

LAND



Landscan LSPHD

A series of linescanning systems designed specifically for use in the glass industry. High definition thermal imaging from a combination of fast scan speeds (up to 150Hz) and high resolution optics (1000 samples per scan line).



Cyclops Portable Thermometers

Land Cyclops 100B & 390B are dedicated high precision, portable infrared thermometers, designed for accurate measurement in the temperature range 450 to 3000 °C / 842 to 5432 °F.



Model FG

The Fibroptic Model FG has been designed specifically for use within the glass industry - particularly on the forehearth and working end. Its output can be linked directly to readout or control equipment.

Intelligent Scanning

Intelligent scanning solutions aim to solve problems by providing more than just a measurement. Land is able to provide a custom solution according to your requirements; this includes custom temperature ranges, application specific mountings, and custom communications protocols.

Non-contact Temperature Measurement Solutions for the Flat Glass Industry

Flat Glass Temperature Measurement Solutions

LAND

Land Instruments International Ltd • Dronfield S18 1DJ • England
Email: land.infrared@ametek.co.uk • www.landinst.com • Tel: +44 (0) 1246 417691 • Fax: +44 (0) 1246 410585

AMETEK Land, Inc. • 150 Freeport Rd • Pittsburgh, PA 15238 • U.S.A.
Email: irsales@ametek.com • www.ametek-land.com • Tel: +1 (412) 826 4444 • Fax: +1 (412) 826 4460

For a full list of international offices, please visit our website.



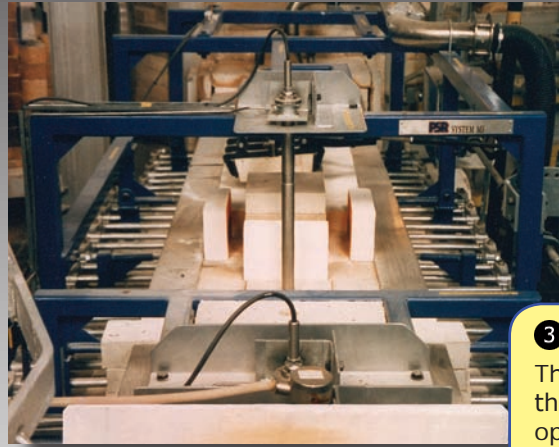
An **AMETEK** Company

Applies in the UK

Applies in the USA

An **AMETEK** Company

Measurement Locations



1 Regenerator

Temperature measurement is essential for this area of the tank. Infrared thermometers provide a long-term, cost effective and more reliable measurement than thermocouples.

Solution: **Model FG**



2 Port Arch

Measurement of the port arches, especially in cross-fired furnaces, can provide important information on basic firing conditions.

Solution: **C100B / C390B**

3 Tank Roof

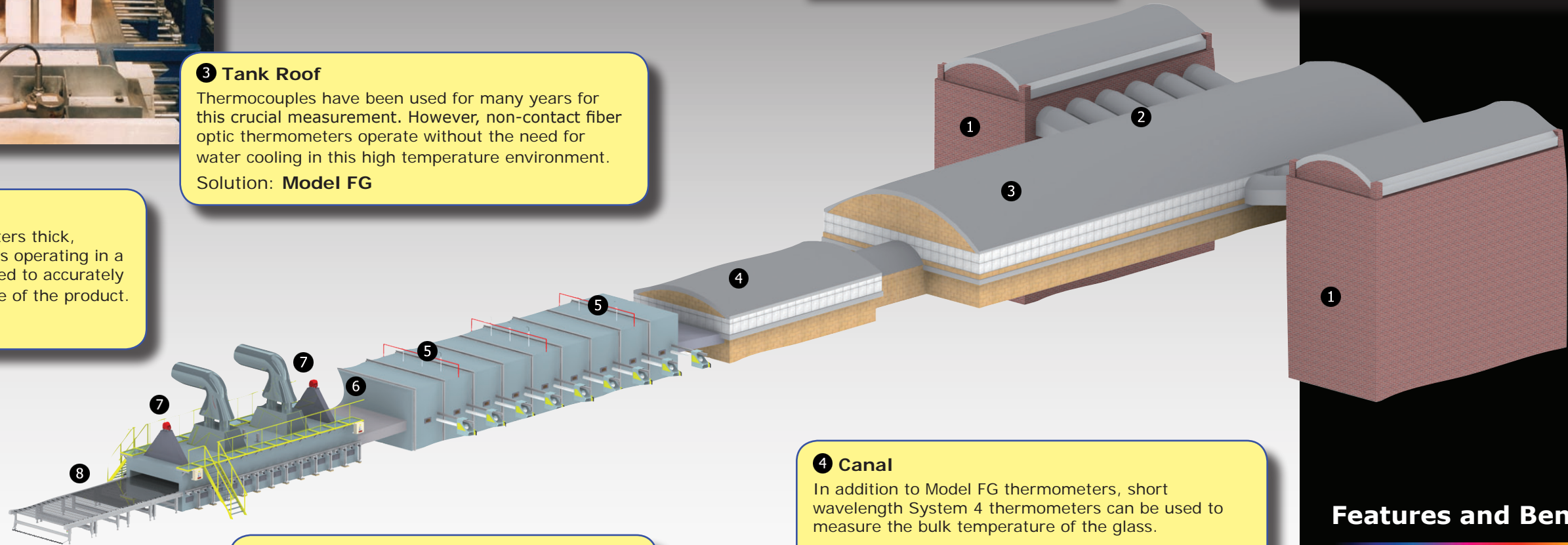
Thermocouples have been used for many years for this crucial measurement. However, non-contact fiber optic thermometers operate without the need for water cooling in this high temperature environment.

Solution: **Model FG**

5 Tin Bath

When glass is just a few millimeters thick, selected waveband thermometers operating in a narrow band around 5µm are used to accurately measure the surface temperature of the product.

Solution: **FLT5A**



4 Canal

In addition to Model FG thermometers, short wavelength System 4 thermometers can be used to measure the bulk temperature of the glass.

