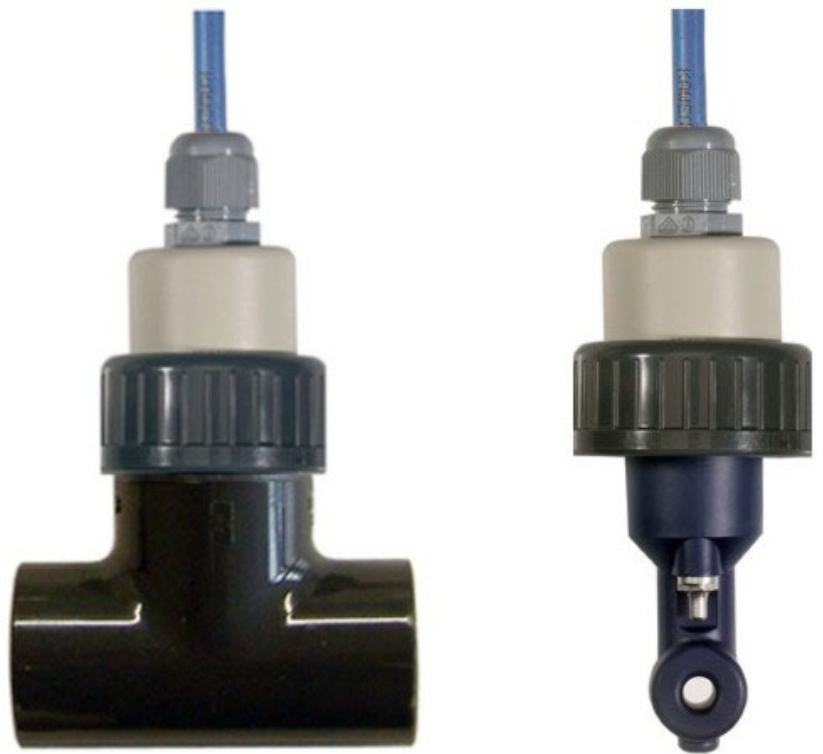


JUMO ecoLine Ci

Inductive conductivity and temperature sensor
for general water engineering
Type 202943



Installation Instructions



20294300T94Z001K000

V3.00/EN/00642313

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1 Safety information

General

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

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

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

Warning symbols



DANGER!

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



WARNING!

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



CAUTION!

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



CAUTION!

This symbol indicates that **components could be destroyed** by electrostatic discharge (ESD = Electro Static Discharge) if the respective cautionary measures are not taken.

Only use the ESD packages intended for this purpose to return device inserts, assembly groups, or assembly components.

Note symbols



NOTE!

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



REFERENCE!

This symbol refers to **additional information** in other sections, chapters, or other manuals.



DISPOSAL!

At the end of its service life, the device and any batteries present do not belong in the trash! Please ensure that they are **disposed of** properly and in an **environmentally friendly** manner.

2.1 Brief description

The sensor measures the electrolytic conductivity of a process liquid. The sensor operates according to the inductive measuring principle. Because it uses the inductive method of measurement rather than the conductive 2-pin or 4-pin measurement method, the sensor is virtually maintenance-free. The measuring accuracy is practically unaffected by deposits and grease/oil film on the surface of the sensor.

A temperature probe (Pt1000) measures the process temperature at the same time. The temperature probe can be selected in a stainless steel sleeve (which responds very quickly) that is free-standing or housed internally in the plastic body (internally is the only option if the material is PVDF). Internal installation is recommended if the sample media could chemically attack the stainless steel sleeve. The sensor body material is composed of polypropylene (PP) as standard. PVDF is also available as an alternative material.

A wide range of process connections are available to ensure flexible application in systems and to provide spare equipment for older devices.

The JUMO ecoLine Ci sensor is designed for connection to the JUMO AQUIS 500 Ci transmitter according to data sheet 202566.

Typical applications

The sensor is primarily designed for use in water technology systems. Typical application areas are general water engineering (drinking water and wastewater), air conditioning and cooling systems, desalination monitoring in cooling towers, rinsing baths, car and vehicle washes, desalination of seawater (intake), swimming pool water monitoring etc. An immersion variant allows use in open channels and containers.

Product benefits

- Practically maintenance-free conductivity measurement
- Materials are FDA/food-use approved
- Various process connections variants
- A fast-response temperature sensor
- Compact, proven sensor

2.2 Measuring principle

The inductive principle of measurement allows a largely maintenance-free recording of the specific conductivity, even in the most challenging medium conditions. In contrast to a conductive method of measurement, problems such as electrode degradation and polarization almost never occur.

