

Type 8221 can be combined with...

Type 8619
 multiCELL
 Transmitter/Controller

The 8221 Hygienic conductivity probes are used to determine electrical conductivity in solutions.

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

Two technology of conductivity probes are available:

- probes based on 2-electrode principle are suited for measurements in clean solutions. Contaminations affect the measurement.
- probes based on 4-electrode principle exclude polarization phenomena and are not sensitive to contamination. The engineered design guarantees an excellent linearity over a wide conductivity range of more than 6 decades.

An integrated temperature sensor (Pt1000) is a standard feature of all versions.

The probe has to be connected to the multi-CELL transmitter/ controller Type 8619 via a 4 x 1.5 mm² shielded cable (maximal cable length of 10 m).

Conductivity sensor for hygienic applications

- 2- or 4-electrode technology
- Extended measuring range 0.05 µS/cm... 500 mS/cm
- Process connections, materials, surface finish designed for use in hygienic applications
- Suitable for steam sterilization, CIP (Clean in place)
- All wetted parts FDA approved

Technical data - (common for all probe version)

Temperature sensor	Pt1000
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**Conductivity probe
1.5" clamp connection**

Technology	2-electrode		
Measuring range	0.05... 20 µS/cm	1... 200 µS/cm	5... 5000 µS/cm
Linearity (relative)	±0.5... 5%	±0.5... 5%	±0.5... 5%
Cell constant ²⁾	0.01 cm ⁻¹	0.1 cm ⁻¹	1 cm ⁻¹
Materials			
Electrode	Stainless steel		
Body	Stainless steel, 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		


**Conductivity probe
G1/4" connection**

Technology	4-electrode
Measuring range	0.1 µS/cm... 500 mS/cm
Linearity ¹⁾ (relative)	±0.5... 5%
Cell constant ²⁾	0.147 cm ⁻¹
Materials	
Electrode	Stainless steel 1.4435/316L
Body	PEEK with FDA approval (CFR 177.2415), Stainless steel 1.4435/316L
Seal	EPDM with FDA approval
Surface quality	0.4 µm, electro-polished
Medium temperature	-20 to 135°C (-4 to 275°F)
Medium pressure	Max. 6 bar (87.06 PSI)
Electrical connections	High temperature cable, length 5 m, instrument side with open wire


**Conductivity probe - long insertion version
1.5" clamp connection**

Technology	4-electrode
Measuring range	0.1 µS/cm... 500 mS/cm
Linearity ¹⁾ (relative)	±0.5... 5%
Cell constant ²⁾	0.147 cm ⁻¹
Materials	
Electrode	Stainless steel 1.4435/316L
Body	PEEK with FDA approval (CFR 177.2415), Stainless steel 1.4435/316L
Seal	EPDM with FDA approval
Surface quality	0.4 µm, electro-polished
Medium temperature	-20 to 135°C (-4 to 275°F)
Medium pressure	Max. 6 bar (87.06 PSI)
Electrical connections	High temperature cable, length 5 m, instrument side with open wire
Standard	Design according to EHEDG


**Conductivity probe
2" (DN50/40) connection adapted for GEA Tuchenhagen
VARINLINE process connections**

Technology	4-electrode
Measuring range	1 µS/cm... 500 mS/cm
Linearity ¹⁾ (relative)	±0.5... 5%
Cell constant ²⁾	0.360 cm ⁻¹
Materials	
Electrode	Stainless steel 1.4435/316L
Body	PEEK with FDA approval (CFR 177.2415), Stainless steel 1.4435/316L
Seal	EPDM with FDA approval
Surface quality	0.4 µm, electro-polished
Medium temperature	-20 to 150°C (-4 to 302°F)
Medium pressure	Max. 20 bar (290.2 PSI) from -20 to 135°C (-4 to 275°F) and max. 10 bar (145.1 PSI) at 150°C (302°F)
Electrical connections	VarioPin (VP 6.0)
Standard	EHEDG approved design


**Conductivity probe - short insertion version
1.5" clamp connection**

Technology	4-electrode
Measuring range	0.1 µS/cm... 500 mS/cm
Linearity ¹⁾ (relative)	±0.5... 5%
Cell constant ²⁾	0.147 cm ⁻¹
Materials	
Electrode	Stainless steel 1.4435/316L
Body	PEEK with FDA approval (CFR 177.2415), Stainless steel 1.4435/316L
Seal	EPDM with FDA approval
Surface quality	0.4 µm, electro-polished
Medium temperature	-20 to 135°C (-4 to 275°F)
Medium pressure	Max. 6 bar (87.06 PSI)
Electrical connections	High temperature cable, length 5 m, instrument side with open wire
Standard	Design according to EHEDG


