

Inductive conductivity meter



- Perfect for concentrated liquids and wide conductivity range
- Pre-parameterized versions available for direct start-up
- Integral device for direct connection to PLC
- Simulation of process values for diagnostics
- Sensor available in PP, PVDF or PEEK

Type 8228 can be combined with...



Type S020
INSERTION fitting



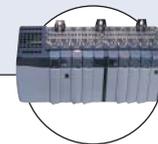
Type 8802-DF
Diaphragm valve with control unit



Type 8611
Single channel controller



Type 8619
multiCELL Transmitter/Controller



PLC

Bürkert's inductive conductivity meter type 8228 is designed for usage under harsh conditions in many industrial processes for measuring in concentrated liquids like acids, caustics or salt-solutions over a wide measuring range.

Applications like cooling water monitoring (i.e. dilution control), industrial water treatment or preparation and identification of cleaning liquids for example in CIP (Clean In Place) 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 Clamp 2" process connection according to ASME BPE (Clamp 1.5" on request).

Complete device data (Fitting + conductivity meter)

Conductivity measurement

Measuring range	100 µS/cm...2 S/cm
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	-15...+130°C (5...266°F)
Resolution	0.1°C (0.18°F)
Measurement deviation*	±1°C (1.8°F)

Temperature compensation

- none or
- according to a predefined graph (NaCl, NaOH, HNO₃ or H₂SO₄) or
- according to a graph defined especially for your process

Medium temperature

with conductivity sensor in	
PP	0...+80 °C (32 to 176°F)
PVDF	-15...+100 °C (5 to 212°F)
PEEK	-15...+130°C (5 to 266°F)

Temperature limits may depend on the material the S020 fitting used is made of. Refer to the relevant data sheet or instruction manual and the pressure/temperature diagram of the fluid on page 3. If the temperature ranges given for the device and the fitting are different, use the most restrictive range.

Fluid pressure max

with conductivity sensor in	
PP	PN6 (87 PSI)
PVDF	PN6 (87 PSI)
PEEK	PN10 (145 PSI)

Pressure limits may depend on the material the S020 fitting used is made of. Refer to the relevant data sheet or instruction manual and the pressure/temperature diagram of the fluid on page 3. If the temperature ranges given for the device and the fitting are different, use the most restrictive range.