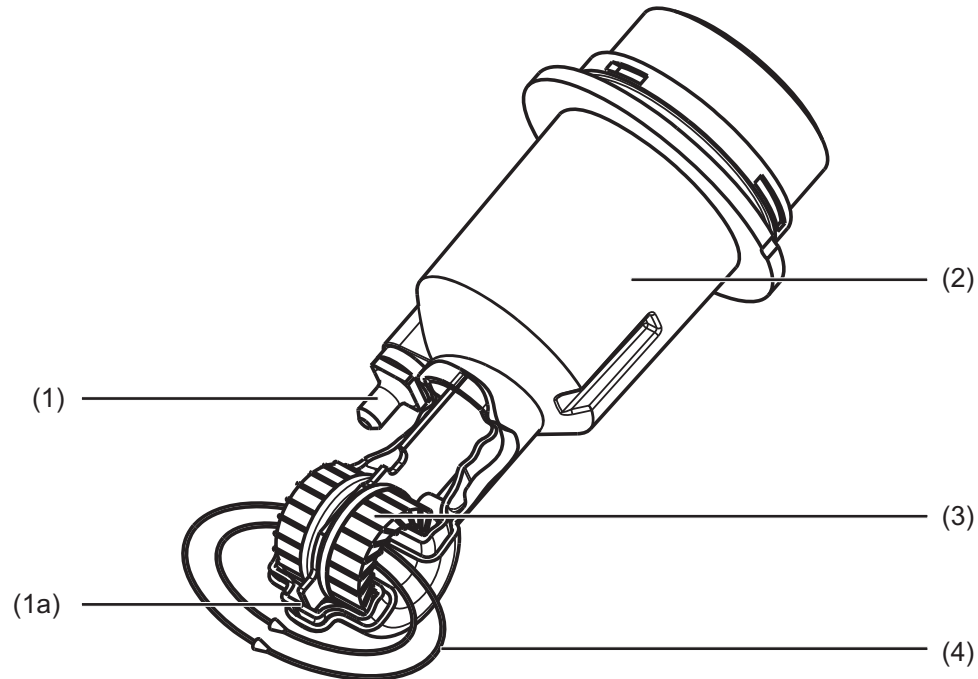
Conductivity is measured using an inductive probe. A sine alternating voltage supplies the transmitter coil. Depending on the conductivity of the liquid to be measured, a current is induced in the receiver coil. The current is proportional to the conductivity of the medium.

2 Introduction

2.3 Function of the sensor

Sensor

The sensor consists of a hermetically sealed body made from polypropylene (PP) or polyvinylidene fluoride (PVDF), inside which both measurement coils are arranged. A flow opening in the sensor enables the flow with the measurement medium. As a result of the measuring principle there is an unavoidable galvanic isolation between the measurement medium and the actual value output. The sensor is highly temperature- and pressure-stable.



- (1) Temperature probe, free-standing, (a) optionally: internal
- (2) Sensor body made from PP
- (3) Measuring coils
- (4) Liquid loops

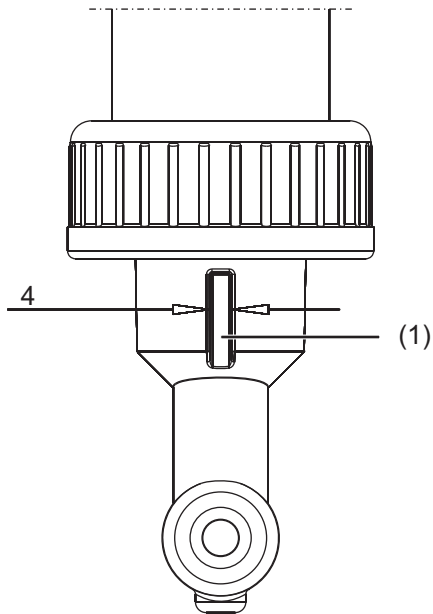
Temperature probe, free-standing:

The sensor in the stainless steel sleeve responds to temperature changes very quickly.

Temperature probe, internal:

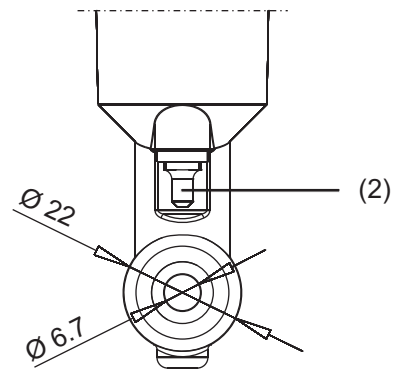
The sensor is integrated into the cell body. In this version, no metal comes into contact with the measurement medium (important for aggressive media). However, the temperature measurement is more sluggish.

2.4 Sensor details



Guide slot

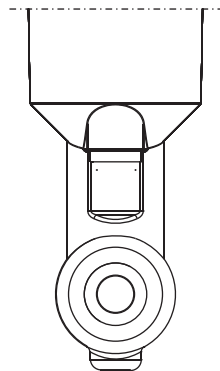
A pin from the T-piece (see accessories) fits in the 4 mm wide guide slot (1), which ensures correct alignment of the sensor towards the direction of flow.



Temperature probe, internal (2)

Standard version

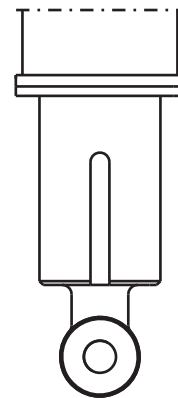
Material touched by measurement medium:
Stainless steel 1.4571 AISI 316ti and FPM



Temperature probe, internal (3)