**Conductivity probe
2" clamp connection**

Technology	4-electrode
Measuring range	1 µS/cm... 500 mS/cm
Linearity ¹⁾ (relative)	±0.5... 5%
Cell constant ²⁾	0.360 cm ⁻¹
Materials	
Electrode	Stainless steel 1.4435/316L
Body	PEEK with FDA approval (CFR 177.2415), Stainless steel 1.4435/316L
Seal	EPDM with FDA approval
Surface quality	0.4 µm, electro-polished
Medium temperature	-20 to 150°C (-4 to 302°F)
Medium pressure	Max. 20 bar (290.2 PSI) from -20 to 135°C (-4 to 275°F) and max. 10 bar (145.1 PSI) at 150°C (302°F)
Electrical connections	VarioPin (VP 6.0)
Standard	Design according to EHEDG


**Conductivity probe
PG13.5 connection**

Technology	4-electrode
Measuring range	1 µS/cm... 500 mS/cm
Linearity ¹⁾ (relative)	±0.5... 5%
Cell constant ²⁾	0.360 cm ⁻¹
Materials	
Electrode	Stainless steel 1.4435/316L
Body	PEEK with FDA approval (CFR 177.2415)
Seal	EPDM with FDA approval
Surface quality	0.4 µm, electro-polished
Medium temperature	-20 to 150°C (-4 to 302°F)
Medium pressure	Max. 20 bar (290.2 PSI) from -20 to 135°C (-4 to 275°F) and max. 10 bar (145.1 PSI) at 150°C (302°F)
Electrical connections	VarioPin (VP 6.0)
Standard	EHEDG approved design (with adapter and direct welding connection Type 8200)

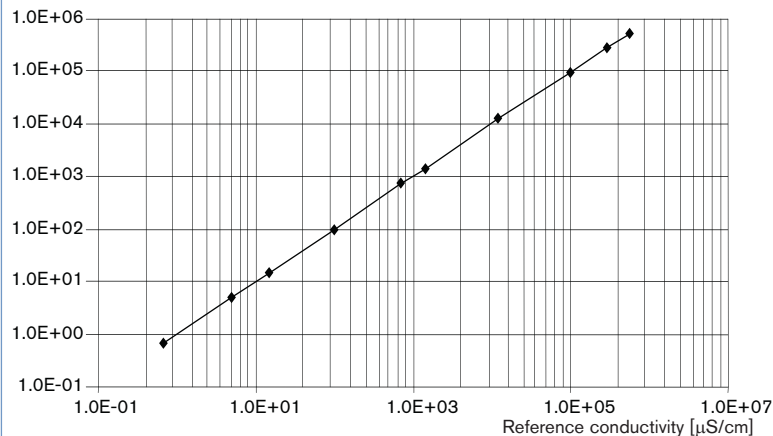
¹⁾ Deviations of ±5% arise when using only ONE single cell constant for the full range. ±0.5% accuracy can be achieved when calibration is performed in a conductivity range close to that of the used solution.

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

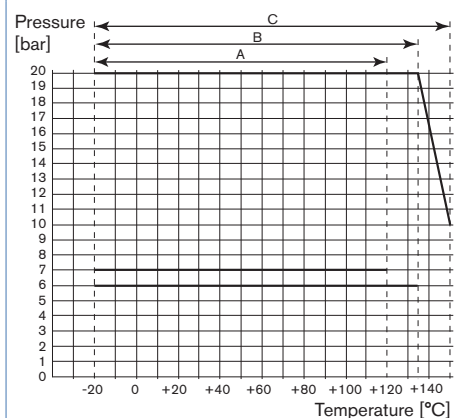
Technical data (continued)

Unique linearity of the 8221 4-electrode conductivity probe

Reading [$\mu\text{S}/\text{cm}$]



Pressure/temperature diagram



Application range for conductivity probe

A: 2 electrodes, 1 or 1.5" clamp connection

B: 4 electrodes, G1 1/4" and 1.5" clamp (short/long) connection

C: 4 electrodes, 2" clamp, 2" (DN50/40) adapted for GEA

Tuchenhagen VARINLINE devices and PG13.5 connection

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 easiest 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 probe based on 4-electrode consist 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 and are not sensitive to contamination and excludes polarization phenomena.