Solution: **Model FG**

6 Break Detector

Measurement here is used to highlight any breakages of the glass. Acting as a simple 'presence detector', a thermometer or linescanner placed at this point aids the complete automation of the process.

Solution: **RT80**

7 Lehr 8 Lehr Exit

As the rate of cooling in the Lehr is so important, frequent accurate measurement of the temperature profile is critical. The most detailed Lehr temperature profiles are generated with a Landscan system utilizing the application dedicated LSP5 FL. This high speed 5µm linescanner, when integrated as part of a multihead linescanning system provides unprecedented levels of information and control of glass temperatures in the Lehr.

Solution: **LSPHD 5FL**



Features and Benefits

- Simple Installation
- Fully Configurable Alarms
- Very Low Maintenance
- Data Exchange
- Suitable for All Coatings
- Designed for Harsh Industrial Environments

Measurement Location	Solution		
	Portable	Fixed	Process Imager
1 Regenerator	C100B / C390B	Model FG	
2 Port Arch	C100B / C390B	Model FG	
3 Tank Roof	C100B	Model FG	
4 Canal		Model FG	
5 Tin Bath		FLT5A	LSPHD 5FL
6 Break Detector		RT80	
7 Lehr		FLT5	LSPHD 5FL
8 Lehr Exit			LSPHD 5FL

Individual thermometer datasheets are available on request

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APPLICATION DEDICATED PRODUCT

FLOAT LINE THERMOMETER - FLT5A

In order to achieve consistent product quality on glass float lines, the temperature across the width of the glass must be kept as uniform as possible. This applies throughout the process: from the initial floating and forming in the bath, to the cooling and annealing sections in the Lehr.

Accurate temperature measurement is vital in ensuring uniformity across the entire width of the glass. The new Land **FLT5A** is designed specifically for use in float lines. **FLT5A** measures glass surface temperature in the range 250 to 1100°C, with excellent precision and long-term stability.

Features

- 250 to 1100°C temperature range
- 4.8 to 5.2µm spectral response
- 50:1 optical field of view
- Compatible with full range of Land System 4 mountings and accessories
- Loop powered, 4 to 20mA output

In the past, Land has specified SOLO 5 instruments for float line applications. The **FLT5A** supersedes SOLO 5, offering improved performance from an appreciably more cost-effective and user-friendly package.

The **FLT5A** measures temperatures from 250 to 1100°C, reducing the number of different instruments on the line.

It has exactly the same spectral response as the SOLO 5 (4.8 to 5.2µm) - i.e. it has the same low "penetration" into the glass and the same insensitivity to atmospheric humidity.

The thermometer features 50:1 optics, fixed focus at 1 metre, with 98% energy guaranteed from within the 20mm target spot.

The thermometer is quickly demountable from a cooling jacket and is compatible with a comprehensive range of mountings and accessories, enabling use in the most hostile of environments.

The thermometer operates on a two-wire, 4 to 20mA current loop and is compatible with industry-standard indicators and recorders.



Photograph shows installation on a pattern glass plant

Land Instruments International • Dronfield S18 1DJ • England • Tel: (01246) 417691 • Fax: (01246) 410585
Email: infrared.sales@landinst.com • Internet: www.landinst.com

Land Instruments International • 10 Friends Lane • Newtown, PA 18940-1804 • U.S.A. • Tel: (215) 504-8000
Fax: (215) 504-0879 • Email: irsales@landinstruments.net • Internet: www.landinstruments.net

France
Land Instruments Sarl
Tel: (1) 34 62 05 45 • Fax: (1) 30 56 51 12
Email: commercial@landinst.fr

Germany
Land Instruments GmbH
Tel: 02171/7673-0 • Fax: 02171/7673-9
Email: infrarot@landinst.de

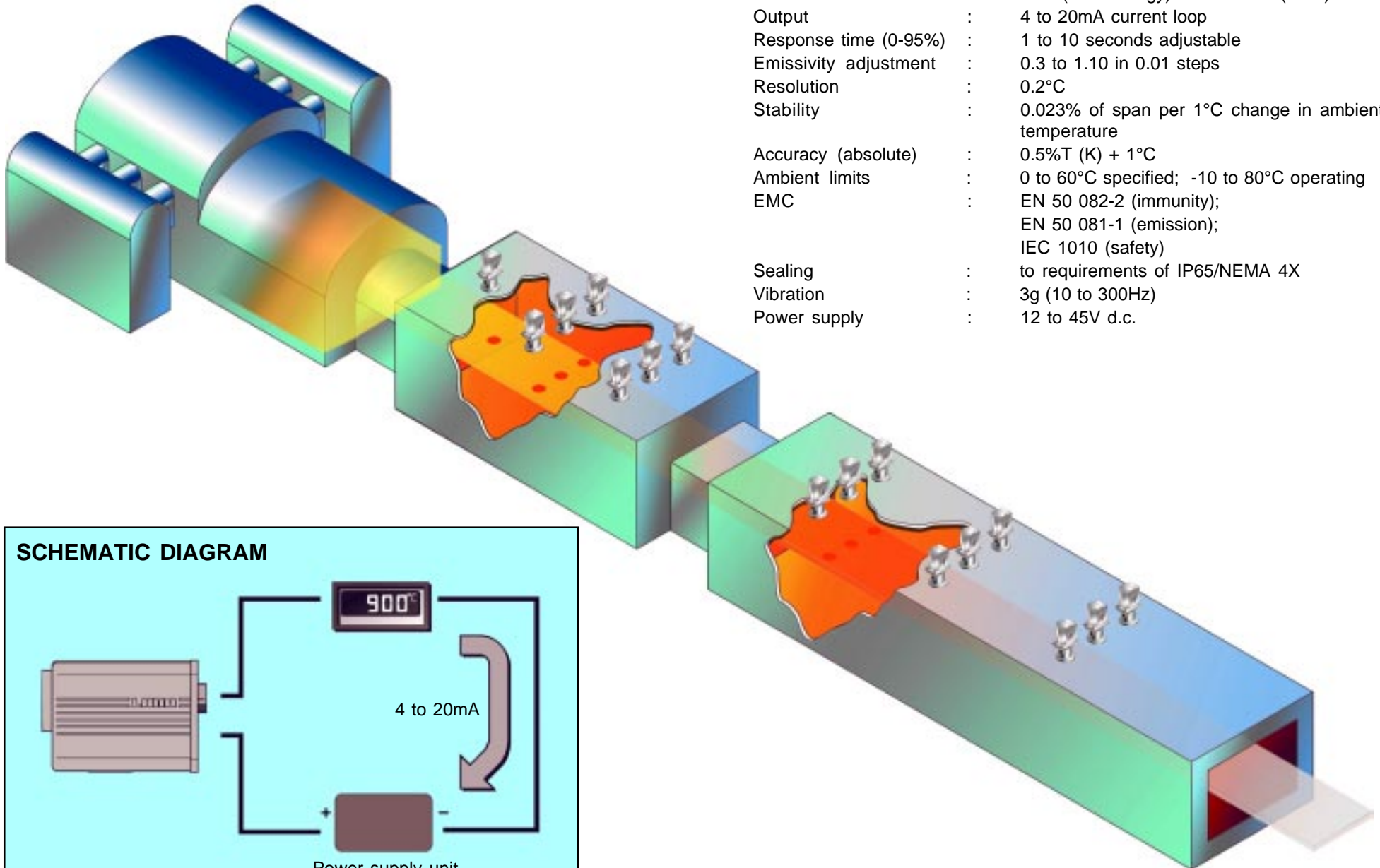
Italy
Land Instruments Srl
Tel: 02/99040423 • Fax: 02/99040418
Email: infrared@landinst.it