* "measurement bias" as defined in the standard JCGM 200:2012

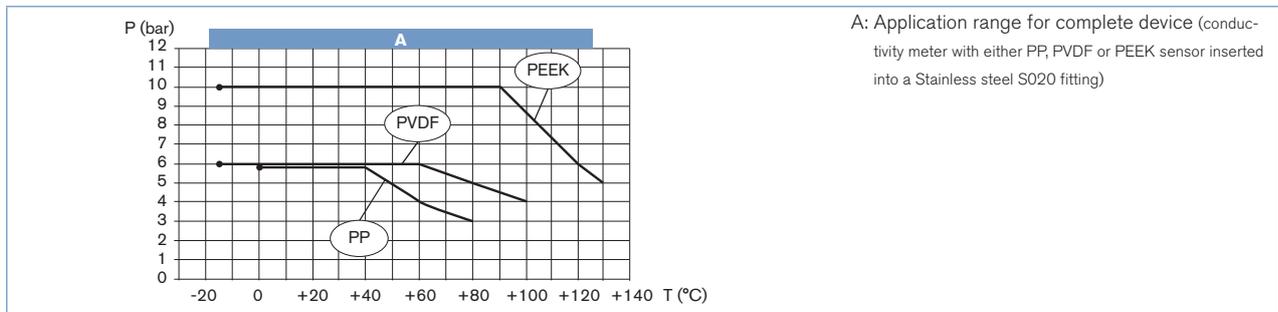
Environment	
Ambient temperature	-10...+60°C (14...140°F) (operating and storage)
Relative humidity	Max. 85%, without condensation
Height above sea level	Max. 2000 m
General data	
Compatibility	
with standard version	Any pipe DN15...DN200 which are fitted out with Bürkert INSERTION Fitting S020 (see corresponding data sheet)
with CIP version	Any pipe from DN32 which are fitted out with a Clamp 2" according to ASME BPE as process connection for the device
Materials	See materials view, on next page
Housing / Cover	Stainless steel 316L, PPS / PC
Seal / Screws	EPDM, silicone / Stainless steel
Fixed connector holder	Stainless steel 316L
Display / Navigation key	PC / PBT
with standard version	
M12 fixed connectors	Brass nickel plated
Nut	PC
Wetted part materials	
Sensor holder	PP, PVDF or PEEK
Seal	FKM (standard) or EPDM (option)
with CIP version	
M12 fixed connectors	Stainless steel 316L
Process connection	Stainless steel 316L
Wetted part materials	
Sensor holder	PEEK and Stainless steel 316L (standard) or PVDF and Stainless steel 316L (on request)
Seal	EPDM (standard) or FKM (on request)
Temperature sensor	Integrated in the sensor
Display (accessories)	Grey dot matrix 128 x 64 with backlighting
Electrical connections	
2 outputs meter (3-wire)	1 x 5-pin M12 male fixed connector,
4 outputs meter (3-wire)	1 x 5-pin M12 male + 1 x 5-pin M12 female fixed connectors
Connection cable	Shielded cable, \varnothing 3...6.5 mm; max. 0.75 mm ² cross section
Electrical data	
Supply voltage	12...36 V DC, \pm 10% oscillation rate, filtered and regulated, SELV (safety extra low voltage) circuit with a non dangerous energy level
Current consumption with sensor	\leq 25 mA (at 12 V DC and without the consumption of the 4...20 mA output)
Reversed polarity of DC	Protected
Voltage peak	Protected
Short circuit	Protected
Output	
Transistor	Polarized, galvanically insulated configurable through wiring and through parameterizing as sourcing (PNP) or sinking (NPN) output NPN: 1...36 V DC, max. 700 mA (or 500 mA max. per transistor if both transistor outputs are wired) output PNP: V+ supply voltage, max. 700 mA (or 500 mA max. per transistor if both transistor outputs are wired)
Current (3-wire)	4...20 mA configurable through wiring and through parameterizing as sourcing or sinking, 22 mA to indicate a fault (can be parametered) max. loop impedance: 1100 Ω at 36 V DC; 610 Ω at 24 V DC; 100 Ω at 12 V DC
Uncertainty of the output value	1% of the full scale
Response time (10...90%)	150 ms (default value)

Standards, directives and certifications	
Protection class acc. to EN 60529	IP65 and IP67 with M12 connectors plugged in and tightened and electronic module cover fully screwed down
Standard and 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) Complying with article 4, §1 of 2014/68/EU directive*
Pressure	
Certificates	
FDA declaration of conformity	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-Recognized for US and Canada 	UL61010-1 + CAN/CSA-C22.2 No.61010-1
Specific technical data of UL-recognized products for US and Canada	
Intended for an inner pollution	Pollution degree 2, according to EN61010-1
Installation category	Category I, according to UL61010-1

* For the 2014/68/EU pressure directive, the device can only be used under following conditions (depend on max. pressure, pipe diameter and fluid).

Type of fluid	Conditions
Fluid group 1, article 4, §1.c.i	Forbidden
Fluid group 2, article 4, §1.c.i	DN ≤ 32 or PN*DN ≤ 1000
Fluid group 1, article 4, §1.c.ii	DN ≤ 25 or PN*DN ≤ 2000
Fluid group 2, article 4, §1.c.ii	DN ≤ 200 or PN ≤ 10 or PN*DN ≤ 5000

