

Features

- The performance and flexibility to meet a wide range of application requirements
- Fast response so you can react to problems immediately
- Rapid upset recovery response
- The compact and modular design to fit into your plant and process easily
- The affordability you need to justify implementation
- An inert cathode immune to damage from trace levels of acid and hydrocarbons
- A non-depleting anode so there's no drifting over time, no false low readings and no frequent recalibrations
- Acid tolerance—the optional STAB-EL™ system removes acids and ionic impurities from the electrolyte
- Full five-year sensor warranty

With the DF-300E family of oxygen analyzers, you have access to accurate, sensitive and rapid oxygen analysis in your application—with the flexibility to apply this technology across the broadest range of applications. DF-300E analyzers are used in everything from harsh and hazardous petrochemical processes to glove box applications. The DF-300E family has the flexibility to meet the needs of industries that include semiconductor, hydrocarbon processing, chemical, oil and gas, pharmaceuticals, and more.

For over three decades, the heart of Delta-F oxygen analyzers has been a unique, coulometric sensor—the ultimate in sensitivity. This sensor uses a non-depleting, ambient temperature oxygen reaction to produce a current flow that is precisely proportional to the number of oxygen molecules reduced at the cathode. These non-depleting oxygen sensors provide unsurpassed long term reliability.

DF-300E Series Oxygen Analyzer

GE Industrial, Sensing is proud to distribute the Delta F 300E Series of products for the Oxygen Analyzing Industry.



Delta F's Unique Sensor Technologies

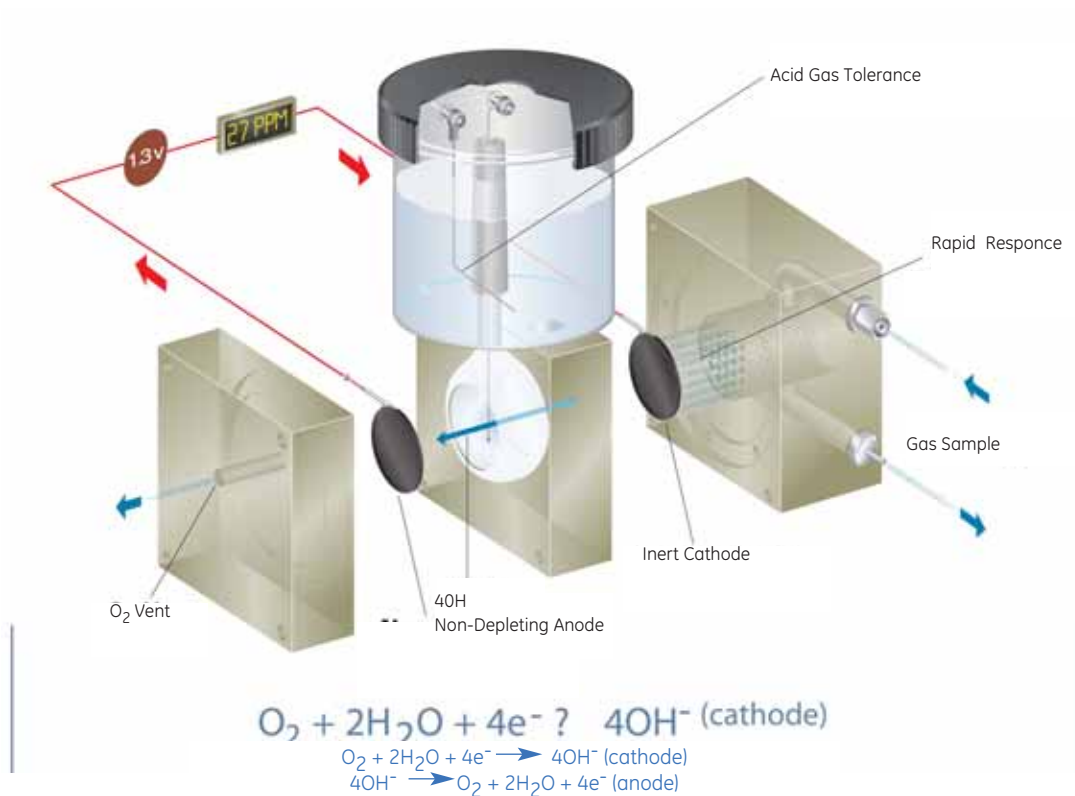
The E-Sensor is Delta F's revolutionary non-depleting coulometric sensor technology reinvented. To create significant performance gains, we went back to the beginning, undertaking extensive research and engineering to determine and address the best way to enhance performance. After a significant investment in time and money we:

