

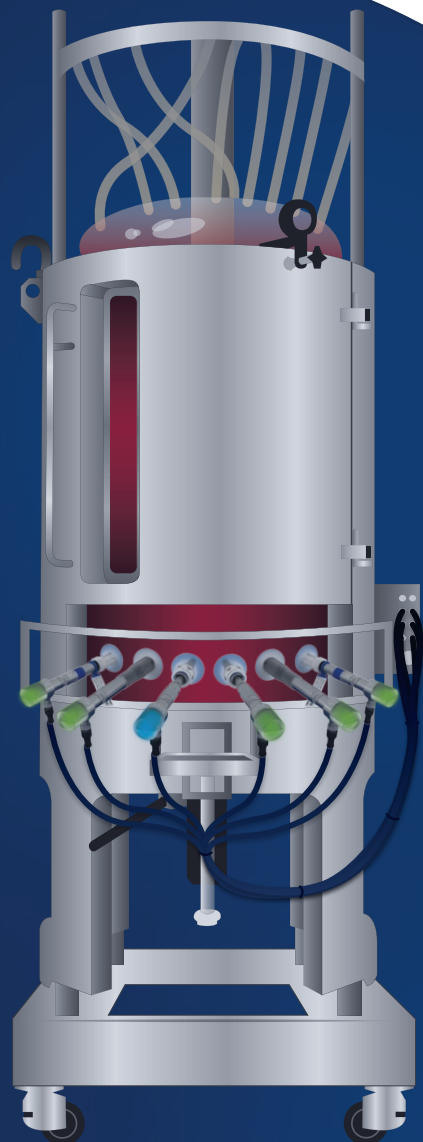
# Single-Use Sensors



# Designed Specifically to Meet Your Single-Use Requirements



Our single-use sensors combine the reliability and measurement stability of our long-term proven conventional sensors with the ease of use as an integral part of the bioreactor. The sensors retain the high accuracy performance even after gamma irradiation and a sufficient shelf life making it the ideal single-use solution.



## READY TO USE

Pre-calibrated and pre-sterilized sensors integrated into the single-use container



## WIDE RANGE CONNECTIVITY

Fully compatible with existing bioreactor controllers



## SHORT WET-IN TIME

< 30 minutes



## RELIABLE

Proven Hamilton sensor technology



## VERY LOW DRIFT

< 0.1 pH / week, unaffected by changing ionic strength



For Detailed Specifications Please Visit:  
[hamiltoncompany.com/single-use](https://hamiltoncompany.com/single-use)

## True Integration Through Arc Technology

### A NEW WAY TO THINK ABOUT SENSOR MANAGEMENT

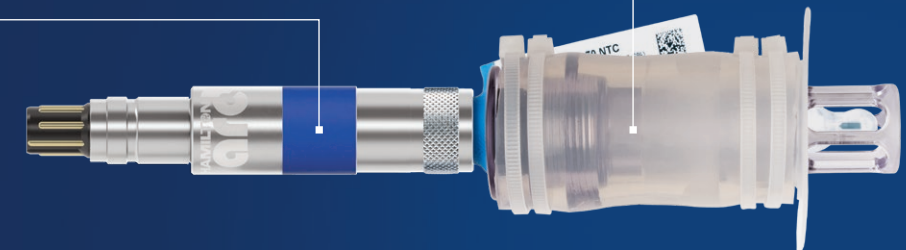
All Hamilton single-use products include options for Arc Intelligent sensor technology. Arc converts the measurement into a robust, noise-free connection without the bulk of traditional transmitters. Choose open source digital protocol Modbus or 4–20mA signals directly into the process control system. Simplify the start of each run through wireless sensor configuration, calibration, GMP validation, and diagnostics using ArcAir software.

### ARC MODULE SU

The detachable Arc Electronics stores all sensor data, amplifies the measurement, and outputs the signal to the process control system.

### DETACHABLE SENSORS

Your measurement comes pre-installed and pre-sterilized in the single-use bioreactor or bag.



