



GAS	MEASURES	APPLICATION
OXYGEN	PERCENT	PROCESS CONTROL SAFETY

#### SENSING TECHNOLOGY

PARAMAGNETIC



## PARAMAGNETIC DIGITAL O<sub>2</sub> ANALYZER DESIGNED FOR HAZARDOUS AREA USE

### UNRIVALLED PERFORMANCE

- Uses industry-leading patented Paramagnetic technology for stable, non-depleting measurement
- Manufactured by Servomex - over 70 years' experience innovating and pioneering gas analysis, and thousands of units used in the field every year

### FLEXIBLE

- Can be used in locations up to Zone 1/Division 1 hazardous area rated
- Intelligent diagnostics and flow sensing
- Optimized for hazardous applications for example; safety critical oxidation, feedstock clean up, blanket inerting and flare stack analysis

### LOW COST OF OWNERSHIP

- No need for reference gases/purge gases during operation including use with flammable samples
- Long calibration intervals and cell life
- Auto-validation reduces hands-on maintenance needs

### EASY TO USE

- Intuitive, engineer-friendly use and interaction
- Reduced requirement for a gas conditioning system for samples with a dew point of <50°C/122°F when sample heated option is used
- Unique FlowCube sensor technology provides unrivalled reliability and accuracy
- Intelligent pressure compensation for barometric and sample vent back pressure variations

### BENCHMARK COMPLIANCE

- IECEx/ATEX/UKEX: for Zone 1, and cCSA<sub>US</sub> C1, D1 for North America
- SIL2 hardware compliance (Route 1H) functional safety manual available

CE marked to meet:

- EU EMC Directive
- EU RoHS Directive

### KEY APPLICATIONS

- Process control
- Safety-critical oxidation, such as ethylene oxide and propylene oxide purity
- Flare stack analysis
- Vapor recovery

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### TOTAL SAFETY IN THE MOST DANGEROUS LOCATIONS

When you work with potentially dangerous, hazardous area applications, you need an O<sub>2</sub> analytical solution that delivers benchmark safety compliance and complete reliability without question; product quality and plant safety depend on the equipment you integrate.

The Oxy has ATEX/UKEX Cat. 2, IECEx Zone 1 and cCSA<sub>us</sub> Class 1, Div. 1 certification and is SIL2 hardware compliant (Route 1H), ensuring it offers solid, trusted reliability in hazardous areas.

### LOW MAINTENANCE, LOW COST OF OWNERSHIP

By utilizing patent Paramagnetic sensing technology, the Oxy benefits from a stable, accurate measurement that requires minimal calibration. Remote device interaction via digital communication options help to further reduce operational costs.

### HIGH PERFORMANCE MONITORING WITH UNIQUE FEATURES

The Oxy introduces three unique options that offer unrivaled flexibility, operational performance and reduced costs. An innovative heated sample bulkhead, when coupled with the fully heated sample compartment, can reduce the requirement for a gas conditioning system on samples with a dew point of up to 50°C/122°F and also offers excellent measurement stability; a unique FlowCube sensor which guarantees low flow indication during normal operation; and an integrated pressure compensation system compensates for sample pressure variation, enabling tighter process control.

### USEFUL LINKS



*These analyzers are not intended for any form of use on humans and are not medical devices as described in the Medical Devices Directive 93/42EEC.*

