NIR-BORESCOPE-2K-GLASS

THERMAL IMAGING SOLUTION

FOR **GLASS FURNACE APPLICATIONS**

1000 to 1800 °C / 1832 to 3272 °F

LAND

AMETEK®

PROCESS & ANALYTICAL INSTRUMENTS

QUALITY CUSTOMER SOLUTIONS

NIR-B-2K-GLASS

THERMAL IMAGING SOLUTION

AMETEK LAND HAS BEEN MANUFACTURING PRECISION MEASURING EQUIPMENT SINCE 1947.

We are specialists in non-contact temperature measurement and combustion monitoring with our products finding applications across diverse industries such as steel and glass making, power generation, cement manufacture and hydrocarbon processing.

As part of AMETEK Process & Analytical Instruments Division since 2006, our customers benefit from the worldwide AMETEK sales and service team.

The NIR-Borescope-2K-Glass (NIR-B-2K-Glass) is a short-wavelength radiometric infrared borescope imaging camera, designed to produce high definition (1968 x 1476 pixels) thermal images, along with providing accurate temperature measurements from any of the three million temperature points in the image.

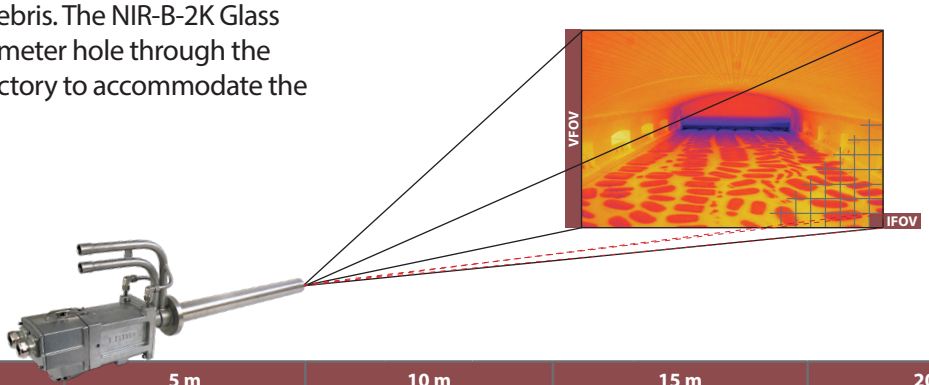
The camera measures temperatures in the range 1000 to 1800 °C (1832 to 3272 °F) and is suitable for float glass, container glass, borosilicate glass, and fibre glass melt furnaces.

With the NIR-B-2K-Glass, it is possible to accurately and continuously profile the temperature of the entire furnace, including glass, refractory walls and port arches, and the crown/roof, with only a small opening in the wall. Thermal imaging inside refractory-lined furnaces, boilers and glass melt tanks normally requires the plant operator to cut large openings in the refractory to enable viewing of the critical area. This can cause significant wasted energy from heat loss and can be difficult to keep the opening free from debris. The NIR-B-2K Glass only requires a small diameter hole through the furnace casing and refractory to accommodate the wide-angle lens tip.

The NIR-B-2K-Glass offers significant advantages over the traditional methods of furnace monitoring. It offers continuous, labour free monitoring whereas manual visual inspection can take hours to complete, is not continuous and unreliable due to user error. A visual camera does not provide a temperature reading, with the NIR-B-2K-Glass you can see the process and measure the temperature at any point within the pixel image and set alarms to detect air and glass leaks affecting the temperature and efficiency of the furnace.

