

Conductivity sensor for hygienic applications



- Perfect for demanding applications in the hygienic industry (CIP and SIP compatible)
- Variants available for usage over a wide conductivity range
- Due to support of the most important process connections specific customer requests can be implemented
- Fits perfectly to our multipurpose transmitter/controller type 8619

Type 8221 can be combined with...



Type 8200

Hygienic holder for conductivity sensor (PG13.5)



Type 8619

Panel multiCELL transmitter/controller



Type 8619

Wall-mounted multiCELL transmitter/controller

The 8221 hygienic conductivity probes are used to determine electrical conductivity in a wide range of pure or concentrated liquids.

Due to their hygienic design and the robust construction, these conductivity probes are suitable for use under demanding conditions in application sectors including food & beverage, pharmaceutical, biotechnology and the general chemical industry.

Two technologies of conductivity probes are available:

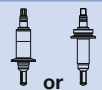
- probes based on the 2-electrode principle are suited for measurements in liquids, especially (ultra) pure water. Contamination affects the measurements.
- probes based on the 4-electrode principle exclude polarization phenomena and are not sensitive to contamination. This clever design guarantees an excellent linearity over a wide conductivity range.

An integrated temperature sensor (Pt1000) is a standard feature of all versions and can be used for temperature compensation.

The probe has to be connected to the multi-CELL transmitter/controller type 8619.

4-electrode conductivity probe

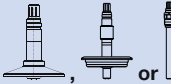
- short or long insertion version



Process connection	1½" clamp connection or G1¼" process connection (on request)
Technology	4-electrode
Measuring range	0.1 µS/cm...500 mS/cm
Linearity¹⁾ (relative)	±0.5...5 %
Cell constant²⁾	0.147 cm ⁻¹
Temperature sensor	Pt1000
Materials	
Electrode	Stainless steel 1.4435/316L
Frame	PEEK (conform to FDA) Stainless steel 1.4435/316L
Seal	EPDM (conform to FDA)
Surface quality	0.4 µm, electro-polished
Medium temperature	-20...+135 °C (-4...+275 °F)
Medium pressure	Max. 6 bar (87.06 PSI)
Electrical connections	VarioPin (VP 6.0)
Certificates	FDA declaration of conformity (only for version with PEEK frame and EPDM seal); ECR1935/2004 declaration, USP class VI declaration; Inspection certificate 3.1; On request: 2-point calibration certificate

¹⁾ Uncertainty of ±5 % arises when using only one single cell constant for the full range. ±0.5 % measurement deviation can be achieved when calibration is performed in a conductivity range close to that of the used solution.

²⁾ Individual cell constant measured with the Bürkert standard procedure. The cell constant can be influenced by the assembly situation.

4-electrode conductivity probe	
	
Process connection	2" clamp connection 2" (DN50/40) connection adapted for GEA Tüchenhagen VARINLINE PG13.5 connection
Technology	4-electrode
Measuring range	1 µS/cm...500 mS/cm
Linearity¹⁾ (relative)	±0.5...5 %
Cell constant²⁾	0.360 cm ⁻¹
Temperature sensor	Pt1000
Materials	
Electrode	Stainless steel 1.4435/316L
Frame	PEEK (conform to FDA)
Seal	Stainless steel 1.4435/316L (not for PG13.5 connection) EPDM (conform to FDA)
Surface quality	0.4 µm, electro-polished
Medium temperature	-20...+135 °C (-4...+275 °F)
Medium pressure	Max. 6 bar (87.06 PSI)
Electrical connections	VarioPin (VP 6.0)
Certificates	
All connection versions	FDA declaration of conformity (only for version with PEEK frame and EPDM seal); ECR1935/2004 declaration, USP class VI declaration; Inspection certificate 3.1; On request: 2-point calibration certificate
2" (DN50/40) connection adapted for GEA Tüchenhagen VARINLINE	EHEDG certified