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# TECHNICAL DATA SHEET



## SERVOTOUGH Oxy 1900

### SPECIFICATIONS

<b>GAS MEASURED</b>	OXYGEN (O <sub>2</sub> )
<b>TECHNOLOGY</b>	Paramagnetic
<b>PERFORMANCE</b>	
Measurement range	0-25% O <sub>2</sub> †
Lower detection limit	< ±50ppm O <sub>2</sub>
Linearity error	No measurable error
Repeatability error	<0.02% O <sub>2</sub>
Intrinsic error (accuracy)	<±0.05% O <sub>2</sub> (based on ±95% confidence limits)
Response time (T <sub>90</sub> )	<6 seconds at 200ml/min and 1l/min
Zero drift per week	<0.05% O <sub>2</sub> /week
Span drift per week	<0.05% O <sub>2</sub> /week
Sample vent pressure effects	Pressure compensation not fitted: 1% change in sample vent pressure corresponds to a 1% change in reading Pressure compensation fitted: 1% change in sample vent pressure corresponds to a 0.05% change in reading
Sample flow variations	A change in flow from 50-250ml/min (12-70l/hr internal bypass option) will cause a zero change of <0.1% O <sub>2</sub> and a span change of <0.5% of reading
<b>SIGNAL OUTPUTS</b>	As standard each unit comes fitted with:
Analog outputs	One isolated 4-20mA / 0-20mA
Analog output range	User selectable over the measurement range (minimum range 0-1% O <sub>2</sub> )
Alarms	Two volt free single pole double throw relays (30V dc 1A)
Status signals	Four volt free single pole double throw relays (30V dc 1A): instrument fault, maintenance required, service in progress and mA range indication
Digital communications	Modbus RTU (RS485) or Ethernet (Modbus TCP)
<b>OPERATING ENVIRONMENT</b>	
Temperature	Operating: -10°C to +55°C (+14°F to +131°F) Storage: -20°C to +60°C (-4°F to +140°F)
Relative humidity	0-95% RH, non-condensing
Warm up time	Typically <4 hours (at 20°C ambient (68°F), depending on application and environment)
Operating altitude range	-500 to 2,000m (-1640 to 6562ft)
Ingress protection	IP66 and NEMA 4X
<b>PHYSICAL</b>	
Size	448mm (17.6") Width x 235mm (9.2") High x 227mm (8.9") Deep
Weight	26kg / 57lbs
Mounting	Wall

† Not suitable for oxygen enriched concentrations ie. >21% O<sub>2</sub>

The performance specification has been written and verified in accordance with the international standard IEC 61207-1:1994 "Expression of performance of gas analyzers"



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FLOW SENSOR	
Accuracy	<±5% of full scale for 100% N <sub>2</sub> **
Minimum detectable change	1% of full scale
Response time	<15 seconds
Ambient temperature coefficient span	<2% of full scale per 10°C
Calibration interval	6-12 months (recommended)
SAMPLE CONDITION	
The sample gas must be clean, non-corrosive and free from oil and condensates	
Particulate size	<3µm
Maximum sample dew point	+5°C (+9°F) below minimum ambient temperature or +50°C (+122°F) (with optional sample heater fitted)
Flow rates*	Standard: 50 to 250ml/min (200ml/min recommended) Optional high flow internal bypass: 50 to 70l/hr (60l/hr recommended)
Sample connection	1/4" NPT female, 6mm tube or 1/4" tube
Maximum sample vent pressure*	124kPa absolute (18psi absolute)‡
Maximum inlet pressure*	0.2kPa (0.03psi) relative to sample vent pressure‡

\* The pressure and flow of sample gases must be externally regulated to meet the above requirements

‡ For the high flow internal bypass option, the maximum sample vent pressure and maximum sample inlet pressure are limited to: 122.8kPa (17.8psia) and 1.4kPa (0.2psi) relative to sample vent pressure respectively

\*\* For gases with higher molecular weights than N<sub>2</sub>, the accuracy will be < ±10% of full scale

UTILITIES	
Supply voltage	100-120 or 220-240V ac, 50/60Hz, 50 VA
CORROSIVE PURGE GAS	
Recommended gas	Instrument grade air
Flow rate	40 to 60ml/min
Purge inlet connection	1/4" NPT female
Purge outlet	Through sample enclosure compartment rear breathers, no external outlet vent connection.
O <sub>2</sub> CALIBRATION GASES	
High calibration setpoint	0.5 to 20.95% O <sub>2</sub>
Low calibration setpoint	0.0% (99.5% zero grade nitrogen recommended)
Minimum difference	0.5% O <sub>2</sub>



## SAMPLE WETTED MATERIALS

	STANDARD TRANSDUCER *	SOLVENT RESISTANT TRANSDUCER *	INTERNAL FLOW ALARM OPTION (in addition)	PRESSURE COMPENSATION OPTION
304 stainless steel	•	•		No additional materials
316 stainless steel	•	•		
Alumina silicate glass			•	
Borosilicate glass	•	•		
Electroless nickel	•	•		
Platinum	•	•		
Platinum/iridium alloy	•	•		
Chemraz® 555		•		
PTFE		•		
Viton®	•			
Yttria stabilised zirconia			•	

\* Special hydrogen resilient transducer option adds EPO-TEK® H72.

\* Special chlorine resistant version replaces Viton & PTFE with Chemraz® 584.