Pressure/temperature chart



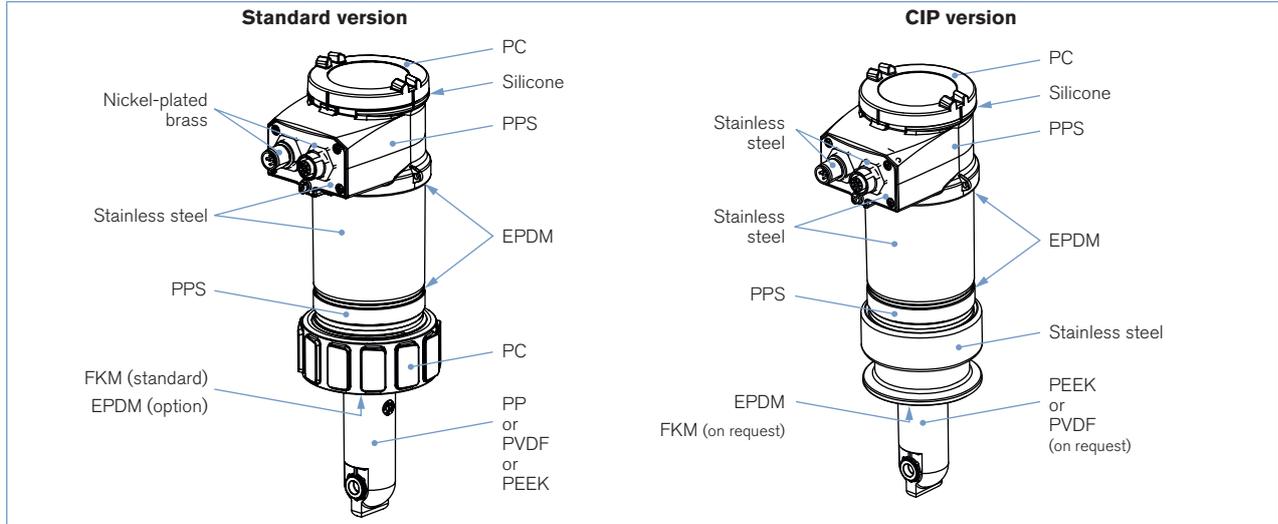
Design and materials view

The compact conductivity meter 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. Several compensation modes are available and can be chosen to satisfy the needs for the different applications. The electronics of Type 8228 converts the measured signal, displays different values in different physical units (if display mounted), monitors limits and computes the output signals. Depending on the variant the compact device type 8228 is available with each one transistor and one 4..20 mA analogue outputs (1 x M12) or with each two transistor and two 4..20 mA analogue outputs. (2 x M12).

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.

Design and materials view (continued)

The detailed parts and materials are displayed in the following picture:



Principle of operation

The conductivity is defined as the ability of a solution to conduct electrical current. The load carriers are ions (E.G. dissolved salt or acids). In order to measure conductivity, an AC voltage source is connected to the primary magnetic coil according to Lenz-Faradays law. The magnetic field induced generates a current in the secondary magnetic coil. The intensity of this induced current is a direct function of the conductivity of the solution.

Up to two 4...20 mA standard signal are available as output signals, 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.

In-line installation

Conductivity meter with G2" process connection (standard version)

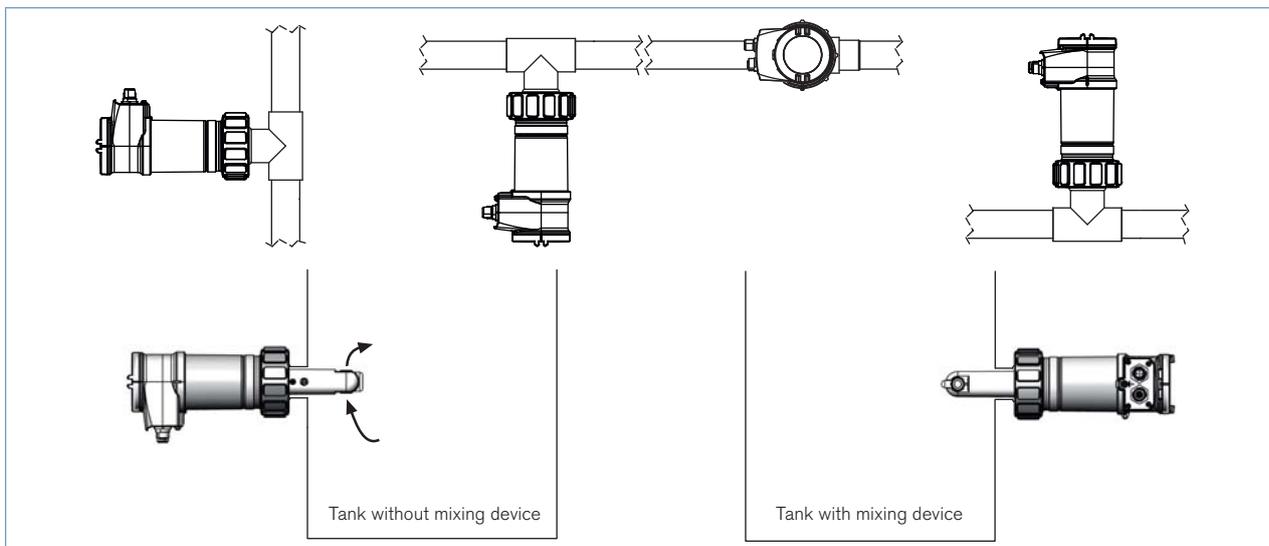


The 8228 conductivity meter can be installed into any Bürkert INSERTION fitting (S020),, by just fixing the main nut.