2-electrode conductivity probe with M12 connector



Process connection	1½" clamp connection
Technology	2-electrode
Measuring range	0.05...20 µS/cm
Linearity¹⁾ (relative)	±0.5...5 %
Cell constant²⁾	0.01 cm ⁻¹
Temperature sensor	Pt1000
Response time (t90)	60 s
Materials	
Electrode	Stainless steel 316L
Frame	Stainless steel 316L and PEEK (conform to FDA - 21CFR 177.2415)
Seal	EPDM (conform to FDA - 21CFR 177.2600)
Surface quality	0.4 µm, electro-polished
Medium temperature	-20...+150 °C (-4...+302 °F)
Medium pressure	Max. 7 bar (100 PSI)
Electrical connections	5 pin M12 male fixed connector
Standards, directives and certifications	
Protection class	IP67 (according to EN 60529)
Standards and directives CE	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	Inspection certificate 3.1; On request: 2-point calibration certificate; FDA declaration of conformity (only for version with stainless steel and PEEK frame and EPDM seal); Test report 2.2 for surface finish

¹⁾ Uncertainty of ±5 % arises when using only one single cell constant for the full range. ±0.5 % measurement deviations can be achieved when calibration is performed in a conductivity range close to that of the used solution.

²⁾ Individual cell constant measured with the Bürkert standard procedure. The cell constant can be influenced by the assembly situation.

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

Type of Fluid	Conditions
Fluid group 1, article 4, §1.c.i	DN ≤ 25
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

2-electrode conductivity probe with cable



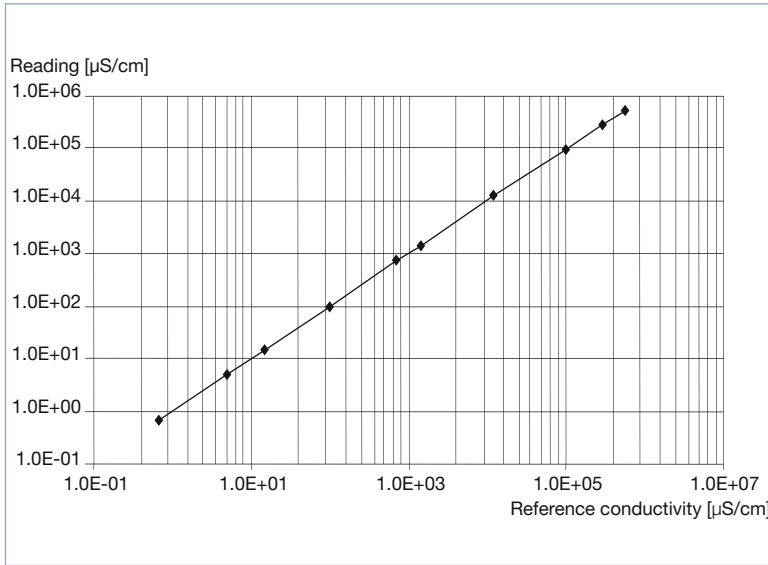
Process connection	1½" clamp connection		
Technology	2-electrode		
Measuring range	0.05...20 µS/cm	1...200 µS/cm	5...5 000 µS/cm
Linearity¹⁾ (relative)	±0.5...5 %	±0.5...5 %	±0.5...5 %
Cell constant²⁾	0.01 cm ⁻¹	0.1 cm ⁻¹	1 cm ⁻¹
Temperature sensor	Pt1000		
Materials			
Electrode	Stainless steel		
Frame	Stainless steel and PTFE		
Seal	EPDM		
Surface quality	0.4 µm, electro-polished		
Medium temperature	Max. 120 °C (248 °F)		
Medium pressure	Max. 7 bar (100 PSI)		
Electrical connections	Cable, length 3 m, instrument side with open wire		
Certificates	Inspection certificate 3.1; 2-point calibration certificate (on request)		

¹⁾ Uncertainty of ±5 % arises when using only one single cell constant for the full range. ±0.5 % measurement deviations can be achieved when calibration is performed in a conductivity range close to that of the used solution.

