

# LAND

## AMETEK®

TEMPERATURE  
MEASUREMENT SOLUTIONS  
FOR CONTAINER GLASS

APPLICATION NOTE

Accurate and reliable temperature measurements at key process locations are vital to ensure consistent quality throughout container glass manufacture.

AMETEK Land provides proven solutions throughout the production process to deliver these measurements, supporting an efficient process and high-quality product.

# CONTAINER GLASS

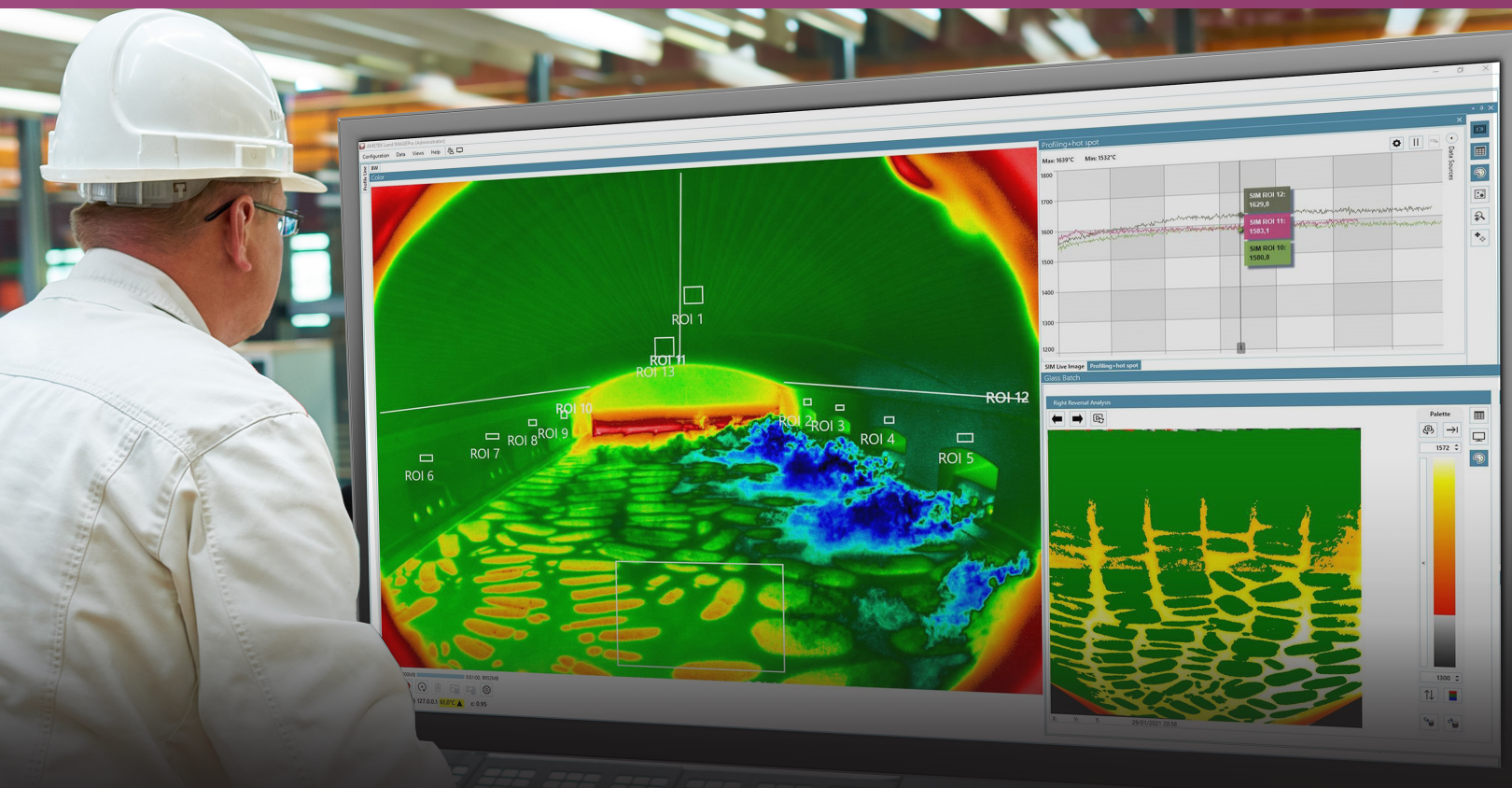
# AREA APPLICATIONS

Container glass is used for bottles, jars and other vessels. It has a higher content of water-insoluble oxides, providing chemical durability against water – an important property when storing beverages and food.

