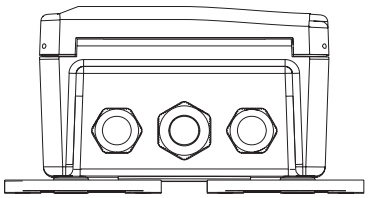
Color	Terminal in box	Signal
Pink	1	RXD
Green	2	GND
Yellow	3	TXD
White	4	b Pt1000
Brown	5	a Pt1000
Red	6	+e / -I
Blue	7	-e / +I
Screen	8	
Gray	11	CAL / NC

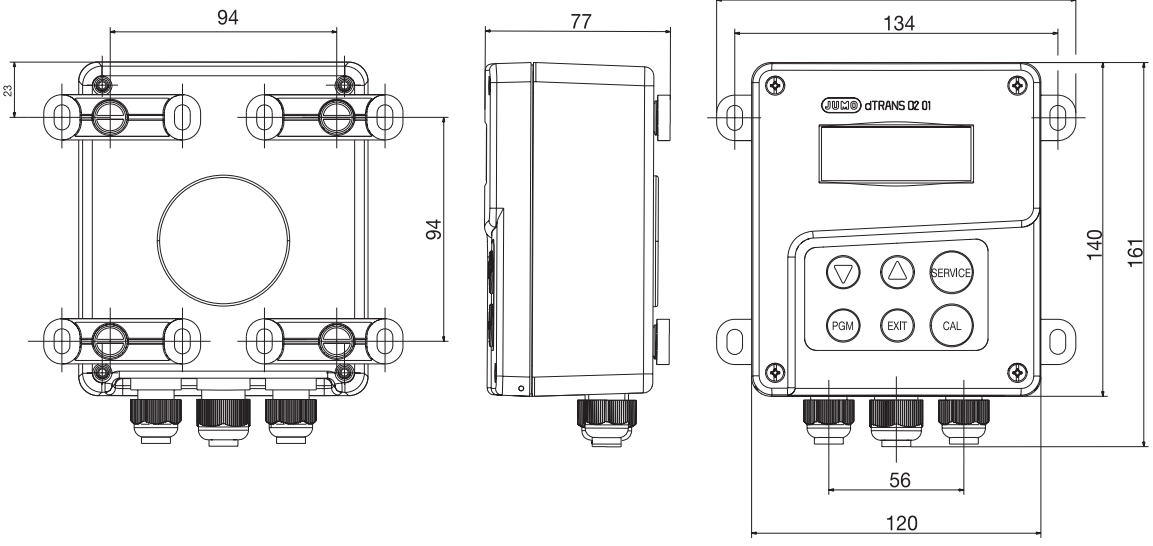
Terminal box or operating unit



Fixing brackets
(standard accessory)

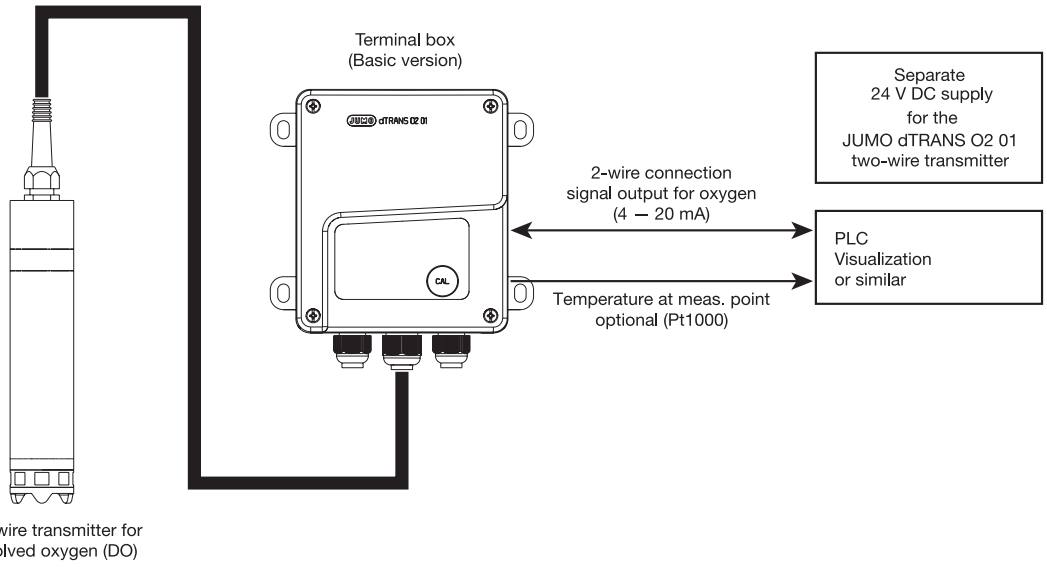
The fixing brackets can be mounted in 2 positions.
For wall mounting, laterally or above/below the terminal box or operating unit.



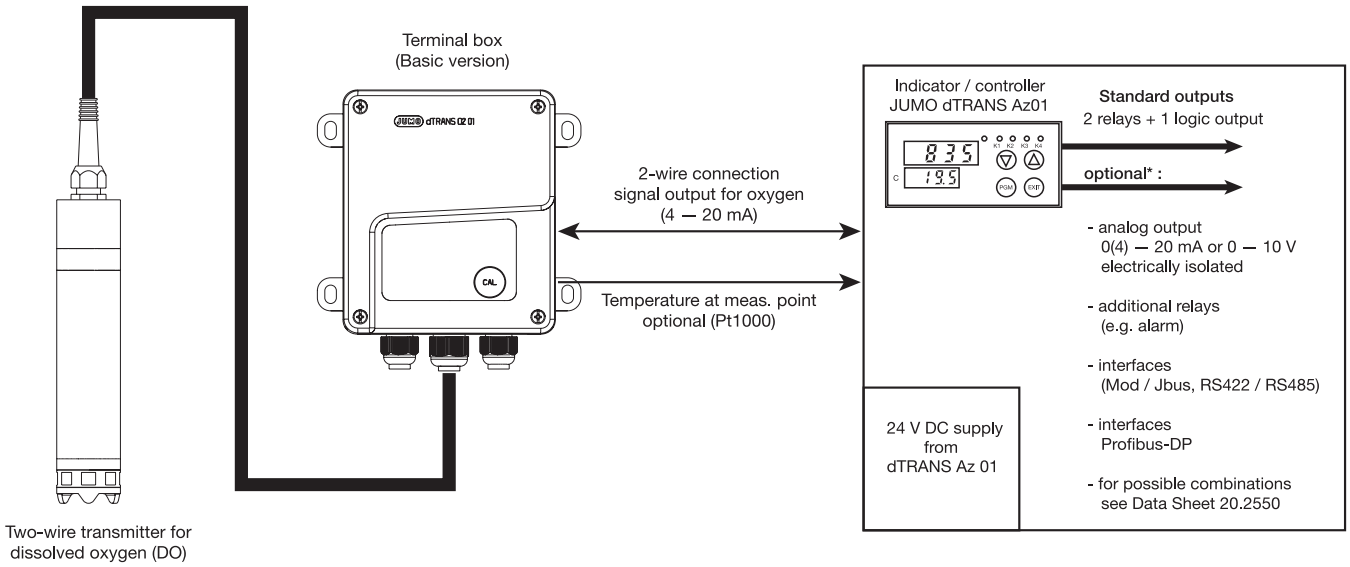


Connection examples

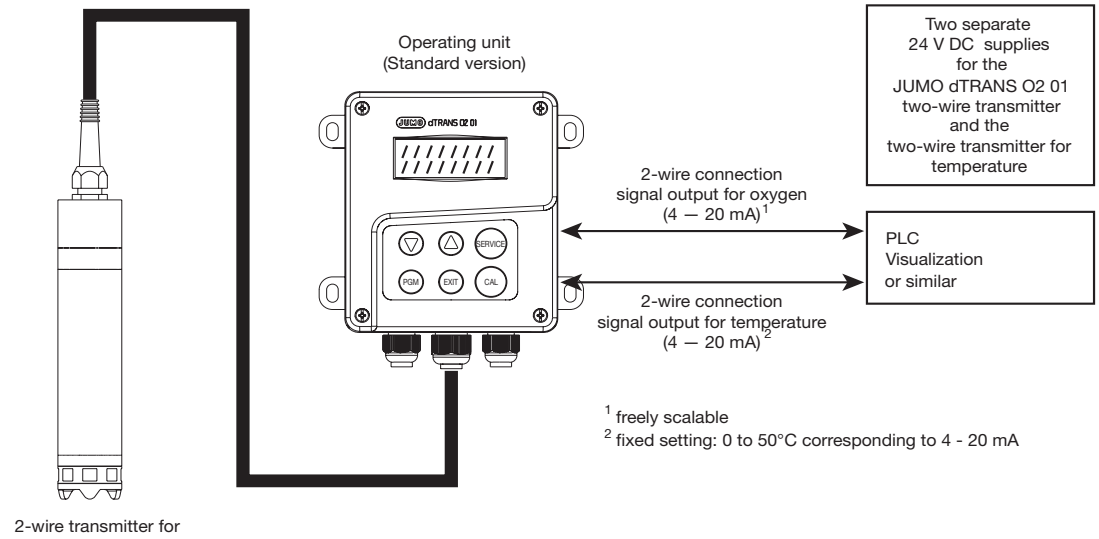
Basic version 202610/80-500-2000-08-28 with terminal box



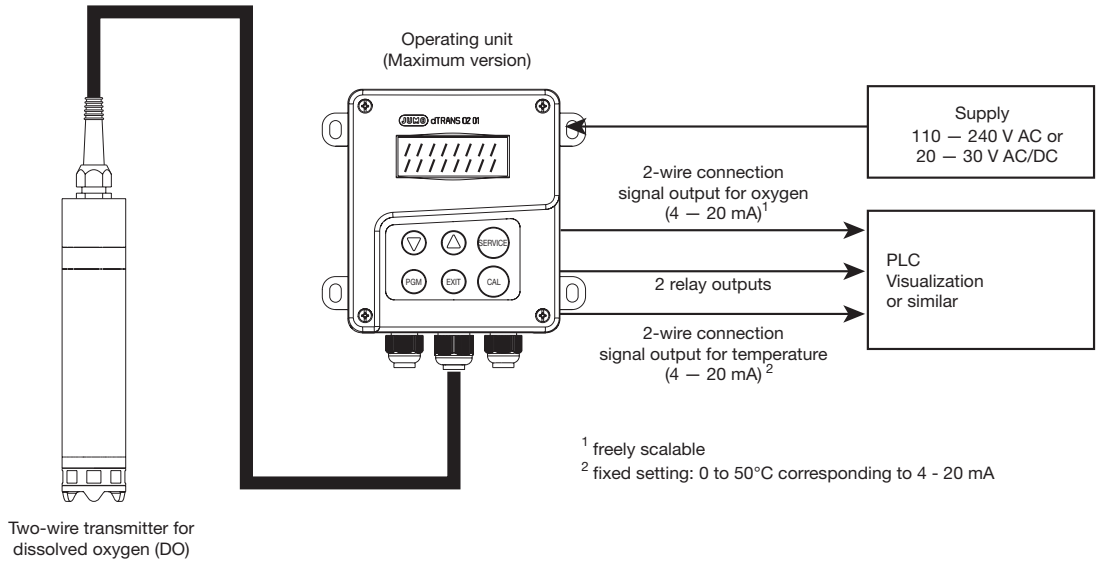
Basic version 202610/80-500-2000-08-28 with terminal box and JUMO dTRANS Az 01



Standard version 202610/81-405-2000-08-28 with operating unit



Maximum version 202610/82-006-2000-08-23 with operating unit



[1] freely scalable
[2] fixed setting: 0 to 50°C corresponding to 4 - 20 mA

Accessories

Flow-through fittings

Brief description
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.

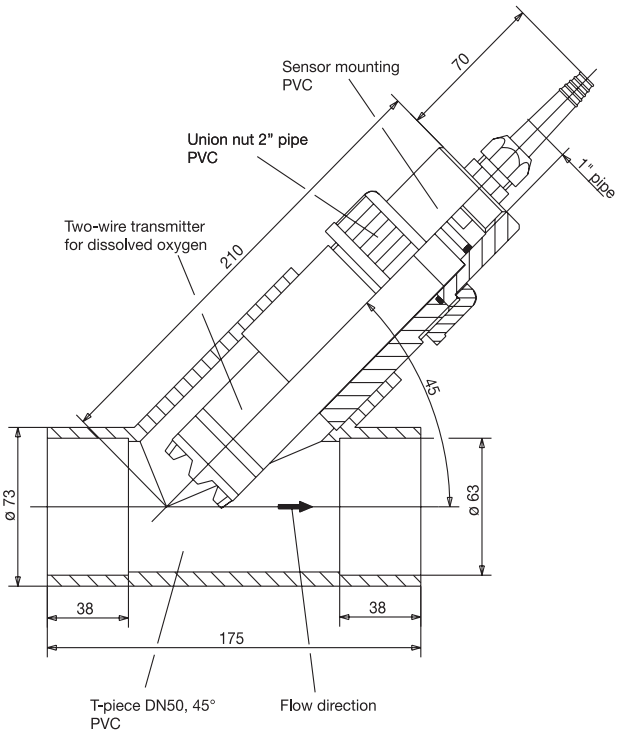
The following points should be noted when planning the pipework layout:

– The fitting must be readily accessible, to allow regular maintenance and cleaning of the transmitter or the fitting itself.

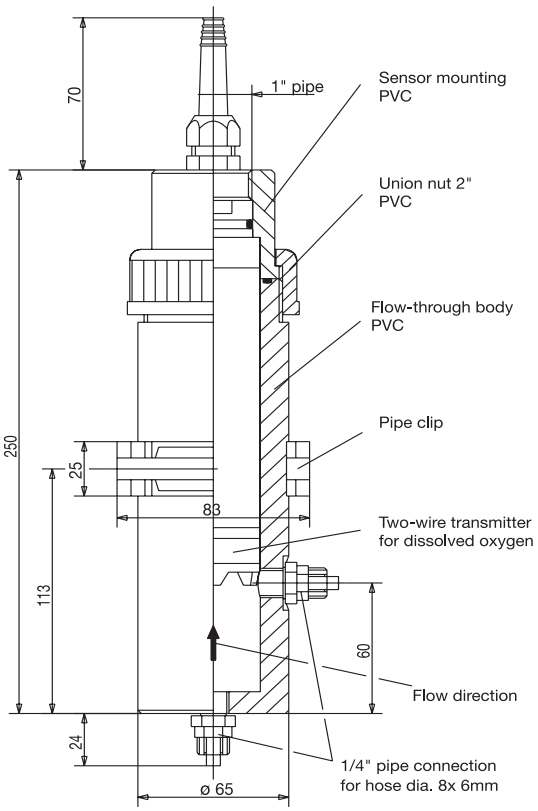
– Bypass measurements are recommended. Shut-off valves should be provided so that the transmitter can be removed.

– 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°
Sales No.	20/00398137



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 x 6 mm dia.)
Sales No.	20/00398142

Immersion fittings

Brief description

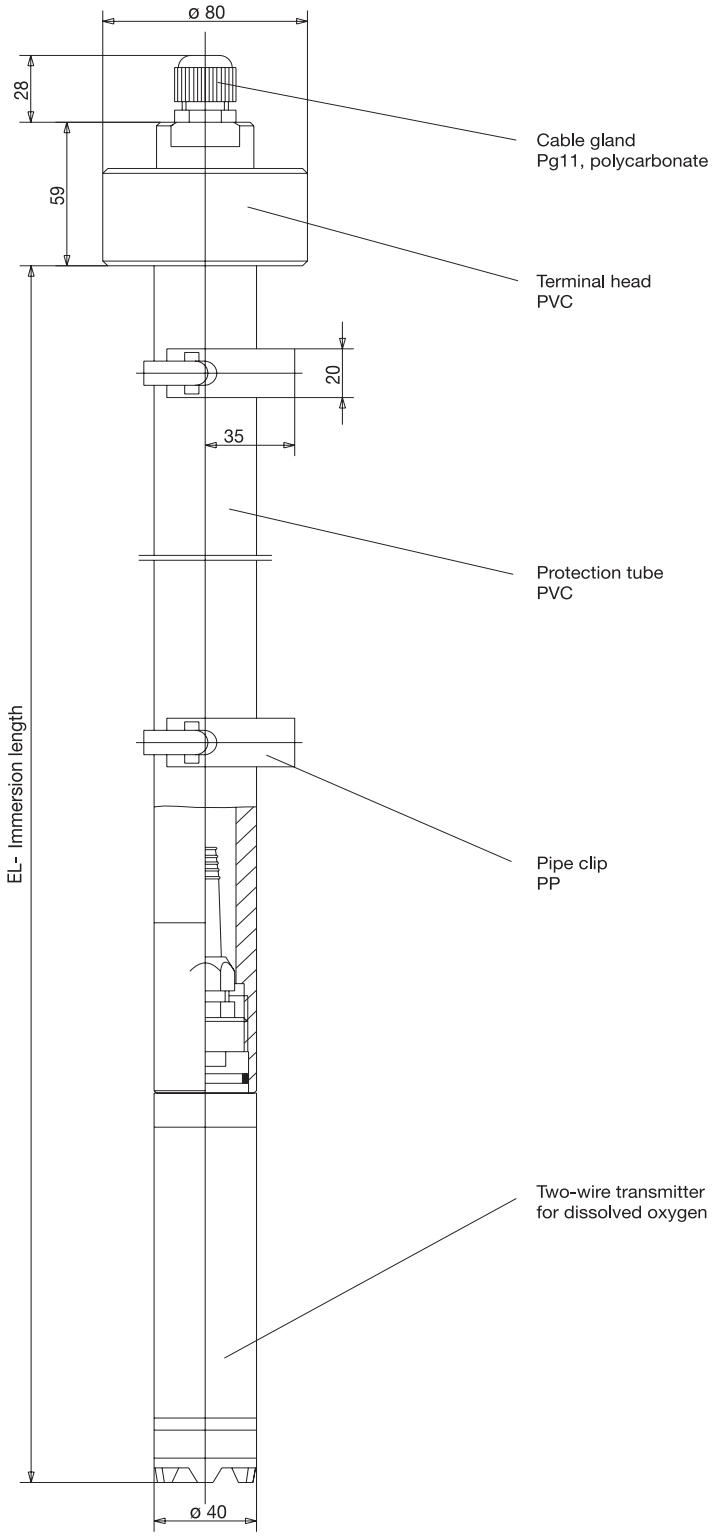
The dTRANS O2 01 oxygen transmitter can be mounted in immersion fittings. The fittings are installed in open containers or sluices using the pipe clips supplied. Different immersion depths are facilitated by various immersion lengths.

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 60 529
Immersion length	500 mm
Sales No.	20/00398131
Immersion length	1500 mm
Sales No.	20/00398135



Suspension fittings

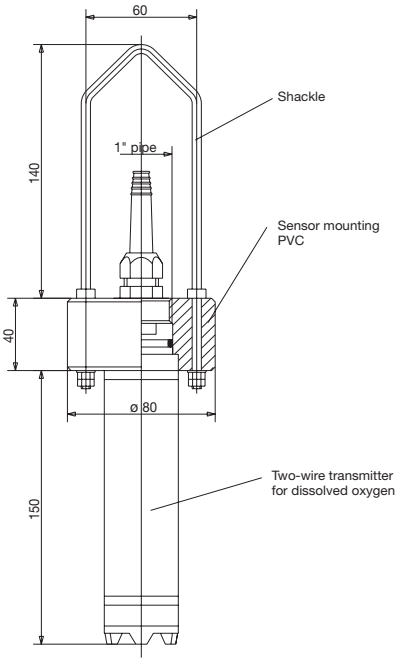
Brief description

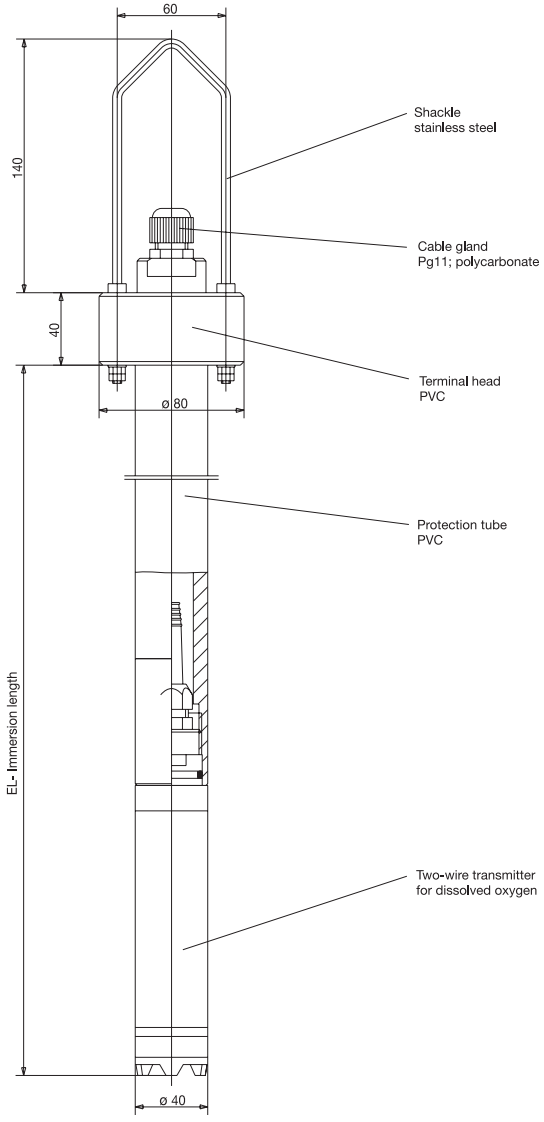
The dTRANS O2 01 oxygen transmitter can be mounted in suspension fittings. The fittings are used primarily for measurement in open vessels. The fitting can be positioned far from the edge of the vessel, suspended from a chain by the shackle, for example. Different immersion depths are facilitated by 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	
Material	immersion tube PVC shackle stainless steel
Permissible temperature	+5 to +50°C
Safe pressure	up to 1 bar
Cable gland	Pg11
Protection	IP65 EN 60 529
Immersion length	150 mm
Sales No.	20/00398148
Immersion length	500 mm
Sales No.	20/00398143
Immersion length	1500 mm
Sales No.	20/00398144





Float fittings

Brief description

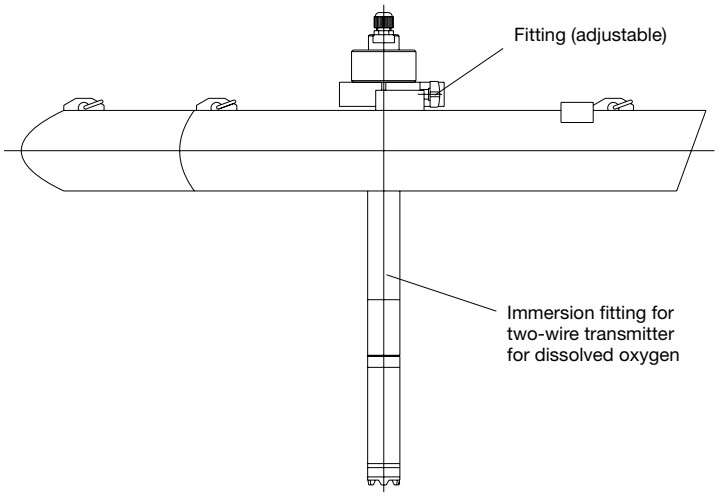
Float fittings are used to mount an immersion fitting in which a dTRANS O2 01 oxygen transmitter is installed. The fittings are used primarily for measurement in open vessels or watercourses. Different immersion depths are facilitated by various support tube lengths of the immersion fitting.

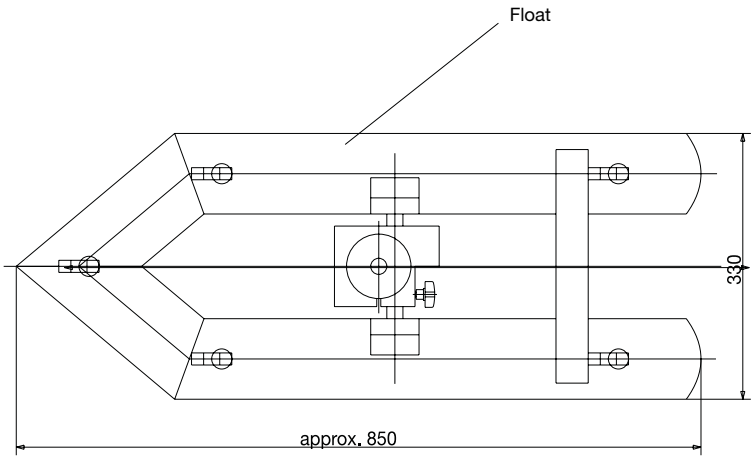
The following points should be noted at the design stage:

- 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 watercourse 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.

Float fitting	
Material	PVC
Permissible temperature	+5 to +50°C
Fitting mounting	40 mm
Sales No.	20/00397483

Suitable immersion fitting	
Immersion length	500 mm
Sales No.	20/00398131
Immersion length	1500 mm
Sales No.	20/00398135





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.

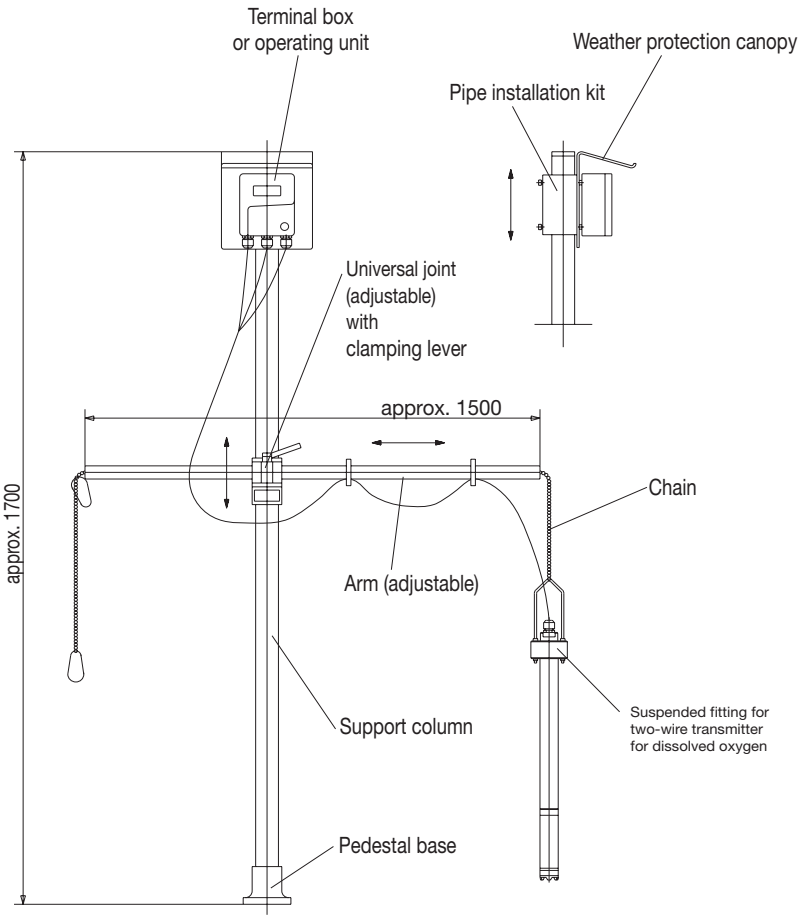
The weather protection canopy protects the terminal box or operating unit against the effects of the weather.

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	
Material	
Column	stainless steel
Pedestal base	die-cast aluminum
Arm	stainless steel
Chain	stainless steel
Universal joint	die-cast aluminum
Permissible temperature	-5 to +50°C
Sales No.	20/00398163

Pipe installation kit[1]	
Material	stainless steel
Sales No.	20/00398162

Weather protection canopy[2]	
Material	stainless steel
Sales No.	20/00398161

Suspension fitting	
Material	see above
Sales No.	20/00398143 or 20/00398144

[1] Using the pipe installation kit, the terminal box or the operating unit can be attached to a pipe (e.g. support column or railing).

[2] The pipe installation kit is required for mounting the weather protection canopy

.

Order details

				(1)	**Basic type**
			202610		Two-wire transmitter for dissolved oxygen (DO)
				(2)	**Basic type extensions**
			80		Basic version[1]
			81		Standard version[1]
			82		Maximum version[1]
				(3)	**Output (of additional temperature output)**
		X	006		4 — 20 mA (internal supply)
	X		405		4 — 20 mA (external supply)
X	X		500		Resistance output Pt1000
				(4)	**Range for oxygen**
X	X	X	2000		0 — 20 mg/l (programmable)
				(5)	**Cable length**
X	X	X	08		8 m
				(6)	**Supply**
		X	23		110 — 240 V AC +10% / -15%, 48 — 63 Hz
		X	25		20 — 53 V AC/DC, 48 — 63 Hz
X	X		28		19 — 31 V DC (2-wire transmitter)
				(7)	**Language**
	X	X	1		German (standard)
	X	X	2		English
	X	X	3		French
	X	X	4		Spanish

X = combination is possible

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code	202610	/	..	-		-	2000	-	08	-		-	
Order example	202610	/	81	-	500	-	2000	-	08	-	28	-	1

[1] Special version: if significant contamination is to be expected, the protective basket of the oxygen transmitter can be delivered equipped with a protective membrane. However, this membrane will delay the sensor response.

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 ex-stock

Type	Sales No.
202610/80-500-2000-08-28-1 (operator language: German)	20/00391336
202610/81-405-2000-08-28-1 (operator language: German)	20/00391357
202610/82-006-2000-08-23-1 (operator language: German)	20/00391358

Not available ex-stock

Type	Sales No.
202610/82-006-2000-08-25-1 (operator language: German)	20/00393328
202610/82-006-2000-08-23-2 (operator language: English)	20/00406637
202610/82-006-2000-08-28-2 (operator language: English)	20/00409019
202610/82-006-2000-15-23-2 (operator language: English)	20/00427326
202610/80-500-2000-08-28-3 (operator language: French)	20/00439521
202610/81-405-2000-08-28-3 (operator language: French)	20/00439522
202610/82-006-2000-08-23-3 (operator language: French)	20/00439523
202610/81-405-2000-08-28-4 (operator language: Spanish)	20/00437029
202610/82-006-2000-08-23-4 (operator language: Spanish)	20/00436038

Optional accessories available ex-stock

Description	Sales No.
Flow-through fitting, angled seat	20/00398137
Flow-through fitting, hose connection	20/00398142
Immersion fitting, immersion tube length 500 mm	20/00398131
Immersion fitting, immersion tube length 1500 mm	20/00398135
Suspension fitting, immersion tube length 150 mm	20/00398148
Suspension fitting, immersion tube length 500 mm	20/00398143
Suspension fitting, immersion tube length 1500 mm	20/00398144
Float fitting	20/00397483
Support column with pedestal base, arm and chain	20/00398163
Weather protection canopy for terminal box or operating unit[3]	20/00398161
Pipe installation kit for terminal box or operating unit[4]	20/00398162
Set of replacement sensor modules (2 items + Operating Instructions)	20/00393329
Setup program with adapter for dTRANS O2 01	20/00394728
PC interface cable with TTL / RS232 converter	95/00301315

[3] The pipe installation kit is necessary for mounting the weather protection canopy.
[4] 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).

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Measuring Cells for free chlorine, chlorine dioxide, ozone

Type 202630/40, Type 202630/41, Type 202630/45, Type 202630/46, Type 202630/50, Type 202630/51

- 2- or 3-electrode principle
- easy calibration
- integrated temperature compensation
- proven measuring system

Type 202630/40-...

Brief description

These membrane-covered, amperometric measuring cells are used to determine the concentration of free chlorine, chlorine dioxide or ozone in aqueous solutions (e.g. in drinking or pool water as well as in service, process or cooling water).

The cell for free chlorine can be applied to determine the following anorganic chlorination agents: chlorine gas (Cl2), electrolytically produced chlorine, sodium hypochlorite (NaOCl, chlorine bleach), calcium hypochlorite (Ca(OCl)2) or chlorinated lime (Ca(OCl)Cl).

The cell for chlorine dioxide is available for measuring chlorine dioxide in chlorite/chlorine and chlorite/hydrochloric acid plants.

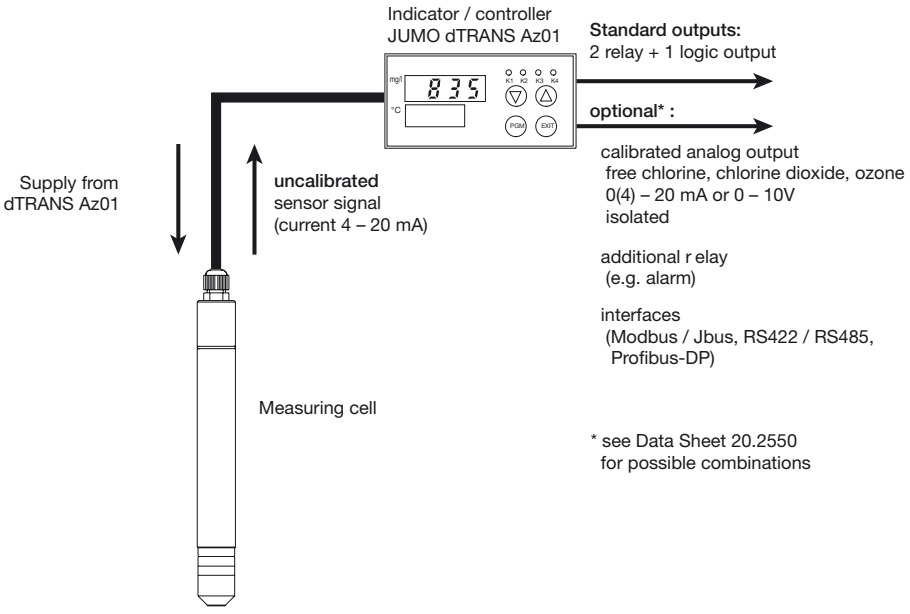
And, by using the cell for ozone, it is also possible to measure electrolytically produced ozone, for example.

The integral electronics of the cells provides a temperature-compensated 4 — 20 mA current signal. Calibration is performed through a connected instrument (indicator, controller, recorder, PLC, etc.).

The measuring cells can be directly connected to a suitable indicator/control instrument.

The JUMO dTRANS Az 01 indicator/controller (Data Sheet 20.2550) lends itself ideally to being combined with measuring cells. It provides the necessary voltage for the cell and enables simple calibration of the measuring system.

Operation



Notes

- Measurement can only be performed in a suitable flow-through fitting (see accessories).
- For proper operation, the incident flow of the sample liquid on the cell must be at least 15 cm/sec (0.5 liters/min). This minimum incident flow velocity can be assured through the JUMO flow monitoring assembly (see accessories), consisting of a flow monitor and a suitable fitting.
- In the case of cells with a hydrophobic membrane, the sample liquid must not contain any tensides (as contained in detergents, cleaning agents and disinfectants).
- Cells with a membrane that is insensitive to chemicals and tensides can also be used in polluted water that is not of drinking or swimming pool water quality. (These cells are only available for ClO_2 and O_3, but **not** for free chlorine).
- In the case of cells with a hydrophilic membrane, it must be checked for each individual application whether the presence of tensides will noticeably shorten the operational life of the cell. However, also in this case, the water should have a quality similar to drinking or swimming pool water.
- A test set is required for calibration, to determine the concentration of free chlorine, chlorine dioxide or ozone according to the DPD method. Suitable photometric/colorimetric test sets are on the market (e.g. Spectroquant or Microquant chlorine tests from Merck).

- To ensure a fault-free sensor performance, only one disinfectant at a time should be used.
- In the cell for free chlorine (Type 202630/40), the pH value must be kept constant after calibration of the cell (ΔpH < 0.05). If this is not possible, then either the compensation is calculated within the range 6.5 to 8.5 pH using the JUMO LOGOSCREEN AQUA 500, or the cell for free chlorine with reduced pH dependence (Type 202630/41) must be employed.
- The output signal of the cell for free chlorine with reduced pH dependence (Type 202630/41) does not depend on the pH value within the range pH 5 to 7. Outside this range, the pH dependence is reduced (see Technical data).
- If the cell for free chlorine with reduced pH dependence (Type 202630/41) is to function properly, the sample liquid must have a conductivity of at least 10 μS/cm.
- The cell for free chlorine (Type 202630/40) is not suitable for determining organic chlorination agents (e.g. products based on cyanuric acid). This application is covered by the cell for free chlorine with reduced pH dependence (Type 202630/41).
- Further informationen about the construction and application of amperometric sensors can be found in our publication “Information on the amperometric measurement of free chlorine, chlorine dioxide and ozone in water”.

Technical data

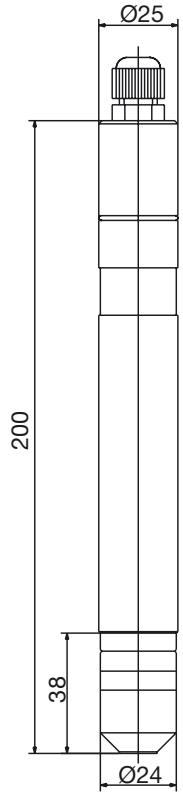
Analyte	**Free chlorine**		**Chlorine dioxide (ClO_2)**		**Ozone (O3)**	
Membrane type	hydrophobic PTFE membrane	hydrophilic membrane	hydrophobic PTFE membrane	membrane insensitive to chemicals and tensides	hydrophobic PTFE membrane	membrane insensitive to chemicals and tensides
	Type 202630/40	Type 202630/41	Type 202630/45	Type 202630/46	Type 202630/50	Type 202630/51
Meaurement cable connection	2-pole terminal, Pg7 gland in polyamide core cross-section 2 x 0.25 mm^2, cable diameter approx. 4 mm					
Supply	U_B 12 to 30 V DC (isolation is recommended)					
Output signal	4 —20 mA					
Burden	$\leq \frac{U_B - 11\ V}{0.02\ A}$					
Settling time	approx. 30 min					
Incident flow velocity	approx. 15 cm/sec If the cell is installed in the JUMO flow-through fitting Type 202810/72-102-86-80-55, this corresponds to a flow-through rate of approx. 30 liters/hr					
Measurement ranges (other ranges on request)	0 — 0.5 mg/liter or 0 — 2.0 mg/liter (ppm)	0 — 2.0 mg/liter (ppm)				
Resolution	0.001 mg/liter, for the 0 — 0.5 mg/liter range 0.01 mg/liter, for the 0 — 2.0 mg/liter range					
Measurement accuracy	$\pm$ 2% of indicated value					
Signal stability / loss of slope	< 1% per month	< 3% per month	< 1% per month			
Response time	t_{90} < 30 sec	t_{90} < 2 min	t_{90} < 15 sec			t_{90} < 1 min
Operating temperature / temp. compensation	> 0 to 45°C		> 0 to 55°C		> 0 to 45°C	> 0 to 55°C
pH application range	5.5 to 8 pH Note the effect of pH on the disinfecting properties, corrosion or dissociation curve!	4 to 12 pH	1 to 14 pH			
pH dependence (loss of slope)	with pH 8: approx. 65% with pH 9: approx. 95% with pH 10: > 99% (starting from pH 7)	within the range 5 to 7 pH: no loss of slope with pH 8: approx. 10% with pH 9: approx. 20% with pH 10: approx. 30% (starting from pH 7)	no pH dependence			
Safe pressure	1 bar Variations in pressure are not permissible for pressurized operation. We recommend unpressurized operation (atmospheric pressure)					
Material	shaft, cover, cap: PVC	shaft, cover, cap: PVC, membrane holder: st. steel	shaft, cover, cap: PVC	shaft, cover, cap: PVC, membrane holder: st. steel	shaft, cover, cap: PVC	shaft, cover, cap: PVC, membrane holder: st. steel
Dimensions	diameter: 25 mm, length: 220 mm					
Weight	approx. 125 g					

Delivery package

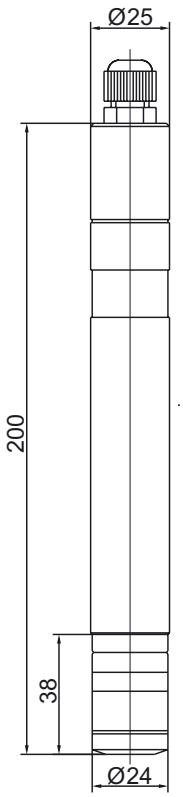
2-wire measuring cell including membrane cap, electrolyte and special abrasive paper for cleaning the cathode

Dimensions

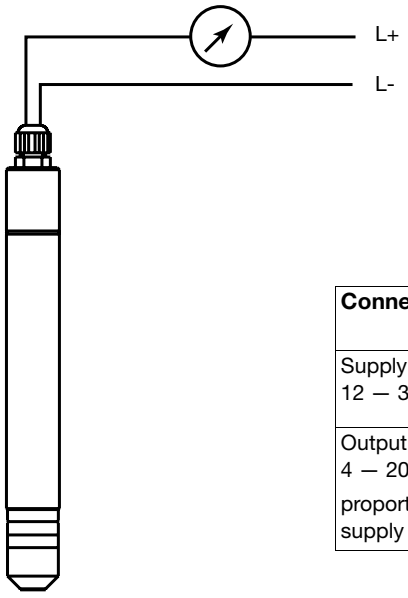
Type 202630/40, Type 202630/45, Type 202630/50



Type 202630/41, 202630/46, 202630/51



Electrical connection



Connection		Screw terminal
Supply 12 — 30 V DC		1 L+ 2 L-
Output 4 — 20 mA 2-wire proportional 4 — 20 mA current in supply		1 L+ 2 L-

Accessory (optional)

Flow-through fitting for chlorine/ chlorine dioxide or ozone cell

Type 202810/01-102-86-080-055

Sales No. 20/00392611

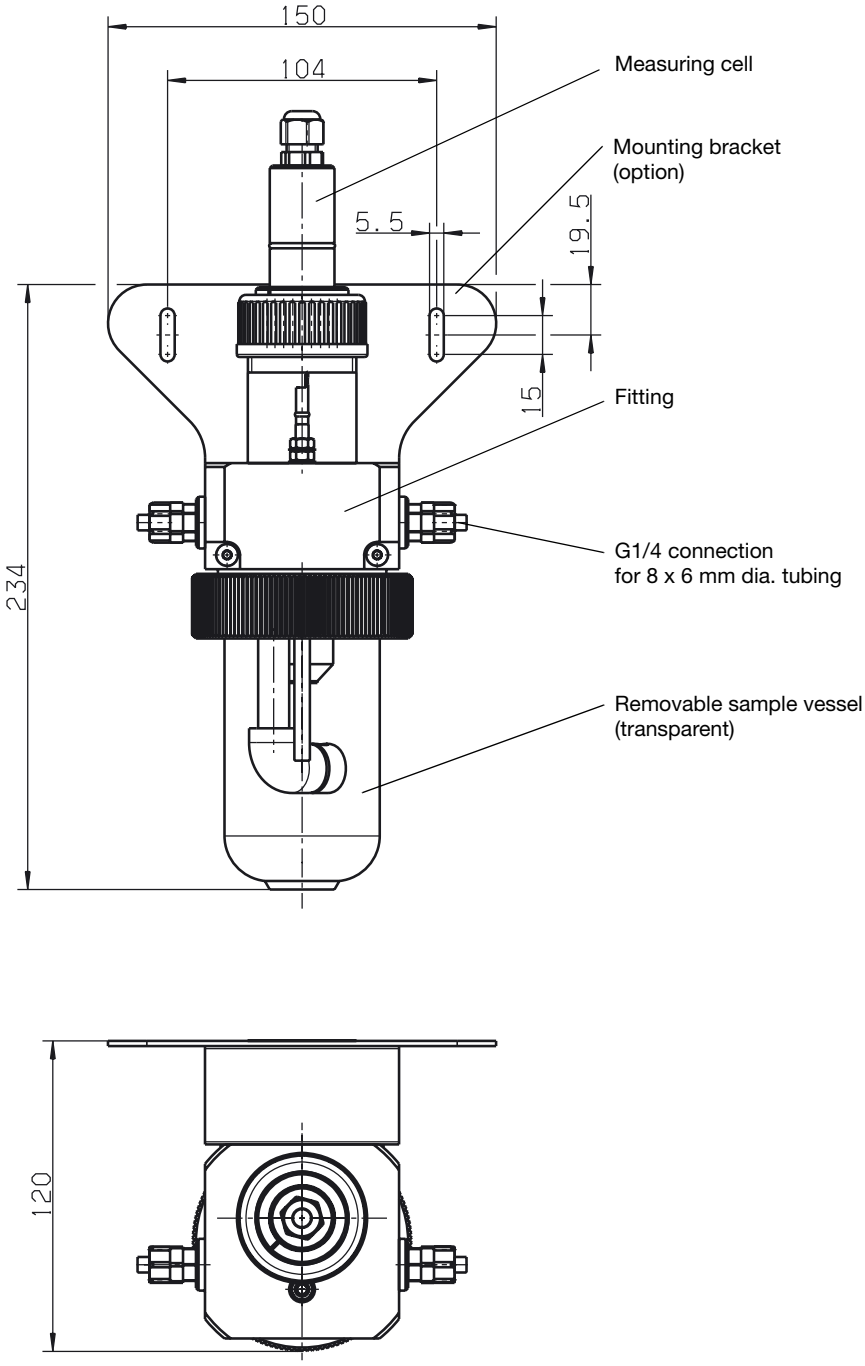
Material
housing: PVC
sample vessel: PC

Permissible temperature / pressure
>0 to +90°C; up to 1 bar

Connection

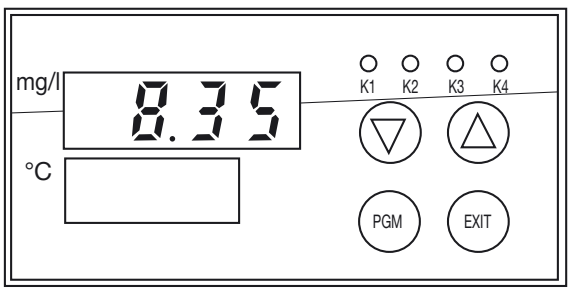
G 1/4 threaded hose connection

Fixing
option: mounting bracket in stainless steel, Mat. Ref. 1.4571



Options

JUMO dTRANS Az 01
Microprocessor indicator/controller for analytical measurement
as indicating/operating and control unit (see Data Sheet 20.2550 for details)



Flow-monitoring assembly

consisting of:

Flow monitor
Sales no. 20/00396471

and

Fitting for flow monitor
Sales no. 20/00396470

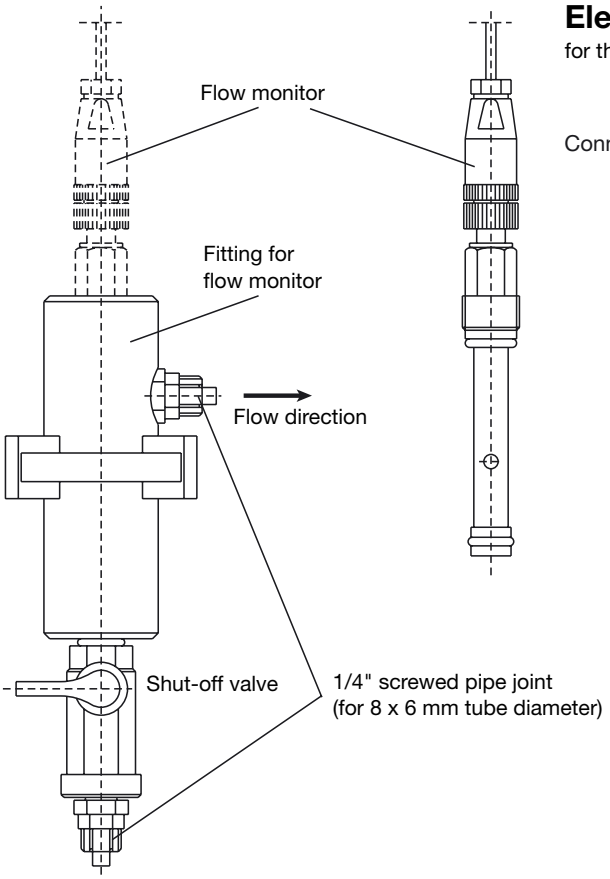
Operation:

For proper operation, the incident flow of the sample liquid on the cell must be at least 15 cm/sec.