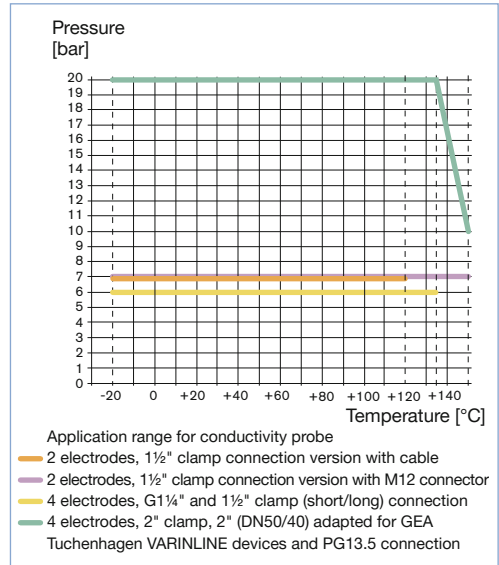
²⁾ Individual cell constant measured with the Bürkert standard procedure. The cell constant can be influenced by the assembly situation.

Technical data (continued)

Unique linearity of the 8221 4-electrode conductivity probe



Pressure/temperature chart



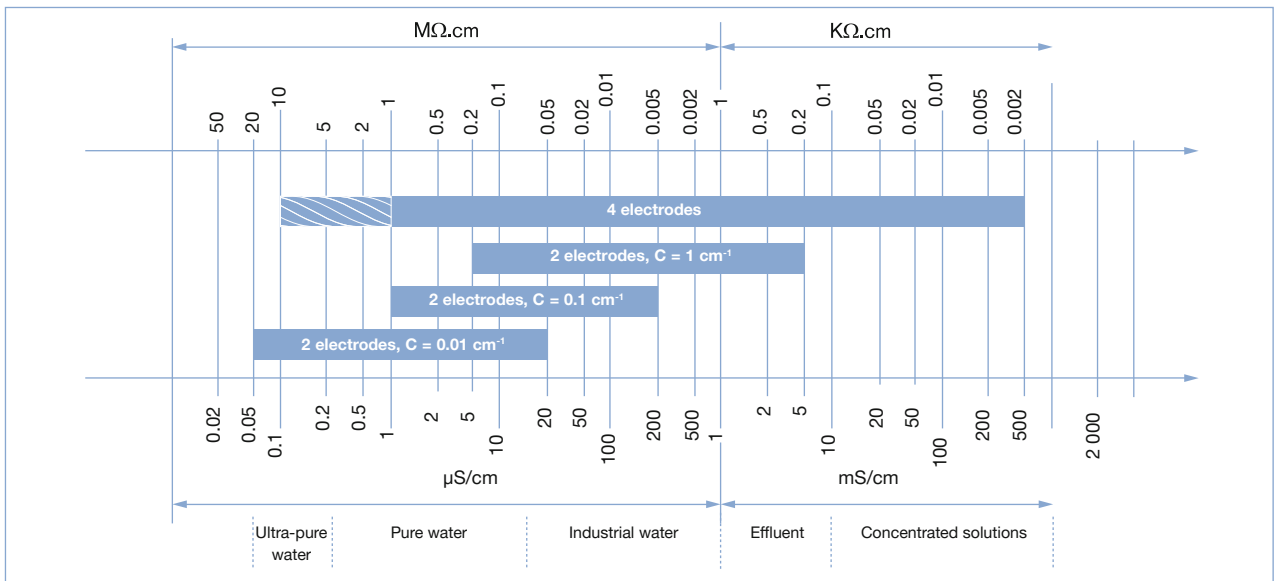
Principle of operation - Electrodes measuring range

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 the simplest case the measurement cell consists of two metal electrodes which are set at a fixed distance apart and with a known specified surface. An AC voltage supplied from the connected transmitter/controller type 8619 is applied to the electrodes. The measured current is a direct function of the quantity of ions contained in the solution, and with help of Ohm's law the conductivity is calculated.

The 4-electrode probe consists of two current and two voltage electrodes. Between the two current electrodes there is a constant electric current. With the two voltage electrodes a voltage drop is measured across the sample. The voltage drop depends on the conductivity of the sample. Because of this measurement principle, 4 electrode sensors have a much broader linear measurement range, are not sensitive to contamination and excludes the polarization phenomena.


There are countless types of conductivity probes whose measurement values vary by a great margin - depending on the electrode assembly. To compensate for the geometry of the conductivity cell a cell constant is used: Conductivity [S/cm] = Measurement [S] x Cell constant [1/cm]. The cell constant is either known or it is determined by means of conductivity standards, and has to be entered into the transmitter prior to measurement.



