

Optical Process Monitoring in Biotechnology Applications



Polestar offers a wide range of sterilizable, autoclavable measurements cell culture and fermentation, specifically the critical parameters of oxygen (dissolved or gas-phase), pH, and CO₂. Polestar's proprietary technology and technical expertise enable solutions for a wide range of application requirements. Whether you are using shake flasks, stirred-tank or single-use reactors, Polestar offers a sensor configuration to meet your needs. Whether your application requires sterilization by SIP (sterilization-in-place), CIP (clean-in-place), autoclave, or gamma radiation, Polestar's products will provide your measurement

solution. Our USP Class VI certified sensors are shipped pre-calibrated or the user can perform a simple standardization procedure. Our systems allow the user to scale the process from drug development to production while maintaining traceability requirements. Polestar's DSP series Optical Process Monitors, single channel or up to four channels, provide flexibility, reliability, ease of use, and cost savings to the customer.

Polestar's sensing technology, which is reliable, accurate, versatile, and maintenance free, allows the user to simplify and optimize the processes, saving time and money.

Benefits offered by the DSP Series and Optical Sensors:

- Designed for easy installation and operation
- Large, easy-to-read four-line VFD display and intuitive menu-driven software
- In-line QC streamlines production
- Measurements, whether oxygen, pH, or carbon dioxide, are inherently self-referencing
- Stable, drift-free calibration
- Sensor calibration is unaffected by fouling
- Sensors are shipped pre-calibrated
- Sensors are immune to gamma sterilization

Applications include

- Single-use bioreactors
- Media prep and downstream processing
- Shake flasks
- Stirred-tank reactors



DSP 4000 MC Product Specifications

Enclosure/Power	
Operator Interface	4-line VFD Display, 8 tactile keys
¼ DIN Dimensions (H x W x D)	6.40 x 6.40 x 5.94 in.
Max Depth – panel mounted	5.94 in.
Mounting	Panel, Pipe, or Wall
Material	Polycarbonate, NEMA 12/4X, IP 65
Weight	5 lbs.
Ratings/Approvals	CE compliant; NEMA 12/4X, IP 65
Power	24 VDC
Environmental	
Storage Temperature	-40 to 70 ° C (-40 to 158 ° F)
Ambient Operating Range	-10 to 50 ° C (-14 to 122 ° F)
Relative Humidity	0 to 95%
Outputs – Independent outputs for each active channel	
Analog output	16-bit isolated 4-20 mA. 10-300 V
Analog output scaling	Used defined
Digital output protocols	RS232/RS485, Modbus@ TCP, Profibus@, @, DeviceNet
Inputs – Independent inputs for each active channel	
Sensors	4 channels (customer choice)
Temperature	PT100 RTD; 4-20 mA signal; manual
Pressure	4-20 mA signal; manual

Oxygen Sensor Specifications

Performance	High	Mid	Low
Detection range gas phase	0.02 - 100% O ₂ (1 atm)	0.002 - 30% O ₂ (1 atm)	0.0002 - 4% O ₂ (1 atm)
Detection range dissolved	0.01 - 40 ppm (25° C)	1 ppb - 12 ppm (25° C)	0.1 ppb - 1.6 ppm (25° C)
Precision	0.2% air sat. (ambient)	5 ppb @ 500 ppb	0.1 ppb @ 5 ppb
Accuracy (as delivered)	< 2% air sat. (ambient)	10 ppb or 5% of reading	0.4 ppb or 3% of reading
Accuracy (w/ standardization)	< 0.3% air sat. (ambient)	7 ppb or 1 % of reading	0.2 ppb or 2% of reading
t₉₀ response	< 15 sec		
Calibration	Ships pre-calibrated; optional 1- or 2-point user standardization		
Cross-sensitivity	SO ₂ and Cl ₂ gas		
Chemical incompatibility	DMF (> 50° C)		
Environmental			
Operating temperature	Known to withstand up to at least 135° C		
Operating pressure	Sensing element has been integrity tested to 1200 psi		
Operating humidity	0 – 100% RH		
Storage conditions	Dry		
Materials	USP Class VI-certified ¹		
Chemical incompatibility	DMF (> 50° C)		
Clean-in-Place	Yes ²		
Sterilizable	Autoclave, Steam-in-Place, Gamma		

¹ Certification documents available upon request

² Details available upon request

For more information
visit Polestar's website at
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