

Geotech

GAS EXTRACTION MONITOR | GAS EXTRACTION SITES

The GEM5000 landfill gas extraction monitor for measuring CH_4 , CO_2 and O_2 . It's an easy to use analyser designed to aid balancing the gas field, maximise power output and ultimately maximise revenue from CH_4 extraction.



SECTOR

🌚 Landfill

APPLICATIONS

- Landfill gas field optimisation
- Landfill gas energy calculation
- Flare / engine output estimation







FEATURES

- Certified: ATEX, IECEx, CSA, MCERTS and UKAS calibration (ISO17025)
- Measures % CH₄, CO₂, O₂
- Records static and differential pressure
- Choice of user settings and simple gas reading function
- Calculates gas flow (m3 / h) and calorific value (KW or BTU) (external flow device and Gas Analyser Manager software required)
- CH_4 and CO_2 accuracy $\pm 0.5\%$ after calibration
- Modular and upgradeable
- 3 year warranty
- Robust design for market leading reliability
- Datalogging and profiling function
- Up to 6 gases monitored

BENEFITS

- Aids balancing of gas field
- Real time adjustments can be made
- Maximise power output from site
- Easy to read
- No need for self-certification of anemometer
- Maximise revenue from CH₄

OPTIONS (AVAILABLE AT PURCHASE OR LATER)

- H₂ compensated CO
- Choice of additional gases including H₂S to 10,000ppm
- GPS / field navigator
- Gas Analyser Manager software for data download
- External gas flow devices: anemometer (ATEX) / Pitot tubes
- Bluetooth communications for data download

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QED Environmental Systems Ltd.