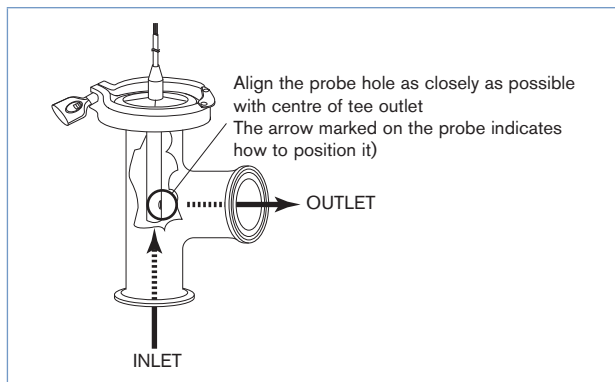
There are countless types of conductivity probes whose measurement values vary by a great margin - depending on the electrode assembly. To compensate for the geometry of the conductivity cell a cell constant is used: Conductivity [S/cm] = Measurement [S] \times Cell constant [$1/\text{cm}$].

The cell constant is either known or it is determined by means of conductivity standards, and has to be put into the transmitter prior to measurement.

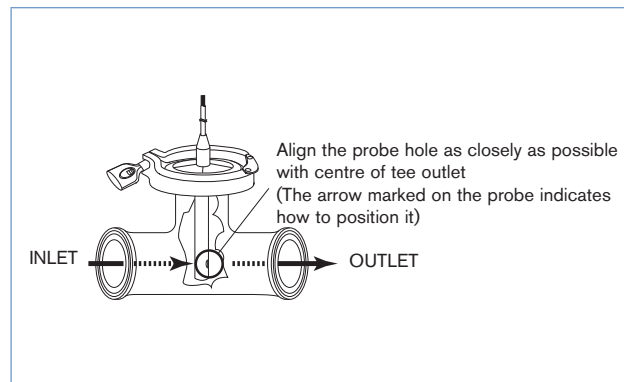
Installation

2-electrode conductivity probe with clamp process connection

Mount the probe **with cell constants 0.01** in a stainless steel sanitary tee 1.5" as shown below.



Mount the probe **with cell constants 0.1 or 1.0** in a stainless steel sanitary tee 1.5" as shown below.



Installation

4-electrode conductivity probe with 1.5 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 an open 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 tee fitting or pipe, a probe holder Type 8200 has to be used. Please refer to the corresponding data sheet, for more information.

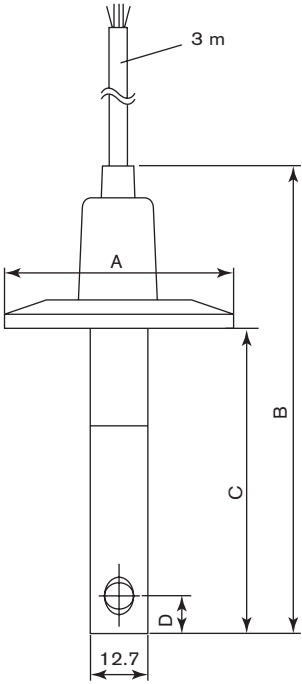
More info.
For more technical information about this product, click on this box... you will come to our website for this product where you can download the datasheet.

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

Dimensions [mm]

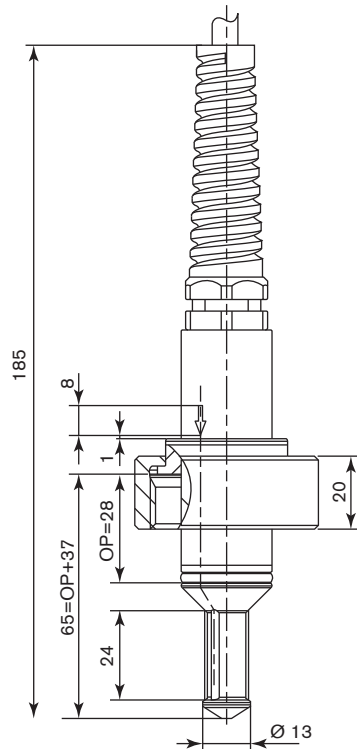
2-electrode probe with 1.5" Clamp connection

Probe with	A	B	C	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

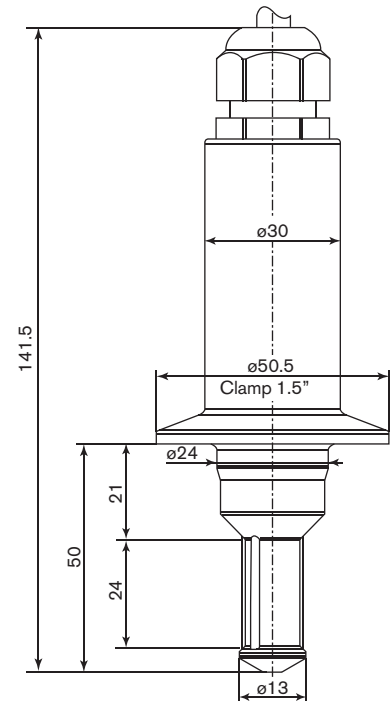


Dimensions [mm]