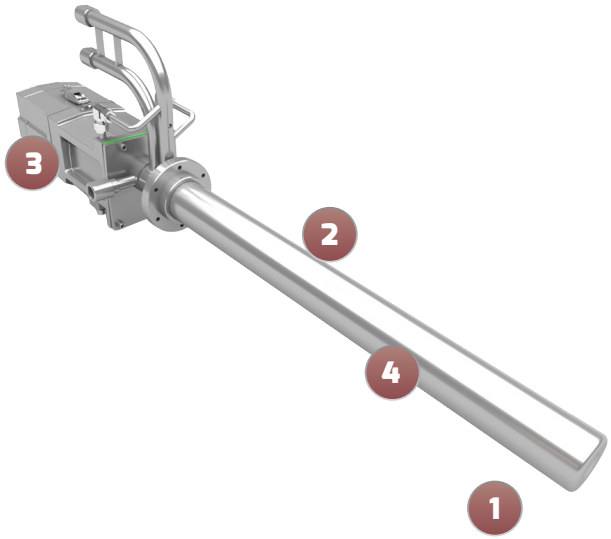
With the new IMAGEPro software it's region of interest (ROI) can be user-defined and trended, showing max, min, and average temperatures and by using the included Playback view you can replay events and stop at any frame to measure multiple temperatures at the same point in time, particularly useful if you are measuring port arch temperatures at the moment of reversal.

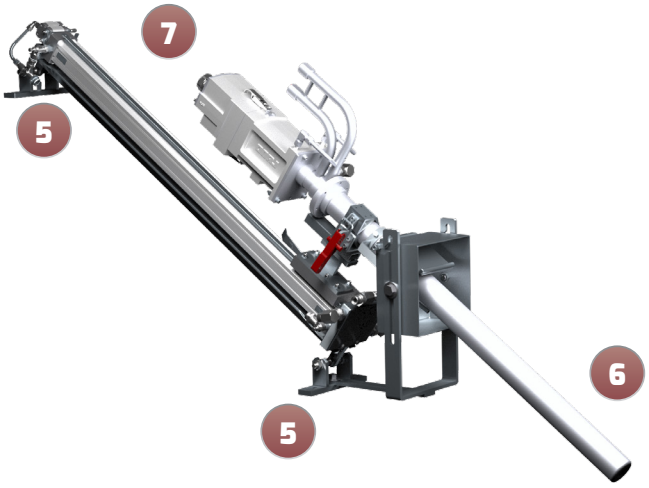
FIELD OF VIEW OPTICS

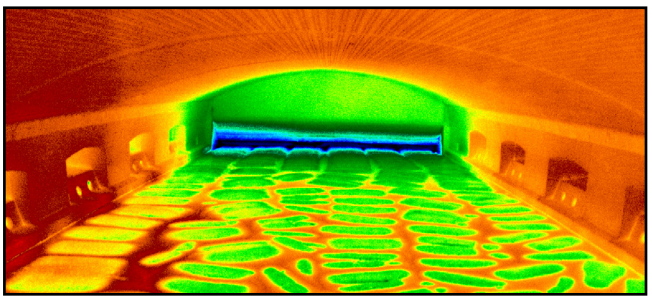


Distance	1 m			5 m			10 m			15 m			20 m		
	Width	Height	IFOV	Width	Height	IFOV	Width	Height	IFOV	Width	Height	IFOV	Width	Height	IFOV
95° x 71°	2.1 m	1.4 m	1.1 mm	10.9 m	7.1 m	5.5 mm	21.8 m	14.2 m	1.1 mm	32.7 m	21.3 m	16.6 mm	43.6 m	28.5 m	22.2 mm

SPECIFICATION AND DESIGN







1: WIDE VIEWING ANGLE
95° x 71° view maximises the area monitored giving a crystal clear and unparalleled internal tank thermal view.

2: RANGE OF PIXEL RESOLUTIONS
Provide accurate real-time temperature measurements from any selected area of interest or individual points up to 3 million pixels.

3: INTEGRATED AIR PURGE
The unique air purge design maintains a clean lens in harsh process environments. Plus, with built-in water cooling, the system minimises air and water flowrate requirements.

4: PROBE LENGTHS
A 3' (915 mm) borescope is supplied as standard, however other probe lengths available upon request.

5: MOUNTING
Two basic options are available including a securely mount directly on the furnace with a flange or combining it with one and an automatic retraction system to retract the system safely in case of cooling or purging failures.

6: THERMOCOUPLE AT NIR-B TIP
Gives the operator an alarm or offers automatic retraction for removing the instrument to prevent damage if maximum temperatures are exceeded.