Installation

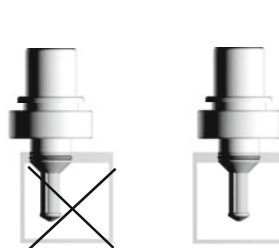
4-electrode conductivity probe with 1½" clamp or G1¼" process connection

The process connection must be sufficiently clean. Install the conductivity probe following the instructions mentioned below.



A: ø 60 mm min

The cell constant and the linearity of the probe can vary with the fitting situation. A symmetrical setup is recommended. Leave a minimum space of 60 mm minimum diameter. *Partitions made of non-conductive material should preferably be used.*



A symmetrical setup is recommended in order to ensure a high degree of linearity. To achieve high precision the cell constant should be calibrated in the final setup. Make sure that all the 4 electrodes are completely and continuously immersed in the measuring sample.

4-electrode conductivity probe with PG13.5 process connection

To install the conductivity probe into a T fitting or pipe, a probe holder type 8200 has to be used. Please refer to the corresponding datasheet, for more information.

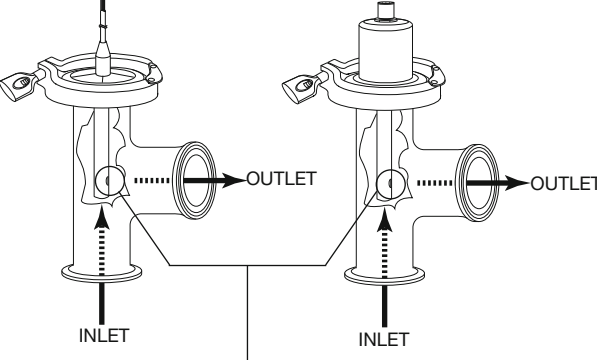


More info.
For more technical information about this product, click on this box... you will come to our website for this product where you can download the datasheet.

Around the tip of the electrode there should be a space of 10 mm.

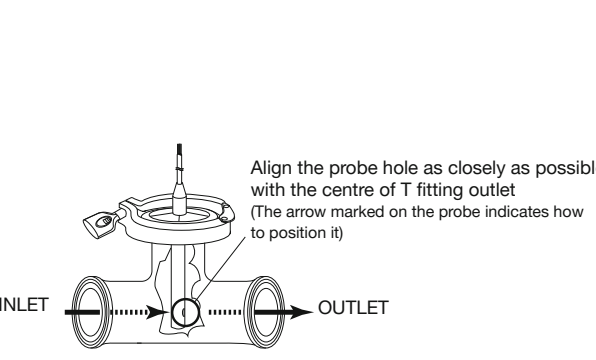
2-electrode conductivity probe with clamp process connection

Mount the probe **with cell constants 0.01 cm⁻¹** in a stainless steel sanitary T fitting 1½" as shown below.



Align the probe hole as closely as possible with the centre of T fitting outlet (The arrow marked on the probe indicates how to position it, for cable version)

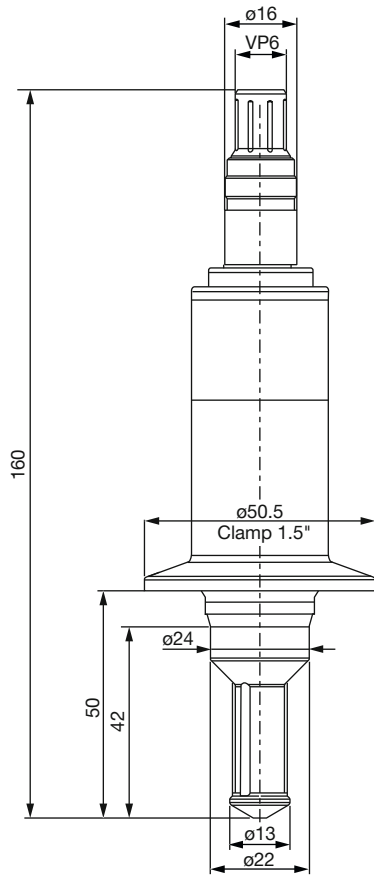
Mount the probe **with cell constants 0.1 or 1.0 cm⁻¹** in a stainless steel sanitary T fitting 1½" as shown below.



