



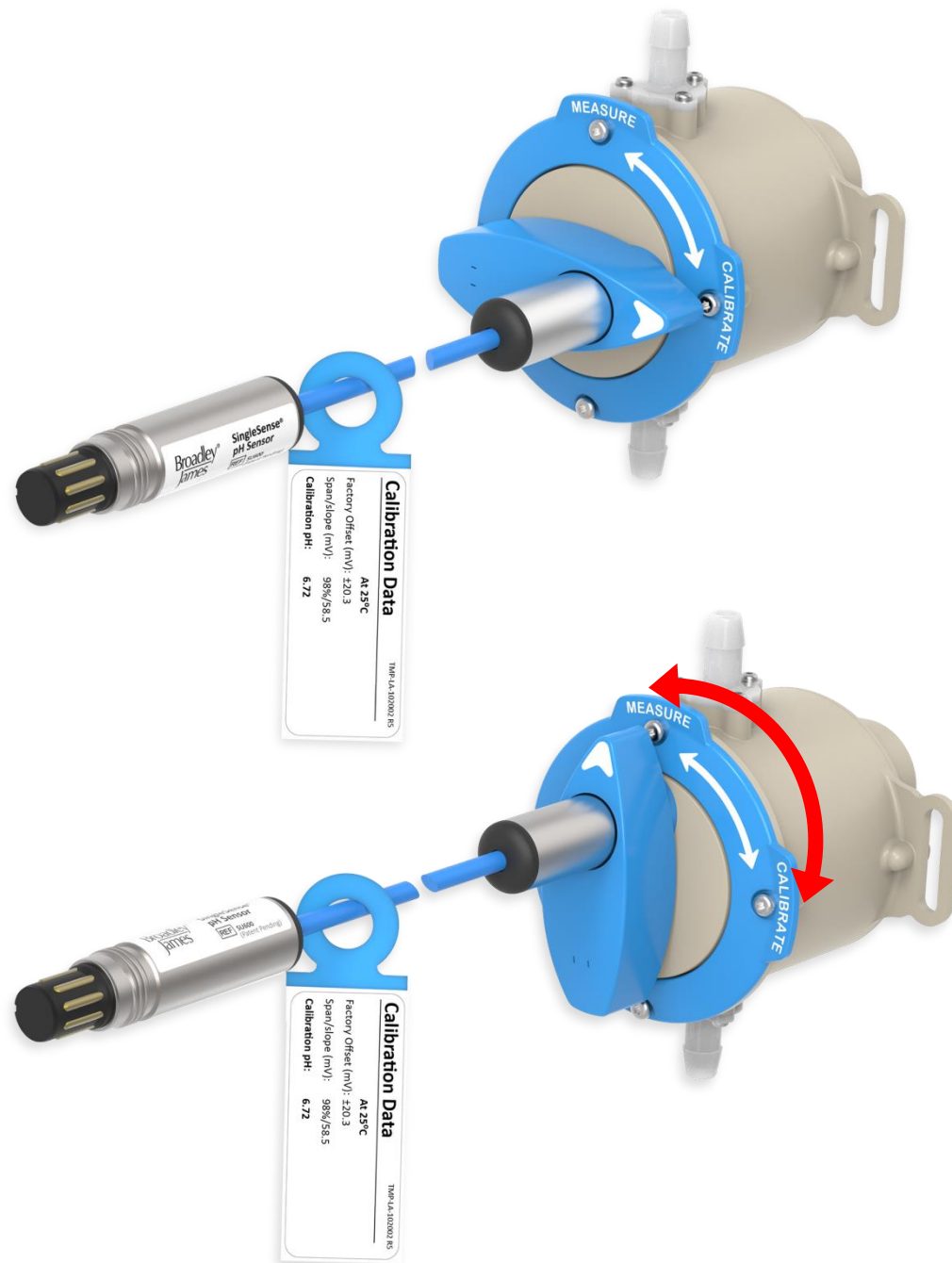
Operation Manual

SingleSense® Single-Use pH Sensor

Model SU600/SU680



Doc Nbr: OM-082101 R5
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Purpose

This manual provides instructions on how to operate Models SU600/SU680 SingleSense® single-use pH sensors for use with a downstream bioprocess system.

Scope

This operation manual is for customers who purchase and use Models SU600/SU680 SingleSense® single-use pH sensors.

Precautions

This product is intended for professional use only. Follow your standard operating procedures when using this product. Do not use the product if it is broken, defective, or visually damaged.

Disclaimers

Read all instructions prior to installing or operating this product. Save this manual for future reference.

If the instructions in this manual are unclear, contact Broadley-James. If this instruction manual is not for the product ordered, call (949) 829-5555.

Follow all warnings, cautions, and instructions marked on and supplied with the product.

To ensure proper performance, use qualified personnel to install, operate, update, calibrate, and maintain the product.

This product is designed for single-use.

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All sales are subject to our Terms and Conditions, available upon request. We reserve the right to revise or improve this publication at any time without notice. For the latest product documentation and specifications, please visit our website.

Compliance

Broadley-James Corporation confirms Models SU600/SU680 SingleSense® single-use pH sensors meet the following regulatory and compliance standards:

CE Compliant	Yes
RoHS Compliant	Yes
REACH Compliant	Yes
CFR 21-11 Compliant	Not applicable
BSE/TSE/ADI Free	Yes
USP Class VI Compliant	Yes, all wetted parts
FDA Material Compliant	Yes, all wetted parts

Wetted Materials

PEEK: UPS Class VI, ADI-Free, Extraction Tested 21CFR, 177 | Dimethyl Silicone Rubber: Pt Cure, USP Class VI, Extraction Tested 21 CFR, 177 | EPDM: USP Class VI, FDA Compliant, ADI-Free | Lead-Free Glass | Alumina Silicate

Full scale extractable and leachable test based on BPOG extractable protocol and USP 665 pending.



Product Description

The SU600 and SU680 SingleSense® single-use pH sensors are designed for operation with a downstream bioprocess system.