7: AUTO-RETRACT SYSTEM
Designed to auto-retract and protect the thermal imager from damage by overheating in the event of loss of water flow, air pressure, electricity supply or high borescope tip temperature alarm.

FEATURES AND BENEFITS

HIGH-TEMPERATURE MEASUREMENT ACCURACY
Enables optimum process control through enhanced thermal imaging.

SHORT WAVELENGTH SENSOR
Low sensitivity to emissivity changes.

IMAGEPRO SOFTWARE
Data points, regions of interest, automated alarms, long term data trending and system inter-connectivity (DCS, Modbus).

REAL-TIME THERMAL DATA COMBINED WITH HIGH-RESOLUTION VISUAL IMAGE
Allows true batch control, flame optimization and the opportunity to improve energy efficiency without degrading the refractory lifetime.

24 HOUR, 7 DAY MONITORING
Shutterless operation guarantees accurate, reliable data with no blind time.

EXPORT LICENSE FREE
Rapid, hassle-free shipping.

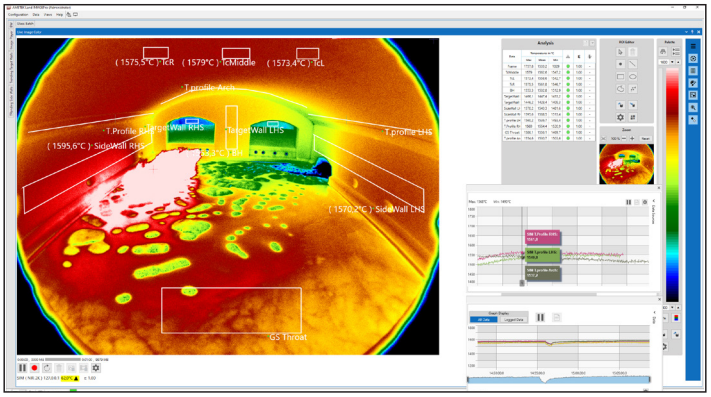
NIR-B-2K-GLASS

THERMAL IMAGING SOLUTION

IMAGEPRO-GLASS is an advanced application dedicated software specialised for glass melt tank temperature measurement, batch monitoring and flame analysis. It is integrated into the powerful IMAGEPro software as an option which can be purschased additionally.

IMAGEPRO-GLASS

The innovative IMAGEPRO-GLASS software is an advanced image processing software for controlling, monitoring, analysing and capturing imager data.



IMAGEPRO-GLASS is a Windows PC software system that enables configuration of imager, display properties and advanced temperature analysis options and supports multiple simultaneous imagers. Free 30-day trial available for extensive testing.

Able to monitor and control up to sixteen imagers, IMAGEPRO-GLASS offers real-time analysis for thermal imager ranges. Giving users exceptionally detailed control over their thermal imaging measurements, IMAGEPRO-GLASS enhances application measurements.

IMAGEPRO-GLASS IS FOR UP TO 16 THERMAL IMAGERS*

KEY BENEFITS OF IMAGEPRO-GLASS

EXTENSIVE FUNCTIONALITY - extensive control and analytical functions for exceptional process control, including multiple free defined ROIs (regions of interest).

FLEXIBLE COMMUNICATIONS - enables exchange of information using a simple cross-platform Modbus TCP protocol, analogue signals or alarm output via I/O modules.

REAL-TIME RESULTS & ANALYSIS - powerful image processing allows for real-time monitoring and analysis of the thermal information provided by up to 16 imagers.

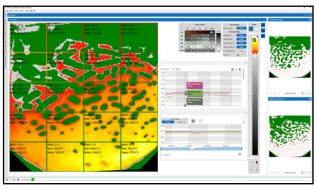
FLEXIBLE INTERFACE LAYOUT - allows complex configuration and arrangement of windows by the user across multiple monitors, which is stored and opens automatically on restart.

ADJUSTABLE WINDOWS - can be docked, re-sized and made floatable to suit specific needs.

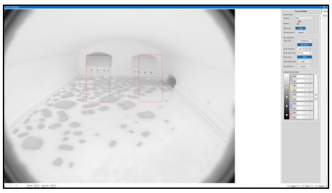
TOOLS & DISPLAY - can be displayed and hidden as needed to maximise screen space.