## Integration Into Existing Control Systems

### SIGNAL INTEGRATION OF SU SENSORS INTEGRATED INTO THE SU CONTAINER

#### pH

Simplified integration of the pH signal into existing transmitters with pre-installed and pre-sterilized sensors. The calibration can be executed easily by introducing the calibration data of the OneFerm pH factory calibration into the transmitter. A 1-point recalibration demanded from many SOPs is recommended at the start of the process and can be executed at any time after that.

#### DO

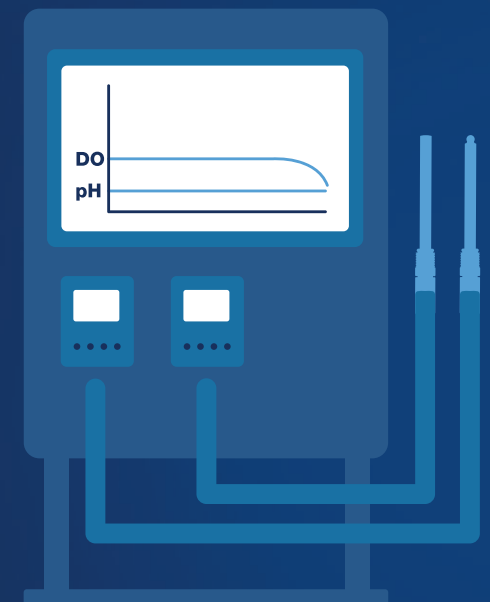
Due to the reproducibility of the Hamilton single-use ODO Cap Sx, only a 1-point calibration is needed. This can be executed with most transmitters at the start of the process to adapt to conditions like temperature and pressure. The 0%-sat does not need to be calibrated due to the high manufacturing repeatability of the ODO Caps, even after gamma irradiation and storage.

#### VCD AND CONDUCTIVITY

VCD SU, Conductivity SU and other reusable sensors that cannot be connected via standard transmitter can be introduced into the control system via 4 – 20 mA signal or as a stand-alone monitoring system with the Hamilton ArcAir software.

#### CONNECTIVITY FOR pH AND DO

A wide range of SU sensors and adapter cables are available to connect the SU sensors with existing control systems. Please contact our technical support (see *last page for contact information*) for the most suitable solution.





# Solutions for Single-Use Bags

## One Vendor, All Measurements

Hamilton has worked closely with single-use equipment manufacturers to understand the market needs.

### WIDE VARIETY OF MEASUREMENTS

Whether media prep, mixing, or cell culture, each application has different sensing requirements. Hamilton's reusable measurement technologies have been adapted for single-use bag installations.

Cond

Cell  
DENSITY

pH

DO

### DESIGNED FOR YOUR NEEDS

There are no accordion-style insertion devices or probe assemblies that must be autoclaved. Single-use sensors come with either weld-in style measurement elements or work with industry standard port fittings. All products can be gamma sterilized with the bag prior to use.