- changed materials of construction for the cathode electrode system
- developed a new cathode electrode system abrication process
- eliminated the carbon anode in favor of a proprietary high purity non-carbon anode
- developed new sensor assembly and conditioning processes
- eliminated impurities in the raw materials of the electrode systems, processing of the electrodes and the electrolyte
- developed new electrolyte formulations and high purity replenishment solution

The end result has been an explosion in performance. Performance enhancements include:

- improved purge-down time
- improved upset recovery
- elimination of the need for Quick Start
- improved speed of response
- extended range of operation/low end resolution
- improved linearity and accuracy
- improved baseline stability
- improved temperature stability
- 25% improvement in hardness/acid gas tolerance
- 50% reduction in fluid-loss and accompanying maintenance

These technological advancements are further proof of our commitment to helping our customers maintain their leadership positions. The E-Sensor will help sustain Delta F oxygen analyzers' best-in-class performance well into the future.



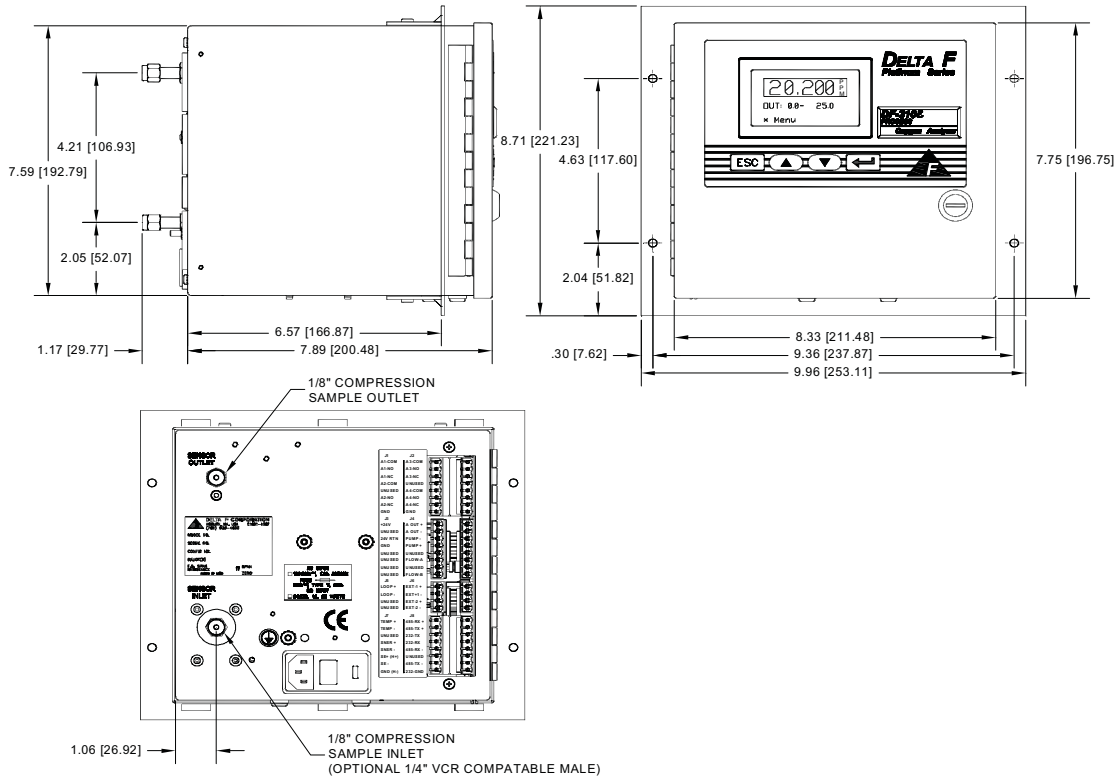
DF-310E—All Purpose Oxygen Analysis

The heart of the DF-300E family is the DF-310E. This flexible and adaptable oxygen analyzer can handle almost any application. There are many ranges offered to meet the demands of your application. The electronics platform has been installed for over a decade, and now, in the DF-310E, it is designed into a small package to reduce installation costs. The DF-310E uses our unique, non-depleting sensor and is available in 24 VDC and 110 VAC and 220 VAC versions. The DF-310E delivers:

- Accuracy: the greater of $\pm 3\%$ reading or $\pm 0.02\%$ of range
- Ranges are available from 0-0.5 ppm to 25%
- Instantaneous response to oxygen change
- Fast response: typically less than 10 seconds for 90% of a step change
- Background gas compatibility for all inert and passive gases including N_2 , H_2 , CO, freons, hydrocarbons, etc.
- STAB-EL™ option removes acids and ionic impurities from the electrolyte that could affect sensor performance

DF-320E—For Classified Areas

The DF-320E is a specialized adaptation of the DF-310E oxygen analyzer. The DF-320E is designed to handle Class I, Division 2 areas where potential explosions are a possibility, for example in natural gas pipelines. The DF-320E provides the same sensitivity and ranges as the DF-310E plus Class I, Div.2, Groups A, B, C, D, CSA and ATEX Zone 2 certification. This allows you to apply the best in oxygen analysis in harsh and hazardous environments.