USER LEVELS - ensures only those with password access can change system configuration.

ADVANCED BATCH CONTROL - monitoring and controlling the batch distribution and flow 24/7 online.

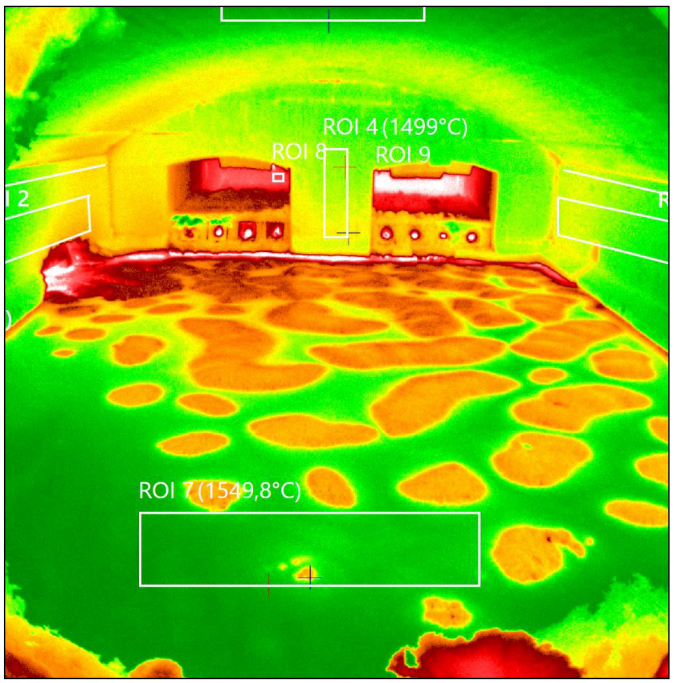


FLAME ANAYSIS - monitoring and analyse furnace flames, distribution and presence.



BATCH COVERAGE AND CROWN TEMPERATURE MONITORING

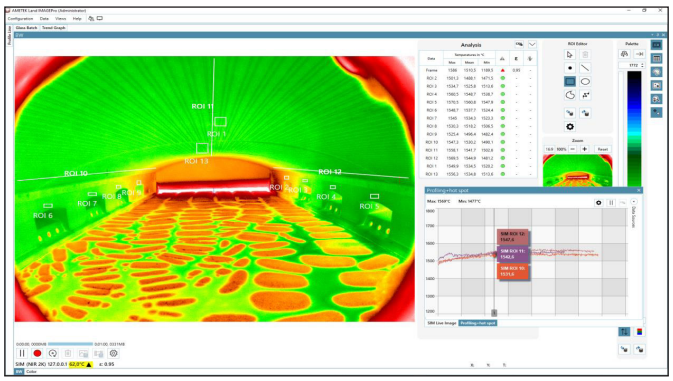
Variation in batch coverage has a direct impact on furnace temperatures. The temperature clearly drops when the batch moves to the front of the furnace, and within the IMAGEPro-Glass software, ROIs can be used to set alarms for the furnace DCS and facilitate better control of the batch coverage by adjusting the batch charging direction and length.

