



Oxygen Probe

SIRO₂ C700 ST Probe

Australian Oxytrol Systems Pty Ltd

85 Wood Street,
California Gully VIC 3556
Australia

P + 61 3 5446 1530

F 61 3 5446 1215

E info@australianoxytrolsystems.com

W www.australianoxytrolsystems.com

SIRO₂ C700 ST Probe

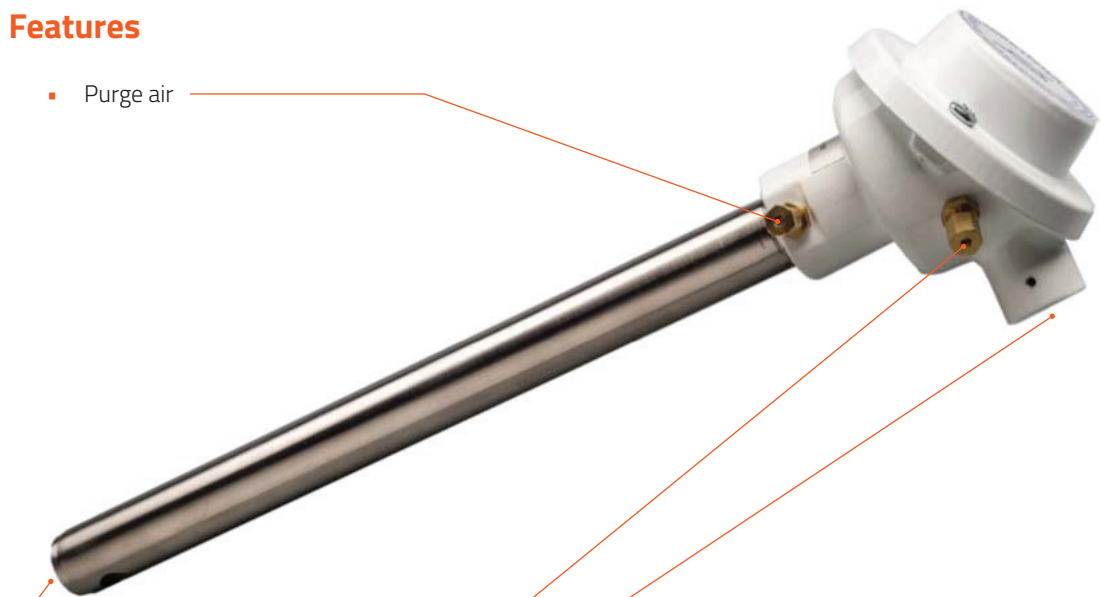
Features

- Purge air

- Gas sensing aperture

- Reference air

- Electrical connections



Description

The ST probe incorporates a SIRO₂ C700 all ceramic oxygen sensor, shielded by a 253 MA stainless steel sheath for use in carburising furnaces. The probe design is specifically intended for small apertures into furnaces. It is used for measurement and control of oxygen sensitive environments at high temperatures. The sensor operates *in situ*, and measures oxygen concentration in real time, without the need for expensive gas sampling, or gas extraction equipment. The probe comes complete with a K-type thermocouple.

Features:

- Specific for O₂
- High O₂ sensitivity and selectivity
- High dynamic range of detection
- High temperature of operation
- Rapid responses
- *In situ* measurement
- Solid state electronic component – rugged sensor
- No power consumed for operation under all conditions
- No bias required to operate
- Available up to 1400 mm
- Air purge

Applications:

- Fuel combustion efficiency control
- Furnace gas analysis
- Waste management systems
- Carburising (heat treating) furnace control
- Annealing furnaces
- Flue gas analysis
- O₂ levels at high temperatures
- CO₂ harsh environments

Specifications

Note: Maximum service temperature is 1150 °C, (2100 °F) above which damage will occur to the probe, and may make removal from the furnace difficult.

Thermal				
Parameter	Minimum	Typical	Maximum	Unit
Absolute Maximum temperature	—	—	1150	°C
Operating temperature	700	—	1100	°C
Control head operating temperature	—	60	80	°C
Ramp rate	—	—	400	°C/hour
Storage	5	20	50	°C

Electrical				
Parameter	Minimum	Typical	Maximum	Unit
Output voltage range*	2.0	1130	1650††	mV @ T ≥ 700 °C
Output impedance	1.00	2.00	10.00	kΩ @ T ≥ 700 °C
Response time	10	20	10000	ms @ T ≥ 700 °C
Offset Error @ 700 °C **	1	2	—	mV @ pO ₂ = pO ₂