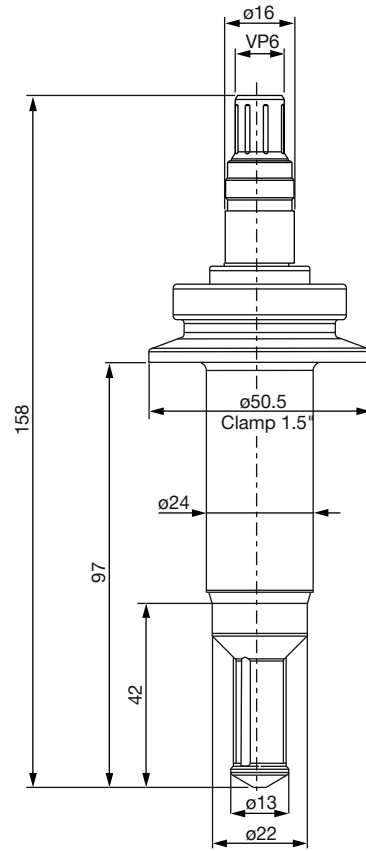
Align the probe hole as closely as possible with the centre of T fitting outlet (The arrow marked on the probe indicates how to position it)

Dimensions [mm]

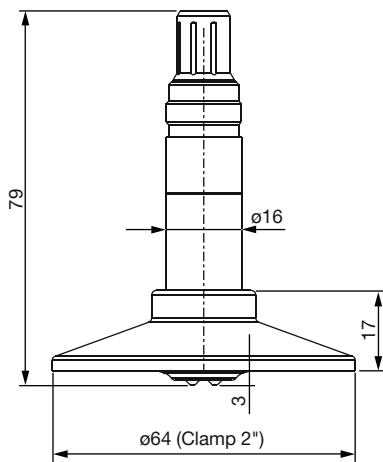
4-electrode probe, short insertion version
with 1½" clamp connection



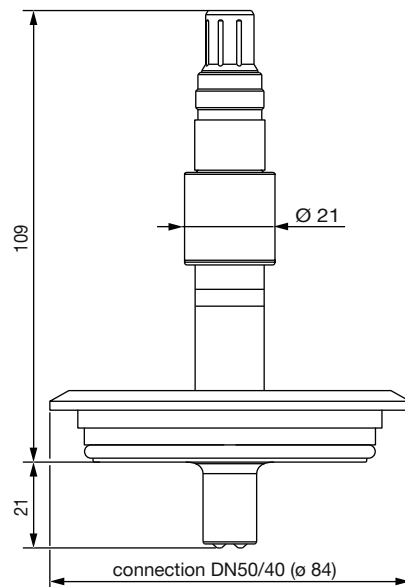
4-electrode probe, long insertion version
with 1½" clamp connection



4-electrode probe version
with 2" clamp connection



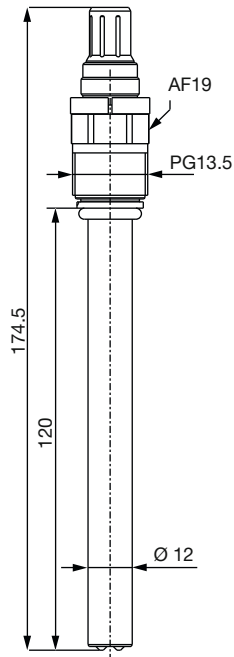
4-electrode probe version
with 2" (DN50/40) connection adapted for GEA Tuchenhagen
VARINLINE process connections
EHEDG certified design



Dimensions [mm] (continued)

