DATA SHEET

Type 8201

bürkert
FLUID CONTROL SYSTEMS

pH measuring system for hygienic applications

- Special glass-free probe for measuring pH to be connected to Type 8619 multiCELL
- Sterile design, CIP-compatible, in-line sterilizable
- Robust and unbreakable construction
- Long service life, long calibration intervals
- Especially suitable when preparing foods and drinks

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

Can be combined with

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

Type 8200 ▸
Armatures for analytical sensors

Type description

The type 8201 pH measuring system is suitable for measuring absolute pH values in liquids between pH 0 and pH 12 at medium temperatures of up to 140°C and process pressures of max. 6 bar.

Due to its hygienic design and the robust glass-free construction, this model is particularly suitable for use in hygienic processes. An example would be the production of foods and active ingredients, during which the pH value of liquid mediums - including those which are viscous or contain solids - is measured.

The pH electrode's extremely smooth enamel surface prevents the medium from sticking and is very easy to clean in line. Due to its robust design and high temperature and chemical tolerance, the electrode stays in the process even during a CIP purification. This means that expensive retractable fittings can be dispensed with.

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1. General Technical Data

The complete measuring system consists of the pH probe, an adaptation set, a fitting, the reservoir with hose for the electrolyte solution, the electrolyte solution and the electric cable for connecting to a suitable transmitter.
The pH probe Type 8201 is supplied without adaptation. According to the chosen fitting/armature the appropriate adaptation set has to be selected. Different hygienic fittings (Type 8201) or for general purpose applications pH armatures of Type 8200 can be selected.

See **data sheet Type 8200** ▶ for more information.

Product properties	
Material	
Please make sure the device materials are compatible with the fluid you are using. Detailed information can be found in chapter "3.1. Chemical Resistance Chart – Bürkert resistApp" on page 5.	
Wetted parts	
Sensor tube	Enamelled steel tube
Diaphragm	Ceramic
Process connection	Stainless steel 1.4404
Electrode head	PVDF
Seal	EPDM
Electrolyte vessel	Stainless steel (1.4301)
Dimensions	Detailed information can be found in chapter "4. Dimensions" on page 6.
Compatibility	Any tanks or process pipelines which are fitted with • pH armature Type 8200 or • Fitting Type 8201 or • Flange connection adapted for GEA Tuchenhagen VARINLINE process connection (DN 50…DN 125) or • Clamp 2" See **data sheet Type 8200** ▶ or chapter "4.2. Fittings Type 8201" on page 9 or chapter "9.4. Ordering chart" on page 14 for more information.
Temperature sensor	Pt1000 integrated within the holder
Measuring variable	Absolute pH value
Reference system	• Aseptic ground (ceramic) diaphragm • Reference electrode Ag/AgCl • KCl electrolyte 3-molar sterile (conform to FDA)
Measuring range	0…10 pH (for up to 12 pH, see chapter "5.2. pH/temperature diagram" on page 11)
Measuring chain zero point	8.65 ± 1 pH[1.)]
Measuring chain isotherm point pH_0	1.0 ± 1 pH; Uis = 440 mV[1.)]
Product accessories	
Suitable transmitter	• Multi channel and multi function multiCELL transmitter/controller Type 8619 See **data sheet Type 8619 multiCELL** ▶ for more information. • Devices with isotherm option
Performance data	
Measuring deviation	Max. ±0.05 pH, depending on calibration
Repeatability	0.05 pH
Slope of measuring chain	56…59 mV/pH[1.)] at 25 °C (77 °F)
Measurement chain potential	+600…-400 mV
Inner resistance of measuring chain	10^9…10^{10} Ω at +25 °C (77 °F)
Diaphragm resistance	Approx. 20…200 kΩ
Insulation resistance	≥10^{12} Ω
Inner capacity (with connection cable)	≤5 nF
Inner inductivity (with connection cable)	Negligibly low
Thermal shock resistance	ΔT = 120 °C (248 °F)
Corrosion resistance	See chapter "5.1. Sensor corrosion resistance diagram" on page 10.
Electrical data	
Output signal	• pH value: analog signal, to be connected to multiCELL transmitter/controller Type 8619. See **data sheet Type 8619 multiCELL** ▶ for more information. • Pt1000: 2-wire

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Medium data	
Fluid temperature	0…+140 °C (+32…+284 °F), see chapter "5.2. pH/temperature diagram" on page 11.
Fluid pressure	-1…+6 bar rel. (-14…+87 PSI)
Fluid conductivity	Min. 1 µS/cm
Process/Port connection & communication	
Process connection	Through adaptation sets for • pH armature Type 8200 in stainless steel or • Hygienic fittings Type 8201 – Weld connection DN 25 (Ingold welding nozzle) – Weld connection DN 30, other on request – Stainless steel connecting pieces 1.4404 or • Flange connection adapted for GEA Tuchenhagen VARINLINE process connection (DN 50…DN 125) or • Clamp 2" See **data sheet Type 8200** ▸ or chapter "4.1. pH probe enamel" on page 6 or chapter "9.4. Ordering chart" on page 14 for more information.
Electrical connection	6 pin gold-plated Variopin connector
Approvals and certificates	
Standards	
Degree of protection according to IEC/EN 60529	IP68
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 "2.3. Pressure Equipment Directive" on page 5.
Certificates	ECR1935/2004 declaration
Environment and installation	
Ambient temperature	Operation and storage: 0…+50 °C (+32…+122 °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 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.) For exact values see probe test report.