Select and install the required fitting onto the pipe, according to specific requirements of the sensor and fitting material (temperature and pressure).

Then, carefully install the device on the fitting, and tighten with the nut. It can be installed in any position (see picture below). In order to get reliable measurement air bubbles must be avoided.

Please ensure that the mounting location provides a continuous and complete immersion of the sensor in the flow stream.



The device must be protected from constant heat radiation and other environmental influences, such as direct exposure to sunlight.

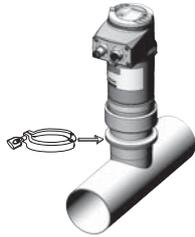
Combining the S020 with a measuring device for conductivity measurement

	DN06	DN15	DN32	DN50	DN65	DN200
Available S020 fittings T-fitting for measuring device with G2" c onnection Welding socket Fusion spigot	[Shaded area]					
				[Shaded area]		
				[Shaded area]		
Conductivity measuring device 8228		***		[Shaded area]		

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

In-line installation (continued)

Conductivity meter with Clamp process connection (CIP version)



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.

In order to get reliable measurement air bubbles must be avoided.

Please ensure that the mounting location provides a continuous and complete immersion of the sensor in the flow stream.

Dimensions [mm]

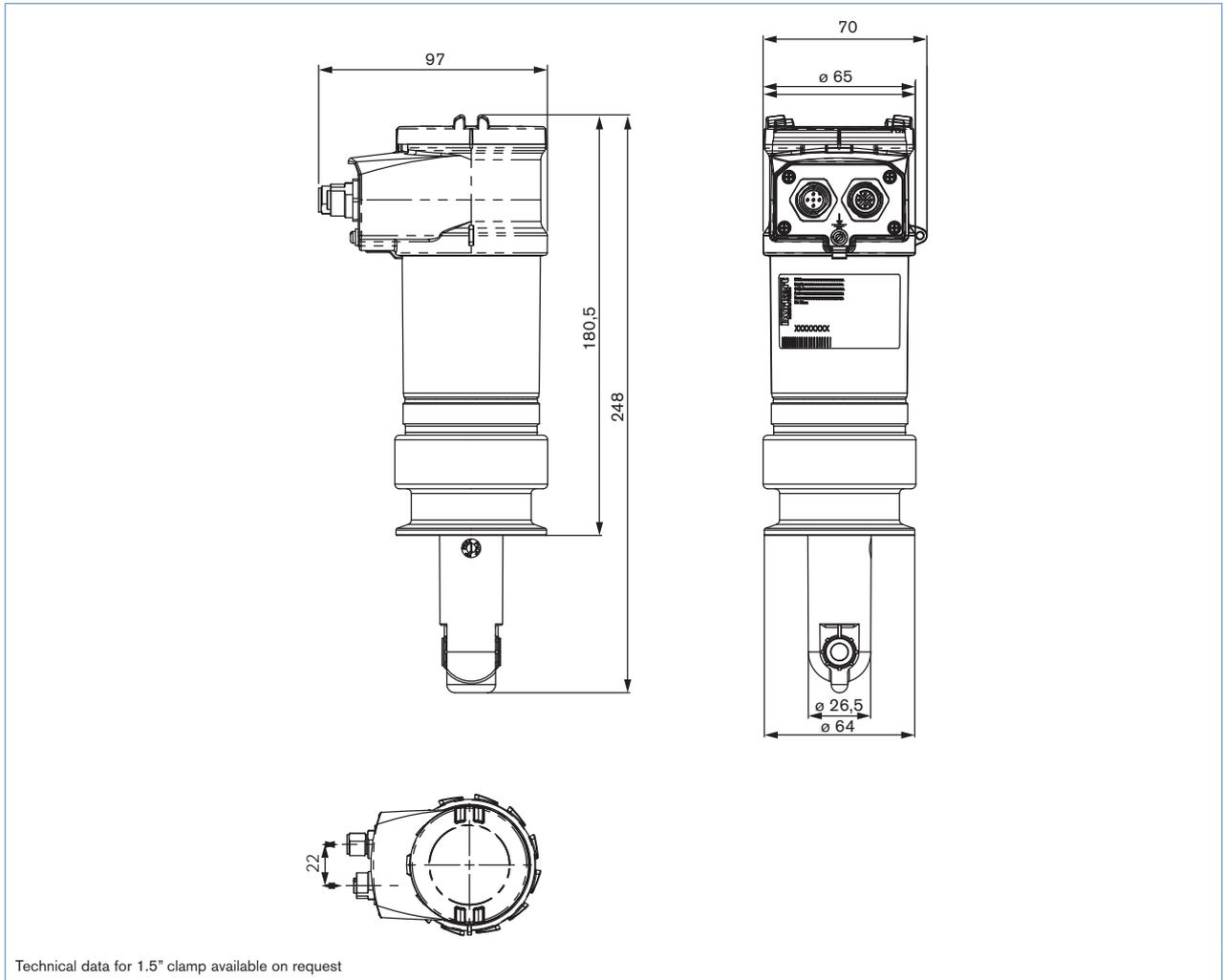
Conductivity meter with G2" process connection (standard version)