Extra code 268

Material touched by measurement medium:
PP, suitable for food



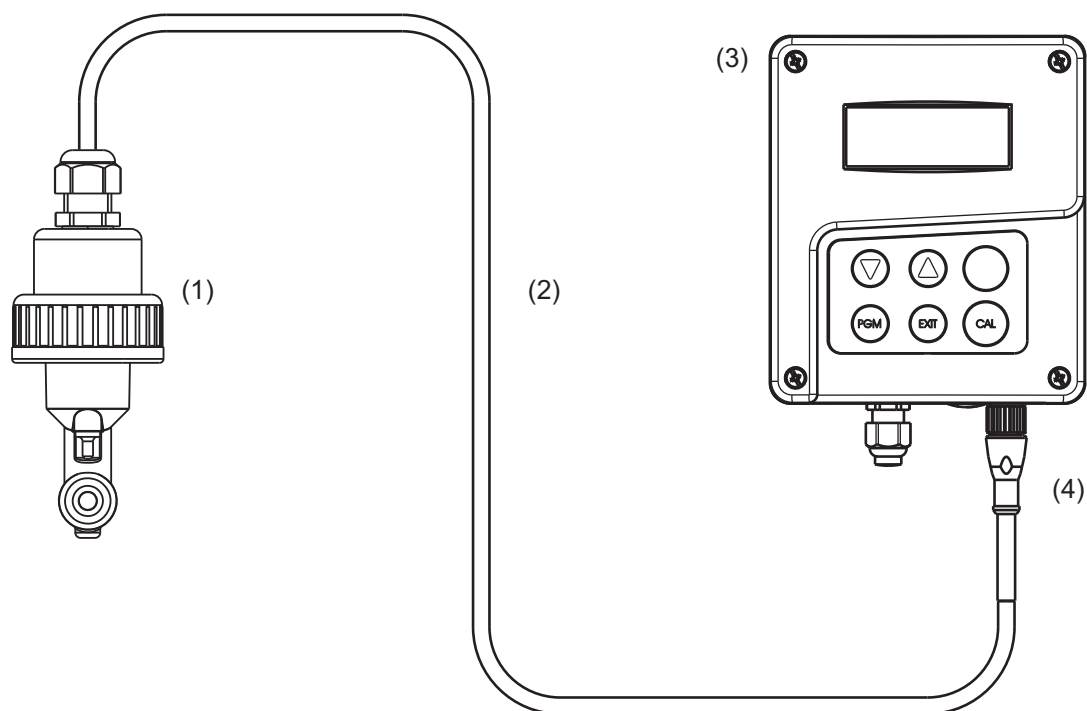
Sensor body made from PVDF

Cell constant 4.65 1/cm

Only available for process connections
168 and 169

2 Introduction

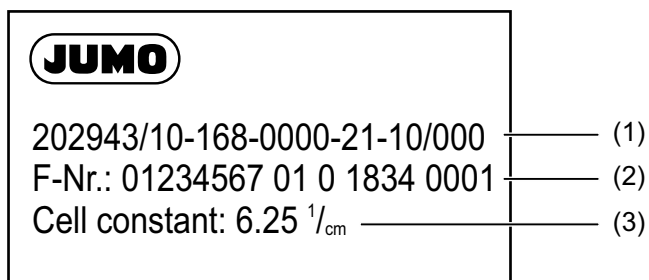
2.5 Setting up a measuring path



- (1) JUMO ecoLine Ci – inductive conductivity and temperature sensor
- (2) Cable (component of JUMO ecoLine Ci), standard length 10 m
- (3) JUMO AQUIS 500 Ci – transmitter/controller for conductivity, concentration, and temperature
- (4) M12 socket

3 Identifying the device version

3.1 Nameplate



- (1) Type
- (2) Manufacturing no.
- (3) Cell constant K (1/cm)



NOTE!

The cell constant K is required for the calibration on the transmitter/controller.

The date of fabrication is contained in the "F-Nr." code: 1834 = 2018/34 (year/calendar week)

3 Identifying the device version

3.2 Order details

(1) Basic type	
202943	JUMO ecoLine Ci – inductive conductivity and temperature sensor for general water engineering
(2) Basic type extension	
10	Sensor body PP, external temperature sensor (standard)
20	Sensor body PP, internal temperature sensor
30	Sensor body PVDF, internal temperature sensor
(3) Process connection	
168	For T-piece installations, with PVC union nut G 1 1/2
169	For T-piece installations, with stainless steel union nut G 1 1/2
607	Taper socket with union nut DN 50 DIN 11851 (dairy pipe fitting) ^{a,b}
616	Clamping socket (clamp) DN 50 (2") DIN 32676 ^{a,b}
617	Clamping socket (clamp) 2.5" similar to DIN 32676 ^{a,b}
690	SMS DN 2" ^{a,b}
706	Immersion model ^b
(4) Immersion length (EL)	
0000	None
0500	500 mm ^c
1000	1000 mm ^c
1500	1500 mm ^c
2000	2000 mm (maximum value) ^c
(5) Electrical connection	
21	Permanent cable with M12 cable socket
(6) Length of permanent cable	
10	10 m (standard)
20	20 m
30	30 m
(7) Extra codes	
000	None

^a Without fitting material (union nut, retaining clip etc)

^b Only with basic type extension 10 or 20

^c Only with process connection 706

	(1)		(2)		(3)		(4)		(5)		(6)		(7)
Order code		/		-		-		-		-		/	
Order example	202943	/	10	-	168	-	0000	-	21	-	10	/	000

3.3 Scope of delivery

1 device in the version ordered
1 installation instructions B 202943.4

3 Identifying the device version

3.4 Accessories

Description	Part no.
Weld-on threaded connection DN 50, DIN 11851 (counter piece for process connection 607)	00085020
T-piece made from PVC DN 32 ^a , including threaded bushing (counter piece for process connection 168 or 169)	00439247
T-piece made from PVC DN 40 ^a , including threaded bushing (counter piece for process connection 168 or 169)	00439249
T-piece made from PP, DN 32 ^a (counter piece for process connection 168 or 169)	00449511
T-piece made from PP, DN 40 ^a (counter piece for process connection 168 or 169)	00449514
T-piece made from PP, DN 50 ^a (counter piece for process connection 168 or 169)	00449516
Union nut G 1 1/2, PVC	00439199
Union nut G 1 1/2, stainless steel	00452039
Grooved union nut DN 50, DIN 11851	00343368
Grooved union nut SMS DN 2"	00345162
Flange DN 32 ^b , material PP	00083375
Flange DN 50 ^b , material PP	00083376
Calibration adapter for inductive conductivity measurement, type 202711/1	00543395

^a With rotation prevention; the sensor can only be installed in the correct direction.