Outline Dimensions for DF-310E, DF-320E and DF-330E

GE Sensing

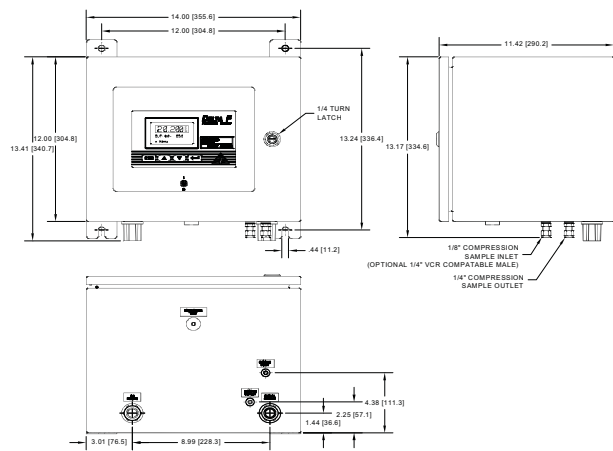
DF-330E—Solid State Coulometric Sensor

The DF-330E uses the latest sensor technology—a solid state coulometric sensor. It provides an effective solution for industrial applications as well as glove box type applications.

The DF-330E is an ideal oxygen analyzer for many industrial applications where very fast response is essential. The DF-330E uses a unique solid state coulometric sensor with a solid electrolyte to deliver fast response across a wide measurement range.

The DF-330E features:

- Exceptionally fast response—ppm levels from air in five minutes
- The ability to be mounted insitu or in flow-through applications
- Quick recovery down to low levels after exposure to air
- Good low-end sensitivity plus a wide measurement range
- Consistent accuracy from sub-atmospheric pressure to 100 psig



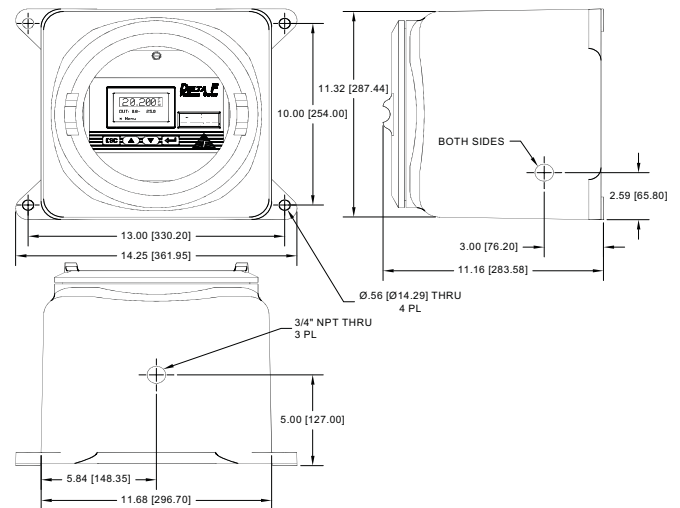
Outline Dimensions for DF-340E

DF-340E and DF-370E—Designed For The Dirty Work

The DF-340E provides a tough, durable Type 4X version of the standard DF-310E that is protected by a dust proof, waterproof enclosure with the sensor in a Type 7 enclosure.

The DF-370E provides the same hard working, industrial strength analyzer, in a Type 7 enclosure with the option to also place a remote sensor in a Type 7 enclosure.

The DF-340E and DF-370E provide the ultimate in oxygen sensing for harsh and hazardous environments where an enclosure is required.



Outline Dimensions for DF-370E

DF-300E Series Specifications

Performance

Accuracy (at constant conditions)

- Standard Models (except the DF-330E):
The greater of $\pm 3\%$ reading or 0.5% of range
- High Resolution Models:
The greater of $\pm 3\%$ reading or 0.02% of range
(Consult the analyzer specification sheet for more details)
- Standard Models for (DF-330E):
3,000 ppm - the greater of ± 5 ppm or $\pm 3\%$ of reading
25% - the greater of $\pm 0.10\%$ or $\pm 3\%$ of reading
100% - the greater of $\pm 1.0\%$ or $\pm 3\%$ of reading

Oxygen Sensitivity

Minimum detectable change 3 ppb (310E-H0050M model) and 500 ppb for the DF-330E

Response Time

Responds instantaneously to oxygen change. Typically less than 10 seconds for 90% of a step change. (Equilibrium time depends on specific conditions.)