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2. Approvals

2.1. Certificates

Certificates	Description
FDA	**FDA** The KCl electrolyte complies in its composition with the Code of Federal Regulations published by the FDA (Food and Drug Administration, USA).
	**EC-Regulation 1935/2004/EC** The device is suitable in its composition for use with foodstuffs and beverages (according to EC Regulation 1935/2004/EC).

2.2. 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

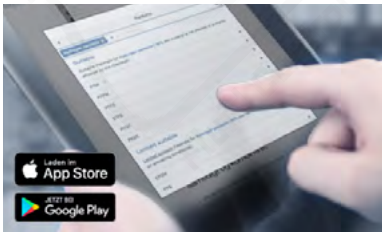
Note:

- 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

3. Materials

3.1. Chemical Resistance Chart – Bürkert resistApp



Bürkert resistApp – Chemical Resistance Chart

You want to ensure the reliability and durability of the materials in your individual application case? Verify your combination of media and materials on our website or in our resistApp.

Start Chemical Resistance Check

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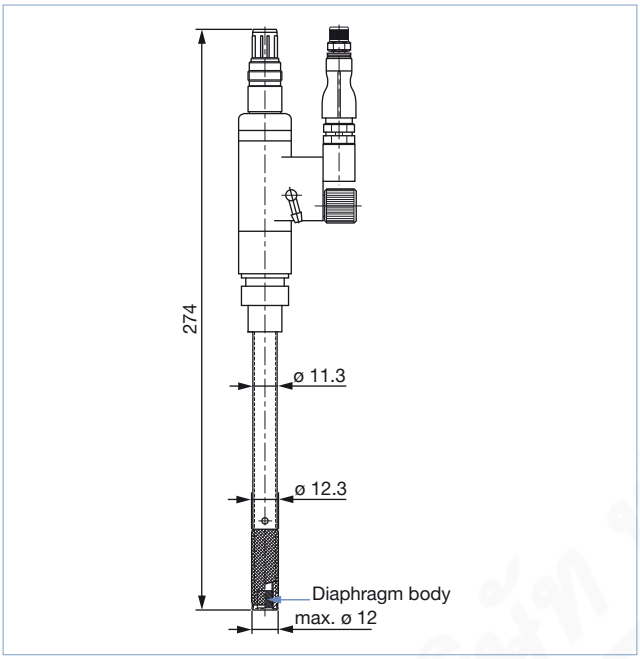
4. Dimensions

4.1. pH probe enamel

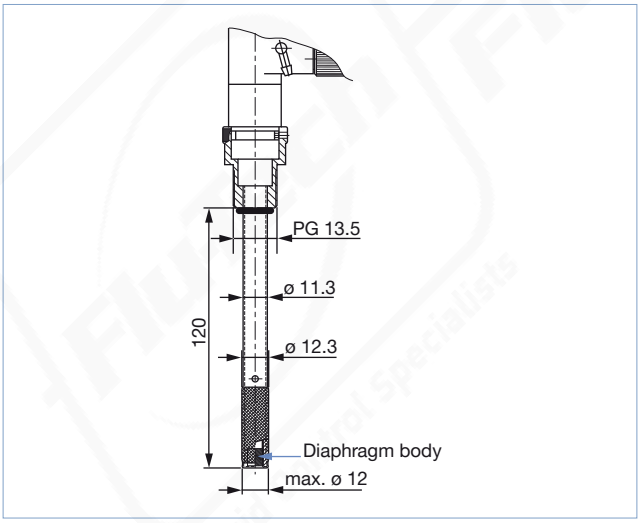
Probe without adaptation

Note:
Dimensions in mm



Probe with adaptation set PG 13.5 for pH armature Type 8200

Note:
Dimensions in mm



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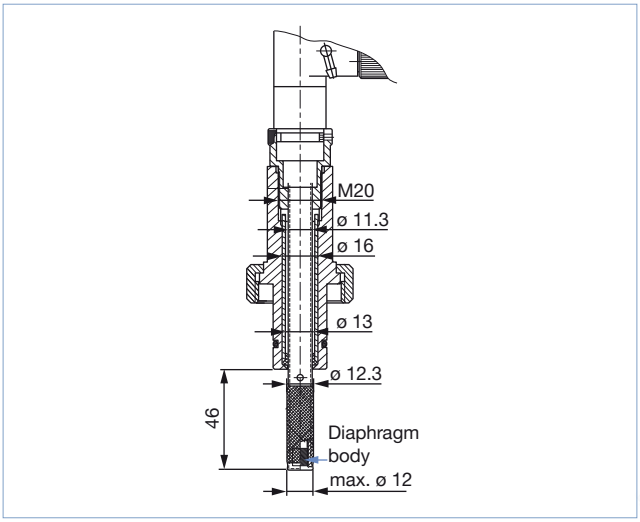
Probe with adaptation set for fitting Type 8201, welding tab DN 25 version