Definition of Symbols



Catalogue number



Serial number



CE marking



Use by date



Temperature limit



Quantity

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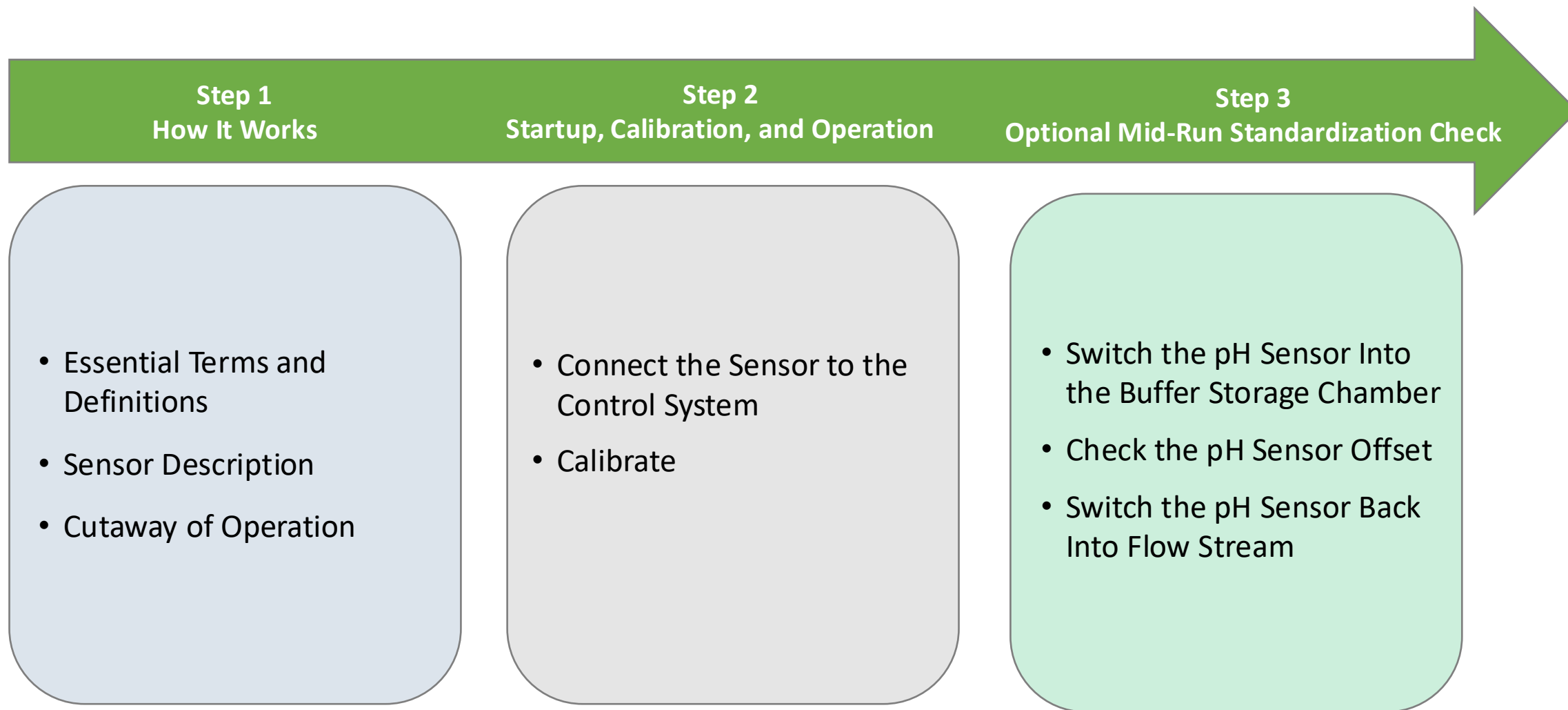
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Operation Steps



Step 1: How It Works

- Essential Terms and Definitions
- Sensor Description
- Cutaway of Operation

1.1 Essential Terms and Definitions

The table outlines terms and definitions that are important for the operation process. See the next slide for their location on the sensor and single-use assembly.

Term	Definition
Aseptic connector (optional)	Attaches the sensor to the flow stream
Bracket clip	For attachment to an optional mounting bracket
Calibration tag	Tag on the sensor's cable that displays data specific to each sensor (do not remove)
Yellow protective cap	Protects the sensor's VP8 connector during shipment
Dial face	Displays the position of the sensor in either measure or calibrate
Inlet	Allows process solution to pass through the sensor
Mounting bracket (optional)	An optional bracket to mount sensor in a vertical position
Outlet	Allows process solution to flow out of the sensor
Protective barb cover	Disposable cover protecting the barb (not shown)
Sensor's VP8 connector	Connects the sensor to the control system
Switch	Changes the position of the sensor between measure and calibrate
Tubing	Allows process solution to pass through the flow cell
Zip ties	Secures tubing to inlet and aseptic connector

1.2 Sensor Description

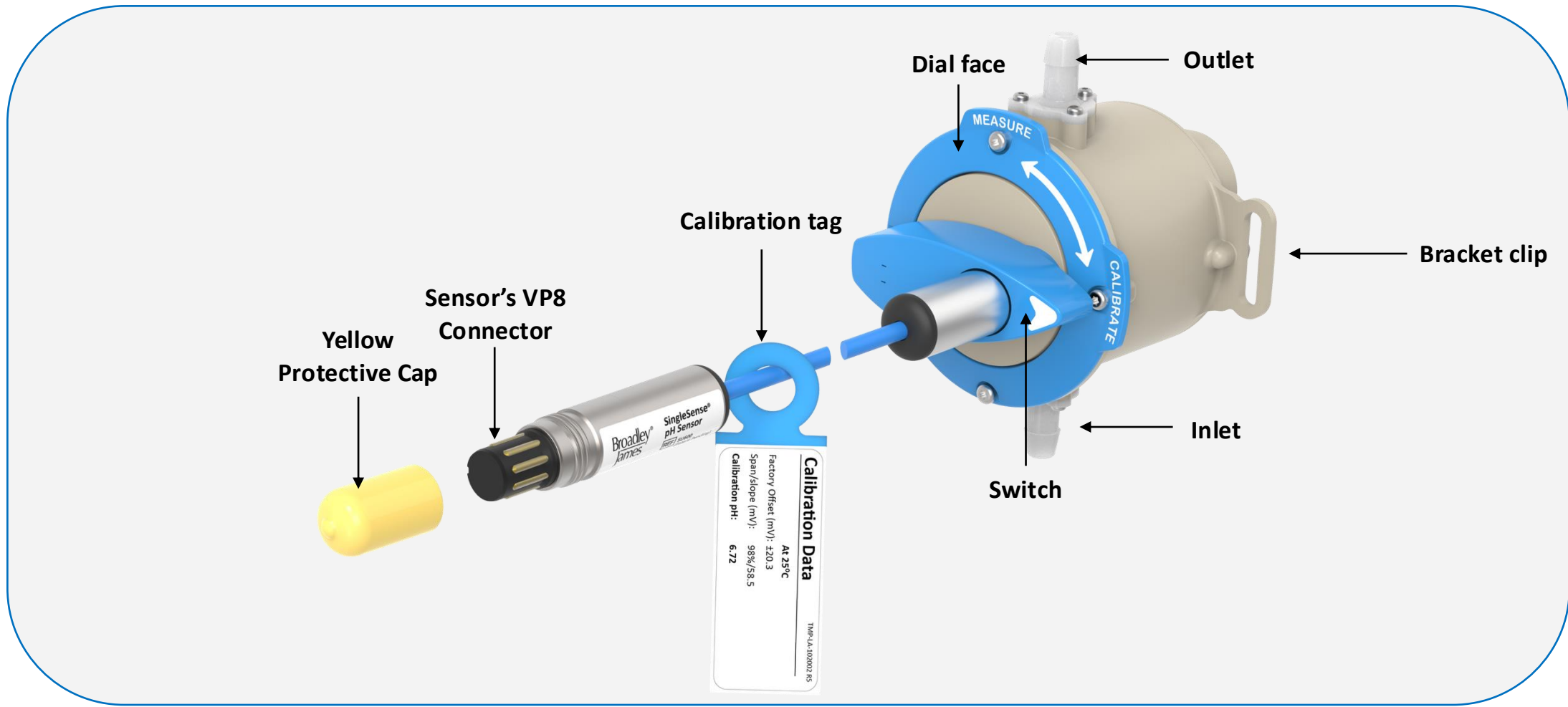


Figure 1. Sensor description

1.4 Mounting to Optional Bracket

To mitigate inline bubbles, the recommended orientation for installing the sensor is vertical, with the outlet on the top and the inlet on the bottom.

Broadley-James offers an optional sensor bracket for this purpose. Contact Broadley-James sales for more information.