Below this minimum incident flow velocity, the cells will indicate values that are too low. This may cause a connected control system to apply a dangerous over/underdose. Above this minimum, the measurement signal will only be slightly affected by the incident flow velocity.

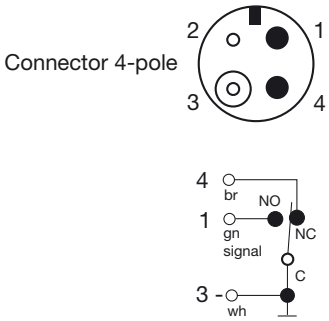
The minimum incident flow velocity of 15 cm/sec can be monitored by means of the flow monitoring assembly.

The flow monitoring assembly consists of a flow monitor and the appropriate fitting. It is installed in line with the flow-through fitting. On reaching or exceeding the minimum incident flow velocity, a contact in the terminal head of the flow monitor will switch. This contact can then be used to operate, for instance, one logic input of the JUMO dTRANS Az 01 (microprocessor indicator/ controller for analytical measurement). With insufficient incident flow, the JUMO dTRANS Az 01 is set to “HOLD”, thereby avoiding an incorrect dosage.



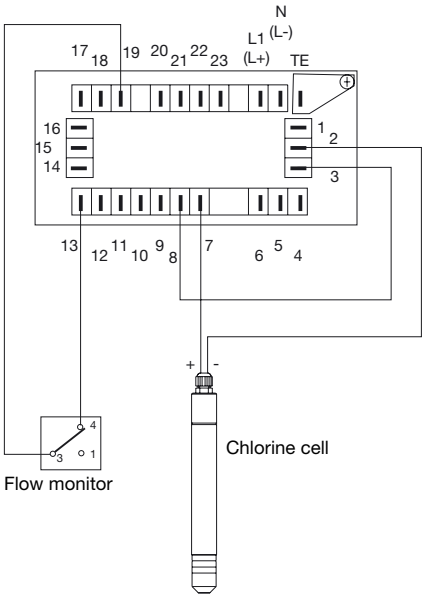
Electrical connection

for the flow monitor



Application example

Connection example of cell and flow monitor to the JUMO dTRANS Az 01 (microprocessor indicator / controller for analytical measurement)



Terminal assignment of the dTRANS Az01

Terminal	Connection
2 + 3 -	Supply for 2-wire transmitter 18 V DC
7 - 8 +	Standard signal input 4 — 20 mA
13 19	Logic input 1 (e.g. for flow monitoring)

Operation
Above a flow velocity of 15 cm/sec, the contact (3+4) of the flow monitor is opened. When the contact (3+4) is closed and the logic input 1 or 2 of the JUMO dTRANS Az 01 is wired up and configured correspondingly, the instrument goes into “HOLD”. This avoids incorrect dosing as a result of an insufficient incident flow on the cell.

Order details

							(1)	Basic type
						202630		Measuring cell
							(2)	Basic type extensions
						40		for free chlorine
						41		for free chlorine (reduced pH dependence)
						45		for chlorine dioxide
						46		for chlorine dioxide (insensitive to chemicals and tensides)
						50		for ozone
						51		for ozone (insensitive to chemicals and tensides)
							(3)	Range
x		o		o		10		0.000 — 0.500 mg/liter (ppm)
o						15		0.00 — 1.00 mg/liter (ppm)
x	o	o	o	o	o	20		0.00 — 2.00 mg/liter (ppm)
o	o					25		0.00 — 5.00 mg/liter (ppm)
o		o		o		35		0.00 — 10.00 mg/liter (ppm)

x = fitted as standard
o = available as an option

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

Note:

The type code is a type designation, not a modular system.
When ordering, please make a selection from the listed “Stock versions” or “Production versions” wherever possible.
Any other freely chosen combination of individual features must be technically checked and approved by us.
In case of doubt, please ask.

Stock versions (shipment: 3 working days after receipt of order)

Type	Sales No.
Measuring cell for free chlorine, Type 202630/40-10/000	20/00391395
Measuring cell for free chlorine, Type 202630/40-20/000	20/00391396
Flow-through fitting, Type 202810/01-102/86/080/055	20/00392611

Production versions (shipment: 10 working days after receipt of order)

Type	Sales No.
Measuring cell for chlorine dioxide, Type 202630/45-20/000	20/00392199
Measuring cell for chlorine dioxide, Type 202630/45-35/000	20/00443713
Measuring cell for chlorine dioxide (insensitive to chemicals and tensides), Type 202630/46-20/000	20/00441317
Measuring cell for ozone, Type 202630/50-20/000	20/00392202
Measuring cell for ozone, Type 202630/50-35/000	20/00398169
Measuring cell for ozone (insensitive to chemicals and tensides), Type 202630/51-20/000	20/00441319
Measuring cell for free chlorine, Type 202630/40-25/000	20/00401586
Measuring cell for free chlorine, Type 202630/40-35/000	20/00452993
Measuring cell for free chlorine (reduced pH dependence), Type 202630/41-20/000	20/00392574
Measuring cell for free chlorine (reduced pH dependence), Type 202630/41-25/000	20/00428275
Suitable indicator/controller: JUMO dTRANS Az 01, Type: 202550/10-665-888-140-23-00/000 (see Data and Price Sheets 20.2550 for additional models)	20/00392573

Accessories (shipment: 10 working days after receipt of order)

Designation	Sales No.
Spare set for chlorine / chlorine dioxide / ozone (1 x membrane cap, fine abrasive paper)	20/00392331
Spare set for chlorine (reduced pH dependence) (1 x special membrane cap, G-holder, fine abrasive paper)	20/00402292
Spare set for chlorine dioxide, insensitive to chemicals and tensides (1 x membrane cap, fine abrasive paper)	20/00409344
Spare set for ozone, insensitive to chemicals and tensides (1 x membrane cap, fine abrasive paper)	20/00441309
Special electrolyte for chlorine 100 ml	20/00438122
Special electrolyte for chlorine 100 ml (reduced pH dependence)	20/00438123
Special electrolyte for chlorine dioxide 100 ml	20/00392332
Special electrolyte for chlorine dioxide 100 ml (insensitive to chemicals and tensides)	20/00441316
Special electrolyte for ozone 100 ml	20/00392333
Special electrolyte for ozone 100 ml (insensitive to chemicals and tensides)	20/00441311
Flow monitor	20/00396471
Fitting for flow monitor	20/00396470
Mounting bracket for flow-through fitting for chlorine, chlorine dioxide or ozone measuring cells	20/00455706

Measuring Cells for peracetic acid or hydrogen peroxide

Type 202630/60-...

Type 202630/55
Type 202630/60

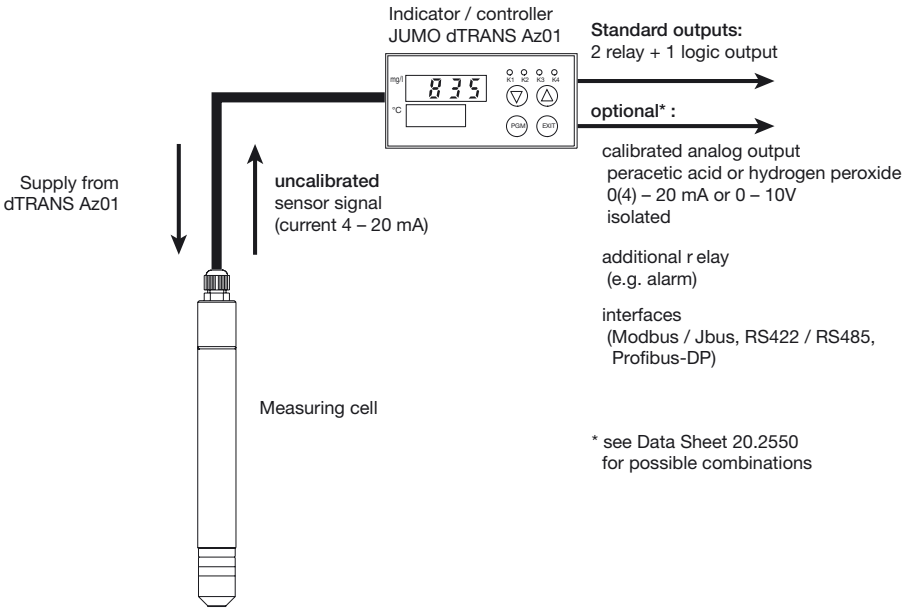
- acquisition of hydrogen peroxide or peracetic acid concentrations in mg range
- 2-electrode principle
- membrane insensitive to chemicals and tensides
- integrated temperature compensation
- easy calibration

Brief description

The type 202630/60... measuring cell is used to determine the concentration of hydrogen peroxide in aqueous solutions. The type 202630/55... cell serves to measure the concentration of peracetic acid. Typical applications are in electroplating plant, the pharmaceutical sector, food and drinks industry, dairies, swimming pools, and the chemical industry.

The cell has an elastic membrane and can be directly attached to a suitable transmitter, controller or indicator (e.g. JUMO dTRANS AZ 01 or JUMO LOGOSCREEN AQUA 500).
The cell electronics provides a standard 4 — 20 mA current signal, which is compensated for temperature.
Calibration (1-point) is performed on the connected instrument (transmitter, controller or indicator), which also supplies the power (2-wire signal).

Operation



Notes

- The measurement can only be carried out in a suitable flow-through fitting (see accessories).
- For proper operation, the incident flow of the sample liquid on the cell must be at least 15 cm/sec (0.5 liter/min). This minimum incident flow can be ensured through the JUMO flow monitoring assembly (see accessories), consisting of a flow monitor and the appropriate fitting.
- An electrolyte is required for start-up and maintenance of the sensor (see accessories).

Delivery package

2-wire measuring cell including membrane cap, electrolyte and special abrasive paper for cleaning the cathode

Technical data

Measuring cell

Measuring cable connection
2-pole terminal, Pg7 gland
core cross-section 2 x 0.25 mm^2,
cable diameter approx. 4 mm

Supply
U_B 12 to 30 V DC
(isolation is recommended)

Output signal
4 — 20 mA

Burden

$$\leq \frac{U_B - 11\ V}{0.02\ A}$$

Incident flow velocity
approx. 15 cm/sec.

When the cell is installed in the JUMO flow-through fitting type 202810/01-102-86-80-55, this corresponds to a flow rate of approx. 0.5 liter/min

Ranges
0 — 500 mg/liter to
0 — 10,000 mg/liter (ppm)
other ranges on request

Measuring accuracy
± 2% of displayed value

Response time
3 to 4 min

Operating temperatures / temperature compensation
0 to 50°C

Safe pressure
pressurized operation up to 1 bar possible

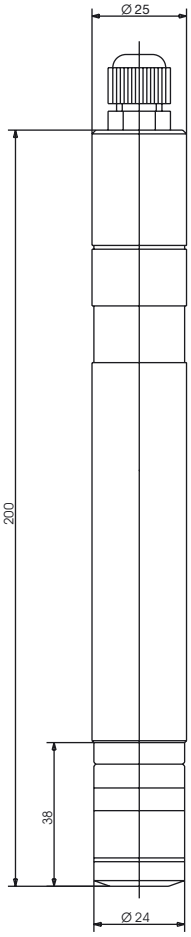
Material
shaft, cover, cap: PVC

Cell dimensions
diameter: 25 mm, length: 225 mm

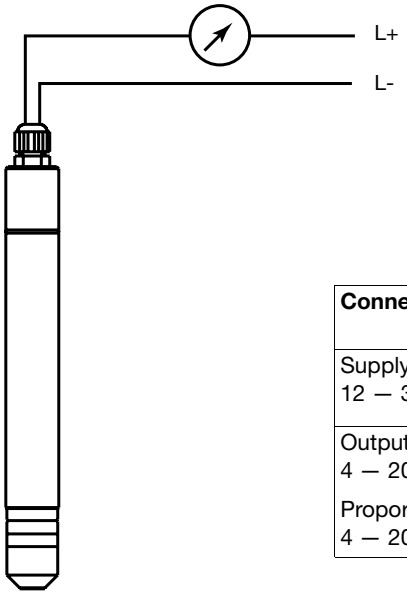
Weight
approx. 125 g

Dimensions

Type 202630/55, Type 202630/60



Electrical connection



Connection		Screw terminal
Supply 12 — 30 V DC		1 L+ 2 L-
Output 4 — 20 mA 2-wire Proportional current 4 — 20 mA in supply		1 L+ 2 L-

Accessory (optional)

Flow-through fitting for cell for hydrogen peroxide or peracetic acid

Type 202810/01-102-86-080-055

Sales No. 20/00392611

Material
housing: PVC
sample vessel: PC

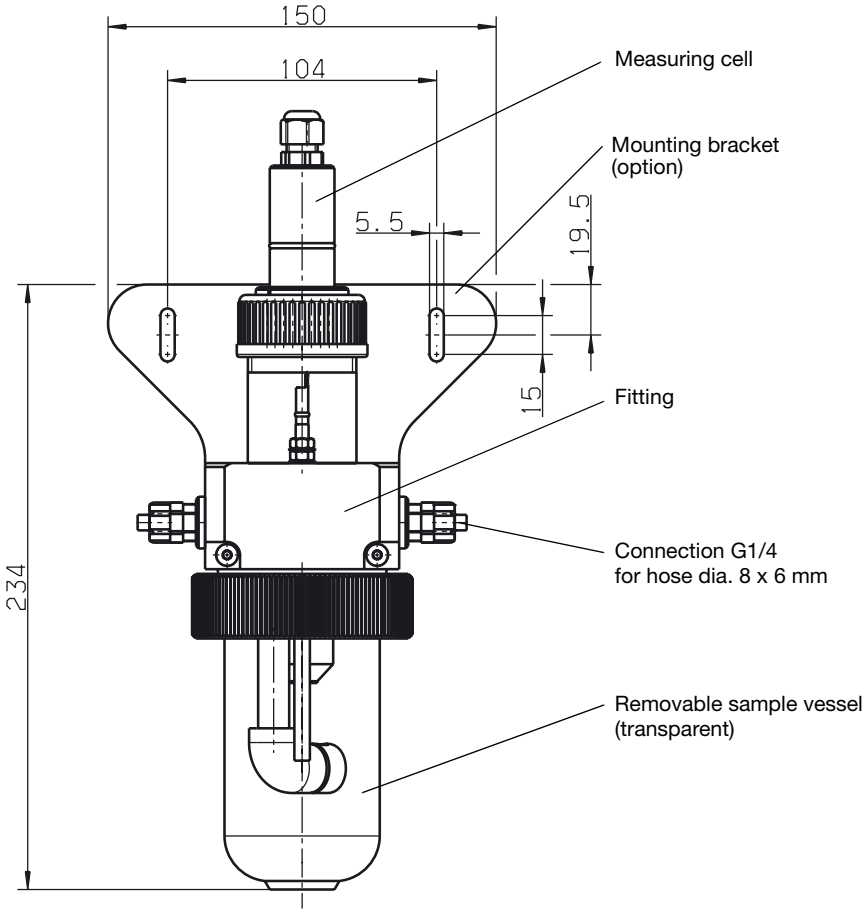
Permissible temperature / pressure
0 to 50°C; up to 1 bar

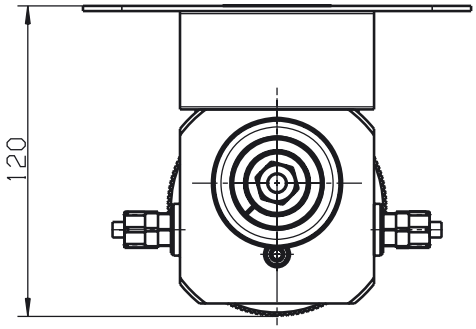
Connection

G 1/4 threaded hose connection

Fixing

option: mounting bracket in stainless steel, Mat. Ref. 1.4571

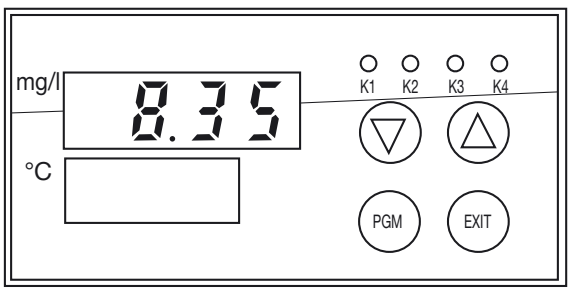




Options

JUMO dTRANS Az 01

Microprocessor indicator/controller for analytical measurement
as indicating/operating and control unit
(for details, please see Data Sheet 20.2550)



Flow-monitoring assembly

Consisting of:

Flow monitor

Sales No. 20/00396471

and

Fitting for flow monitor
Sales No. 20/00396470

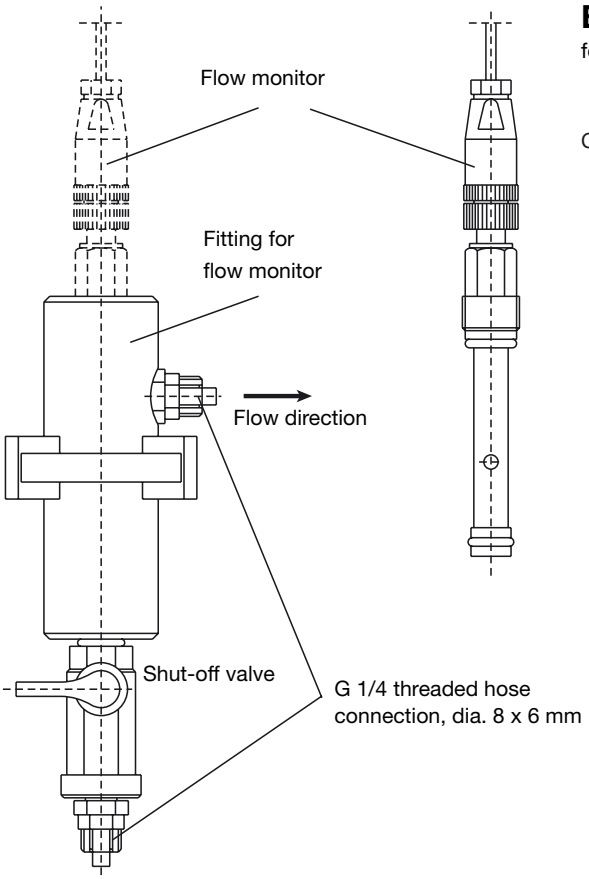
Operation

For proper operation, the incident flow of the sample liquid on the cell must be at least 15 cm/sec.

Below this minimum flow velocity, the cells will indicate values that are too low. This may cause a connected control system to apply a dangerous over/underdose. Above this minimum, the measurement signal will only be slightly affected by the incident flow velocity.

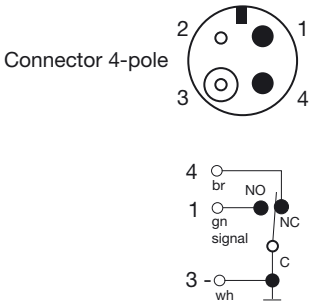
The minimum incident flow velocity of 15 cm/sec can be monitored by means of the flow monitoring assembly.

The flow monitoring assembly consists of a flow monitor and the appropriate fitting. The flow monitoring assembly is installed in line with the flow-through fitting. On reaching, or exceeding, the minimum flow velocity, a contact in the terminal head of the flow monitor will switch. This contact can then be used to operate, for instance, one logic input of the JUMO dTRANS Az 01 (microprocessor indicator/controller for analytical measurement). With insufficient incident flow, the JUMO dTRANS Az 01 is set to “HOLD”, thereby avoiding an incorrect dosage.



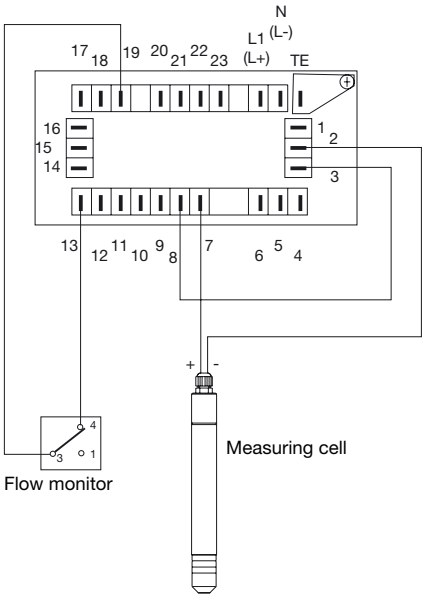
Electrical connection

for flow monitor



Application example

Connection example of the cell and the flow monitor to the JUMO dTRANS Az 01 (microprocessor indicator/controller for analytical measurement)



Terminal assignment for the JUMO dTRANS Az01

Terminal	Connection
2 + 3 -	Supply for 2-wire transmitter 18 V DC
7 - 8 +	Input for standard 4 — 20 mA signal
13 19	Logic input 1 (e.g. for flow monitoring)

Operation
Above a flow velocity of 15 cm/sec, the contact (3+4) of the flow monitor is opened. When the contact (3+4) is closed and the logic input 1 or 2 of the JUMO dTRANS Az 01 is wired up and configured accordingly, the instrument reacts with “HOLD”. This will prevent incorrect dosing as a result of insufficent incident flow on the cell.

Order details

			(1)	Basic type
		202630		Measuring cell

			(2)	Basic type extensions
		55		peracetic acid
		60		hydrogen peroxide
			(3)	Range[1]
o	o	60		0 — 500 mg/liter (ppm)
o	o	80		0 — 10,000 mg/liter (ppm)

x = fitted as standard
o = available as an option

	(1)		(2)		(3)
Order code		/		-	
Order example	202630	/	60	-	60

[1] others on request

Stock versions (shipment: 3 working days after receipt of order)

Type	Sales No.
Flow-through fitting, Type 202810/01-102/86/080/055	20/00392611

Production versions (shipment: 10 working days after receipt of order)

Type	Sales No.
Measuring cell for hydrogen peroxide, Type 202630/60-60/000	20/00409342
Measuring cell for hydrogen peroxide, Type 202630/60-80/000	20/00409343
Measuring cell for peracetic acid, Type 202630/55-60/000	20/00421852
Measuring cell for peracetic acid, Type 202630/55-80/000	20/00443718
Suitable indicator/controller: JUMO dTRANS Az 01, type 202550/10-665-888, 140-23-00/000 (for other versions, please see Data and Price Sheet 20.2550)	20/00392573

Accessories (shipment: 10 working days after receipt of order)

Important:
Please always specify the measuring range when ordering spare parts kits for the cells!

Designation	Sales No.
Spare parts kit for 202630/55 and /60 measuring range 0 to 500 mg/l (ppm) (1 x membrane cap, fine abrasive paper)	20/00409344
Spare parts kit for 202630/55 and /60 measuring range 0 to 10.000 mg/l (ppm) (1 x membrane cap, fine abrasive paper)	20/00438125
Special electrolyte for 202630/55, 100 ml	20/00440821
Special electrolyte for 202630/60, 100 ml	20/00438126
Flow monitor	20/00396471
Fitting for flow monitor	20/00396470
Mounting bracket for flow-through fitting for chlorine, chlorine dioxide or ozone measuring cells	20/00455706

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2-wire transmitter

for pH Type 202701/10
for redox Type 202701/20

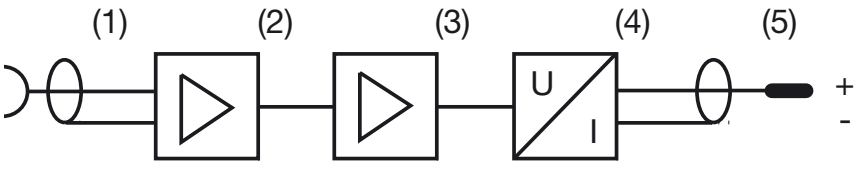
General application

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 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 MOhm) 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.

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 N (5) connects the 2-wire transmitter to the next instruments.

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.

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Electrical connection

Input
coaxial connector suitable for most commercially available electrode connector heads

Output
coaxial screw-plug connection suitable for cable socket N

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

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

Coaxial plug		**Coaxial cable**	
outer sleeve	-	screen	-
inner pin	+	inner conductor	+

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).

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**
x x	86		N cable socket
		(4)	**Electrical connection - output**
x x	21		N plug cap (S7)
o o	32		Harting connector (Harax M12)
o o	83		M12 connector (4-pole)
		(5)	**Measuring span**
x	01		+600 to -600 mV (for pH)
x	02		-1000 to+1000 mV (for redox)
o	03		-600 to +600 mV (special pH version)
o	04		-500 to +500 mV (special redox version)

	(1)		(2)		(3)		(4)		(5)
Order code		/		-		-		-	
Order example	202701	/	10	-	86	-	21	-	01

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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)

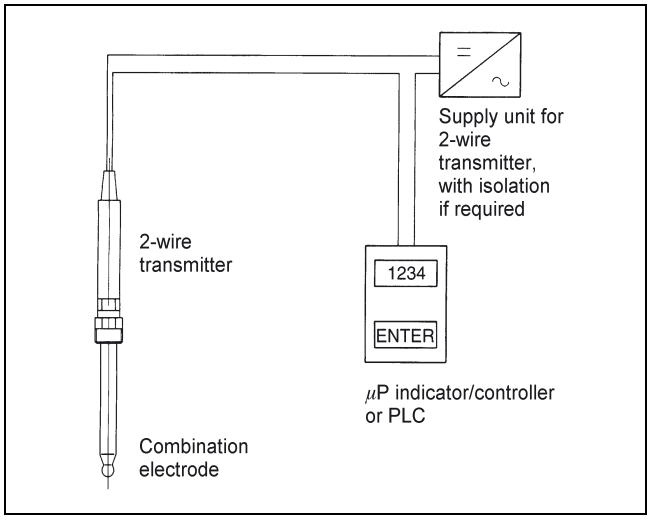
Type	Description	Sales No.
202701/10-86-83-01	pH, M12 connector	20/00409877
202701/10-86-83-03	pH, M12 connector, -600 to +600 mV	20/00415579

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 5 mm		20/00409877
Adapter for checking the signal output of the 2-wire transmitter		20/00332273

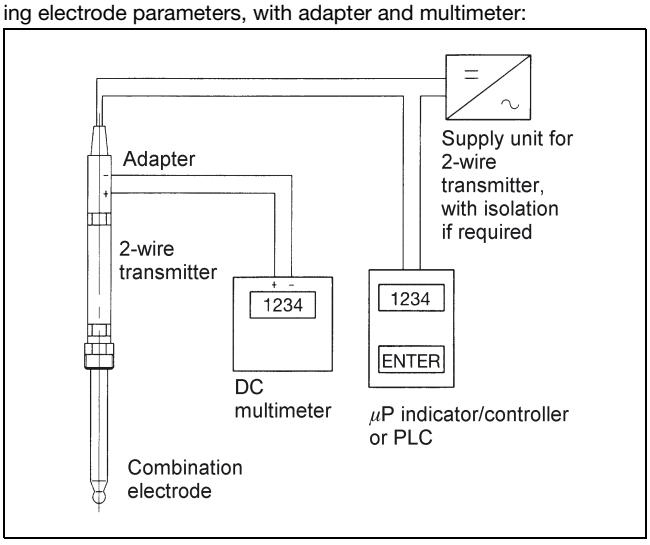
Example 1:

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 $^{1}/_{cm}$. 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

Technical data

Instrument 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

Power supply
9 V block battery, type IEC 6F22

Current drawn
approx. 30 mA

Special functions
- segment test at switch-on
- measuring circuit monitoring
- "hold" function (freeze latest measurement)
- MIN/MAX memory
- automatic switch-off (can be de-activated)
- battery change display

Electrode/probe connection
for pH/redox combination electrodes: BNC
for temperature probe: mini DIN socket

Dimensions
142 x 71 x 26 mm (L x W x H)

Housing material
ABS

Protection class
IP65 at front

Weight (without sensor)
approx. 145 g

Instrument version 202710/30

Conductivity ranges
0 — 200 µS/cm
0 — 2000 µS/cm
0 — 20 mS/cm
0 — 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 cell
$K = 1.0\ ^{1}/_{cm}$

Temperature coefficient of cell
as per EN 27888
(non-linear compensation)

Temperature compensation
automatic

Operating temperature
instrument: 0 to +50°C
cell: -5 to +80°C

Storage temperature
-20 to +70°C

Power supply
9 V block battery, type IEC 6F22

Current drawn
approx. 50 mA

Special functions
- segment test at switch-on
- measuring circuit monitoring
- "hold" function (freeze latest measurement)
- MIN/MAX memory
- automatic range changeover
- automatic switch-off (can be de-activated)
- battery change display

Dimensions (hand-held meter)
142 x 71 x 26 mm (L x W x H)

Dimensions (cell)
length: 120 mm
diameter: 12 mm
attached connecting cable, approx. 1 m long

Housing material
ABS

Protection class
IP65 at front

Weight (with cell)
approx. 225 g

Order details

Microprocessor-based hand-held meters for analytical measurement variables

			(1)	**Basic type**
		202710		Hand-held meters for analytical measurement variables
			(2)	**Basic type extensions**
		20		pH, redox[1], temperature[2]
		30		conductivity[3], temperature[4]
			(3)	**Extra codes**
x	x	000		no extra code
o		070		case with calibration solutions pH 4.00 and pH 7.00; with KCl electrolyte (50 ml each)
	o	071		case

x = standard
0 = available as an option

	(1)		(2)		(3)
Order code	202710	/		/	
Order example	202710	/	20	/	070

[1] combination electrode not included in delivery
[2] Pt100 temperature sensor not included in delivery
[3] including conductivity cell
[4] the temperature sensor is integrated in the cell

Stock versions (shipment: 3 working days after receipt of order)

Type	Description	Sales No.
202710/20/000	hand-held meter for pH/redox/temperature (without combination electrode, without temperature probe)	20/00453200
202710/30/000	hand-held meter for conductivity/temperature (including cell)	20/00454356

Production versions (shipment: 10 days after receipt of order)

Type	Description	Sales No.
202710/20/070	hand-held meter for pH/redox/temperature (without combination electrode, without temperature probe) in case, with calibration solutions pH 4.00 and pH 7.00; with KCl electrolyte (50 ml each)	20/00453205
202710/30/071	hand-held meter for conductivity/temperature (including cell) in case	20/00454357

Accessories

Type	Sales No.
Pt100 immersion temperature probe, attached cable connection, mini DIN plug for instrument type 202710/20...	20/00453208
pH combination electrode JUMO ecoLine pH, 2 m attached cable, BNC plug for instrument type 202710/20...	20/00424828
pH combination electrode JUMO labLine pH, KCl-filled, 1 m attached cable, BNC plug for instrument type 202710/20...	20/00300196
pH insertion electrode JUMO labLine pH, stainless steel sheath, solid electrolyte gel, perforated diaphragm, 1 m attached cable, BNC plug for instrument type 202710/20...	20/00454820
pH combination electrode JUMO ecoLine pH, solid electrolyte gel, with 2 m attached cable, annular-gap diaphragm, BNC plug for instrument type 202710/20...	20/00458459
redox combination electrode JUMO ecoLine Redox, 2 m attached cable, BNC plug for instrument type 202710/20...	20/00424950

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JUMO ecoTRANS Lf 01/02
Microprocessor Transmitter / Switching Device for Conductivity

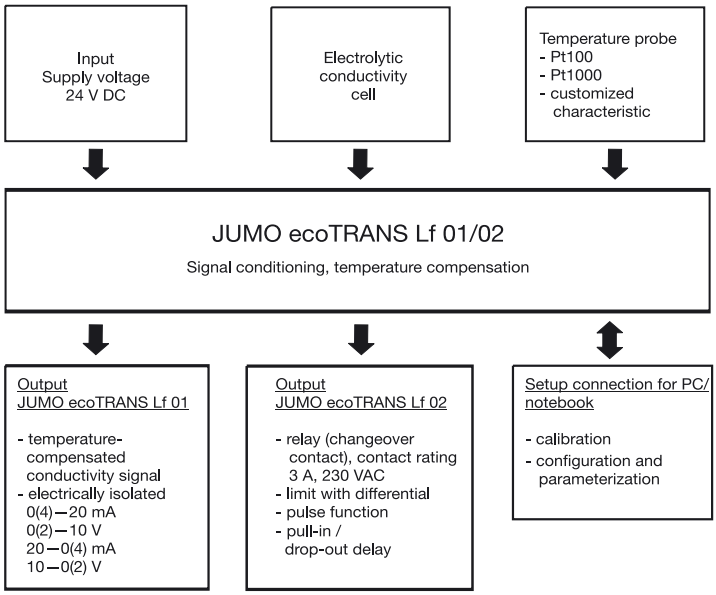
Type 202731
Housing for DIN rail mounting
(35 x 7.5 mm to EN 60 715 A.1)

Brief description

The JUMO ecoTRANS Lf 01/02 conductivity transmitter is used to measure the conductivity of liquids in conjunction with electrolytic conductivity cells.
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 isolated from each other)
- DIN rail mounting
- 1 electrically isolated analog output 0(4) — 20 mA / 0(2) — 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 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 01/02 offers the user the possibility of compensating any deviation from the nominal value of the cell constant through **manual entry** (range 20 — 500%) or **automatic calibration** of the relative cell constant K_{rel}.

■ Calibration of the temperature coefficient α

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 α [% 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 — 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 / ≤ 3.4 mA / ≤ 1.4 V.
Depending on the range,
“High” is: 22 mA / 10.7 V

■ Simulation of the measurement output

The measurement output (0/2 — 10 V or 0/4 — 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 — 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 Ω.

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 Ω
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 — 99.99 Ω.
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 — 5 µS to 0 — 200 mS, depending on the cell constant. Intermediate values are programmable.

Cell constant K	Measuring range
0.01 /cm	0 — 5 µS/cm
0.01 /cm	0 — 20 µS/cm
0.1 /cm	0 — 200 µS/cm
0.1 /cm	0 — 1000 µS/cm
1 /cm	0 — 2 mS/cm
1 /cm	0 — 20 mS/cm
10 /cm	0 — 100 mS/cm
10 /cm	0 — 200 mS/cm

Deviation from characteristic, conductivity
on ranges 0 — 5 µS/cm and
0 — 20 µS/cm: ≤ 1.0% of range
All other ranges:
≤ 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: ≤ 0.6%
with customized characteristic: ≤ 5 Ω.

Outputs

JUMO ecoTRANS Lf 01 (analog output):
freely configurable:
0(2) — 10 $V R_{load} \geq 2$ kΩ or
10 — (2)0 $V R_{load} \geq 2$ kΩ or
0(4) — 20 $mA R_{load} \leq 400$ Ω or
20 — (4)0 $mA R_{load} \leq 400$ Ω
electrically isolated from the inputs:
ΔU ≤ 30V AC or
ΔU ≤ 50V DC
minimum scaling span:
10% of measuring range span.

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Deviation from characteristic of the output signal
≤ 0.25% ± 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
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 — 30V 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^2

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 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

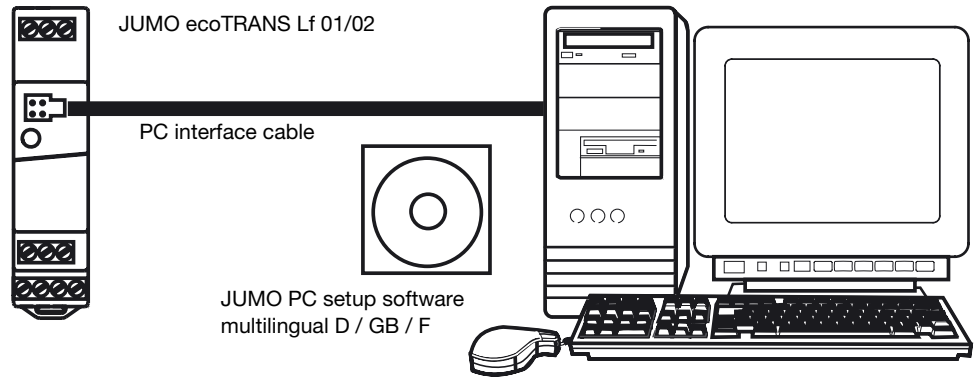
Housing
housing for DIN rail mounting: PC (polycarbonate)

Mounting
on 35 x 7.5 mm DIN rail to EN 50 022

Operating position
unrestricted

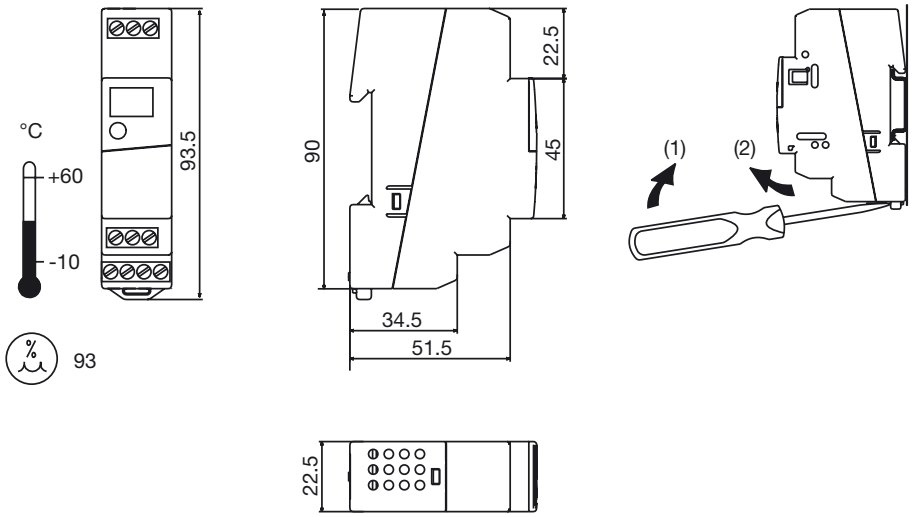
Weight
approx. 110g

Operation via the setup interface



PC or notebook with RS232 interface
Operating system:
- Windows '98®
- Windows 2000®
- Windows XP®
- Windows NT® 4.0 or higher

Dimensions



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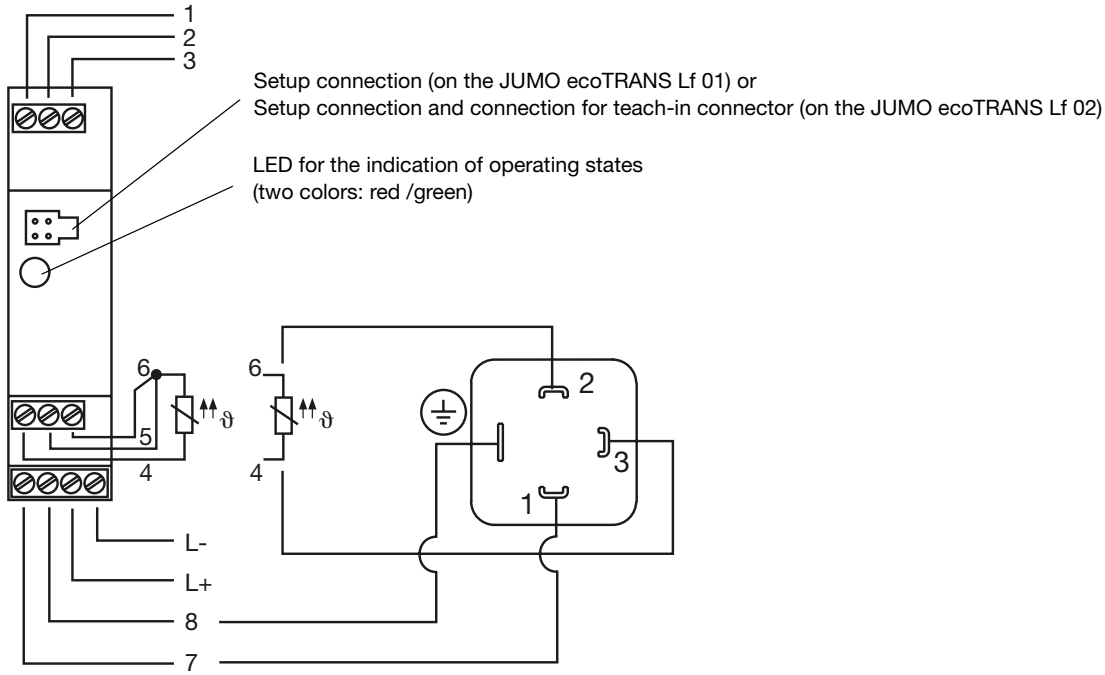
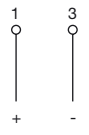
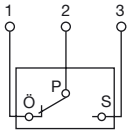
Connection diagram



Connection for conductivity cell

	Conductivity cell (JUMO types)			JUMO ecoTRANS Lf 01/02
	Plug-in head	Fixed cable	M12 connector	
Outer electrode	⏚	white	1	8
Inner electrode	2	brown	2	7
Temperature sensor	1	yellow	3	4*
	3	green	4	6*

* 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)	

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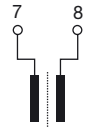
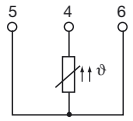
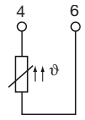
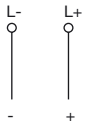
Measurement inputs		Terminal assignments	Symbol
Conductivity cell		8 outer electrode, on coaxial cells 7 inner electrode, on coaxial cells	
Resistance thermometers in 3-wire circuit		4 5 6	
Resistance thermometers in 2-wire circuit		4 6	

Supply		Terminal assignments	Symbol
Supply		L- L +	

Type designation:

JUMO ecoTRANS Lf01 /02
Programmable transmitter / switching device for electrolytic conductivity using the 2-electrode procedure

(1) Basic type

202731 JUMO ecoTRANS Lf 01/02

(2) Basic type extension

01 version with transmitter (analog output only)
02 switching device version (relay output only)

(3) Measurement range

015 range preset to 0 — 2 mS/cm
K=1.0; ATC with Pt100
016 range preset to 0 — 20 mS/cm
K=1.0; ATC with Pt100

(4) **Extra codes**

000 none
024 including PC setup software

	(1)		(2)		(3)		(4)
Order code	202731	/		-		/	
Order example	202731	/	01	-	015	/	000

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Stock items (shipment: 3 working days after receipt of order)

	Sales No.
JUMO ecoTRANS Lf 01 (with analog output), type 202731/01-015/000 Preset range: 0 — 2mS / cm; K = 1.0 1 / cm	20/00421026
JUMO ecoTRANS Lf 01 (with analog output), type 202731/01-015/024, including PC setup software (bundle) Preset range: 0 — 2mS / cm; K = 1.0 1 / cm	20/00421035
JUMO ecoTRANS Lf 02 (with relay output), type 202731/02-016/000, including teach-in connector Preset range: 0 — 20mS / cm; K = 1.0 1 / cm	20/00421032
JUMO ecoTRANS Lf 02 (with relay output), type 202731/02-015/024, including teach-in connector and PC setup software (bundle) Preset range: 0 — 2mS / cm; K = 1.0 1 / cm	20/00421049

Accessories (available from stock)

Designation	Sales No.
PC setup software for JUMO ecoTRANS Lf 01 / 02	20/00432577
PC interface cable with TTL / RS232 converter and adapter (serial connection cable)	70/00350260
PC interface cable with USB / TTL converter and two adapters (USB connection cable)	70/00456352
Conductivity simulator (see data sheet 20.1090)	20/00300478
Connection cable for conductivity simulator (DIN connector/bare cable ends)	20/00082901

For suitable conductivity cells, please see our data sheets 20.2922, 20.2923, 20.2924 and 20.2925.