^b Only in connection with sensor with process connection 706 (immersion version)



NOTE!

The following is required for the initial startup of the sensor and transmitter/controller or for component exchange:

- Transmitter/controller, such as JUMO AQUIS 500 Ci, data sheet 202566
- Inductive conductivity and temperature sensor JUMO ecoLine Ci, data sheet 202943
- Calibration adapter for inductive conductivity measurement, type 202711/21, data sheet 202711

4 Mounting

4.1 General information

Mounting site

Ensure that the device is easily accessible for later calibration.

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

Avoid direct sunlight!

Ensure a good flow through and around the sensor (see following drawing)!

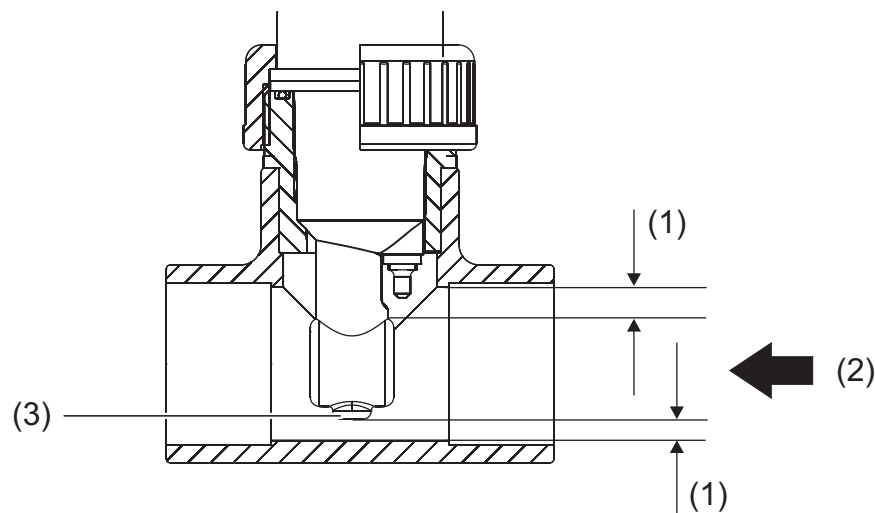
For insertion in a pipeline, a minimum distance of 20 mm must be observed from the sensor to the pipe wall!

If the minimum distance cannot be maintained, a limited compensation can be achieved with the parameter "insertion factor".

For insertion in basins, a representative mounting site for typical conductivity and/or concentration should be provided.

Installation position

The sensor can be installed in any position.



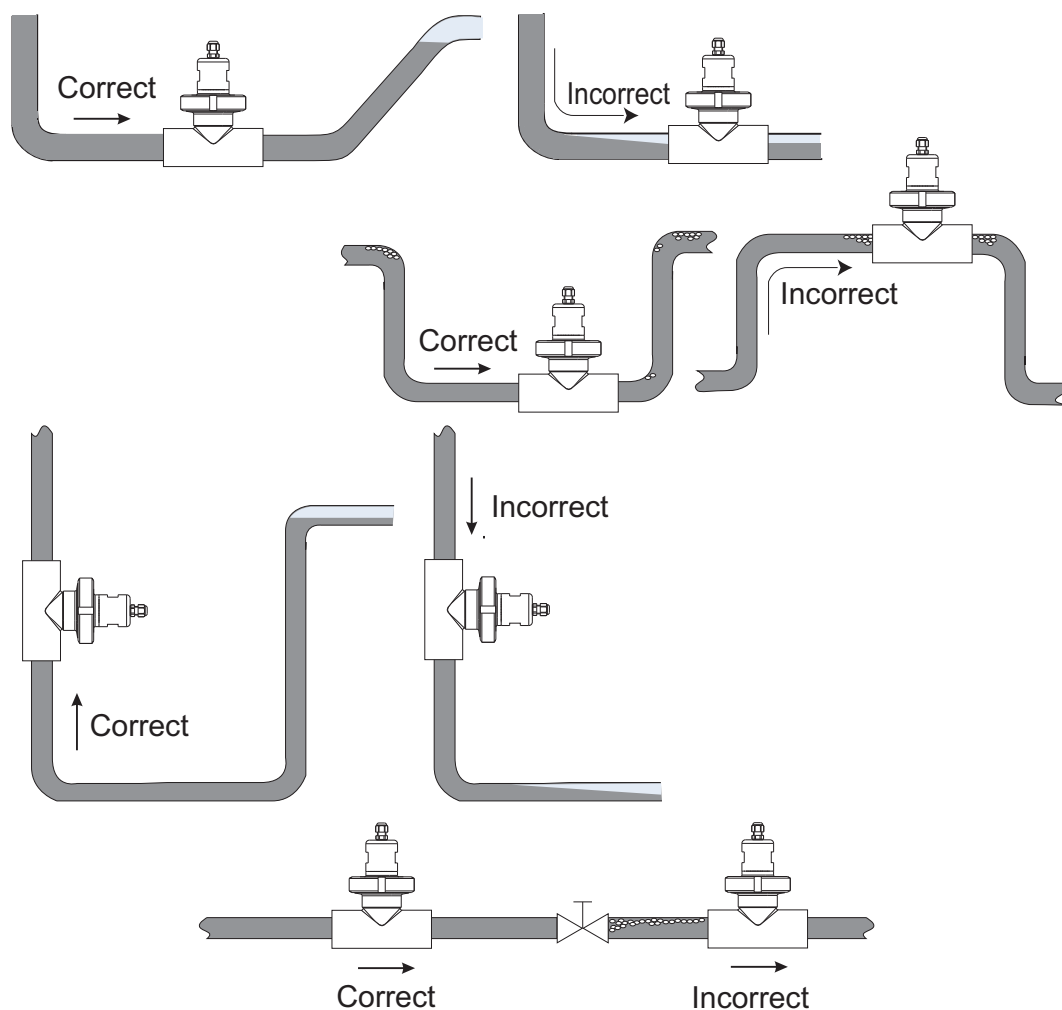
- (1) At least 20 mm
- (2) Direction of flow
- (3) Sensor



