SARTORIUS

Product Datasheet

BioPAT® Conductivity | pH

Sensor for Flow Applications

Product Information

BioPAT® Conductivity | pH is a single-use (SU) sensor for flow applications with aqueous process media. The sensor is intended to determine conductivity and pH. For pH measurement, there are two options available: a pre-installed pH electrode (dry-stored) or an optional wet-stored pH electrode.

Features and Benefits

- Response time of pH electrode is < 5 s (dry-stored), < 10 s (wet-stored)
- No calibration required because of pre-determined calibration data
- Optional one-point | two point calibration of pH electrode by the user
- The sensor is offered in two variants, either with optional pH electrode (wet-stored) or as pre-installed pH electrode (dry-stored). Both variants are useable in the SU pipe

Introduction

Key Features of BioPAT® Conductivity | pH

- Very small footprint
- Fast response time of pH electrode
- Integrated PT1000 temperature sensor in both sensors
- NaOH resistant up to 1 hour
- Can be used with a Knick read-out card for control unit integration
- Various wet-ware sizes and connectors available

Figure 1: *The BioPAT® Conductivity | pH Sensor with Integrated Conductivity Sensor and Pre-Installed pH Electrode (Dry-Stored)*

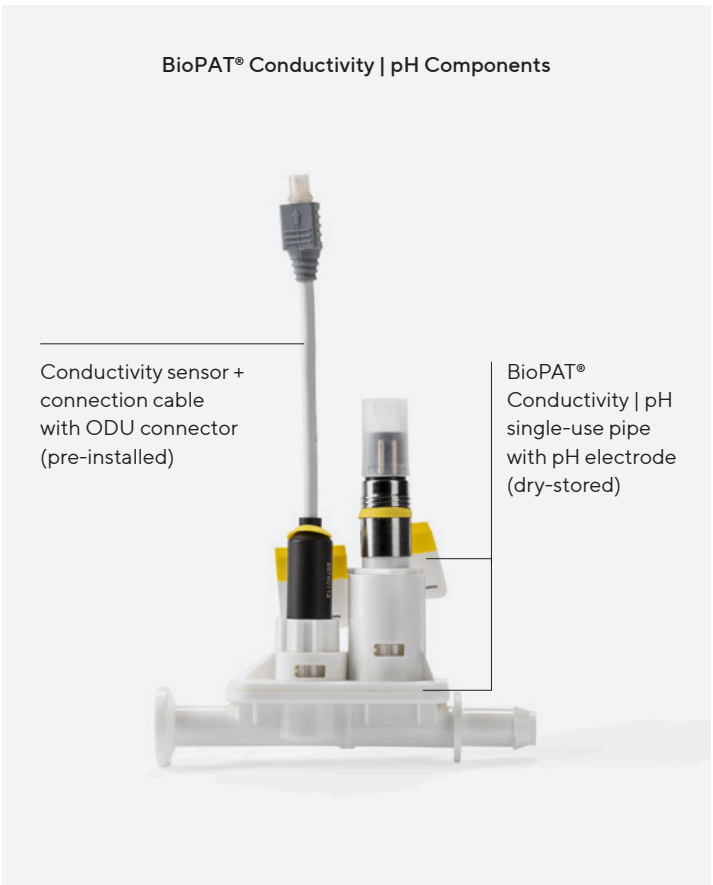
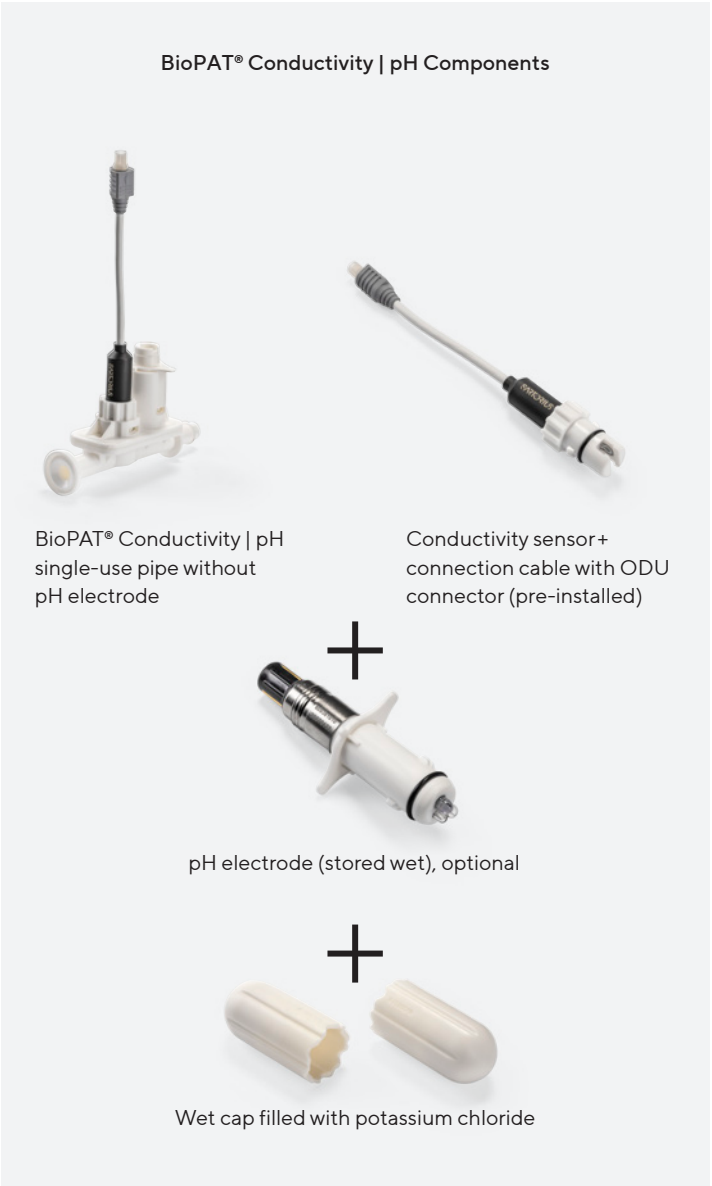