## COMPLIANCE

HAZARDOUS AREA APPROVALS	
ATEX (Europe)	II 2G Ex db ia IIC T4 Gb (-10°C ≤ Ta ≤ +60°C)* II 2D Ex tb IIIC T90°C Db (-10°C ≤ Ta ≤ +60°C)*
UKEX (Great Britain)	II 2G Ex db ia IIC T4 Gb (-10°C ≤ Ta ≤ +60°C)* II 2D Ex tb IIIC T90°C Db (-10°C ≤ Ta ≤ +60°C)*
IECEx (International)	Ex db ia IIC T4 Gb (-10°C ≤ Ta ≤ +60°C)* Ex tb IIIC T90°C Db (-10°C ≤ Ta ≤ +60°C)*
cCSAus (North America)	Class I, Div 1, Groups A, B, C, D T4 (-10°C ≤ Ta ≤ +60°C)* Class II, Div 1, Groups E, F, G (-10°C ≤ Ta ≤ +60°C)* Class III (-10°C ≤ Ta ≤ +60°C)* Ex ia d IIC T4, Ex tD T90°C (-10°C ≤ Ta ≤ +60°C)* AEx ia d IIC T4, AEx tD T90°C (-10°C ≤ Ta ≤ +60°C)*
CML (Japanese)	Ex db ia IIC T4 Gb (-10°C ≤ Ta ≤ +60°C)* Ex tb IIIC T90°C Db (-10°C ≤ Ta ≤ +60°C)*

\* (+14°F ≤ Ta ≤ +140°F)

EC DIRECTIVES	This product complies with the EMC Directive, RoHS Directive, and all other applicable directives.
ELECTRICAL SAFETY	Electrical safety to IEC 61010-1



## OPTIONS

DESCRIPTION	
Analyzer certification	5 certified versions of the Oxy analyzer are available: European, Great Britain, International, North American & Japanese.
Supply voltage	2 versions of supply voltage are available: 100-120 and 220-240Vac.
Measurement	Stainless Steel pipework with Viton® seals. Stainless Steel pipework with Chemraz® and PTFE seals allowing enhanced solvent resistance.
Sample flow	Standard flow option of 150-250ml/min (200ml/min nominal). An internal bypass option allows inlet flows of 50 to 70 l/hr (60 l/hr or 1l/min nominal).
Sample heating	The measurement transducer in the Oxy and the full sample pipework including the sample inlet and outlet connections are heated to 60°C (140°F). This allows the gases up to a dew point of 50°C (122°F) to be sampled directly into the analyzer.
Internal pressure compensation	The uncorrected gas measurement is directly affected by changes in atmospheric pressure and any sample vent back pressures on the sample outlet. A 1% change in pressure will directly affect the measurement by 1% of reading. This needs to be considered when looking at the measurement performance required. The fitting of the internal pressure transducer reduces the effect of pressure changes by 20x. A 1% change in pressure will result in a less than 0.05 % change in sample reading.
Flowcube internal flow sensor	The measurement of the analyzer is highly reliable and has internal diagnostics to ensure correct operation, yet in low flow conditions the measurement accuracy may be affected and this cannot be diagnosed by the instrument without a flow sensor. Our Flowcube technology offers an internal solid state flow sensor fitted directly to the outlet of the measurement transducer, ensuring that the measurement gas is flowing through the transducer at all times for maximum reliability and safety. Flowcube technology offers one high and two low flow alarms which can be configured to be inactive or to indicate a fault or maintenance required status, via the instrument relay output and the digital communications. Flow level is also reported via the digital communications or the display, so flow trending and maintenance of systems elements can be scheduled. (Note: the flow sensor is currently not suitable for gas mixtures that contain hydrogen and/or helium at concentrations over 10% of the total mixture).
Autovalidation/calibration	An option card is available that allows the instrument to control validation or calibration gases automatically (voltage free single pole double throw relays: 30V dc 1A). This option can also be used for remote calibration of the analyzer. Autovalidation using test gases allows the maximum confidence in the measurement to be gained on a regular basis without the expense of using personnel for routine validation. During autovalidation the analyzer indicates that it is off line from the process with a service in progress relay contact and if it should detect that the measurement performance is outside preset tolerances it will indicate that maintenance is required through a second relay contact.
Digital communications	This allows for the analyzer to be fully maintained and configured remotely. It also allows for a greater level of remote diagnostics to be carried out above that supplied by the standard relay contacts. Modbus RTU (RS485) or Ethernet TCP/IP.
Sample inlet	Allows the connection of 1/4" NPT male fittings directly to the analyzer. Allows the connection of 1/4" OD tube directly to the analyzer. Allows the connection of 6mm OD tube directly to the analyzer.
Enclosure options	IP66 Breather fitted as standard allows the pressure within the enclosure to be the same as the surrounding atmosphere. A 1/4" NPT female inlet fitting allows inert gas to be supplied to the analyzer to prevent the build up of any corrosive gases within the sample compartment. This will extend the operational life of the analyzer in such environments.
Gland/conduit entries	As standard the analyzer is supplied with 4 gland entries: 2 x 1/2" NPT female and 2 x 3/4" NPT female Adapters to M20 gland entries supplied (optional) Adapters to PG13.5 gland entries supplied (optional)
Operators manual	An Operators manual contains all the information needed to install and safely set up the analyzer.
Service manual	A Service manual contains technical descriptions, fault diagnosis, parts removal, refitting and test instructions, tool and test equipment lists, and electrical drawings. It is intended for use by Servomex trained service personnel.
Functional Safety SIL2 (Route 1H) requirement	This manual provides detailed information and instructions that will be needed in order to use the SERVOTOUGH Oxy in safety instrumented systems, in respect of hardware safety integrity only (route 1H), according to IEC 61508 Edition 2.0 2010-04. It is aimed at those responsible for planning, designing, installing, commissioning, operating and maintaining safety instrumented systems using the SERVOTOUGH Oxy.