The production process for container glass has several points where temperature measurements are key, from thermal imaging of the melt tank through to temperature measurements in the forehearth and monitoring cooling in the annealing process.

Accurate measurements at critical locations are vital to supporting consistent quality in container glass manufacture.

**WITH DECADES OF EXPERIENCE PROVIDING EFFECTIVE SOLUTIONS TO THE GLASS INDUSTRY, AMETEK LAND HAS DEVELOPED A RANGE OF ADVANCED, HIGH-PRECISION INSTRUMENTS, SPECIFICALLY DESIGNED FOR GLASS APPLICATIONS, TO PRODUCE THE REQUIRED RESULTS.**



## AMETEK LAND SOLUTIONS FOR CONTAINER GLASS

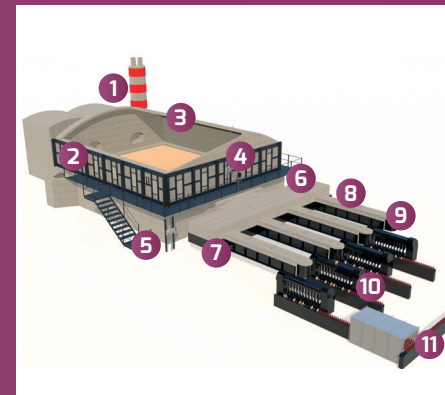
Precision temperature measurements are critical to the glass-making process.

As the world leader in temperature measurement, AMETEK Land has supplied the glass industry with essential equipment for more than 70 years.

Our specifically designed instruments provide accurate results at key locations throughout the process, meeting the highest standards of quality and reliability.

Using infrared technology, our thermometers deliver non-contact measurements, so there is no contamination or interference with the process, nor any seeding or bubbling. Glass is used for a variety of purposes, and can be shaped, toughened, coloured, laminated or treated to suit specific requirements.

Our measurement systems provide accurate temperature monitoring to support these applications.



### FLUE GAS

01

Controlling emissions of particulate matter (dust and other pollutants) is a key activity, to ensure compliance but can prove challenging, as the high-particulate environment can adversely affect both the measurements and the instrument. Continuous emissions monitoring helps ensure that plants meet the necessary control regulations, avoiding the prospect of sizeable fines.

### REGENERATORS

02

Accurate measurements in the high temperatures of the regenerator support the efficiency of the melt process. They also provide early warning of any incorrect or unbalanced firing which could affect product quality and energy consumption. There is also a need to monitor emissions to ensure compliance with environmental regulations.

### BATCH INLET

03

Monitoring temperatures at the inlet confirms uniformity, ensuring the batch melts at the expected point. It also helps monitor the batch for any impurities which might affect glass quality. Ensuring the batch temperature is within the desired parameters supports the quality of the glass, and helps prevent damage to the batch charger and melt tank from overheated batch.

### MELT TANK – INSIDE REFRACTORY

04

The melt tank experiences the highest temperatures of the glass production process. Real-time monitoring of these temperatures is vital to the efficiency of the application and the quality of the product. It is important to be able to study the entire tank interior to detect any structural damage.

### MELT TANK – BULK GLASS

05

Continuous monitoring of the extremely high temperatures in the melt tank is essential to ensure uniformity of the glass throughout the production process. Process efficiency can also be controlled by monitoring the temperature of the bulk glass as it melts. Reducing the time required for the melting process lowers energy costs, increases productivity, and ensures the refractory wall is not exposed to molten glass for excessive periods.

### MELT TANK – OUTSIDE

06

Monitoring the exterior of the melt tank with a thermal imager can provide an indication of any hot areas which may indicate refractory damage. It also gives an early warning of potential glass break-outs. Detection of damage to the tank allows early maintenance and extends the tank's lifespan. Around 70% of container glass production costs come from energy, so preventing cracks and lost heat produces significant savings.

### DISTRIBUTORS AND FEEDERS

07

Distributors carry the molten glass from the tank furnace to the forehearth, while the feeder delivers glass gobbs to the forming machine. Accurate, non-contact temperature measurements are essential to ensure consistent glass quality at these stages, and to make certain the glass continues to flow in a molten state.

### FOREHEARTH

08

The forehearth must be kept hot enough to maintain the glass in a molten state without any variations that could affect the properties of the gob. A temperature difference of just 1°C creates a viscosity deviation of 1%, so accurate temperature monitoring is vital to control the forehearth zone temperatures. Consistent viscosity leads to improved production rates and a reduction in scrap from glass breakages further along the process.

