



Inductive conductivity meter, ELEMENT Design

- Perfect for concentrated liquids and wide conductivity ranges
- Pre-parameterized versions available for direct start-up
- Compact measurement device for direct connection to PLC
- Simulation of process values for diagnostics
- Versions of the sensor available in PP, PVDF or PEEK

Product variants described in the data sheet may differ from the product presentation and description.

Can be combined with



Type S020 ▶
Insertion fitting for flow or analytical measurement



Type 8611 ▶
eCONTROL - Universal controller



Type 8619 ▶
multiCELL - Multi-channel and multi-function transmitter/controller



Type 8693 ▶
Digital electropneumatic process controller for the integrated mounting on process control valves



Type 8802 ▶
ELEMENT continuous control valve systems - overview

Type description

The Bürkert inductive Type 8228 conductivity meter is used in many industrial processes where measurements are required in aggressive or concentrated media such as acids, alkalis or liquids with high salt contents and a wide measuring range.

Applications like cooling water monitoring (i.e. dilution control), industrial water treatment or the preparation and identification of cleaning liquids, for example in CIP processes.

The device is available in two models:

- The first is the standard version with a G 2" process connection to be mount in Type S020 fitting
- The second is the CIP version with a 2" clamp process connection according to ASME BPE (1.5" clamp on request).

1. General technical data

Product properties

Material

Please make sure the device materials are compatible with the fluid you are using. Detailed information can be found in chapter "4.1. Chemical Resistance Chart – Bürkert resistApp" on page 8.

Non wetted parts

Housing	Stainless steel 316L, PPS
Cover	Polycarbonate (PC), transparent (opaque on request)
Display/configuration module	PC
Navigation Key	PBT
Seal	EPDM, silicone
Screws	Stainless steel 1.4401 (316 (A4))
Fixed connector holder	PPS CF30
Grounding terminal and screw	Stainless steel 1.4301 (304 (A2))
Others	Depending on the device version. Detailed information can be found in chapter "2. Product versions" on page 6 and in chapter "4.2. Material specifications" on page 8.

Wetted parts

Depending on the device version.

Detailed information can be found in chapter "2. Product versions" on page 6 and in chapter "4.2. Material specifications" on page 8.

Dimensions	Detailed information can be found in chapter "5. Dimensions" on page 9.
Compatibility	Depending on the device version. Detailed information can be found in chapter "2. Product versions" on page 6.
Pipe diameter	Depending on the device version. Detailed information can be found in chapter "2. Product versions" on page 6.
Temperature sensor	Integrated in the sensor
Temperature compensation	<ul style="list-style-type: none"> • None or • According to a predefined graph (NaCl, NaOH, HNO₃ or H₂SO₄) or • According to a graph defined especially for your process
Concentration	Conversion of conductivity to dissolved electrolyte concentration (Total dissolved solids (TDS)) by using a user adjustable factor.

Conductivity measurement

Measuring range	100 µS/cm...2 S/cm
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Temperature measurement

Measuring range	-15...+130 °C (+5...+266 °F)
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Product accessories

Display	Grey dot matrix 128 x 64 with backlighting
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Performance data

Conductivity measurement

Measuring range resolution	0.1 µS/cm
Measurement deviation	±(2 % of the measured value + 5 µS/cm)
Linearity	±2 %
Repeatability	±(0.2 % of the measured value + 2 µS/cm)
Response time t90	From 3 s (without filter) to 40 s (with slow filter)

Temperature measurement

Measuring range resolution	0.1 °C (0.18 °F)
Measurement deviation	±1 °C (1.8 °F)
4...20 mA output uncertainty	±1 % of range

Electrical data

Operating voltage	12...36 V DC, ±10 % oscillation rate, filtered and regulated, Connection to main supply: permanent (through external SELV (Safety Extra Low Voltage) and LPS (Limited Power Source) power supply)
Power source (not supplied)	Limited power source according to UL/EN 60950-1 standards or limited energy circuit according to UL/EN 61010-1 §9.4
Protection against DC polarity reversal	Yes