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 —20 mA output (Lf 01) or switching point set to max. range (Lf 02), temperature coefficient alpha = 2.2 %/°C.
It is **not** possible to switch over from type ecoTRANS Lf 01 to type ecoTRANS Lf 02 or vice versa.

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JUMO ecoTRANS Lf 03
Microprocessor Transmitter / Switching Device for conductivity or resistivity and temperature

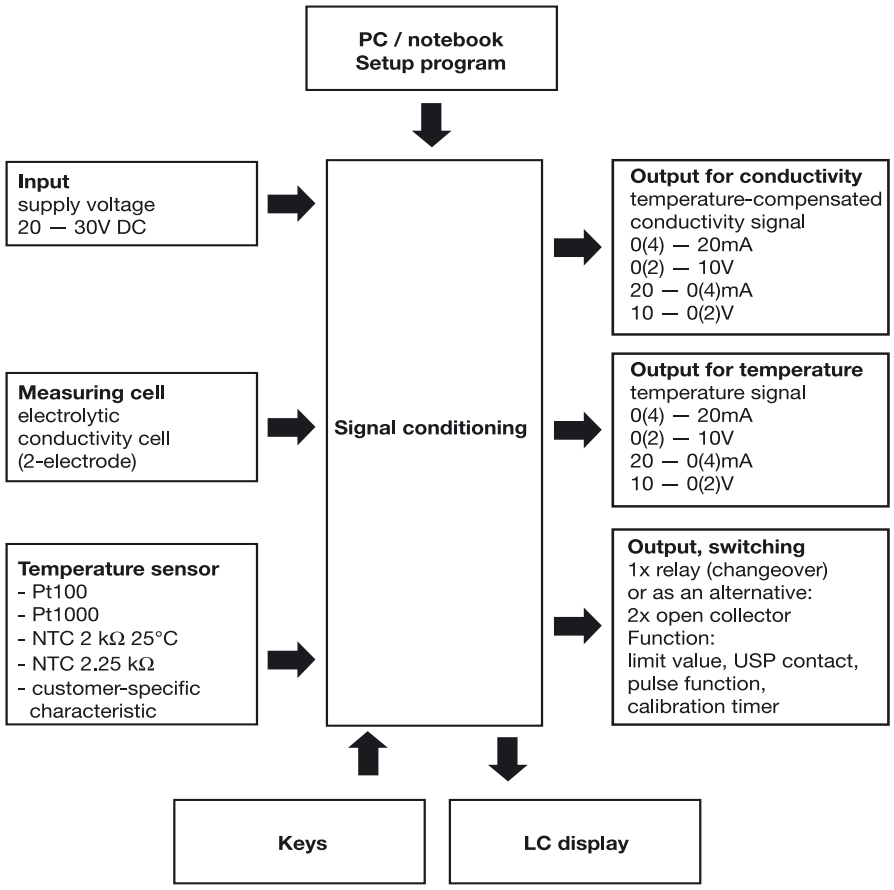
Type 202732
Housing for DIN rail mounting
(35 x 7.5 mm to DIN EN 60 715 A.1)

Compliant with USP<645>

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.

Block structure



Key features

- Display units µS/cm, mS/cm, kOhm*cm, MOhm*cm, µmho/cm, mmho/cm
- Two parallel signal outputs for conductivity and process temperature 0(4) — 20mA / 0(2) — 10V; 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 α

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 α [% 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 $^1/_{cm}$ (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 Ω.

Zero-point calibration, analog input 1
Zero-point errors caused by the system can be compensated.

Conductivity ranges
0 — 1 µS 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 2kΩ; 25°C, B=3500 -10 to +150°C
- NTC UUA 32J49; 2.25kΩ -10 to +150°C
- KTY 11-6; 2000 Ω -10 to +150°C
- Customer-specific characteristic, maximum resistance 4500Ω

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: ≤ 0.6%
NTC 2 kΩ: ≤ 1.5%
NTC UUA: ≤ 2.0%
KTY11-6: ≤ 0.8%
with customer-specific characteristic: ≤ 5 Ω.

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Outputs

Two analog outputs
freely configurable:
0(2) — 10 V $R_{load} \geq 2\,k\Omega$ or
10 — (2)0 V $R_{load} \geq 2\,k\Omega$ 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:
$\Delta U \leq 30$ V AC or
$\Delta U \leq 50$ V DC
minimum scaling span: 10% of range span.

Deviation from characteristic of the output signal
≤ 0.25% ± 50 ppm per °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 ≤ 1.2V, not short-circuit-proof

General characteristics

A/D converter
resolution 14 bit

Sampling time
500 msec = 2 measurements per second

Ambient temperature error
≤ 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 voltage
20 — 30V DC, ripple < 5%
power consumption ≤ 3 W,
with reverse-polarity protection.
For operation with SELC or PELV circuits.

Electrical connection
screw terminals up to 2.5 mm^2

Permissible ambient temperature
-10 to +60°C

Permissible storage temperature
-20 to +75°C

Climatic conditions
rel. humidity ≤ 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 x 7.5 mm DIN rail to DIN EN 60 715

Operating position
unrestricted

Weight
approx. 150g

Cell constant	**Measurement ranges** Display span / unit				
K = 0.01 $^1/_{cm}$	0 — 1.000 µS/cm	0 — 1.000 µmho/cm	1000 — 9999 kΩ*cm	1.00 — 99.99 MΩ*cm	1
K = 0.01 $^1/_{cm}$	0 — 2.00 µS/cm	0 — 2.00 µmho/cm	500 — 9999 kΩ*cm	0.50 — 50.00 MΩ*cm	1
K = 0.01 $^1/_{cm}$	0 — 5.00 µS/cm	0 — 5.00 µmho/cm	200 — 9999 kΩ*cm	0.20 — 20.00 MΩ*cm	1
K = 0.01 $^1/_{cm}$	0 — 20.00 µS/cm	0 — 20.00 µmho/cm	50 — 2500 kΩ*cm	0.05 — 2.50 MΩ*cm	2
K = 0.1 $^1/_{cm}$	0 — 5.00 µS/cm	0 — 5.00 µmho/cm	200 — 9999 kΩ*cm	0.20 — 20.00 MΩ*cm	1
K = 0.1 $^1/_{cm}$	0 — 20.00 µS/cm	0 — 20.00 µmho/cm	50 — 2500 kΩ*cm	0.05 — 2.50 MΩ*cm	1
K = 0.1 $^1/_{cm}$	0 — 200.0 µS/cm	0 — 200.0 µmho/cm	5.0 — 250.0 kΩ*cm	- -	2
K = 0.1 $^1/_{cm}$	0 — 1000 µS/cm	0 — 1000 µmho/cm	1.00 — 50.00 kΩ*cm	- -	3
K = 1 $^1/_{cm}$	0 — 500.0 µS/cm	0 — 500.0 µmho/cm	2.00 — 99.99 kΩ*cm	- -	1
K = 1 $^1/_{cm}$	0 — 1000 µS/cm	0 — 1000 µmho/cm	1.00 — 50.00 kΩ*cm	- -	3
K = 1 $^1/_{cm}$	0 — 2.00 mS/cm	0 — 2.00 mmho/cm	0.50 — 25.00 kΩ*cm	- -	2
K = 1 $^1/_{cm}$	0 — 10.00 mS/cm	0 — 10.00 mmho/cm	0.10 — 5.00 kΩ*cm	- -	3, 4
K = 1 $^1/_{cm}$	0 — 20.00 mS/cm	0 — 20,00 mmho/cm	- -	- -	2
K = 1 $^1/_{cm}$	0 — 100.0 mS/cm	0 — 100.0 mmho/cm	- -	- -	3, 4
K = 3 $^1/_{cm}$	0 — 30.00 mS/cm	0 — 30.00 mmho/cm	- -	- -	3, 4
K = 10 $^1/_{cm}$	0 — 100.0 mS/cm	0 — 100.0 mmho/cm	- -	- -	3, 4
K = 10 $^1/_{cm}$	0 — 200.0 mS/cm	0 — 200.0 mmho/cm	- -	- -	3

-- -Measurement range cannot be implemented
The following deviations from the characteristic refer to µS/cm or mS/cm
[1] Deviation from characteristic ≤ 1%
[2] Deviation from characteristic ≤ 1.5%
[3] Deviation from characteristic ≤ 2%
[4] Above a temperature of ≥ 85°C and a temperature coefficient $T_K > 2.2\%/°C$, higher deviations from the characteristic may occur

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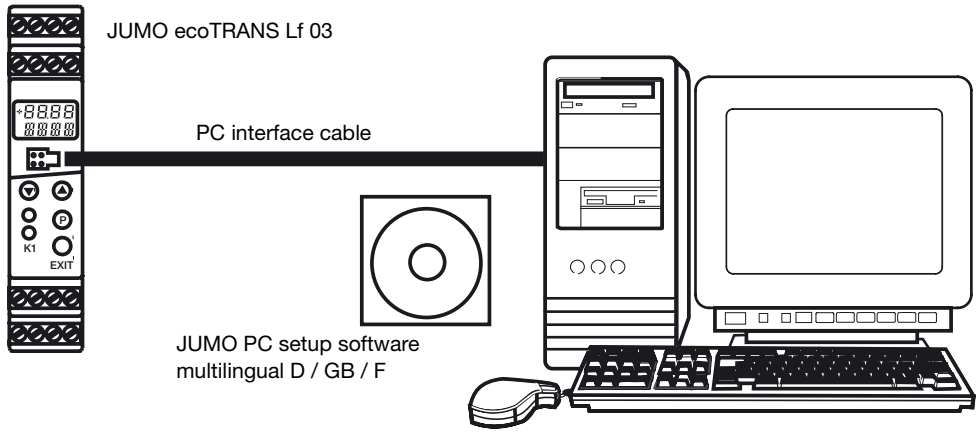
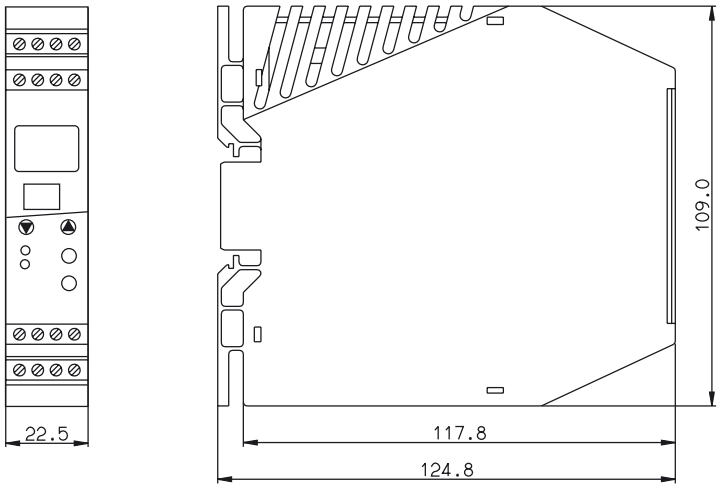
Operation via the setup interface

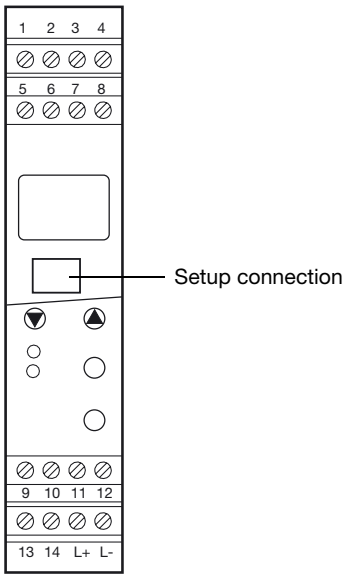


PC or notebook with
RS232 interface
Operating system:
- Windows '98®
- Windows 2000®
- Windows XP®
- Windows NT® 4.0 or higher

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
Tempera-ture sensor	1	yellow	3	9*
	3	green	4	12*

* type of connection: 2-wire

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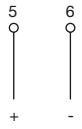
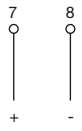
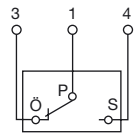
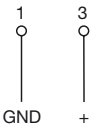
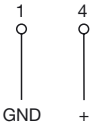
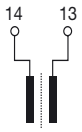
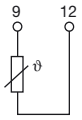
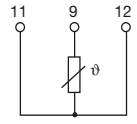
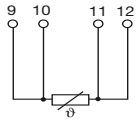
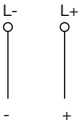
Outputs	**Terminal assignment**		**Symbol**
I Analog signal output: conductivity (electrically isolated)	5 6	+ -	
II Analog signal output: temperature (electrically isolated)	7 8	+ -	
III. Relay	1 3 4	common n.c. (break) n.o. (make)	
Open-collector output 1 (electrically isolated)	1 3	GND +	
Open-collector output 2 (electrically isolated)	1 4	GND +	

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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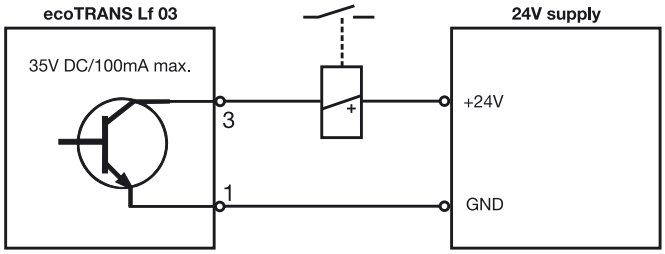
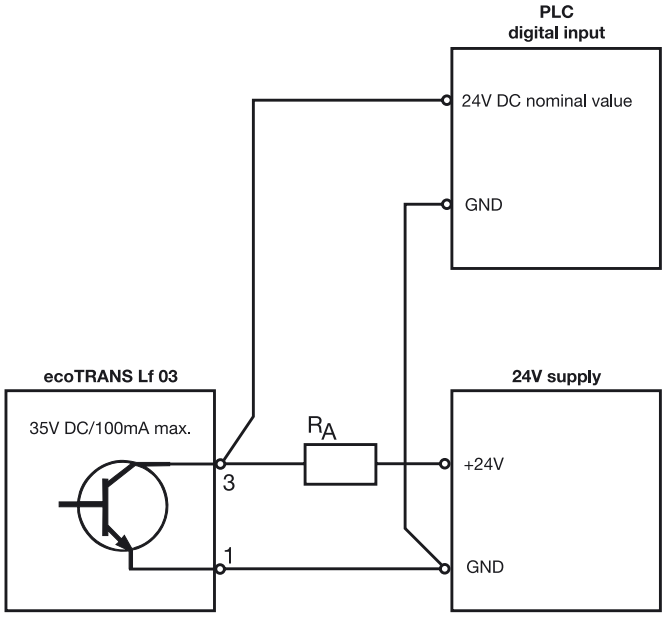
Connection example for open-collector output

Connection of a relay



Connection of a PLC



R_A is a current-limiting resistor for I = 100 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)
Order code		/		-		-		/	
Order example	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 20.1090)	20/00300478
SMPS for DIN rail mounting input voltage 100 — 240 VAC / 50 — 60 Hz output voltage 0.3 A 24 VDC	Switched-mode power supply, Type PS5R-A24

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MEASUREMENT AND CONTROL

Inductive conductivity transmitter JUMO CTI-920

- **inductive conductivity measuring cell**
- **isolated, hermetically sealed PVDF transducer with integrated Pt100 for temperature measurement /correction of the conductivity measurement**
- **max. operating temperature 120°C** (briefly up to 140°C, e.g. for steam sterilisation)
- **max. operating pressure 10 bar**
- **second current output for temperature provided as standard**
- **up to 9 measurement ranges integrated**
- **measurement range 0 — 1 mS/cm to 0 — 2000 mS/cm**
- **up to 4 temperature coefficients can be set**

Typical areas of application:

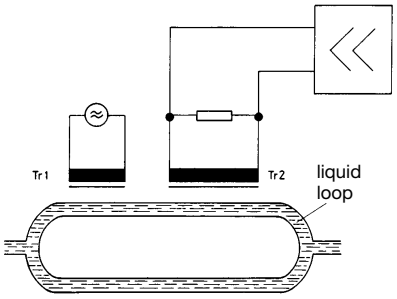
- food, drinks and pharmaceutical industry
- product monitoring (phase separation product/product mixture/water) in the drinks industry, breweries and dairies
- operation (e.g. phase separation detergent/rinsing water) of cleaning processes
  e.g. for bottle cleaning plants and tank cleaning
- concentration control for acids and caustic solutions
  e.g. in galvanisation and process chemistry
- use in CIP plants
- water and waste water technology, e.g. for car wash and non-drinking water monitoring
- dosing of chemicals
- leakage indication with separate circuits, e.g. for heating and cooling plants

General application

The inductive conductivity transmitter CTI-920 is used to measure the specific conductivity of liquid media.
Its application is particularly recommended for media where severe deposits of dirt, oil, grease, gypsum or lime are to be expected. The inductive measurement process permits a largely maintenance-free acquisition of the specific conductivity, even in the most difficult media conditions. As opposed to the conductive measurement process, problems such as electrode decomposition and polarisation do not occur.

Functional description

Inductive conductivity measurement



A transformer Tr1 is supplied with a constant alternating voltage and generates a current proportional to the conductivity in the liquid which acts as secondary winding. The liquid also acts as primary winding for a transformer Tr2 which operates as a current transformer. The output current of the transformer Tr2 is directly proportional to the conductivity of the liquid.

Type designation

	Basic type
202752	inductive transmitter head for conductivity and temperature
/10	version 1, without temperature compensation
/21	version 2, with single temperature compensation
/22	version 2, with 4-fold temperature compensation
/31	version 3, with single temperature compensation
/32	version 3, with 4-fold temperature compensation

Pressure connection

-107	male thread $1^1/_4$" pipe A
-108	male thread $1^1/_2$" pipe A
-110	male thread 2" pipe A
-160	union nut $2^3/_4$", PVC, (G+F), e.g. in combination with extra Codes /355, /356 or /357
-607	screwed pipe joint DN50, DIN 11851
-608	screwed pipe joint DN65, DIN 11851
-609	screwed pipe joint DN80, DIN 11851
-617	clamp connection $2^1/_2$"
-686	connection VARIVENT DN50
-690	SMS screw joint DN2"

Extra Codes

/000	without extra Code
/110	integral digital indicator ($3^1/_2$ digits)
/355	PVC tee DN50 (G+F)
/356	PVC through-flow fitting
/357	PVC tee DN50 with screwed butt joint

Instrument description

Transmitter

The transmitter CTI-920 has been designed for use on site. A sturdy housing of glass fibre-reinforced polyamide protects the electronics and the electrical connections from corrosive environmental conditions (Protection IP65). A **3-wire transmitter for conductivity** and a **2-wire transmitter for temperature (output signals 4 — 20mA)** are provided as standard. Optionally, the conductivity can be output via an integrated $3^1/_2$ digit LCD digital display. The standard signals can be processed by suitable indicator/ control units or directly on a PLC.

Temperature compensation (TC)

Depending on the instrument version which was ordered, the instrument can be operated without, with single or 4-fold temperature compensation. The strong dependency of the conductivity on the temperature of the medium usually necessitates a compensation of the temperature-dependent variation.

The version **without TC** can be used for measurements with stable temperature conditions in which measurement inaccuracies can be tolerated. In addition, instruments without TC can be connected to evaluation units in which TC is performed in the software, for example (PLC or similar). Note: The standard temperature transmitter is also included in versions without TC.

For most applications the version with a **single TC** is sufficient. A scaled potentiometer enables the adjustment of the temperature coefficient in the range 0 — 3%/°C.

The version with a **4-fold TC** permits a very comfortable process control. Depending on the medium or the medium temperature up to 4 preset temperature coefficients can be selected (selection e.g. via PLC, depending on process development, medium or temperature). The temperature coefficients can also be set via 4 scaled potentiometers in the range 0 — 3 %/°C.

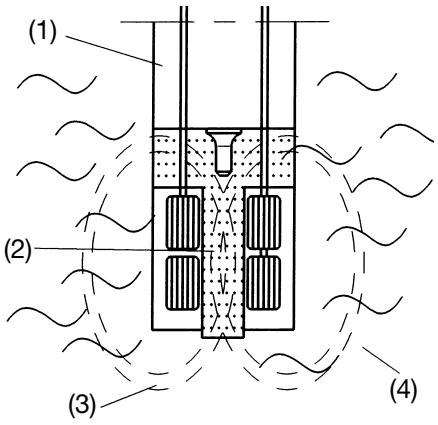
Process connections

For a variety of applications, the unit can be supplied with different process connections. If not otherwise specified, the male threads and process connections are made of stainless steel V2A 1.4301 (on request also possible in PP or PVDF).

Measuring cell

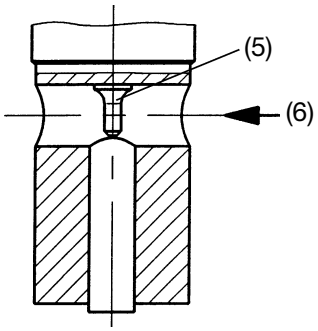
The cell consists of a hermetically sealed PVDF body inside which the two measurement coils are arranged. Holes in the measuring cell enable the measurement medium to flow through. The cell is temperature- and pressure-stable to a high degree. For temperature measurement and compensation, the cell is fitted with a fast-response temperature sensor (Pt100). For applications which have to comply with the highest standards of hygiene, connection type VARIVENT is available which also features a cell with a special style (see detailled diagram of process connection -90).

The measurement principle means that there is an inevitable isolation between the measurement medium and the current output.



Schematic arrangement of the standard cell

(1) PVDF body
(2) T-shaped through-flow channel
(3) liquid loop
(4) measurement medium

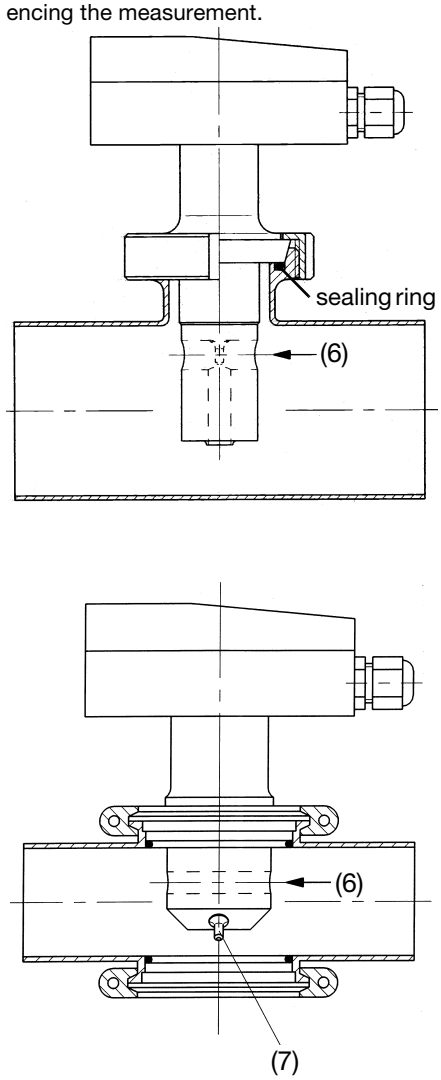


Positioning the Pt100 temperature sensor in the through-flow channel ensures a rapid response of the temperature compensation.

(5) Pt100 (in stainless steel pocket) in through-flow channel
(6) through-flow channel

Fitting in position at the location

The CTI-920 can best be fitted in position in a pipe of DN65 or larger by means of a tee with an NW50 screwed pipe joint.
The operating position is generally unrestricted. However, it is essential to ensure that there is a continuous exchange of the measurement medium (6) in the through-flow channel. It may be helpful to mount it from below so that gas bubbles can flow away via the measuring cell without influencing the measurement.



CTI-920
with VARIVENT process connection DN50
built into
Varivent inline housing DN50
(6) through-flow channel
(7) Pt100 in stainless steel pocket

The version VARIVENT features a measuring cell with a straight through-flow channel (6) without internal hindrances. This means an even smaller danger of deposits or blockages. The temperature probe (Pt100 in a stainless steel pocket) protrudes laterally from the measuring cell, which ensures that it is optimally enveloped by the medium.

Ordering example

202752/21-607/110
Inductive transmitter head
for conductivity and temperature,
with single temperature compensation,
integral digital display ($3^1/_2$ digits),
with process connection
screwed pipe joint DN50, DIN 11851

Standard accessory

Operating Instructions

Available accessories

weld-on threaded pipe adapter DN50
DIN 11851
mating connector for
process connection -85:
for welding onto tank walls or in pipe lines.

Technical data

Supply
22 — 30 V DC
nominally 24V DC

Electrical connection
plug-in connectors with screw terminal

Display (option)
$3^1/_2$ digit LCD digital display for conductivity, automatic adjustment to the selected measurement range
character height 10 mm

Permitted ambient temperature
-5 to +70°C
with extra Code /110: 0 — 50°C

Protection
IP65

Housing
glassfibre-reinforced polyamide
two Pg glands are standard
(Pg9 and Pg11)

Weight
2 kg approx.

Characteristic data for conductivity transmitter

Version 1:
can be switched over
0 — 2/20/200 mS/cm,
0 — 20/200/2000 mS/cm
or 0 — 5/50/500 mS/cm
without temperature compensation

Version 2:
can be switched over
0 — 1/10/100 mS/cm,
0 — 10/100/1000 mS/cm
or 0-2.5/25/250 mS/cm
with temperature compensation

Version 3:
can be switched over
0 — 2/20/200 mS/cm
with temperature compensation

Range switching
Three measurement groups can be selected as standard using jumpers (except for version 3). Within these three groups it is possible to switch internally via short-circuit links or externally via floating contacts.

Current output
3-wire circuit
4 — 20 mA

Current drawn
120 mA max.

Characteristic
linear

Accuracy
2% or better

Max. burden permitted

$$R_{Bmax} = \frac{U_V - 20V}{0.02A}$$

R_{Bmax}= maximum burden permitted in Ohm
U_V= supply voltage in Volt

Example:
U_V = 24V DC => R_{Bmax} = 200Ω

Characteristic data for temperature transmitter

Temperature measurement range
0 — 150°C

Current output
2-wire circuit
4 — 20 mA

Current drawn
40 mA max.

Characteristic
linear

Accuracy
2% or better

Max. burden permitted

$$R_{Bmax} = \frac{U_V - 20V}{0.02A}$$

R_{Bmax}= maximum burden permitted in Ohm
U_V= supply voltage in Volt

Example:
U_V = 24V DC => R_{Bmax} = 200Ω

Temperature compensation (option)

Reference temperature
25°C

Temperature coefficient
1 x 0 — 3%/°C adjustable
or
4 x 0 — 3%/°C adjustable, can be freely assigned via non-floating voltage

Compensation range
0 — 100°C

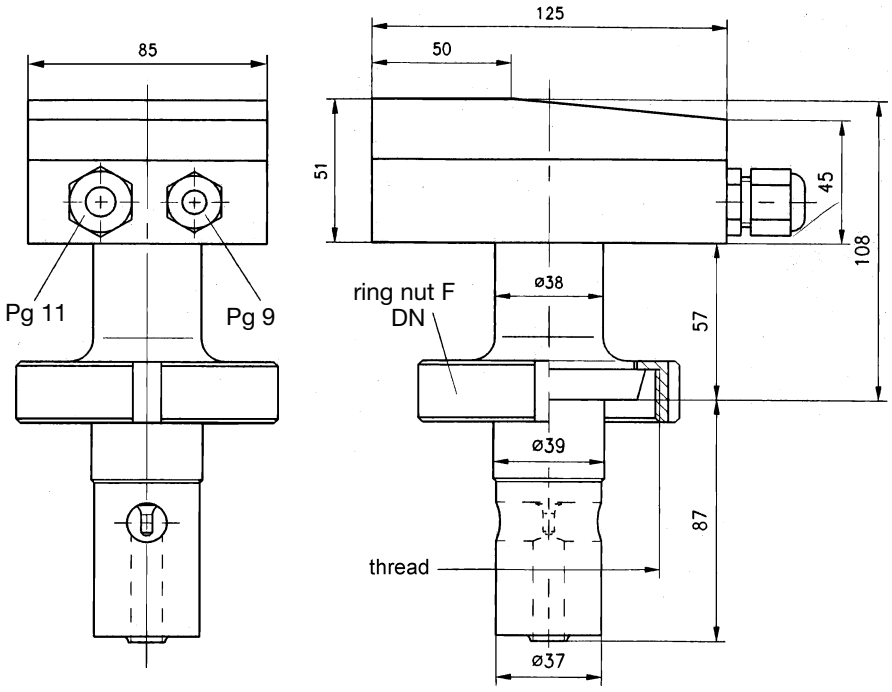
Measuring cell

Material
PVDF
Note:
Temperature, pressure and measurement medium influence the life expectancy of the measuring cell

Temperature of the measurement medium
120°C max.
140°C for short periods (sterilisation)
With pressure connection -60 PVC union nut, for extra Code /355 and /356 55°C max.

Pressure
max. 10 bar

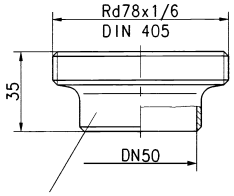
Dimensions



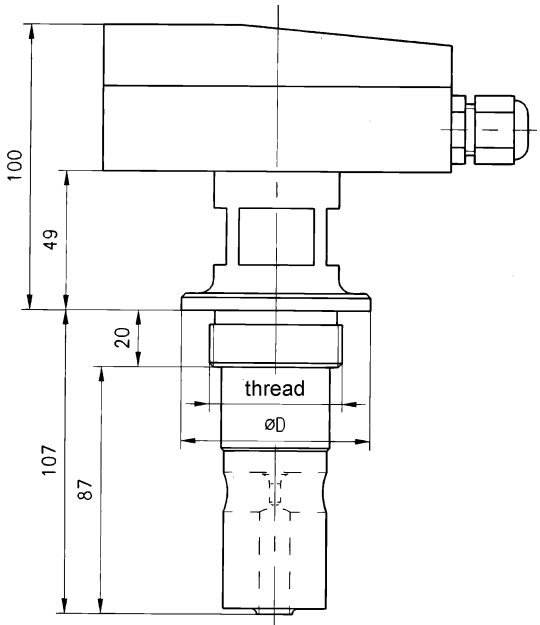
Process connection	
-607	screwed pipe joint DN50
-608	screwed pipe joint DN 65
-609	screwed pipe joint DN 80

Available accessory

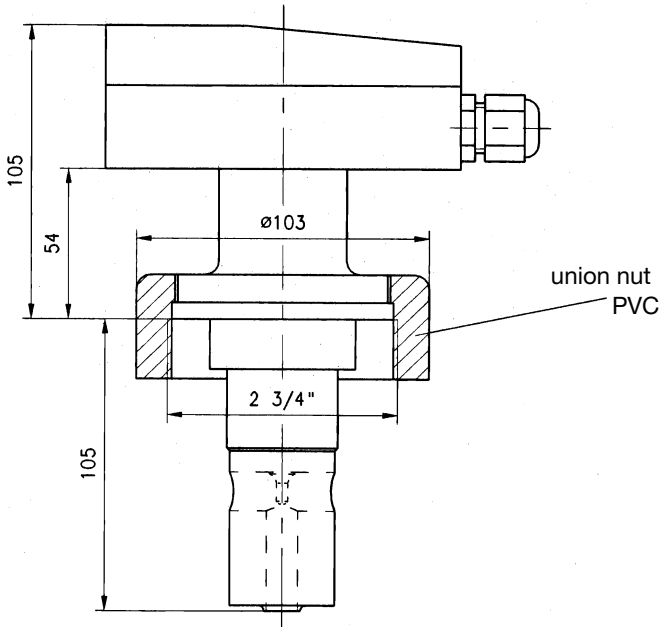
for process connection -607



weld-on threaded pipe adapter DN50
DIN 11851

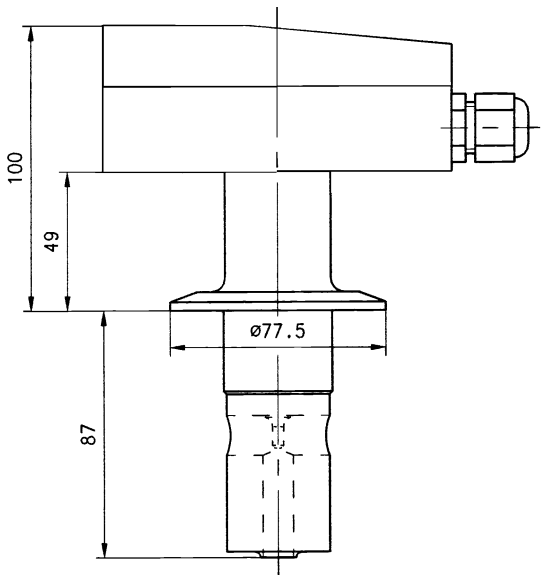


Process connection		dia.
-107	male thread $1^1/_4$"pipe A	60
-108	male thread $1^1/_2$" pipe A	68
-110	male thread 2"A	78

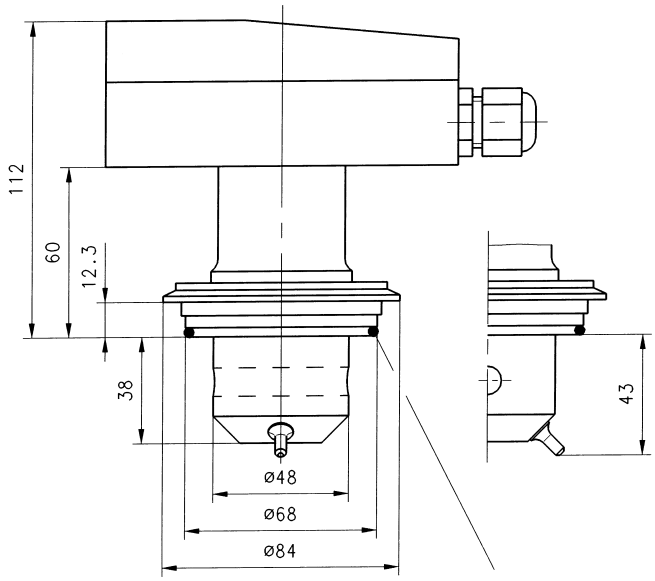


Process connection	
-160	union nut $2^2/_3$", PVC

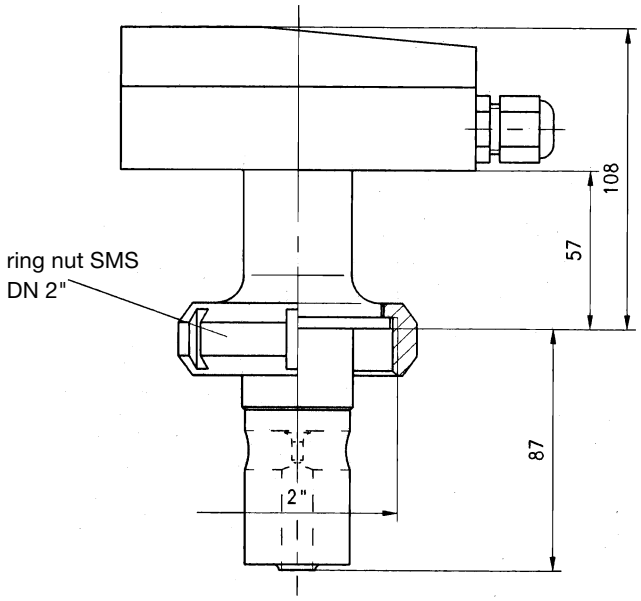
Extra Codes



Process connection	
-617	clamp connection $2^1/_2$"

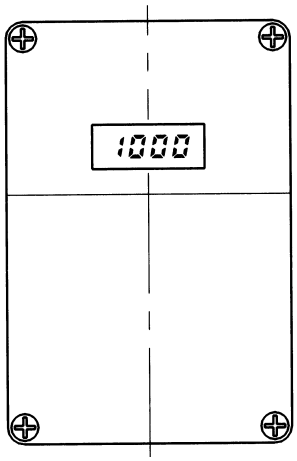


Process connection	
-686	connection VARIVENT

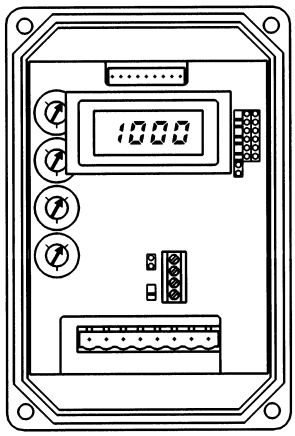


Process connection	
-690	SMS thread DN 2"

Extra Codes

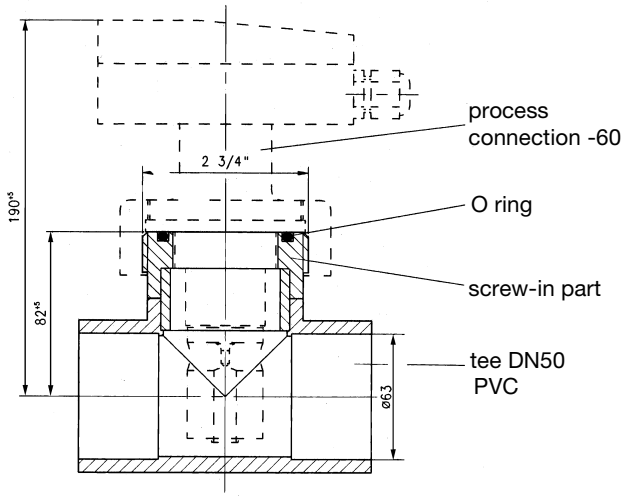


display in the housing cover

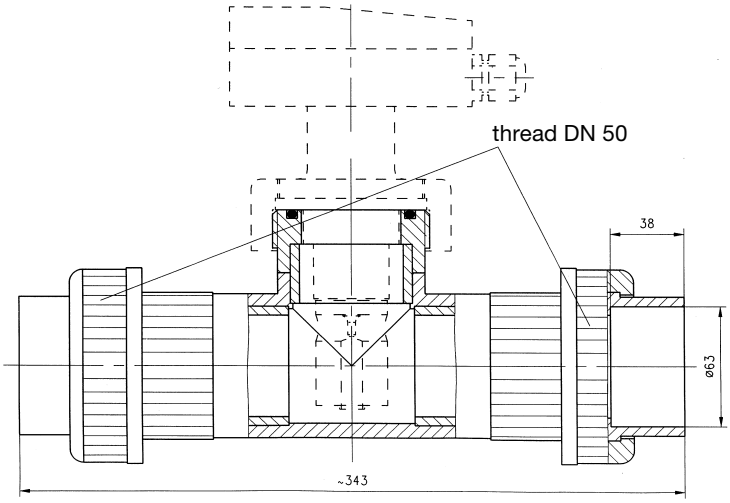


instrument opened

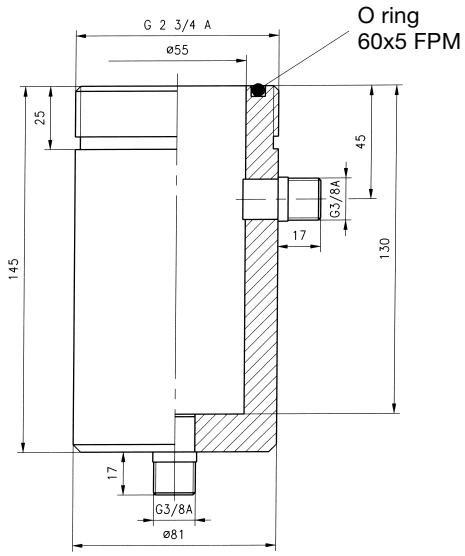
Extra Code /110 integral digital display ($3^1/_2$ digits)



Extra Code /355
PVC tee DN 50



Extra Code / 357
PVC tee with screwed butt joint DN 50



Extra Code /356 through-flow fitting, PVC

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JUMO CTI-500

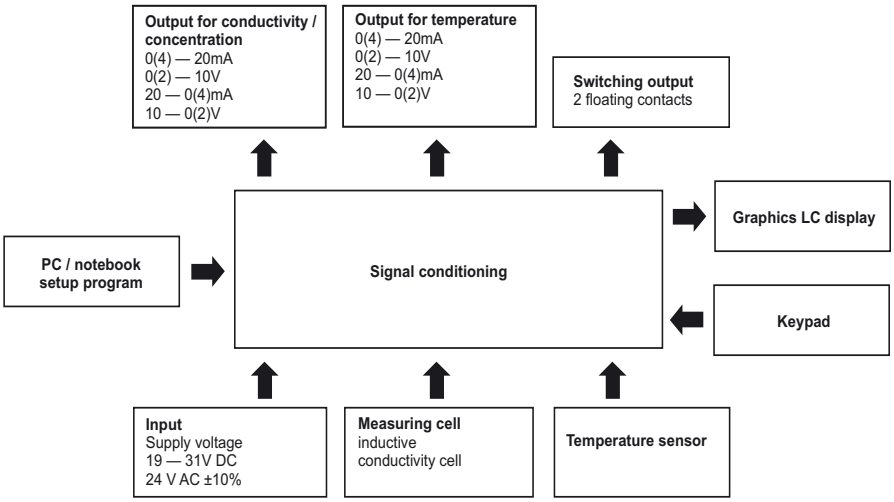
Inductive Conductivity/Concentration and Temperature Transmitter with switch contacts

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.

Block structure



Key features

- Activation of up to four ranges
- Activation of up to four temperature coefficients
- Concentration measurement of
  - caustic soda NaOH
  - nitric acid HNO_3
  - 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

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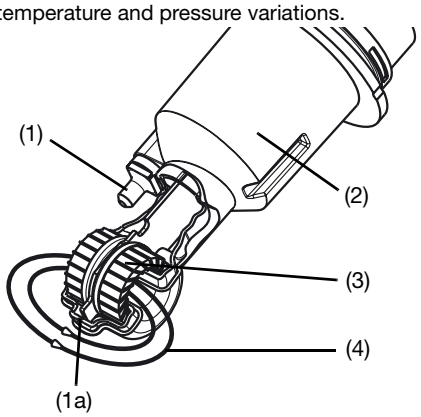
Functional description

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 polyvinyl-idenefluoride (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

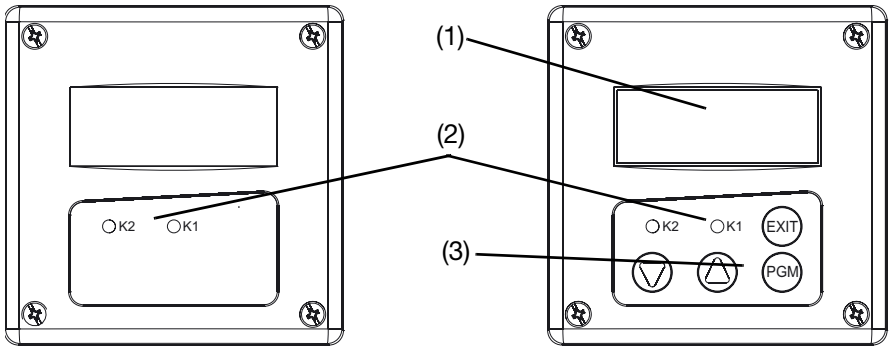
The JUMO CTI-500 can be operated either from the instrument keys and the graphics LC display and/or through the setup program from a PC or laptop.
The instrument can be secured against unauthorized alteration by a password.