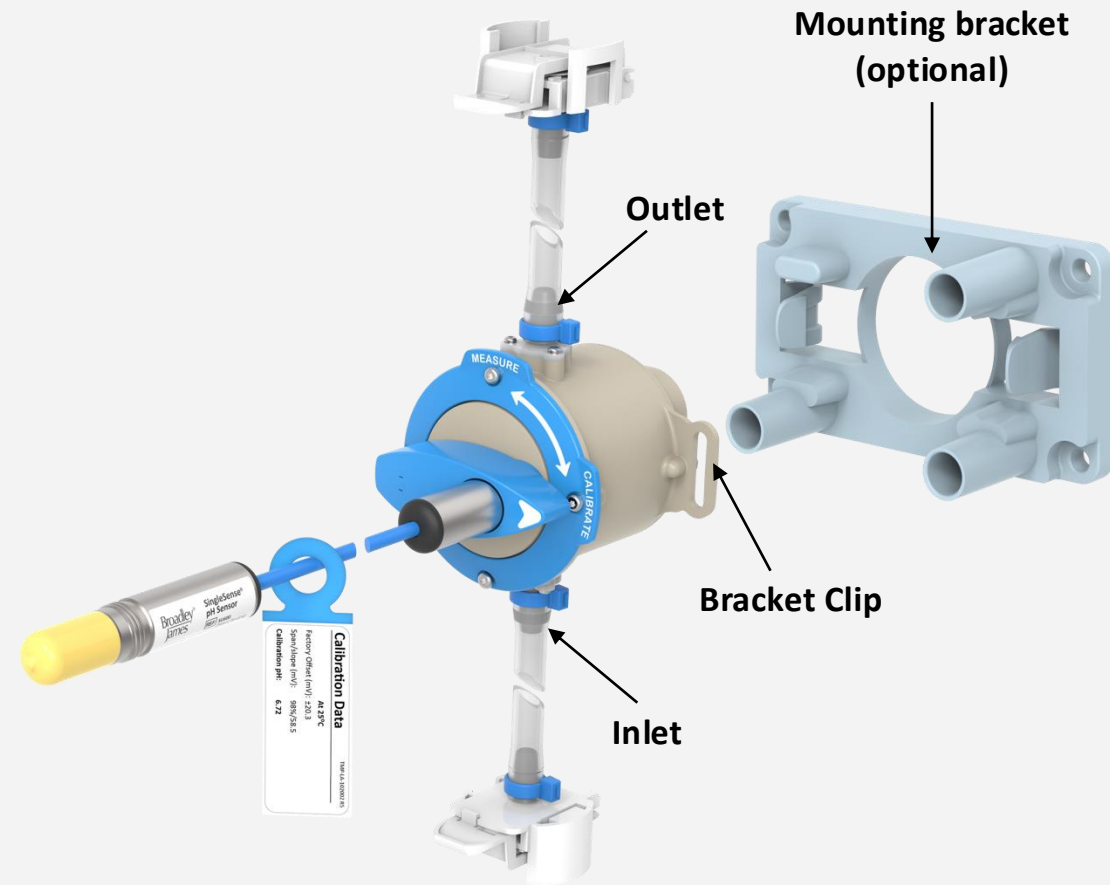
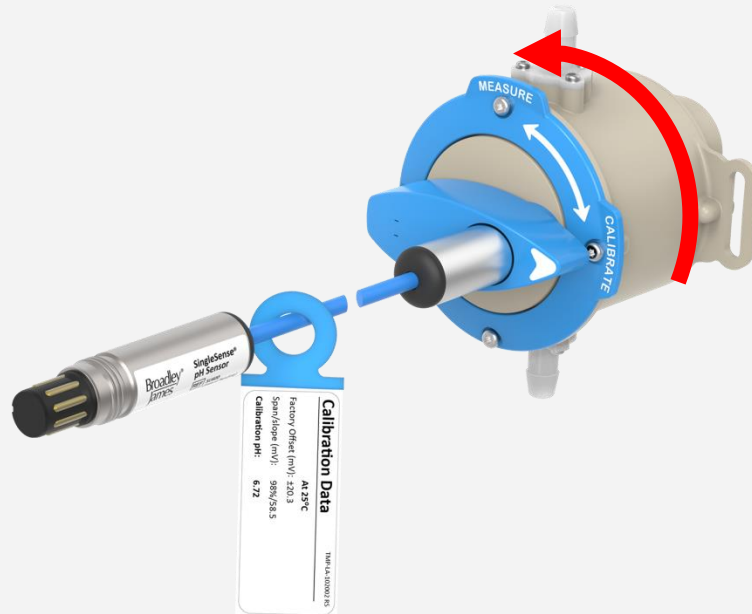


Figure 3. Mounting sensor to optional bracket

1.5 Sensor Operation Modes

The sensor has two operation modes—measure and calibrate. Use the switch on the dial face to move the sensor between the two positions.

Move Switch to the Measure Position
pH Sensor in Flow Stream



Move Switch to the Calibrate Position
pH Sensor in Buffer Storage Chamber

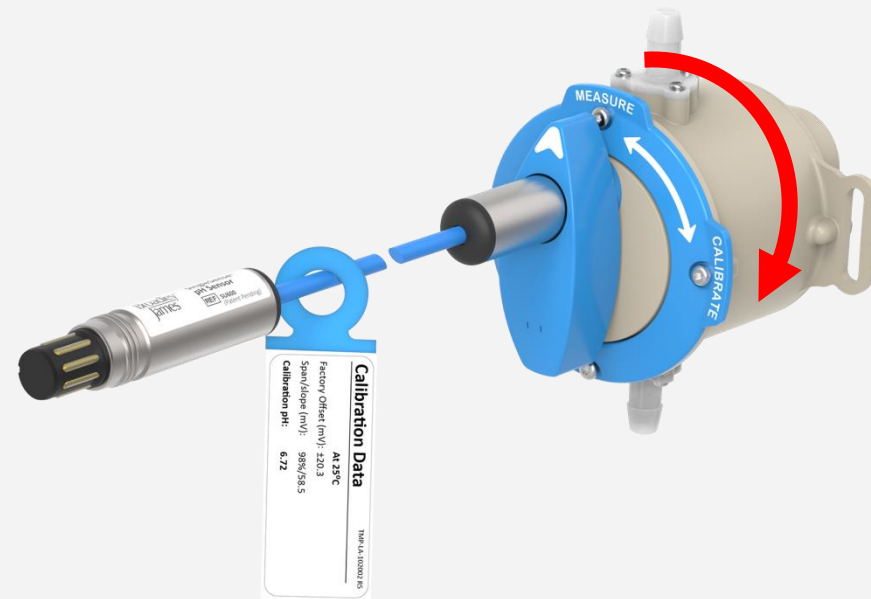


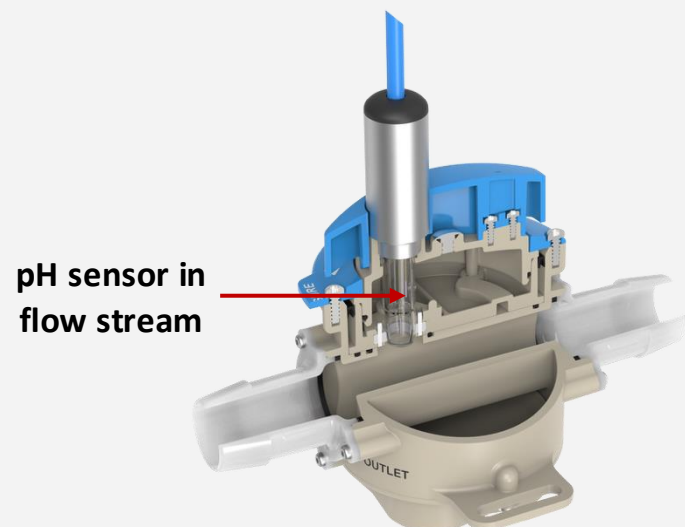
Figure 4. Sensor operation modes

1.6 Cutaways of Sensor Operation Modes

Switch to the Measure Position

pH Sensor in Flow Stream

This image shows the pH sensor out of the buffer storage chamber and measuring the pH of the process solution.