Power / Current consumption	<ul style="list-style-type: none"> Without the consumption of the current outputs and the transistor outputs: max. 1 W (25 mA at 12 V DC; inrush current ~100 mA) With the consumption of the current outputs and the transistor outputs: max. 40 W (max. 1 A for the transistor outputs)
Output signal	<p>The device is available with one transistor and one 4...20 mA analogue outputs (2 outputs meter) or with two transistor and two 4...20 mA analogue outputs (4 outputs meter)</p> <ul style="list-style-type: none"> Pulse (transistor): <ul style="list-style-type: none"> Polarized Configurable through wiring and through parameterizing as sourcing (PNP) or sinking (NPN) NPN-output: 1...36 V DC, max. 700 mA (or 500 mA max. per transistor if both transistor outputs are wired) PNP-output: V+ supply voltage, max. 700 mA (or 500 mA max. per transistor if both transistor outputs are wired) Galvanic insulation and protected against overvoltage, polarity reversals and short circuit Current (3-wire): <ul style="list-style-type: none"> 4...20 mA configurable through wiring and through parameterizing as sourcing or sinking, 22 mA to indicate a fault (can be parametered) Loop impedance max.: 1100 Ω at 36 V DC; 610 Ω at 24 V DC; 100 Ω at 12 V DC Response time (10...90 %): 150 ms (default value)
Voltage supply cable	Shielded cable, Ø 3...6.5 mm; max. 0.75 mm ² cross section
Media data	
Temperature	<p>With conductivity sensor in:</p> <ul style="list-style-type: none"> PP: 0...+80 °C (+32...+176 °F) PVDF: -15...+100 °C (+5...+212 °F) PEEK:-15...+130 °C (+5...+266 °F) <p>For the standard version, temperature limits may depend on the material the S020 fitting used is made of. Refer to the relevant instruction manual and data sheet and detailed information can be found in chapter "6.1. Pressure temperature diagram" on page 11. If the temperature ranges given for the device and the fitting are different, use the most restrictive range.</p>
Pressure	<p>With conductivity sensor in:</p> <ul style="list-style-type: none"> PP: max. PN6 (87 PSI) PVDF: max. PN6 (87 PSI) PEEK: max. PN10 (145 PSI) <p>For the standard version, pressure limits may depend on the material the S020 fitting used is made of. Refer to the relevant instruction manual and data sheet and detailed information can be found in chapter "6.1. Pressure temperature diagram" on page 11. If the pressure ranges given for the device and the fitting are different, use the most restrictive range</p>
Process/Port connection & communication	
Process connection	
Standard version	G 2" for use with S020 Insertion fitting
CIP version	Clamp 2" according to ASME BPE (clamp 1.5" on request)
Electrical connection	<p>For the device with:</p> <ul style="list-style-type: none"> 2 outputs meter (3-wire): 1 × 5 pin M12 male fixed connector 4 outputs meter (3-wire): 1 × 5 pin M12 male + 1 × 5 pin M12 female fixed connectors
Approvals and Certificates	
Standards	
Degree of protection ¹⁾ according to IEC/EN 60529	IP65 and IP67 with M12 connectors plugged in and tightened and electronic module cover fully screwed down

Directives	
CE directives	The applied standards, which verify conformity with the EU Directives, can be found on the EU Type Examination Certificate and/or the EU Declaration of conformity (if applicable)
Pressure equipment directives	Complying with Article 4, Paragraph 1 of 2014/68/EU directive Detailed information on the pressure equipment directive can be found in chapter “3.2. Pressure Equipment Directive” on page 7.
Certificates	<ul style="list-style-type: none"> FDA-certificate (only for standard or CIP version with PEEK or PVDF sensor holder and EPDM or FKM seal) ECR1935/2004 declaration (only for standard or CIP version with PEEK sensor holder and EPDM seal)
Certification	UL-Listed for USA and Canada
Environment and installation	
Ambient temperature	Operating and storage: -10...+60 °C (+14...+140 °F)
Relative air humidity	≤85 %, without condensation
Height above sea level	Max. 2000 m
Operating condition	Continuous
Equipment mobility	Fixed
Application range	Indoor and outdoor (protect the device against electromagnetic interference, ultraviolet rays and, when installed outdoors, against the effects of climatic conditions)
Installation category	Category I according to UL/EN 61010-1
Pollution degree	Degree 2 according to UL/EN 61010-1

1.) Not evaluated by UL

2. Product versions

The device is available in two models:

- Standard version with a G 2" process connection to be mount in Type S020 fitting
- CIP version with a Clamp 2" process connection according to ASME BPE (clamp 1.5" on request)