Orifice	H		
	T-Fitting	Plastic spigot	Metal spigot
15	235*		
20	235*		
25	235*		
32	235		
40	239		
50	245		240
65	245	266**	246
80		266**	251
100		266**	261
125		301	272
150		308	283
200		329	304

* Only use plastic fitting in analytical version with true union acc. to DIN 8063 (PVC), to DIN 16962 (PP) or to ISO 10931 (PVDF)
 ** use analytical fusion spigot (Item no. 418652, 418660 or 418644 in PP, PVDF or PE) for orifice DN65-DN100

Dimensions [mm] (continued)

Conductivity meter with Clamp 2" process connection (CIP version)



Ordering information for compact conductivity meter Type 8228

Conductivity meter with G2" process connection (standard version)

A complete compact ELEMENT conductivity meter Type 8228 consists of a compact ELEMENT conductivity meter Type 8228, a removable display/configuration module and a Bürkert INSERTION adaptor Type S020.

The following information is necessary for the selection of a complete device:

- **Item no.** of the desired ELEMENT conductivity meter **Type 8228** available with or without display/configuration module (see ordering chart on p. 9)
- **Item no.** of the selected INSERTION fitting **Type S020** (see separate data sheet)



Attention!

When you order devices without display/configuration module, please take care that you also order at least one display/configuration module for parameterizing the device or order a pre-configured device (see ordering chart on p. 10).

Order no. of the removable display/configuration module (see ordering chart on p. 10)

When you click on the orange box "More info." below, you will come to our website for the resp. product where you can download the data sheet.

Example

Compact conductivity meter Type 8228



+

Removable display/configuration module (included or separately available)





INSERTION fitting Type S020



More info.



Complete ELEMENT device for conductivity measurement Type 8228



Fitting (example only)

Conductivity meter with Clamp 2" process connection (CIP version)

A complete compact ELEMENT conductivity meter Type 8228 consists of a compact ELEMENT conductivity meter Type 8228, a removable display/configuration module.

The following information is necessary for the selection of a complete device:

- **Item no.** of the desired ELEMENT conductivity meter **Type 8228** available with or without display/configuration module (see ordering chart on p. 9)



Attention!

When you order devices without display/configuration module, please take care that you also order at least one display/configuration module for parameterizing the device.

Order no. of the removable display/configuration module (see ordering chart on p. 10)

Ordering chart for compact conductivity meter Type 8228

Conductivity meter with G2" process connection (standard version)

All settings and digital output can be adjusted with the optional available display module.