Switch to the Calibrate Position

pH Sensor in Buffer Storage Chamber

This image shows the pH sensor out of the process solution and measuring the pH of the buffer storage chamber.

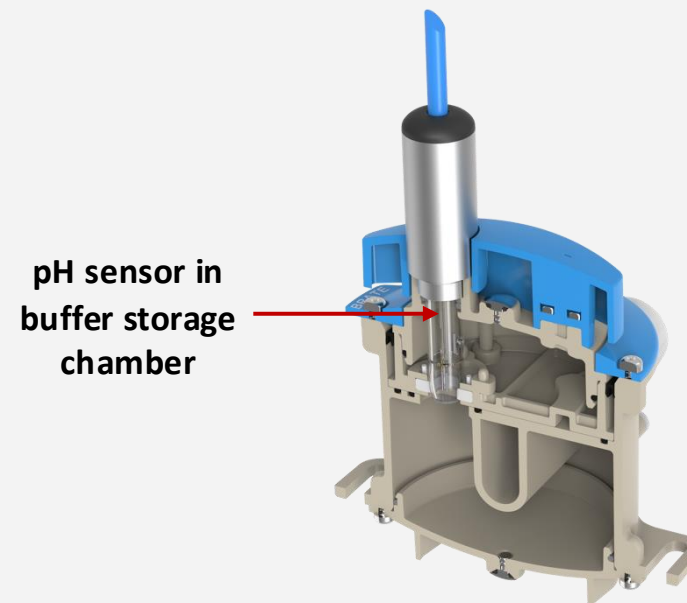
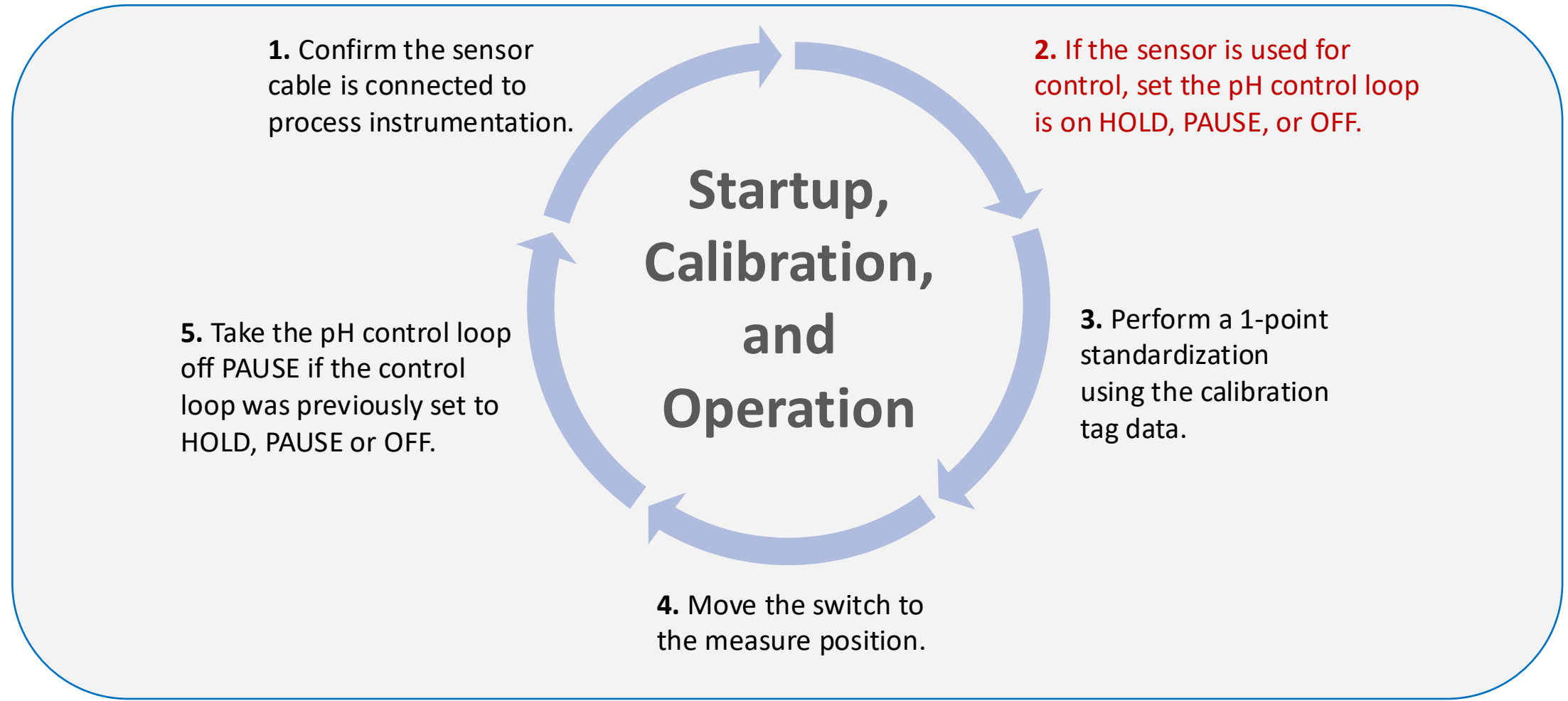


Figure 5. Cutaways of sensor operation modes

Step 2: Startup, Calibration, and Operation

- Sequence of Startup, Calibration, and Operation
- Mount Sensor to Optional Bracket
- Connect the Sensor to Instrumentation
- Calibrate Sensor