# Solutions for Single-Use Bioreactors

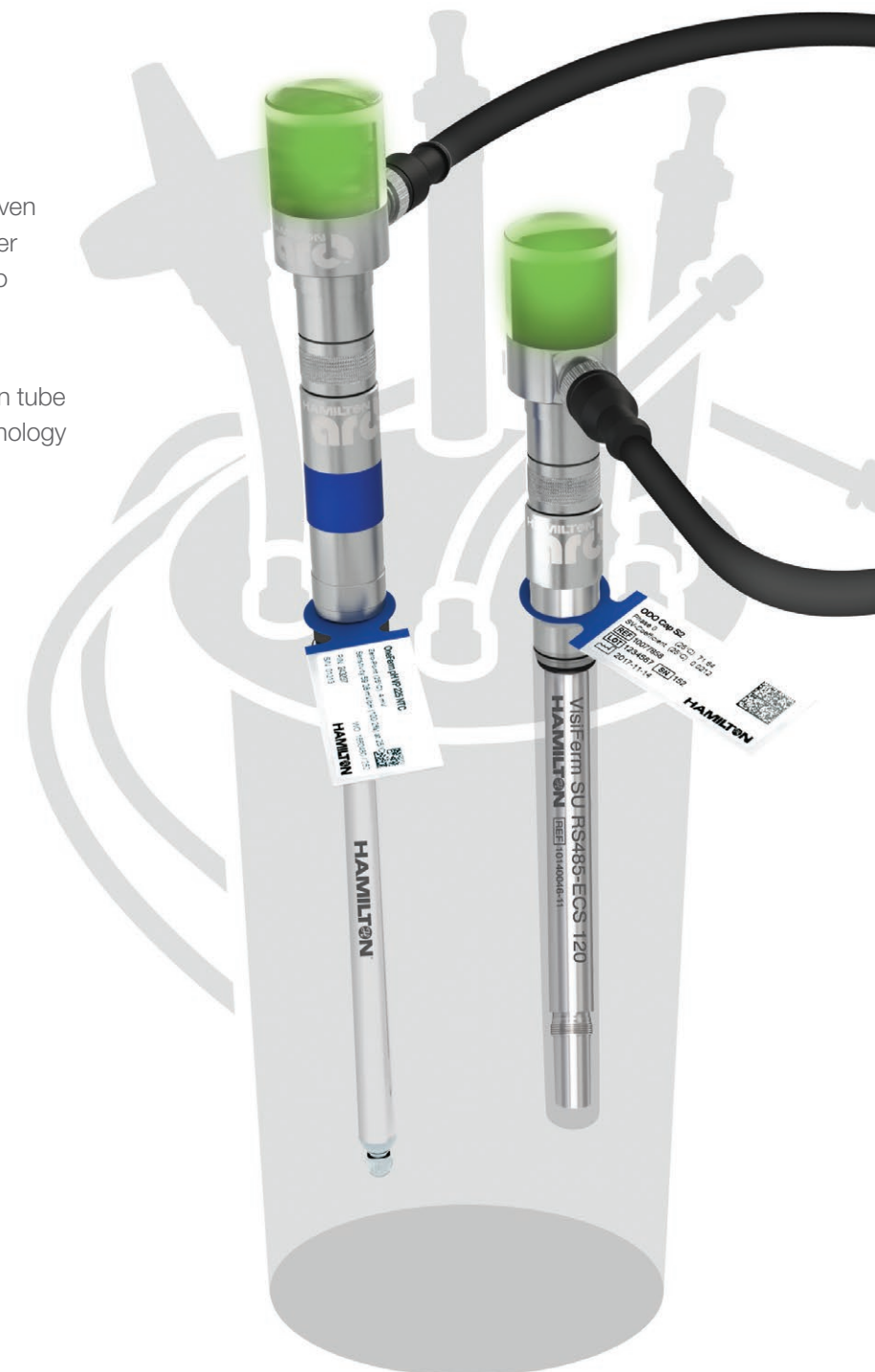
## Technology You Can Trust

Reliable glass membrane pH technology offers a proven measurement with broad range and very low drift after wet-in. The OneFerm is available in lengths from 70 to 425 mm so that your entire bioreactor product family can be outfitted with single-use pH sensors.

The unique S2 optical DO cap mounts on an insertion tube from the bioreactor headplate. It uses the same technology as the industry leading VisiFerm Optical DO sensor.

### GENERAL REQUIREMENTS FOR ALL SENSORS

- 3rd party test data available for review
- Sensor elements and accessories for the integration into the single-use disposable suitable for ISO 14644 Class 7 production environment to ensure lowest contamination risk
- All sensor elements come with unique calibration data