### GOB

09

By accurately measuring the gob temperature, it is possible to calculate the weight of the gob. This value is closely related to its viscosity, so precise monitoring can provide a reliable indicator of product quality. Temperature monitoring of the gob ensures a consistent viscosity of the product as it enters the moulding stage. This means that the quality of the glass is constant, reducing waste and increasing process efficiency.

### MOULD

10

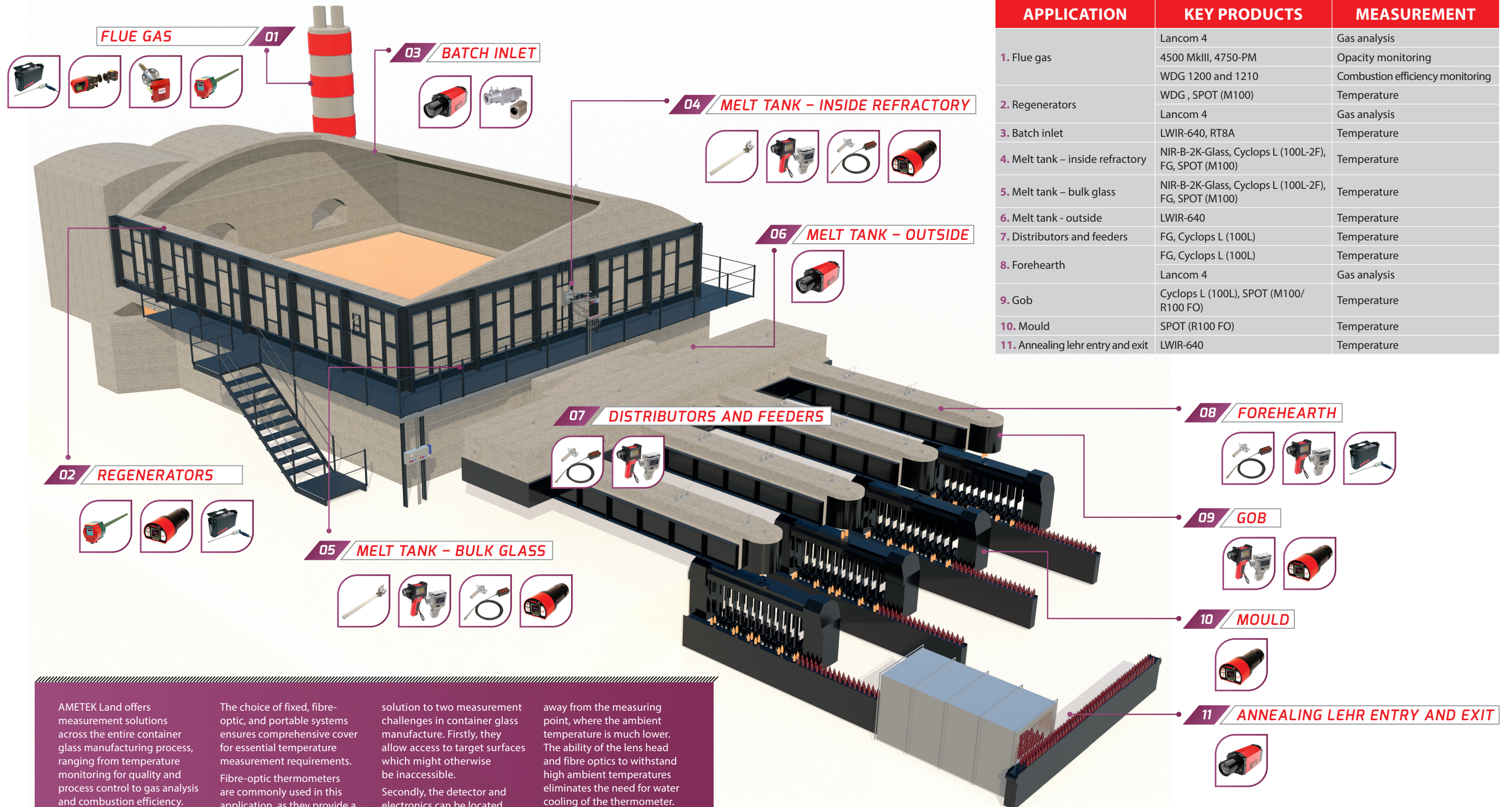
Temperature measurements at the mould are critical to ensuring consistent product quality. The rapid operation of the mould means that a short-wavelength, non-contact device is needed, providing a very short response time. By ensuring the mould is sufficiently heated, consistent glass quality can be monitored and scrap product avoided. Glass will stick to a mould which is too cold, producing a substandard finished product.