CAUTION!

The environmental conditions (temperature, pressure etc.) must not exceed or fall below the admissible range.

► chapter 8 "Technical data", page 20



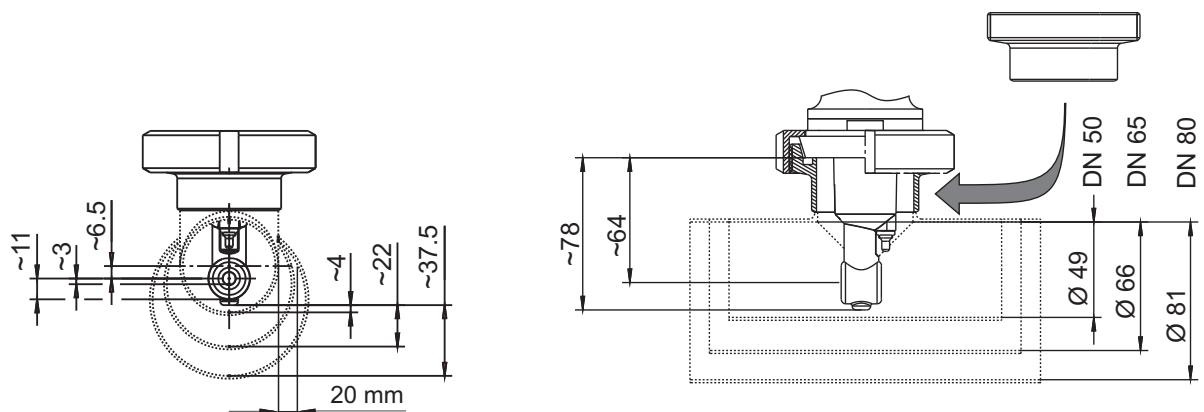
CAUTION!

Avoid at all costs:

- Formation of gas bubbles
- Dry running
- Flow separation
- Eddying

4 Mounting

4.2 Assembly examples for the accessories

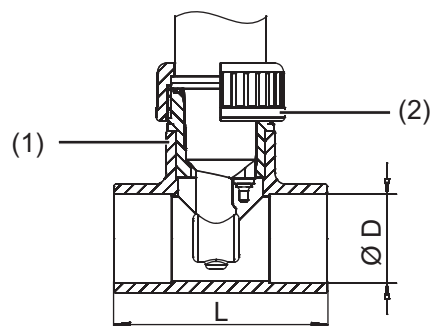


Weld-on threaded connection DN 50, DIN 11851

Part no. 00085020

suitable for process connection 607

The shown reduced-T-piece DIN, short, SSS, DN 50/50 or DN 65/50 or DN 80/50 should be provided on site (not available from JUMO).