CONFIGURATION					
<b>OXY VARIANTS:</b>	We have 3 pre configured Oxy builds (SV01, SV02 and SV03) to cover the most common chosen option configurations to enable a quick turnaround from specification to delivery.				
<b>Standard Variant 1 (SV01)</b>	The pre-configured standard variant 1 base level configuration, including the solvent resistant transducer, for general oxygen measurement requirements.				
<b>Standard Variant 2 (SV02)</b>	The pre-configured standard variant 2 mid level configuration, adding sample heating and auto validation/calibration to the SV01 build, covering mid level process measurement needs.				
<b>Standard Variant 3 (SV03)</b>	The pre-configured standard variant 3 full configuration, adding pressure compensation and flow alarm options to the SV02 mid level build, covering all your process measurement needs.				
<b>User Configured (UC)</b>	Other analyzer configurations not covered by one of the above standard variant configurations, including optional Ethernet TCP communications and corrosion prevention purge options.				
OXY VARIANT		SV01	SV02	SV03	UC
<b>Analyzer certification<sup>†</sup></b>	cCSAus	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	IECEX	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	ATEX	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	UKEX	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Japanese approval (CML)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Supply voltage</b>	100 - 120Vac	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	220 - 240Vac	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Measurement</b>	Standard transducer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Solvent resistant transducer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Hydrogen resilient transducer*	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Sample flow</b>	Standard 150-250ml/min (200ml/min nominal)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Bypass Option 50 to 70l/hr (60l/hr or 1l/min nominal)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Heated sample bulkhead</b>	Sample heating not required	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Sample heating fitted	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Internal pressure compensation</b>	Pressure compensation not required	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Pressure compensation fitted	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Internal flow sensor<sup>‡</sup></b>	Flow sensor not required	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Flow sensor fitted	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Autovalidation / calibration</b>	Autovalidation not required	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Autovalidation fitted	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Digital communications</b>	Modbus RTU (RS485)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Modbus TCP (Ethernet)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Sample inlet</b>	1/4" NPT (F)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	1/4" OD compression fitted	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	6mm OD compression	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Enclosure options</b>	Breather fitted	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
	Corrosive purge fitted	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<b>Gland entries</b>	NPT	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Metric M20	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	PG 13.5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Operators manual</b>	English	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	German	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Japanese (CML certification option only)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Service manual</b>	Not required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	English	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	German	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Functional safety SIL2 (Route 1H)</b>	Not required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Required - English safety manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Required - German safety manual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Tick a single box for each selectable option