Note:

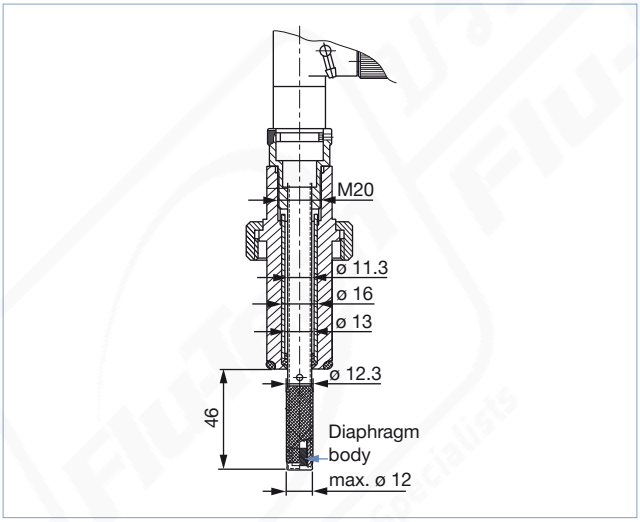
- Dimensions in mm
- Fitting Type 8201, see chapter "9.4. Ordering chart" on page 14.



Probe with adaptation set for fitting Type 8201, welding tab DN 30 version

Note:

- Dimensions in mm
- Fitting Type 8201, see chapter "9.4. Ordering chart" on page 14.



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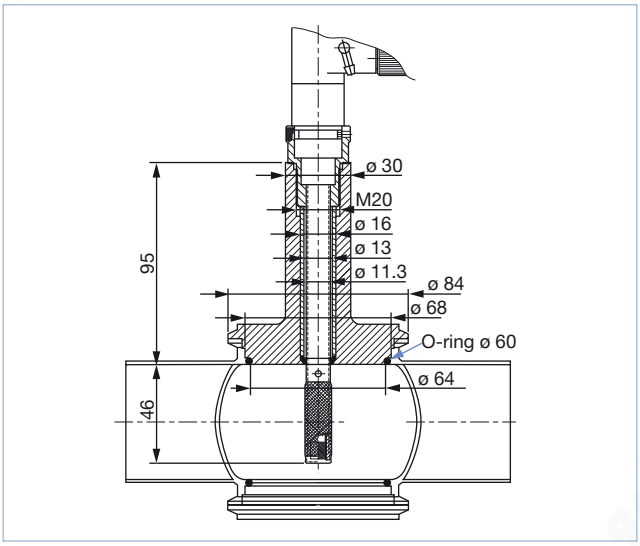
Probe with adaptation set for flange connection adapted for GEA Tuchenhagen VARINLINE process connection

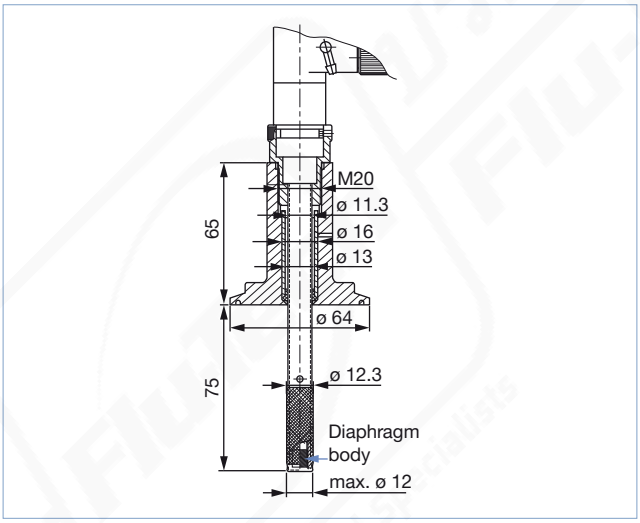
Note:

- Dimensions in mm
- Process connection DN 50…DN 125
- Housing and O-ring Ø 60 not included in delivery



Probe with adaptation set for clamp 2" external Ø 64 mm

Note:
Dimensions in mm



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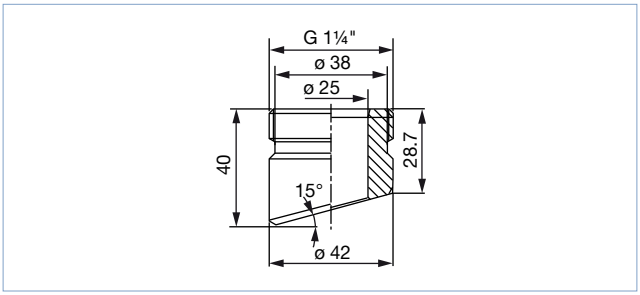
4.2. Fittings Type 8201