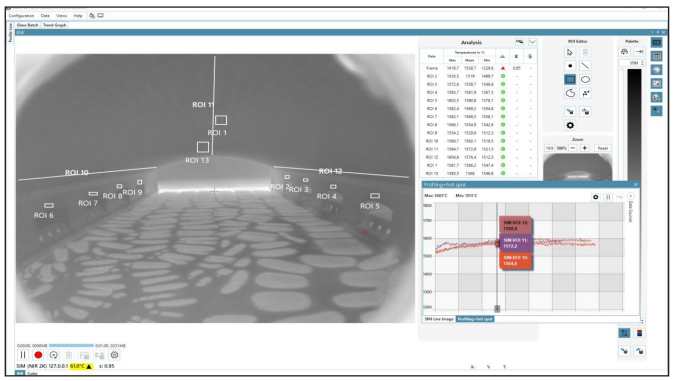


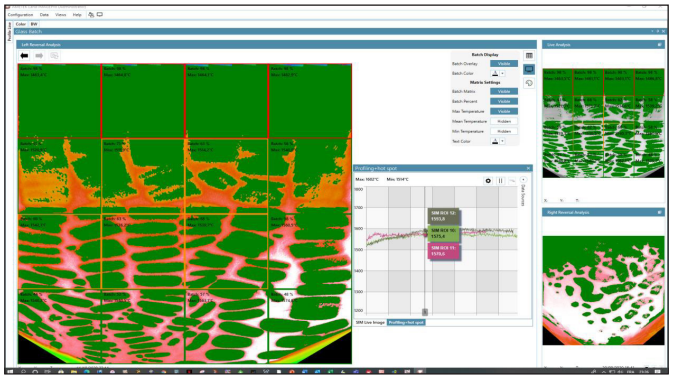
Key batch monitoring features include:

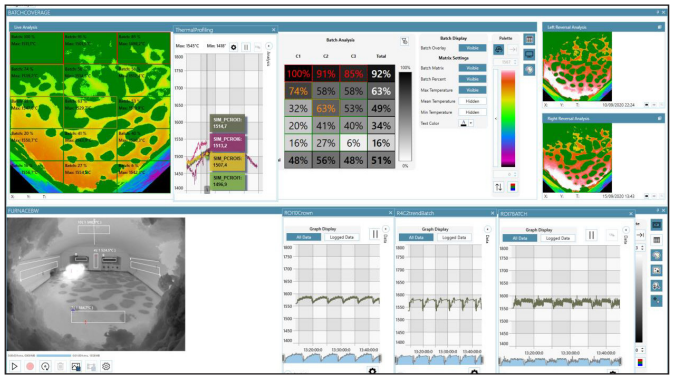
- See a top 2D view of the melter
- Set an ROI in front of the throat
- Configure a batch ROI in the coverage melting grid near the throat
- Adjust manually batch length

By monitoring the batch coverage near the throat, this critical ROI can help avoid large amounts (below 15%) of batch entering this area even for large pull rates and prevent production of glass defects.