Option selectable

Option not available in that variant

Pre-selected option

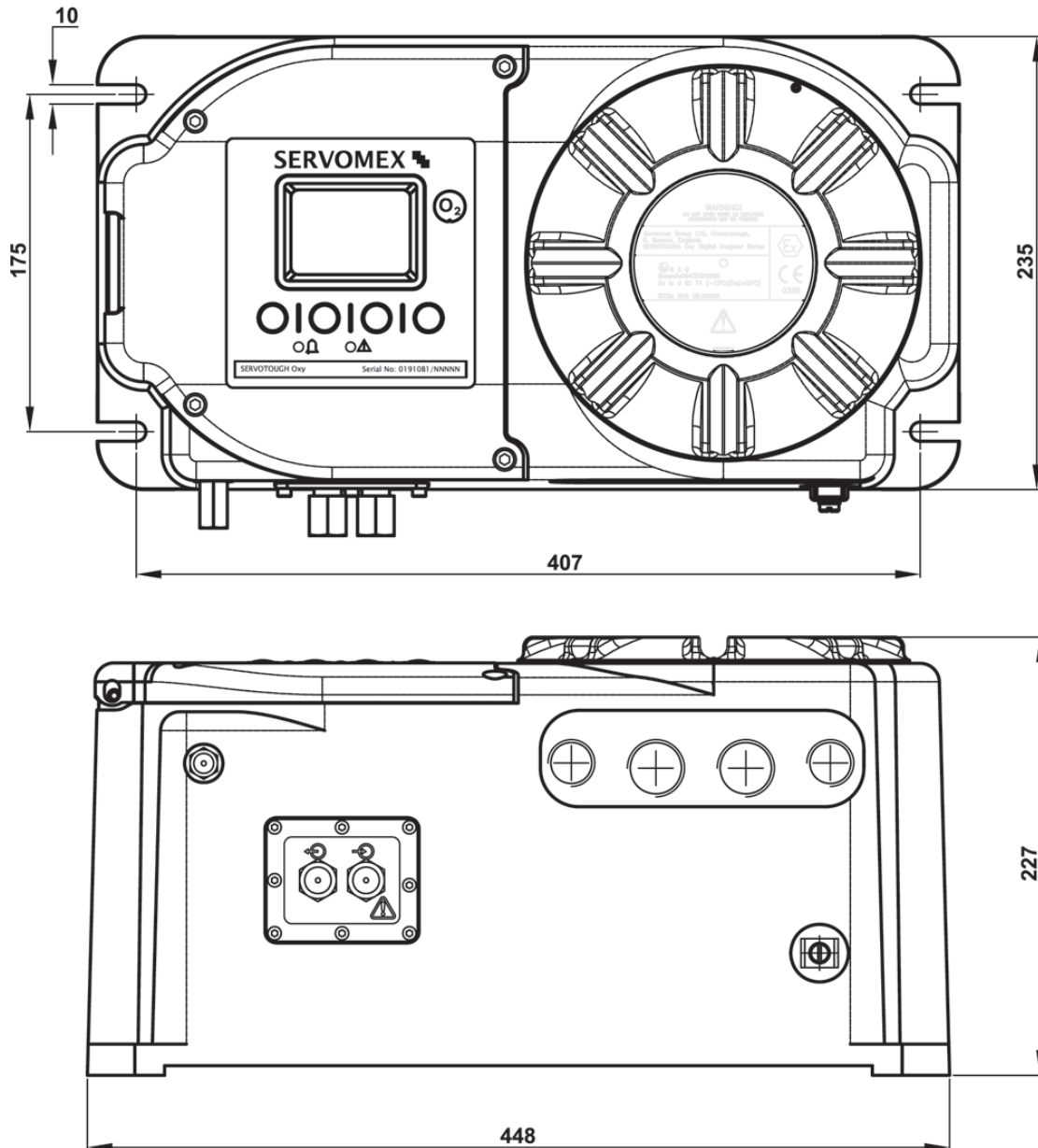
<sup>†</sup> Refer to [www.servomex.com/product-certification-hazardous-areas](http://www.servomex.com/product-certification-hazardous-areas) for full product certification markings

\* Available only as a special build - please consult Servomex

<sup>‡</sup> Not suitable for sample gas composition with hydrogen / helium >10% vol.



## DIMENSIONAL DRAWINGS



Dimensions shown in millimetres  
Weight: 26kg nominal



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**SERVOMEX**  
**ANALYZERS**  
HIGH-PERFORMANCE GAS ANALYSIS



# > WE'RE READY TO HELP

WHATEVER YOUR GAS ANALYSIS REQUIREMENTS, WHEREVER YOU ARE



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