

MDTC Sensors for Carbon Dioxide, Nitrogen, or Hydrogen Measurement

- Solid-state design, virtually maintenance-free
- Can install directly in-line, without by-pass loop or sample alteration
- Withstand hot CIP cleaning
- Not influenced by sample color, viscosity, suspended particles or pulp
- Operate in liquid or gaseous samples
- Capable of sustaining sample pressures up to 170 bar

Orbisphere's unique membrane covered dynamic thermal conductivity detector (MDTC) sensors offer a highly accurate and virtually maintenance-free method for measuring CO₂, N₂, and H₂ in process. The sensors operate at hydrostatic pressures up to 20 bar and are fully compensated for temperature effects in a range of 0–50°C. Special high-pressure models are available for measurement in samples of up to 170 bar with no loss of accuracy.

Constructed of stainless steel, these compact, rugged sensors meet IP 68 (NEMA 4) specifications. They can be located up to 100 meters from the instrument via a cable, which detaches at the sensor to enable permanent installation in conduit or cable raceway. MDTC sensors are installable in all Orbisphere flow chambers and process access fittings, and weigh only 0.95 kg. They satisfy a wide range of applications, from in-line measurements in beverage processing to corrosion control and safety measurements in power generation.

PRINCIPLE OF MEASUREMENT

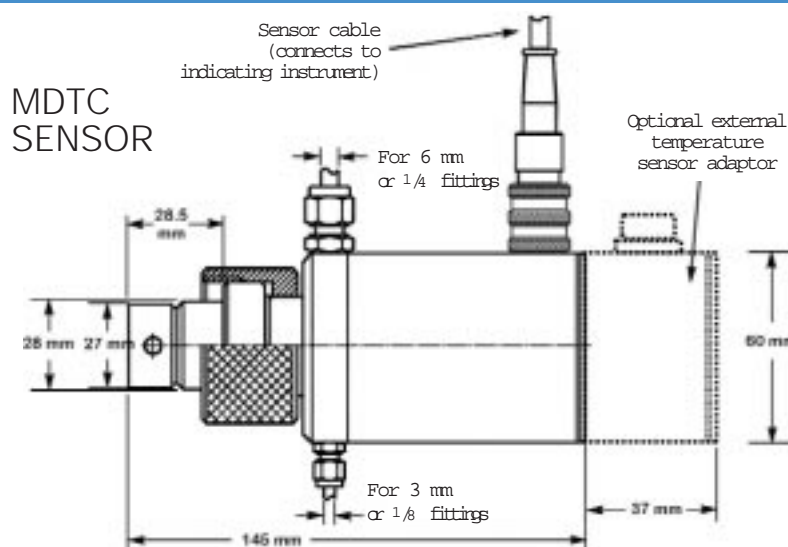
A novel type of gas-sensing technique combines a gas-diffusion membrane with a unique solid-state gas thermal conductivity detector operating in a dynamic mode. The small volume enclosed between the diffusion membrane and the thermal conductivity detector is periodically flushed with a purge gas. After each purge cycle, the thermal conductivity of the gas surrounding the detector gradually changes from the value of the purge gas to that of the gas of interest, due to the inflow of the gas of interest.

The rate of change is continuously monitored and is a direct function of the concentration of the gas to be measured. With its hydrophobic diffusion membrane, the MDTC sensor can be used for measuring dissolved gas in almost any liquid, or gas in a gas mixture, at a wide range of temperatures and pressures.



MDTC sensor





APPLICATION
DEPENDENT
MEMBRANE/SENSOR
SPECIFICATIONS

Sensor model *	314xx for CO ₂	315xx for N ₂	312xx for H ₂	312xx for H ₂	312xx for H ₂
Membrane model	29561A	29561A	29561A	29562A	2952A
Recommended application	In-line beverage measurement	In-line beverage measurement	Waste gas offgas, and reactor coolant	Trace level applications	Reactor coolant
Recommen. purge gas	Pure N ₂ or air	Pure CO ₂	Pure N ₂ or air	Pure N ₂ or air	Pure N ₂ or air
Material	PFA	PFA	PFA	Silicone rubber/ Polycarbonate	ETFE
Thickness	25 µm	25 µm	25 µm	25 µm	25 µm
Radiation dose limit	2 x 10 ⁴ rad	10 ⁵ rad	10 ⁵ rad	10 ⁷ rad	10 ⁸ rad
Recommended calibration gas	Pure CO ₂	Pure N ₂	Pure H ₂	10% H ₂ 90% N ₂	Pure H ₂
Measurement range at 25°C	0-10 bar, or 0-15 g/kg, or 0-7 V/V	0-20 bar, or 0-350 ppm, or 0-300 ml/l	0-2 ppm, or 0-25 cc/kg, or 0-1.5 bar	0-1000 ppb, or 0-10 cc/kg, or 0-0.5 bar	0-10 ppm, or 0-120 cc/kg, or 0-6 bar
Signal drift (per year)	<1% of reading	<2% of reading	<1% of reading	<1% of reading	<1% of reading
Accuracy, sample temperature 20-50°C, within ±5°C of calibration temperature	the greater of: ±1% of reading, or ±8 mbar, or ±0.012 g/kg, or ±0.006 V/V	the greater of: ±2% of reading, or ±15 mbar, or ±0.3 ppm, or ±0.25 ml/l	the greater of: ±1% of reading, or ±2 ppb, or ±0.03 cc/kg, or ±1.5 mbar	the greater of: ±1% of reading, or ±1 ppb, or ±0.01 cc/kg, or ±0.6 mbar	the greater of: ±1% of reading, or ±8 ppb, or ±0.1 cc/kg, or ±6 mbar
Accuracy, temperature range 0-50°C, independent of calibration temperature	the greater of: ±2% of reading, or ±14 mbar, or ±0.048 g/kg, or ±0.02 V/V	the greater of: ±4% of reading, or ±34 mbar, or ±1 ppm, or ±0.8 ml/l	the greater of: ±3% of reading, or ±15 ppb, or ±0.18 cc/kg, or ±6 mbar	the greater of: ±3% of reading, or ±3 ppb, or ±0.03 cc/kg, or ±2 mbar	the greater of: ±3% of reading, or ±60 ppb, or ±0.6 cc/kg, or ±20 mbar
Measurement cycle	22 seconds	22 seconds	17 seconds	12 seconds	17 seconds
Sample flow rate ¹	100 ml/minute	300 ml/minute	220 ml/minute	250 ml/minute	200 ml/minute
Linear flow rate ²	50 cm/second	150 cm/second	N/A	N/A	N/A

¹ Recommended, through model 32001 flow chamber. ² Recommended, past model 29501 sensor socket

* Sensor models:
 31x50 Standard MDTC sensor
 31x60 MDTC sensor with external temperature sensor adapter
 31x6xHP High pressure MDTC sensor, to 170 bar sample pressure
 31252 H₂ MDTC sensor with CO₂ purge gas

In the interest of continued product development, Orbisphere reserves the right to make improvements to this literature and/or the products it describes, without notice or obligation.



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