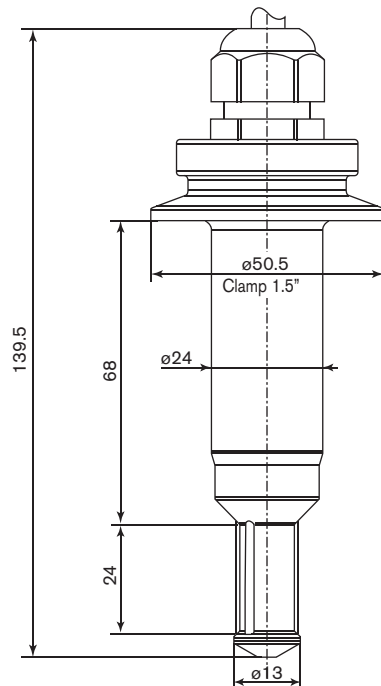
**4-electrode probe
with G1¼" connection
Design according to EHEDG**



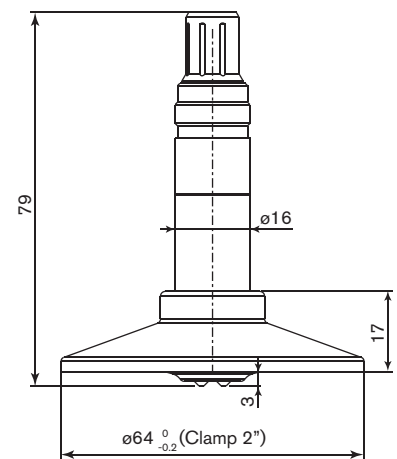
**4-electrode probe, short insertion version
with 1.5" Clamp connection
Design according to EHEDG**



**4-electrode probe, long insertion version
with 1.5" Clamp connection
Design according to EHEDG**

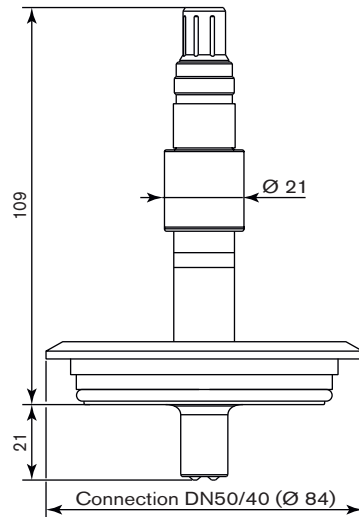


**4-electrode probe version
with 2" Clamp connection
Design according to EHEDG**

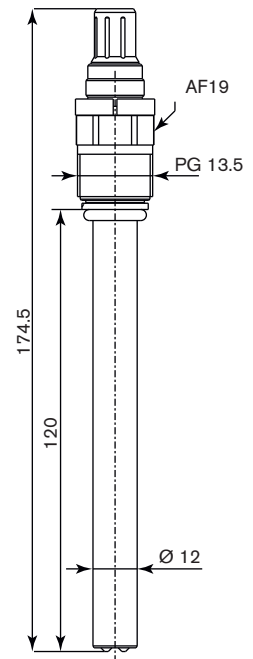


Dimensions [mm]

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



4-electrode probe
with PG13.5 connection
 EHEDG approved design with adapter and direct welding connection Type 8200 [More info.](#)



Ordering chart for conductivity probe Type 8221

Specifications	Technology	Cell constant	Measuring range	Process connection	Electrical connection	Item no.
Conductivity probe	2-electrode	0.01 cm ⁻¹	0.05... 20 µS/cm	1.5" Clamp	Cable 3 m open wires	564 898
		0.1 cm ⁻¹	1... 200 µS/cm	1.5" Clamp	Cable 3 m open wires	562 261
		1 cm ⁻¹	5... 5 000 µS/cm	1.5" Clamp	Cable 3 m open wires	564 899
	4-electrode	0.147 cm ⁻¹	0.1... 500 000 µS/cm	G1 1/4"	Cable 5 m open wires	562 240
	Short, 4-electrode	0.147 cm ⁻¹	0.1... 500 000 µS/cm	1.5" Clamp	Cable 5 m open wires	557 719
	Long, 4-electrode	0.147 cm ⁻¹	0.1... 500 000 µS/cm	1.5" Clamp	Cable 5 m open wires	558 884
	4-electrode	0.360 cm ⁻¹	1 ... 500 000 µS/cm	PG 13.5	VarioPin male connector	563 186
	4-electrode	0.360 cm ⁻¹	1 ... 500 000 µS/cm	2" Clamp	VarioPin male connector	559 120
	4-electrode	0.360 cm ⁻¹	1 ... 500 000 µS/cm	2" (DN50/40) adapted for GEA Tuchenhausen VARINLINE	VarioPin male connector	563 269



Further versions on request



Process connection

Others...