Cyan Park- Unit 3, Jimmy Hill Way, Coventry, CV2 4QP, UNITED KINGDOM

GEM5000

TECHNICAL SPECIFICATIONS

Battery typeRechargeable indet multi-lydride battery pack (not user replaceable)Battery tylifeTypical ace 8 hours for multi-lydry arger powered from mains supply (10-240 V)Battery charge for senare intelling arger powered from mains supply (10-240 V)Senare intelling arger powered from mains supply (10-240 V)Battery charge for senare intelling arger powered from mains supply (10-240 V)Senare intelling arger powered from mains supply (10-240 V)Gases measuredGo, and Ch, and PalaMulti-arger powered from mains supply (10-240 V)Gases measuredGo, and Ch, and PalaMulti-arger powered from mains sensorGases measuredGo, and Ch, and PalaMulti-arger powered from mains sensorGases measuredGo, and Ch, and PalaMulti-arger powered from mains sensorGases measuredGo, and Ch, and PalaMulti-arger powered from mains sensorSandard gas cellsCellNangeMulti-arger powered from mains sensorGalaGalaSensorColone (1000)SensorGalaGalaSensorMulti-arger powered from mains sensorGalaGalaSensorSensorGalaGalaSensorMulti-arger powered from mains sensorGalaGalaSensorSensorGalaGalaSensorSensorGalaGalaSensorSensorGalaGalaSensorSensorGalaGalaSensorSensorGalaGalaSensorSensorGalaGalaSensorSensorGalaGala	POWER SUPPLY					
<th colspa<="" td=""><td>Battery type</td><td colspan="4">Rechargeable nickel metal hydride battery pack (not user replaceable)</td></th>	<td>Battery type</td> <td colspan="4">Rechargeable nickel metal hydride battery pack (not user replaceable)</td>	Battery type	Rechargeable nickel metal hydride battery pack (not user replaceable)			
Battery charger powered from mains supply (100-240V) Charge time Approximately 4 hours from complete discharge COV and CH, By dual wavelength infrared sensor with reference tannel Cosess measured CO, and CH, By internal electrochemical sensor Image: COV (100 - 240	Battery life	Typical use 8 hours from	Typical use 8 hours from fully charged			
Charge time GO, and CH, By dual wavelength infrared sensor with reference channel Op By internal electrochemical sensor CO (H, compensated), H, S, M, and H, compensated), (inptional) By internal electrochemical sensor A full range of internal gas cells can be specified at the time of manufacture Typical accuracy* T	Battery charger	Separate intelligent 3A battery charger powered from mains supply (100-240V)				
CAS RANCES Evidual wavelength infrared sensor with reference channel O2, By internal electrochemical sensor Gases measured CO(H, compensated), H5, NH, and H, loptonal) By internal electrochemical sensor A full range of internal gas cells can be specified at the time of manufacture Typical accuracy* (range : accuracy) Standard gas cells Cell Range Typical accuracy* (range : accuracy) Typical accuracy* (range : accuracy) Co, 0-100% 0-70% : 40.5% (vol) 70-100% : ±1.5% (vol) 70-100% : ±1.5% (vol) O2, 0-25% 0-25% : ±1.0% (vol) 60-100% : ±1.5% (vol) 60-100% : ±1.5% (vol) CO 0-2,000pm ±2.0% F5 CO CO 0-2,000pm ±2.0% F5 CO 0-2,000pm ±2.0% F5 CO CO 0-2,000pm ±2.0% F5 H5 0-500pm ±2.0% F5 CO CO 0-2,000pm ±2.0% F5 H5 0-10,000ppm ±2.0% F5 CO CO 0-2,000pm ±2.0% F5 H5 0-10,000ppm ±2.0% F5 CO CO CO CO	Charge time	Approximately 4 hours from complete discharge				
CO ₂ and CH ₄ By dual wavelength infrared sensor with reference disord O ₂ A By internal electrochemical sensor CG(H, compensated), (pational) By internal electrochemical sensor Image: CG(H, compensated), (pational) A full range of internal gas cells can be specified at the time of manufacture Topical accuracy* (range: accuracy) Topical accuracy* Standard gas cells Cell Range Topical accuracy* (CO 0-3000ppm ±2.0% FS U U CO 0-3000ppm ±2.0% FS U U U U CO 0-3000ppm ±2.0% FS U U U U Up incl accuracy H,5	GAS RANGES					
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A full range of internal zeals can be specified at the time of manufacture of time of nature of time of t	Gases measured	CO (H_2 compensated), H_2S , NH_3 and H_2 (optional)	By internal electrochemical sensor			
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Standard gas cellsCH4 q0-100% Q-100% : ±0.5% (vol)70-100% : ±1.5% (vol)QQ Q0-100% Q-25% : ±0.0% (vol)0-100% : ±1.5% (vol)0-100% : ±1.5% (vol)Q Q0-25% : ±0.0% (vol)0-25% : ±0.0% (vol)0-100% : ±1.5% (vol)CI Q Q0-500ppm±2.0% FS	Standard gas cells	Cell	Range	Typical accuracy* (range : accuracy)	Typical accuracy* (range : accuracy)	
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Image0-25%0-25% ±1.0% (vol)CellRangeTypical accuracy*CO0-5000pm±2.0% FSCO0-1,0000pm±2.0% FSCO0-2,0000pm±2.0% FSCO0-2,0000pm±1.0% FSCO0-2,0000pm±1.0% FSH,S0-5000pm±2.0% FSH,S0-5000pm±2.0% FSH,S0-2000pm±2.0% FSH,S0-2000pm±2.0% FSH,S0-10000pm±2.0% FSCo30 seconds±2.0% FSCo30 seconds±2.0% FSH,S30 seconds±2.5% FSH,S <td>CO₂</td> <td>0-100%</td> <td>0-60% : ±0.5% (vol)</td> <td>60-100% : ±1.5% (vol)</td>		CO ₂	0-100%	0-60% : ±0.5% (vol)	60-100% : ±1.5% (vol)	