2.1 Sequence of Startup, Calibration, and Operation



2.2 Mount the sensor onto the optional bracket by snapping it into place.

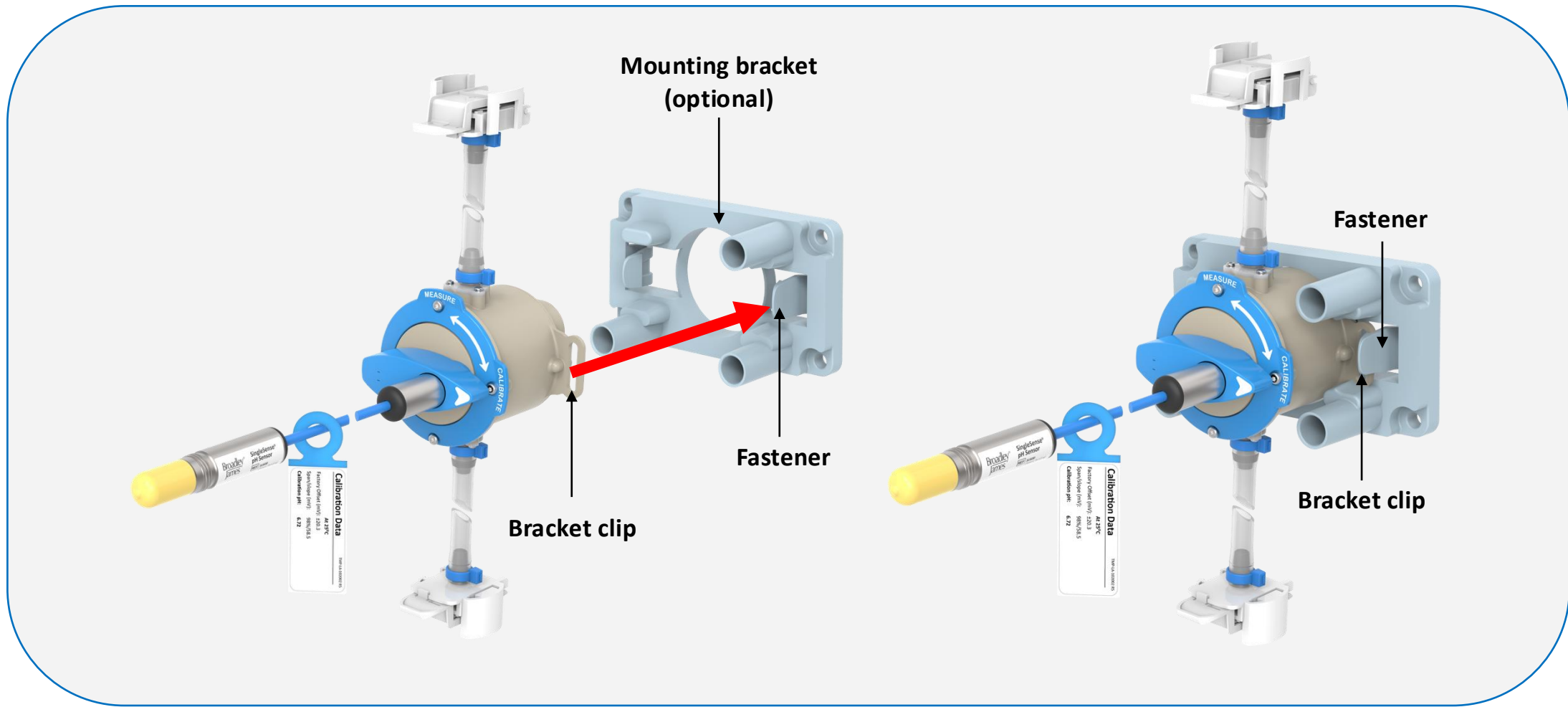


Figure 6. Installing new sensor to optional mounting bracket

2.3 Confirm the sensor is connected to your instrumentation.

- Remove the yellow protective cap from the sensor's VP8 connector.
- Connect the sensor to your pH meter or process control system with the VP8 plug.



Do not touch the connector pins or change the switch on the dial face to the measure position.

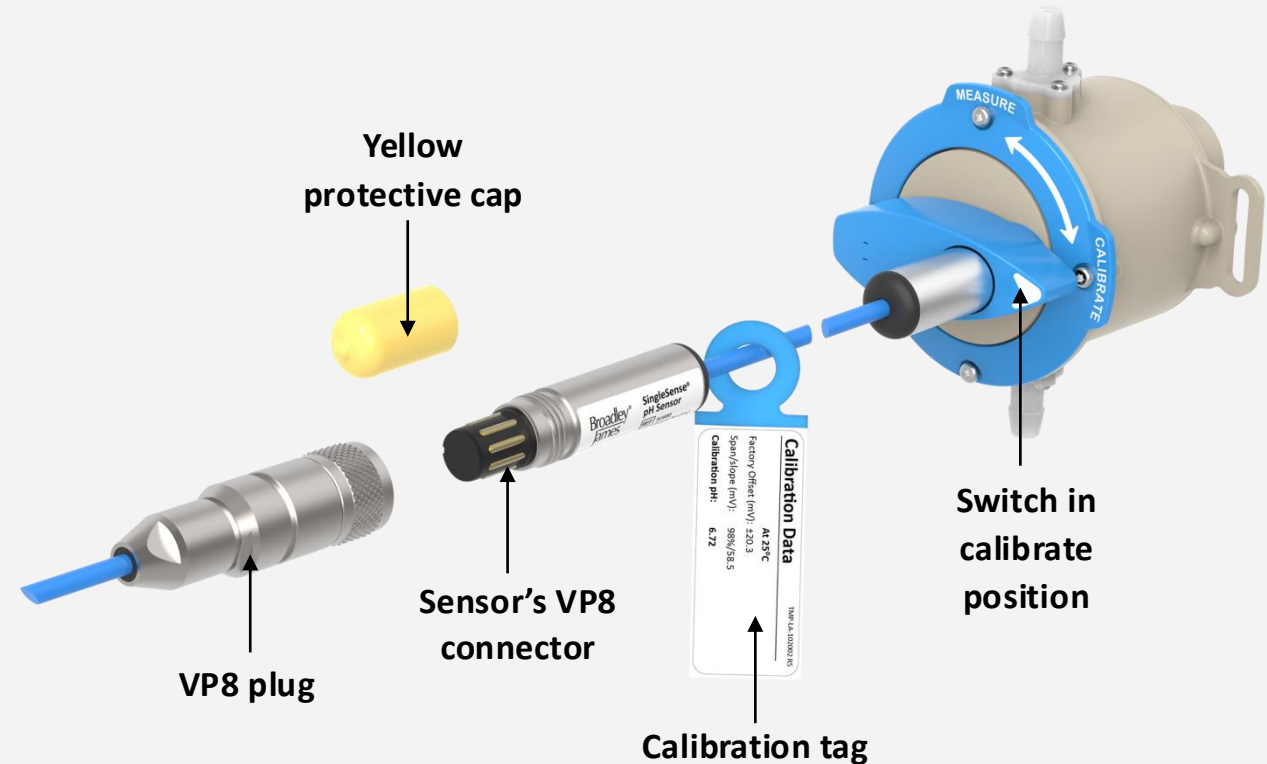


Figure 7. Connecting sensor to instrumentation

2.4 Pre-Calibration Precaution



If this sensor is used for control, confirm the pH control loop is set to HOLD, PAUSE, or OFF in the control system before calibration.

Do not switch the sensor to calibrate position if the closed loop control is active.

Note: Follow your standard operating procedure for sensor calibration.

2.4 Calibration: Direct Input of Offset and Slope

1. Reference the data on the calibration tag.
2. Take the **Factory Offset** and **Span/slope (mV)** information and input it into the process instrumentation.

Note: The pH value should read within 0.05 pH units of the values on the calibration tag, correctly reflecting the buffer storage chamber pH.

See next slide to perform a 1-point standardization.

**Calibration Data**

TMP-LA-102002 R5

At 25°CFactory Offset (mV): ±20.3

Span/slope (mV): 98%/58.5

Calibration pH: 6.72

The **Factory Offset** is the sensor's offset (mV at pH 7) when measured at the factory before shipping.

The **Span/slope (mV)** is the sensor's mV to one pH units at a given temperature or the percentage of the theoretical value of the sensor's millivolts to pH units at a given temperature.

Figure 8. Direct input of offset and slope

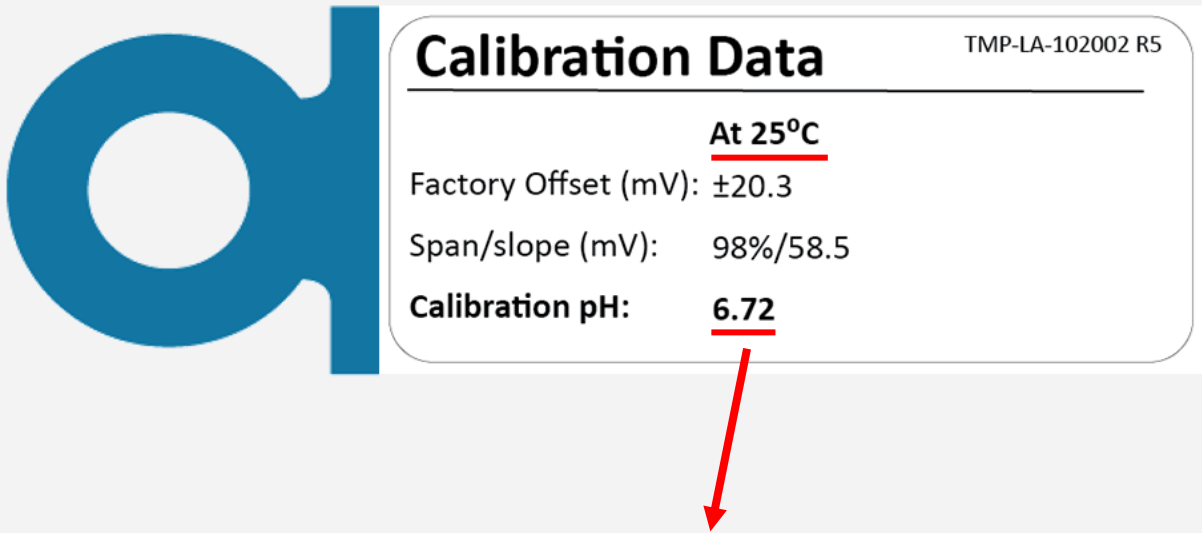
2.5 Calibration: 1-point Standardization

Perform a 1-point standardization.