2.1. Standard version



Product details	
Material	<ul style="list-style-type: none"> Non wetted parts: <ul style="list-style-type: none"> M12 fixed connectors in nickel-plated brass Nut in PC or in PPA (with PEEK sensor holder) Wetted parts: <ul style="list-style-type: none"> Sensor holder in PP, PVDF or PEEK Seal in FKM (standard) or EPDM (option)
Compatibility	Any pipe from DN15...DN200 which are fitted with Bürkert S020 Insertion fitting. For the selection of the nominal diameter of the Insertion sensor-fittings, see data sheet Type S020 ▶.
Pipe diameter	DN15...DN200


2.2. CIP version



Product details	
Material	<ul style="list-style-type: none"> Non wetted parts: <ul style="list-style-type: none"> M12 fixed connectors in stainless steel 316L Process connection (clamp) in stainless steel 316L Wetted parts: <ul style="list-style-type: none"> Sensor holder in PEEK and stainless steel 316L (standard) or in PVDF and stainless steel 316L (on request) Seal in EPDM (standard) or FKM (on request)
Compatibility	Any pipe from DN32 which are fitted out with a clamp 2" according to ASME BPE as process connection for the device

3. Approvals

3.1. Certification UL

Certificate	Description
	UL-Recognized for USA and Canada Products are UL-certified products and comply also with the following standards: <ul style="list-style-type: none"> UL 61010-1 CAN/CSA-C22.2 No.61010-1

3.2. Pressure Equipment Directive

The device conforms to Article 4, Paragraph 1 of the Pressure Equipment Directive 2014/68/EU under the following conditions:

Device used on a pipe

Note:

- The data in the table is independent of the chemical compatibility of the material and the fluid.
- PS = maximum admissible pressure, DN = nominal diameter of the pipe

Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.c.i	DN ≤ 25
Fluid group 2, Article 4, Paragraph 1.c.i	DN ≤ 32 or PS*DN ≤ 1000
Fluid group 1, Article 4, Paragraph 1.c.ii	DN ≤ 25 or PS*DN ≤ 2000
Fluid group 2, Article 4, Paragraph 1.c.ii	DN ≤ 200 or PS ≤ 10 or PS*DN ≤ 5000

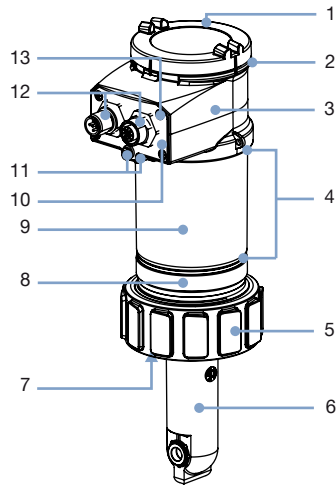
Device used on a vessel

Note:

- The data in the table is independent of the chemical compatibility of the material and the fluid.
- PS = maximum admissible pressure, V = vessel volume

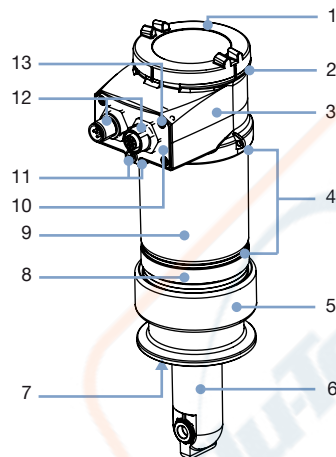
Type of fluid	Conditions
Fluid group 1, Article 4, Paragraph 1.a.i	V > 1 L and PS*V ≤ 25 bar.L or PS ≤ 200 bar
Fluid group 2, Article 4, Paragraph 1.a.i	V > 1 L and PS*V ≤ 50 bar.L or PS ≤ 1000 bar
Fluid group 1, Article 4, Paragraph 1.a.ii	V > 1 L and PS*V ≤ 200 bar.L or PS ≤ 500 bar
Fluid group 2, Article 4, Paragraph 1.a.ii	PS > 10 bar and PS*V ≤ 10000 bar.L or PS ≤ 1000 bar