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CO 0-1,000ppm ±2.0% FS CO 0-2,000ppm ±2.0% FS CO(H_3)** 0-2,000ppm ±1.0% FS H_2S 0-50ppm ±1.0% FS H_2S 0-500ppm ±2.0% FS H_5 0-500ppm ±2.0% FS H_5 0-500ppm ±2.0% FS H_2S 0-1,000ppm ±2.0% FS MH3 0-1,000ppm ±2.0% FS MV 0-1,000ppm ±2.0% FS ME Mp/dagen cross gas effect - n carbon monoxide approximately 1%. Do not use where hydrogen cross gas effect - n carbon monoxide approximately 1%. Do not use where hydrogen cross gas effect - n carbon monoxide approximately 1%. CO 20 seconds CO 20 seconds		СО	0-500ppm	±2.0% FS	±2.0% FS	
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Optional gas cellsCO (H,)**0-2,000pm±1.0% FSH,S0-500pm±1.5% FSH,S0-200ppm±2.0% FSH,S0-500ppm±2.0% FSH,S0-1,000ppm±2.0% FSH,S0-1,000ppm±2.0% FSH,S0-10,000ppm±5.0% FSH,S0-10,000ppm±10.0% FSH,S0-10,000ppm±10.0% FSH,S0-10,000ppm±10.0% FSH,S0-10,000ppm±2.5% FSH,G0-10,000ppm±2.5% FSHydrogen corse gas effect or carbon monoxide approximately 1%. Do not use where hydrogen cross gas off 0,000ppm±0.0% FS*Hydrogen compensated carbon monoxideFSOn cu use where hydrogen cross gas off cordsCO_2≤10 secondsCH_a≤10 secondsCO_2≤20 secondsG0_2≤20 secondsH,S≤30 secondsH,S≤30 secondsH,A≤90 seconds <td>СО</td> <td>0-2,000ppm</td> <td>±2.0% FS</td> <td colspan="2">±2.0% FS</td>		СО	0-2,000ppm	±2.0% FS	±2.0% FS	
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Optional gas cellsH ₂ S0-200pm±2.0% FSH ₂ S0-500ppm±2.0% FSH ₂ S0-1,000ppm±2.0% FSH ₂ S0-10,000ppm±2.0% FSH ₃ S0-1,000ppm±5.0% FSNH ₃ 0-1,000ppm±10.0% FSH ₂ S0-1,000ppm±2.5% FS*Typical accuraciesVargen cross gas effect are after calibration pursued.*Hydrogen compensated carbon monoxideHydrogen cross gas effect are nonoxide approximately 1%. Do not use where hydrogen cross of 10,000pm*Gagen cross gas effect are after calibration pursued.Hydrogen cross gas effect are cross of 10,000pm*Gagen cross gas effect are calibration pursued.Hydrogen cross gas effect are cross of 10,000pm*Gagen cross gas effect are calibration pursued.Hydrogen cross gas effect are calibration particle.*Gagen cross gas effect are calibration pursued.Hydrogen cross gas effect are calibration particle.*Gagen cross gas effect are calibration particle.Hydrogen cross gas effect are calibration particle.*Gagen cross gas effect are calibration particle.Hydrogen cross gas effect are calibration particle.*Gagen cross gas effect are calibration particle.For fail particle.*Gagen cross gas effect are calibration particle.Hydrogen cross gas effect are calibration.*Hydrogen cross gas effect are calibration particle.Gagen cross gas effect are calibration.*Gagen cross gas effect are calibration particle.Gagen cross gas effect are calibration.*Gagen cross gas effect are calibration particle.Hydrogen cross gas effect are calibration.*G		H ₂ S	0-50ppm	±1.5% FS	±1.5% FS	
H2S0-500ppm±2.0% FSH2S0-1,000ppm±2.0% FSH3S0-5,000ppm±2.0% FSH2S0-10,000ppm±5.0% FSH30-1,000ppm±10.0% FSH30-1,000ppm±2.5% FS*Typical accuraciesVariagen cross gas effect are after calibration pursues of calibration gas used.*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesHydrogen cross gas effect are after calibration pursues of 10,000pm*Typical accuraciesFor after are after advise of approx*Typical accuraciesFor after are after advise of approx*Typical accuraciesFor after advise		H ₂ S	0-200ppm	±2.0% FS	±2.0% FS	
H ₂ S 0-1,000ppm ±2.0% FS H ₂ S 0-5,000ppm ±2.0% FS H ₂ S 0-10,000ppm ±5.0% FS NH ₃ 0-1,000ppm ±10.0% FS *Typical accuracies All typical accuracies quotes are after calibration public scaracy of calibration gas used. *Typical accuracies Hydrogen cross gas effector carbon monoxide approximately 1%. Do not use where hydrogen is in excess of 10,000ppm *Ange Response time Equipment CH ₄ ≤10 seconds CO ₂ ≤10 seconds CO ₂ ≤10 seconds CO ₂ ≤20 seconds H ₂ S ≤30 seconds H ₂ S ≤30 seconds H ₂ S ≤30 seconds H ₂ S ≤90 seconds H ₂ S ≤90 seconds H ₂ S ≤90 seconds H ₃ ≤90 seconds H ₂ S ≤90 seconds		H ₂ S	0-500ppm	±2.0% FS	±2.0% FS	
H2S 0-5,000pm ±2.0% FS H2S 0-10,000pm ±5.0% FS NH3 0-1,000pm ±10.0% FS *Typical accuracies All typical accuracies quotacies qu		H ₂ S	0-1,000ppm	±2.0% FS		
H ₂ S 0-10,000pm ±5.0% FS H ₃ 0-1,000pm ±10.0% FS *Typical accuracies H 0-1,000pm ±2.5% FS *Typical accuracies All typical accuracies are after calibration pas used. H *thydrogen compensated carbon monoxide Hydrogen cross gas effector carbon monoxide approximately 1%. Do not use where hydrogers is in excess of 10,000pm H Range Response time E E Cl-4 \$10 seconds E CO2 \$10 seconds E O2 \$20 seconds E FO \$20 seconds E HA_3 \$30 seconds E HA_5 \$30 seconds E HA_5 \$30 seconds E HA_5 \$30 seconds E HA_5 \$30 seconds E HA_6 \$90 seconds E HA_6 \$90 seconds E Flow 550 ml / min typically E Flow fail point \$200 mbar vacuum- user table E Maximum vacuum restart		H ₂ S	0-5,000ppm	±2.0% FS	±2.0% FS	