Note: The pH value of the sensor’s buffer chamber is indicated on the tag at 25° C.

Refer to **Appendix A – Storage Buffer Table** for a complete chart of storage buffer value versus temperature.

This completes the 1-point standardization process.



The **Calibration pH** refers to the pH of the buffer solution inside the sensor at 25° C.

Figure 9. Calibration: 1-point standardization

2.6 Switch the sensor to the measure position.

After completing a 1-point standardization, rotate the switch to the measure position. The pH sensor is now in the flow stream.

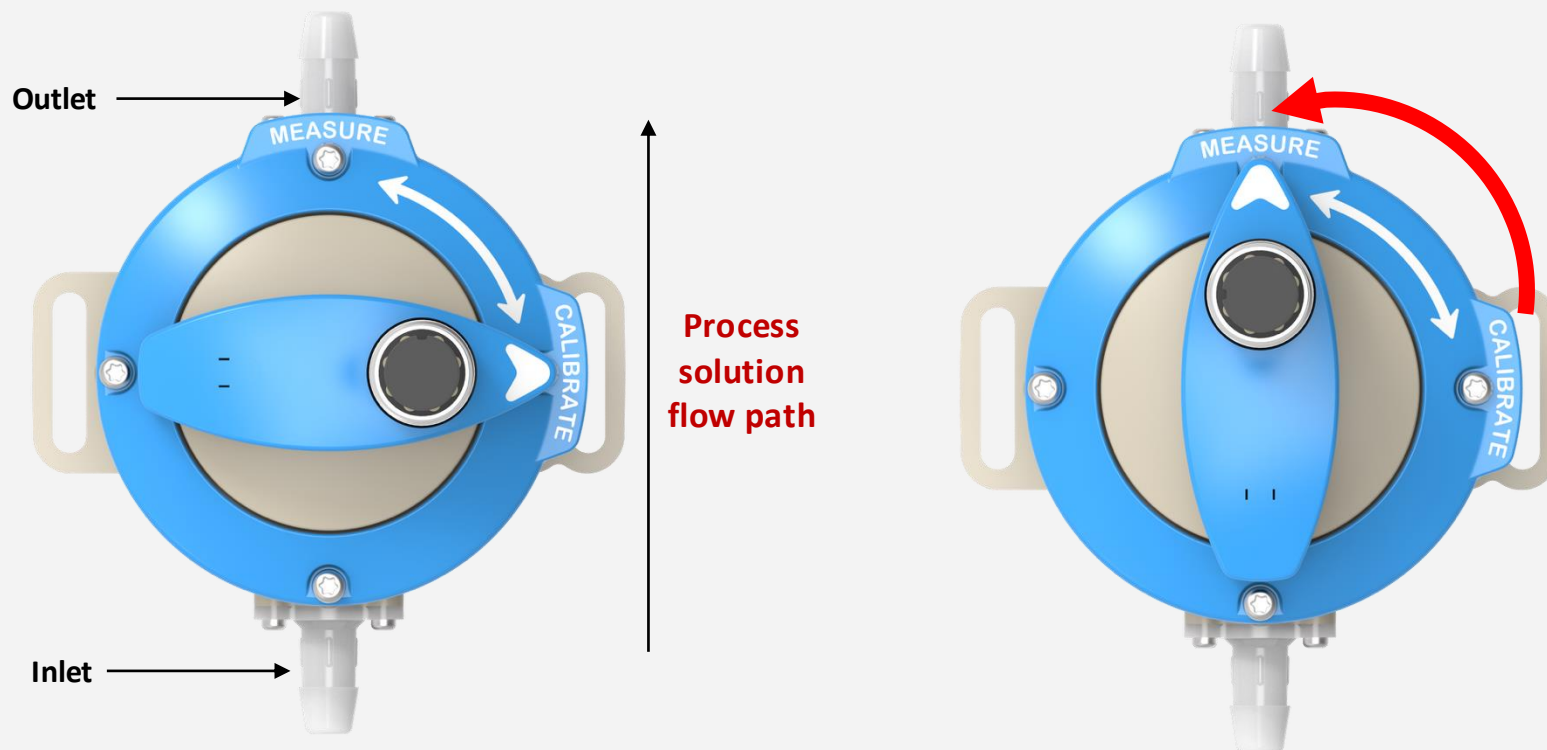


Figure 10. Switch position change

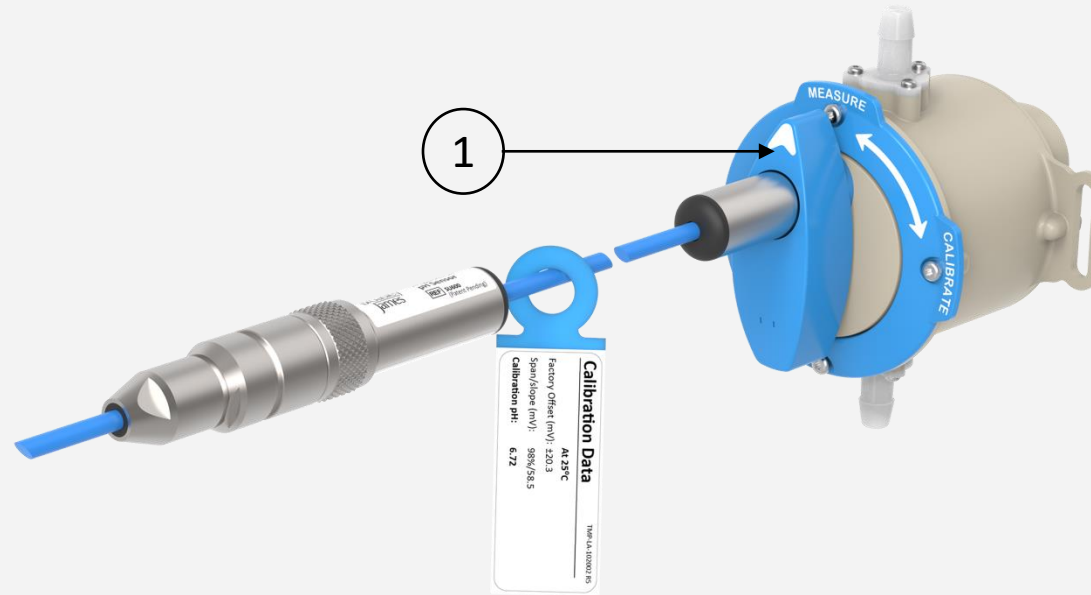
2.7 Reengage the pH control loop.



If this sensor is used for control, take the pH control loop off HOLD, PAUSE, or OFF on the control system.

This completes the startup and calibration. The sensor is now operational and measuring the pH of the downstream process.