Measurement Range				
Parameter	Minimum	Typical	Maximum	Unit
O ₂ Atmosphere	10 ⁻²⁴	—	1	pO ₂ @ 700 °C
O ₂ Atmosphere	10 ⁻¹²	—	1	pO ₂ @ 1300 °C
Reference air	—	10	20	mL/min

Sheath Mechanical				
Parameter	Minimum	Typical	Maximum	Unit
Outer diameter stainless steel sheath	25.54	26.54	26.74	mm
Outer diameter of ceramic sheath	28.00	30.00	32.00	mm
Probe length	300	—	1400	mm ±3 mm
Weight	4	—	8	kg

Electrical Connections			
Description	Pin No	Type	Wiring (internal)
Thermocouple positive leg	1	Output	Black (thermocouple +)
Thermocouple negative leg	2	Output	Red (thermocouple -)
Sensor internal (reference) connection	3	Output	Blue (O ₂ sense-reference)
Sensor external (sense) connection	4	Output	Grey (O ₂ sense-chamber)

Connector type				
Mating connector	Manufacturer	Part Number	Supplier	Supplier code
4 Pin female XLR Cannon	Neutrik	NC4MXX	Mouser	568-NC4MXX

* Absolute maximum output voltage without damage to the sensor for the given atmosphere of 10⁻²⁴ oxygen concentration. The sensor will provide an output response above 1130 mV, however lifetime cannot be guaranteed under these operating conditions.

†† Under some conditions, an output voltage of 1650 mV may be observed. Accuracy of readings above 1400 mV or greater than 1600 degrees may result in erroneous readings.

** Offset error should be subtracted from the voltage reading during measurements for high accuracy applications. Also, note that this offset value is temperature dependent.

The probe can be installed anywhere in the kiln or furnace if used at temperatures below 1100°C. For operating temperatures above 1100°C, the probe should hang vertically, to avoid bending.

Corrosion resistance in air – Sandvik 253 MA data sheet

Sandvik 253 MA has very high resistance to oxidation, especially at cyclically varying temperatures. The service temperature in air should not exceed about 1150°C (2100°F).

Isothermal oxidation at 1150°C (2100°F) for 100 h results in a corrosion rate of about 0.3 mm/year (13 mpy), and exposure at the same temperature for 1000 h causes about 0.2 mm/year (9 mpy). Cyclic oxidation at 1150°C (2100 F) for 5 x 24 h, with cooling to room temperature every 24 hours gives a corrosion rate of less than 1.1 mm/year (43 mpy), which is only marginally greater than the corrosion rate at 1000°C (1830°F).

Cyclic oxidation testing for 1000 h (15 minutes at the testing temperature and 5 minutes at room temperature, making a total of 3000 cycles) places heavy demands on the elasticity and adhesive capacity of the oxide.

Installation

Probe handling is critical to ensure all seals remain intact. The probe must only be handled by the stainless-steel sheath with no weight or force applied to the connector head assembly. Two hands should be applied at the quarter mid-points of the probe. Carefully insert the probe into the furnace aperture. Once the probe has been inserted the instrument interface cable and reference air may then be connected.

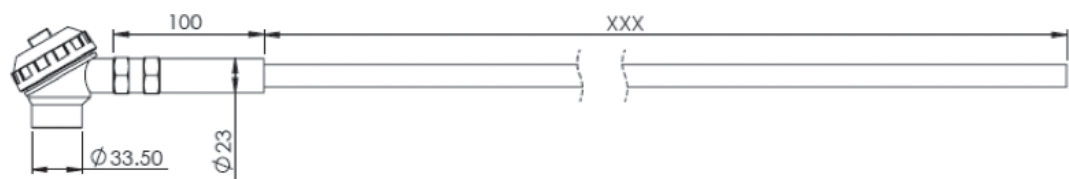
Fitting the probe into a kiln is best done when the kiln is at room temperature and there is no risk of thermal shock. Care should be taken to fill all open apertures to ensure minimum leakage occurs from the aperture to heat the probe head.

In the even the probe is to be removed or inserted when the kiln is on, then extreme care must be taken to ensure the probe is not subjected to thermal shock.

This means the probe must be inserted or removed from the kiln in a slow and careful manner. Careful not to bump or knock the probe as the delicate sensor can be damaged, much like a light bulb.

Ordering information

Probe lengths (XXX) are specified from the end of their stainless-steel fixing to the tip of the ceramic sheath.



This probe can be ordered in a range of different sizes in steps of 100 mm, and with two different thermocouples. The probe part number has the following format.

ST – 0300 – K – CS

- Ceramic sheath** CS for Ceramic sheath
NS for no sheath
- Thermocouple** R for R-type thermocouple
K for K-type
- Probe length** 0300 for 300 mm
0400 for 400 mm
...
1400 for 1400 mm