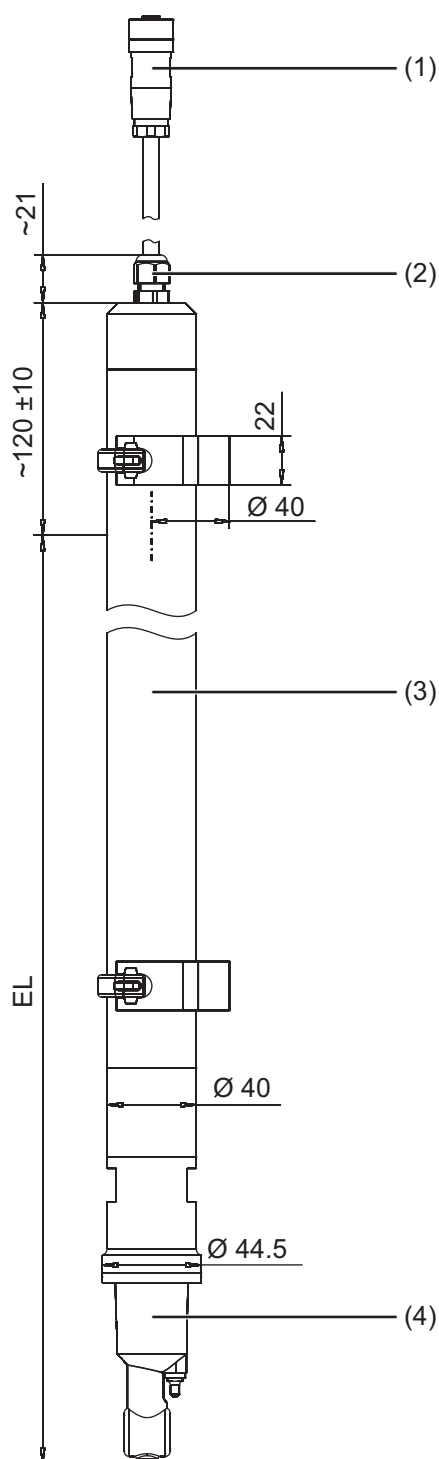
T-piece made from PVC or PP

suitable for process connection 168 and 169

- (1) Threaded bushing G 1 1/2" (PVC or PP)
- (2) Union nut (PVC for 168 stainless steel for 169)

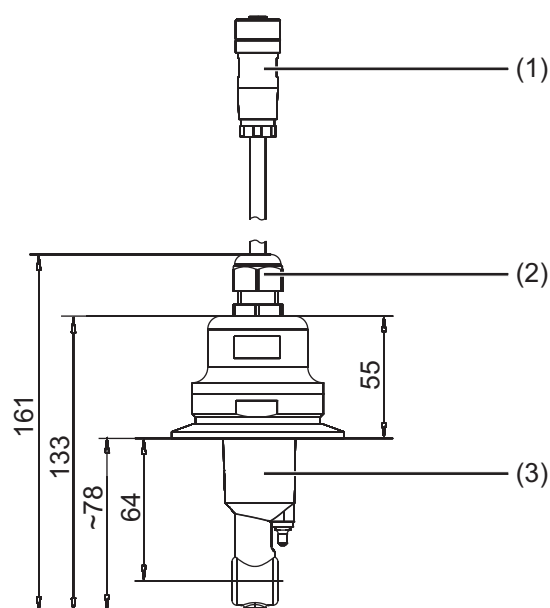
DN	Ø D	L	Material	Maximum Temperature	Part No.
32	40	98	PVC	60 °C	00439247
40	50	118	PVC	60 °C	00439249
32	40	88	PP	80 °C	00449511
40	50	102	PP	80 °C	00449514
50	63	124	PP	80 °C	00449516

4.3 Dimensions



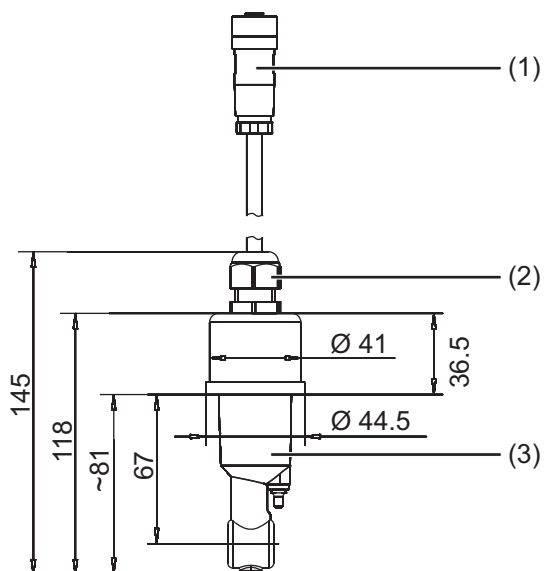
Type 202943/10-706-...
immersion version

- (1) Socket M12, PBT/PA
- (2) Cable fitting M16, protection type IP68 (up to 0.2 m), PBT/PA
- (3) PP
- (4) Stainless steel 1.4301, AISI 304

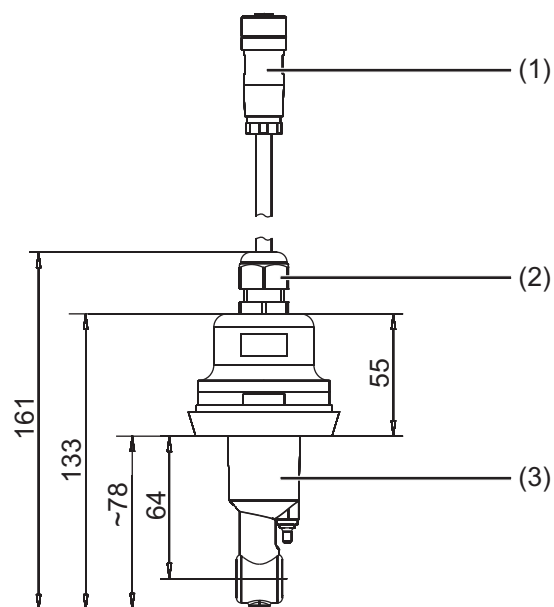


Type 202943/10-617-... or
type 902941/10-616-...
clamp 2''' or clamp 2 1/2'''