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

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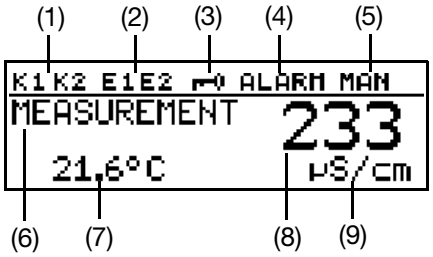
Graphics LC display



(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.

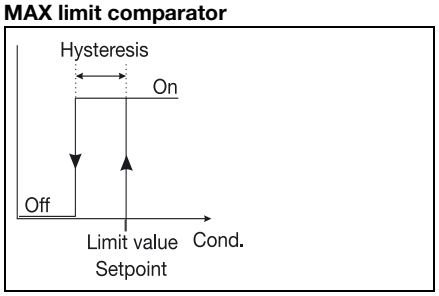
These can be used freely for monitoring the conductivity/concentration or the temperature.

The following functions can be assigned:

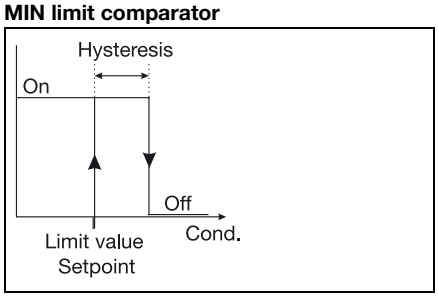
- ❏ Limit monitoring (MAX. or MIN. limit comparator) with programmable hysteresis
- ❏ Pulse function (the output switches briefly on reaching the switching point, then opens again).
- ❏ Pull-in and drop-out delay
- ❏ Inverted switching outputs
- ❏ Response to overrange/underrange or with activated measuring circuit monitoring (pull-in/drop-out).
- ❏ “Calibration timer run down" signal.

Contact functions

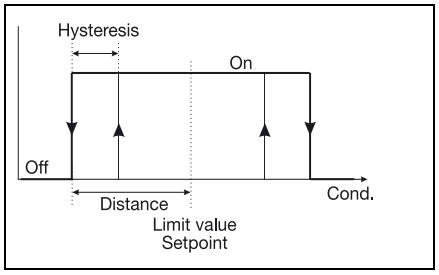
MAX limit comparator



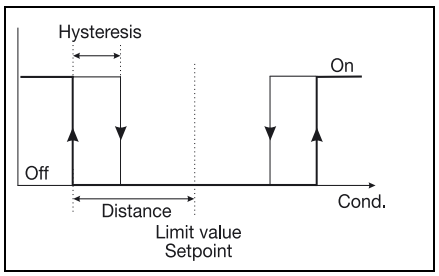
MIN limit comparator



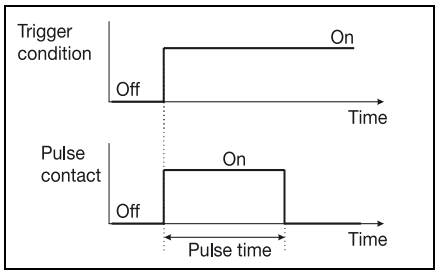
Alarm window 1



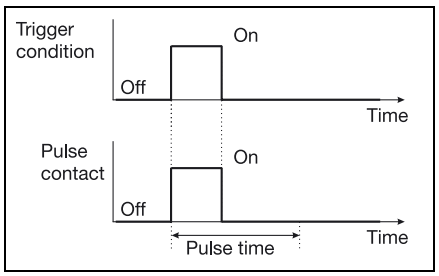
Alarm window 2



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	open
	Range2/TC2	closed	open
	Range3/TC3	open	closed
	Range4/TC4	closed	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)

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^2 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_3 (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.

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[1]	

[1] not compensated for temperature

Note:
The overall tolerance is made up of the tolerance of the transmitter + the tolerance of the sensor.

Temperature transmitter

Temperature acquisition
manually -20.0 to 25.0 to 150°C/°F
or automatically

Temperature measuring range
-20.0 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_{09} ≤ 6 sec
with internal temperature sensor
t_{09} ≤ 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
-10 to +100°C max.

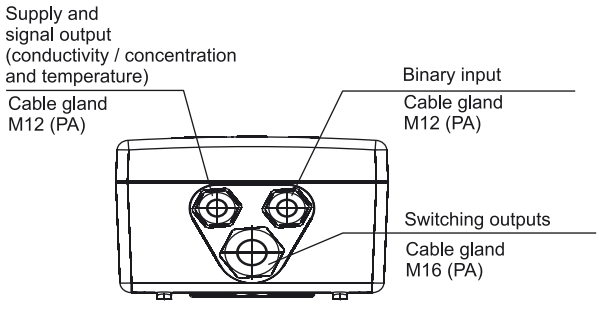
Pressure
10 bar max. at 20°C
6 bar max. at 60°C

Measuring range Sensor	Tolerance (in % of range span)
0 — 500 µS/cm	≤1%
0 — 1000 µS/cm	
0 — 2000 µS/cm	≤0.5%
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[1]	

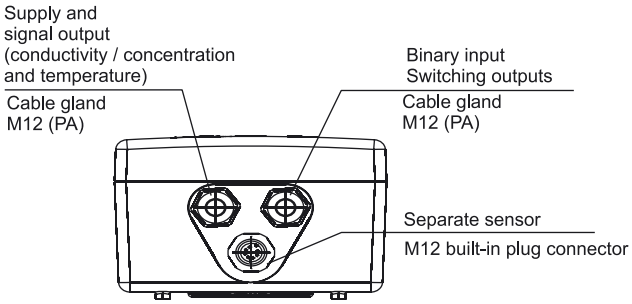
[1] not compensated for temperature

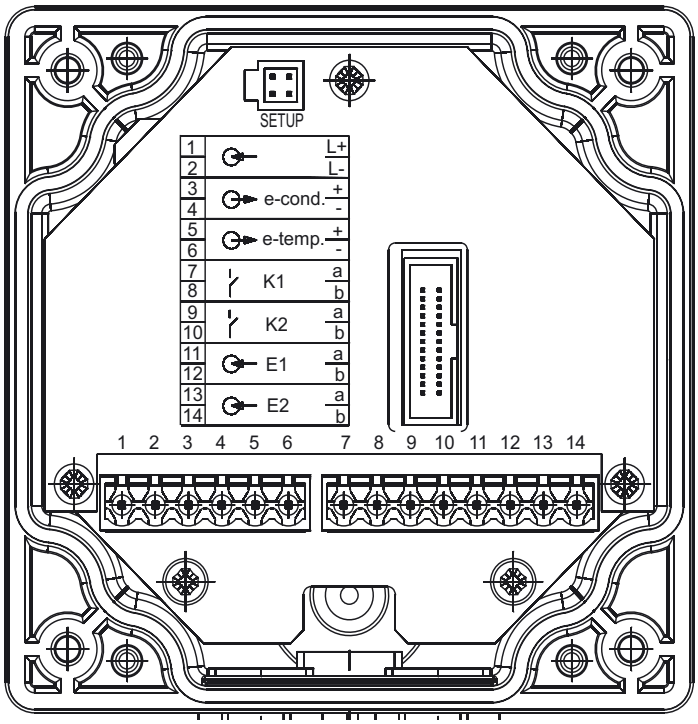
Electrical connection - head transmitter (transmitter with cable glands (-82))

Wiring recommendation - head transmitter



Wiring recommendation - with separate sensor





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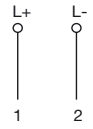
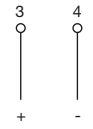
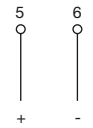
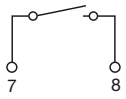
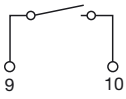
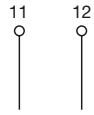
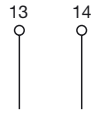
e-mail: info@jumo.us
Internet: www.jumo.us

Supply	**Terminal assignment**		**Symbol**
Supply (with reverse-polarity protection)	1 2	L + 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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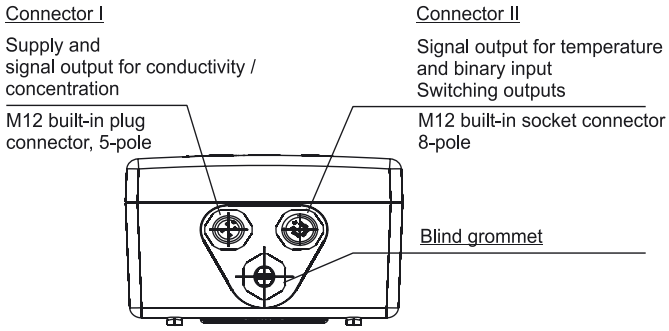
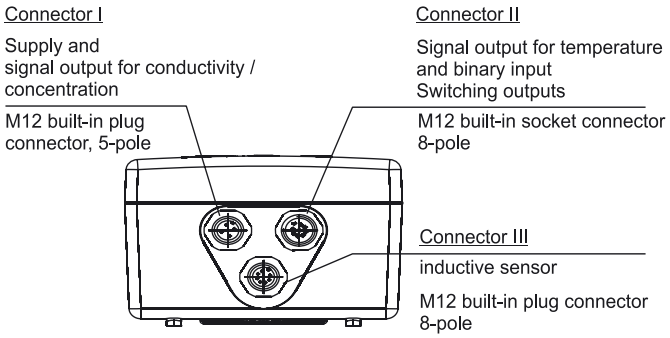
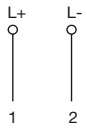
Electrical connection (transmitter with M12 connectors (-83))

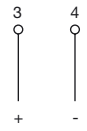
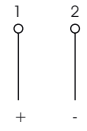
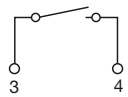
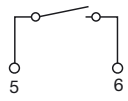
Head transmitter

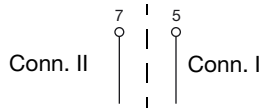
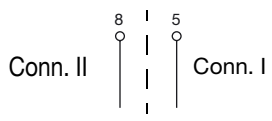


Transmitter with separate sensor



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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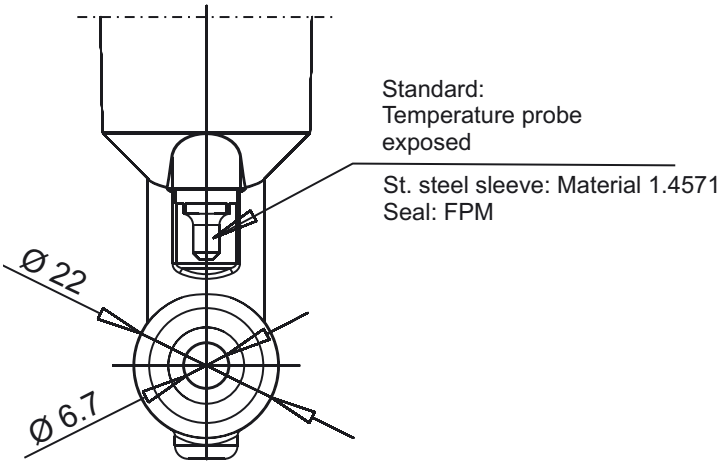
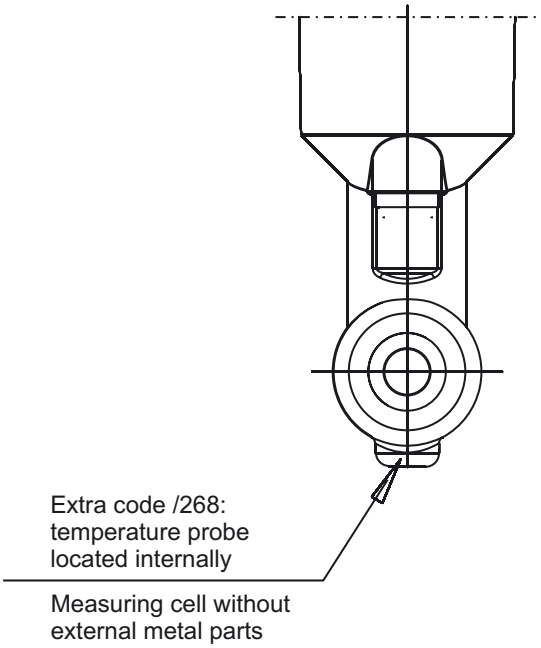
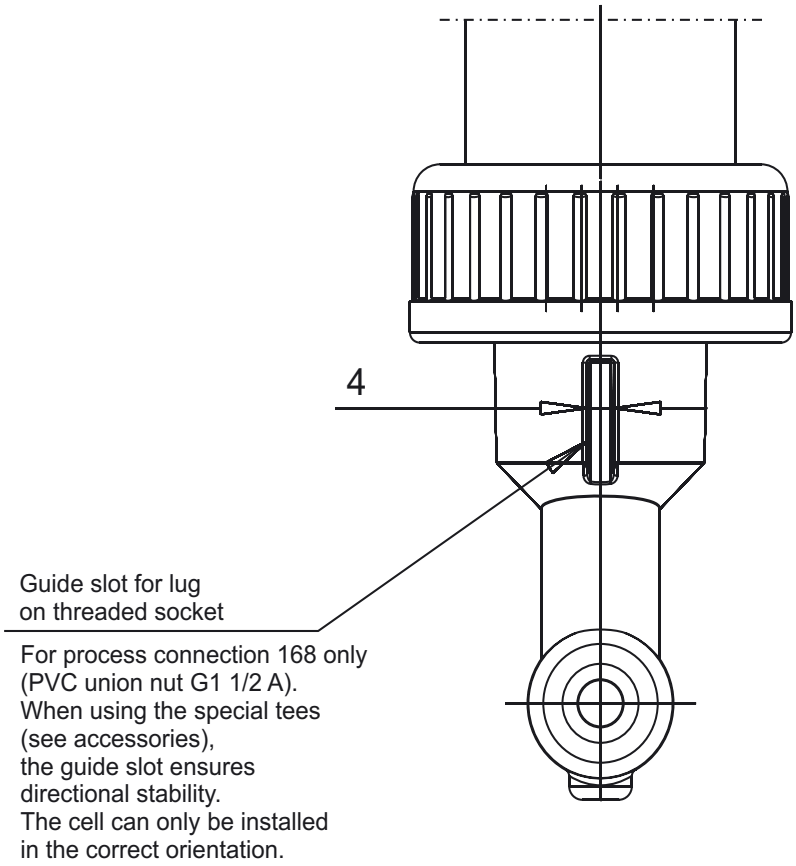
Dimensions

Sensor (detail)







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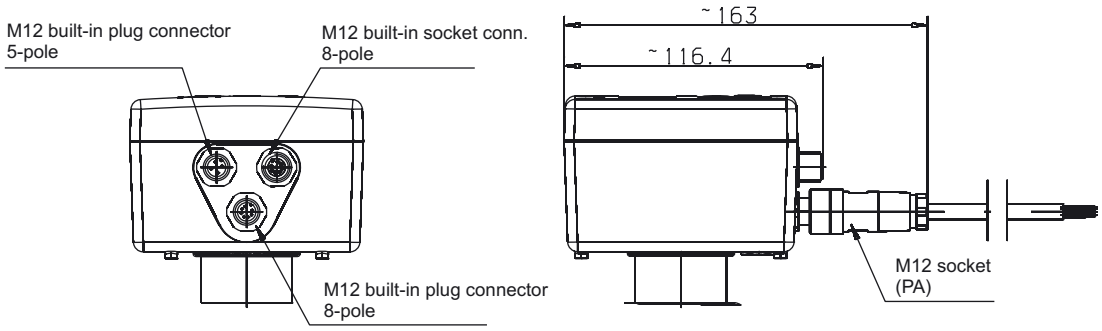
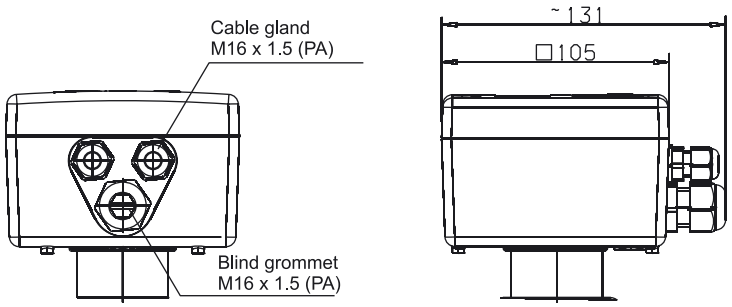
Dimensions

Transmitter with M12 plug connectors and M12 socket connectors



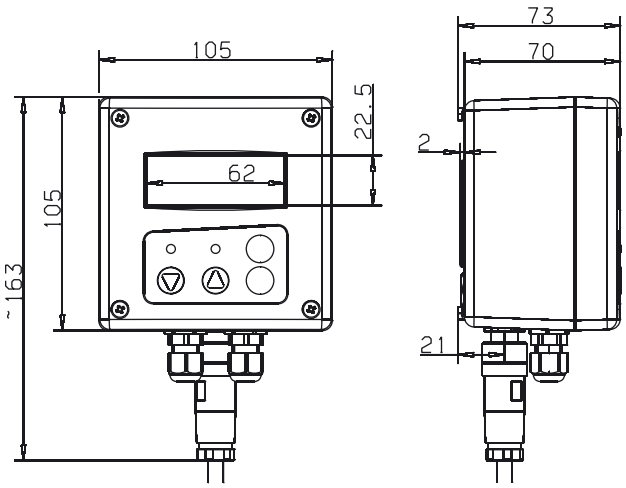
Transmitter with M16 cable gland

(only for the "head transmitter" model)

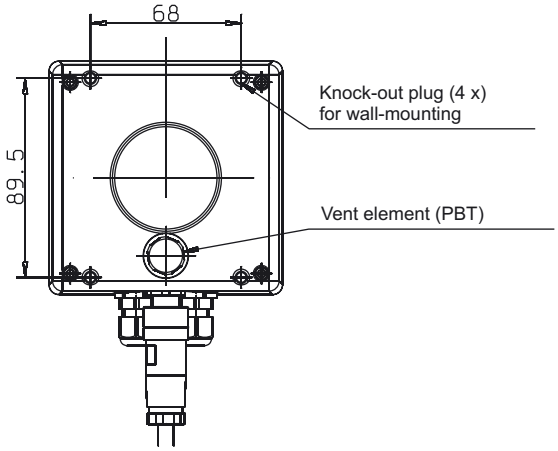


Version:
Transmitter with separate sensor (split version)

(basic type extensions /20, /25, /60 or /65)



Drilling diagram



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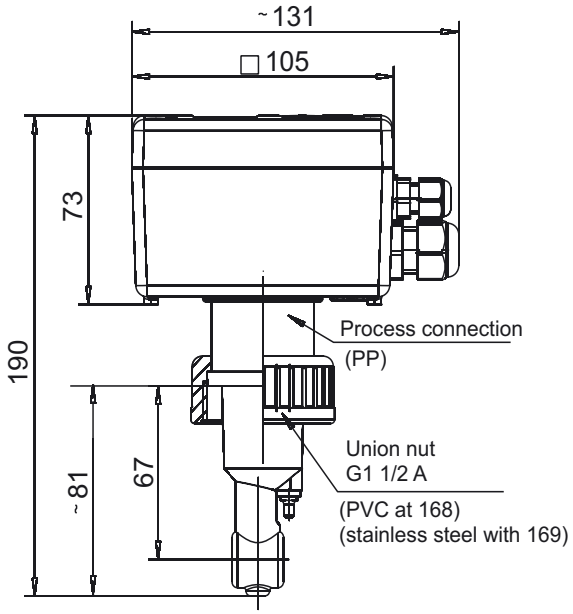
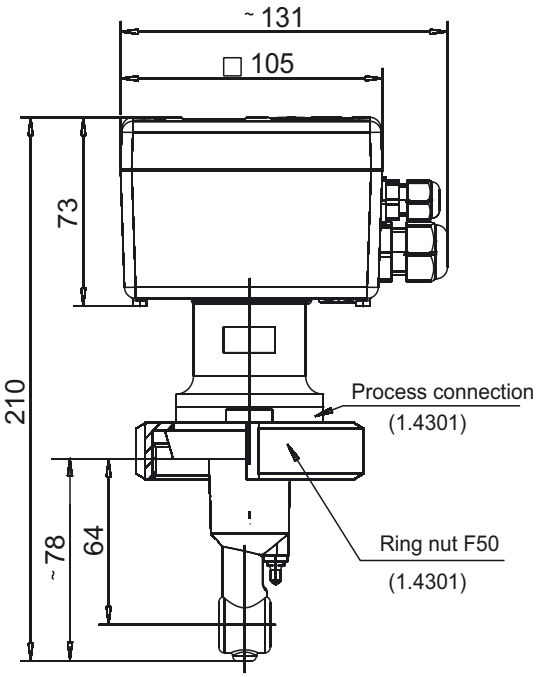
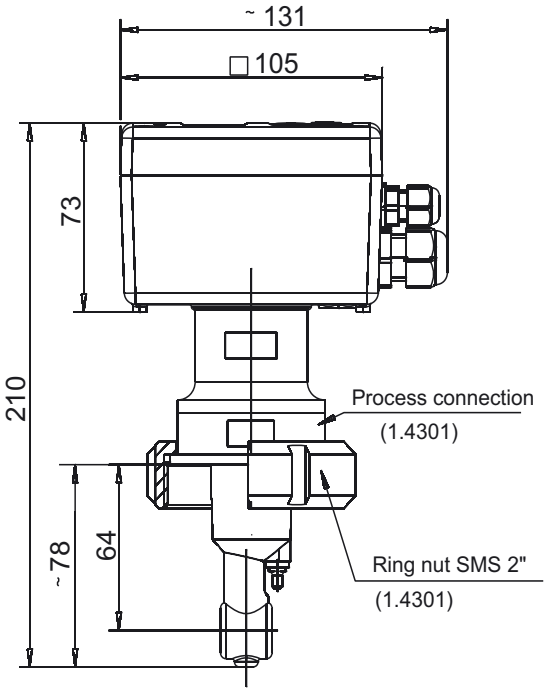
Dimensions / Process connections (head transmitter)



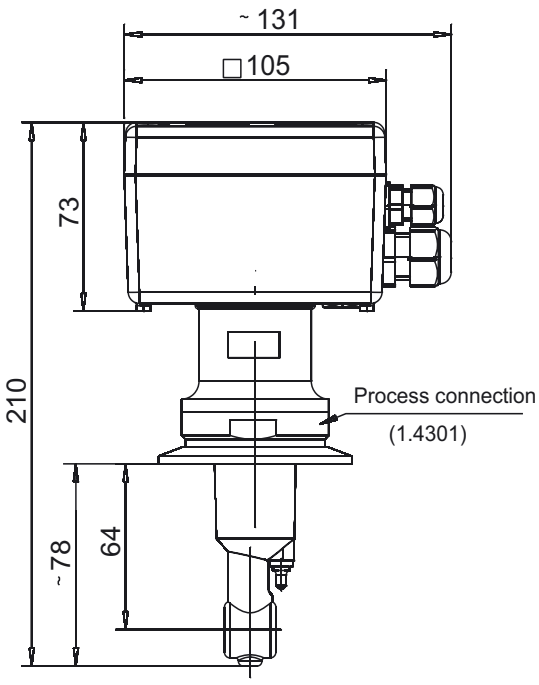
Version with
process connection 168
DN32 and DN40



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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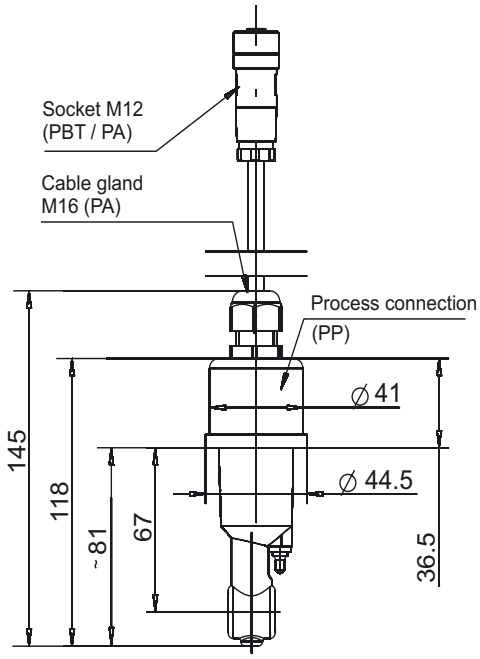
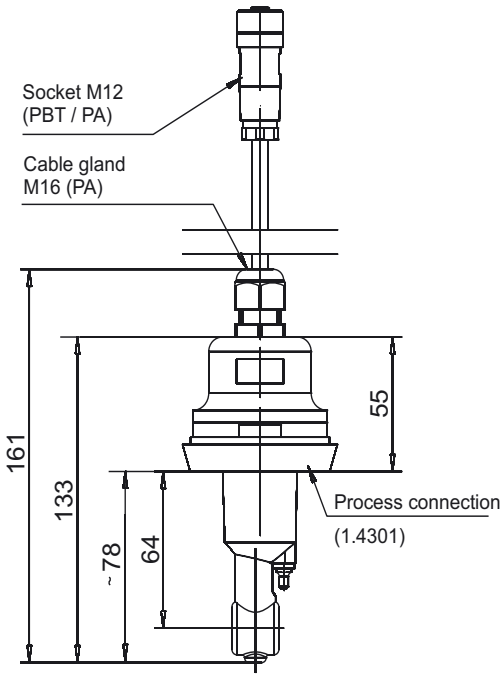
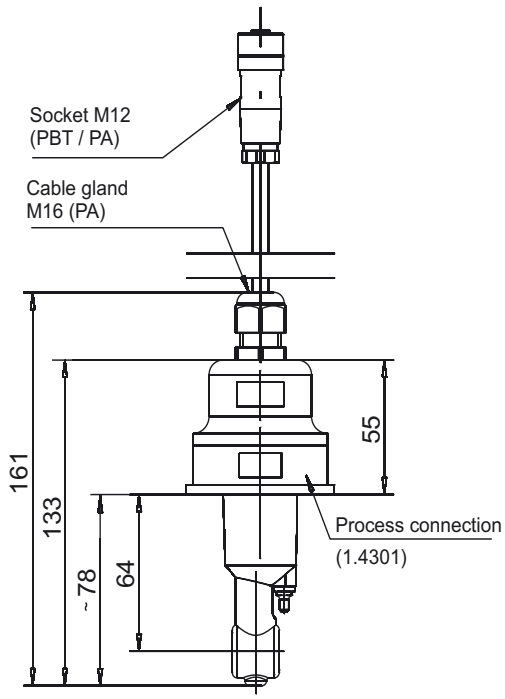
Dimensions / Process connections (separate sensor)



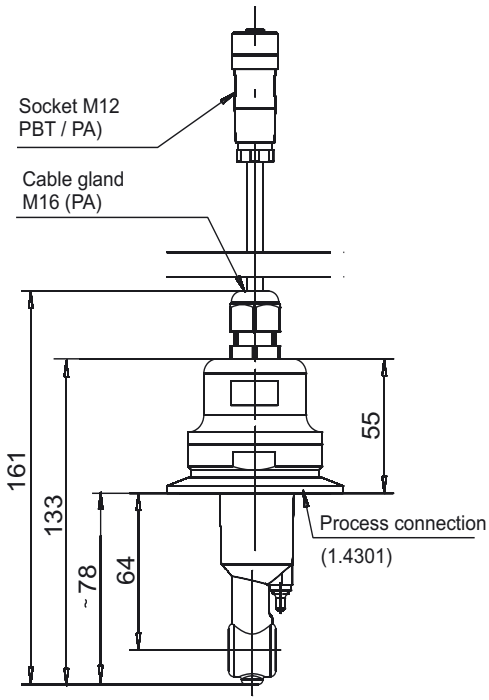
Split version
for process connection 168
DN32 and DN40
(union nut not included
in delivery)



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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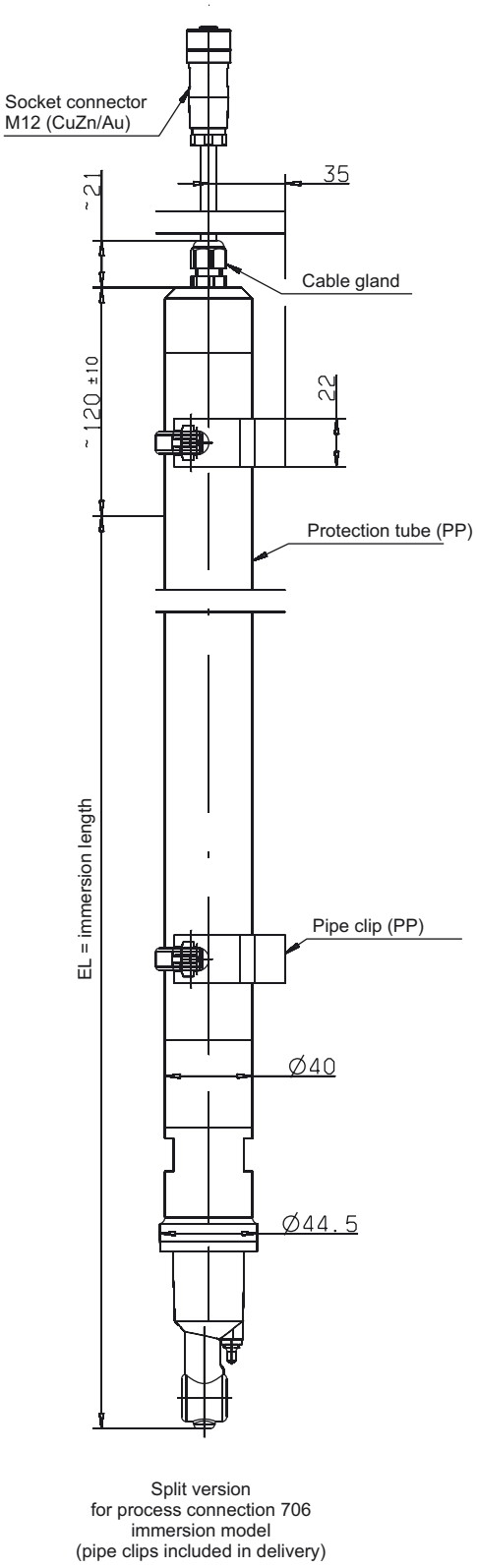
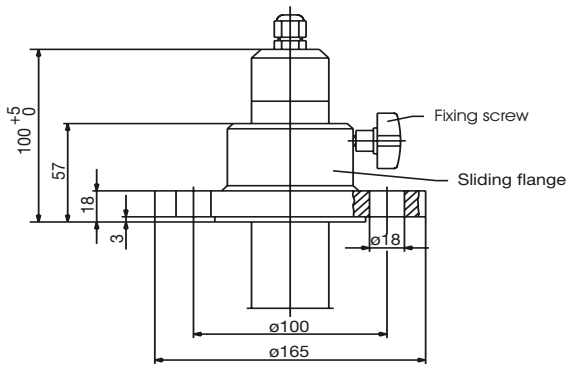
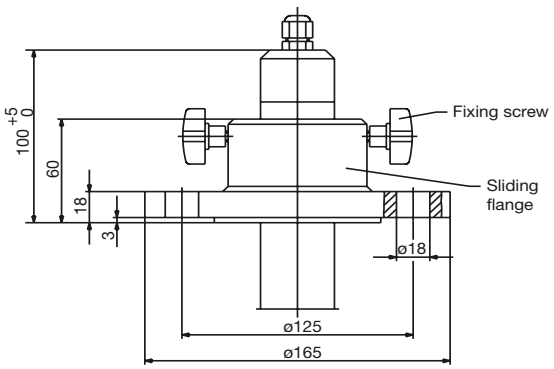
Dimensions (separate sensor as immersion model)



Split version
for process connection 706
immersion model
(pipe clips included in delivery)



Optional accessory:
flange DN32, Sales No. 20/00083375



Optional accessory:
flange DN50, Sales No. 20/00083376

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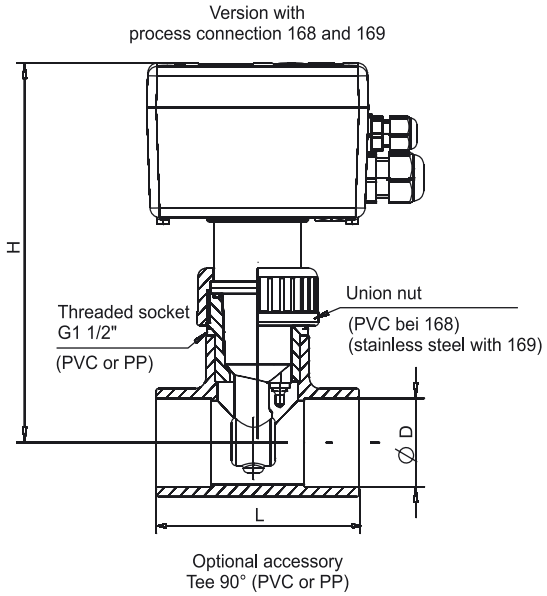
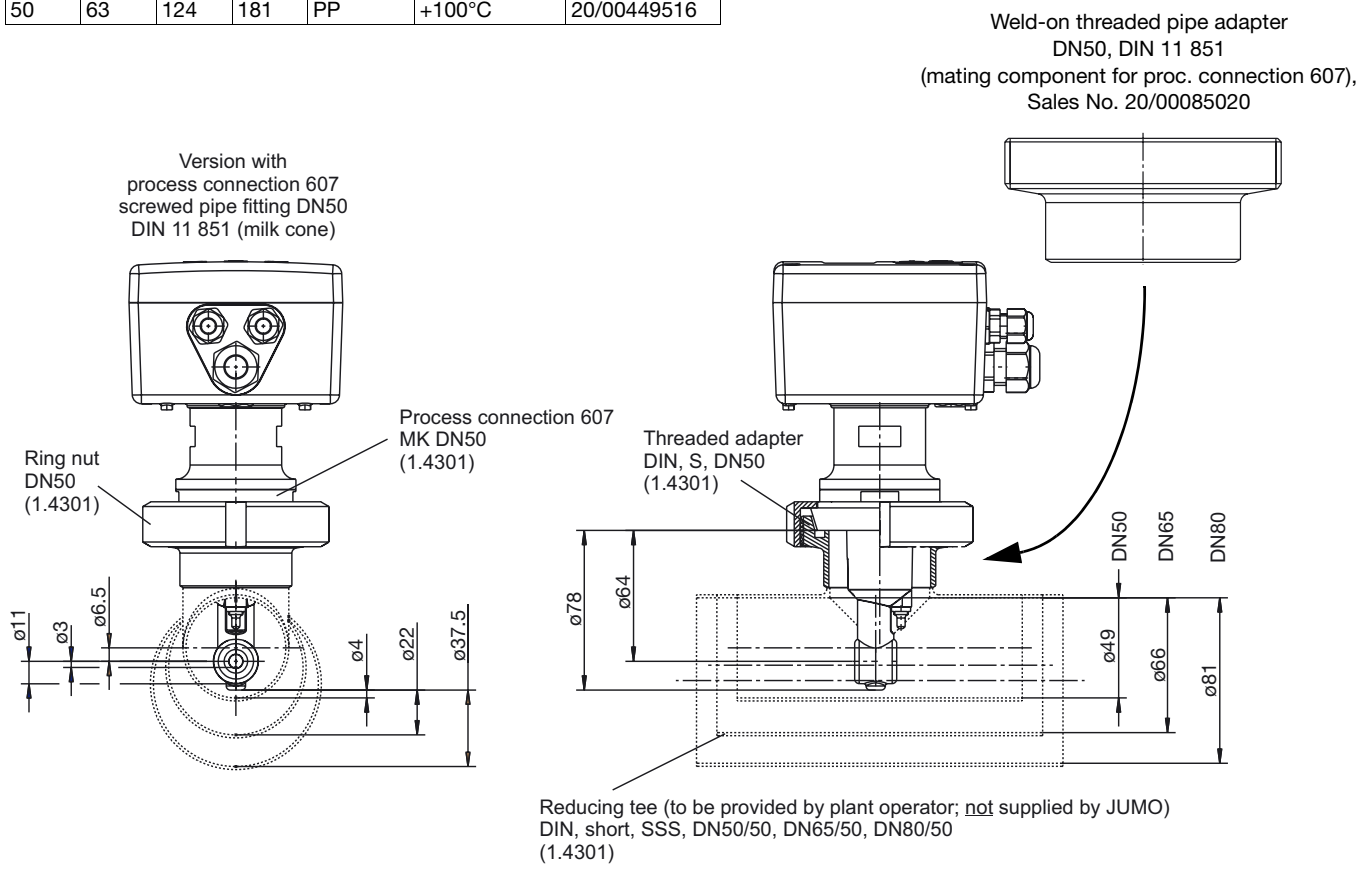
Mounting examples



DN	ø D	L	H	Material	Maximum temperature	Sales No.
32	40	98	172	PVC	+60°C	20/00439247
40	50	118	177	PVC	+60°C	20/00439249
32	40	88	179	PP	+100°C	20/00449511
40	50	102	181	PP	+100°C	20/00449514
50	63	124	181	PP	+100°C	20/00449516



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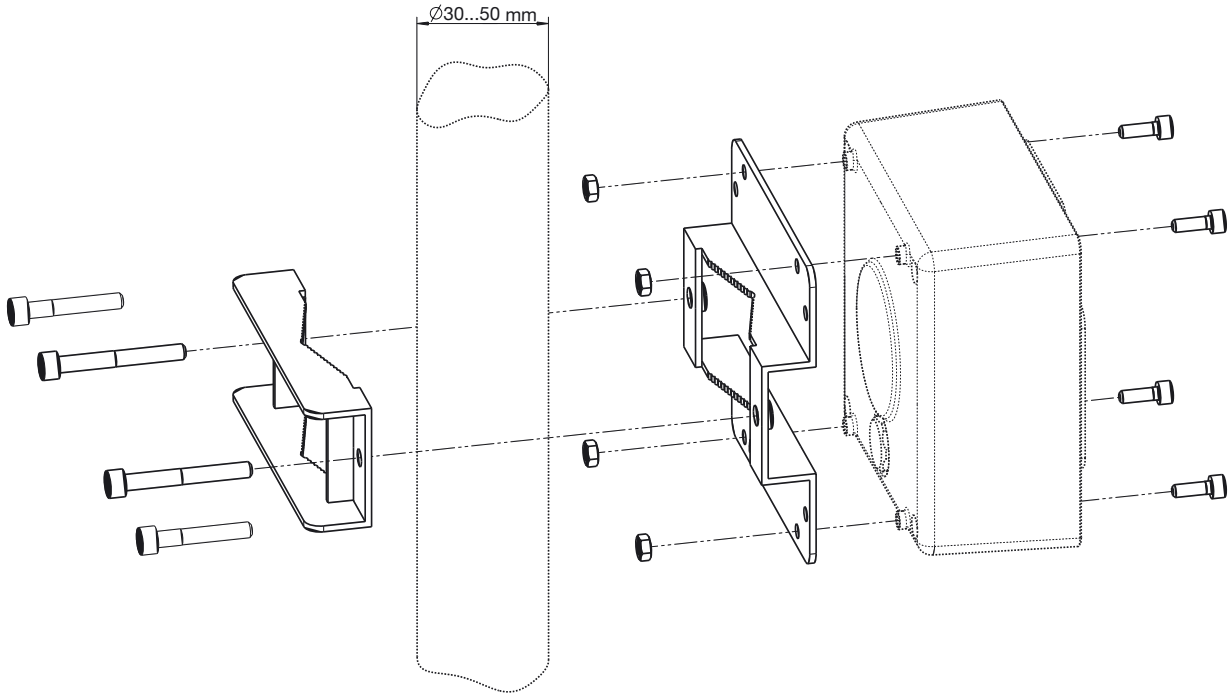
Kit for pipe mounting



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Order details: CTI-500 as "Head transmitter"

			(1)	**Basic type**
		202755		JUMO CTI-500 Inductive transmitter/ switching device for conductivity/ concentration and temperature
			(2)	**Basic type extensions**
		10		head transmitter without display/keypad [1]
		15		head transmitter with display/keypad
			(3)	**Process connection**
o	o	168		PVC union nut G1 1/2 A [2, 6]
o	o	169		stainless steel union nut G1 1/2 A [2]
o	o	607		screwed pipe fitting DN50, DIN 11 851(MK DN50, milk cone)
o	o	617		clamp connection 2 1/2"
o	o	690		SMS 2"
			(4)	**Immersion length**
o	o	000		see dimensions
			(5)	**Electrical connection**
o	o	82		cable glands
o	o	83		M12 plug/socket connectors (instead of the cable glands) [3]
o	o	84		two M16 cable glands and one blind grommet
			(6)	**Extra codes[4]**
x	x	000		no extra code
o	o	268		internal temperature sensor
o	o	580		1 set M12 plug/socket connectors
o	o	844		supply voltage 24 V AC
o	o	768		cell material PVDF[5]
o	o	844		supply 24 AC V ±10%

x = standard
o = available as an option

	(1)		(2)		(3)		(4)		(5)		(6)		(6)
Order code		/		-		-	000	-		/		,	...
Order example	202755	/	10	-	108	-	000	-	82	/	000		

[1] The PC setup program is required for programming the instrument, see accessories
[2] Special tee is not included in delivery, see accessories
[3] If required, order extra code /580
[4] List extra codes in sequence, separated by commas
[5] Only with process connections 168 and 169, in combination with extra code 268
[6] Maximum temperature of medium: 60°C
[7] Mounting items (mounting brackets) do not come with delivery. If required, please include in your order (accessories)

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Order details: CTI-500 as "Transmitter with separate sensor"

						(1)	**Basic type**
					202755		JUMO CTI-500 Inductive transmitter/switching device for conductivity/ concentration and temperature
						(2)	**Basic type extensions**
					20		transmitter without display/keypad (without sensor) [1]
					25		transmitter with display/keypad (without sensor) [7]
					60		transmitter without display/keypad including sensor (cable length: 10 m) [1]
					65		transmitter with display/keypad including sensor (cable length: 10 m)
					80		replacement sensor with a 10 m long cable without transmitter, including adjustment set [3, 7]
						(3)	**Process connection**
x	x				000		not available
		o	o	o	168		PVC union nut G1 1/2A (media temperature: 60°C max.) [2, 8]
		o	o	o	169		stainless steel union nut G1 1/2A [2]
		o	o	o	607		screwed pipe fitting DN50, DIN 11 851(MK DN50, milk cone)
		o	o	o	617		clamp connection 2 1/2" [3]
		o	o	o	690		SMS 2" [3]
		o	o	o	706		immersion model
						(4)	**Immersion length**
x	x				000		not available
		o	o	o	500		500 mm
		o	o	o	1000		1000 mm
		o	o	o	1500		1500 mm
		o	o	o	2000		2000 mm (max. length)
		o	o	o	xxxx		special length (in 250 mm steps; e.g. 0250; 0750; 1250; 1750)
						(5)	**Electrical connection**
				x	21		attached cable with M12 socket connector on separate sensor
o	o	o	o		82		cable glands on the operating unit
o	o	o	o		83		M12 plug/socket connectors on operating unit [4]
o	o	o	o		84		two cable glands and one blind grommet
						(6)	**Extra codes[5]**
x	x	x	x	x	000		no extra code
		o	o	o	268		internal temperature sensor
o	o	o	o		580		1 set M12 plug/socket connectors
		o	o		768		cell material PVDF [6]
o	o	o	o		844		supply voltage 24 V AC

x = standard
0 = available as an option

	(1)		(2)		(3)		(4)		(5)		(6)		(6)
Order code	202755	/		-		-		-		/		,	...
Order example	202755	/	65	-	108	-	1000	-	21	/	000		

[1] The PC setup program is required for programming the instrument, see accessories
[2] Special tee is not included in delivery
[3] Mounting items (union/ring nuts, mounting brackets) do not come with delivery. If required, please include in your order (accessories)
[4] If required, order extra code /580
[5] List extra codes in sequence, separated by commas
[6] Only with process connections 168 and 169, in combination with extra code 268
[7] A calibration kit is absolutely essential for commissioning. If required, please include in your order (accessories)
[8] Maximum temperature of medium: 60°C

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Stock items (shipment: 3 days after receipt of order)

Type	Sales No.
202755/15-168-0000-82/000	20/00445843
202755/15-607-0000-82/000	20/00445845

Production items (shipment: 10 days after receipt of order)

Type	Sales No.
202755/65-607-0000-82/000	20/00445840

Accessories

Type		Sales No.
Weld-on threaded adapter DN50, DIN 11 851 (mating component for process connection -607)		20/00085020
Special tee[1] DN32, PVC, including threaded socket (60°C max.) (mating component for process connection -168)		20/00439247
Special tee[1] DN40, PVC, including threaded socket (60°C max.) (mating component for process connection -168)		20/00439249
Special tee[1] DN32, PP, including threaded socket (100°C max.) (mating component for process connection -169)		20/00449511
Special tee[1] DN40, PP, including threaded socket (100°C max.) (mating component for process connection -169)		20/00449514
Special tee[1] DN50, PP, including threaded socket (100°C max.) (mating component for process connection -169)		20/00449516
Union nut G1 1/2, PVC		20/00439199
Union nut G1 1/2, stainless steel		20/00452039
Ring nut DN50, DIN 11 851		20/00343368
Ring nut SMS DN2"		20/00345162
Flange DN32 [2], material: PP		20/00083375
Flange DN50 [2], material: PP		20/00083376
Kit for pipe mounting		20/00459189
M12 socket connector, 5-pole, straight, for assembly by user	necessary for versions 202755/xx-xxx-xxxx-83/xxx [3]	20/00444313
M12 plug connector, 8-pole, straight, for assembly by user	necessary for versions 202755/xx-xxx-xxxx-83/xxx [3]	20/00444307
M12 socket connector, 8-pole, straight, for assembly by user	replacement part for sensor 202755/80...	20/00444312
PC setup software for JUMO CTI-500		20/00447634
PC interface cable with TTL / RS232 converter and adapter (serial connection cable)		70/00350260
PC interface cable with USB / TTL converter and two adapters (USB connection cable)		70/00456352
Switched-mode power supply, Type PS5R-A24	SMPS for DIN rail mounting input voltage 100 — 240 VAC / 50 — 60 Hz output voltage 0.3 A 24 VDC	20/00374661
Cover with LC display and keypad	facilitates the programming of transmitters without display and without keypad	20/00443725

[1] with anti-rotation lug - the cell can only be installed in the correct orientation
[2] only in conjunction with a separate sensor in the immersion version 202755/60-706-... or 202755/65-706-... or 202755/80-706-...
[3] not required if extra code 580 is ordered

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Inductive Conductivity/Concentration and Temperature Transmitter with switch contacts

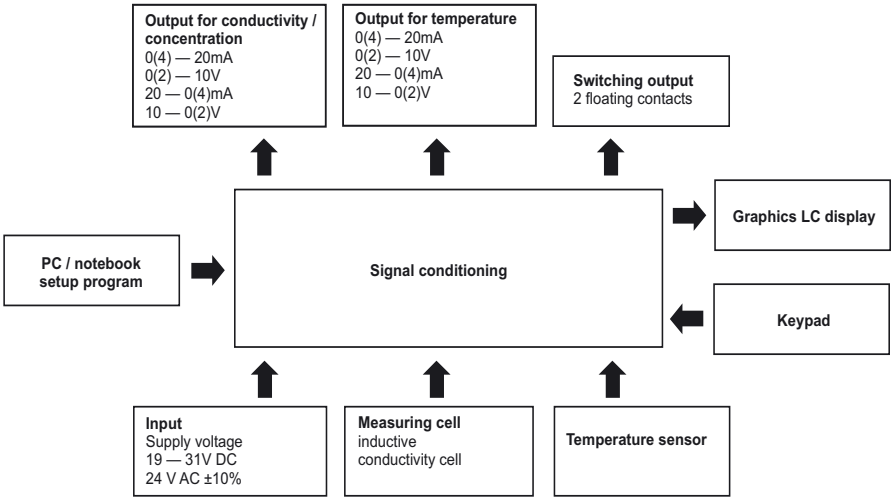
JUMO CTI-750

Type 202756

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, 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 (operator language can be changed over) or through the user-friendly PC setup program. Simply rotating the housing cover makes it possible to read the display, regardless of whether the installation is in horizontally or vertically arranged pipes. By using the setup program, the instrument configuration data for plant documentation can be saved 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-750 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.
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

- Activation of up to four ranges
- Activation of up to four temperature coefficients
- Concentration measurement of
  - caustic soda NaOH
  - nitric acid HNO_3
  - a freely definable curve (through the setup program)
- Fast-response temperature sensor
- Temperature compensation
  - linear
  - natural water
  - specific characteristic (learning function)
- Operation
  - via keypad and LC display
  - through setup program
- Operator languages: English, French, German, Italian, Dutch, Polish, Portuguese, Russian, Spanish, Schwedish
- By using the setup program:
  - user-friendly programming
  - plant documentation
- Learning function for the temperature coefficient
- Individual characteristic for concentration indication
- Dilution control

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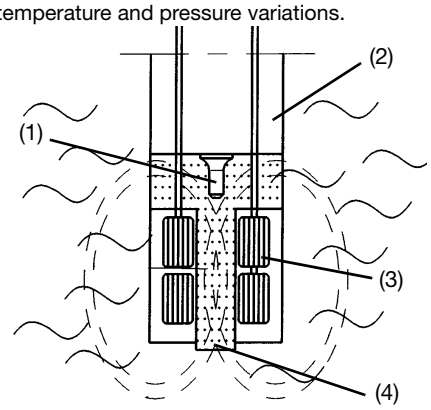
Functional description

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 polyetheretherketone (PEEK) or polyvinylidenefluoride (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 in flow-through channel
optionally: internal
(2) Cell body in PEEK or PVDF
(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).