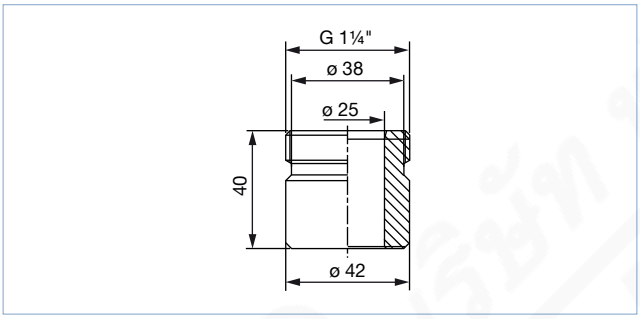
Welding tab DN 25, sloped

Note:
Dimensions in mm



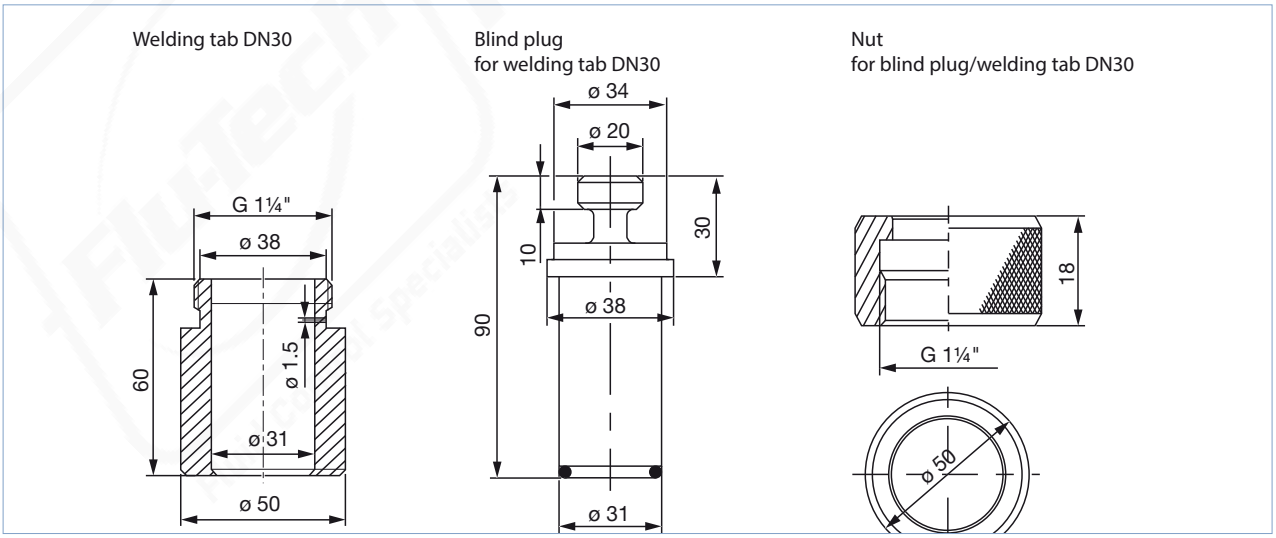
Welding tab DN 25, straight

Note:
Dimensions in mm



Welding tab DN 30

Note:
Dimensions in mm



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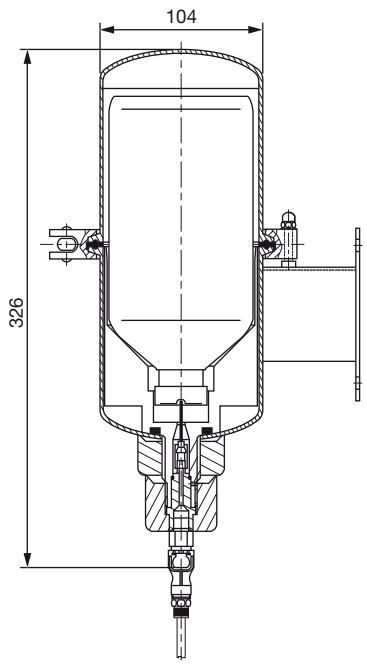
4.3. Electrolyte vessel