4. Material specifications Standard version



No.	Element	Material
1	Cover	PC
2	Seal	Silicone
3	Housing (top)	PPS
4	Seals	EPDM
5	Nut	PC or PPA (with PEEK sensor holder)
6	Sensor holder	PP, PVDF or PEEK
7	Seal	FKM (standard) or EPDM (option)
8	Housing (base)	PPS
9	Housing (body)	Stainless steel 316L
10	Fixed connector holder	PPS CF30
11	Grounding terminal and screw	Stainless steel 1.4401 (316 (A4))
12	Fixed connector (female /male M12)	Nickel-plated brass
13	Screws	Stainless steel 1.4301 (304 (A2))

CIP version



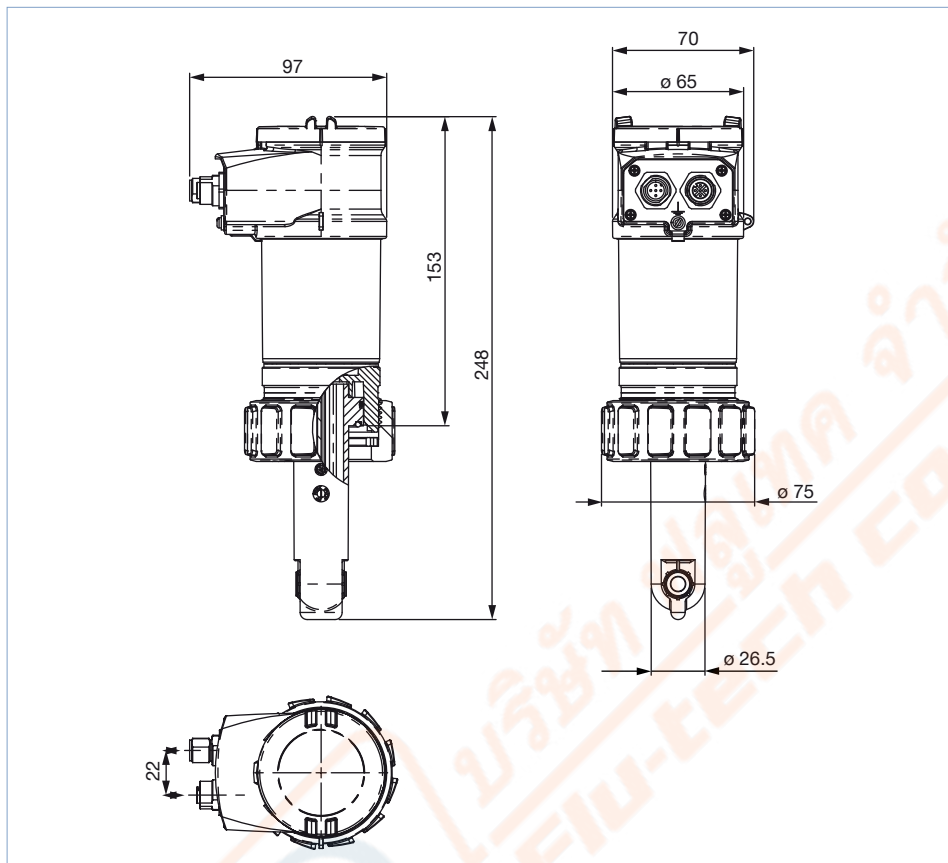
No.	Element	Material
1	Cover	PC
2	Seal	Silicone
3	Housing (top)	PPS
4	Seals	EPDM
5	Process connection (clamp)	Stainless steel 316L
6	Sensor holder	PEEK and stainless steel 316L (standard) or PVDF and stainless steel 316L (on request)
7	Seal	EPDM (standard) or FKM (on request)
8	Housing (base)	PPS
9	Housing (body)	Stainless steel 316L
10	Fixed connector holder	PPS CF30
11	Grounding terminal and screw	Stainless steel 1.4401 (316 (A4))
12	Fixed connector (female /male M12)	Nickel-plated brass
13	Screws	Stainless steel 1.4301 (304 (A2))

5. Dimensions

5.1. Standard version

Note:

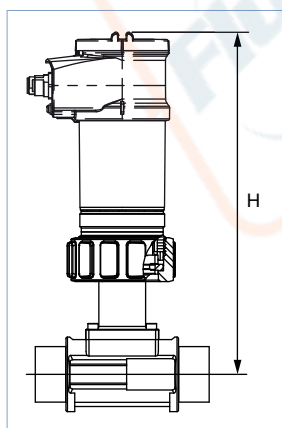
Specifications in mm



5.2. Standard version installed in a S020 fitting

Note:

Specifications in mm



DN	H		
	T-Fitting	Plastic spigot	Metal spigot
15	235 ^{1.)}	–	–
20	235 ^{1.)}	–	–
25	235 ^{1.)}	–	–
32	235	–	–
40	239	–	–
50	245	–	240
65	245	266 ^{2.)}	246
80	–	266 ^{2.)}	251
100	–	266 ^{2.)}	261
125	–	301	272
150	–	308	283
200	–	329	304

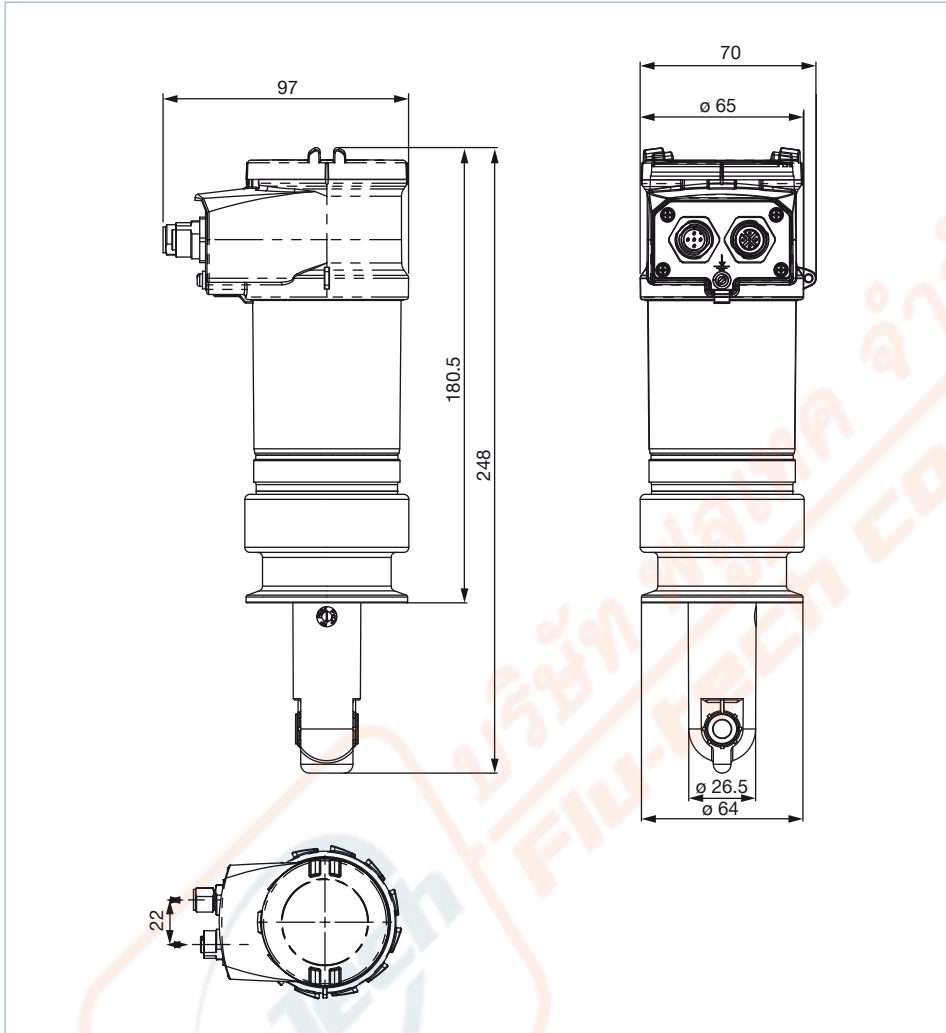
1.) Only use plastic fitting in analytical version with true union acc. to DIN 8063 (PVC), to DIN 16962 (PP) or to ISO 10931 (PVDF)

2.) Using fusion spigot (Article no. 418652, 418660 or 418644 in PP, PVDF or PE) for orifice DN65...DN100.