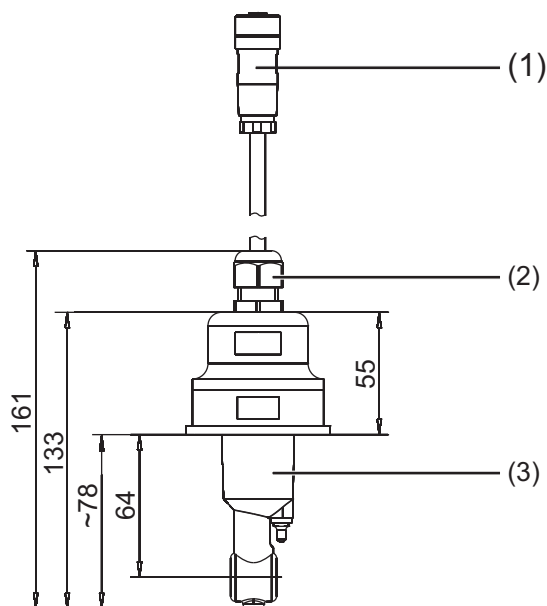
4 Mounting



**Type 202943/10-168-... or
type 202943/10-169-...
DN 32 or DN 40**



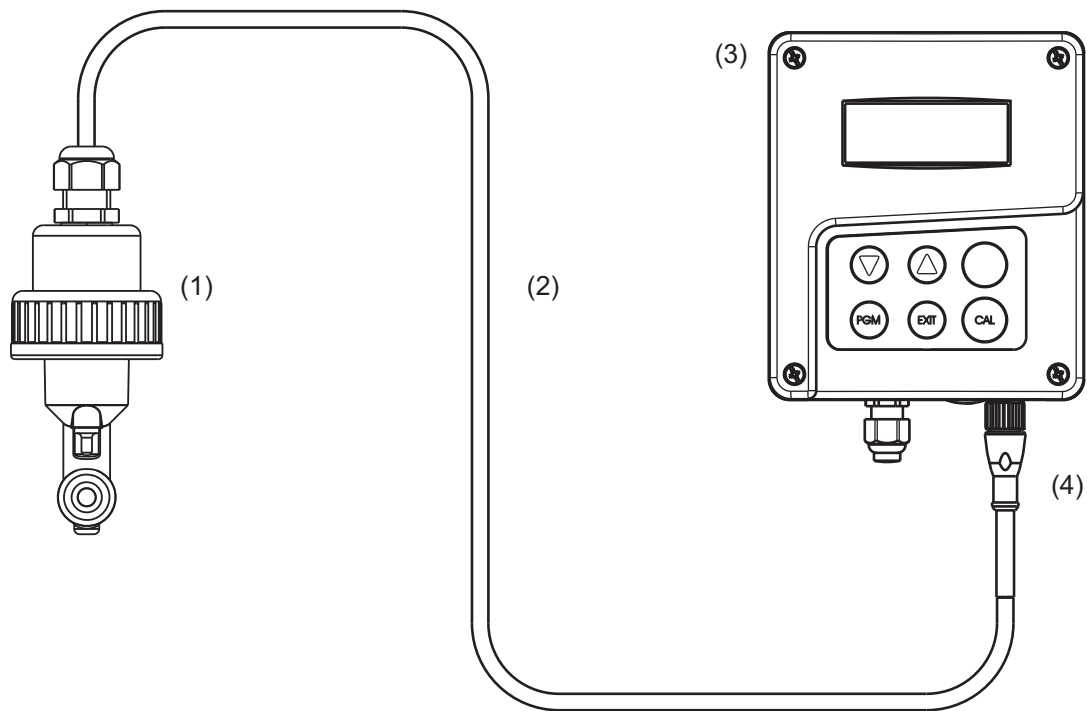
**Type 202943/10-607-...
MK DN 50**



**Type 202943/10-690-...
SMS 2"**

- (1) Socket M12, PBT/PA
- (2) Cable fitting M16, protection type IP68 (up to 0.2 m), PBT/PA
- (3) PP
- (4) Stainless steel 1.4301, AISI 304

Electrical connection



- (1) JUMO ecoLine Ci – inductive conductivity and temperature sensor
 - (2) Cable (component of JUMO ecoLine Ci), standard length 10 m
 - (3) JUMO AQUIS 500 Ci – transmitter/controller for conductivity, concentration, and temperature
 - (4) M12 socket
1. Connect the M12 socket (4) to the connector on the transmitter/controller and screw on.



CAUTION!

The connecting cable must not be shortened or mechanically damaged!

After the connection, the inductive conductivity and temperature sensor **must** be calibrated.

► Operating manual for the transmitter/controller

6 Maintenance

Clean sensor



CAUTION!

Do not use solvents!

Stubborn coatings and deposits can be dissolved, for example with diluted hydrochloric acid, and removed with a soft brush (such as a bottle brush). The safety regulations must be observed!

7 Overcoming errors and malfunctions

7.1 Possible faults

Problem	Possible cause	Measure
No measured value display or actual value output	No voltage supply	Check supply voltage, check terminals
Measured value display 000 or actual value output 0 % (e. g. 4 mA)	Sensor not submerged in medium; Container level too low	Top up container
	Flow fitting blocked	Clean flow fitting
	Sensor faulty	
Incorrect or unstable measured value display	Sensor not submerged deeply enough	Top up container
	No through-mixing	Ensure good through-mixing, ensure sensor has approx 18 mm free rinsing flow on all sides
	Air bubbles	Observe installation information

7.2 Device testing



NOTE!

The device is maintenance-free.

If deviations from the measured value still occur with no known cause, the complete measuring chain (sensor, connecting cable and transmitter/controller) must be checked.