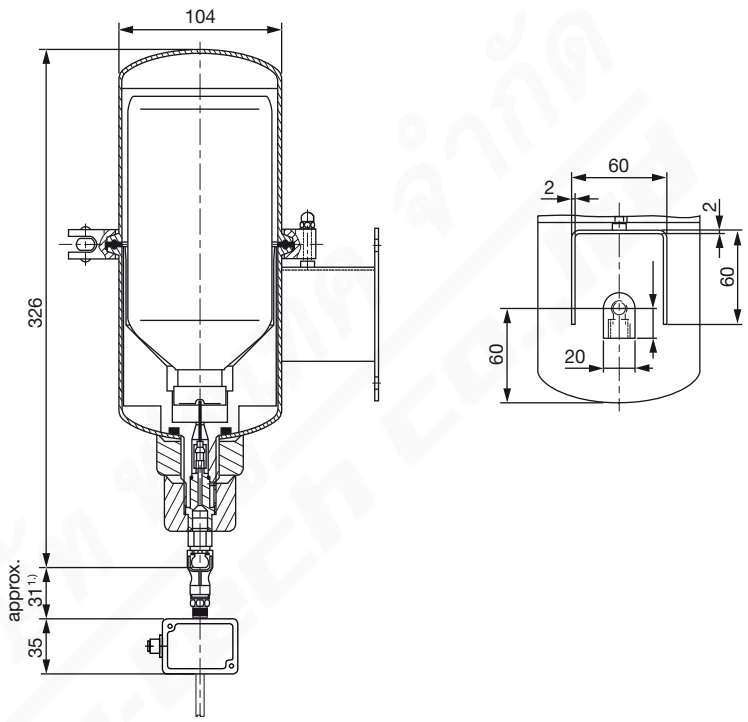
Note:

- Dimensions in mm
- With built-in electrolyte supply bottle

Electrolyte vessel without level switch



Electrolyte vessel with mounted level switch (option)



1.) The electrolyte level sensor is installed on the flexible tube that connects the electrolyte tank to the pH sensor, as close as possible to the electrolyte tank outlet

5. Performance specifications

5.1. Sensor corrosion resistance diagram

Note:
A corrosive attack of under 0.1 mm/year is deemed resistant.

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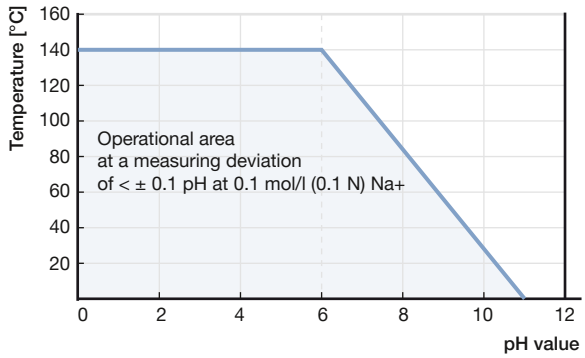
5.2. pH/temperature diagram



6. Product installation

6.1. Installation notes

Intended performance is limited to proper installation of the fitting (by weld), integrating the probe into the process using the appropriate adaptation kit, proper mounting of the electrolyte vessel (electrolyte attachment perpendicularly downwards) close to the measuring point and connecting the pH sensor and electrolyte vessel using the hose connection supplied. The electrolyte supply bottle is inserted into the electrolyte vessel and the pH sensor filled with electrolyte by opening the ventilation screw.

The assembly position of the pH sensor can be chosen freely. During operation care must be taken that the active surface (length approx. 45 mm from probes lower edge) is completely surrounded by medium. The flow velocity should not exceed 3…4 m/s. Dry-storage of the pH sensor is unrestricted.

The probe is connected to the transmitter by means of the attachment cable. Inductive level switch is attached to a suitable analysing device.

7. Product operation

7.1. Measuring principle

The pH sensor works as a single-rod measuring cell. The measuring electrode and reference electrode are combined in one element. An enamelled steel pipe is used as the basic carrier. The measuring electrode is created by additionally attaching an ion-sensitive enamel layer (yellow) with metallic voltage conductor (positioned in the non-conductive blue enamel carrier layer). An ion exchange of H+ions and alkali ions takes place on the surface (gel layer) of this enamel layer. The Ag/AgCl reference electrode is located in the interior of the enamel pipe filled with electrolyte. A ceramic machined diaphragm is pressed into the lower end of the pipe. Electrolytic conduction takes place through the contact of the electrolyte via the annular gap of the diaphragm to the measuring solution. A Pt1000 for temperature compensation is also integrated in the sensor. The electrolyte (conform to FDA) used is 3-molar KCl, stored in a separate electrolyte vessel and permanently connected to the probe via a hose.
The pressure of the electrolyte vessel must be maintained above the process pressure by means of a Bürkert Type TPM001 pressure controller (not supplied, see **data sheet Type TPM001** ▸ for more information) or another one available on the market. We recommend a pressure difference of at least 0.5 bar. Under these conditions, the electrolyte flow rate is about 0.01 ml/h (actual flow rate specified in the test report delivered with the device). For non-pressurised processes the static overpressure of the pressure vessel mounted approx. 0.5 m above the probe is generally sufficient (50 mbar). Due to the extremely low permanent electrolyte flow through the very small annular gap, contamination of the reference electrode is practically excluded. Accidental operation without electrolyte is prevented by optional inductive level monitoring of the pressure container. When a minimum level has been reached, the electrolyte supply bottle in the pressure container is simply changed.