NIR-B-2K-GLASS

THERMAL IMAGING SOLUTION

MONITORING EFFICIENCY

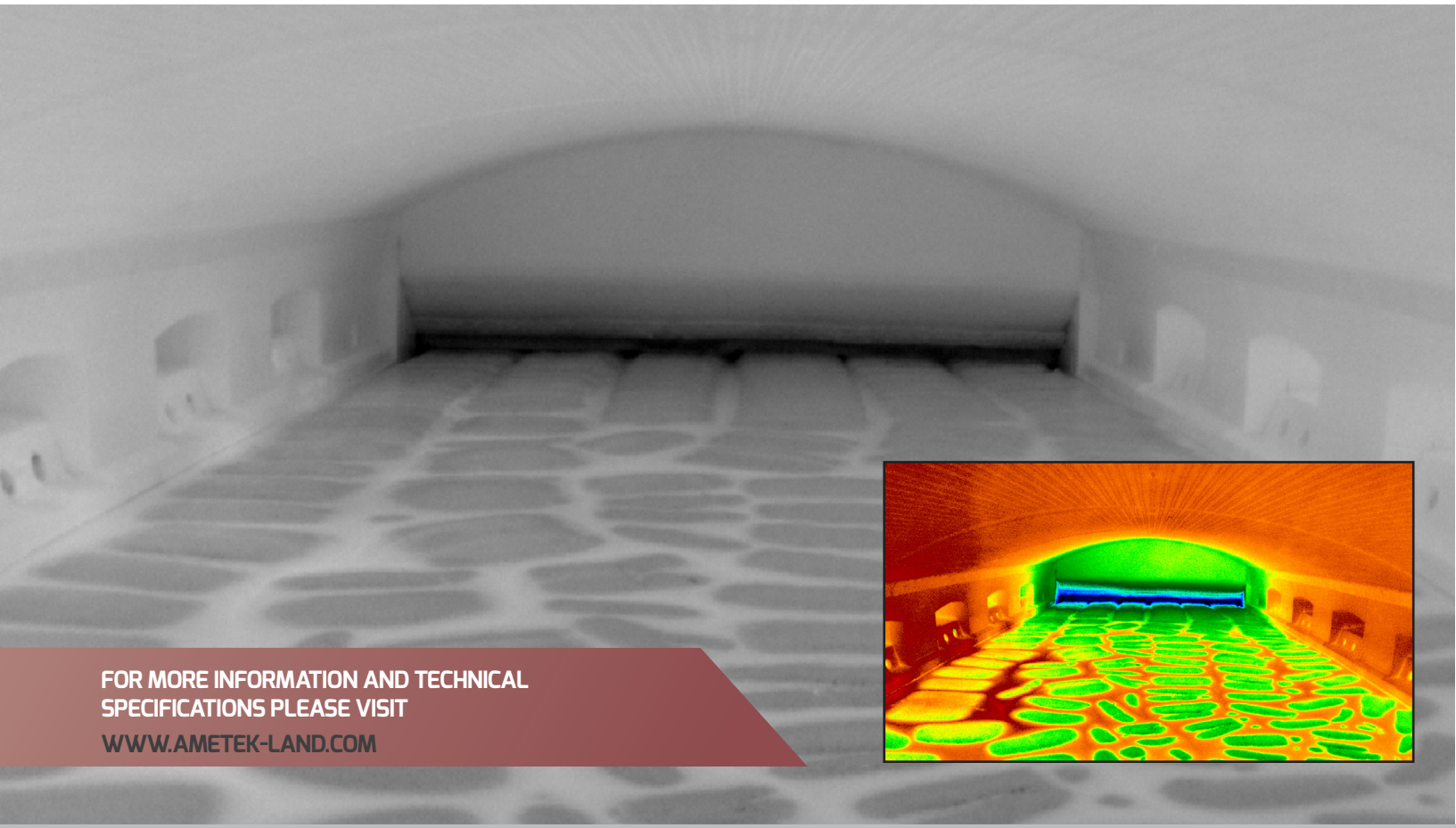
The melt tank experiences the highest temperatures of the glass production process. Real-time monitoring of these temperatures is vital to the efficiency of the application and the quality of the product. It is important to be able to study the entire tank interior to detect any structural damage.

Reversals of the furnace's burner and exhaust ports take place every 20-30 minutes, making traditional, slower-response thermal profiling difficult and time-consuming, with significant risk of human error. Real-time analysis is required to ensure overheating is avoided and the hot spot is located at the optimum point for fuel-efficiency.

The condition of the furnace refractories is vitally important to safety and process efficiency, especially towards the end of the life of the tank. Deterioration of the refractories can increase fuel costs and may cause glass breakouts or refractory failure.

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. Early detection of glass breakouts enhances plant safety.

Monitoring the condition of the melt tank enables interior damage to be detected and repaired, improving energy efficiency and reducing unplanned downtime. Thermal measurements in the melt tank also support process efficiency and consistent glass quality.



FOR MORE INFORMATION AND TECHNICAL SPECIFICATIONS PLEASE VISIT

WWW.AMETEK-LAND.COM

RETRACTION SYSTEMS

AUTO-RETRACT SYSTEMS PROTECT THE THERMAL IMAGING CAMERAS FROM DAMAGE BY OVERHEATING IN THE EVENT OF LOSS OF WATER FLOW, AIR PRESSURE, ELECTRICITY SUPPLY OR HIGH BORESCOPE TIP TEMPERATURE ALARM

LAND PNEUMATIC AUTO REATRCTION SYSTEM (LPAR)

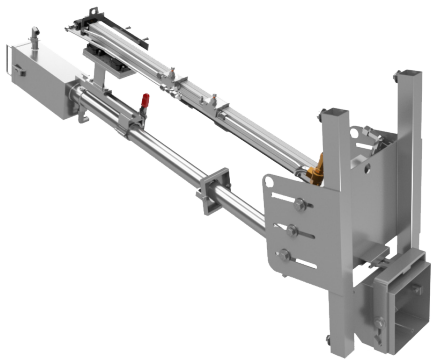
THE RECOMENDED RETRACTION SYSTEM FOR ANY AMETEK LAND AIR-COOLED BORESCOPE

The system comprises borescope thermal imaging camera, water cooled and air purged borescope tube and imager protective housing, AMETEK Land pneumatic auto retraction system, 25m or 50m high temperature cable set (imager to control unit), PCU pneumatic control unit, mounting and adjusting frame assembly with media bar, remote control unit with cable, high-temp ethernet and power cables, hose assembly and IMAGEPro software.