Figure 2: *BioPAT® Conductivity | pH Sensor with Integrated Conductivity Sensor and Optional pH Electrode (Wet-Stored)*

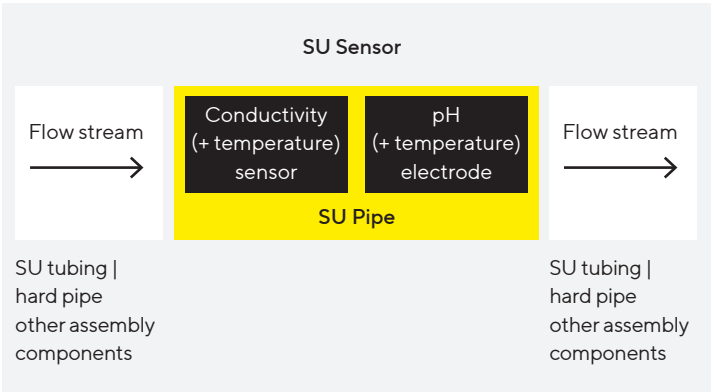


Working | Measurement Principle

The BioPAT® Conductivity | pH sensor consists of a SU pipe into which the sensor components are assembled. A temperature sensor is integrated into both sensors for direct read-out and compensation of the conductivity and pH measurement. The hardware integration considers the current strategy for process automation and is carried out via a Knick read-out card.

The sensor consists of three core technologies: an electrochemical pH electrode for pH measurement, a 4-electrode platinum thick-film technology (consisting of 2 ceramic plates, arranged in parallel), for conductivity measurement, and a PT1000 for temperature measurement (Figure 3).