5.3. CIP version

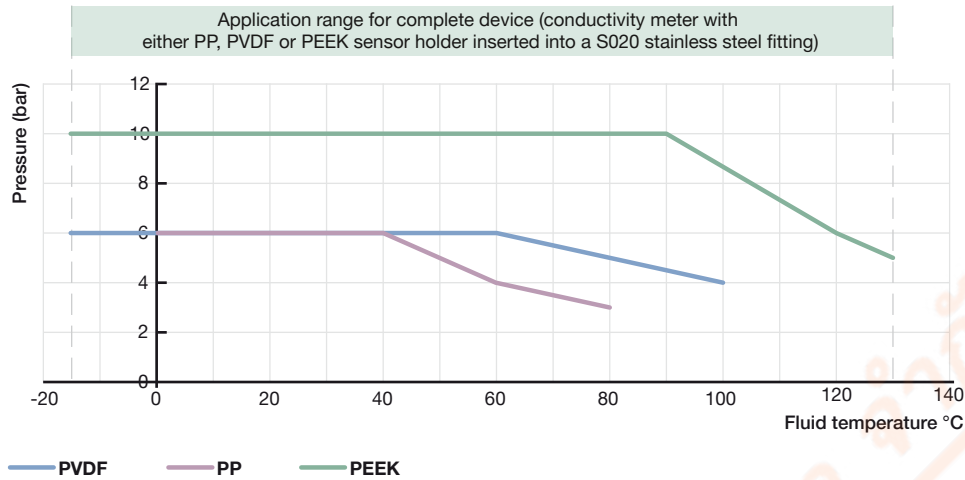
Note:

- Specifications in mm
- Technical data for 1.5" clamp available on request



6. Performance specifications

6.1. Pressure temperature diagram



7. Product installation

7.1. Installation notes

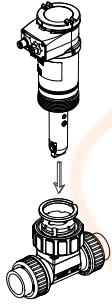
Standard version

Note:

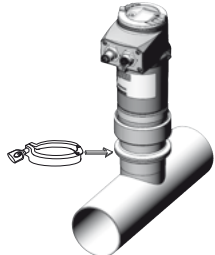
The conductivity meter Type 8228 can be installed into most of Bürkert Insertion fittings (Type S020).

Detailed information on the combination possibilities of the fittings can be found in chapter [“10.2. Combination with available S020 fittings DN”](#) on page 14.

See [data sheet Type S020](#) ▶ for more information.

Installation example	Description
	<p>The 8228 conductivity meter is installed in the pipe together with a Bürkert insertion fitting (Type S020). Select and install the required fitting onto the pipe, according to specific requirements of the sensor and fitting material, temperature and pressure. Then cautiously install the unit on the fitting and tighten with the nut.</p> <p>Detailed information on the assembly can be found in chapter “9.1. Product assembly” on page 13.</p>