NH3 0-1,000pm ±10.0% FS *Typical accuracies All typical accuracies que tare after calibration pass used. *2.5% FS *Typical accuracies All typical accuracies que tare after calibration pass used. ** *Hydrogen compensated carbon monoxide Hydrogen cross gas effect varbon monoxide approximately 1%. Do not use where hydrogen in excess of 10,000 varbon So not use where hydrogen cross of 10,000 varbon Range Response time So not use where hydrogen cross of 10,000 varbon So not use where hydrogen cross of 10,000 varbon Range Response time So not use where hydrogen cross of 10,000 varbon So not use where hydrogen cross of 10,000 varbon Range Range So conds So not use where hydrogen cross of 10,000 varbon So not use where hydrogen cross of 10,000 varbon C0_2 So conds So conds So acconds		H ₂ S	0-10,000ppm	±5.0% FS		
Image 0-1,000ppm ±2.5% FS *Typical accuracies All typical accuracies que difer calibration pas used. **Hydrogen compensated carbon monoxide Hydrogen cross gas effect or carbon monoxide approximately 1%. Do not use where hydrogen time excess of 10,000proximately 1%. Do not use where hydrogen cross of 10 seconds Range Response time (H_4 <10 seconds		NH ₃	0-1,000ppm	±10.0% FS		
*Typical accuracies All typical accuracies que dare after calibration plus accuracy of calibration gas used. **Hydrogen compensated carbon monoxide Hydrogen cross gas effector carbon monoxide approximately 1%. Do not use where hydrogen is in excess of 10,000ppm Response time, T90 Range Response time Q2 <10 seconds		H ₂	0-1,000ppm	±2.5% FS	±2.5% FS	
**Hydrogen compensated carbon monoxide Hydrogen cross gas effect or carbon monoxide approximately 1%. Do not use where hydrogen cross gas effect or is in excess of 10,000ppm De not use where hydrogen cross gas effect or is in excess of 10,000ppm Public Column Range Response time CO2 \$10 seconds CO2 \$20 seconds CO \$30 seconds CO \$30 seconds Hy3 \$90 seconds Hy4 \$10 seconds Hy4 \$10 seconds Hy4 \$10 seconds Hy5 \$10 seconds	*Typical accuracies	All typical accuracies quoted are after calibration plus accuracy of calibration gas used.				
Range Response time CH4 ≤10 seconds CO2 ≤10 seconds O2 ≤20 seconds CO ≤30 seconds H25 ≤30 seconds H2 ≤90 seconds H2 ≤90 seconds PUMP ≤90 seconds Flow 550 ml / min typically Flow fail point -200 mbar vacuum- user =ttable Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min	**Hydrogen compensated carbon monoxide	Hydrogen cross gas effect on carbon monoxide approximately 1%. Do not use where hydrogen is in excess of 10,000ppm				
Response time, T90 CH_4 ≤ 10 seconds O_2 ≤ 20 seconds O_2 ≤ 20 seconds CO ≤ 30 seconds H_2S ≤ 30 seconds H_3 ≤ 90 seconds H_2 ≤ 90 seconds H_2 ≤ 90 secondsPUMP ≤ 90 secondsFlow fail point 550 ml / min typicallyFlow fail point -200 mbar vacuum- user settableMaximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min	Response time, T90	Range Response time				
Response time, T90 CO2 ≤10 seconds Q2 ≤20 seconds CO ≤30 seconds H2S ≤30 seconds NH3 ≤90 seconds H2 ≤90 seconds H2 ≤90 seconds Flow 550 ml / min typically Flow fail point -200 mbar vacuum- user table Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min		CH ₄	≤10 seconds			
Response time, T90 O2 ≤20 seconds CO ≤30 seconds H2S ≤30 seconds NH3 ≤90 seconds H2 ≤90 seconds H2 ≤90 seconds PUMP ≤90 seconds Flow 550 ml / min typically Flow fail point -200 mbar vacuum- user settable Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min		CO ₂	≤10 seconds			
CO ≤30 seconds H₂S ≤30 seconds NH₃ ≤90 seconds H₂ ≤90 seconds PUMP ≤90 seconds Flow 550 ml / min typically Flow fail point -200 mbar vacuum- user settable Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min		0 ₂	≤20 seconds			
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H₂ ≤90 seconds PUMP Flow 550 ml / min typically Flow fail point -200 mbar vacuum- user settable Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min		NH ₃	≤90 seconds			
PUMP Flow 550 ml / min typically Flow fail point -200 mbar vacuum- user settable Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min		H ₂	≤90 seconds			
Flow 550 ml / min typically Flow fail point -200 mbar vacuum- user settable Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min	PUMP					
Flow fail point-200 mbar vacuum- user settableMaximum vacuum restart-375 mbar approximately with flow rate of approx 80ml / min	Flow	550 ml / min typically				
Maximum vacuum restart -375 mbar approximately with flow rate of approx 80ml / min	Flow fail point	-200 mbar vacuum- user settable				
	Maximum vacuum restart	-375 mbar approximately with flow rate of approx 80ml / min				