Range

Ranges are available from 0 to 0.5 ppm to 100%

Ambient Operating Temperature

- DF-310E, 320E, 340E, 370E: 32°F to 113°F (0°C to 45°C)
- DF-330E: 32°F to 176°F (0°C to 80°C)

Background Gas Compatibility

- Basic Sensor:
All inert and passive gases, including N₂, H₂, CO, freons, hydrocarbons, etc.
- Sensor with Stab-EL™ Option:
Neutralizes trace contaminants, including acids such as CO₂, H₂S, Cl₂, NO_x, SO_x, etc. (Consult GE Sensing for concentration limits)

- Solid State Sensor:
Not compatible with gases containing hydrocarbons, combustibles, H₂, CO, NO₂, S or Pb. Compatible sample gases: N₂, AR and most freons. For other gases contact GE Sensing.

Gas Sample Conditions

Sample Pressure

- Operating limits (except the DF-330E):
0.2 to 1.0 psig (1.03 to 1.08 bar) standard
15-25 psig with welded sample inlet (orifice restricted)
2.0 psi vacuum to 0.2 psig (0.88 to 1.03 bar) use pump
1.0 to 10 psig (1.08 to 1.7 bar) use valve (standard) or regulator (optional)
Above 10 psig (1.7 bar) use regulator
Sensor overpressure damage limit: 10 psig (1.7 bar)
- Operating limits for DF-330E:
Pressure: Up to 100 psig (7.9 bar)
Vacuum: Down to 300 Torr

Return Pressure

Atmospheric Vent (optimal)
Limits: +5 psig to -5 psig (1.36 bar to 0.67 bar)
No limits for DF-330E

Flow Rate

1.0 to 3.0 SCFH (0.5 to 1.5 slpm)
Ambient to 3.0 SCFH (1.5 slpm for DF-330E only)

Temperature (Gas Sample)

0°F to 150°F (-17.8°C to 66°C) except 32°F to 176°F (0°C to 80°C) for DF-330E

Moisture

No limits (avoid condensation)

Oil/Solvent Mist

- <0.5 mg/ft³ (standard)
- >0.5 mg/ft³ (use filter)

Solid Particles

- <2 mg/ft³ (standard)
- >2 mg/ft³ (use filter)

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Gas Flow System

Construction Materials

300 Series stainless steel

Gas Connections

0.125 in (3.175 mm) compression tube fittings (for DF-310E, DF-320E and DF-330E)

1/4 in compression tube fittings (for DF-340E and DF-370E)

0.25 in (6.35 mm) VCR compatible (optional except standard for DF-310E-H0050M and DF-320E-H0050M)

Construction

Enclosure

Type 1, Type 4, Type 7

Remote Type 4, Type 7 or sensor bracket (optional for DF-310E and DF-320E)

Weight

DF-310E, DF-320E and DF-330E

10 lb (4.52 kg)

DF-340E

35 lb (15.9 kg)

DF370E

Electronics: 50 lb (22.73 kg)

Sensor: 27 lb (12.25 kg)

Dimensions (w x h x d)

DF-310E, DF-320E and DF-330E

8.32 in X 7.75 in X 7.91 in

(211 mm x 197 mm x 201 mm)

DF-340E

14 in x 13.18 in x 11.42 in

(35.6 cm x 33.5 cm x 29 cm)

DF-370E

Electronics:

14.5 in x 11.5 in x 11.5 in (36.8 cm x 29.2 cm x 29.2 cm)

Sensor:

10.75 in x 8.5 in x 8.38 in (27.31 cm x 21.59 cm x 21.29 cm)

Electrical

Power Input

110 VAC, 220 VAC options or 22-28 VDC, 1 amp (maximum)

Output Signals

- Non-isolated 0-5, 10 VDC AND isolated 4-20 mA DC (optional)
- User adjustable to 10% of full scale to full scale (standard res)
- User adjustable to 1% of full scale to full scale (high res)
- User selectable output freeze during calibration

Alarms, Audible/Visual

- Four oxygen (optional) (with adjustable set-point)
- Electrolyte condition (standard)
- Temperature (optional)
- Low flow (optional)

Alarm Relays

Four independently assignable to alarms, in-calibration, sensor off and expanded range scale

Alarm Relay Rating

0.3 amps at 30 VDC Failsafe Action

Display

Supertwist LCD graphics

Certifications

CE Conformance, CSA, CENELEC Class 1, Division II (DF-320E)



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Instructions: Please fill out the fields in color. Any field with a block is a required field.