Bürkert Transmitter/Controller Type 8619 provides the analysis of the measured value. The maximum length of cable (5 m) between probe and converter (transmitter) has to be respected. pH probe Type 8201 is supplied without adaptation. The appropriate set is selected according to the fitting/armature chosen. Different hygienic variations of Type 8201 are available. Various standard armatures Type 8200 can be used as well.

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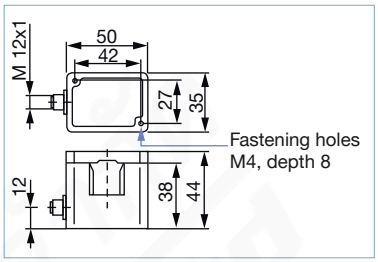
8. Product accessories

8.1. Ultrasonic detection electrolyte level switch

The use of a level switch allows the monitoring of the filling level of the pressure vessel.

Accessory	Description	Dimensions
	**Ultrasonic level switch** • Body and cover in POM, ultrasonic cell in PPMA, seal in FKM, plug housing in PUR • M12x1 connector • 10…35 V DC, PNP open collector Detailed information can be found in the instruction manual of the electrolyte monitoring, see **user manual Type 8201** ▸ and for ordering information, see chapter "9.5. Ordering chart accessories" on page 14.	

8.2. Maintenance sets

Since the enamelled pH sensor does not deteriorate and is largely insensitive to dirt, the maintenance and cleaning of the sensor system is minimal.

- Maintenance sets for the pH sensor and for the electrolyte vessel are available. They contain small parts such as O-rings, seals, stainless steel cannula, flexible tubing, couplings etc.
- You may need to disinfect and rinse the measuring system. For this you will require demineralised water and a plastic bottle with septum for alcohol filling.

See chapter "9.5. Ordering chart accessories" on page 14 for more information.

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9. Ordering information

9.1. Bürkert eShop – Easy ordering and quick delivery

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9.2. Recommendation regarding product selection

Note:
The cable between probe and transmitter must categorically be selected as short as possible (particularly at low process temperatures) in order to guarantee measurement signal dynamics that are as high as possible. A cable length of 10 m should only be used in exceptional cases.

A complete Type 8201 pH measuring system contains the following components:

- pH probe enamel
- Suitable adaptation set for fitting/armature
- Fitting/armature
- Electrolyte vessel (electrolyte hose included)
- Supply bottle with 1 litre electrolyte KCl
- Connection cable for transmitter
- Transmitter / Controller Type 8619 (see **data sheet Type 8619** ▶ for more information)
- Pressure controller (see **data sheet Type TPM001** ▶ for more information) or another one available on the market.

Seven different components must be ordered in order to select a complete device. The following information is required:

- **Article no.** of the pH probe enamel (see chapter "9.4. Ordering chart" on page 14)
- **Article no.** of the suitable adaptation set for fitting/armature (see chapter "9.4. Ordering chart" on page 14)
- **Article no.** of the fitting Type 8201(see chapter "9.4. Ordering chart" on page 14) or armature Type 8200 (see **data sheet Type 8200** ▶ for more information)
- **Article no.** of the electrolyte vessel (see chapter "9.4. Ordering chart" on page 14)
- **Article no.** of the supply bottle with 1 litre electrolyte KCl (see chapter "9.4. Ordering chart" on page 14)
- **Article no.** of the connection cable for transmitter (see chapter "9.4. Ordering chart" on page 14)
- **Article no.** of the Transmitter/Controller Type 8619 (see **data sheet Type 8619** ▶ for more information)
- **Article no.** of a pressure controller Type TPM001 (see **data sheet Type TPM001** ▶ for more information)

9.3. Bürkert product filter

Bürkert product filter – Get quickly to the right product

You want to select products comfortably based on your technical requirements? Use the Bürkert product filter and find suitable articles for your application quickly and easily.