Japan
Land KK
Tel: 06 6330 5153 • Fax: 06 6330 5338
Email: ikeland@silver.ocn.ne.jp

Spain
Land Instruments International
Tel: 91 630 0791 • Fax: 91 630 2918
Email: land-infrared@landinst.es

Mexico
Land Instruments International
Tel: 52 55 9171 1466 • Fax: 52 55 9171 1477
Email: ventas@landinstruments.net

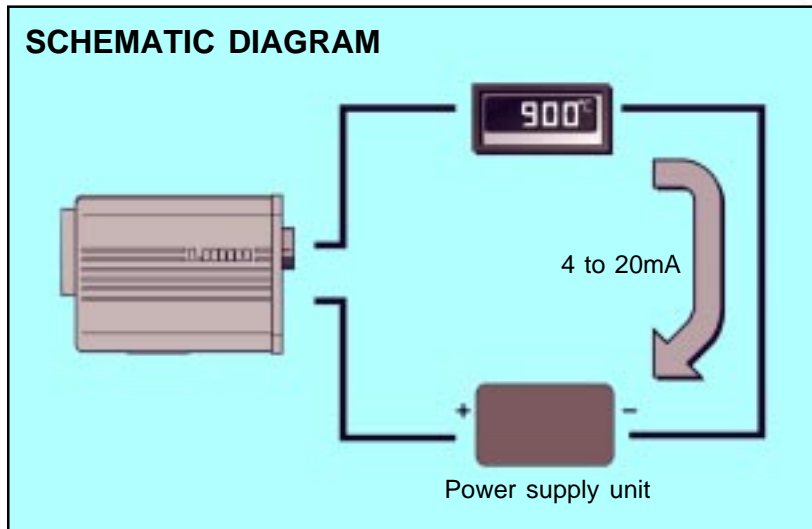
TYPICAL MEASUREMENT POINTS



SPECIFICATION

Range	:	250 to 1100°C
Spectral response	:	4.8 to 5.2µm
Field of view	:	50:1 (98% energy) at 1m focus (fixed)
Output	:	4 to 20mA current loop
Response time (0-95%)	:	1 to 10 seconds adjustable
Emissivity adjustment	:	0.3 to 1.10 in 0.01 steps
Resolution	:	0.2°C
Stability	:	0.023% of span per 1°C change in ambient temperature
Accuracy (absolute)	:	0.5%T (K) + 1°C
Ambient limits	:	0 to 60°C specified; -10 to 80°C operating
EMC	:	EN 50 082-2 (immunity); EN 50 081-1 (emission); IEC 1010 (safety)
Sealing	:	to requirements of IP65/NEMA 4X
Vibration	:	3g (10 to 300Hz)
Power supply	:	12 to 45V d.c.

SCHEMATIC DIAGRAM



Continuous product development may make it necessary to change these specifications without notice

LAND



SYSTEM 4

PROCESSORS AND SYSTEM OVERVIEW



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SYSTEM 4

LAND

For over 50 years, Land have been the world leaders in delivering solutions to temperature measurement problems.

The new family of products, combining unrivalled expertise and design know-how with the latest technology is...

SYSTEM 4

SYSTEM 4 gives you a choice of products which covers all applications, environments and budgets, ensuring premium performance at competitive prices. Compatibility and interchangeability of each product ensures maximum flexibility, both at time of purchase and subsequently for easy maintenance.