Specifications	Voltage supply	Output	Sensor holder material	Sensor seal material ²⁾	Electrical connection	UL Certification	Item no. ¹⁾ without display	Item no. ¹⁾ with display
Compact conductivity meter	12...36 V DC	1 x transistor NPN/PNP + 1 x 4...20 mA	PP	FKM	5-pin M12 male fixed connector	No	565 601	566 601
						 UL-Recognized	565 611	566 611
			PVDF	FKM	5-pin M12 male fixed connector	No	565 603	566 603
						 UL-Recognized	565 613	566 613
			PEEK	FKM	5-pin M12 male fixed connector	No	565 605	566 605
						 UL-Recognized	565 615	566 615
		2 x transistors NPN/PNP + 2 x 4...20 mA	PP	FKM	5-pin M12 male and 5-pin M12 female fixed connectors	No	565 602	566 602
						 UL-Recognized	565 612	566 612
			PVDF	FKM	5-pin M12 male and 5-pin M12 female fixed connectors	No	565 604	566 604
						 UL-Recognized	565 614	566 614
			PEEK	FKM	5-pin M12 male and 5-pin M12 female fixed connectors	No	565 606	566 606
						 UL-Recognized	565 616	566 616

¹⁾ Transparent cover in standard

²⁾ FKM seal in standard; 1 set including a green FKM and a black EPDM seals for the sensor, is supplied with each conductivity meter

Conductivity meter with Clamp 2" process connection according to ASME BPE (CIP version)

Specifications	Voltage supply	Output	Sensor holder material	Sensor seal material	Electrical connection	FDA conformity	UL Certification	Item no. ¹⁾ without display	Item no. ¹⁾ with display
Compact conductivity meter	12...36 V DC	1 x transistor NPN/PNP + 1 x 4...20 mA	PEEK	EPDM	5-pin M12 male fixed connector	Yes	No	567 200	567 478
						Yes	 UL-Recognized	567 480	567 482
		2 x transistors NPN/PNP + 2 x 4...20 mA	PEEK	EPDM	5-pin M12 male and 5-pin M12 female fixed connectors	Yes	No	567 199	567 479
						Yes	 UL-Recognized	567 481	567 483

¹⁾ Transparent cover in standard

Further versions on request



Materials

For version with Clamp process connection

PVDF sensor holder

FKM seal



Process connection

1.5" Clamp connections

Ordering chart for pre-parameterized conductivity meter Type 8228

Conductivity meter with G2" process connection (standard version)

Reduction of the installation effort because of pre-parametrized variants for direct start-up.

Without filtering, temperature compensation linear 2%/°C, 1 analogue output in sink mode and 1 digital output (Transistor; not assigned)

Specifications	Voltage supply	Sensor holder material	Sensor seal material ²⁾	Electrical connection	4...20 mA output corresponding	UL Certification	Item no. ¹⁾ without display
Compact conductivity meter for direct start-up	12...36 V DC	PP	FKM	5-pin M12 male fixed connector	0...1 mS/cm	No	566 560
					0...10 mS/cm	No	566 561
					0...100 mS/cm	No	566 562
					0...1 S/cm	No	566 563
		PVDF	FKM	5-pin M12 male fixed connector	0...1 mS/cm	No	566 564
					0...10 mS/cm	No	566 565
					0...100 mS/cm	No	566 566
					0...1 S/cm	No	566 567
		PEEK	FKM	5-pin M12 male fixed connector	0...1 mS/cm	No	566 568
					0...10 mS/cm	No	566 569
					0...100 mS/cm	No	566 570
					0...1 S/cm	No	566 571

¹⁾ Transparent cover in standard

²⁾ FKM seal in standard; 1 set including a green FKM and a black EPDM seals for the sensor, is supplied with each conductivity meter

