

## Optical Process Monitoring in FUELS and BIOFUELS applications



Growing interest in alternative sources of fuel has resulted in a boon of activity related to bio-derived fuels, as well as blends thereof with traditional petrochemical fuels. The flammable nature of these materials, however, presents some unique process monitoring challenges. Given the role of oxygen, in particular, in fuel flammability, octane rating, etc., it is highly desired to be able to monitor oxygen partial pressure in fuel tanks, process vessels, etc.

Polestar's DSP Series optical process monitoring systems are ideal for such applications, overcoming the key limitations of both traditional electrode-based sensors, as well as other optical sensors.

### Benefits offered by the DSP Series

- Remote location of the electronics allows use of the sensors in explosive environments
- All sensors are compatible with 0-100% ethanol, as well as common hydrocarbons
- No glass electrodes breaking in your lines
- No aqueous electrolytes to replace
- O<sub>2</sub> and CO<sub>2</sub> sensors can measure in either liquid or gas phase
- Gas-phase measurements are highly specific:
  - no cross-sensitivity between O<sub>2</sub> and CO<sub>2</sub>
  - allows sub-ppb detection of O<sub>2</sub> in otherwise pure CO<sub>2</sub> (or vice versa)
- Gas-phase readings are unaffected by humidity or ambient light
- Liquid readings are unaffected by solids, turbidity, etc.
- Sensor calibration is unaffected by fouling



### Applications include

- DO in fuels
- O<sub>2</sub> in fuel tank headspace
- DO and pH during the fermentation (or enzymatic treatment) process for fuel ethanol
- DO of aqueous effluents

## DSP 4000 MC Product Specifications

<b>Enclosure/Power</b>	
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
<b>Environmental</b>	
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%
<b>Outputs – Independent outputs for each active channel</b>	
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
<b>Inputs – Independent inputs for each active channel</b>	
Sensors	4 channels (customer choice)
Temperature	PT100 RTD; 4-20 mA signal; manual
Pressure	4-20 mA signal; manual

## Oxygen Sensor Specifications

<b>Performance</b>	<b>High</b>	<b>Mid</b>	<b>Low</b>
<b>Detection range gas phase</b>	0.02 - 100% O <sub>2</sub> (1 atm)	0.002 - 30% O <sub>2</sub> (1 atm)	0.0002 - 4% O <sub>2</sub> (1 atm)
<b>Detection range dissolved</b>	0.01 - 40 ppm (25° C)	1 ppb - 12 ppm (25° C)	0.1 ppb - 1.6 ppm (25° C)
<b>Precision</b>	0.2% air sat. (ambient)	5 ppb @ 500 ppb	0.1 ppb @ 5 ppb
<b>Accuracy (as delivered)</b>	< 2% air sat. (ambient)	10 ppb or 5% of reading	0.4 ppb or 3% of reading
<b>Accuracy (w/ standardization)</b>	< 0.3% air sat. (ambient)	7 ppb or 1 % of reading	0.2 ppb or 2% of reading
<b>t<sub>90</sub> response</b>	< 15 sec		
<b>Calibration</b>	Ships pre-calibrated; optional 1- or 2-point user standardization		
<b>Cross-sensitivity</b>	SO <sub>2</sub> and Cl <sub>2</sub> gas		
<b>Chemical incompatibility</b>	DMF (> 50° C)		
<b>Environmental</b>			
<b>Operating temperature</b>	Known to withstand up to at least 135° C		
<b>Operating pressure</b>	Sensing element has been integrity tested to 1200 psi		
<b>Operating humidity</b>	0 – 100% RH		
<b>Storage conditions</b>	Dry		
<b>Materials</b>	USP Class VI-certified <sup>1</sup>		
<b>Chemical incompatibility</b>	DMF (> 50° C)		
<b>Clean-in-Place</b>	Yes <sup>2</sup>		
<b>Sterilizable</b>	Autoclave, Steam-in-Place, Gamma		

<sup>1</sup> Certification documents available upon request

<sup>2</sup> Details available upon request

For more information  
visit Polestar's website at  
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