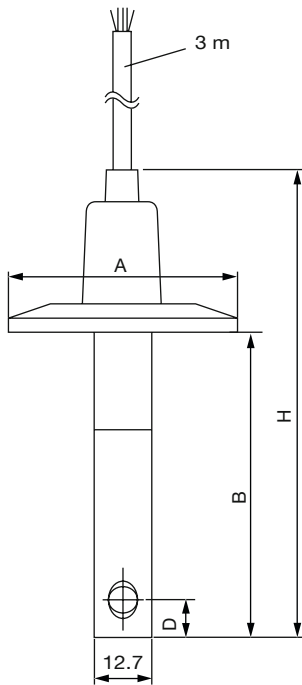
4-electrode probe version

with PG13.5 connection



2-electrode probe version

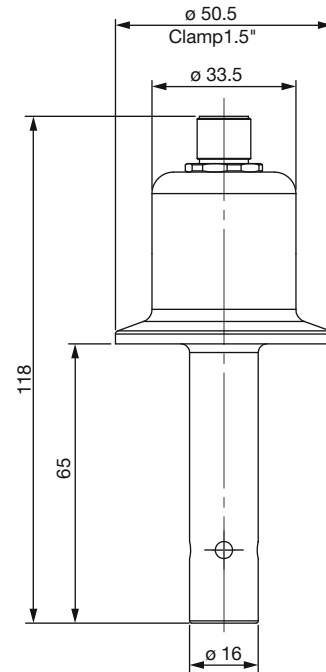
with 1½" clamp connection and with cable 3 m open wire



Probe with	A	H	B	D
C = 0.01	50.5	154	127	50
C = 0.1	50.5	94	67	7.9
C = 1.0	50.5	94	67	7.9

2-electrode probe version


with 1½" clamp connection and with 5 pin M12 male connector





Ordering chart for conductivity probe type 8221

Specification	Cell constant/ Probe version	Measuring range	Process connection	Certifications				Electrical connection	Item no.	
				EHEDG	FDA	ECR1935/2004	USP class VI			
Conductivity probe 4-electrode	0.147 cm ⁻¹ / short	0.1...500 000 µS/cm	1½" clamp	No	Yes	Yes	Yes	VarioPin male connector	562 420	
	0.147 cm ⁻¹ / long	0.1...500 000 µS/cm	1½" clamp	No	Yes	Yes	Yes	VarioPin male connector	564 064	
	0.360 cm ⁻¹	1...500 000 µS/cm	2" (DN50/40) adapted for GEA Tuchenhagen VARINLINE	2" clamp	No	Yes	Yes	Yes	VarioPin male connector	559 120
				2" (DN50/40) adapted for GEA Tuchenhagen VARINLINE	Yes	Yes	Yes	Yes	VarioPin male connector	563 269
				PG13.5	No	Yes	Yes	Yes	VarioPin male connector	563 186
Conductivity probe 2-electrode	0.01 cm ⁻¹	0.05...20 µS/cm	1½" clamp	No	Yes	No	No	5 pin M12 male connector	568 818	
				No	No	No	No	Cable 3 m open wires	564 898	
	0.1 cm ⁻¹	1...200 µS/cm	1½" clamp	No	No	No	No	Cable 3 m open wires	562 261	
				1.0 cm ⁻¹	5...5 000 µS/cm	1½" clamp	No	No	No	No