LPAR can be mounted on the optionally available AMETEK Land base frame or a customer provided option.

THE LAND PNEUMATIC AUTO REATRCTION SYSTEM (LPAR) IS THE AMETEK LAND CHOICE FOR GLASS MELT TANK APPLICATIONS.

PNEUMATIC AUTO-RETRACT (PAR) SYSTEM



The system comprises borescope thermal imaging camera, water cooled and air purged borescope tube and imager protective housing, pneumatic auto retraction system, 25 m high temperature cable set (imager to control unit), control unit and media control box, local control box (mounted next to thermal camera auto retraction system), local media bar complete with 6 ball valves, PTFE hoses one set (ambient temperature 200 °C) (protective housing to media bar), air filter set and IMAGEPro software.

THE ELECTRICAL AUTO-RETRACT (AR) SYSTEM IS AVAILABLE ON REQUEST

NIR-B-2K-GLASS

THERMAL IMAGING SOLUTION

SPECIFICATIONS

CAMERA UNIT	
Measurement Range:	1000 - 1800 °C / 1832 - 3272 °F
Pixel Resolution:	1968x1476
Spectral Response:	1 µm
Frame Rate:	15 fps (full frame mode)
Detector:	FPA - Semiconductor
Optic (HFOV x VFOV):	95° x 71°
Optic (IFOV):	0.84 mrad (95° x 71°) 2.53 mrad
Focus Range:	1 m to infinity
Probe Diameter:	Ø 61mm / Ø 2.4"
Probe Lengths:	915 mm (36 in) with AR or PAR; 610 mm (24 in) with AR
Mountings:	Choice of 3" ANSI 150 RF Flange & Gasket or PN16 DN80 Flange & Gasket with a 12" standpipe
Protection Window:	Sapphire
Accuracy:	1% of reading (K)
Repeatability:	1 K
Dimensions:	254 x 560 x 810 mm* (* or 1120 or 1420 mm); 10 x 22 x 32 in** (** or 44 or 56 in)
Power Rating:	24 V DC, 4W
Weight:	15 kg / 33.07 lbs (for 24" variant)
Environmental Rating:	IP65 / NEMA 4
CAMERA SUPPLY	
Connections:	Gbit Ethernet; Local connection interface between camera unit and image processing system
Service:	Water, instrument air, power input, located to the rear of the enclosure
POWER SUPPLY UNIT (PSU)	
Components:	Power supply, Ethernet communications (switch), Fibre optic data connection (option)
IP Rating:	IP65 / NEMA 4
Size:	380 x 380 x 211 mm / 15" x 15" x 8.3"
Weight:	15 kg (33.07 lbs)
UL Approval:	Listed to UL508A & CSA-C22.2 No. File Number E499440
IMAGE PROCESSING	
Software:	IMAGEPro-Glass Advanced glass application processing software
Workstation:	PC - Workstation (option)
Interfacing:	Open Data Interface, Modbus TCP, Moxa I/O unit
ACCESSORIES	
Optional Accessories:	Power supply, cables, water-cooled/purged mounting and tube, software, workstation, auto-retraction systems

NIR-BORESCOPE-656
NIR-BORESCOPE-2K

NIR-BORESCOPE
THERMAL IMAGING
SYSTEMS OVERVIEW

NIR-B-640-EX
FORMERLY: NIR-BORESCOPE-3XR

DISCOVER HOW OUR BROAD RANGE OF NON-CONTACT TEMPERATURE MEASUREMENT AND COMBUSTION & EMISSIONS PRODUCTS OFFER A SOLUTION FOR YOUR PROCESS

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