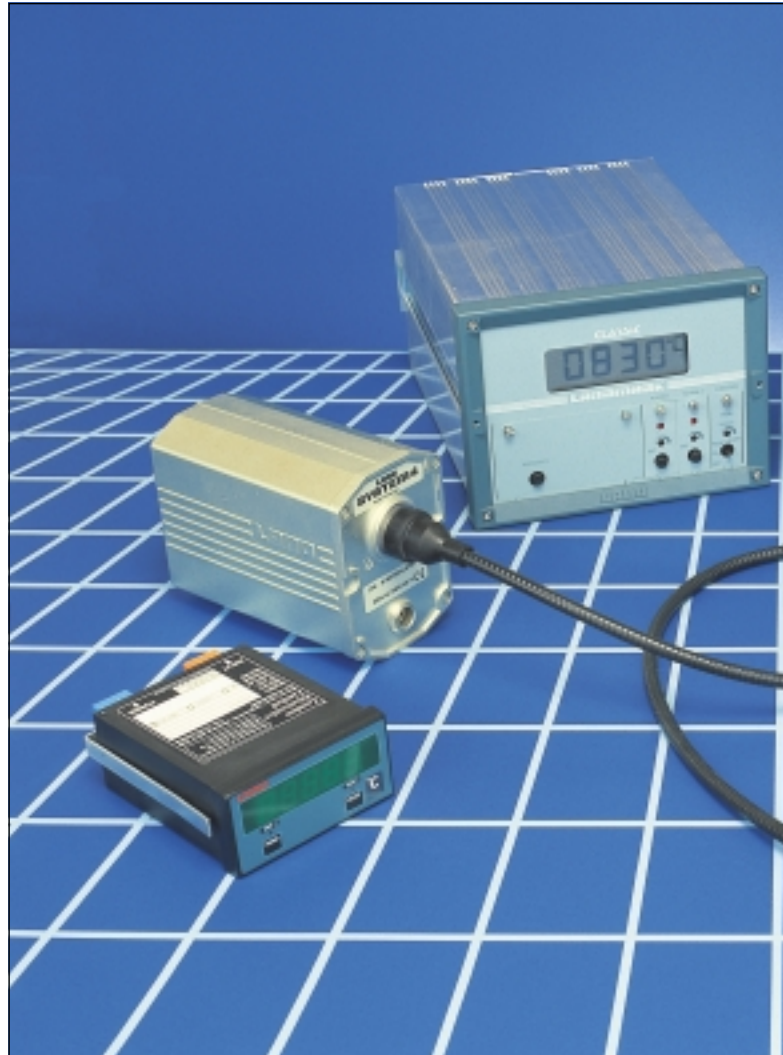
Non contact temperature measuring systems are designed for continuous quality and process monitoring and control in a wide range of industries. They can be used in a variety of applications such as metal production, processing, foundry and forging, glass, electronics, mineral processing and petrochemical where accurate measurement of temperature is vital.

No other method of temperature measurement offers the benefits of non contact infrared radiation thermometry.

- Infrared radiation thermometer systems measure continuously the temperature of hot, moving or normally inaccessible materials accurately and safely at a distance.
- Sensing heads do not require contact with the target object, and therefore cannot interfere with, damage or contaminate the product they are measuring.
- Thermometers do not remove heat or disturb the process being monitored and offer the only solution when the product is small, fragile or in a vacuum or controlled atmosphere.

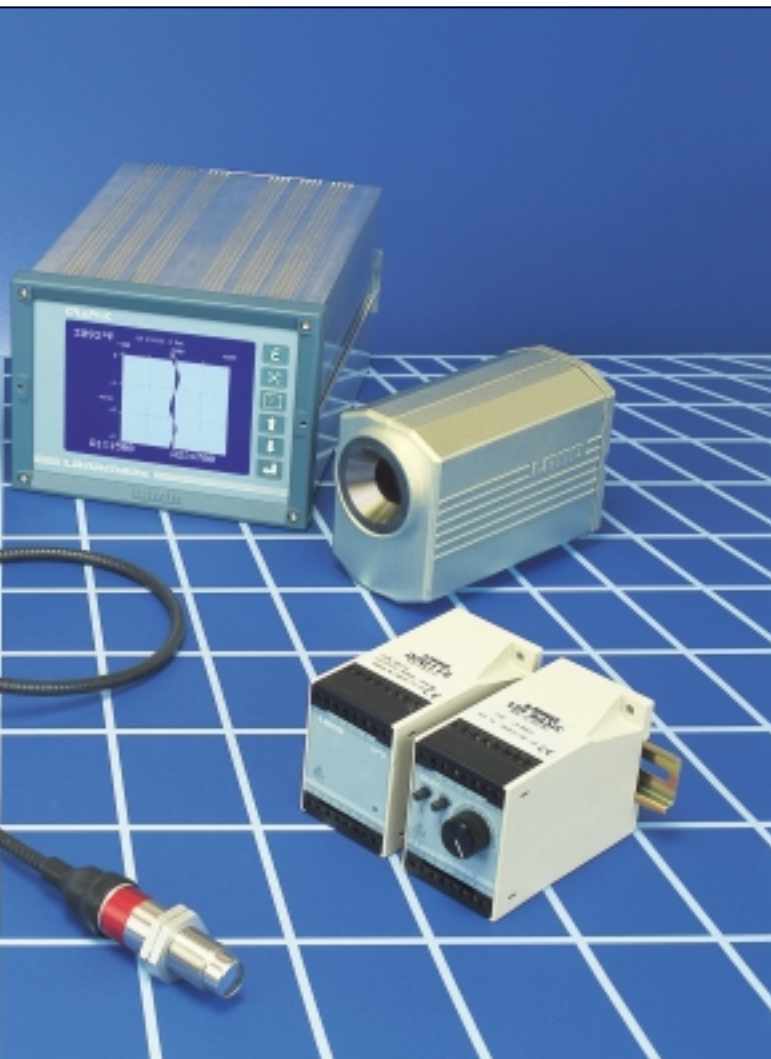
SYSTEM 4 gives you a wide choice of compatible items to ensure the system you buy is optimized to meet the needs of your application, budget and environment.

LANDMARK® processors are designed to produce the process control variables you need from ANY of the **SYSTEM 4** sensors. With this total compatibility, you are free to choose a processor to give the features and performance you need and select the sensor type best suited to the application. All **SYSTEM 4** processors and sensors are calibrated individually to guarantee interchangeability and hence easy maintenance for many years.



SYSTEM 4 offers an extensive, and expanding, range of Standard and Fibroptic thermometers, designed to cover all industrial non contact temperature measurement applications.





SYSTEM 4 includes an extensive range of mountings and accessories which provides protection and accurate alignment for both Standard and Fibroptic thermometers. All mountings permit quick and tool-free installation and removal of thermometers, keeping downtime to the absolute minimum.



PROCESSORS

The heart of any temperature measurement system is the signal processor. A **LANDMARK®** signal processor puts the controls of your system where you need them - panel mounted or DIN rail mounted, the choice is yours. **SYSTEM 4** uses high speed inputs, real time signal processing and flexible outputs to convert the output of each sensor into real process variables.