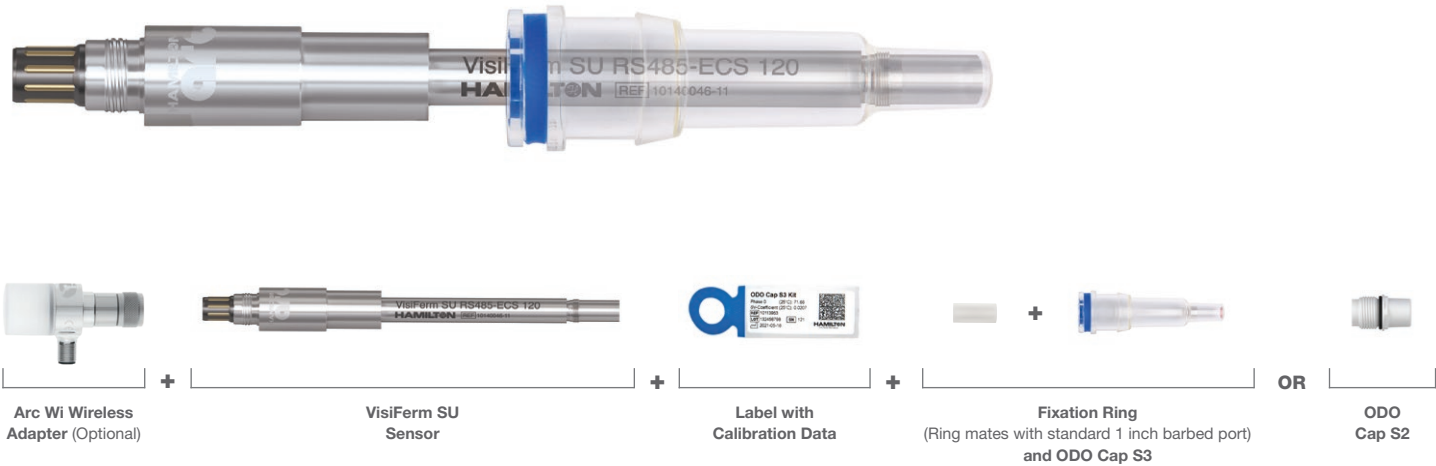
# Single-Use Sensor Solutions

pH OneFerm pH



Criteria	Description
Shaft length options	70 mm, 120 mm, 160 mm, 225 mm, 325 mm, 425 mm
Electrical Connector	K8, VP6 (traditional) / VP8 (Arc)
Temperature Sensor	PT100, PT1000 (traditional) / NTC 22 kOhm (Arc)
pH measuring range	3–10
Drift	< 0.1 pH /week
Wetted Parts	Glass / VMQ (Silicone elastomer)