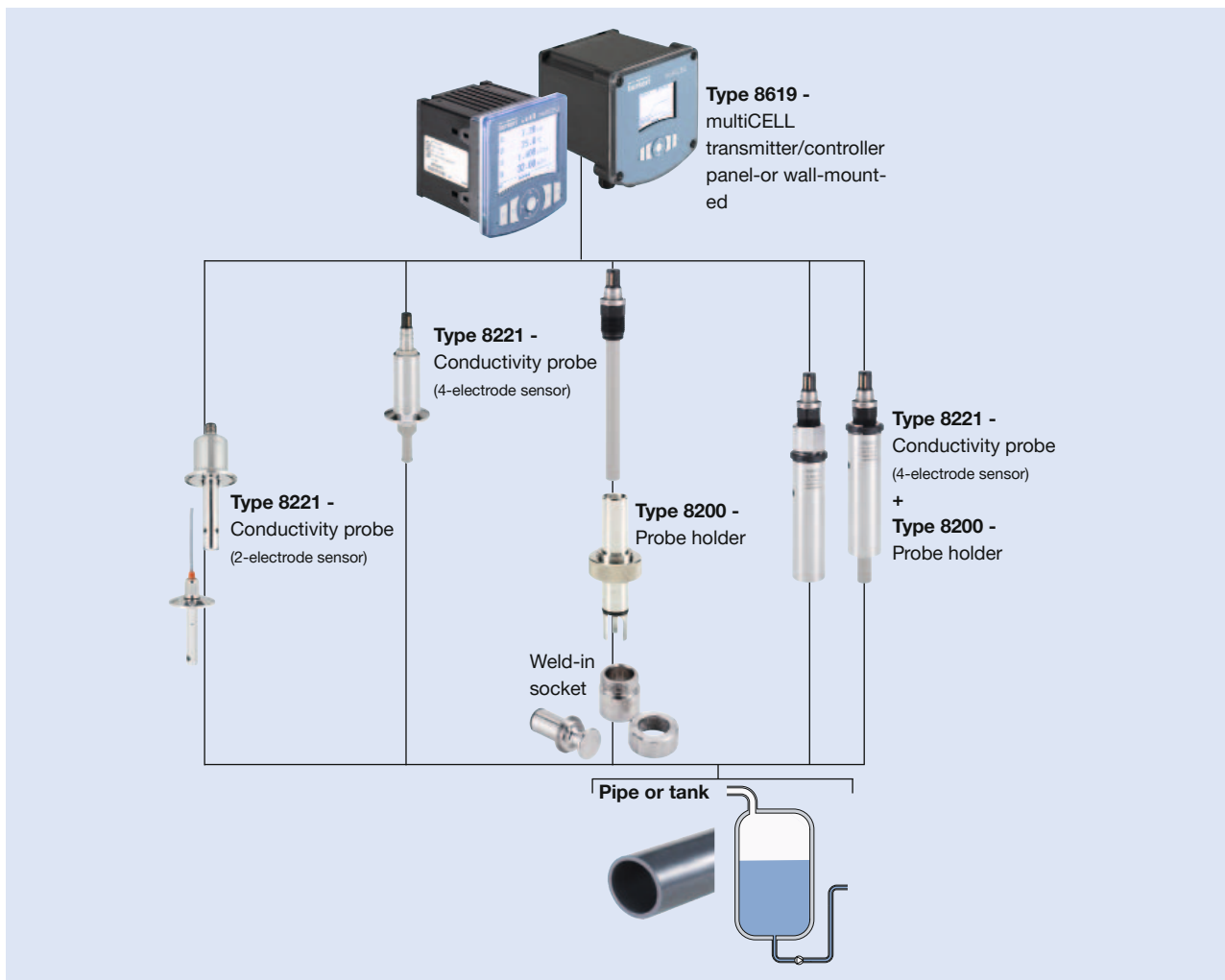
 Further versions on request

 **Process connection**
Others... i.e. G¼"

Ordering chart for accessories for conductivity probe type 8221

Description	Item no.
Buffer solution, 5 µS/cm conductivity standard, ±1 % accuracy, 300 ml	440 015
Buffer solution, 15 µS/cm conductivity standard, ±5 % accuracy, 300 ml	440 016
Buffer solution, 100 µS/cm conductivity standard, ±3 % accuracy, 300 ml	440 017
Buffer solution, 706 µS/cm conductivity standard, ±2 % accuracy, 300 ml	440 018
Buffer solution, 1413 µS/cm conductivity standard, ±1 % accuracy, 300 ml	440 019
Buffer solution, 100 mS/cm conductivity standard, ±1 % accuracy, 300 ml	440 020
Connection cable VarioPin (VP 6.0) female connector, 3 meters	554 855
Connection cable VarioPin (VP 6.0) female connector, 5 meters	554 856
Connection cable VarioPin (VP 6.0) female connector, 10 meters	554 857
 5 pin M12 female straight cable plug with plastic threaded locking ring, to be wired	917 116
 5 pin M12 female straight cable plug moulded on cable (2 m, shielded)	438 680
5 pin M12 female straight cable plug moulded on cable (5 m, shielded)	560 365
5 pin M12 female straight cable plug moulded on cable (10 m, shielded)	563 108

Interconnection possibilities with other Bürkert devices



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