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 liquid in the flow channel.

Transmitter

The CTI-750 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

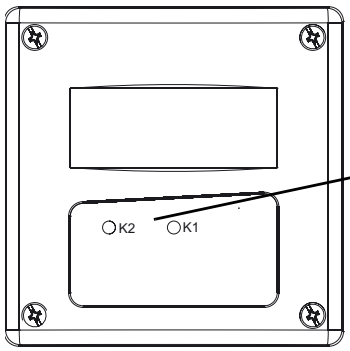
The JUMO CTI-750 can be operated either from the instrument keys and the graphics LC display and/or through the setup program from a PC or laptop.
The instrument can be secured against unauthorized alteration by a password.

Functions of the outputs

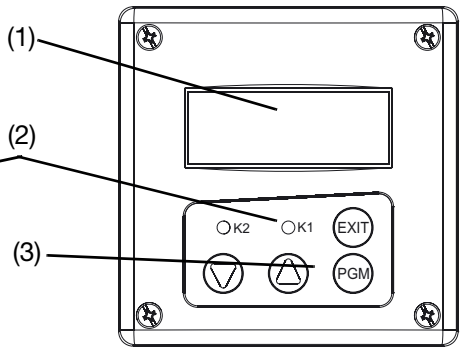
Analog outputs

- ❏ 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

(1) Graphics LC display
(2) LEDs for the switching status indication of the outputs K1 and K2
(3) Keys

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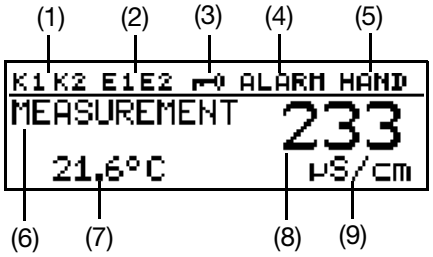
Graphics LC display



(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.

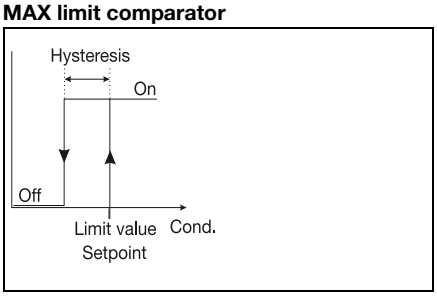
These can be used freely for monitoring the conductivity/concentration or the temperature.

The following functions can be assigned:

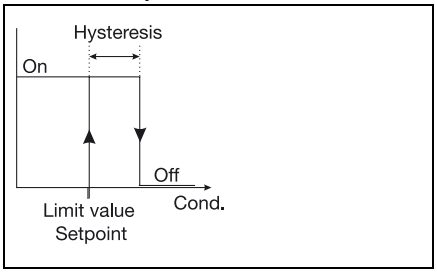
- ❏ Limit monitoring (MAX. or MIN. limit comparator) with programmable hysteresis
- ❏ Pulse function (the output switches briefly on reaching the switching point, then opens again).
- ❏ Pull-in and drop-out delay
- ❏ Inverted switching outputs
- ❏ Response to overrange/underrange or with activated measuring circuit monitoring (pull-in/drop-out)
- ❏ "Calibration timer run down" signal.

Contact functions

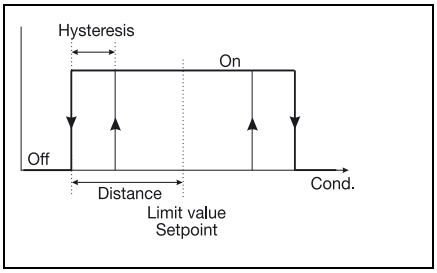
MAX limit comparator



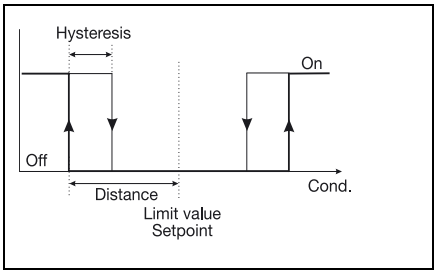
MIN limit comparator



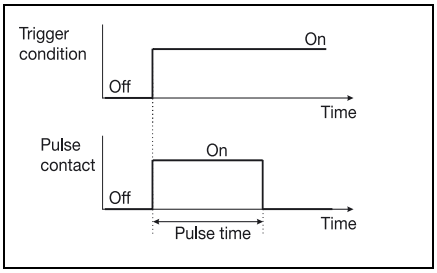
Alarm window 1



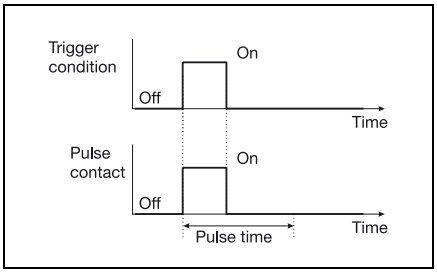
Alarm window 2



Pulse contact
Trigger conditions longer than pulse 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.
- 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
Range/temperature coefficient changeover	Range1/TC1	open	open
	Range2/TC2	closed	open
	Range3/TC3	open	closed
	Range4/TC4	closed	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

General

A/D converter
resolution: 15-bit
sampling time: 500msec = 2 meas. per sec

Supply voltage
for operation with SELV or PELV circuits as standard:
19 — 31 V DC (24 V DC nominal),
the instrument is protected against polarity reversal
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
2.5 mm^2 plug-in screw terminals or
M12 plug/socket connectors

Display (option)
graphics LCD with background lighting; contrast is adjustable,
dimensions: 62 x 23 mm

Permissible ambient temperature (transmitter)
-5 to +50°C
max. 93% relative humidity, no condensation

Permissible storage temperature (transmitter)
-10 to +75°C
max. 93% relative humidity, no condensation

Enclosure protection (transmitter)
IP67

Electromagnetic compatibility
to EN 61 326
interference emission: Class B
interference immunity: to industrial requirements

Housing
with basic type extensions 10, 15, 20, 25, 60 and 65: polyamide (PA)
with basic type extensions 16,26 and 66: stainless steel 1.4305

Weight
depending on version and process connection:
approx. 0.3 — 2 kg

Conductivity/concentration transmitter

Concentration measurement
(implemented in the device software)
- NaOH (caustic soda)
  0 — 15 % by weight or 25 — 50 % by weight
- HNO_3 (nitric acid)
  0 — 25 % by weight or 36 — 82 % by weight
- customer-specific concentration curve, freely 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 — 4 mA
The output signal is freely scalable.

Burden
≤ 500Ω for current output
≥ 2kΩ for voltage output

Ambient temperature error
≤ 0.1%/°C

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 value with a fixed setting

Measuring ranges
Four ranges can be selected. One of these ranges can be activated via an external switch or a PLC.

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[1]	

[1] not compensated for temperature

Note:
The overall tolerance is made up of the tolerance of the transmitter + the tolerance of the sensor.

Temperature transmitter

Temperature acquisition
manually -20.0 to 25.0 to +150°C/°F
or automatically

Temperature range
-20 to +150°C or °F

Characteristic
linear

Accuracy
≤ 0.5% of range

Ambient temperature error
≤ 0.1%/°C

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 — 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 +120°C (briefly to +140°C).

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Burden
≤ 500Ω for current output
≥ 2kΩ for voltage output

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 value with a fixed setting

Temperature compensation

Reference temperature
15 to 30°C, adjustable

Temperature coefficient
0.0 — 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
PEEK (polyetheretherketone)
PVDF (polyvinylidenefluoride)
Note:
Temperature, pressure and sample medium affect the life of the cell

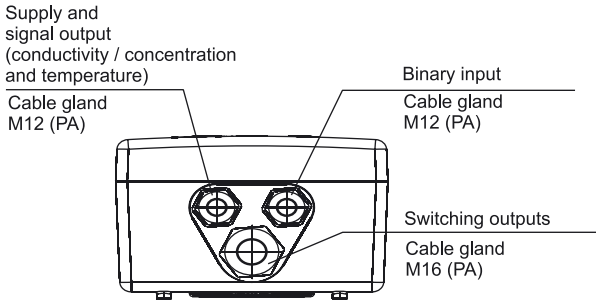
Temperature of the sample medium
-10 to +120°C
briefly +140°C (sterilization)

Pressure
10 bar max.

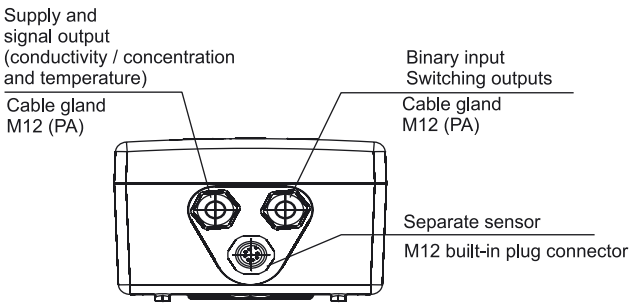
Meas. range Sensor	Tolerance (in % of range span)
0 — 500 µS/cm	≤ 1%
0 — 1000 µS/cm	
0 — 2000 µS/cm	≤ 0.5%
0 — 5000 µS/cm	
0 — 10 mS/cm	
0 — 20 mS/cm	
0 — 50 mS/cm	
0 — 100 mS/cm	
0 — 200 mS/cm	
0 — 500 mS/cm	
0 — 1000 mS/cm	≤ 1%
0 — 2000 mS/cm[1]	

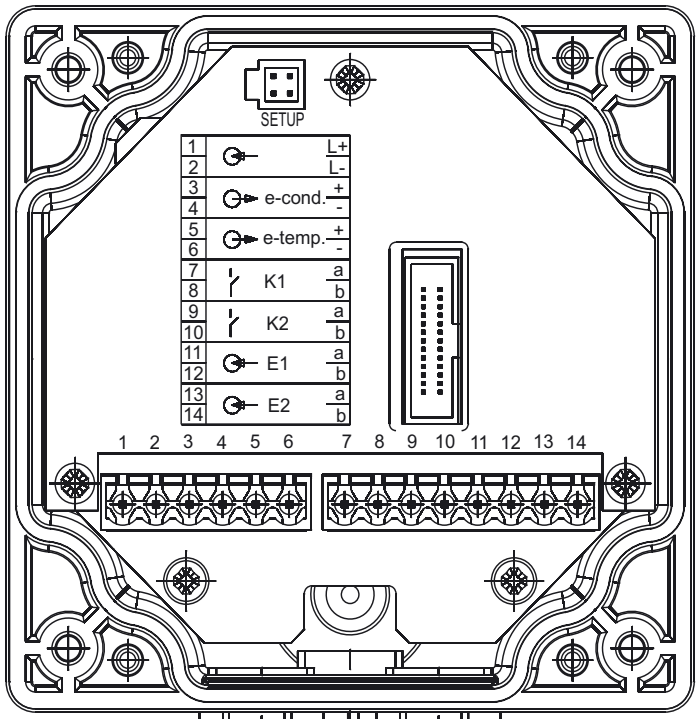
Electrical connection - head transmitter (transmitter with cable glands (-82))

Wiring recommendation - head transmitter



Wiring recommendation - with separate sensor





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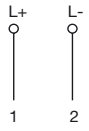
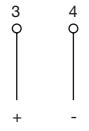
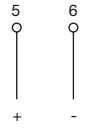
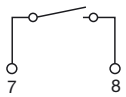
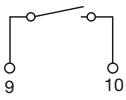
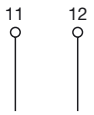
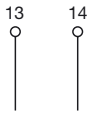
Supply	**Terminal assignment**		**Symbol**
Supply (with reverse-polarity protection)	1 2	L + L-	

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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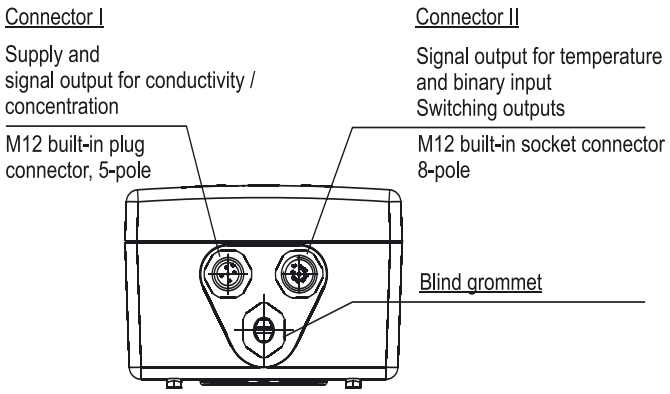
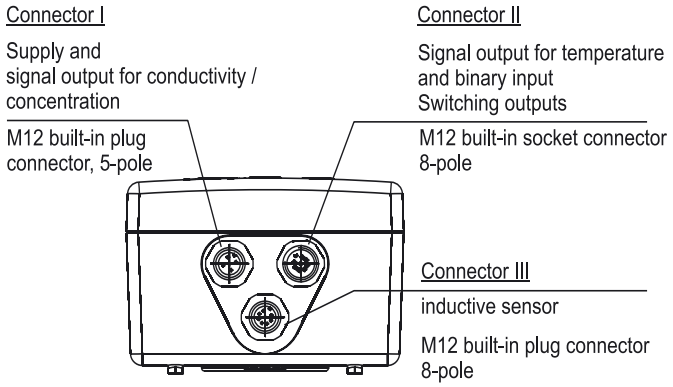
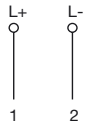
Electrical connection (transmitter with M12 connectors (-83))

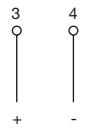
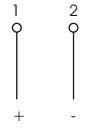
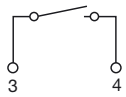
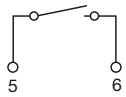
Head transmitter

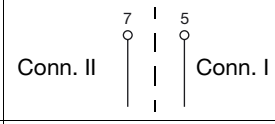
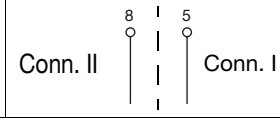


Transmitter with separate sensor



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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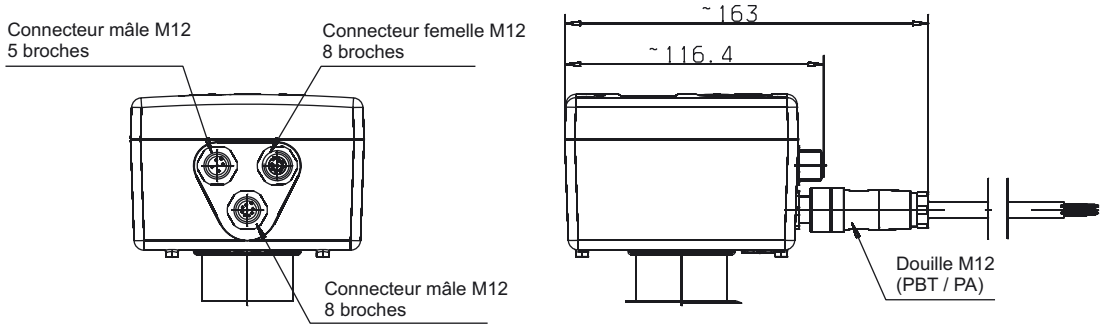
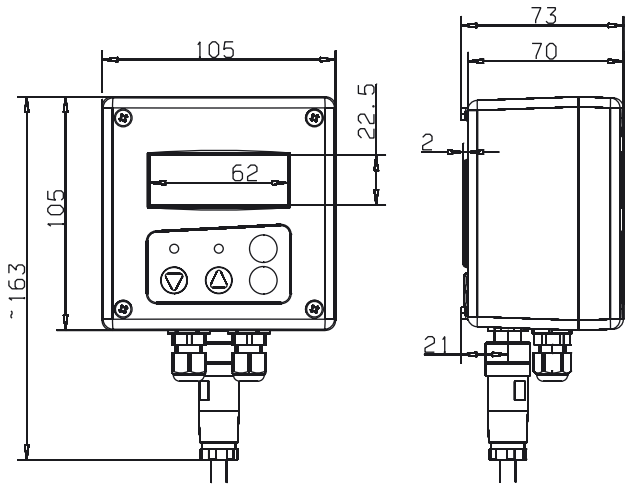
Dimensions

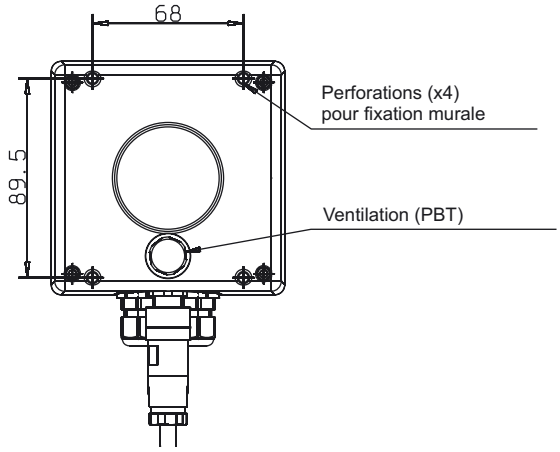
Operating unit of transmitter (head transmitter in plastic housing) with basic type extension 10 or 15 and electrical connection 83



Operating unit of transmitter (transmitter with separate sensor, in plastic housing) with basic type extension 20 or 25 and electrical connection 82



Drilling diagram



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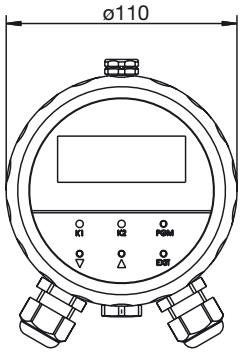
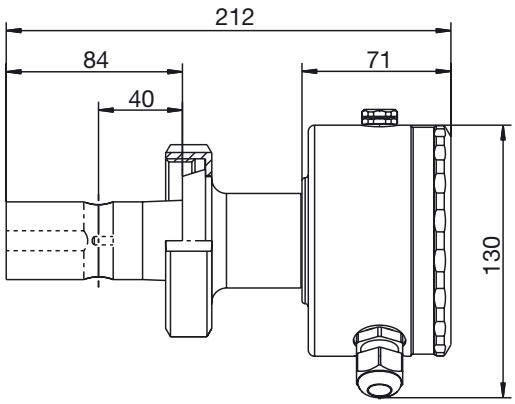
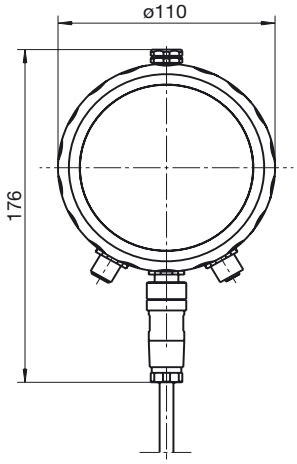
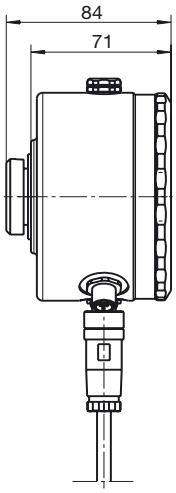
Operating unit of transmitter (head transmitter in stainless steel housing) with basic type extension 16 and electrical connection 82



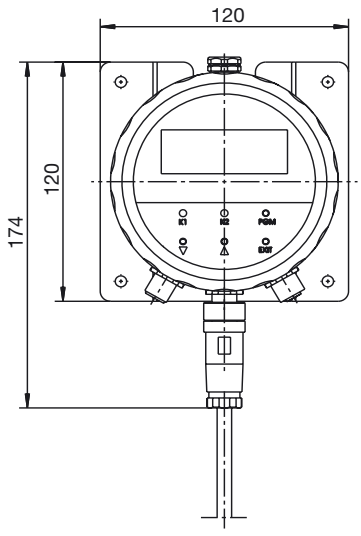


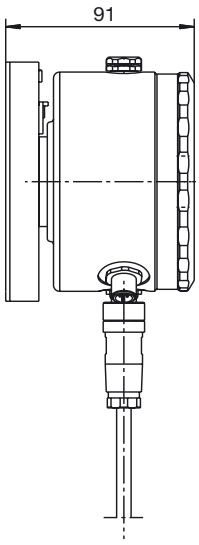
Operating unit of transmitter (transmitter with separate sensor, in stainless steel housing) with basic type extension 26 or 66 and electrical connection 83

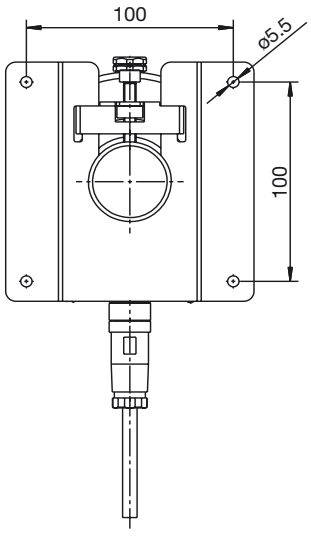




Wall mounting







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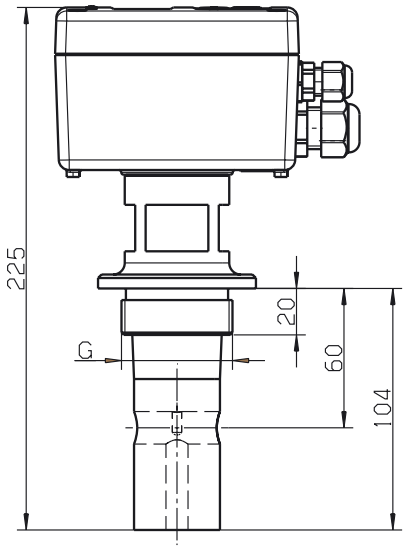
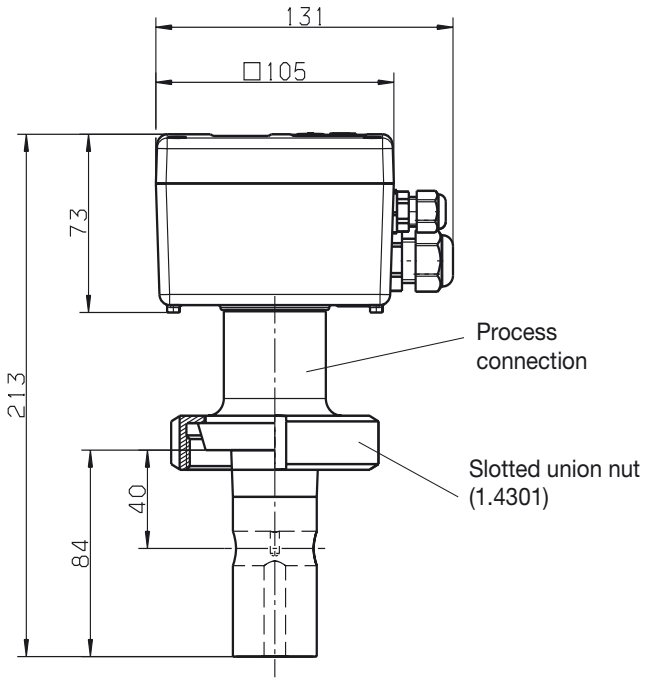
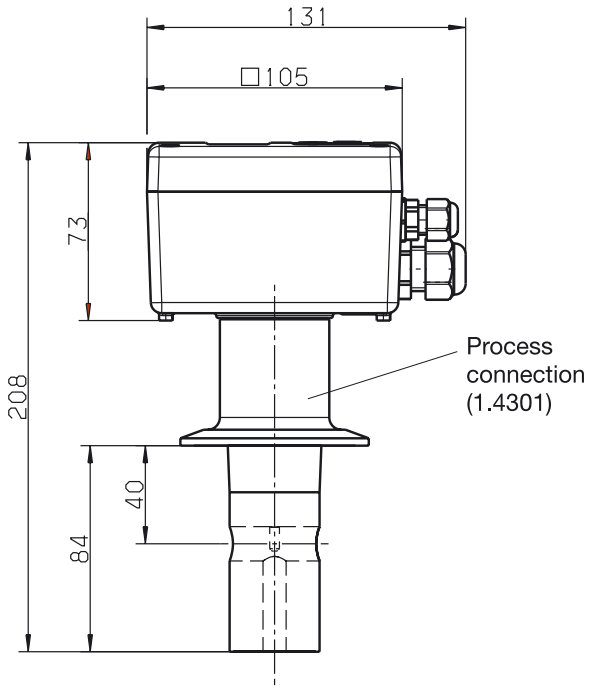
Dimensions / Process connections (head transmitter)



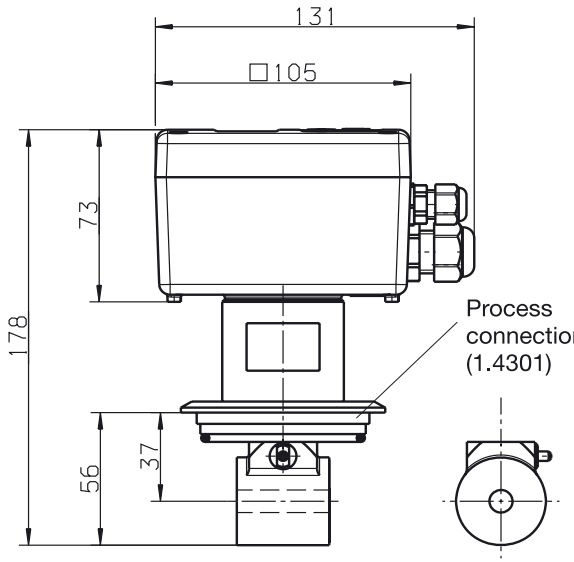
Version with process connection
107 = screw-in thread G1 1/4A
108 = screw-in thread G1 1/2A
110 = screw-in thread G2A



Version with process connection
606 = MK DN40
607 = MK DN50
608 = MK DN65
609 = MK DN80



Version with
process connection 617
clamp 2 1/2"
(retaining clip not
included in delivery)



Version with
process connection 686
VARIVENT® DN40/50

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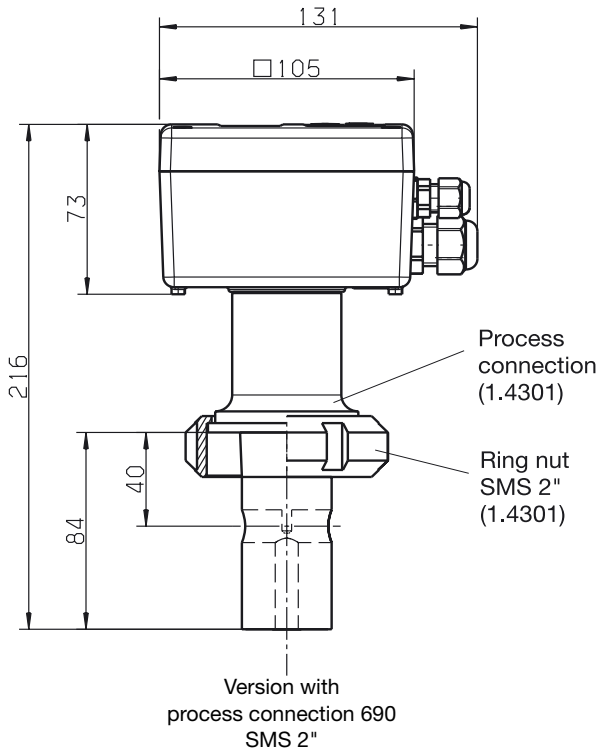
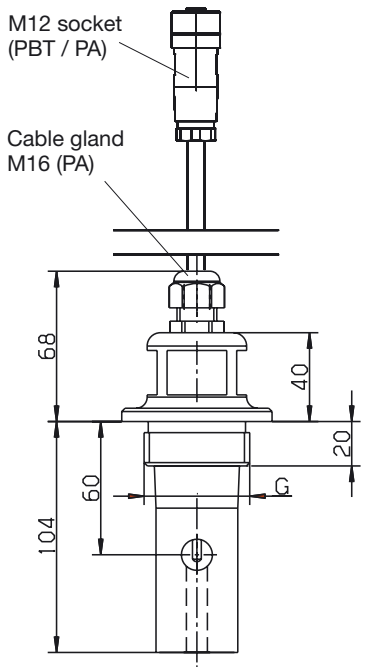
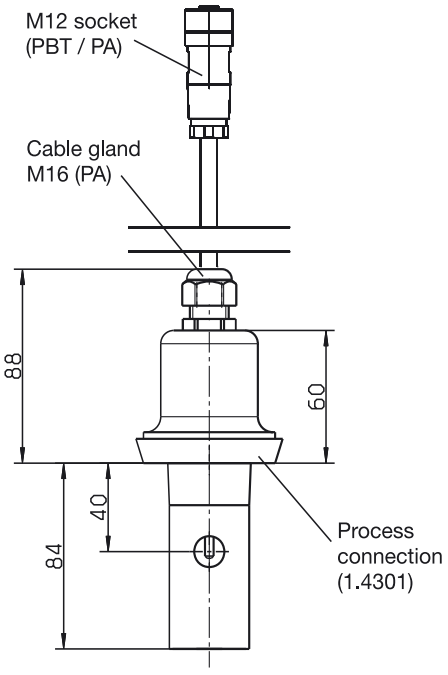


Dimensions / Process connections (separate sensor)



Split version with process connection
107 = screw-in thread G1 1/4A
108 = screw-in thread G1 1/2A
110 = screw-in thread G2A



Split version with process connection
606 = MK DN40
607 = MK DN50
608 = MK DN65
609 = MK DN80
(union nut not included in delivery)

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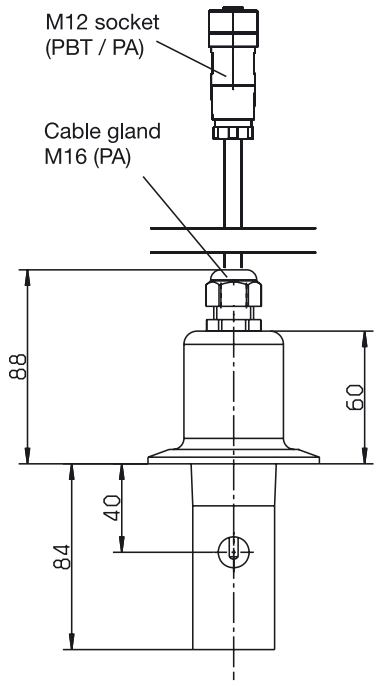
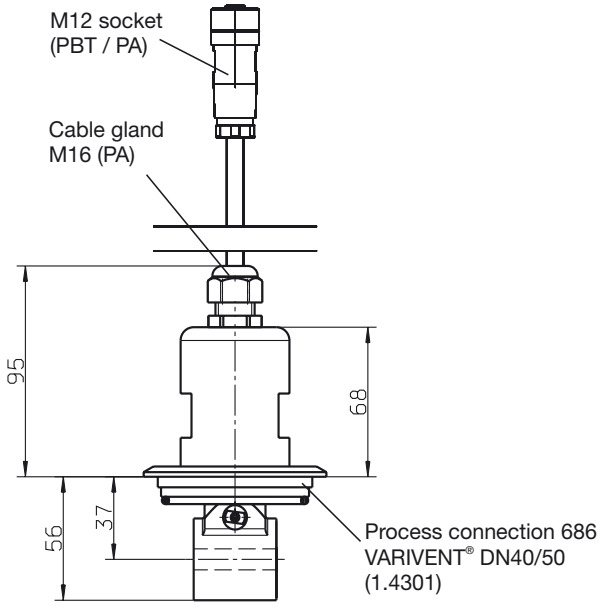
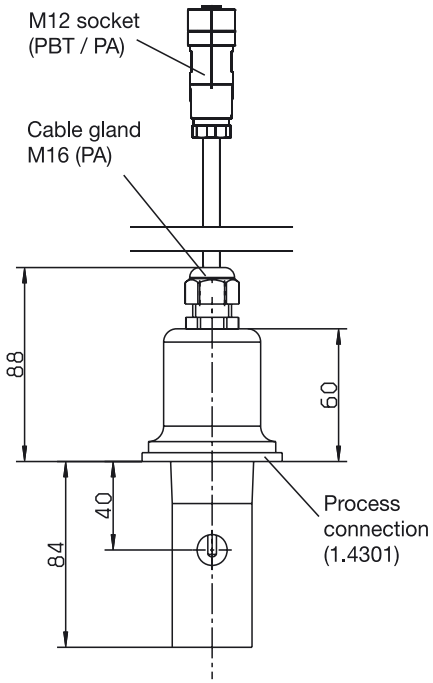


Split version with
process connection 617
clamp 2 1/2"
(retaining clip not included in delivery)



Split version with
process connection 686
VARIVENT® DN40/50
(retaining clip not included in delivery)



Split version with
process connection 690
SMS 2"
(union nut not included in delivery)

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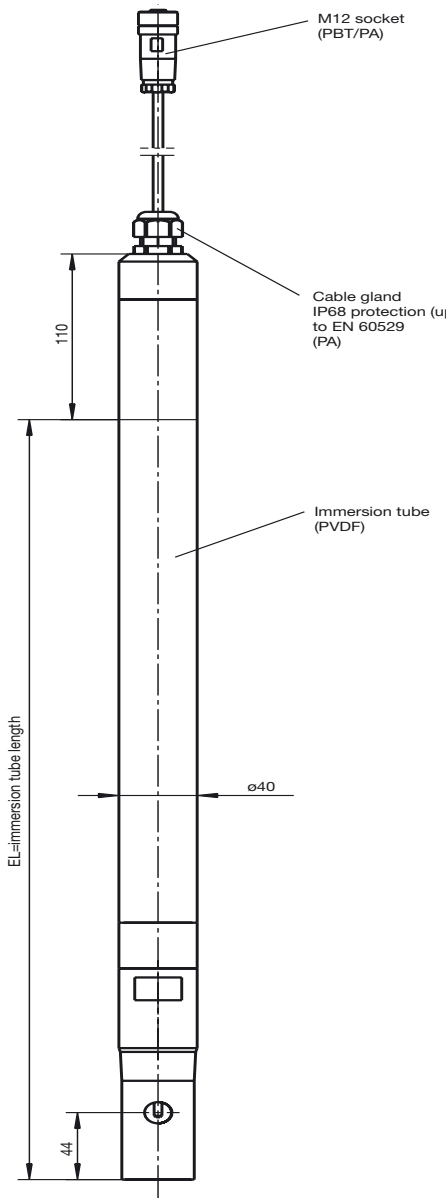
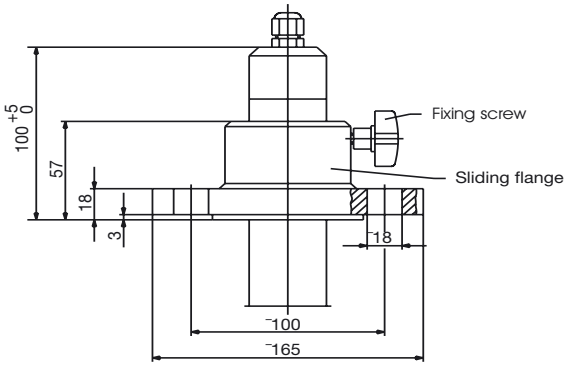
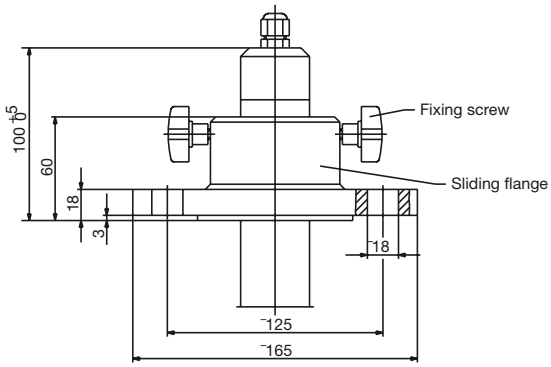


Remote (split) version with
process connection 706
immersion model
(pipe clips not included in delivery)



Optional accessory:
DN32 flange, Sales No. 20/00083375



Optional accessories:
DN50 flange, Sales No. 20/00083376

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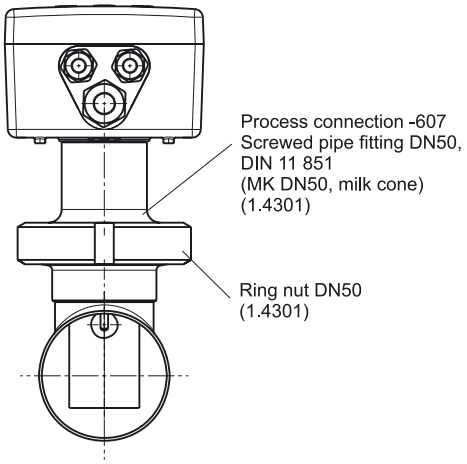
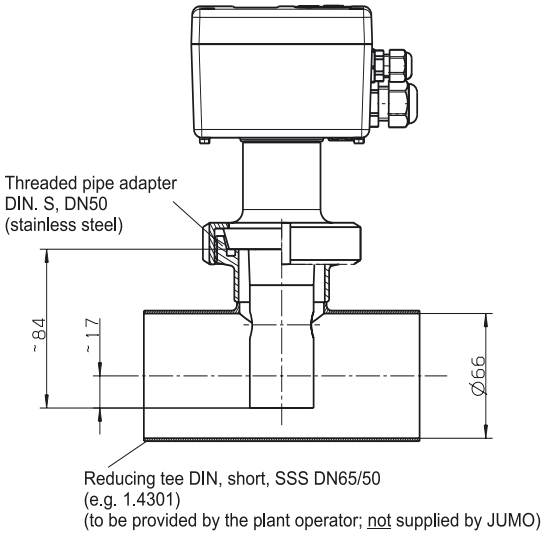
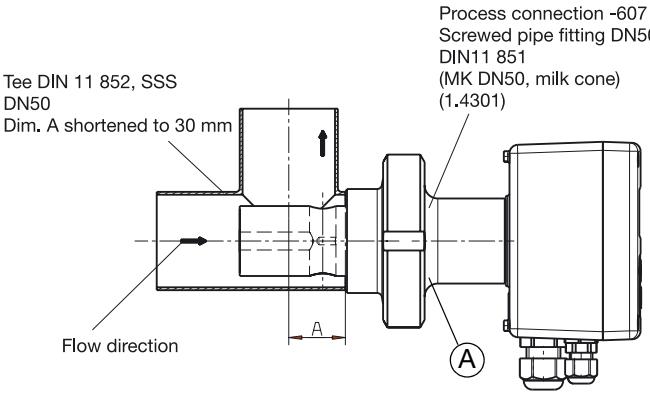
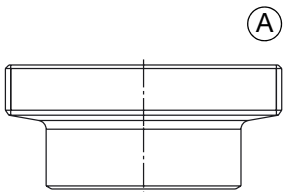
Mounting examples



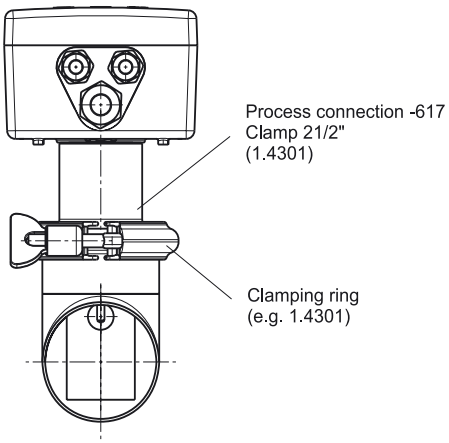


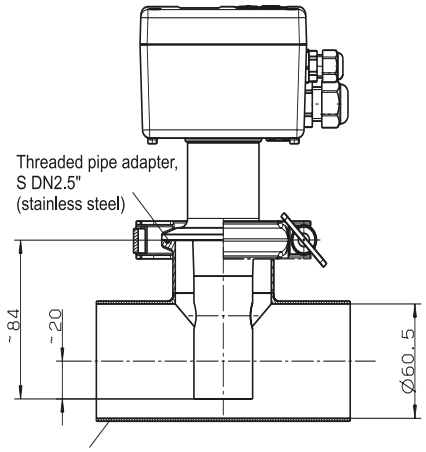
Reducing tee DIN, short, SSS DN65/50
(e.g. 1.4301)
(to be provided by the plant operator; not supplied by JUMO)





Weld-on threaded pipe adaptor
DN50, DN 11 851
(matching part for
process connection 607)
Sales No. 20/00085020





Tee, short, SSS DN2.5"
(e.g. 1.4301)
(to be provided by the plant operator; not supplied by JUMO)

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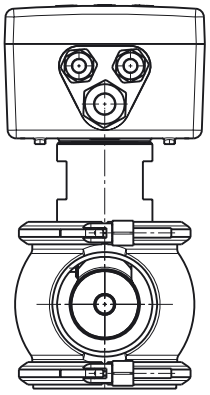
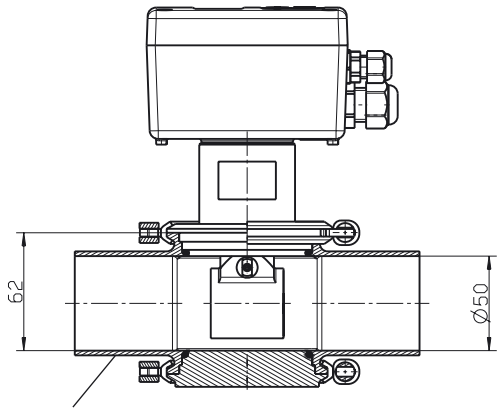
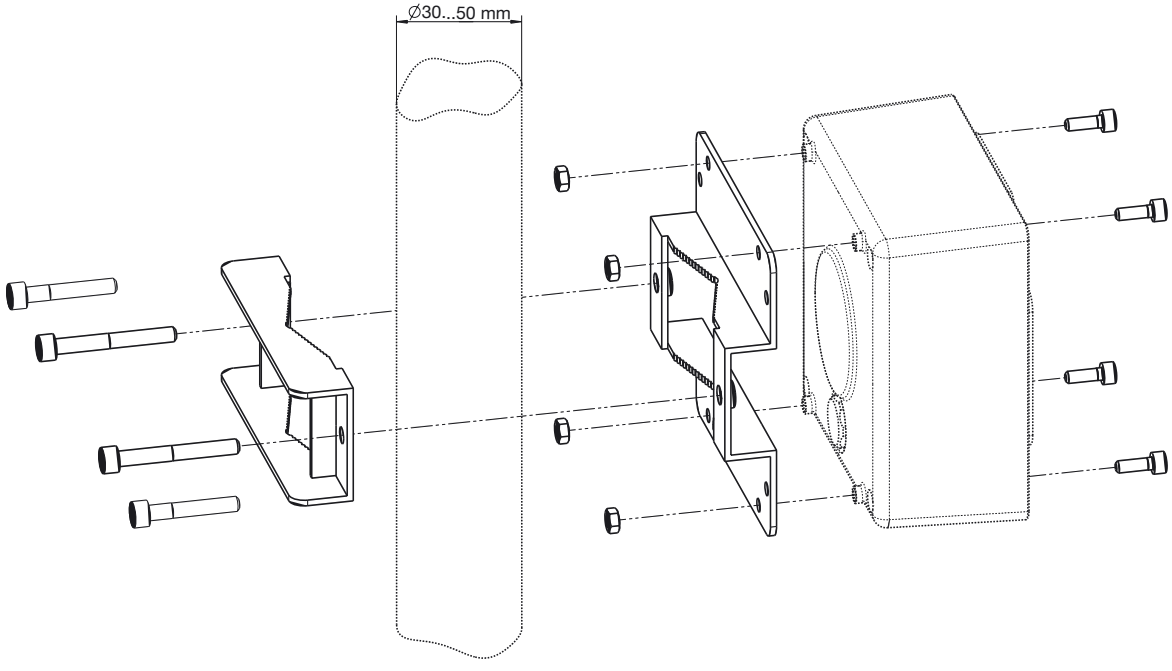




Tee, VARIVENT, DN50
(e.g. 1.4301)
(to be provided by the plant operator; not supplied by JUMO)

Kit for pipe mounting



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Order details: CTI-750 as "Head transmitter"

				(1)	**Basic type**
			202756		JUMO CTI/750 Inductive transmitter/switching device for conductivity/ concentration and temperature
				(2)	**Basic type extensions**
			10		head transmitter in plastic housing, without display/keypad [1]
			15		head transmitter in plastic housing, with display/keypad
			16		head transmitter in stainless steel housing, with display/keypad
				(3)	**Process connection**
o	o	o	107		screw-in thread G1 1/4A
o	o	o	108		screw-in thread G1 1/2A
o	o	o	110		screw-in thread G2A
o	o	o	606		DN40 screwed pipe fitting, DIN 11 851 (MK DN40, milk cone)
o	o	o	607		DN50 screwed pipe fitting, DIN 11 851 (MK DN50, milk cone)
o	o	o	608		DN65 screwed pipe fitting, DIN 11 851 (MK DN65, milk cone)
o	o	o	609		DN80 screwed pipe fitting, DIN 11 851 (MK DN80, milk cone)
o	o	o	617		clamp 2 1/2" [2]
o	o	o	686		VARIVENT® DN40/50 [3]
o	o	o	690		SMS 2"
				(4)	**Immersion length**
o	o	o	000		see "Dimensions for head transmitter"
				(5)	**Electrical connection**
o	o	o	82		cable glands
o	o	o	83		M12 plug/socket connectors (instead of the cable glands) [4]
o	o	o	84		two M16 cable glands and one blanking plug
				(6)	**Extra codes [5]**
o	o	o	580		1 set M12 plug/socket connectors
x	x	x	767		cell material: PEEK
o	o	o	768		measuring cell material PVDF
o	o	o	844		supply voltage 24 V AC

x = standard
o = available as an option

	(1)		(2)		(3)		(4)		(5)		(6)		(6)
Order code		/		-		-	000	-		/		,	...
Order example	202756	/	10	-	607	-	000	-	82	/	767		

[1] The PC setup program is required for programming the instrument, see accessories.
[2] Mounting items (mounting brackets) not included in delivery.
[3] Only in conjunction with extra code 767 (cell material PEEK)\
[4] If required, order extra code 580.
[5] List extra codes in sequence, separated by commas.