Figure 3: *General Concept Scheme for BioPAT® Conductivity | pH (and Temperature) Sensors*



Installation Description (Connection to Local Automation)

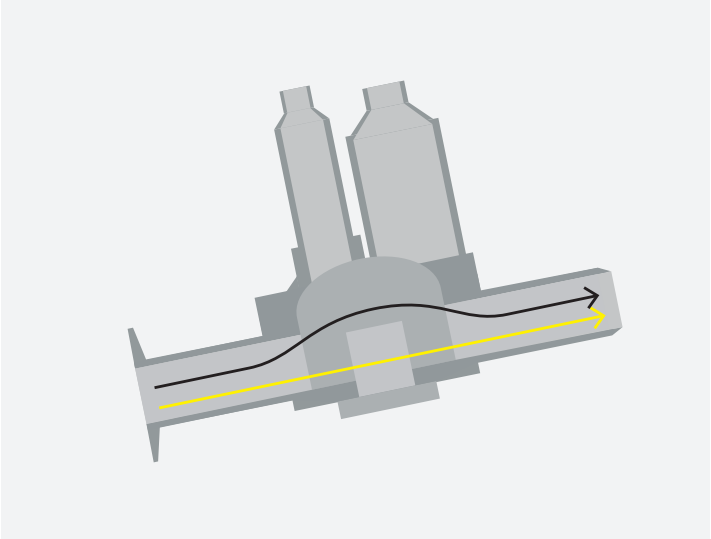
The BioPAT® Conductivity | pH SU pipe is installed at a slight angle into the process flow using the two connections (Figure 4). After removing the connector transport guard from the conductivity sensor, the ODU data cable is plugged into the sensor's connector. Finally, the ODU data cable is connected to the respective control unit.

The pH electrode must be connected via a VP8 data cable. To plug the VP8 cable connector into the pH electrode, the connector transport guard is removed from the pH electrode. The connector of the data cable should be turned onto the pH electrode until no gap is visible between the connector and the pH electrode. Finally, the VP8 data cable is also connected to the respective control unit.

Installation Recommendation

The presence of air bubbles disturbs the flow measurement. Therefore, it is recommended that the conductivity sensor is installed so that the BioPAT® Conductivity | pH pipe is at a 10° – 45° angle (top upwards) to avoid air bubbles.

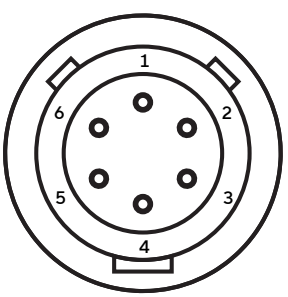
Figure 4: *BioPAT® Conductivity | pH Installation Guidance*



Data Read-Out

Conductivity Sensor

Data read-out is realized by plugging the ODU data cable connector into the connector of the conductivity sensor. The ODU data cable should be connected to the respective control unit.

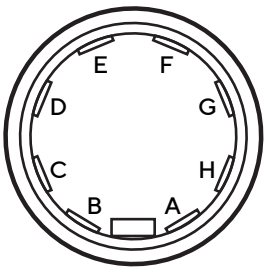


Pin Assignment Conductivity Sensor

Pin	Signal	Pos. VP8-ST (Female)	Color
1	U high	A	White
2	I high	B	Brown
3	U low	C	Green
4	I low	D	Yellow
5	RTD	E	Gray & pink
6	RTD	F	Blue & red

pH Electrode

Data read- out via the VP8 data cable connector into the pH electrode. The VP8 data cable should be connected to the respective control unit.



Pin Assignment pH Electrode (VP4 Male)

Pin	Signal
A	Contact 1 (pH)
B	Ground (Ref)
C	–
D	–
E	Contact 2 (PT)
F	Contact 3 (PT)
G	–
H	–

Pin Assignment VP4 Data Cable (VP4 Male)

Pin	Signal
A	Contact 1 (pH)
B	Ground (Ref)
C	–
D	–
E	Contact 2 (PT)
F	Contact 3 (PT)
G	–
H	–

Data Read-Out With a Third-Party Reader

Direct data read-out from the conductivity sensor and pH electrode is also possible via analytical measuring devices. The preferred analytical devices for direct data read-out are Portavo 907 Multi Cond and Portavo 907 Multi pH from Knick (see Ordering Information).