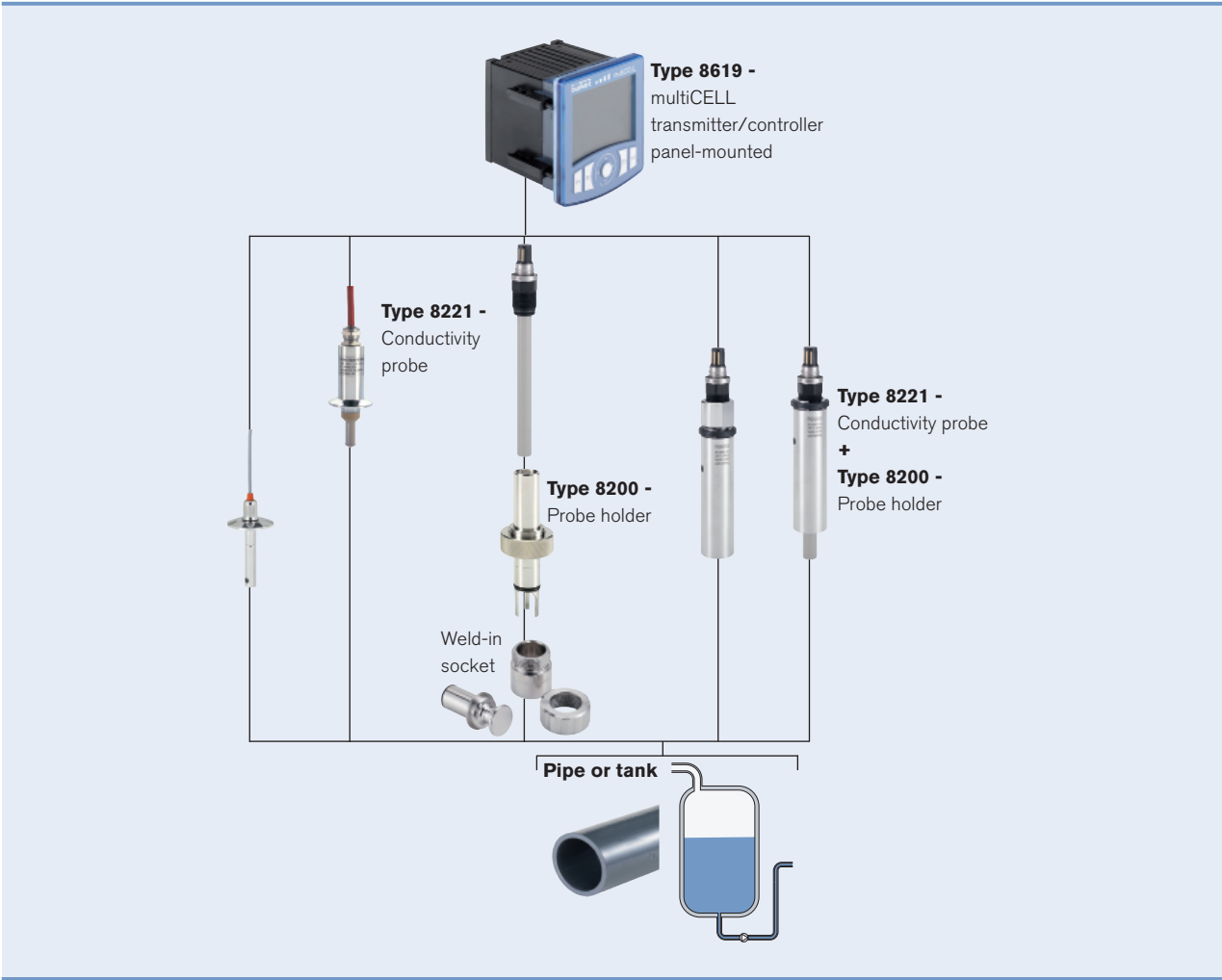
Electrical connection

Others cable length...

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

Interconnection possibilities with other Bürkert devices



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www.burkert.com

In case of special application conditions,
please consult for advice.

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