LANDMARK® GRAPHIC is the state-of-the-art, panel mounted signal processor, designed to control and process data from *any* **SYSTEM 4** Thermometer. The Multi-channel processor accepts, processes and displays inputs from *any combination* of up to four separate thermometers simultaneously - it is *not* multiplexed. Multiple outputs are provided which can be integrated directly into any process monitoring, recording or control system.

LANDMARK® GRAPHIC processors offer a variety of features and advanced time functions which present temperature data in a choice of displays and outputs to suit the particular application.

LANDMARK® GRAPHIC processors are rugged, and extremely versatile, utilizing the latest technology available, giving you more choice and more precision in the measurement of temperature.

For applications which do not require this high level of processor power, a simple alternative is available - **LANDMARK® CLASSIC**.

LANDMARK® CLASSIC can be used with any **SYSTEM 4** Thermometer. It displays the measured temperature and optional plug-in cards give you a choice of either a peak picker or averager time function, plus up to two alarm modules.

LANDMARK® TECHNIC is a high precision, DIN-rail mounted intelligent digital processor. Its features include adjustable emissivity/non-greyness, peak picker, averager, track and hold, alarm and 4 to 20mA outputs, and RS232C serial communications for set up via a PC.

LANDMARK® BASIC is a simple DIN-rail mounted signal processing unit, providing simple signal conditioning with economy and versatility.

THERMOMETERS

Infrared radiation thermometers do not require contact with the target object, so they cannot interfere with, damage, or contaminate the product they are measuring. They do not remove heat or disturb the process being monitored and offer the only solution when the product is moving, small, fragile, or in a vacuum or controlled atmosphere.

SYSTEM 4 Thermometers all feature temperature spans and operating wavebands selected to ensure optimum accuracy of measurement for each application.

Any **SYSTEM 4** thermometer, selected from the extensive range available, can be used with *any* **SYSTEM 4 LANDMARK®** processor, allowing you to build a temperature measurement system designed specifically to your application requirements.

Standard thermometers feature precision through-the-lens focusable optics which guarantee exact viewing and accurate measurement of the smallest of target areas.

Single wavelength thermometers are intended for both general purpose use as well as solving problems in specific applications.

Fibroptic thermometers are used to measure the temperature of materials where the target is difficult to access, and where high temperature or high magnetic fields prevent the use of other types of sensor.

Ratio thermometers are used in difficult environments containing steam, smoke, or dust, or where the target is small or does not completely fill the field of view.

For more details, refer to the 'System 4 Standard and Fibroptic Thermometers' Brochure

GRAPHIC

LANDMARK® GRAPHIC is the premier non contact temperature measurement system offering an extensive range of standard features and user benefits.

- Highest system accuracy
- High speed, high precision, real time signal processing
- Unique Multi-channel and Math Function options
- Modular, expandable system design
- Simple, user-friendly interface with large numeric and graphic displays
- Selectable time functions and alarm settings
- 0 to 20mA, 4 to 20mA and 1mV/° outputs to suit all industry control systems
- Optional Serial Communications

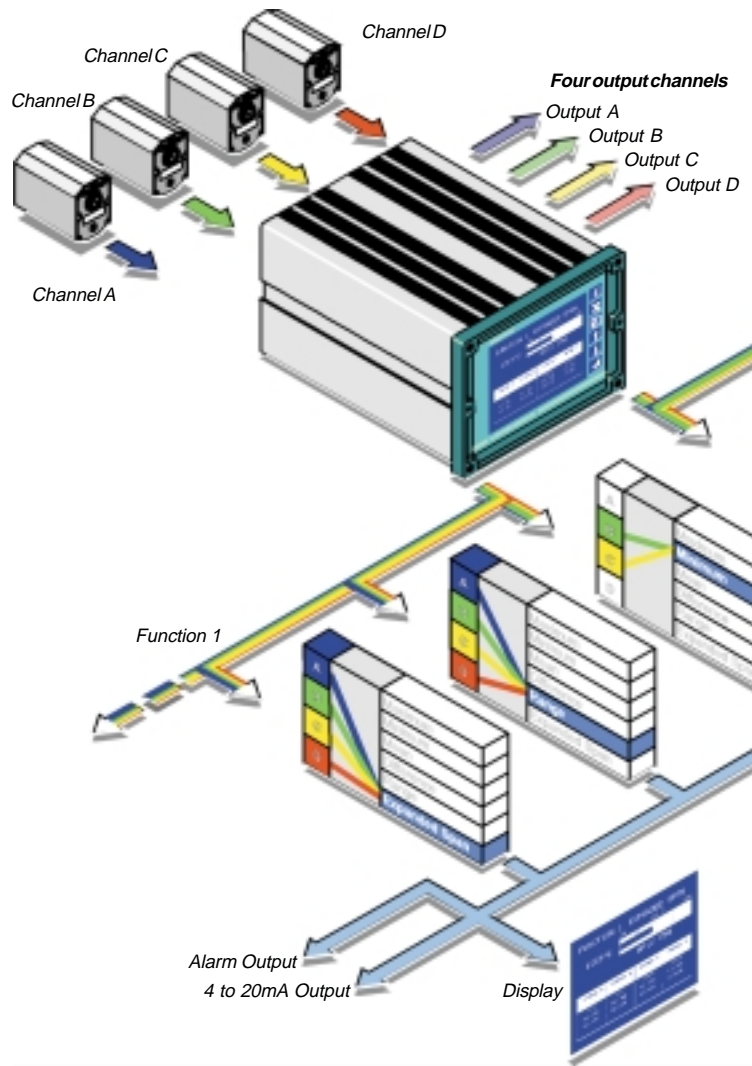
LANDMARK® GRAPHIC is a high precision, intelligent multiple microprocessor-based thermometer signal processor, designed to give the ultimate in process monitoring and control.

LANDMARK® GRAPHIC processors are multi-channel capable and can be configured to work with up to four different **SYSTEM 4** thermometers simultaneously.