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9.4. Ordering chart

Note:
All necessary parts have to be ordered separately

Description	Comment	Article no.
Probe		
pH probe-enamel without adaptation	pH measuring range: 0…10 (12), medium temperature: 0…+140 °C, pressure (relative): -1…6 bar, electrical connection: 6 pin gold-plated	554849
Adaptation sets		
Adaptation set for welding tab DN 25 Type 8201	Union nut G 1¼" / DN 25	554866
Adaptation set for welding tab DN 30 Type 8201	Union nut G 1¼" / DN 30	554873
Adaptation set PG 13.5 for pH armature Type 8200	PG 13.5 with O-ring	554862
Adaptation set for flange connection adapted for GEA Tuchenhagen VARINLINE process connection (DN 50…DN 125)	Flange adapted for GEA Tuchenhagen VARINLINE process connection	558617
Adaptation set Clamp 2" external Ø 64 mm	Clamp 2"	559744
Electrolyte vessel		
Electrolyte vessel, stainless steel	Including electrolyte hose set 5 m, compressed air attachment, pipe/wall-mounting unit 1	554850
Electrolyte vessel, stainless steel, with level switch		554851
Operating liquids		
Electrolyte KCl, sterilised, 1 litre plastic bottle (conform to FDA)	Electrolyte reference system	554852
Connection cables		
Connection cable for pH probe enamel, 3 m long	6 pin Variopin coupling on pH probe, flexes on transmitter	554855
Connection cable for pH probe enamel, 5 m long		554856
Connection cable for pH probe enamel, 10 m long[1.)]		554857
Fittings Type 8201		
Welding tab DN 25, 40 mm, straight, 1.4404	DN 25/weld attachment straight	554858
Welding tab DN 25, 40 mm, sloped, 1.4404	DN 25/weld attachment diagonal	554859
Welding tab, DN 30, 60 mm, straight, 1.4404	DN 30/weld attachment straight	554860
Blind plug for welding tab, DN 30, 1.4404[2.)]	Union nut G 1¼" / DN 30	554861
Nut for blind plug for welding tab, DN 30, 1.4404[2.)]	G 1¼" / DN 30	554872

1.) Only to be used in exceptional cases, please consult your Bürkert application specialist for application advice.

2.) Absolutely necessary in order to prevent warping when welding DN 30 connecting pieces.

9.5. Ordering chart accessories

Description	Comment	Article no.
Level switch		
Ultrasonic detection electrolyte level switch cplg	With 5-pin M12 male fixed connector (includes a 5-meter long cable equipped with a right-angle 5-pin M12 female plug)	561533
Locking screw M12 × 1 cplg.	Locking screw PVDF with O-ring FKM	554887
Maintenance sets		
Inspection set for pH probe enamel	2 O-rings 10 × 2.5 mm EPDM, 2 O-rings 20 × 2.5 mm silicon, 2 O-rings 23.39 × 3.53 mm EPDM, 4 items adaptor reinforcement ring PTFE for spacer tube	554876
Flexible tube set	1 hose connection with shut-off, 1 hose connector with shut-off, 1 PTFE hose 4 × 1 mm, length 5 m	554883
Cleaning		
Plastic bottle with septum	For self-filling with alcohol 70 % vol.	554854
Demineralised water	Sterile in 1 litre plastic bottle	554853

Please use the attached application questionnaire to describe your process and send it to your Bürkert office to check the suitability. Please complete all three pages.

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Product Enquiry Form - pH measuring system

Thank you for your interest in our products! In order to provide you with optimum advice, please fill out the following form and send it to your **Bürkert representative** or e-mail address: info@burkert.com. All information submitted will of course be kept strictly confidential.

Note: The interactive functions of this PDF may be restricted depending on the PDF reader used.

Personal Information			
Company		**Contact person**	
Customer no.		**Department**	
Street		**Country / Postcode / Town**	
Telephone no.		**Email**	

Delivery			
	Quantity		Required delivery date

Our process		
Process description		
Application	○ Continuously pH regulation	○ Continuously pH monitoring
Temperature range[1.)]	from	to [°C]
Pressure range[1.)]	from	to [bar]
pH range[1.)]	from	to [pH]
Concentration of dissolved substances		
Molarity		[mol]
or Proportion		[%]
Which substances		
Variable concentration	○ Yes	○ No
	if yes, please quotate the variation	[mol]

1.) Please chart this data into the process time lapse diagram at chapter „Process time lapse“ on page 2.

Cleaning process	Concentration [mol]	Temperature [°C]	Time [minutes]	pH value [pH]
Cleaning[1.)]				
with base				
with acid				
Sterilisation[1.)]				
with steam				
with product				
with aseptic solutions				
Others cleaning[1.)]				

1.) Please chart this data into the cleaning time lapse diagram at chapter „Cleaning time lapse“ on page 3.