### ANNEALING LEHR ENTRY AND EXIT

11

Temperature monitoring is required at the annealing Lehr to ensure sufficient heating of the glass. Incorrect heating and cooling can weaken the glass, introducing weak points that may not be noticed until after the product has been transported. Thermal imaging provides an accurate view of the glass product as it enters and leaves the Lehr, allowing a comparison of properties and early detection of any substandard product.

# CONTAINER GLASS TEMPERATURE MEASUREMENT SOLUTIONS



APPLICATION	KEY PRODUCTS	MEASUREMENT
1. Flue gas	Lancom 4	Gas analysis
	4500 MkIII, 4750-PM	Opacity monitoring
	WDG 1200 and 1210	Combustion efficiency monitoring
2. Regenerators	WDG, SPOT (M100)	Temperature
	Lancom 4	Gas analysis
3. Batch inlet	LWIR-640, RT8A	Temperature
4. Melt tank – inside refractory	NIR-B-2K-Glass, Cyclops L (100L-2F), FG, SPOT (M100)	Temperature
5. Melt tank – bulk glass	NIR-B-2K-Glass, Cyclops L (100L-2F), FG, SPOT (M100)	Temperature
6. Melt tank - outside	LWIR-640	Temperature
7. Distributors and feeders	FG, Cyclops L (100L)	Temperature
8. Forehearth	FG, Cyclops L (100L)	Temperature
	Lancom 4	Gas analysis
9. Gob	Cyclops L (100L), SPOT (M100/R100 FO)	Temperature
10. Mould	SPOT (R100 FO)	Temperature
11. Annealing lehr entry and exit	LWIR-640	Temperature

AMETEK Land offers measurement solutions across the entire container glass manufacturing process, ranging from temperature monitoring for quality and process control to gas analysis and combustion efficiency.

The choice of fixed, fibre-optic, and portable systems ensures comprehensive cover for essential temperature measurement requirements. Fibre-optic thermometers are commonly used in this application, as they provide a

solution to two measurement challenges in container glass manufacture. Firstly, they allow access to target surfaces which might otherwise be inaccessible. Secondly, the detector and electronics can be located

away from the measuring point, where the ambient temperature is much lower. The ability of the lens head and fibre optics to withstand high ambient temperatures eliminates the need for water cooling of the thermometer.

## FG



FIXED SPOT THERMOMETERS



A simple fibre-optic, two-wire, loop-powered thermometer with 4 to 20mA output. Specifically designed to improve process control in the glass industry.

**Temperature range:** 20 to 1700 °C (68 to 3092 °F)

**Spectral response:** 0.7 to 1.0 μm

**Response speed:** 0.5 s (to 98%)

**Accuracy (uncertainty):** ±2 °C (±4 °F)

## SPOT



FIXED SPOT THERMOMETERS



A family of fully featured, high-performance pyrometers for fixed non-contact infrared spot temperature measurements. Available in a range of operating wavelengths, temperature ranges and process requirements.

**Temperature ranges:** models cover ranges from 50 to 1800 °C (122 to 3272 °F)

**Spectral response:** model dependent, 1.0 to 2.4 μm

**Response speed:** Adjustable, 1 ms to 10 s

**Accuracy (uncertainty):** Mono & Duo: ±0.25% K | Ratio & Multi: ±0.5% K

**Repeatability:** <1 °C (2 °F)

## RT8A



FIXED SPOT THERMOMETERS



A non-contact infrared thermometer for use in many low-temperature applications, it helps glass manufacturers meet quality compliance requirements in multiple standalone applications.

**Temperature ranges:** models cover ranges from 0 to 500 °C (32 to 1000 °F)

**Spectral response:** 8 to 14 μm

**Response speed:** adjustable, 1 to 10 s

**Accuracy (uncertainty):** 0.5% of span

## LWIR-640



FIXED THERMAL IMAGERS



A long-wavelength thermal imager providing a full temperature measurement range of 0 to 1000 °C (32 to 1832 °F) in two ranges with a choice of different optics and fields of view.

**Temperature ranges:** models cover ranges from 0 to 1000 °C (32 to 1832 °F)

**Spectral response:** 8 to 14 μm

**Accuracy (uncertainty):** 1.5% or 2 °C of reading

## NIR-B-2K-GLASS



FIXED THERMAL IMAGERS



A borescope thermal imaging camera specifically developed to return precise temperature measurements in glass furnace applications.