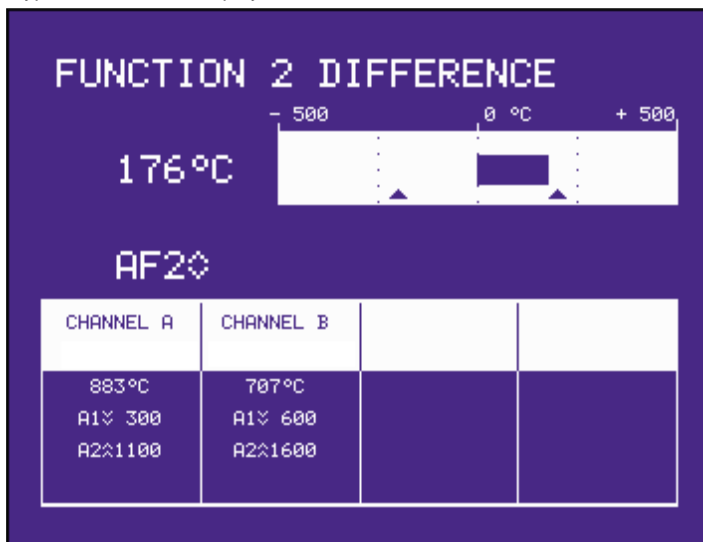
A Math Function option is available which applies user-configured math functions to the temperature measurement signals from the thermometers in the system.

The processor supplies power to each thermometer and the control signals required for either emissivity or non-greyness compensation. A large LCD display shows temperature and parameter variables, and system outputs.

A complete range of thermometer signal conditioning functions is provided including: peak picker, averager, track and hold, and alarm outputs.

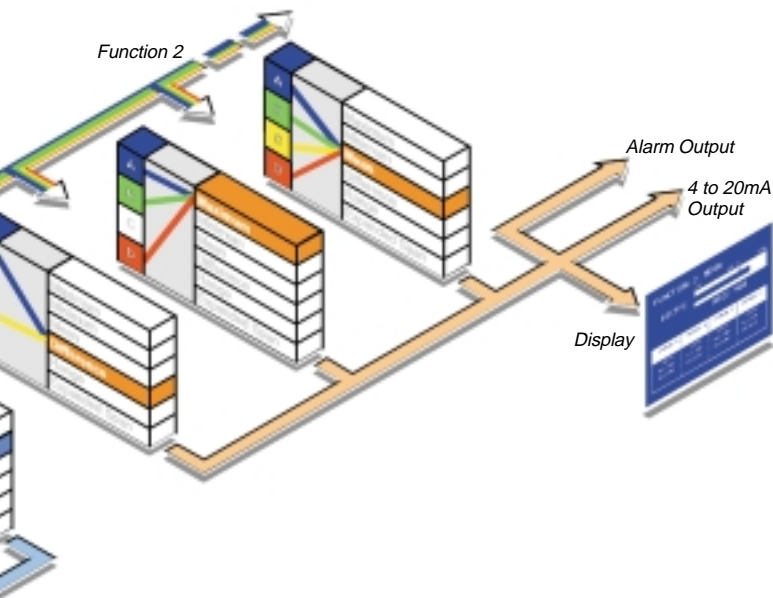


Typical Difference display



Landmark Graphic Processor fitted with Math function option





MULTI-CHANNEL CAPABILITY

The Multi-channel version of the **LANDMARK® GRAPHIC** processor provides up to four fully featured and independent temperature measurement systems in one package.

Any **SYSTEM 4** Thermometer can be connected to any input channel of the processor. Each channel is fully independent of the other, the inputs are *not* multiplexed. Additional channels may be added as required without affecting existing settings.

The processor can control all types of **SYSTEM 4** thermometer simultaneously (i.e. M1, R1, M6 etc.). The thermometers can have differing temperature ranges and even units (°C or °F).

Each channel has identical features to the single channel version; two analog outputs; a fully scaleable 0 to 20 or 4 to 20mA output, and a 1mV/° output. Two alarm outputs, both either High or Low activated, each with changeover relay, are provided on every channel card.

MATH FUNCTIONS

The unique multi-channel capability of the **LANDMARK® GRAPHIC** makes possible the, also unique, Math Function option. The processor accepts and compares up to four thermometer signals. The results are then output to the process control instruments in the form most suited to their requirements.

Two independent math functions are provided, each can calculate, display and output either the *Maximum*, *Minimum*, *Mean*, *Difference* or *Range* of temperatures measured by the selected thermometers in your system.

The *Expanded Span* function allows you to extend the span of your temperature measurement system from the minimum temperature of the thermometer with the lowest temperature range, to the maximum temperature of the thermometer with the highest temperature range.

Any **SYSTEM 4** Thermometer can be used in conjunction with the Math Functions. Up to *four* **SYSTEM 4** Thermometers can be connected to the processor and *two* Maths Functions can be configured. There are many different options for each Math Function, the same option can be selected for both functions if required.

Each Math Function is fully independent from the other, and both are independent from the four individual thermometer temperature output channels, standard to the Landmark Graphic Processor. Each function has both a current output, either 0 to 20mA or 4 to 20mA, and a single relay alarm output.

Math Functions have an almost unlimited range of uses in applications such as trending, cross-product uniformity, hot edge detection etc.

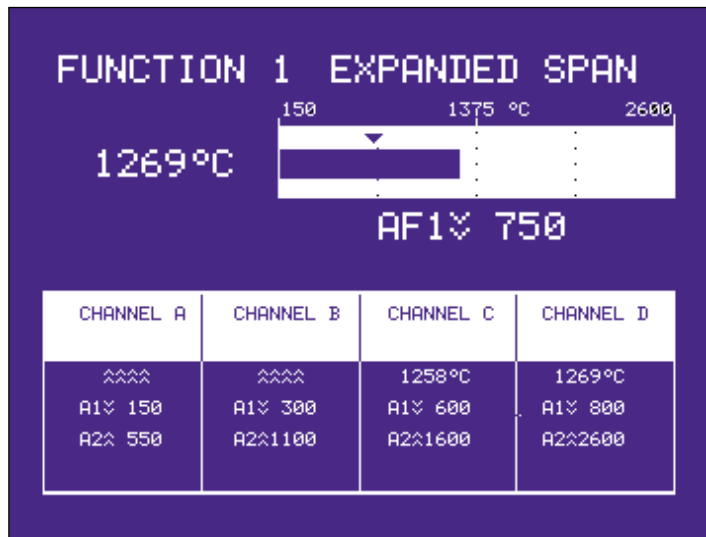
SERIAL COMMUNICATIONS

RS232C and RS485 serial communications are included with the Math Function option for the **LANDMARK® GRAPHIC** processor. A serial option is also available for users who do not require Math Functions.