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GEM5000

TECHNICAL SPECIFICATIONS CONTINUED

FACILITIES				
Temperature measurement	-10°C to +75°C with optional probe			
Temperature accuracy	±0.5°C with optional probe			
Flow measurement	Via Pitot tube, orifice plate, or anemometer			
Energy measurement	Calculated using gas concentrations, flow, and temperature readings			
Alarm	User selectable alarms			
Communications	Via USB lead or wireless Bluetooth*			
Relative pressure measurement	±500 mbar			
Relative pressure accuracy	±4 mbar typically (should be zeroed before reading) to ±15 mbar max			
Barometric pressure measurement	500 to 1500 mbar, ±5 mbar accuracy			
GPS sensor	Location and positioning			
Available memory	2,000 IDs *, 4000 readings, 2,000 events *			
ENVIRONMENTAL CONDITIONS				
Operating temperature range	-10°C to +50°C			
Atmospheric pressure range	700 to 1200 mbar			
Relative humidity	0-95% non condensing			
Case seal	IP65			
PHYSICAL				
Weight	1.6kg			
Size	L 220mm, W 155mm, D 60mm			
Case material	High impact ABS composite with rubber over-moulding.			
Кеуѕ	Alpha-numeric keypad with "tactile" membrane			
Display	Ultra-clear high resolution 4.3" full colour TFT			
Connections	Colour coded gas inlet, outlet and pressure ports. Waterproof USB port, anemometer and charger / temperature probe connections.			
Gas sample filters	External user changeable 2.0µm ptfe water traps			
CERTIFICATION RATING				
ATEX / IECEx	II 2G Ex ib IIA T1 Gb (Ta =-10°C to +50°C)			
MCERTS	MC / 130239			
ISO17025	Calibration to UKAS certificate number 4533			
CSA	Ex ib IIA T1 (Ta=-10°C to +50°C) (Canada), AEx ib IIA T1 (Ta=-10°C to +50°C) (USA)			
* Gas Analyser Manager software	required. Bluetooth is an optional extra.			
Important note: The information	in this document is correct at the time of generation.			

We do however, reserve the right to change the specification without prior notice as a result of continuing development.



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