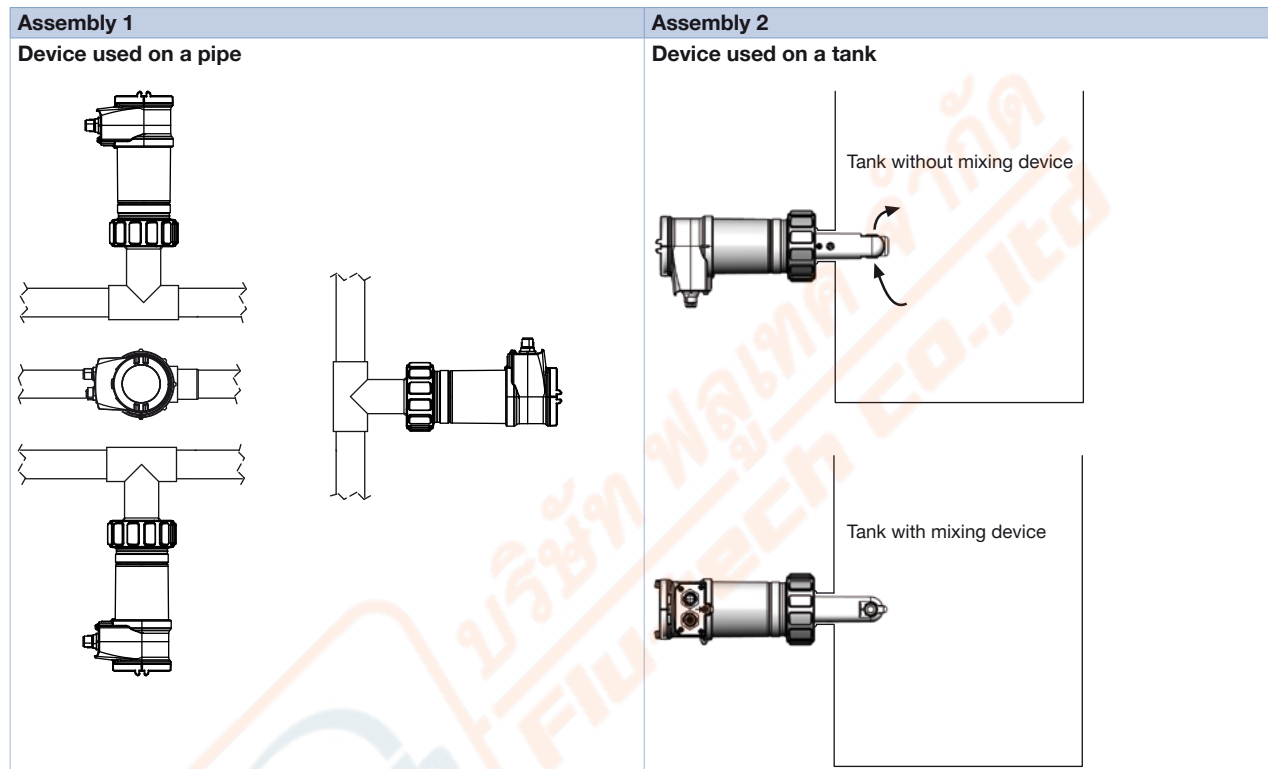
CIP version

Installation example	Installation example
	<p>Mount the device in a stainless steel pipe of min. DN32 which is fitted out with a clamp 2" according to ASME BPE as process connection for the device and carefully positioning it as shown opposite. The electrical connection have to be parallel with the pipe.</p>

7.2. Mounting options

Note:

- In order to get a reliable measurement, air bubbles must be avoided and the mounting location must ensure that the electrode is continuously and completely immersed in the flow stream.
- The transmitter must be protected from constant heat radiation and other environmental influences, such as direct exposure to sunlight.
- The sensor can be installed in any position.
- The drawing shows the assembly with a standard version of the conductivity meter, but this also applies to the CIP version.



8. Product operation

8.1. Measuring principle

Conductivity is defined by the property of a solution to conduct electrical current. The charge carriers are ions (e.g. dissolved salts or acids).

The measuring cell consists of an emitting coil and a receiving coil, which are placed around the hollow measuring tube. This assembly is inserted into the lower part of the moulded probe housing and is thus separated from the fluid surrounding the probe, but which is also present in the hole crossing the probe (hollow measuring tube).

An alternating voltage (AC) is applied to the primary (emitting) coil, which generates a magnetic field. Following Lenz-Faraday's law, an electric current is then induced in the fluid, which then generates a magnetic field that is detected by the secondary (receiver) coil. The intensity of the current measured at the secondary coil is a direct function of the quantity of ions in the solution, and the conductivity is derived.

Several temperature compensation modes are available and can be chosen to satisfy the needs for the different applications. The integrated transmitter module converts the measured signals (conductivity and temperature) into common values, monitors limit values, displays different values in different physical units via the optional display module (if mounted) and computes the output signals.

Depending on the variant the 8228 compact device is available with each one transistor and one 4...20 mA analogue outputs (1xM12) or with each two transistor and two 4...20 mA analogue outputs (2xM12). The 4...20 mA standard output signal is proportional to the conductivity and/or to the temperature of the fluid.

The conductivity meter is a three-wire device and requires a power supply of 12...36 V DC.

9. Product design and assembly

9.1. Product assembly

The conductivity meter Type 8228 consists of a sensor, plugged-in and pinned to an enclosure with cover, containing the transmitter module and a removable display. The sensor cell consists of a pair of magnetic coils (called primary and secondary) in a PP, PVDF or PEEK holder. The integrated temperature probe (without direct contact to the fluid) for automatic compensation is a standard feature in the conductivity sensor holder.