2.8 Operation Checklist



- ☐ 1. Has the sensor been switched to the measure position for full operation?
- ☐ 2. If this sensor is being used for control, is the pH control loop system reengaged after the 1-point standardization check?

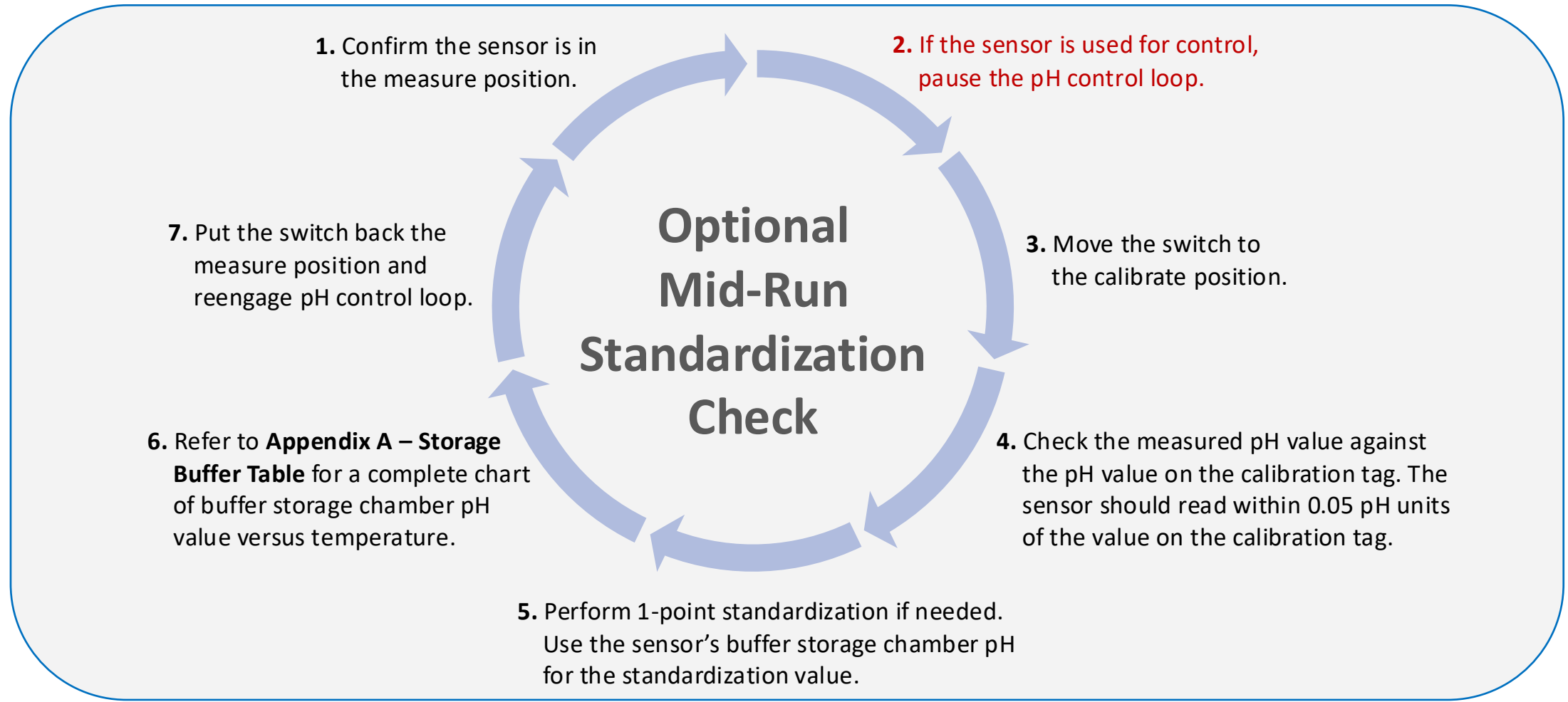
The startup is complete. The sensor is calibrated and operational.

Figure 11. Post-startup checklist

Step 3: Optional Mid-Run Standardization Check

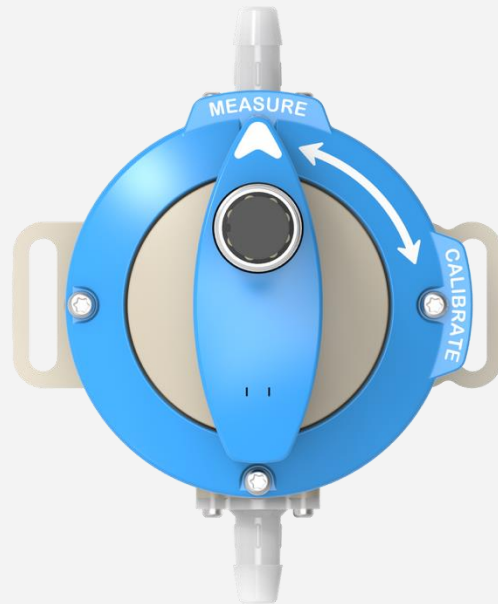
- Sequence of Optional Mid-Run Standardization Check
- Switch the pH Sensor Into the Buffer Storage Chamber
- Check the pH Sensor Offset
- Switch the pH Sensor Back Into the Flow Stream

3.1 Sequence of Optional Mid-Run Standardization Check

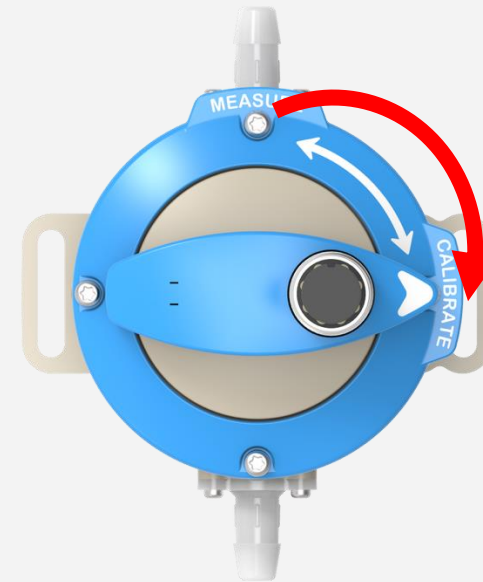


3.2 Switch the pH Sensor Into the Buffer Storage Chamber

1. Confirm the sensor is in the measure position.



2. Move the switch to the calibrate position.



Before you switch to calibrate, pause the pH control loop if the sensor is used for control.

Figure 12. Switching pH sensor into the buffer storage chamber

3.3 Checking the pH Sensor Offset

1. Check the pH value on the calibration tag. The sensor should read within 0.05 pH units of the value on the calibration tag.
2. If a 1-point standardization is necessary, use the sensor's buffer storage chamber pH for the standardization value.
3. Refer to **Appendix A – Storage Buffer Table** for a complete chart of buffer storage chamber pH value versus temperature.