Serial communications provide a remote interface between the processor and the process control computer. The serial communications circuitry connects directly to the internal microprocessor, via which it has access to all the data in the **LANDMARK® GRAPHIC**.

A single option card can input any parameter for any fitted channel card, and retrieve all existing settings along with the temperature data and system status information for any fitted channel card.

Typical Expanded Span display



GRAPHIC

EASY CONFIGURATION

LANDMARK® GRAPHIC is easy to configure using the text based, setup menu system which is switch selectable in different languages; English, French, German, Italian, Spanish and Japanese. Once the thermometer type has been entered, the processor automatically configures the appropriate input data. You can then select the required temperature span for the output current range, target emissivity/non greyness values and a range of time functions and alarm settings to match your exact needs.

All parameter settings are entry code protected.

Customer connections are also made as easy as possible, using two-part demountable terminal strips located on the rear panel. The modular construction of **SYSTEM 4** ensures that any system expansion is catered for with ease.

GRAPHICAL DISPLAY AND KEYPAD

The LCD panel features a large 320 x 240 pixel display, providing a high quality visual interface with the system.

The tactile keypad enables easy configuration of the processor with thermometer and process variables.

Help and error messages simplify setup and operation.

The cold cathode back-lit LCD panel provides a display of measured temperature in numeric or graphic formats, presenting useful profile or trending data. The LCD panel provides a choice of numeric, line chart, deviation chart or mixed displays.

Inputs from up to four individual thermometers can be displayed simultaneously as 4 channel numeric, 4 channel bar graph or 4 channel deviation bar graph.

REAL TIME PROCESSING

A fully featured and real time **Peak Picker** is used when measuring the temperature of intermittent targets, or where the hot target surface is obscured by cool areas such as scale on rolled steel.

Fast input sampling by the **Peak Picker**, combined with a built-in spike protection filter allows the processor to respond quickly to a rise in temperature signal from the thermometer.

The user settings also includes a threshold value which, together with On/Off delay timers and two distinct modes of operation, allow configuration to deal with the most demanding of applications.

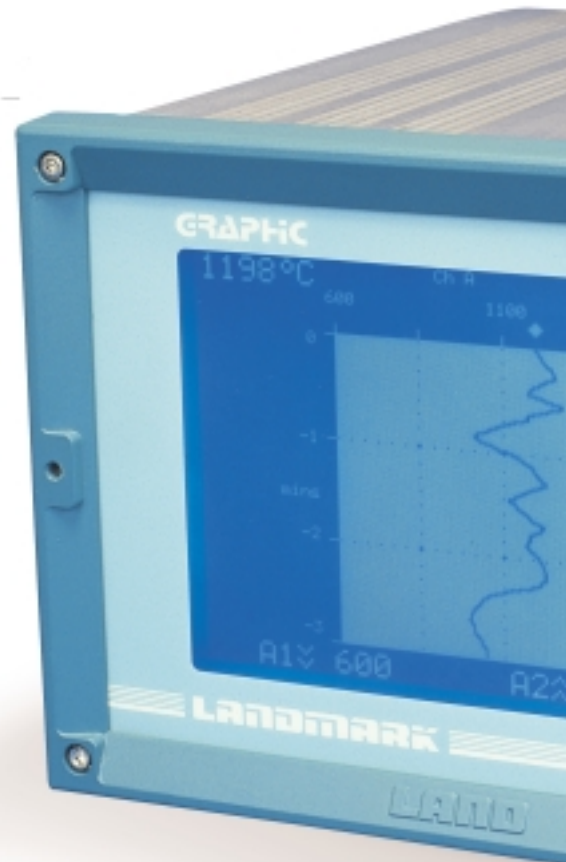
An **Averager** is used to smooth any rapid fluctuations in the process value or reading to deliver a stable, time-averaged value for process control.

The time constant is selected from 0 to 512 seconds, to give suitable, gradual changes in the temperature display and processor output.

If your process is intermittent or interrupted, a **Track and Hold** function is provided which allows you, via an external command signal, to **Hold** the required measurement value until you wish to once again **Track** the variations in the process.

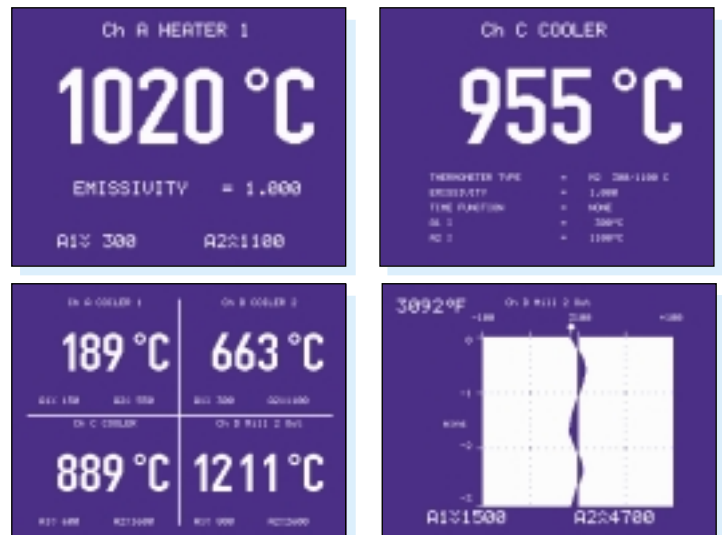
ALARMS

Two alarms are provided, selectable as either high or low, and are ideal for use as ON/OFF controllers. Alarm thresholds are selectable in 1° steps within the temperature of the thermometer.