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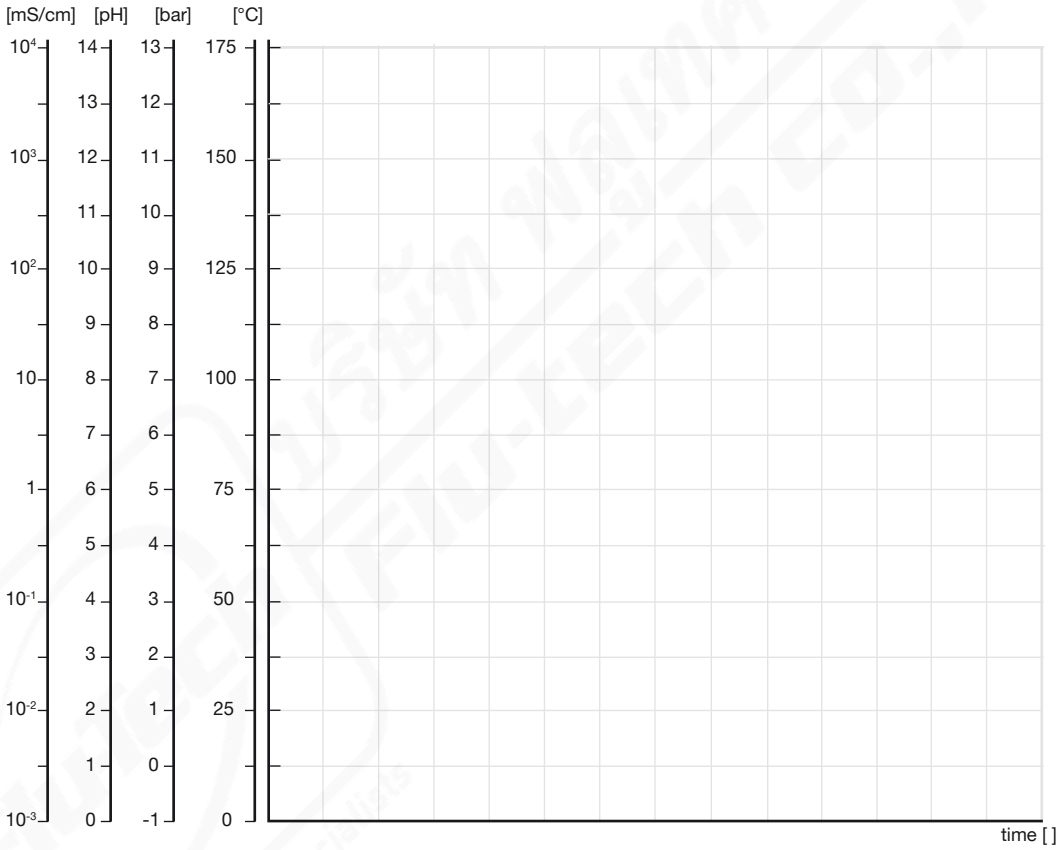
Currently used measuring	
Used type of pH measuring system	
Following issues are existing	

Process time lapse



Remarks:

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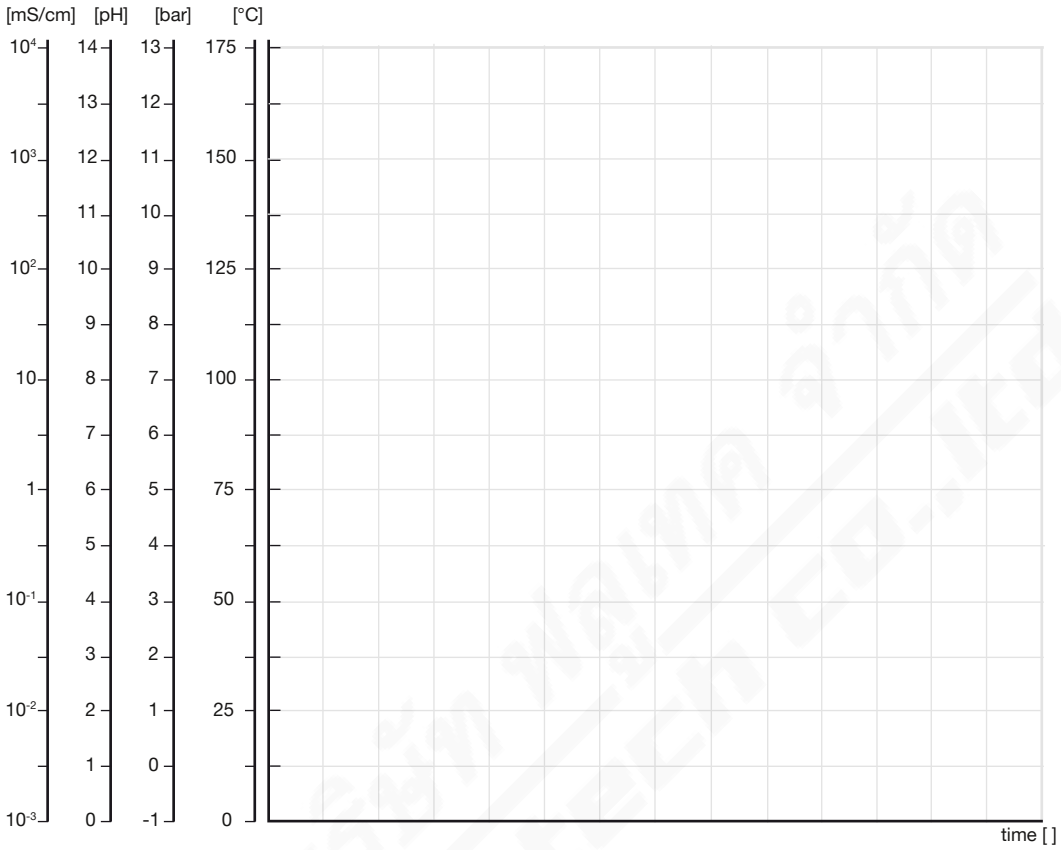
Cleaning time lapse



Remarks:

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