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Internet: www.jumo.us

Order details: CTI-750 as "Transmitter with separate sensor"

						(1)	**Basic type**
					202756		JUMO CTI-750 Inductive transmitter/switching device for conductivity/concentration and temperature
						(2)	**Basic type extensions**
					20		transmitter in plastic housing, without display/keypad (without sensor)[1]
					25		transmitter in plastic housing, with display/keypad (without sensor)[2]
					26		transmitter in stainless steel housing, with display/keypad (without sensor)[2]
					60		transmitter in plastic housing, without display/keypad [1] including sensor (cable length: 10 m)
					65		transmitter in plastic housing, 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)[2, 3]
					85		replacement sensor with a 10 m long cable for transmitter in stainless steel housing (without transmitter)[2, 3]
						(3)	**Process connection**
x	x				000		not available
		o	o	o	107		screw-in thread G1 1/4A
		o	o	o	108		screw-in thread G1 1/2A
		o	o	o	110		screw-in thread G2A
		o	o	o	606		DN40 screwed pipe fitting, DIN 11 851 (MK DN40, milk cone)
		o	o	o	607		DN50 screwed pipe fitting, DIN 11 851 (MK DN50, milk cone)
		o	o	o	608		DN65 screwed pipe fitting, DIN 11 851 (MK DN65, milk cone)
		o	o	o	609		DN80 screwed pipe fitting, DIN 11 851 (MK DN80, milk cone)
		o	o	o	617		clamp $2^1/_2$" [3]
		o	o	o	686		VARIVENT® DN40/50 [4]
		o	o	o	690		SMS 2"
						(4)	**Immersion length** (see "Dimensions for separate sensor")[5]
x	x				0000		not available
		o	o	o	500		500 mm
		o	o	o	1000		1000 mm
		o	o	o	1500		1500 mm
		o	o	o	2000		2000 mm
		o	o	o	xxxx		special length (in 250 mm increments, e.g. 0250, 0750, 1250, 1750)
						(5)	**Electrical connection**
				x	21		fixed cable with M12 socket connector on separate sensor
o	o	o	o		82		cable glands on the operating unit
o	o	o	o		83		M12 plug/socket connectors on operating unit [6]
o	o	o	o		84		two M16 cable glands and a blind grommet

continued on next page

[1] The PC setup program is required for programming the instrument, see accessories.
[2] A calibration kit is absolutely essential for commissioning. If not available, please include in your order (see accessories)
[3] Mounting items (union/ring nuts, mounting brackets) are not included in delivery. If required, please include in order (accessories).
[4] Only in conjunction with extra code 767 (cell material PEEK).
[5] Only in conjunction with extra code 768 (cell material PVDF).
[6] If required, order M12 plug/socket connectors, extra code 580.

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						(6)	**Extra codes**[7]
x	x				000		no extra code
o	o	o	o		580		1 set M12 plug/socket connectors
o	o	x	x	x	767		cell material PEEK
o	o	x	x	x	768		cell material PVDF
o	o	o	o		844		supply voltage 24 V AC

x = standard
o = available as an option

	(1)		**(2)**		**(3)**		**(4)**		**(5)**		**(6)**		**(6)**
Order code		/		-		-		-		/		,	...
Order example	202756	/	65	-	607	-	0000	-	82	/	767		

[7] List extra code in sequence, separated by commas.

Stock items (shipment: 3 working days after receipt of order)

Type	**Sales No.**
202756/10-607-0000-82/767	20/00451592
202756/15-607-0000-82/767	20/00449604
202756/65-607-0000-82/767	20/00449610

Non-stock items (shipment: 10 working days after receipt of order)

Type	**Sales No.**
202756/15-108-0000-82/767	20/00467153
202756/10-690-0000-82/767	20/00451594
202756/15-690-0000-82/767	20/00451593
202756/60-690-0000-82/767	20/00451597
202756/65-690-0000-82/767	20/00451596
202756/60-607-0000-82/767	20/00451595
202756/10-686-0000-82/767	20/00454702
202756/15-686-0000-82/767	20/00454704
202756/60-686-0000-82/767	20/00454705
202756/65-686-0000-82/767	20/00454707
202756/16-607-0000-82/767	20/00481095

Accessories

Type		**Sales No.**
DN50 weld-on threaded adaptor, DIN 11 851 (matching part for process connection -607)		20/00085020
Slotted union nut DN50, DIN 11 851		20/00343368
Slotted union nut SMS DN2"		20/00345162
Flange DN32[2], material PP		20/00083375
Flange DN50[2], material PP		20/00083376
Kit for pipe mounting		20/00083376
Wall bracket with mounting items, suitable for transmitter in st. steel housing, with separate sensor		20/00477194
M12 socket connector, 5-pole, straight, assembly by user	necessary for versions 202755/xx-xxx-xxxx-83/xxx [1]	20/00444313
M12 plug connector, 8-pole, straight, assembly by user	necessary for versions 202755/xx-xxx-xxxx-83/xxx [1]	20/00444307
M12 socket connector, 8-pole, straight, assembly by user	replacement part for sensor 202755/80	20/00444312

[1] Not required if extra code 580 is ordered.
[2] Only in conjunction with separate sensor as immersion model: 202756&60-xxx... or 202756&65-xxx... or 202756&66-xxx...

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M12 socket connector, 8-pole, straight, for assembly by user	replacement part for sensor 202755/80...	20/00444312
PC setup software for JUMO CTI-750		20/00454710
PC interface cable with TTL/RS232 converter and adapter (serial connection cable)		70/00350260
PC interface cable with USB/TTL converter and two adapters (USB connection cable)		70/00456352
Switched-mode power supply, type PS5R-A24	switched-mode power supply for mounting on DIN rail input voltage 100 — 240 VAC / 50 — 60 Hz output voltage 0.3 A / 24 VDC	20/00374661
Cover with LC display and keypad	facilitates the programming of transmitters without display and without keypad	20/00443725
Calibration kit (for calibrating a replacement transmitter or replacement sensor).		20/00459436

Additional concentration curves for the usual acids and lyes (20 interpolation points in tabular form), for entry on the CTI-750 through the setup program.

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Flow-through fittings

202810 Series

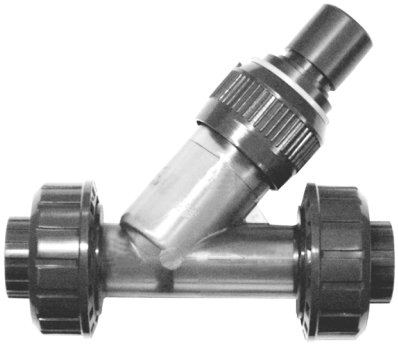
Brief description

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.

202810/03-104-87-80/000 with optional mounting angle, stainless steel 1.4571, Sales No. 20/00327603



202810/01-970-86

Additional fittings in our range

Type of fitting	Data Sheet
Flow-through fittings	20.2810
Immersion fittings	20.2820
Quick-change fittings	20.2822
Process fittings	20.2825

Flow-through fittings 2DA-G1/2-PP series

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.

202810/03-104-87-80/000
with mounting angle, stainless steel 1.4571,
Sales No. 20/00327603

Technical data

Materials	housing: sample vessel: seals:	polypropylene (PP) polycarbonate (PC) or polypropylene (PP) 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	Pg13.5 thread for 1 to 3 sensors (blind grommets are included)	
Connection	½" pipe A	
Protection	IP65, EN 60 529	
Weight	0.4 kg approx.	

Order details

		(1)	**Basic type**
	202810		flow-through fitting
		(2)	**Basic type extension**
x	03		for up to 3 sensors
		(3)	**Process connection**
x	104		connection ½" pipe
		(4)	**Material of body**
x	87		polypropylene (PP)
		(5)	**Material of sample vessel**
x	80		polycarbonate (PC) (standard)
o	87		polypropylene (PP)
		(5)	**Extra codes**
x	000		no extra code
o	055		earthing rod

	(1)		(2)		(3)		(4)		(5)		(6)
Order code		/		-		-		-		/	
Order example	202810	/	03	-	104	-	87	-	080	/	000

Stock items (delivery: 3 working days after receipt of order)

Device type	Designation	Sales No.
202810/03-104-87-80/000	2DA-G1/2-PP, sample vessel: “transparent”, material: polycarbonate (PC)	20/00327603
202810/03-104-87-87/000	2DA-G1/2-PP/PP, sample vessel: “not transparent”, material: polypropylene (PP)	20/00351404

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.

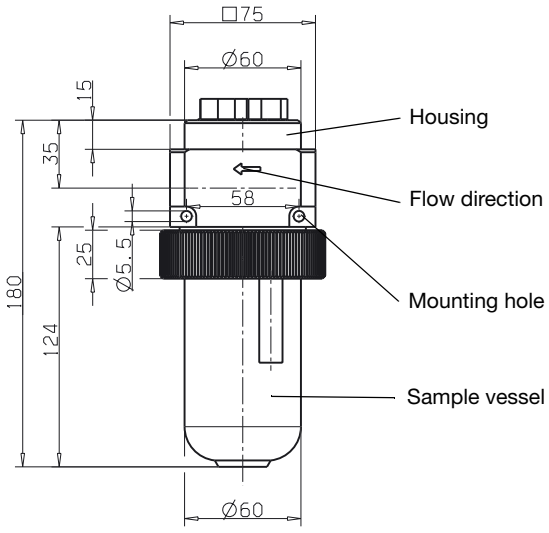
Production items (delivery: 10 working days after receipt of order)

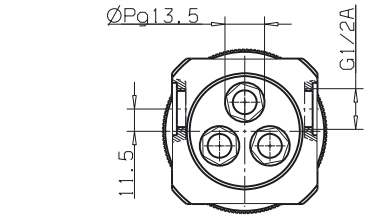
Type	Designation	Sales No.
202810/03-104-87-80/055	2DA-G1/2-PP, sample vessel: “transparent”, material: polycarbonate (PC)	20/00362345
202810/03-104-87-87/055	2DA-G1/2-PP/PP, sample vessel: “not transparent”, material: polypropylene (PP)	20/00378117

Accessories and spare parts (delivery: 3 working days after receipt of order)

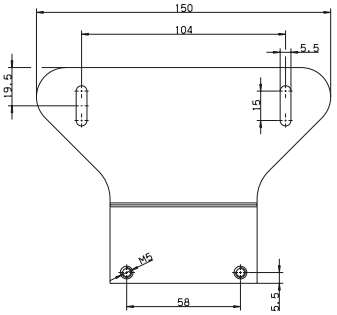
Type	Sales No.
replacement vessel; polycarbonate (PC); including O ring; for Type 202810/03 version **since** september 2005	20/00417498
replacement vessel; polypropylene (PP); including O ring; for Type 202810/03 version **since** september 2005	20/00463367
replacement vessel; polypropylene (PP); including O ring; for Type 202810/03 version **upto** september 2005	20/00417499
KCl reservoir, pressure-tight; to set up an electrolyte bridge, or when using electrodes filled with KCl, for wall mounting	20/00060254
mounting angle, stainless steel 1.4571	20/00455706

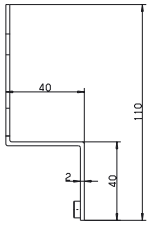
Dimensions



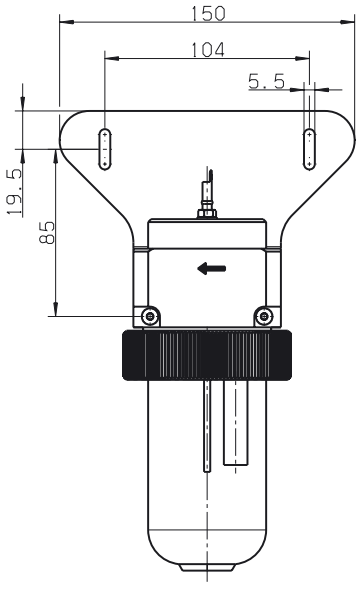


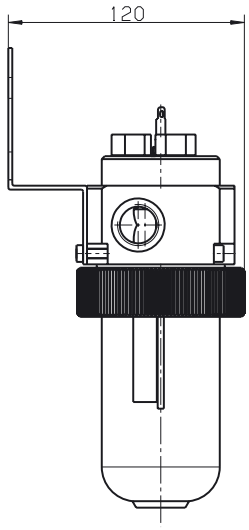
Flow-through fitting, type 202810/03-104-87-80/000





Mounting angle, stainless steel 1.4571,
Sales No. 20/00455706

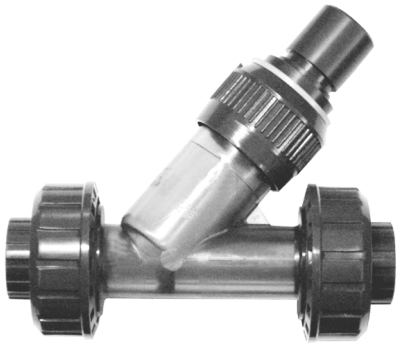




Flow-through fitting, fixed on mounting angle

Type 202810/01 in PVC

Suitable for mounting one sensor with a Pg13.5 thread and a mounting length of 120 mm.



202810/01-970-86

Technical data

Materials	flow-through body: PVC electrode holder: PVC
Permissible temperature of liquid	+0 to +60°C
Electrode holder	Pg13.5 for 1 sensor
Connection	solvent-weld sockets
Protection	IP65, EN 60 529
Weight	approx. 0.34 kg

202810/01-968-86

Order details

		(1)	**Basic type**
	202810		flow-through fitting
		(2)	**Basic type extension**
x	01		for 1 sensor
		(3)	**Process connection**
x	965		inclined position, DN 20
o	966		inclined position, DN 25
o	970		inclined position, DN 20, with screwed butt joint
o	971		inclined position, DN 25, with screwed butt joint
o	967		T-piece, DN 32
o	968		T-piece, DN 40
o	969		T-piece, DN 50
		(4)	**Material of body**
x	86		polyvinylchloride (PVC)

	(1)		(2)		(3)		(4)
Order code		/		-		-	
Order example	202810	/	01	-	970	-	86

Available accessories and spare parts

Sales No.	Designation
20/00060254	KCl reservoir, pressure-tight; to arrange an electrolyte bridge, or when using electrodes filled with KCl, for wall mounting

Stock items (delivery: 3 working days after receipt of order)

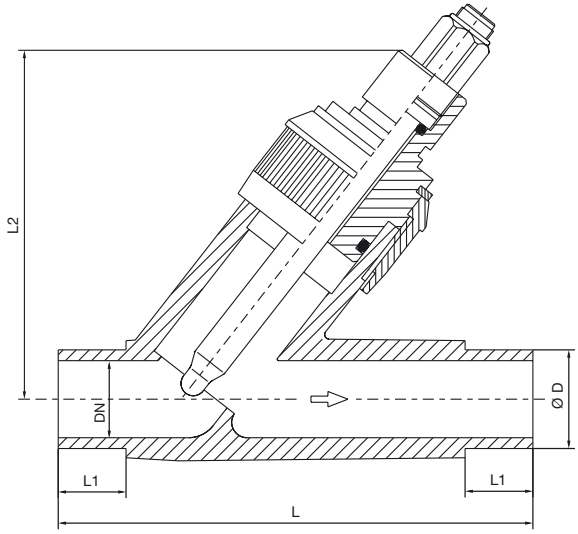
Typ	Bezeichnung	Verkaufs-Artikel-Nr.
202810/01-965-86	inclined-position fitting, DN20, PVC	20/00056390
202810/01-966-86	inclined-position fitting, DN25, PVC	20/00056389
202810/01-970-86	inclined-position fitting, DN20, with screwed butt joint, PVC	20/00416456
202810/01-971-86	inclined-position fitting, DN25, with screwed butt joint, PVC	20/00416457
202810/01-967-86	T-piece fitting, DN32, PVC	20/00069106
202810/01-968-86	T-piece fitting, DN40, PVC	20/00069105
202810/01-969-86	T-piece fitting, DN50, PVC	20/00069104

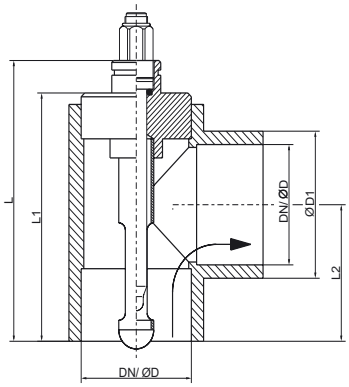
Accessories (delivery: 3 working days after receipt of order)

Typ	Verkaufs-Artikel-Nr.
KCl reservoir, pressure-tight; to set up an electrolyte bridge, or when using electrodes filled with KCl, for wall mounting	20/00060254

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.

Dimensions





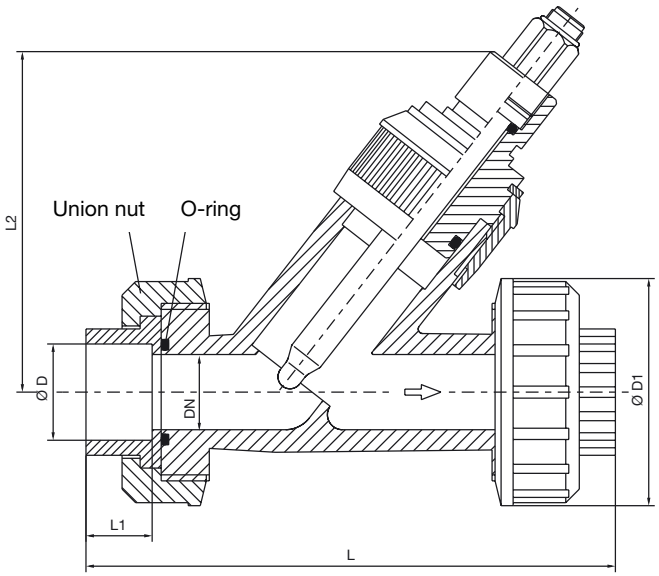
vertical mounting position

Inclined-position version

Type	DN	Ø D	L	L_1	L_2
202810/01-965-86	20	25	144	19	110
202810/01-966-86	25	32	154	22	115

T-piece version

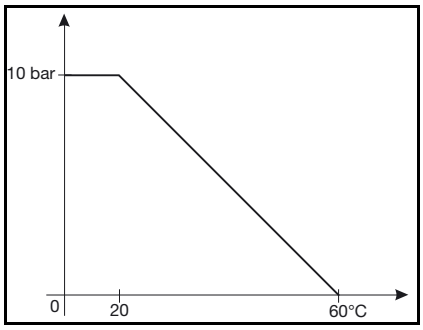
Type	DN	Ø D	Ø D_1	L	L_1	L_2
202810/01-967-86	32	40	51	129	112	47
202810/01-968-86	40	50	62	137	120	59
202810/01-969-86	50	63	77	147	130	72



Inclined-position version with screwed butt joint

Type	DN	Ø D	Ø D_1	L	L_1	L_2
202810/01-970-86	20	25	66	158	19	110
202810/01-971-86	25	32	75	176	22	115

Permitted pressure



Stock items (delivery: 3 working days after receipt of order)

Device type	Designation	Sales No.
202810/03-104-87-80/000	2DA-G1/2-PP, sample vessel: “transparent”, material: polycarbonate (PC)	20/00327603
202810/03-104-87-87/000	2DA-G1/2-PP/PP, sample vessel: “not transparent”, material: polypropylene (PP)	20/00351404
202810/01-965-86	inclined-position fitting, DN20, PVC	20/00056390
202810/01-966-86	inclined-position fitting, DN25, PVC	20/00056389
202810/01-970-86	inclined-position fitting, DN20, with screwed butt joint, PVC	20/00416456
202810/01-971-86	inclined-position fitting, DN25, with screwed butt joint, PVC	20/00416457
202810/01-967-86	T-piece fitting, DN32, PVC	20/00069106
202810/01-968-86	T-piece fitting, DN40, PVC	20/00069105
202810/01-969-86	T-piece fitting, DN50, PVC	20/00069104

Production items (delivery: 10 working days after receipt of order)

Device type	Designation	Sales No.
202810/03-104-87-80/055	2DA-G1/2-PP, sample vessel: “transparent”, material: polycarbonate (PC), with earthing rod	20/00362345
202810/01-966-86	2DA-G1/2-PP/PP, sample vessel: “not transparent”, material: polypropylene (PP), with earthing rod	20/00056389

Accessories and spare parts

Type	Sales No.
replacement vessel; polycarbonate (PC); including O ring; for Type 202810/03 version **since** september 2005	20/00417498
replacement vessel; polypropylene (PP); including O ring; for Type 202810/03 version **since** september 2005	20/00463367
replacement vessel; polypropylene (PP); including O ring; for Type 202810/03 version **upto** september 2005	20/00417499
KCl reservoir, pressure-tight; to set up an electrolyte bridge, or when using electrodes filled with KCl, for wall mounting	20/00060254
mounting angle, stainless steel 1.4571	20/00455706

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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:

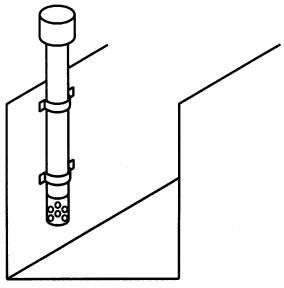
- The fittings must be readily accessible, to ensure that the sensor can be cleaned and serviced at regular intervals.
- pH and redox electrodes must not be allowed to remain dry for a prolonged period - this can be prevented by using a wetting cup.
- The suitability of the materials (e.g. chemical compatibility) has to be tested by the system designer.

202820/063...

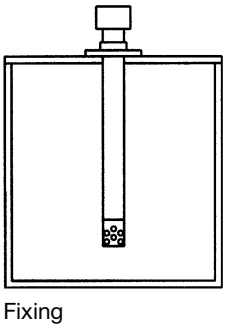
202820/040...

Installation options

Standard

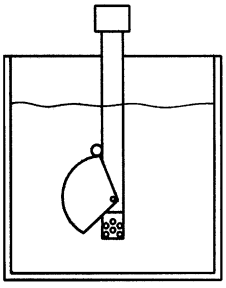


Fixing
with pipe clips
in the inlet channel

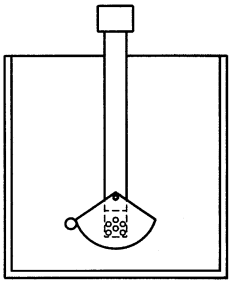


Fixing
with a flange
on a container

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 20.2995), or a 2-wire transmitter Type 202701 (see Data Sheet 20.2701) can be incorporated.

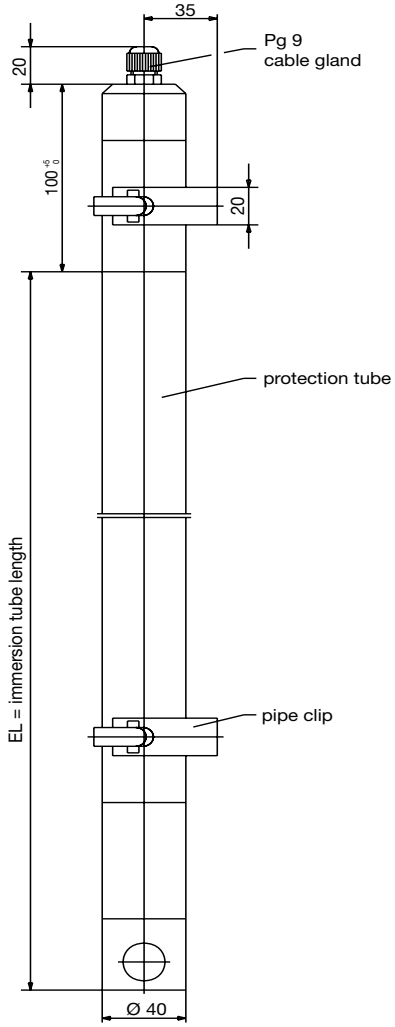
202820/40-0500-87

Technical data

Material	polypropylene (PP), seals FPM. Others to special order.
Permissible temperature	0 to +95°C
Safe pressure	1 bar, up to +90°C
Electrode holder	Pg13.5 thread
Immersion tube length	normally 500 mm and 1000 mm. up to 2000 mm can be implemented standard lengths 500, 800, 1000, 1300, 1500 and 2000 mm.
Mounting	normally with pipe clips other mounting forms (flange, etc.) are optionally available
Protection	IP65, EN 60 529
Weight	depending on length

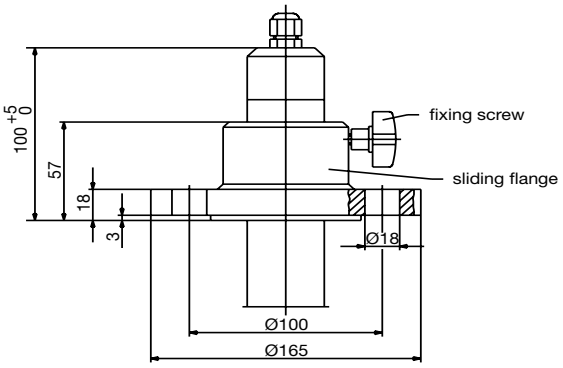
Note:
An external KCl reservoir can be used with all immersion fittings.

Dimensions

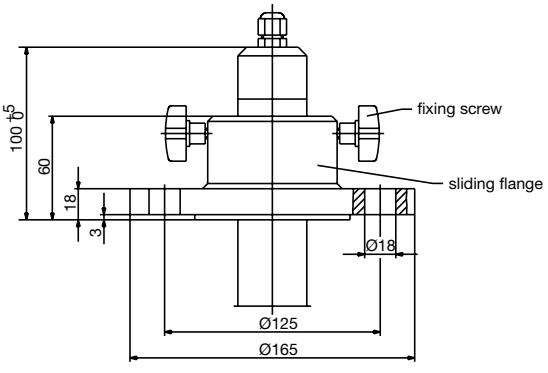


Immersion fitting 202820/40-...

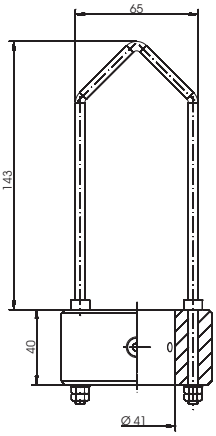
Extra codes / accessories



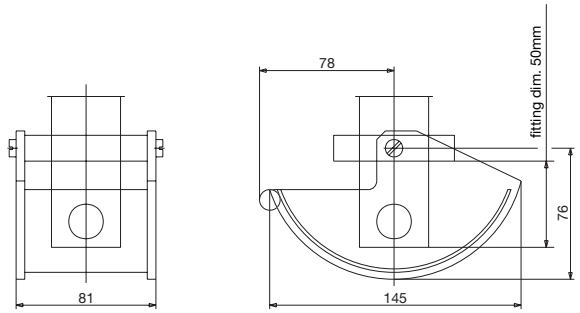
Flange DN32, Sales No. 20/00083375



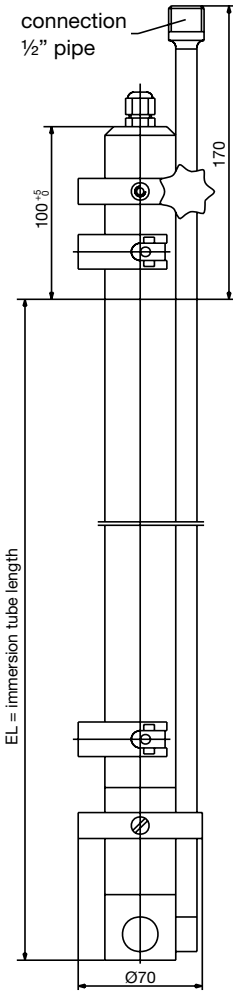
Flange DN50, Sales No. 20/00083376



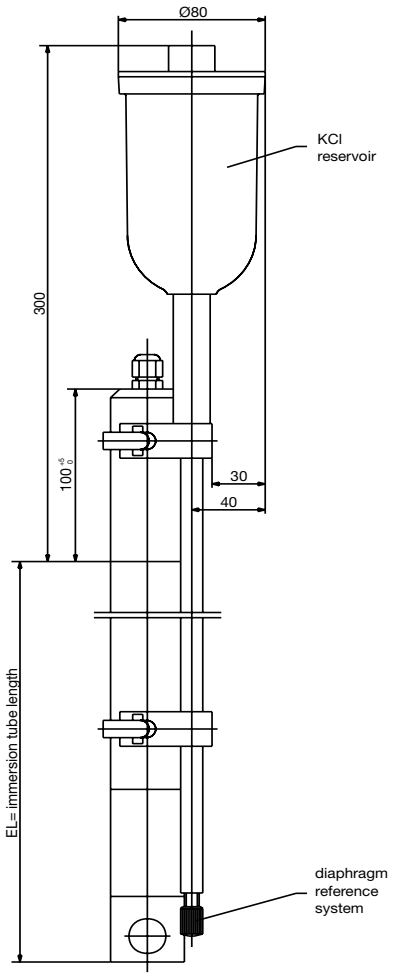
Shackle
Sales No. 20/00453191



Wetting cup, Sales No. 20/00083372



Cleaning nozzle,
code 078



KCl 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		KCl reservoir with diaphragm tube

	(1)	(2)	(3)	(4)	(5)
Order code	202820 /	40 -	.... -	87 -	...
Order example	202820 /	40 -	1500 -	87 -	082

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
20/00083375	flange DN32[1], material PP
20/00083376	flange DN50[1], material PP
20/00083372	wetting cup[1], material PP, clamping screws in polyamide
20/00453191	Shackle

[1] 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 20.2995), or a 2-wire transmitter Type 202701 (see Data Sheet 20.2701) can be incorporated.

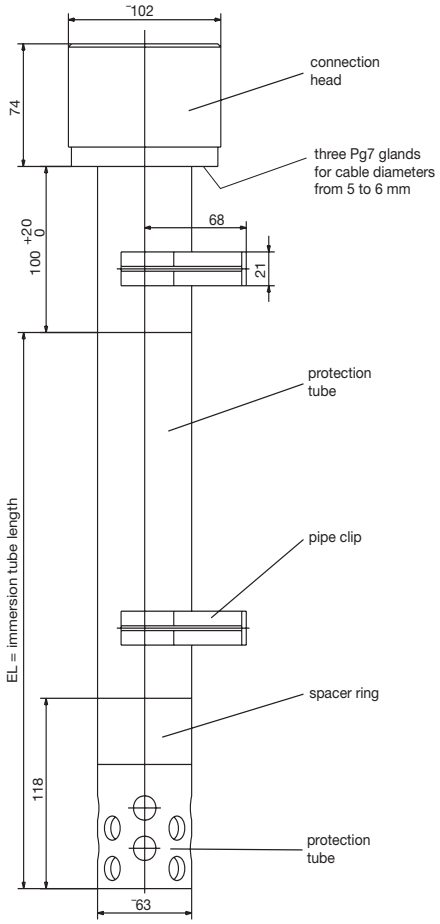
202820/63-0500-87

Technical data

Material	polypropylene (PP), seals FPM.
Permissible temp.	0 to +95°C
Safe pressure	1 bar, up to +90°C
Electrode holder	Pg13.5 threads for 1 to 3 electrodes (blind grommets are included)
Immersion tube length	ex-stock 500 mm up to 2000 mm can be implemented standard lengths 500, 800, 1000, 1300, 1500 and 2000 mm.
Mounting	normally with pipe clips other mounting forms (flange, etc.) are optionally available
Protection	IP65, EN 60 529
Weight	depending on length

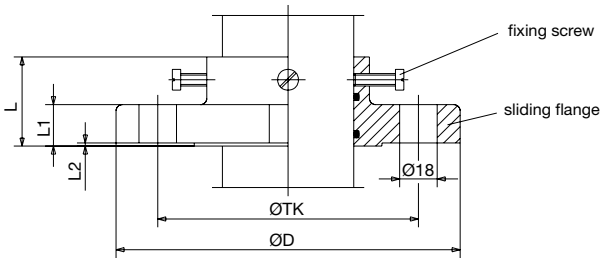
Note:
An external KCl reservoir can be used for all immersion fittings.

Dimensions



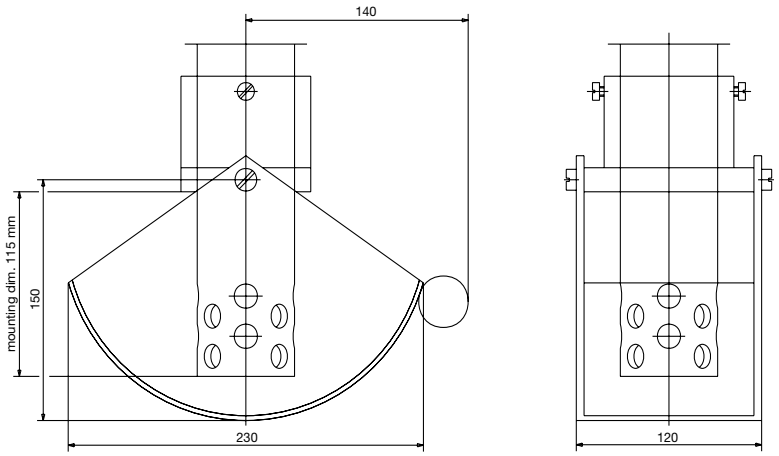
Immersion fitting 202820/63-...

Extra codes / accessories

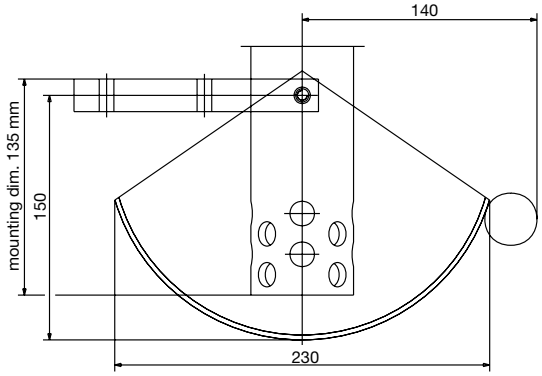


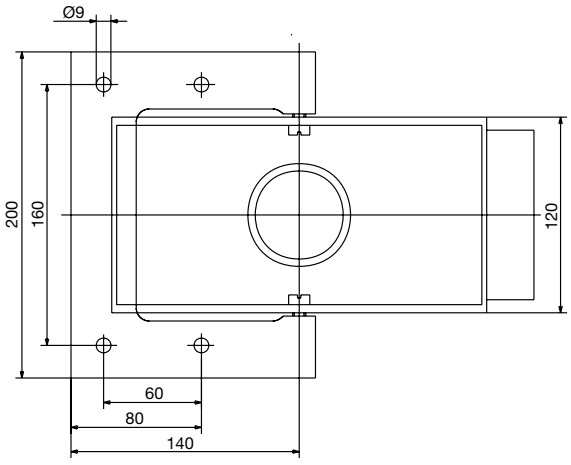
Flange DN50, Sales No. 20/00056544
Flange DN65, Sales No. 20/00056545

DN	D	TK	L	L_1	L_2
50	165	125	43	20	1.5
65	185	145	49	22	2

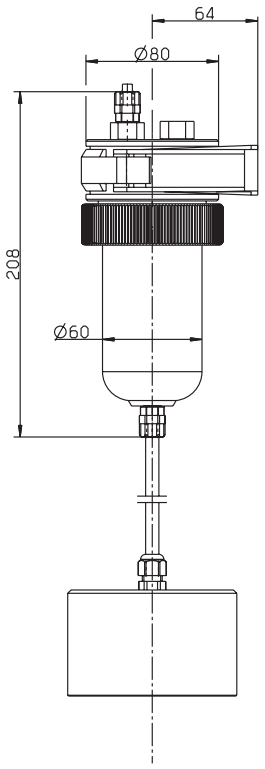


Wetting cup, Sales No. 20/00057581

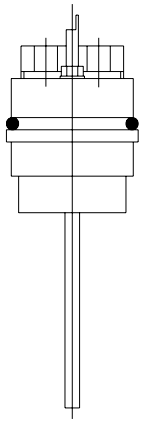




Wetting cup with mounting plate, Sales No. 20/00063825



KCl reservoir, pressure-tight, suitable for wall mounting
Sales No. 20/00060254;
to set up an electrolyte bridge or when using KCl-filled electrodes



Earthing rod, code 055
for equipotential bonding,
e.g. in insulated plastic containers

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	KCl reservoir, pressure-tight, suitable for wall mounting
20/00063825	wetting cup with mounting plate

Additional fittings

Type of fitting	Data Sheet
Flow-through fittings	T 20.2810
Immersion fittings	T 20.2820
Quick-change fittings	T 20.2822
Process fittings	T 20.2825

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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 Pg13.5 thread and a mounting length of 120 or 225mm.

Type 202822/105.../87

Type 202822/106.../26

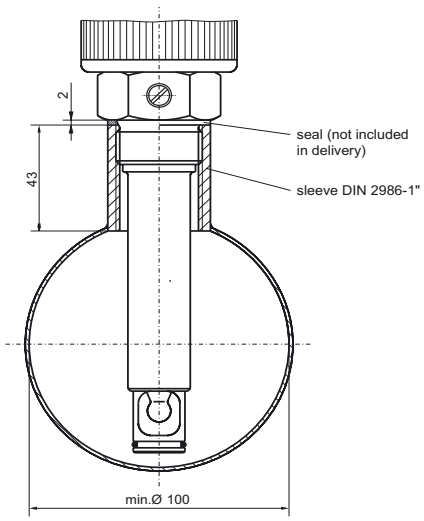
Type 202822/613.../26

Applications

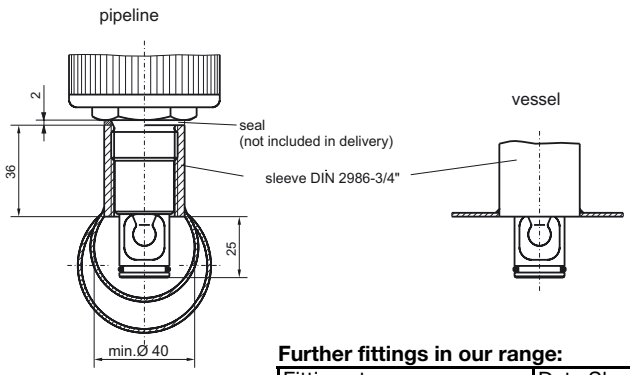
- measurements in closed liquid cycles,
  e.g. pH measurement in cooling and water purification plants
- measurements in closed containers and tanks
- final pH check in outflow, if a bypass is not possible
- Type 202822/106-135-..
  fitting with screw-in thread G1A, for installing one sensor with a Pg 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-..