**Temperature range:** 1000 to 1800 °C (1832 to 3272 °F)

**Spectral response:** 1 μm (centre)

**Accuracy (uncertainty):** 1% of reading (K)

**Repeatability:** 1 K

## CYCLOPS 100L



PORTABLE THERMOMETERS



A range of premium quality, highly accurate hand-held instruments, these ergonomic, single-handed-use, non-contact thermometers provide easy, accurate, point-and-measure temperature readings.

**Temperature range:** 600 to 3000 °C (1112 to 5432 °F)

**Spectral response:** 1 μm with advanced spectral filtering

**Response speed:** 30 ms

**Accuracy (uncertainty):** ≤0.25% (K)

**Repeatability:** ≤1 °C (2 °F)

## LANCOM 4



PORTABLE GAS ANALYSERS



A compact portable multigas analyser, capable of measuring up to eight flue gases in a range of combustion and emissions processes.

## 4500 MKIII



OPACITY AND DUST MONITORS



A high-specification opacity and dust monitor meeting global compliance standards for monitoring combustion processes.

## 4750-PM



OPACITY AND DUST MONITORS



A high-sensitivity, back-scatter laser measurement for particulate matter, for use in combustion processes where condensed water is not present.

## WDG 1200 AND 1210



COMBUSTION EFFICIENCY MONITORS

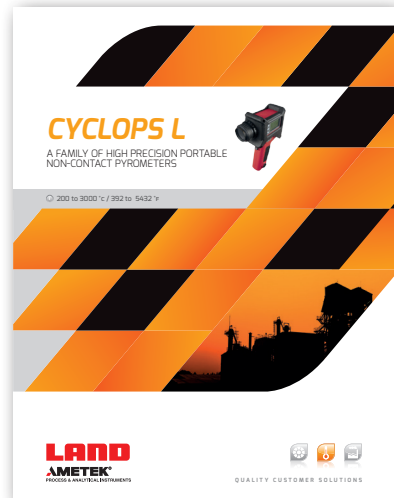
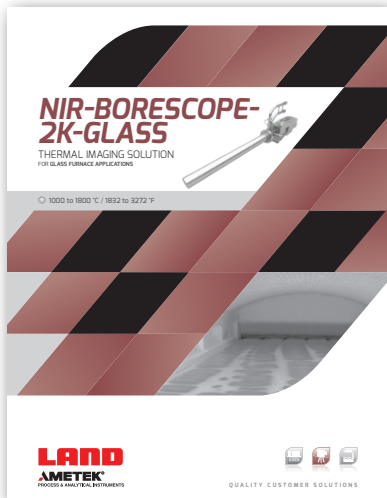
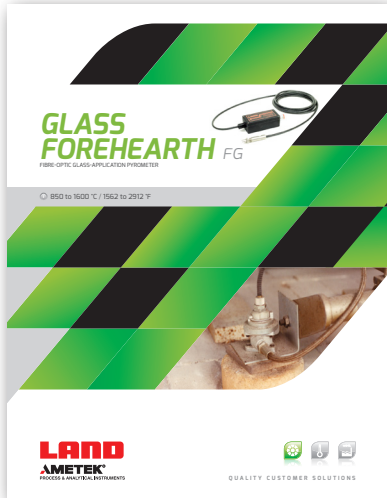


A highly flexible range of high-precision flue gas oxygen analysers developed specifically for combustion analysis and control applications.

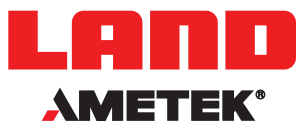
# TEMPERATURE MEASUREMENT SOLUTIONS FOR CONTAINER GLASS



Our global service centres provide after-sales services to ensure you get the best performance from your system. This includes technical support, certification, calibration, commissioning, repairs, servicing, preventative maintenance and training. Our highly trained technicians/engineers can also attend your site to cover planned maintenance schedules and repair emergency breakdowns.



DOWNLOAD THE BROCHURES AT: [WWW.AMETEK-LAND.COM](http://WWW.AMETEK-LAND.COM)



## CONTACT US



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We are fully committed to Quality Assurance. See all our accreditations at [AMETEK-LAND.COM/QUALITY](http://AMETEK-LAND.COM/QUALITY)

MARCOM0664

Temperature measurement solutions for container glass app note.

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