Today's Date: **Delta F Oxygen Application Data Sheet**

Contact Information

Name:	 	Phone:	
Company:	 	Fax:	
Address:	 	E-mail:	
Installation Address:	 	Delivery Want	
Measurement Points	 		
Account Manager/Sales rep (if known)	 		

Process Data

Process/Application:	 						
Physical State of material:	<input type="checkbox"/> Gas	<input type="checkbox"/> Confirm gas phase					
Complete Chemical Composition:	Component Name	Chemical Formula	Volume Percent				
Gas A	Oxygen	O2	Nominal:	% +/-	 	%	
Gas B			Nominal:	% +/-	 	%	
Gas C			Nominal:	% +/-	 	%	
Gas D			Nominal:	% +/-	 	%	
Gas E			Nominal:	% +/-	 	%	
Gas F			Nominal:	% +/-	 	%	
Other*			Nominal:	% +/-	 	%	
			Total**	100%			

*Attach additional pages if more space is needed **Gas composition must total 100%

Pressure at sample points:	Units	Minimum	Maximum	Nominal	
Temperature at sample points:	Units	Minimum	Maximum	Nominal	
Sample Outlet:	<input type="checkbox"/> Vent to atmosphere	<input type="checkbox"/> Return to process			
If sample will be returned to process, pressure at sample return point:					
	Units	Minimum	Maximum	Nominal	
Temperature at sample return point:					
	Units	Minimum	Maximum	Nominal	

Measurement Parameters

Analyzer range:	<input type="checkbox"/> 0 to 100 ppm	<input type="checkbox"/> 0 to 1000 ppm	<input type="checkbox"/> 0 to 10,000 ppm		
	<input type="checkbox"/> 0 to 10%	<input type="checkbox"/> 0 to 25 %	<input type="checkbox"/> Other, please specify		
Utilities available at transmitter:	<input type="checkbox"/> Air, pressure	psig	<input type="checkbox"/> N2, pressure	psig	
	<input type="checkbox"/> Water, pressure	psig	<input type="checkbox"/> Temperature	<input type="checkbox"/> Deg F	<input type="checkbox"/> Deg C
	24 VDC power	<input type="checkbox"/> Available	<input type="checkbox"/> Not available		
Area classification:	<input type="checkbox"/> Nonhazardous	<input type="checkbox"/> Hazardous			
Ambient pressure:	Units	Minimum	Maximum	Nominal	
Ambient temperature:	Units	Minimum	Maximum	Nominal	

Electronics/Display Package

Digital display:	<input type="checkbox"/> Local	<input type="checkbox"/> Remote	<input type="checkbox"/> Not required			
Type:	<input type="checkbox"/> Weatherproof	<input type="checkbox"/> Explosionproof	<input type="checkbox"/> Rack	<input type="checkbox"/> Bench	<input type="checkbox"/> Panel	
Automatic calibration:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required				
Alarm relays:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required				
Output units:	<input type="checkbox"/> Single 4 to 20 mA (isolated)	<input type="checkbox"/> Dual 4 to 20 mA (isolated)				
If display is remote please fill in below:						
Power available:	<input type="checkbox"/> VAC	<input type="checkbox"/> HZ	<input type="checkbox"/> Other			
Area classification:	<input type="checkbox"/> Nonhazardous	<input type="checkbox"/> Hazardous				
If hazardous:	Class	Division	Groups			
Distance between display(s) & transmitter(s) if remote:	<input type="checkbox"/> ft	<input type="checkbox"/> m	Choose one			
Tagging:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required				
Drawings:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required				
Other Requirements:	 					

Additional Measurements

Moisture:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required	
Flow:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required	
Energy flow rate:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required	
Hydrogen concentration:	<input type="checkbox"/> Not required	<input type="checkbox"/> Required	

Thermal conductivity:	<input type="checkbox"/>	Not required	<input type="checkbox"/>	Required	
Flue gas analysis:	<input type="checkbox"/>	Not required	<input type="checkbox"/>	Required	
Combustible gas:	<input type="checkbox"/>	Not required	<input type="checkbox"/>	Required	
Wobbe index:	<input type="checkbox"/>	Not required	<input type="checkbox"/>	Required	
CARI:	<input type="checkbox"/>	Not required	<input type="checkbox"/>	Required	
Calorific value:	<input type="checkbox"/>	Not required	<input type="checkbox"/>	Required	
Carbon potential:	<input type="checkbox"/>	Not required	<input type="checkbox"/>	Required	
Special Requirements:					
Please attach a brief description or sketch of the process					