Qualification and Quality Assurance

All components of the BioPAT® Conductivity | pH sensor comply with the quality and safety requirements of typical biopharmaceutical processes. Full batch traceability and quality control ensure that the SU components follow the directives and guidelines of the relevant regulatory agencies. The same applies to the hardware components.

A comprehensive analysis procedure includes, among others:

- Extractable studies
- RoHs | REACH compliance
- Non-cytotoxicity

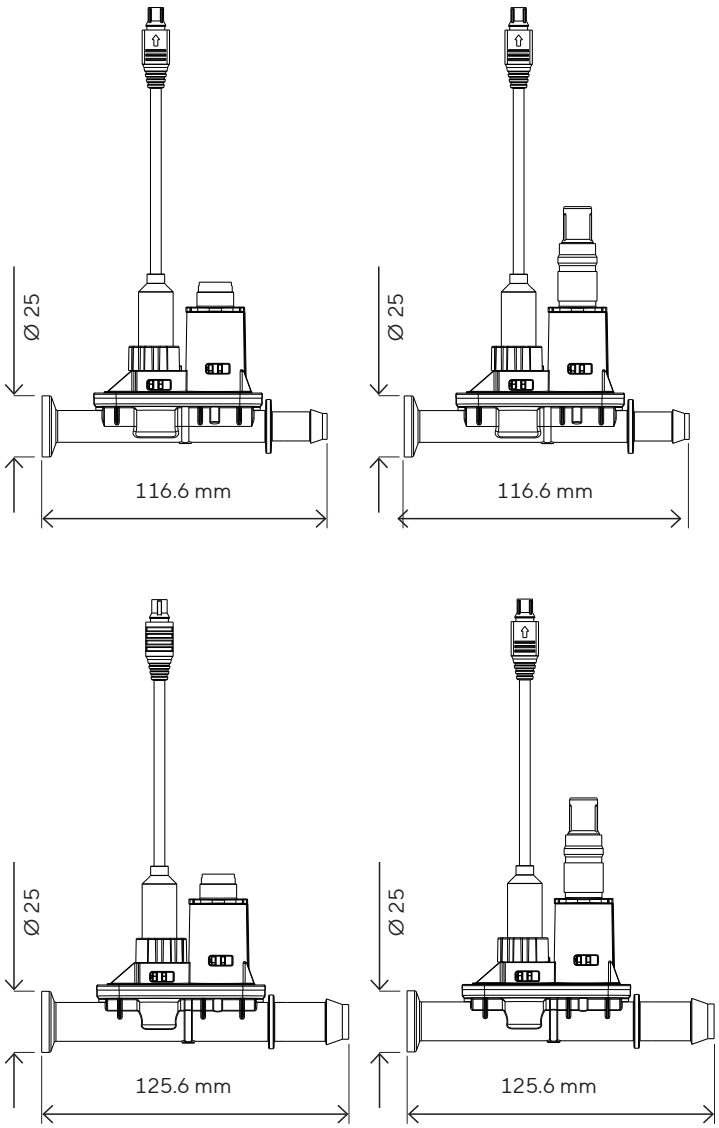
Ranges and Limits

	Measurement and Accuracy	Drift	Response Time	Temperature
Conductivity sensor	▪ 0.1 – 150 mS/cm ▪ Accuracy ≤ 5% c.v. pre-calibrated ▪ Accuracy ≤ 2% c.v. one-point calibration	< 2% c.v. per week	t90 time: < 2 sec	Accuracy: ± 1% (at 4 – 40 °C)
pH electrode	▪ pH 3 – pH 10 ▪ Accuracy: ± 0.2 pH (pre-calibrated) ▪ Accuracy: ± 0.1 pH (one-point calibration) ▪ Accuracy: ± 0.08 pH (two-point calibration)	< 0.1 pH units per week	t90 time: < 5 sec	Accuracy: ± 1% (at 4 – 40 °C)