i Further versions on request

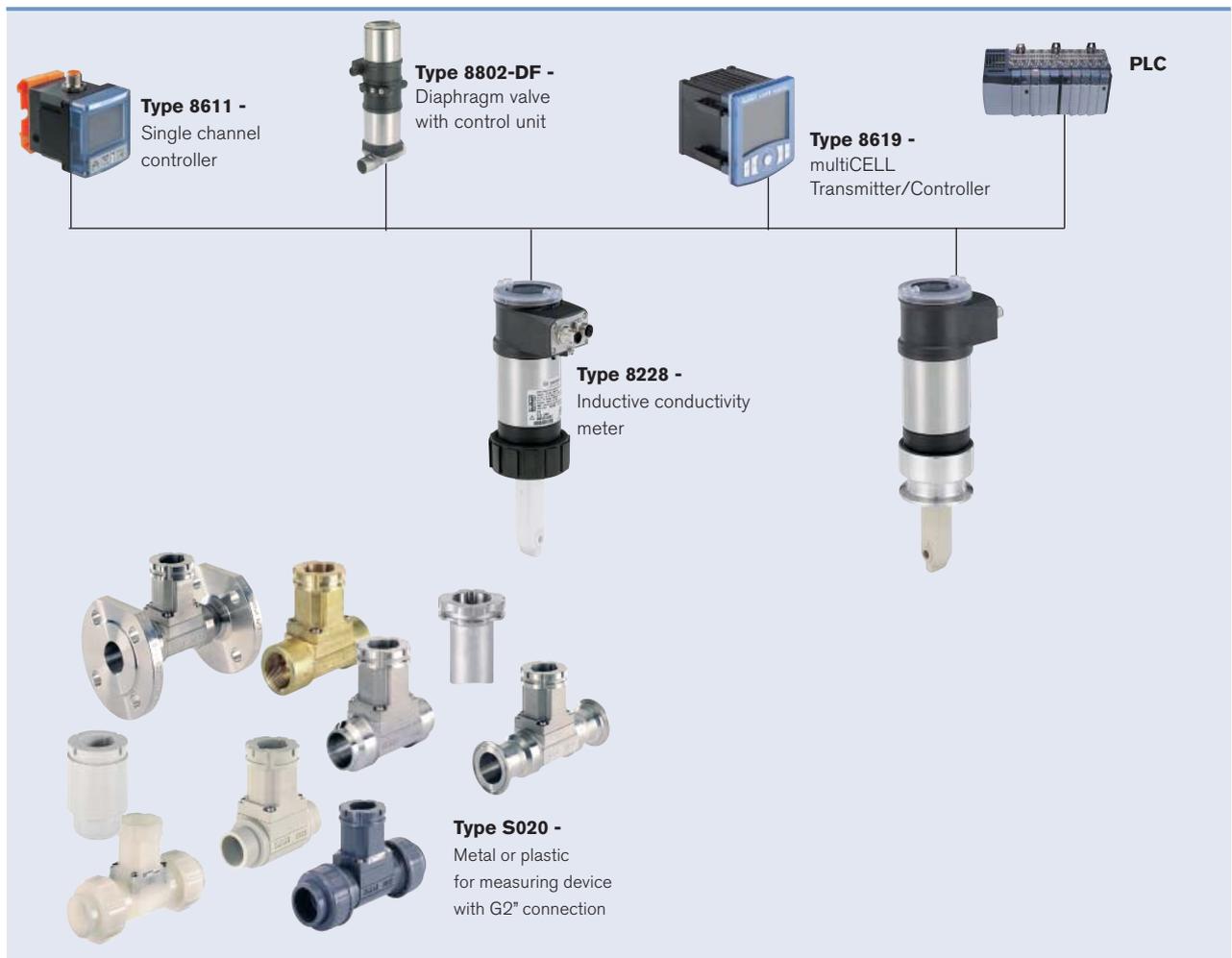
> **Additional**
Configurations: 2- or 4- outputs, Filter, Temperature compensation, Threshold, etc.

🔧 **Process connection**
1.5", 2" Clamp connections

Ordering chart for accessories

Description	Item no.
Removable display/configuration module (with instruction sheet)	559 168
Blind cover with EPDM seal	560 948
Transparent cover with EPDM seal (standard)	561 843
Ring	619 205
PC - nut	619 204
Calibration solution, 300 ml, 706 µS/cm	440 018
Calibration solution, 300 ml, 1413 µS/cm	440 019
Calibration solution, 500 ml, 12880 µS/cm	565 741
Calibration solution, 300 ml, 100 mS/cm	440 020
 5-pin M12 female straight cable plug with plastic threaded locking ring, to be wired	917 116
 5-pin M12 male straight cable plug with plastic threaded locking ring, to be wired	560 946
 5-pin M12 female straight cable plug moulded on cable (2 m, shielded)	438 680
 5-pin M12 male straight cable plug moulded on cable (2 m, shielded)	559 177

Interconnection possibilities with other Bürkert devices



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