8 Technical data

General Information

	Type 202943/10-...	Type 202943/20-...	Type 202943/30-...
Measuring principle	Inductive		
Measuring range ^a	0 to 1000 µS/cm to 0 to 2000 mS/cm (depending on connected transmitter)		
Accuracy for measuring range			
0 to 1 mS/cm	≤ 1 %		
0 to 10 mS/cm	≤ 0.5 %		
0 to 50 mS/cm	≤ 0.5 %		
0 to 100 mS/cm	≤ 0.5 %		
0 to 1000 mS/cm	≤ 1 %		
0 to 2000 mS/cm	≤ 1 %		
Cell constant	k = 6.25 1/cm	k = 6.25 1/cm	k = 4.65 1/cm
Temperature sensor	Pt1000, class A		
t ₉₀ temperature ^b	≤ 6 s	≤ 2 min	≤ 10 min
Admissible ambient temperature	-10 °C to +60 °C		
Admissible storage temperature	-20 °C to +75 °C		
Protection type ^c	IP68		
Admissible medium temperature			
Operation	-10 °C to +80 °C	-10 °C to +80 °C	-10 °C to +100 °C
Briefly	≤ +100 °C (≤ 15 min)	≤ +100 °C (≤ 15 min)	≤ +110 °C (≤ 15 min)
For process connections 168 and 706 (immersion fitting)	-10 °C to +60 °C (depressurized)	-10 °C to +60 °C (depressurized)	-10 °C to +60 °C (depressurized)
Admissible process pressure	(Pressure temperature diagram ⇒ page 21)		
at 20 °C	10 bar	10 bar	10 bar
at 60 °C	6 bar	6 bar	6 bar
at 80 °C	0 bar	0 bar	4 bar
at -10 °C to +100 °C	minimum -0.1 bar	minimum -0.1 bar	minimum -0.1 bar
Sensor material			
touched by medium	Depending on design: stainless steel 1.4301 (304), stainless steel 1.4571 (316ti), PP, EPDM	Depending on design: stainless steel 1.4301 (304), PP	PVDF
not touched by medium	Depending on design: stainless steel 1.4301 (304), PA6, PUR, FPM, PBT/PA, CR/NBR, CuZn	Depending on design: stainless steel 1.4301 (304), PA6, PUR, FPM, PBT/PA, CR/NBR, CuZn	Depending on design: stainless steel 1.4408, PA6, PUR, PBT/PA, CR/NBR, CuZn
Process connection	see order details/dimensions		

^a Usual application range from approx. 100 µS/cm.

^b DIN EN 60751.

^c DIN EN 60529.

Electrical connection

The inductive conductivity sensors, type 202943/10-..., type 202943/20-... and type 202943/30-... are suitable for connection to inductive conductivity transmitters/controllers.

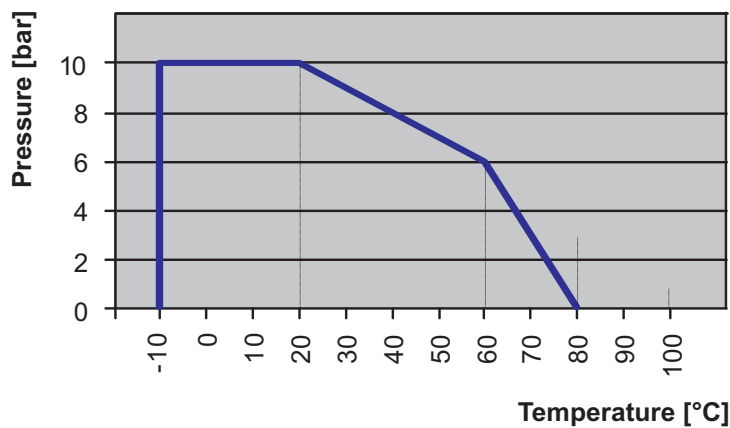
Connection type	Securely connected cable
Socket	Socket M12, 8-pole
Socket material	CuZn, PA6.6 GF30, PUR
Cable material	Outer cover: PUR
Cable lengths	See order details
Admissible temperature	-20 °C to +75 °C

Approvals/approval marks

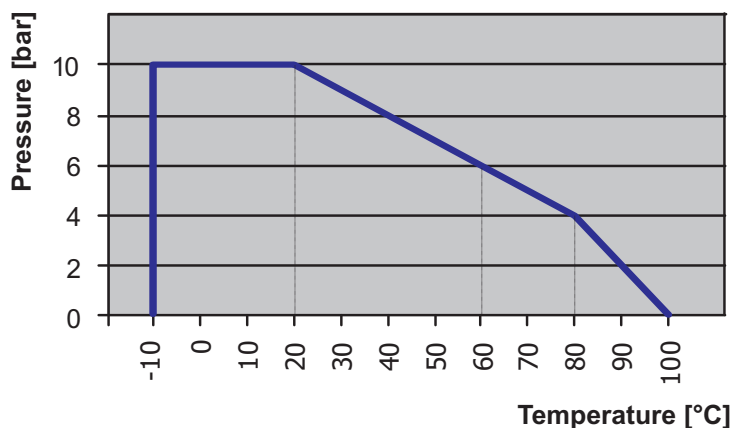
The materials that have been touched by the measurement medium are approved for food, physiologically harmless and listed by the FDA.

Admissible process pressure

Type 202943/10-... and type 202943/20-...



Type 202943/30-...



NOTE!

Temperature, pressure and measurement medium affect the operating life of the sensor!



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