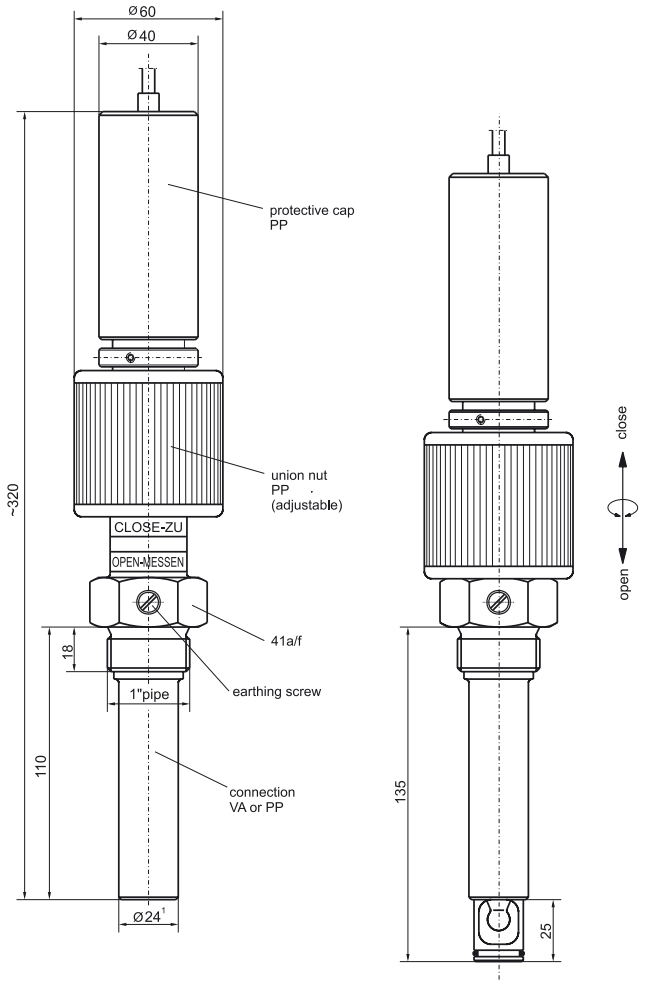
Type 202822/105-062-26



Further fittings in our range:

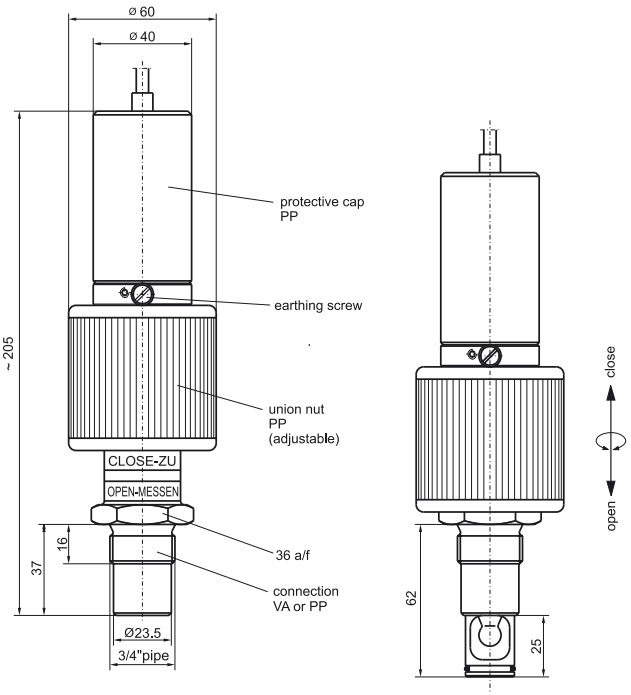
Fittings type:	Data Sheet
Flow-through fittings	T 20.2810
Immersion fittings	T 20.2820
Quick-change fittings	T 20.2822
Process fittings	T 20.2825

Dimensions

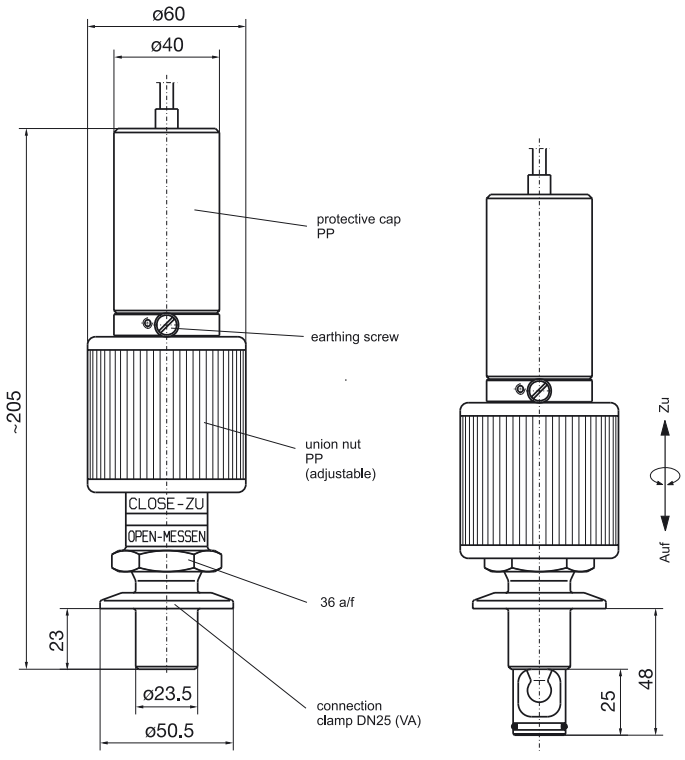


Type 202822/106-135-26, Type 202822/106-135-87

[1] with material PP: 29 mm dia.



Type 202822/105-062-26, Type 202822/105-062-87



Type 202822/613-048-26

[1] Bei Werkstoff PP ø 29 mm

Technical data

Parts in contact with medium	stainless steel 1.4571 and FPM or PP and FPM
Permissible temperature [1]	-30 to +135°C stainless steel -10 to + 60°C PP
Safe pressure at 25°C	up to 10 bar for stainless steel up to 6 bar for PP
Seal	FPM
Protection	IP65
Mounting position	please observe the mounting instructions for the sensor that is used
Electrode holder	Pg 13.5 thread A type 202995 impedance converter or a type 202701 two-wire transmitter can be incorporated.
Weight	Type 202822/105-062-260.8 kg Type 202822/106-135-261.0 kg Type 202822/613-048-261.2 kg

Order details

				(1)	**Basic version**
			202822		Manual quick-change fitting
				(2)	**Process connection**
			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
				(3)	**Mounting length**
		x	048		048 mm
x			062		062 mm
	x		135		135 mm
				(4)	**Material**
x	x	x	26		parts in contact with medium: stainless steel 1.4571
x	x		87		polypropylene (PP)

x = available

	(1)		(2)		(3)		(4)
Order code		/		-		-	
Order example	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)

Sales No.	Type
20/00366915	202822/105-062-26
20/00345780	202822/106-135-26
20/00348649	202822/613-048-26

Production items (delivery: 10 working days after receipt of order)

Sales No.	Type
20/00375339	202822/106-135-87
20/00381650	202822/105-062-87

Optional accessories

Sales No.	Description
20/00060254	KCl reservoir, pressure-tight, wall-mounted. To arrange an electrolyte bridge, or when using KCl-filled electrodes.
20/00315751	Pressure head for KCl-filled pH combination electrodes 2GE-2-D-... series, see Data Sheet 20.2900.

[1] 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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Process fittings in stainless steel

Type 202825
Type 202831

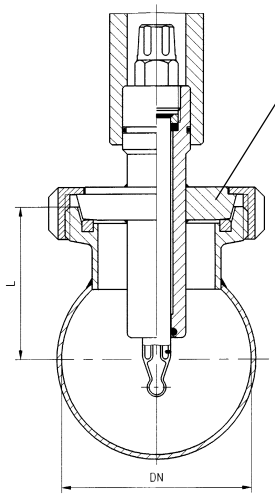
Brief description

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 accomodate sensors of 120 mm length. Other lengths to special order.

Type 202825

Type 202831

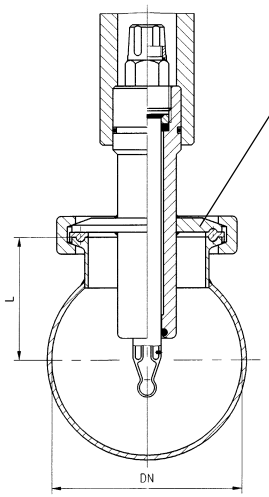
Installation options



Cone nipple

DN 25DN (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

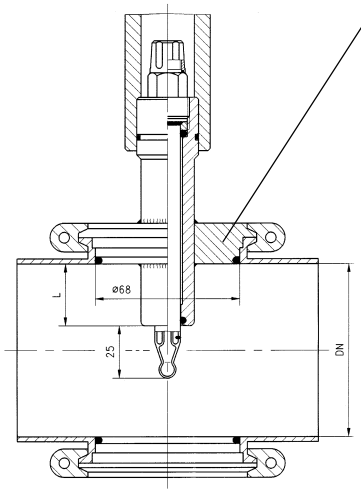
DN 50DN (pipe)L (fitting dim.)
DN 50 63 mm
DN 65 52 mm
DN 80 63 mm
DN 100 75 mm
DN 125 90 mm



Clamp connection

DN 25DN (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

DN 50DN (pipe)L (fitting dim.)
DN 50 51 mm
DN 65 40 mm
DN 80 51 mm
DN 100 63 mm
DN 125 77 mm



VARIVENT connection

DN 40/50DN (pipe) L (fitting dim.)
DN 40 5 mm
DN 50 5 mm
DN 65 30 mm
DN 80 30 mm
DN 100 30 mm
DN 125 30 mm

Additional fittings

Type of fitting	Data Sheet
Flow-through fittings	T 20.2810
Immersion fittings	T 20.2820
Quick-change fittings	T 20.2822
Process fittings	T 20.2825

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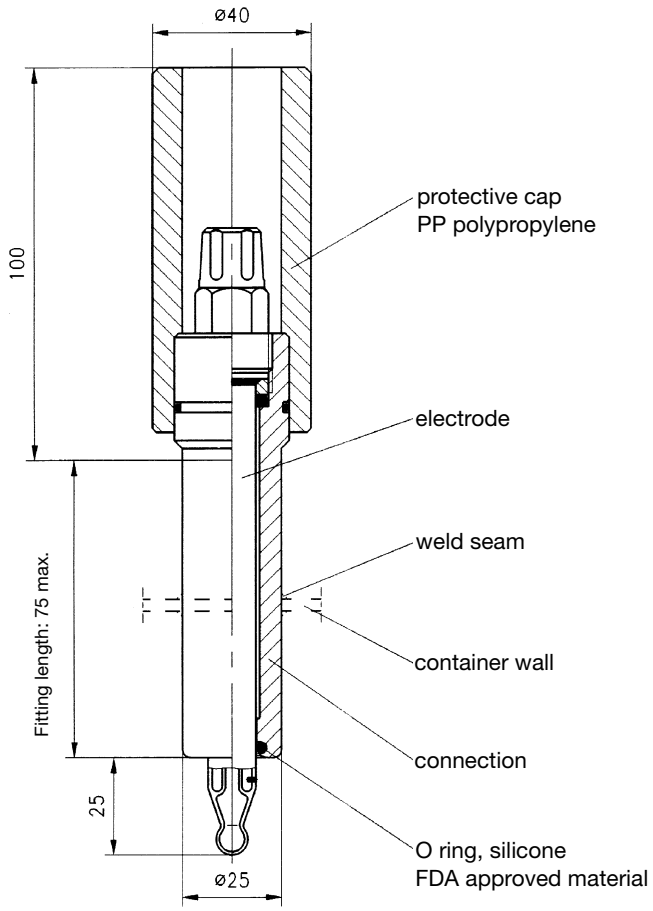
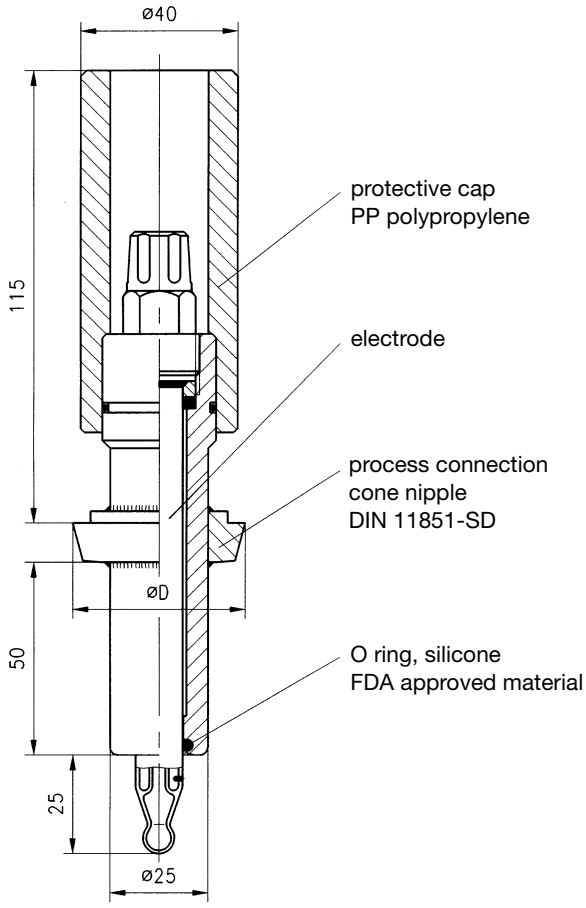
Technical data

Materials	wetted components in stainless steel 1.4571, electropolished, Ra ≤0.80 (on type 202825/...), Seal: silicone O rings (FDA approved)
Permissible temperature[1]	0 to +135°C
Safe pressure[1]	up to 10bar
Electrode holder	Pg13.5 gland An impedance converter (2AMZ-20) or a 2-wire transmitter (202701) can be incorporated.
Fitting length	see installation options for the appropriate process connection
Protection	IP65, EN 60529
Weight	depending on the process connection

Dimensions



Type 202825-000



Type 202825-607-26, Type 202825-604-26
Cone nipple: DN50, ø D = 68,5mm dia.
DN25, ø D = 44,0mm dia.

[1] Please also note the maximum operating data for the sensor used!

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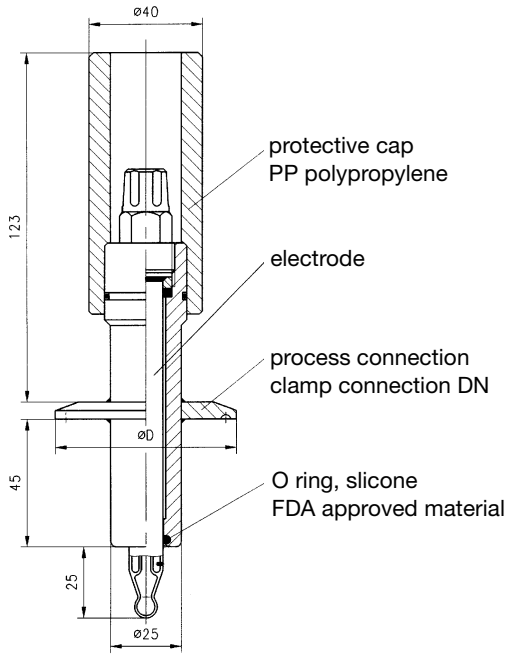
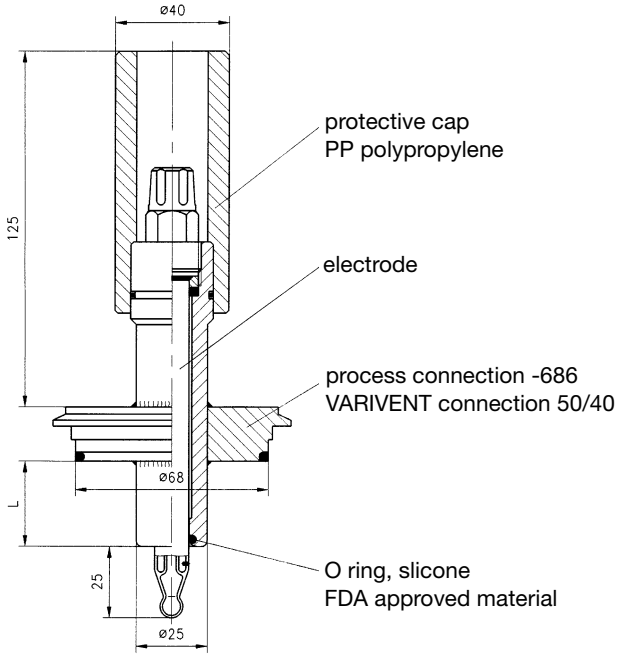
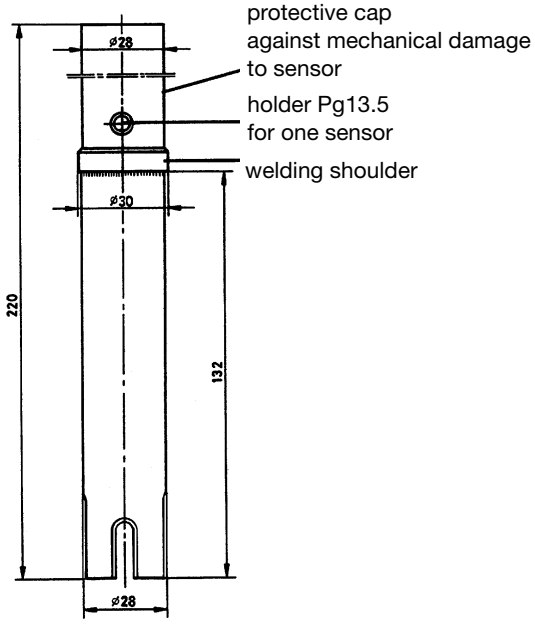
Dimensions



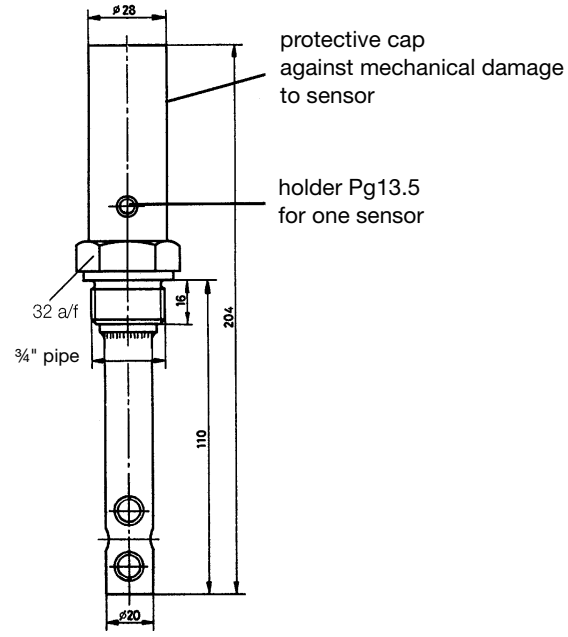
Type 202825-616-26, Type 202825-613-26
Clamp connection: DN50, ø D = 64.0 mm dia. L= 45 mm
DN25, ø D = 50.5 mm dia. L = 45 mm



Type 202825-686-26
VARIVENT connection: DN40, 50L= 5 mm
DN65, 80, 100, 125L = 30 mm



Type202831-000-26



Type202831-105-26

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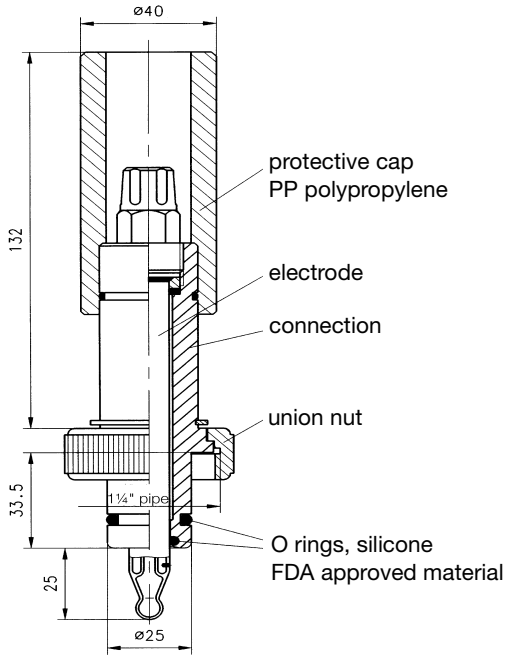
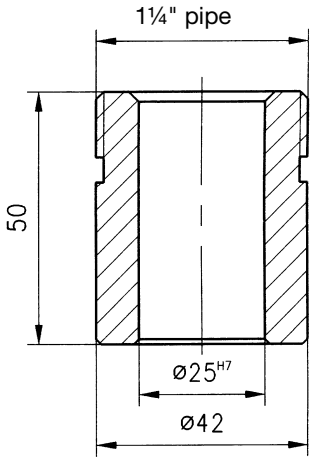


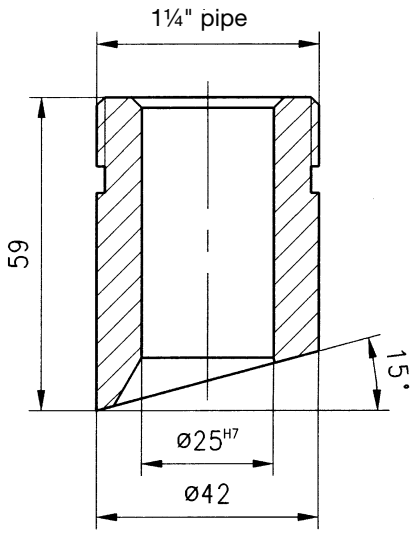
Type202825-688-26

Ingold connection: 1¼" pipe thread, 33.5mm fitting length (together with nipple 3)

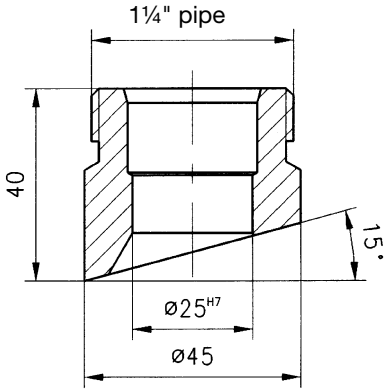
Available weld-in nipples for connection 688



Nipple 1



Nipple 2



Nipple 3

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Order details: Process fittings in stainless steel

			(1)	Basic type
		202825		process fittings, suitable for media with increased hygienic requirements (food, pharmaceutical, chemical applications); silicone seals, FDA approved material
		202831		process fittings, suitable for use in water management and process engineering
			(2)	**Process connection**
	x	000		weld seam
	x	105		thread ¾" pipe male
x		604		cone nipple DIN 11851-DN25
x		607		cone nipple DIN 11851-DN50
x		613		clamp DN25
x		616		clamp connection DN50
x		686		VARIVENT DN 40/50
x		688		1¼" pipe thread (Ingold connection)
			(3)	**Material**
x	x	24		wetted components in stainless steel 1.4404 (AISI 316L)
	x	26		wetted components in stainless steel 1.4571

	(1)		(2)		(3)
Order code		/		-	
Order example	202825	/	607	-	26

Stock versions (delivery: 3 working days after receipt of order)

Type	formerly	Sales No.
202831/000-26	2EA-30-VA-1	20/00302472
202831/105-26	2GA-3/4-VA-1	20/00302474

Production versions (delivery: 10 working days after receipt of order)

Type	Sales No.
202825/000-26	20/00358137
202825/604-26	20/00358132
202825/607-26	20/00357679
202825/613-26	20/00358134
202825/616-26	20/00358133
202825/686-26	20/00358136
202825/000-26	20/00358137
202825/604-26	20/00358132

Accessories (delivery: 3 working days after receipt of order)

Type	Sales No.
KCl reservoir, pressure-resistant to set up an electrolyte bridge or when using KCl-filled electrodes	20/00060254

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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JUMO BlackLine Lf-GT / -EC electrolytic 2-electrode conductivity cells

Cell constants K=0.01-1.0 and 3.0

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 Lf-GT with the cell constants K=1.0 and K=3.0

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 cell 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 20.2810, 20.2820, 20.2822).

JUMO BlackLine Lf-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 cells either have a G1/2A or 1/2"-14 thread.
The version with K=1.0 achieves a measuring range of 0.1 to about 5000 µS/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 µS/cm. Cells with K=0.01 cover ranges from 0.05 to 20 µS/cm. They are therefore extremely suitable for pure and high-purity water applications. The electrode material for these cells is stainless steel 1.4571.

Operating principle

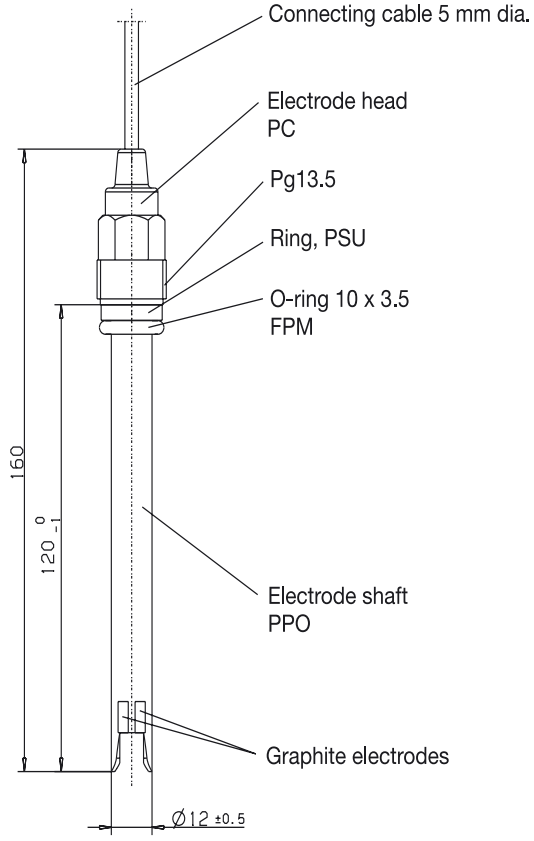
The measuring cells in the 202922 series are 2-electrode cells. A transmitter applies an AC voltage to the cells. The current flowing through the liquid and the electrodes is determined by the conductivity of the liquid.

Technical data

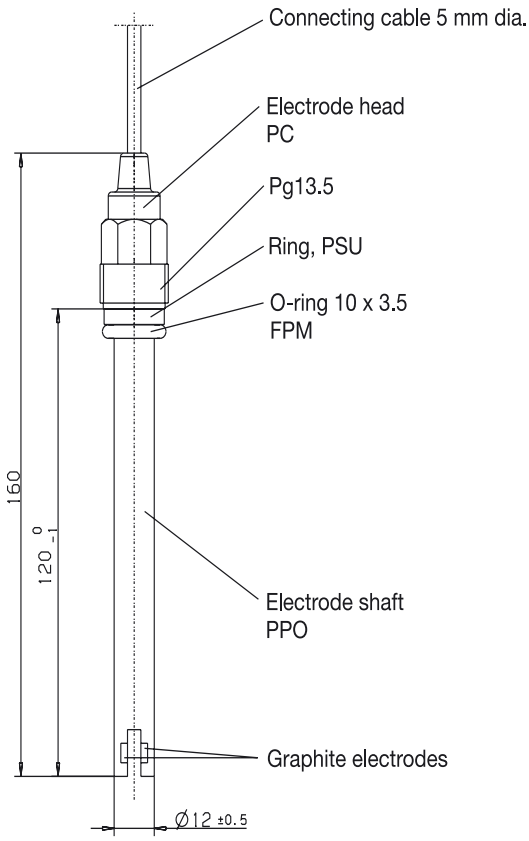
Type	**JUMO BlackLine Lf-GT**		**JUMO BlackLine Lf-EC**		
Cell constant[1]	K=1.0	K=3.0	K=0.01	K=0.1	K=1.0
Typical measuring range[2]	0.1 to approx. 10 mS/cm (with the appropriate evaluation equipment: up to 100 mS/cm)	0.1 to approx. 30 mS/cm (with the appropriate evaluation equipment: up to 200 mS/cm)	0.05 to approx. 20 µS/cm	0.1 to approx. 1000 µS/cm	0.1 to approx. 5000 µS/cm
Temperature compensation	none / Pt100 / Pt1000		Pt100		
Process connection	Pg13.5 screw-in thread		G1/2A or 1/2"-14 NPT screw-in thread		
Electrode material	special graphite		stainless steel 1.4571		titanium
Body material	PPO (polyphenylene oxide)		PEI (polyetherimide)		
Operating temperature	-5 to +80°C		-5 to +90°C		
Maximum pressure	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) M12 connector		

1 Any deviation of the cell constant can be adjusted on the transmitter.
2 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.

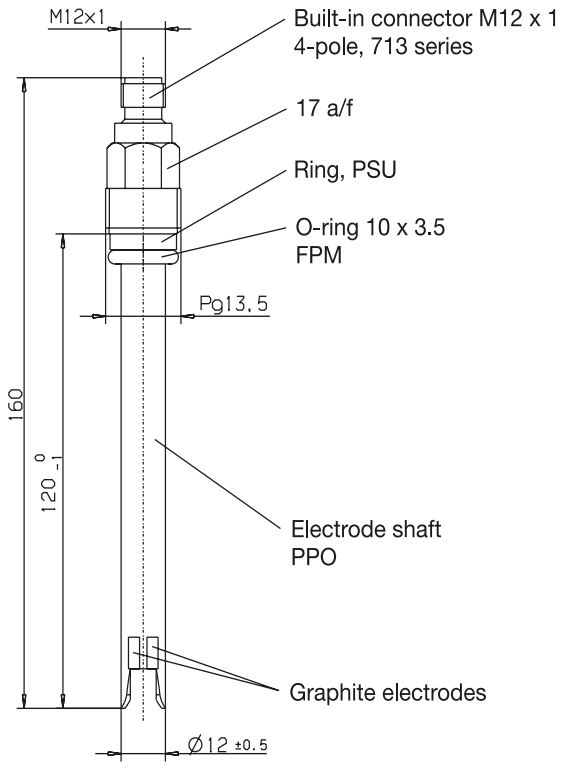
Dimensions for JUMO BlackLine Lf-GT



Type 202922/10-0300-xxxx-84-413-20-5000-120/000
Cell constant K = 3.0



Type 202922/10-0100-xxxx-84-413-20-5000-120/000
Cell constant K = 1.0



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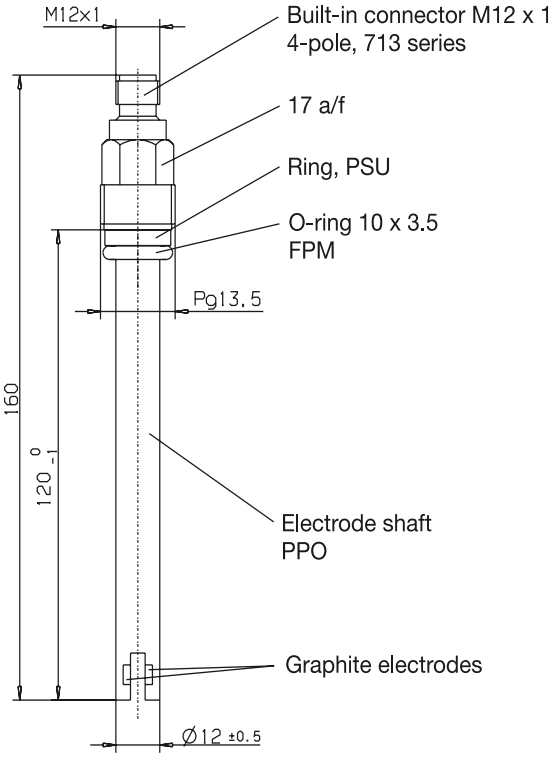
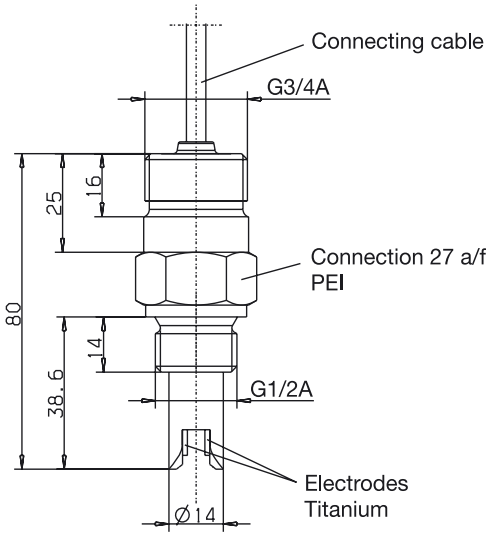
Cell constant K = 3.0

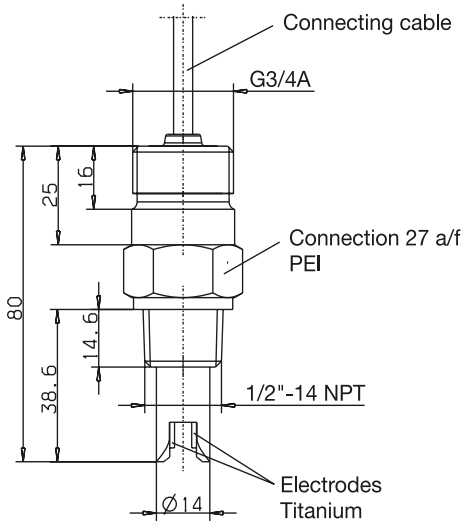


Type 202922/10-0100-xxxx-84-413-83-0000-120/000
Cell constant K = 1.0

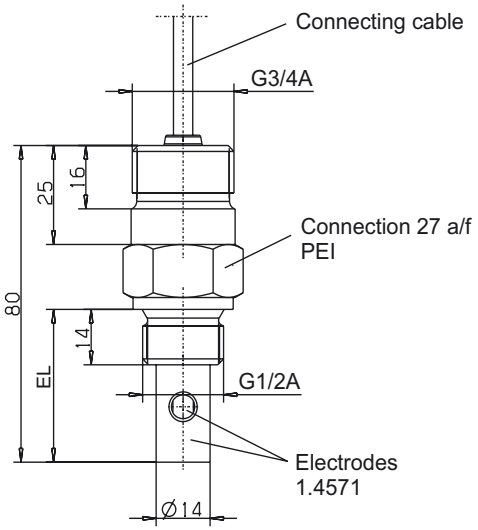
Dimensions for JUMO BlackLine Lf-EC



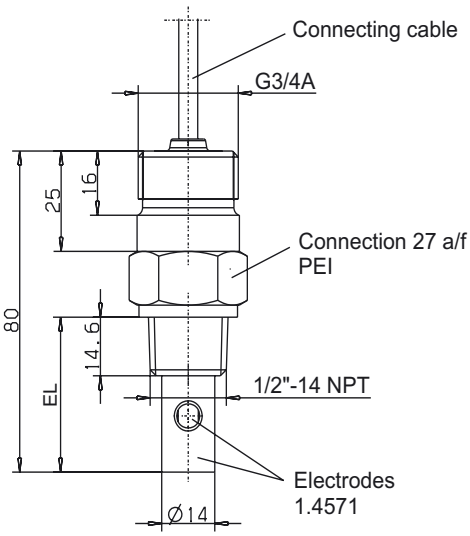
Type 202922/20-0100-1003-60-104-20-5000-040/000
Cell constant K = 1.0



Type 202922/20-0100-1003-60-144-20-5000-040/000
Cell constant K = 1.0



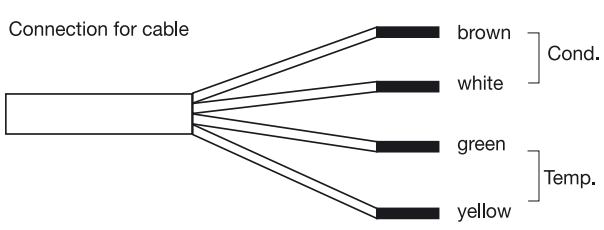
Type 202922/20-0010-1003-26-104-20-5000-040/000
Cell constant K = 0.1
Type 202922/20-0001-1003-26-104-20-5000-040/000
Cell constant K = 0.01

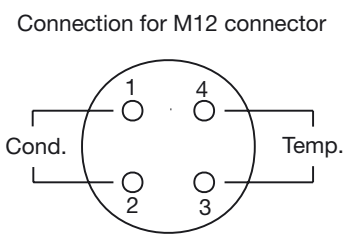


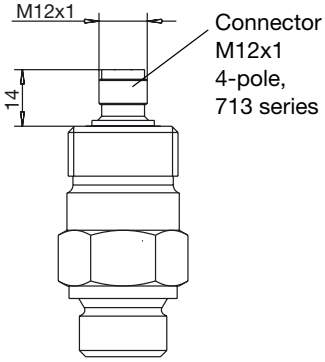
Type 202922/20-0010-1003-60-144-20-5000-040/000
Cell constant K = 0.1
Type 202922/20-0001-1003-26-144-20-5000-040/000
Cell constant K = 0.01

Type	Fitting length EL mm
202922/20-0010-...	38.6
202922/20-0001-...	63

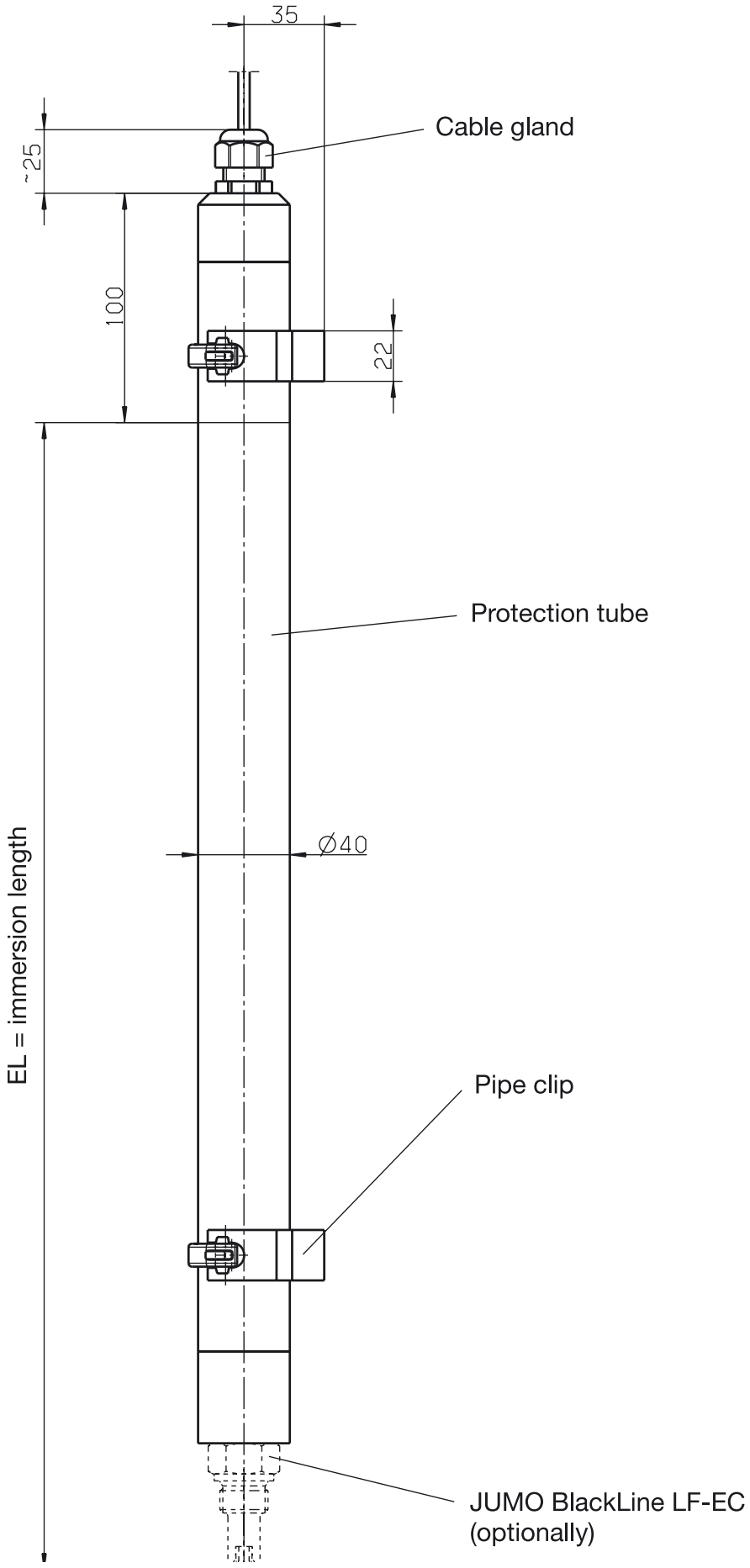
Electrical connection







Accessories for JUMO BlackLine Lf-EC



Choice of immersion length EL:
500 mm or 1000 mm

Order details

			(1)	**Basic type**
		202922		JUMO BlackLine Lf-GT / -EC, electrolytic 2-electrode conductivity cells
			(2)	**Basic type extensions**
		10		Style: JUMO BlackLine Lf-GT
		20		Style: JUMO BlackLine Lf-EC
			(3)	**Cell constant**
	o	0001		K = 0.01
	o	0010		K = 0.1
o	o	0100		K = 1.0
o		0300		K = 3.0
			(4)	**Temperature sensor**
o		0000		none
o	x	1003		Pt100
o		1005		Pt1000
			(5)	**Electrode material**
	o	26		stainless steel 1.4571
	o	60		titanium
o		84		special graphite
			(6)	**Process connection**
	o	104		G1/2A screw-in thread
	o	144		1/2"-14 NPT screw-in thread
o		413		Pg13.5 thread
			(7)	**Electrical connection**
o	o	20		attached cable
o	o	83		M12 connector
			(8)	**Cable length**
x		0000		no cable (with electrical connection 83)
x	x	5000		length in mm (other lengths on request)
			(9)	**Fitting length**
	x	040		40 mm
	x	063		63 mm (for cell constant K=0.01 only)
x		120		120 mm
			(10)	**Extra codes**
x	x	000		none

X = combination is standard
o = combination is optional

Other versions on request!

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)		(10)
Order code		/		-		-		-		-		-		-		-		/	
Order example	202922	/	10	-	0100	-	0000	-	84	-	104	-	83	-	0000	-	120	/	000

Note:
The type code is a type designation, not a modular system.
If at all possible, choose the articles listed under “Stock items” or “Non-stock 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

Sales No.	Type	Brief description
20/00430769	202922/10-0100-0000-84-413-20-5000-120/000	K=1.0, without Pt100, attached cable, Pg13.5, 120 mm
20/00430770	202922/10-0100-1003-84-413-20-5000-120/000	K=1.0, with Pt100, attached cable, Pg13.5, 120 mm
20/00437646	202922/20-0100-1003-60-104-20-5000-040/000	K=1.0, with Pt100, attached cable, G1/2A, 40 mm
20/00437647	202922/20-0100-1003-60-144-20-5000-040/000	K=1.0, with Pt100, attached cable, 1/2"-14 NPT, 40 mm
20/00418069	202922/20-0010-1003-26-104-20-5000-040/000	K=0.1, with Pt100, attached cable, G1/2A, 40 mm
20/00441398	202922/20-0010-1003-26-144-20-5000-040/000	K=0.1, with Pt100, attached cable, 1/2"-14 NPT, 40 mm
20/00448986	202922/20-0001-1003-26-144-20-5000-063/000	K=0.01, with Pt100, attached cable, 1/2"-14 NPT, 63 mm

Non-stock items

Sales No.	Type	Brief description
20/00442432	202922/10-0100-1003-84-413-83-0000-120/000	K=1.0, with Pt100, M12 connector, Pg13.5, 120 mm
20/00442433	202922/10-0300-1003-84-413-83-0000-120/000	K=3.0, with Pt100, M12 connector, Pg13.5, 120 mm
20/00442434	202922/10-0300-1003-84-413-20-5000-120/000	K=3.0, with Pt100, attached cable, Pg13.5, 120 mm

Other versions on request!

Accessories for version with M12 connector

Sales No.	Brief description
20/00318906	4-pole cable connector M12 x 1, 713 series, angled (supplied without cable), gold-plated contacts
20/00303681	25 m connecting cable, for self-assembly, 4-pole + screen

Accessories for JUMO BlackLine Lf-EC

Sales No.	Brief description
20/00452567	immersion fitting, EL = 500 mm
20/00452571	immersion fitting, EL = 1000 mm

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JUMO ecoLine Lf-PVC Electrolytic Conductivity Cells

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 20°C

Brief description

Conductivity cells 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 G3/4" or G1" 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 DN25, 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 cell features 3 metallic pin electrodes. The two outer pins are electrically connected and form one pole of the 2-electrode cell. 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

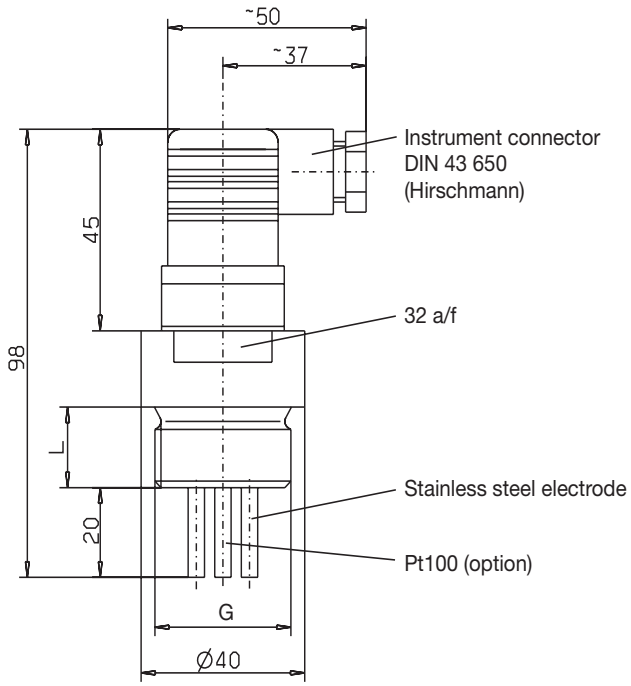
The 20.2923 series measuring cells are 2-electrode cells. An a.c. voltage is applied by means of a transmitter. The current flowing through the liquid and the electrodes is determined by the conductivity of the liquid.