Technical Specifications

BioPAT® Conductvity | pH Sensor

Material	In contact with the product: Polybutylene terephthalate (PBT)
Sizes (ID)	⅜", ½"
Connections	HB-HB, HB-TC
Operating temperature range	4 – 40 °C
Operating pressure range	▪ with pH electrode up to 1 bar ▪ without pH electrode up to 4 bar
Recommended installation angle	10° – 45°
Chemical resistance (at 25 °C)	▪ Aqueous buffers (pH 1 – 13) ▪ 1 M NaOH for 30 min ▪ 1 M HCl for 30 min ▪ 20% ethanol or isopropanol for 24 h ▪ 20% solutions for 1h: N, N-dimethylacetamide (DMAc), dimethyl sulfoxide (DMSO), N, N-dimethylformamide (DMF), propylene glycol (PG), acetonitrile (ACN), N-methyl-pyrrolidone (NMP)
Shelf-life	▪ Prior to gamma | x-ray irradiation: 1 year ▪ After gamma | x-ray irradiation: 2 years

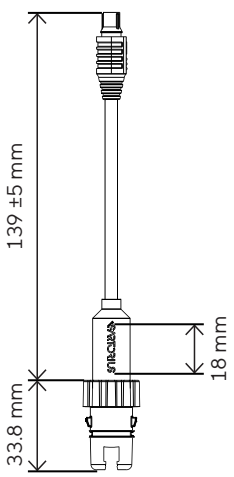


* Also available with HB-HB connectors

Conductivity Sensor

Material	▪ Polybutylene terephthalate (PBT) ▪ Ceramic ▪ Platinum ▪ Ethylene propylene diene monomer (EPDM) ▪ LOCTITE®
Dimensions [mm]	172.8 × 19 × 19
Connections	ODU connector
Drift, per week mS/cm	< 2% C.V.
Accuracy	Pre-calibrated 5% c.v. – current value 1-point calibration 2% c.v.

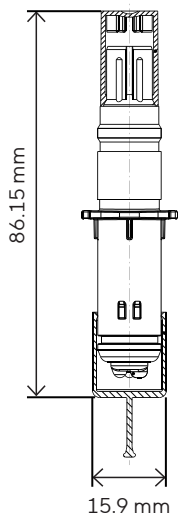
* The accuracy is calculated as 1-sigma accuracy (mean deviation from the reference measurement + 1 standard deviation)



pH Eletrode

Material	▪ Polybutylene terephthalate (PBT) ▪ Glass ▪ Ethylene propylene diene monomer (EPDM) ▪ LOCTITE®
Dimensions [mm]	86.15 × 15.9 × 15.9
Connections	VP connector
Drift, per week pH	< 0.1
Accuracy (over the entire measuring range)*	▪ Pre-calibrated pH ±0.2 ▪ 1-point calibration pH ±0.1 ▪ 2-point calibration pH ±0.08

* The accuracy is calculated as 1-sigma accuracy (mean deviation from the reference measurement + 1 standard deviation)



Ordering Information

Single-Use Pipes

Product Description	Order Number
BioPAT® Cond | pH pipe w. plug ⅜" TC-HB	BPC0321
BioPAT® Cond | pH pipe w. plug ⅜" HB-HB	BPC0331
BioPAT® Cond | pH pipe w. pH ⅜" TC-HB	BPC0322
BioPAT® Cond | pH pipe w. pH ⅜" HB-HB	BPC0332
BioPAT® Cond | pH pipe w. plug ½" TC-HB	BPC0421
BioPAT® Cond | pH pipe w. plug ½" HB-HB	BPC0431
BioPAT® Cond | pH pipe w. pH ½" TC-HB	BPC0422
BioPAT® Cond | pH pipe w. pH ½" HB-HB	BPC0432

pH Probe

Product Description	Order Number
pH probe for BioPAT® Cond | pH, wet, 1 bar	BPC1000*

*To be used with order numbers: BPC0321, BPC0331, BPC0421, BPC0431

Data Read Out Analytical Measuring Devices

Product Description	Order Number
Portavo 907MULTICOND	84463**
Portavo 907 MULTIPH	84462** / BPP0001
Cable Conductivity | Knick Handheld	BPT0033
YF-ZU1163 Connection cable for pH sensors	65659**

** To be ordered via external supplier Knick

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Status: 4 | 2025