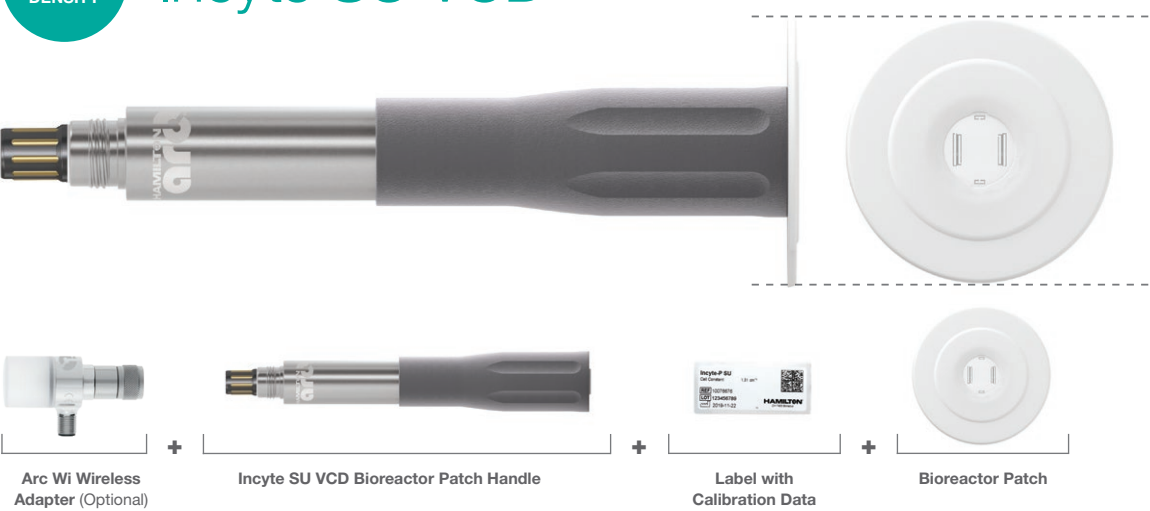
DO VisiFerm SU



Criteria	Description
Measurement principle	Oxygen dependent luminescence quenching
ODO Insert Options	ODO Cap S0 (Bag), ODO Cap S2 (Bioreactor), ODO Cap S3 (Bag)
Response time t98%	< 30s at 25°C
Drift at room temperature	< 1% per week
Wetted parts	PA (Cycloaliphatic polyamide) / VMQ (Silicone elastomer) / EPDM

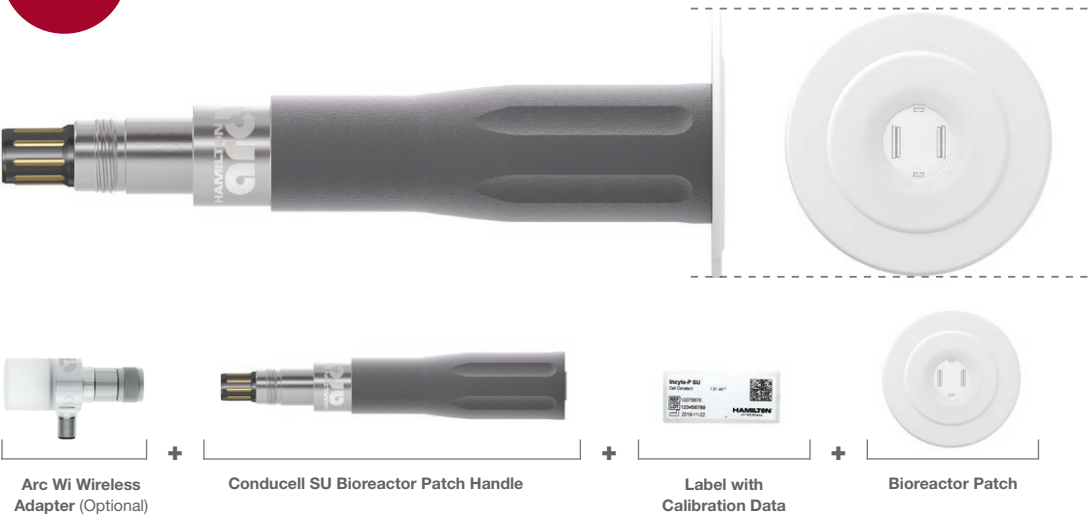
# Single-Use Sensor Patch Solutions

Cell DENSITY Incyte SU VCD



Criteria	Description
Measurement principle	Permittivity and Conductivity
Measurement range	0–700 pF/cm, equivalent to 5 x 10 <sup>5</sup> to 8 x 10 <sup>9</sup> cells/mL (mammalian)
Installation	Weld-in flush sensing element
Arc Module Options	Straight for stirred tank bags
Wetted Parts	HDPE / Ceramic / Glass / Platinum

Cond Conducell SU



Criteria	Description
Measurement principle	4-Pole contacting conductivity
Measurement range	100 µS/cm to 100 mS/cm
Installation	Weld-in flush sensing element
Arc Module Options	Straight for stirred tank bags
Wetted Parts	HDPE / Ceramic / Glass / Platinum

# Getting Started with Hamilton

## Product Discussion Guide

Demos? Samples? Hamilton OEM support realizes that selecting single-use measurement technology requires pre-qualification before launching to the public. Let us help by getting some basic information about your process to see if Hamilton Single-Use products can be a good fit.

### MECHANICAL INTEGRATION

- Definition of SU container (bag, benchtop, size, etc.)
- Needed Measurements
- Sensor Geometry for Your Application
- Documentation (Validation reports, Biocompatibility, Extractable study, etc.)

### CONTROLLER INTEGRATION

- Digital Integration: Modbus RTU
- Converters (Profibus, Foundation Fieldbus, Profinet, OPC UA)
- Analog Sensor Signals (pH: mV, DO: nA, all: 4–20mA)



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