Technical data

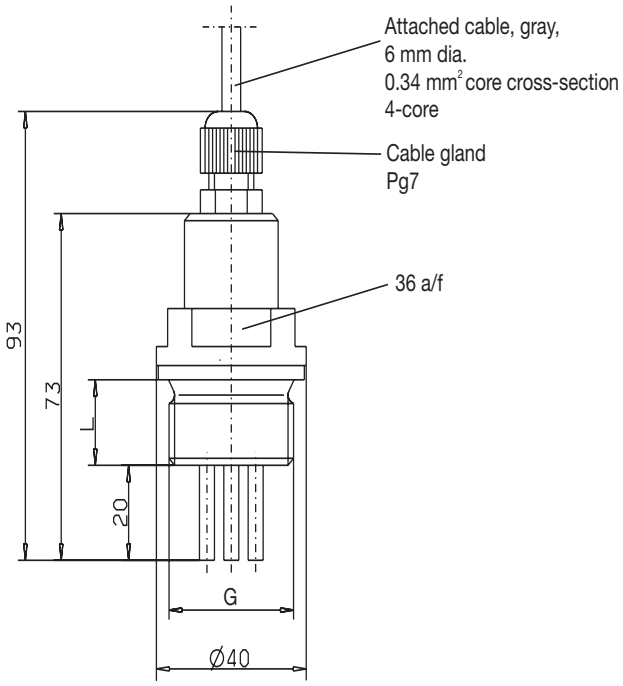
Cell constant[1]	K = 0.1 or K = 1.0	
Typical measuring ranges[2]	0 — 1.0 mS/cm 0.01 — 15 mS/cm	(with K = 0.1) (with K = 1.0)
Temperature compensation	optionally with Pt100	
Process connection	screw-in thread $G^3/_4$A; G1A; union nut DN25; $1^1/_2$" for PVC tees	
Body material	PVC	
Cell material	stainless steel 1.4571 graphite	(with K=0.1) (with K=1.0)
Operating temperature	up to +55°C	
Maximum pressure	6 bar at 25°C	
Electrical connection	instrument connector (Hirschmann) to DIN 43 650, IP65 protection or 5 m attached cable, other cable lengths on request.	

[1] Any deviation of the cell constant can be adjusted on the transmitter.
[2] 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.

Dimensions / installation options

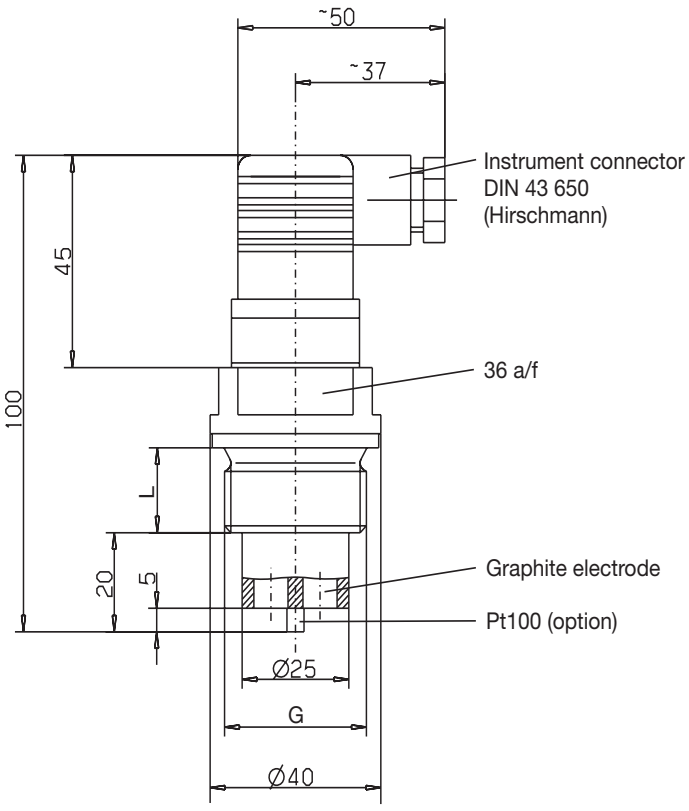


Type 202923/0010-1003-xxx-37-86-26/000
cell constant K = 0.1

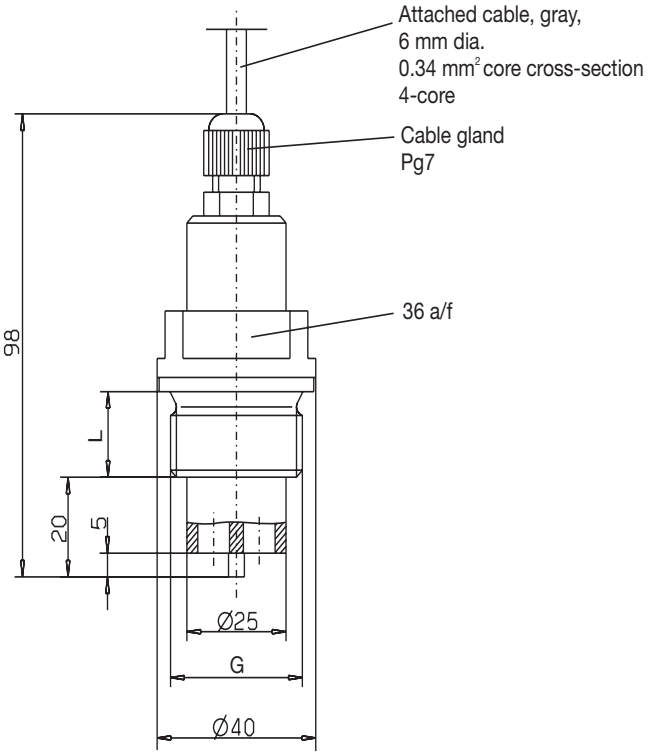


Type 202923/0010-1003-xxx-17-86-26/000
cell constant K = 0.1

Process connection	G	L
-105	G3/4	16
-106	G1	18

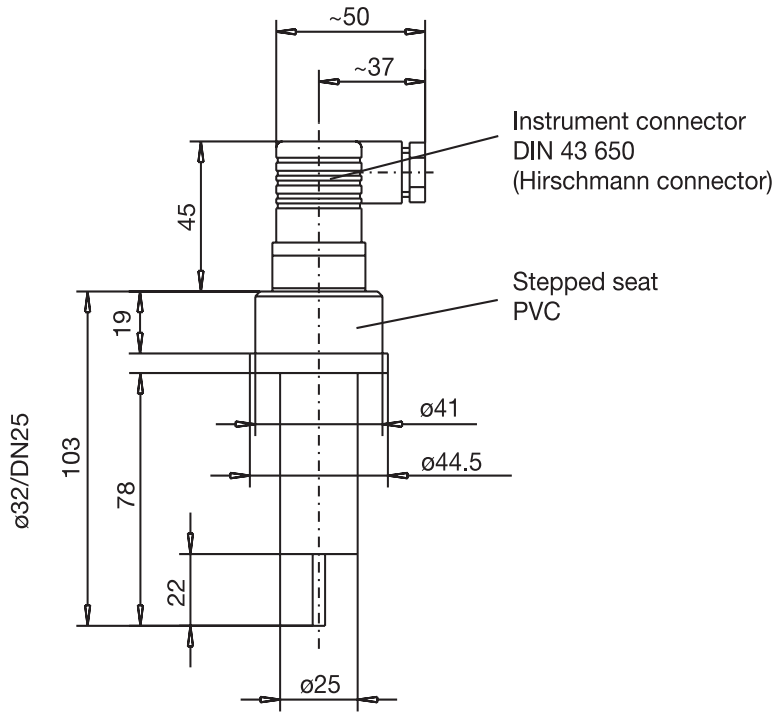


Type 202923/0100-1003-xxx-37-86-88/000
cell constant K = 1.0

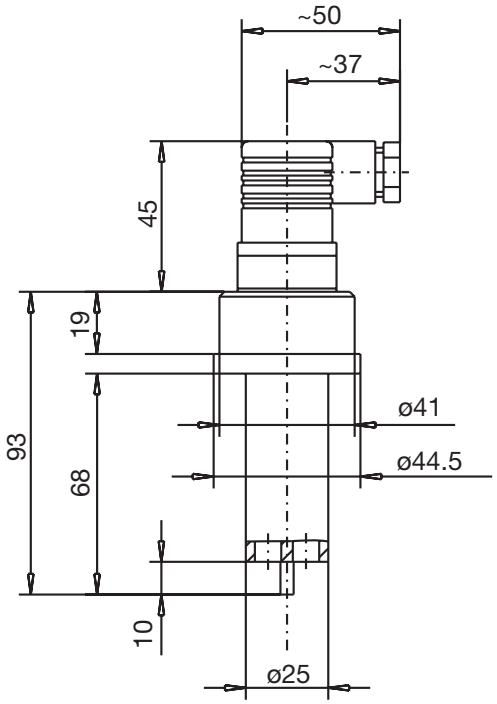


Type 202923/0100-1003-xxx-17-86-88/000
cell constant K = 1.0

Pluggable version

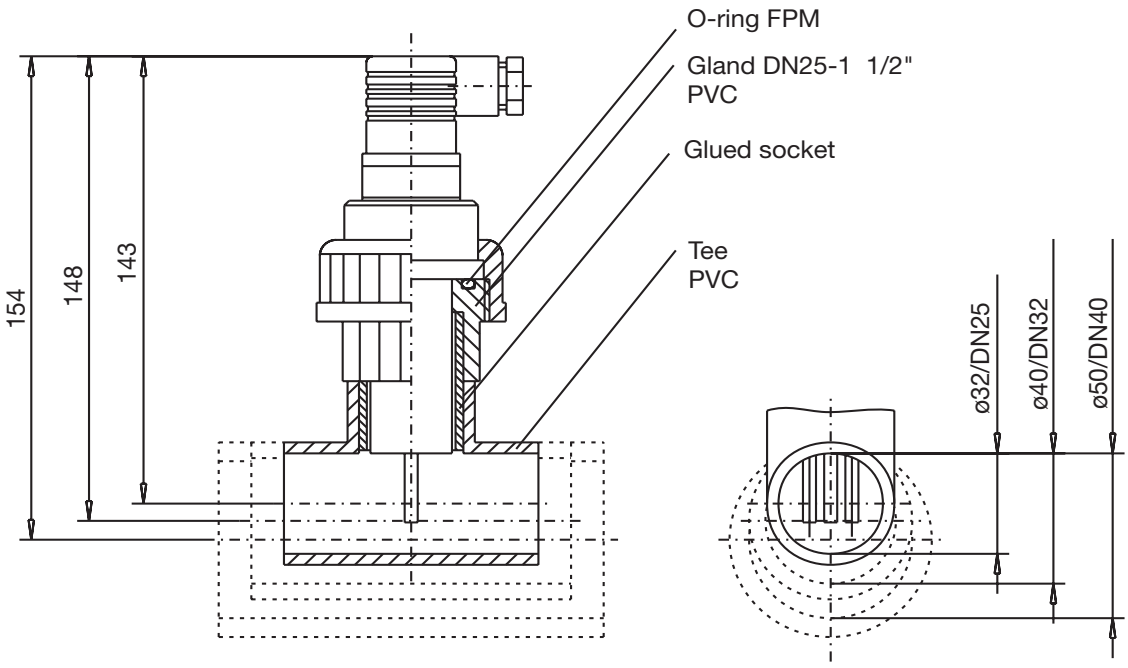


Type 202923/0010-1003-687-37-86-26/000
cell constant K = 0.1
Note: supplied without union nut!



Type 202923/0100-1003-687-37-86-84/000
cell constant K = 1.0
Note: supplied without union nut!

Accessories for pluggable version



tee DN25
tee DN32
tee DN40

Electrical connection

Connection for	Connector	Attached cable
Outer electrode	⏚	white
Inner electrode	2	brown
Temperature com*	1 3	yellow green

*option

Order details

			(1)	**Basic type**
		202923		JUMO ecoLine Lf-PVC, electrolytic conductivity cells
			(2)	**Cell constant**
		0010		K = 0.1 (measuring range 0 — 1.0 mS/cm)
		0100		K = 1.0 (measuring range 0.01 — 15 mS/cm)
			(3)	**Temperature sensor**
o	o	0000		none
x	x	1003		Pt100
			(4)	**Process connection**
o	o	687		stepped seat PVC ø32 / DN25 (supplied **without** union nut)
x	x	105		screw-in thread G $^3/_4$" A
o	o	106		screw-in thread G 1" A
			(5)	**Electrical connection**
o	o	17		by attached cable with Pg gland, cable length 5 m
x	x	37		by instrument connector to DIN 43 650 (Hirschmann connector)
			(6)	**Body material**
x	x	86		PVC
			(7)	**Cell material**
x	-	26		stainless steel 1.4571
-	x	84		graphite
			(8)	**Extra codes**
o	o	000		none

x = combination is standard
o = combination is optional
– = combination cannot be supplied

Additional versions on request!

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)
Order code	202923	/		-		-		-		-	86	-		/	
Order example	202923	/	0010	-	1003	-	196	-	17	-	86	-	26	/	000

Stock items

Sales No.	Type	Brief description
20/00303793	202923/0010-1003-105-37-86-26/000	K = 0.1; Pt100; G3/4A
20/00319402	202923/0010-1003-105-17-86-26/000	K = 0.1; Pt100; G3/4A; 5 m attached cable

Non-stock items

Sales No.	Type	Brief description
20/00089411	202923/0010-1003-106-37-86-26/000	K = 0.1 / Pt100 / G1A
20/00402638	202923/0010-1003-106-17-86-26/000	K = 0.1 / Pt100 / G1A / 5 m attached cable
20/00437032	202923/0100-1003-105-37-86-84/000	K = 1,0 / Pt100 / G3/4A
20/00409610	202923/0100-1003-106-37-86-84/000	K = 1,0 / Pt100 / G1A
20/00437034	202923/0100-1003-687-17-86-84/000	K = 1,0 / Pt100 / stepped seat PVC / 5 m attached cable

Accessories (for pluggable version)

Sales No.	Brief description
20/00437035	PVC tee DN25 (incl. union nut, O-ring and glued socket for pluggable version)
20/00437037	PVC tee DN32 (incl. union nut, O-ring and glued socket for pluggable version)
20/00437038	PVC tee DN40 (incl. union nut, O-ring and glued socket for pluggable version)
20/00303681	Connecting cable 25 m (4-core + screen)
20/00304181	Connecting cable 50 m (4-core + screen)

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JUMO tecLine Lf-VA Electrolytic Conductivity Cells in stainless steel or titanium

202924 Series (formerly 2 EL6... Series)

- 2-electrode system
- for ranges from 0.05 µS/cm to 1 mS/cm
- large variety of process connections
- rugged construction
- version for pharmaceutical requirements can be supplied
- shaft diameter 16 mm (with version 202924/20-...)

Type 202924/10-xxxx-1003-105-37-88-26

Type 202924/20-xxxx-1003-613-83-31-31

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 202924/10... and 202924/20... 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
- reverse osmosis plant

Conductivity cells that **meet pharmaceutical requirements** can be delivered with a surface roughness of <0.8µ, 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 20.2924 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.

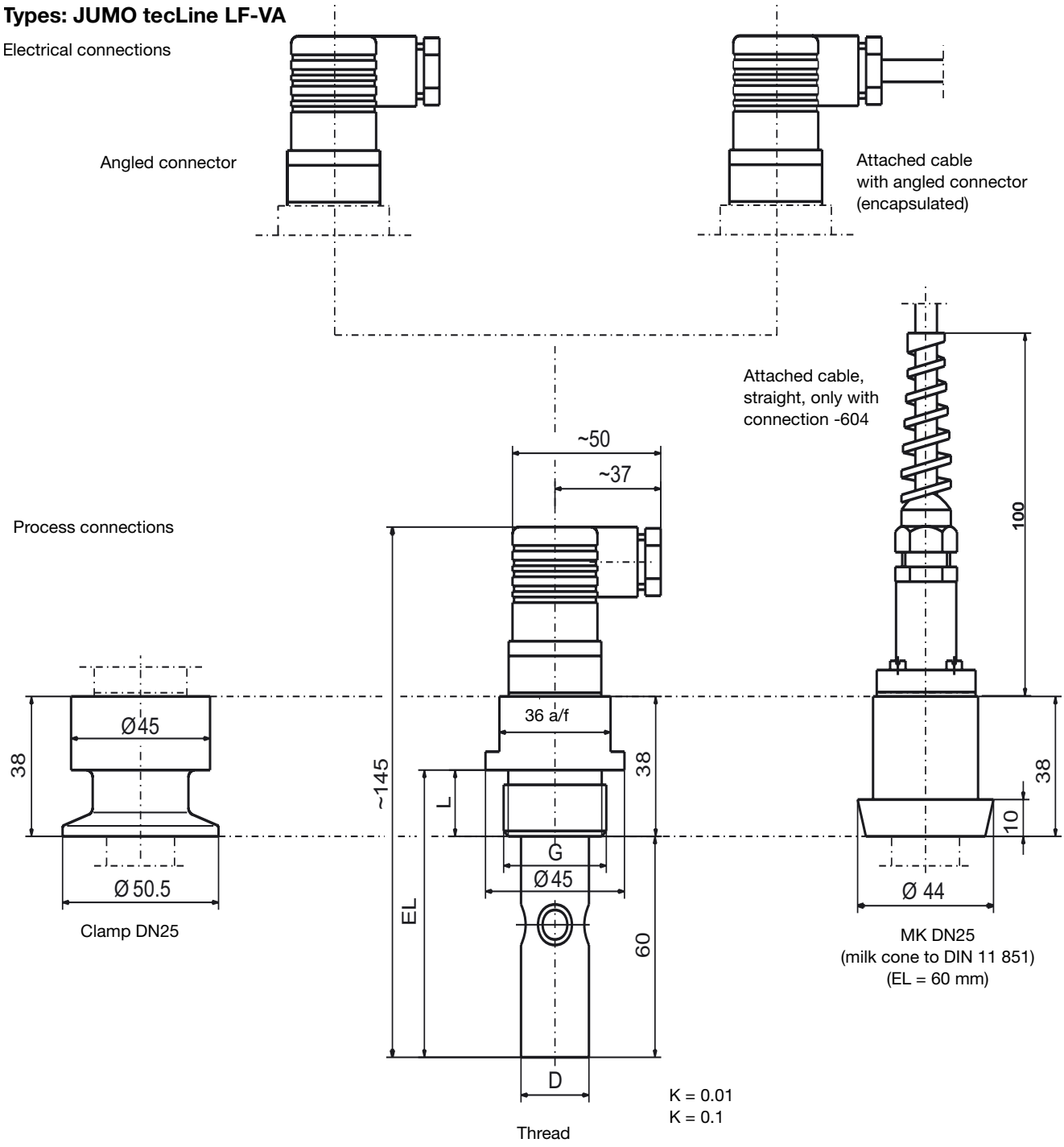
Technical data

Cell constant[1]	K = 0.01 or K = 0.1
Typical measuring ranges	0.1 — 20MΩcm or 0.05 — 10µS/cm (for K = 0.01) or 1µS — 1mS/cm (for K = 0.1)
Temperature compensation	with Pt100 or Pt1000 or 2xPt100 (twin Pt100)
Process connection	thread G1/2; G3/4"; G1"; NPT3/4; NPT1/2; milk cone DN25; clamp DN25; clamp DN50
Body material	PVDF (standard); stainless steel 1.4435 (optional); stainless steel 1.4571 (optional); PEEK (optional)
Cell material	stainless steel 1.4571 (standard); stainless steel 1.4435 (optional); titanium (optional)
Operating temperature	Type 202924/10: up to +135°C; high-temperature version: up to +200°C Type 202924/20: up to +135°C
Maximum pressure	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
Optional certificates	factory certificate to EN 10204 2.1; EN 10204 2.2; EN 10204 3.1 (material, roughness)
ASTM test certificate:	determination of the precisely measured cell constant according to ASTM D1125-95 and ASTM D5391-99 (1-point calibration)
FDA approved:	the plastic materials used (insulator and O-rings) are FDA-listed.

[1] Cell constant deviations can be adjusted on the transmitter.
[2] 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.

Dimensions / Overview of types

Types: JUMO tecLine LF-VA

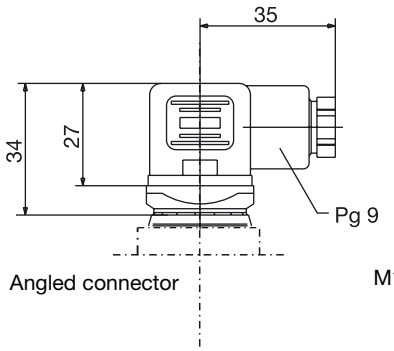


G (thread)	L	Shaft diameter D	EL (fitting length)
NPT3/4-14	20	22	80
G1A	18	22	78
G3/4A	16	22	76
G1/2A	14	16	74

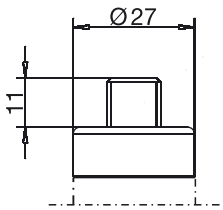
Types: JUMO tecLine LF-VA SL (16 mm dia.)

All process connections shown here can be combined with the electrical connections.

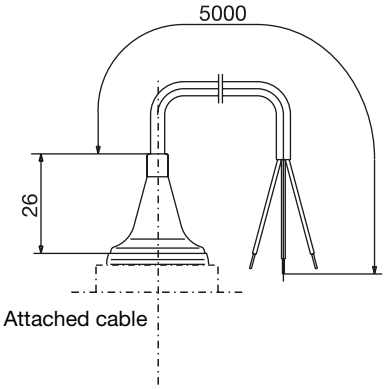
Electrical connections



Angled connector

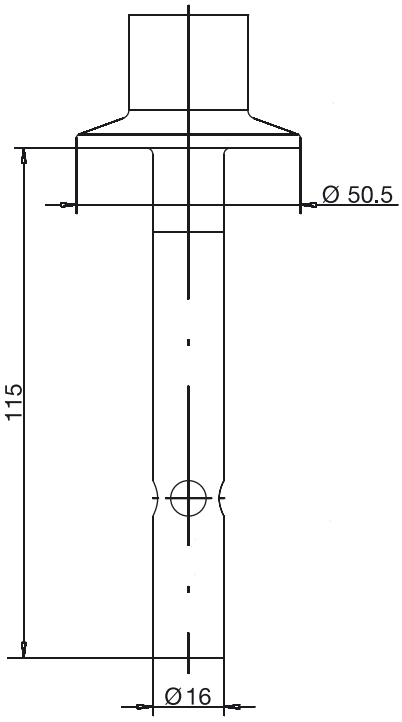


M12 connector

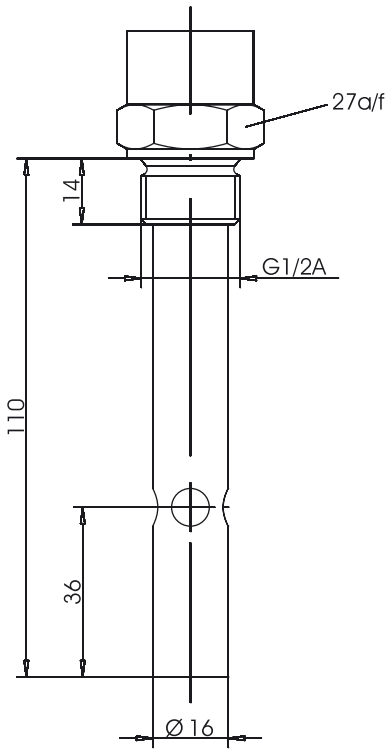


Attached cable

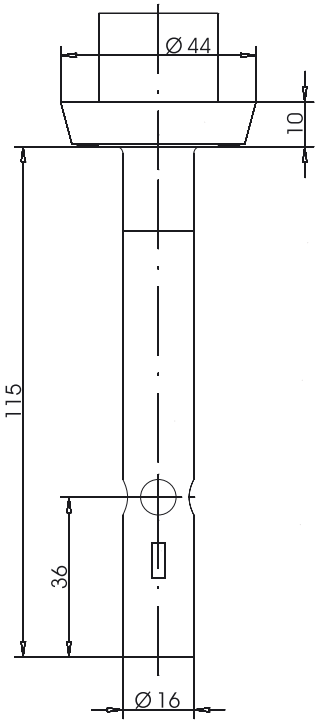
Process connections



Clamp DN25

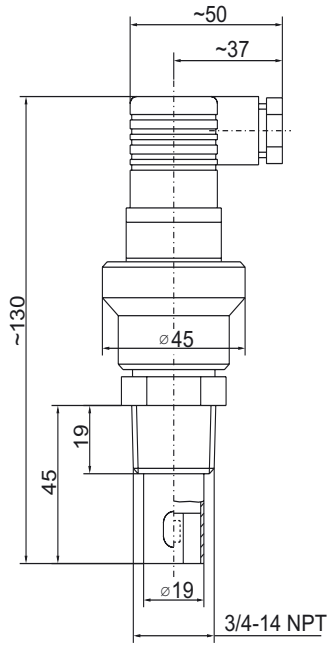


Thread G1/2A



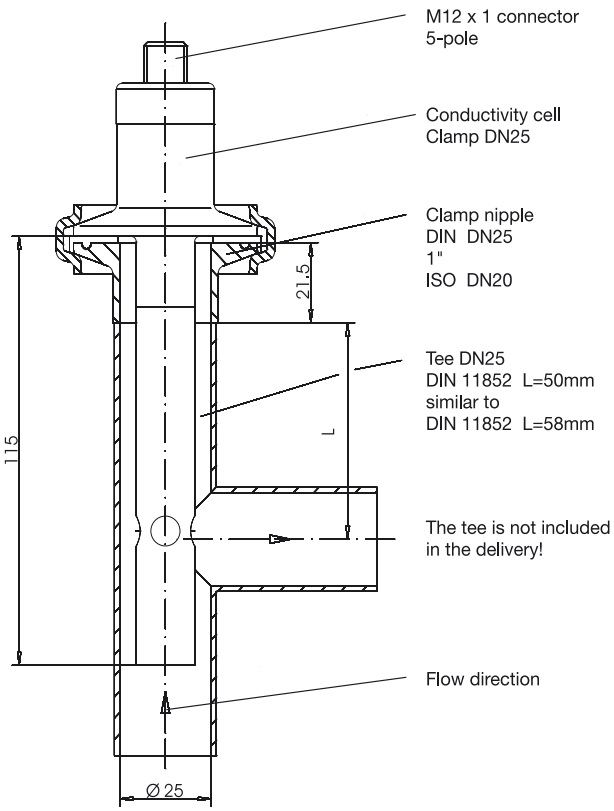
MK DN25
(milk cone to DIN 11 851)

Extra code /765: high-temperature version
(available for process connection 3/4-14NPT (145) only)



K = 0.1

Installation example Type 202924/20



Electrical connection

Connection for	Connector	M12 connector	Attached cable
Outer electrode	⏚	1	white
Inner electrode	2	2	brown
Temperature compensation*	1 3	3 4	yellow green
3-wire circuit		5	

*option

Order details

			(1)	**Basic type**
		202924		Conductivity cells
			(2)	**Basic type extensions**
		10		JUMO techLine Lf-VA
		20		JUMO techLine Lf-VA SL (16 mm dia.)
			(3)	**Cell constant**
x	x	0001		K = 0.01 (range 0.1 — 20MΩcm or 0.05 — 10µS/cm)
x	x	0010		K = 0.1 (range 1µS — 1mS/cm)
			(4)	**Temperature sensor**
o	o	0000		none
o	o	1003		Pt100
o	o	1005		Pt1000
			(5)	**Process connection**
o	o	104		thread G1/2A
x		105		thread G3/4A
o		106		thread G1A
	o	144		1/2"-14 NPT
o		145		3/4"-14 NPT
o	o	604		taper connection DIN 11 851-DN25 (milk cone)
o	x	613		clamp DN25
			(6)	**Electrical connection**
o	o	17		attached cable connection, cable length 5 m
x		37		angled connector to DIN 43 650
	x	83		M12 connector
			(7)	**Body material**
o		26		stainless steel 1.4571
	x	31		stainless steel 1.4435 (similar to 316L, pharmaceutical version)
o		79		PEEK[1]
x		88		PVDF (standard)
			(8)	**Cell material**
x		26		stainless steel 1.451 (standard)
	x	31		stainless steel 1.4435 (similar to 316L, pharmaceutical version)
o		60		titanium[2]
			(9)	**Extra codes**
x	x	000		none
o		765		high-temperature version[3]

x = combination comes as standard
o = combination is optional

Other versions on request.

---

[1] only with process connection -145 (3/4-14 NPT), available in conjunction with extra code /765
[2] only available with body material -88 (PVDF)
[3] only available with process connection -145 (3/4-14 NPT)

	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)		(9)
Order code	202924	/		-		-		-		-		-		-		/	
Order example	202924	/	10	-	0010	-	0000	-	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.

Stock items (delivery: 3 working days after receipt of order)

Sales No.	Type	Brief description
20/00300203	202924/10-0010-0000-105-37-88-26/000	K = 0.1 / G3/4A
20/00300202	202924/10-0010-1003-105-37-88-26/000	K = 0.1 / Pt100 / G3/4A
20/00338487	202924/10-0010-1003-104-37-88-26/000	K = 0.1 / Pt100 / G1/2A
20/00300204	202924/10-0001-0000-105-37-88-26/000	K = 0.01 / G3/4A
20/00300079	202924/10-0001-1003-105-37-88-26/000	K = 0.01 / Pt100 / G3/4A
20/00456809	202924/20-0001-1003-104-83-31-31/000	K = 0.01 / Pt100 / G1/2A / 16 mm dia.
20/00452527	202924/20-0010-1003-104-83-31-31/000	K = 0.1 / Pt100 / G1/2A / 16 mm dia.

Production items (delivery: 10 working days after receipt of order)

Sales No.	Type	Brief description
20/00353041	202924/10-0001-0000-105-37-26-26/000	K = 0.01 / G3/4A / process connection 1.4571
20/00089395	202924/10-0001-1003-604-37-88-26/000	K = 0.01 / Pt100 / milk cone
20/00089389	202924/10-0010-1003-106-37-88-26/000	K = 0.1 / Pt100 / G1A
20/00089393	202924/10-0001-1003-106-37-88-26/000	K = 0.01 / Pt100 / G1A
20/00350627	202924/10-0010-0000-105-37-26-26/000	K = 0.1 / G3/4A / process connection 1.4571
20/00322533	202924/10-0010-1003-613-37-26-26/000	K = 0.1 / Pt100 / clamp DN25 / process connection 1.4571

Certifiable conductivity cells

Sales No.	Type	Brief description
20/00392030	202924/10-0001-1003-105-37-88-26/000	certifiable version - certificates must be ordered separately
20/00392031	202924/10-0010-1003-105-37-88-26/000	certifiable version - certificates must be ordered separately

Certificates (optional)

Sales No.	Type
20/00365727	Materials test certificate to EN 10204 3.1 (when ordering, please specify in plain text: “material” and / or “roughness”)
20/00359893	ASTM test certificate for precisely measured cell constant (1-point calibration)
20/00423913	FDA approval for insulator and O-rings

Pharmaceutical versions (incl. certificates)

Sales No.	Type	Brief description
20/00405886	202924/10-0010-1003-613-37-31-31/000	K = 0.1 / Pt100 Class A / clamp DN25 and body material Mat. Ref. 1.4435 / airtight film packaging / incl. ASTM certificate, 3.1 certificate for material and roughness <0.8 µ
20/00420617	202924/10-0001-1003-613-37-31-31/000	K = 0.01 / Pt100 Class A / clamp DN25 and body material Mat. Ref. 1.4435 / airtight film packaging / incl. ASTM certificate, 3.1 certificate for material and roughness <0.8 µ
20/00456810	202924/20-0001-1003-613-83-31-31/000	K = 0.01 / Pt100 Class A / clamp DN25 and body material Mat. Ref. 1.4435 / airtight film packaging / incl. ASTM certificate, 3.1 certificate for material and roughness <0.8 µ
20/00456812	202924/20-0010-1003-613-83-31-31/000	K = 0.1 / Pt100 Class A / clamp DN25 and body material Mat. Ref. 1.4435 / airtight film packaging / incl. ASTM certificate, 3.1 certificate for material and roughness <0.8 µ

High-temperature version

Sales No.	Type	Brief description
20/00397615	202924/10-0010-1003-145-37-00-00/765	K = 0.1 / Pt100 / NPT3/4-14

Accessories

Sales No.	Type	Brief description
20/00303681	connection cable 25 m	4-pole + screen
20/00304181	connection cable 50 m	4-pole + screen
20/00300478	conductivity simulator	2H-SLF-1
20/00082902	connecting cable for simulator	5-pole AMP / 1.10 m

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Internet: www.JumoUSA.com

JUMO tecLine Lf-GT Electrolytic Conductivity Cells Industrial Version with graphite electrodes

202925 Series

- 2-electrode system
- cell constant K=1.0; 3.0 or 10.0
- for ranges up to 200mS/cm
- different process connections enable optimal adaptation to process conditions

Brief description

Conductivity cells are used in conjunction with conductivity transmitters to determine the electrolytic conductivity of liquids. The materials used are physiologically harmless and conform to FDA requirements.
JUMO 202925 Series conductivity cells 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

Principle of operation

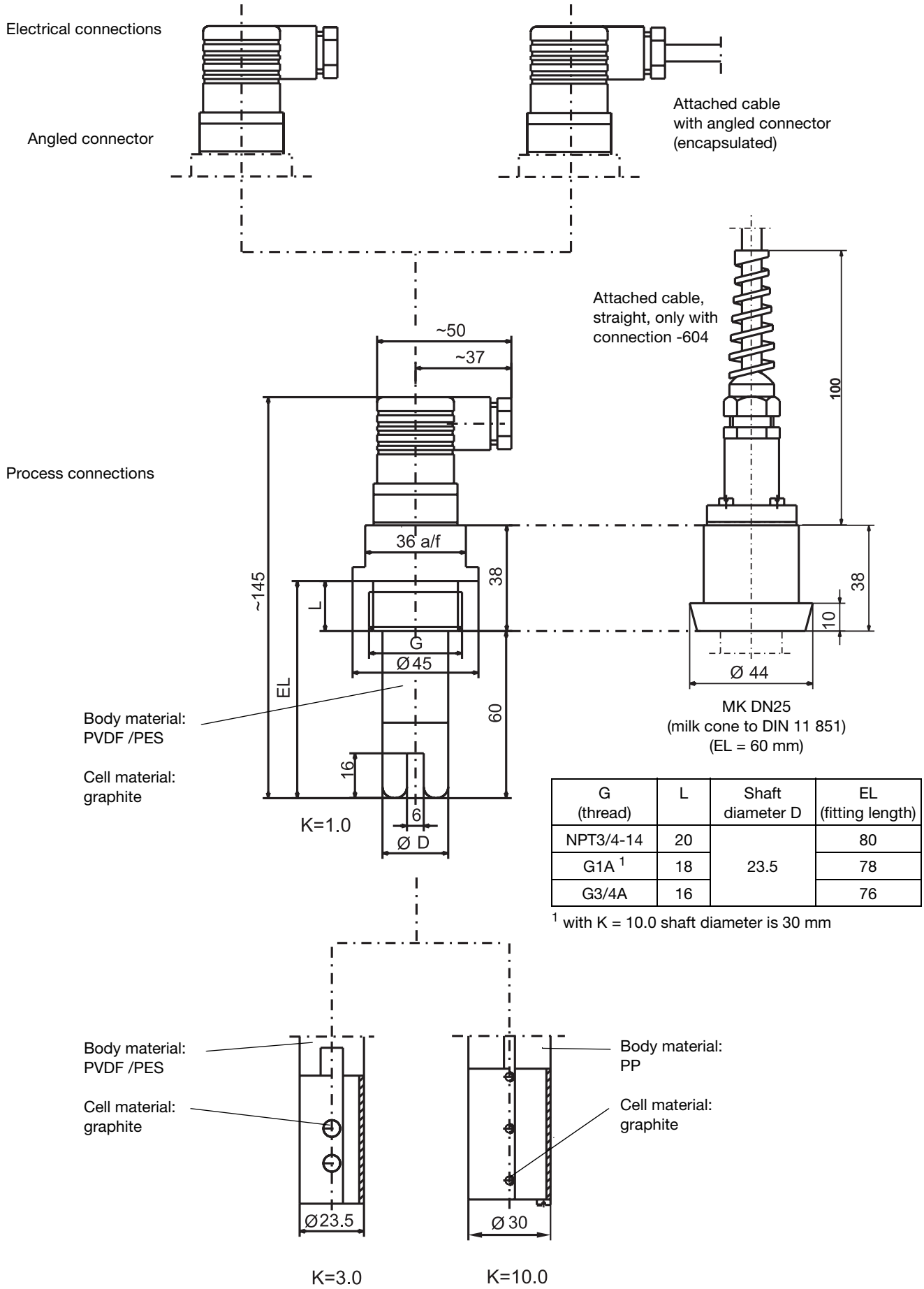
202925 Series measuring cells are 2-electrode cells. An a.c. voltage is applied through the transmitter. The current flowing through the liquid and the electrodes is determined by the conductivity of the liquid.

Technical data

Cell constant[1]	K = 1.0 or K = 3.0 or K = 10.0
Typical measuring ranges[2]	10 µS/cm — 15 mS/cm(for K = 1.0) 0.1 — 30 mS/cm or 200 mS/cm (for K = 3.0 / 10.0)
Temperature compensation	with Pt100 or Pt1000
Process connection	standard: G3/4A optional: G1A or NPT3/4-14 or taper connection DIN 11851-DN25 (milk cone)
Body material	PVDF for K = 1.0 and K = 3.0 PP for K = 10.0
Cell material	graphite / PES
Electrical connection	angled connector (Hirschmann connector) to DIN 43 650; protected to IP65 10 m fixed cable, other cable lengths on request
Maximum pressure	16 bar at 25°C or 9 bar at 60°C
Maximum temperature	PVDF 130°C / PP 80°C

[1] Any deviation from the cell constant can be adjusted on the transmitter.
[2] 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.

Dimensions / overview of types



G (thread)	L	Shaft diameter D	EL (fitting length)
NPT3/4-14	20	23.5	80
G1A [1]	18		78
G3/4A	16		76

[1] with K = 10.0 shaft diameter is 30 mm

Electrical connection

Connection for	Connector	Attached cable
Outer electrode	⏚	white
Inner electrode	2	brown
Temperature com*	1 3	yellow green

*option

Order details

				(1)	**Basic type**
			202925		Conductivity cells 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 G3/4A
o	o	x	106		thread G1A
o	-	-	145		3/4-14 NPT
o	-	-	604		taper connection DIN 11 851-DN25 (milk cone)
				(5)	**Electrical connection**
x	x	x	37		angled connector to DIN 43 650 (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 = combination is standard
o = combination is optional
– = combination cannot be supplied

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code	202925	/		-		-		-		-		-	84
Order example	202925	/	0100	-	1003	-	105	-	37	-	88	-	84

Stock items

Sales No.	Type	Brief description
20/00300200	202925/0100-1003-105-37-88-84	K = 1.0 / Pt100 / G3/4A
20/00300201	202925/0100-0000-105-37-88-84	K = 1.0 / G3/4A
20/00089385	202925/0100-1003-106-37-88-84	K = 1.0 / Pt100 / G1A

Non-stock items

Sales No.	Type	Brief description
20/00089381	202925/0300-1003-105-37-88-84	K = 3.0 / Pt100 / G3/4A
20/00305206	202925/1000-1003-106-37-88-84	K = 10.0 / Pt100 / G1A

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JUMO PROCESS CONTROL INC.

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Fax: 610-380-8009
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Internet: www.JumoUSA.com

Impedance converter for combination electrodes

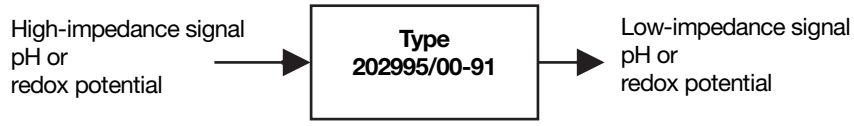
Series 202995 (former designation: 2 AMZ-20)

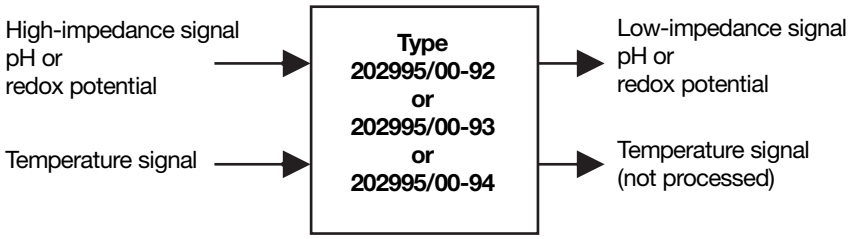
- **independent of mains supply**
- **retrofitting is possible**
- **enables longer cable distances**
- **stabilizes signal**

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	$i_e \leq 2$ pA at 25°C
Input voltage	$U_e \pm 1$ V ± 10%

Output

Offset voltage	$U_0 \leq 6$ mV (typ.)
Temperature drift	15 µV/°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
≤ 0.5%, if the input impedance of the subsequent amplifier is ≥ 20 MΩ.

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.

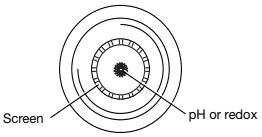
Housing
PC (polycarbonate)

Weight
35 g

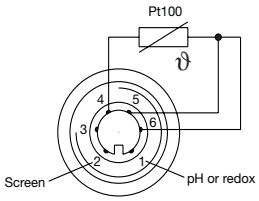
Electrical connection

Input / output
The assigment of input and output is always identical

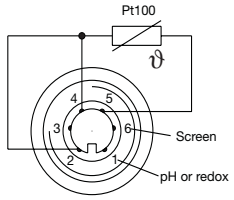
Connection
-91 (standard):
N cap
plug connector matches the JUMO electrode caps with cable socket N (see Data Sheet 20.2900) and most of the usual electrode caps (S7, S8).



-92:
SMEK cap or SixPlug,
terminal assignment "JUMO" for pH or redox combination electrodes with integrated temperature sensor
(plan view of the connector for the impedance converter)



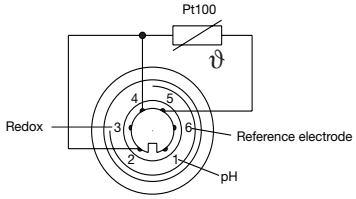
-93:
SMEK cap or SixPlug,
terminal assignment "other electrode manufacturers" for pH or redox combination electrodes with integrated temperature sensor (plan view of the connector for the impedance converter)



(1) Connection to glass/metal electrode

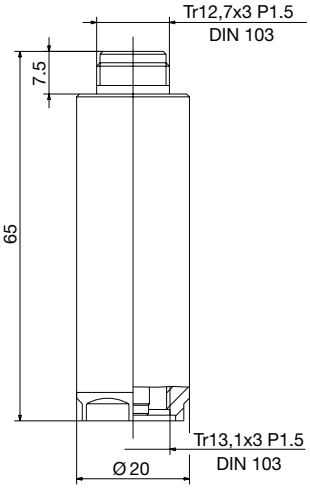
(2) Connection to reference electrode

-94:
SMEK cap or SixPlug,
terminal assignment for multiparameter sensor (pH/redox and temperature signal) e.g. JUMO Multitrode
(plan view of the connector for the impedance converter)

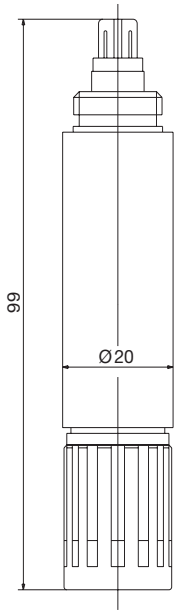


Dimensions

Type 202995/00-91



Type 202995/00-92
Type 202995/00-93
Type 202995/00-94



Available from stock

(delivery 3 days after receipt of order)

Impedance converter with N cap, Type 202995/00-91 **Sales No.** 20/00300455

Not available from stock

(delivery 2 weeks after receipt of order)

Impedance converter with SMEK cap (SixPlug), pin assignment "JUMO"[1], Type 202995/00-92 **Sales No.** 20/00406964
Impedance converter with SMEK cap (SixPlug), pin assignment "other electrode manufacturers"[1], Type 202995/00-93 **Sales No.** 20/00406965

[1] Take note of the pin assignment!

Order details

	(1)	**Basic type**
202995		Impedance converter
	(2)	**Basic type extension**
00		none
	(3)	**Connection**
91		N cap, matching the N connector
92		SMEK cap (SixPlug), pin assignment JUMO"[1]
93		SMEK cap (SixPlug), pin assignment "other electrode manufacturers"[1]
94		SMEK cap (SixPlug), for multiparameter sensor (pH, redox, temperature)[1]

	(1)	(2)	(3)
Order code	202995 /	00 -	
Order example	202995 /	00 -	91