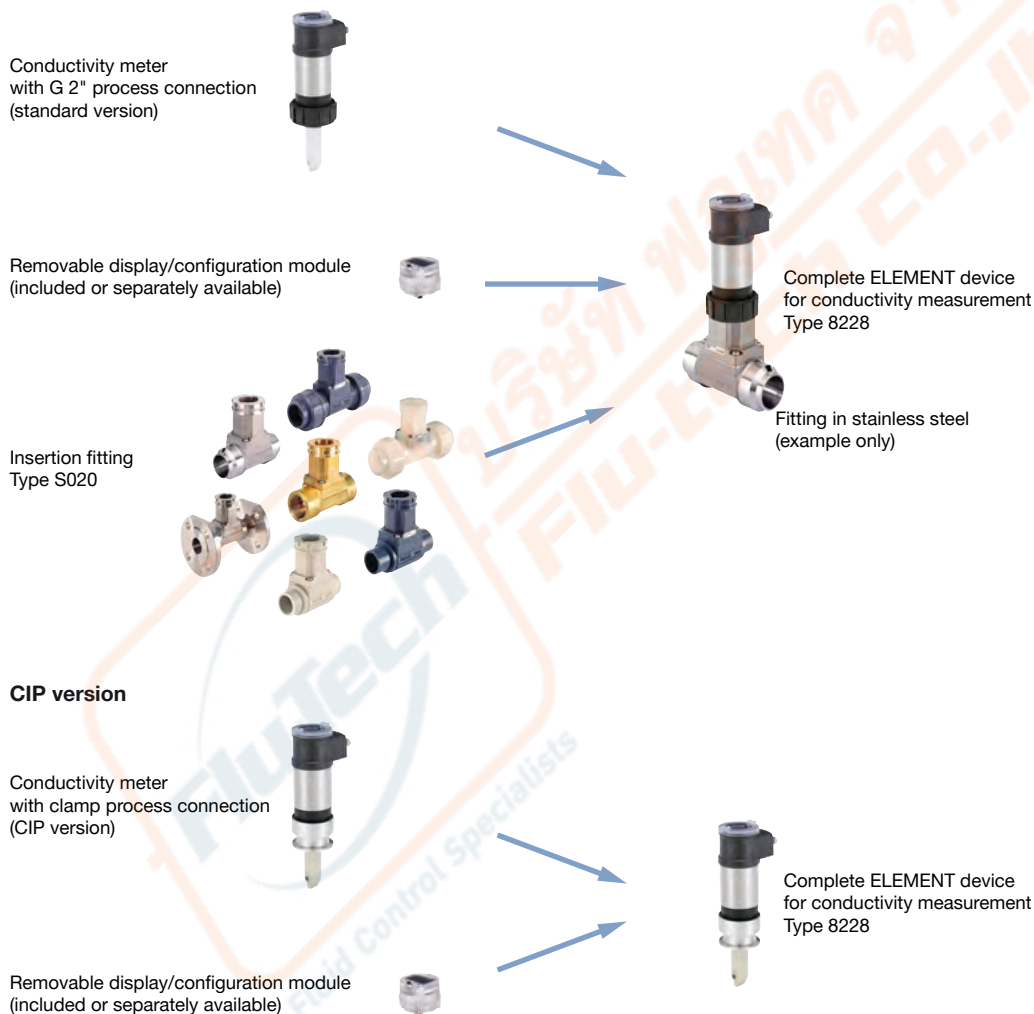
The conductivity meter can operate independent of the display but it will be required for parameterize the device (i.e. selection of sensor cell constant, language, measuring range, engineering units, calibration...) and also for visualizing continuously the measured and processed data.

Standard version

Note:

The S020 Insertion fitting ensures simple installation of the conductivity meter into pipes from DN15...DN200.

See **data sheet Type S020** ▶ for more information.



10. Networking and combination with other Bürkert products

10.1. Combination with transmitter/controller and fitting

Example:

<p>Type 8228</p>	All version		Standard version
	<p>Type 8619 ▶ multiCELL Transmitter/ Controller</p>	<p>Type 8611 ▶ eCONTROL - Universal controller panel, wall or rail-mounting version</p>	<p>Type 8802 ▶ (2301 & 8693) ELEMENT Continuous control valve systems</p>

10.2. Combination with available S020 fittings DN

	DN15	DN32	DN50	DN65	DN100	DN200
Available S020 fittings DN						
T-Fitting	[Available]					
Welding socket				[Available]		
Fusion spigot				[Available]		
Conductivity measurement Type 8228	⚠ Note A					

Note A: Only use plastic fitting in analytical version with true union acc. to DIN 8063 (PVC), to DIN 16962 (PP) or to ISO 10931 (PVDF).

See **data sheet Type S020** ▶ for more information.