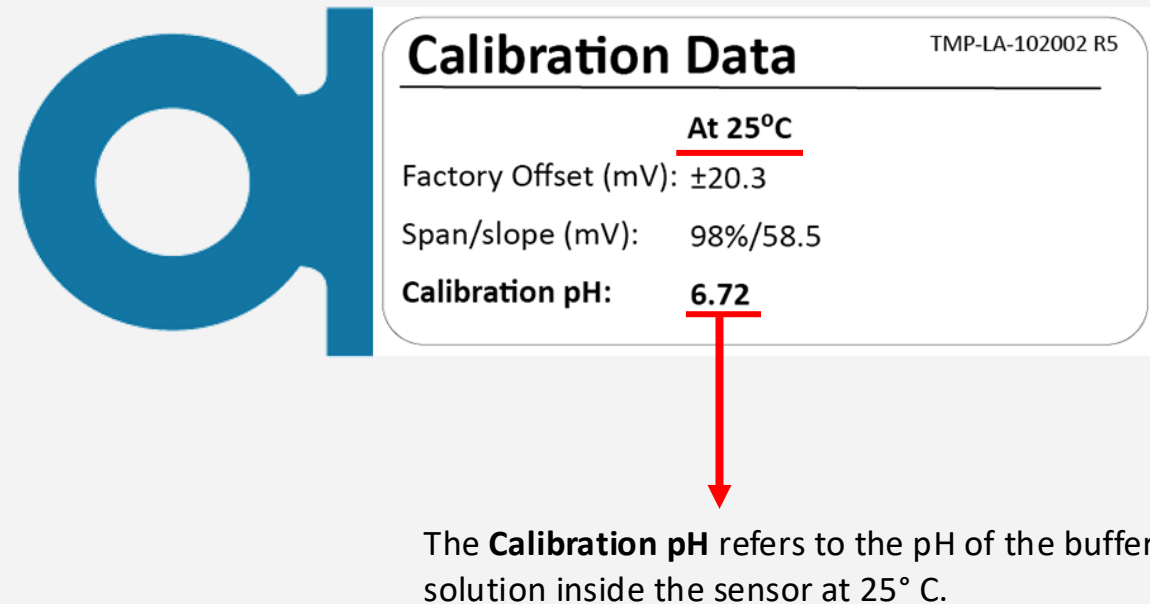
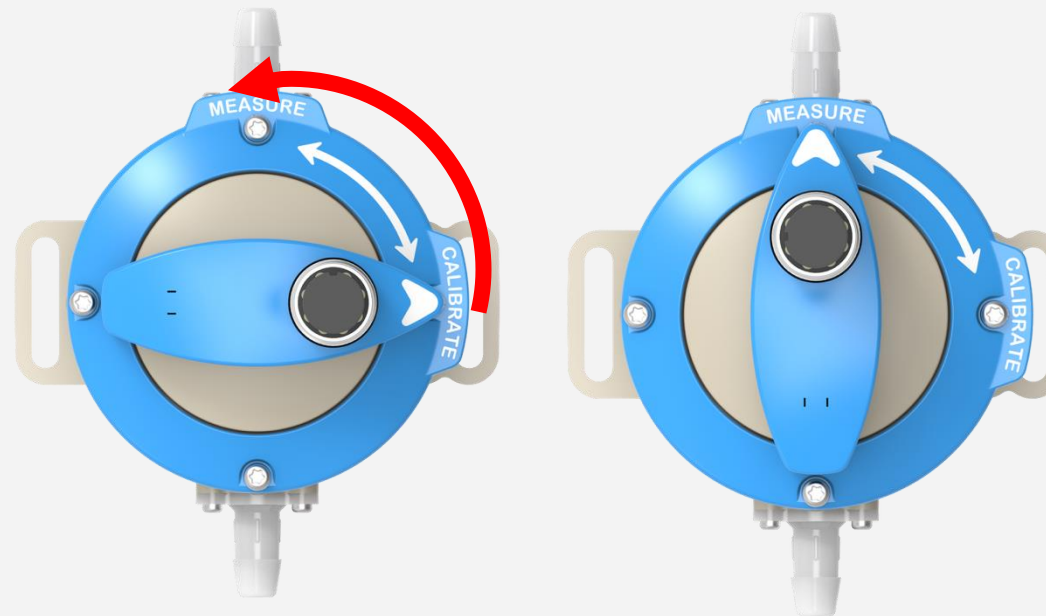


Figure 13. Checking the pH sensor offset

3.4 Switching the pH Sensor Back Into Flow Stream

Move the switch back to the measure position. Reengage the pH control loop.



This completes the optional mid-run standardization check.

Figure 14. Switching the pH sensor back into flow stream

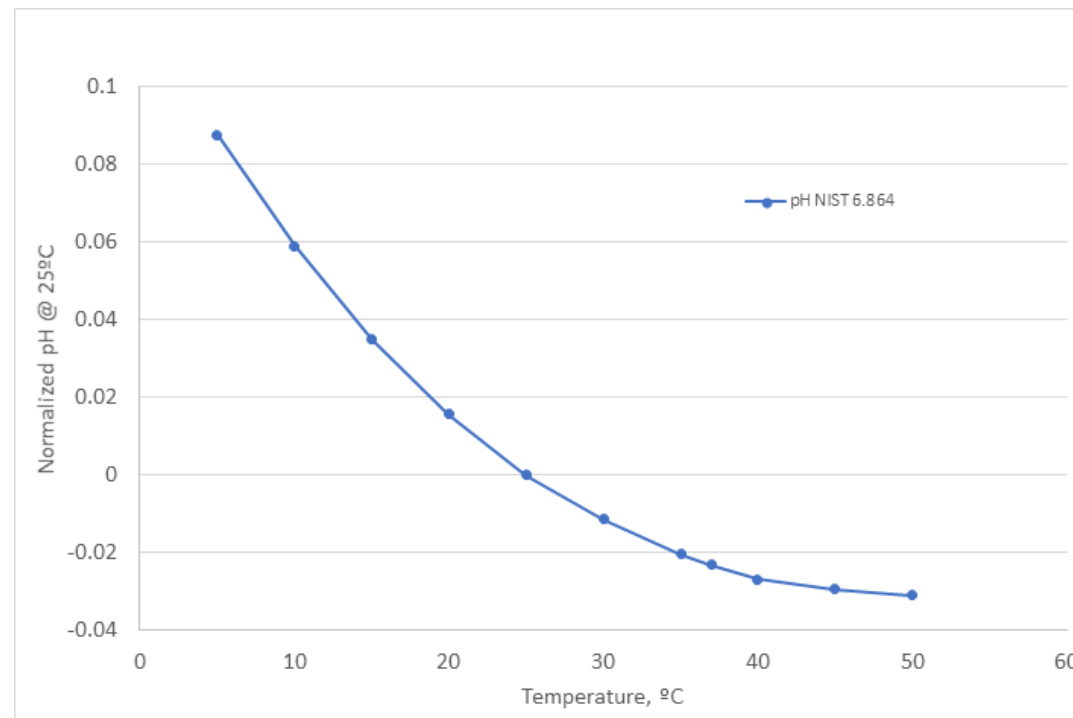
Appendices

- Appendix A – Buffer Storage Chamber Solution Table
- Appendix B – Calibration Tag Data

Appendix A – Buffer Storage Chamber Solution Table

This table outlines the nominal pH level of the sensor's buffer storage chamber solution in correlation with temperature.

T, °C	Normalized pH (NIST 6.864)
5	0.0875
10	0.0589
15	0.0349
20	0.0156
25	0
30	-0.0114
35	-0.0205
37	-0.0232
40	-0.0268
45	-0.0294
50	-0.0309



Appendix B – Calibration Tag Data

**Calibration Data**

TMP-LA-102002 R5

At 25°CFactory Offset (mV): ± 20.3

Span/slope (mV): 98%/58.5

Calibration pH: 6.72

Note: The data on the tag is for sample purposes only.

1. The **Calibration Data** is unique to each sensor. It gives the factory calibration principles and data for each sensor.
2. The **Factory Offset** is the sensor's offset (mV at pH 7) when measured at the factory before shipping.
3. The **Span/slope (mV)** is the percentage of the theoretical value of the sensor's millivolts to pH units at a given temperature.
4. The **Calibration pH** refers to the pH of the buffer solution inside the sensor at a given temperature.

Figure 15. Calibration tag data

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