Landmark® Graphic Processor display and keypad

Typical Landmark® Graphic Displays



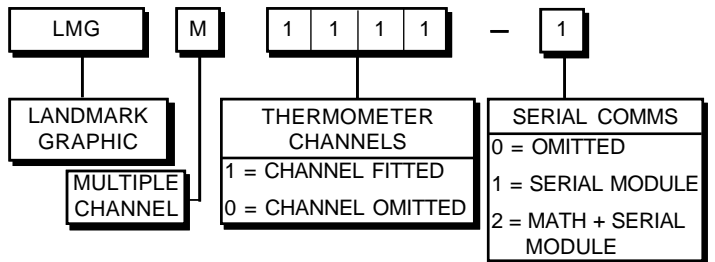


ORDERING INFORMATION

LANDMARK® GRAPHIC has a unique model number which describes the processor model.

The model number, consisting of the various options available, can be used for selection and ordering purposes (see below).

MULTI-CHANNEL PROCESSOR



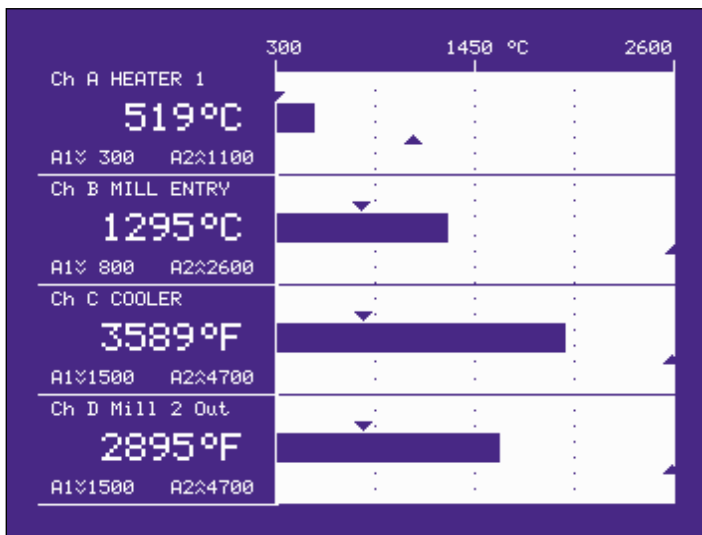
For example: LMG - M 1 1 1 1 - 1 is a **LANDMARK® GRAPHIC** configured with four thermometer input cards with serial communications.

ENVIRONMENTAL PROTECTION

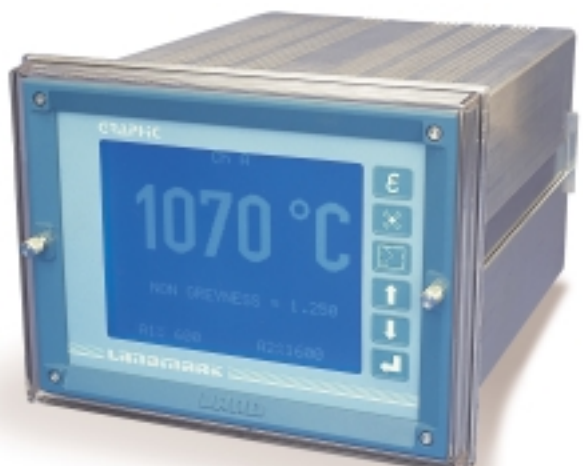
The processor case is constructed from high quality extruded aluminium with a die cast bezel.

An optional, clear, moulded cover panel is available. The cover panel, designed to the requirements of IP65/NEMA 4 is removable and provides environmental protection in hostile locations.

Multi-Channel Bar Chart Display



Landmark Graphic Processor fitted with cover panel



CLASSIC

The Landmark® Classic is a simple, reliable thermometer signal processing unit, with many optional features, intended for cost conscious temperature monitoring and control applications.

- Rugged flexible modular design
- Proven, reliable electronics
- Optional time function and alarm modules
- Industry standard 4 to 20mA output to suit all industries and control systems

LANDMARK® CLASSIC is a modular, flexible processor, fully compatible with the entire range of **SYSTEM 4** thermometers.

The processor provides the necessary power and control signals required by the thermometer for either emissivity or non greyness compensation. It has an LCD display of temperature and parameter variables.

The processor accepts the input signal from the **SYSTEM 4** thermometer, provides a display of temperature and retransmits the signal as an industry standard 4 to 20mA output either directly to your process control system, or via optional time function and alarm modules.

LANDMARK® CLASSIC can be configured with either a peak picker or averager time function, and up to two alarm modules which may be selected at the time of purchase or retrofitted in the field. There is no requirement for recalibration on subsequent change of options installed.

The modular design of **LANDMARK® CLASSIC** gives you maximum flexibility on the choice of processing requirements for your application.

This ensures that your temperature measurement system can be adapted to suit all applications, whatever the specific requirements.

EASY CONFIGURATION

Configuration is simple and quick. The measurement range is scaled to suit the particular type of thermometer in use via span and offset controls on the front panel.

Built-in reference sources enable processor calibration without any external test equipment.

Switches are provided for thermometer series, units (°C or °F) and emissivity or non greyness.



Landmark Classic Processor fitted with Alarms and Peak Picker function





DISPLAY

The large, easy to read LCD panel provides a continuous display of measured temperature, together with over and under range indications.

Alarm and emissivity or non-greyness settings are displayed at the press of a button.

REAL TIME PROCESSING

A fully featured and real time **Peak Picker** is used when measuring the temperature of intermittent targets, or where the hot target surface is obscured by cool areas such as scale on rolled steel.

Fast input sampling by the **Peak Picker**, combined with a built-in spike protection filter allows the processor to respond quickly to a rise in temperature signal from the thermometer.

The **Peak Picker** has a user adjustable decay rate and both manual and remote reset controls, giving flexibility to deal with the most demanding of applications.

An **Averager** is used to smooth any rapid fluctuations in the process value or reading to deliver a stable, time-averaged value for process control.

The time constant is selected from 0 to 512 seconds, to give suitable, gradual changes in the temperature display and processor output.

ALARMS

Two alarms are provided, selectable as either high or low, and are ideal for use as ON/OFF controllers. Alarm thresholds are adjustable in 1° steps within the temperature of the thermometer.

ENVIRONMENTAL PROTECTION

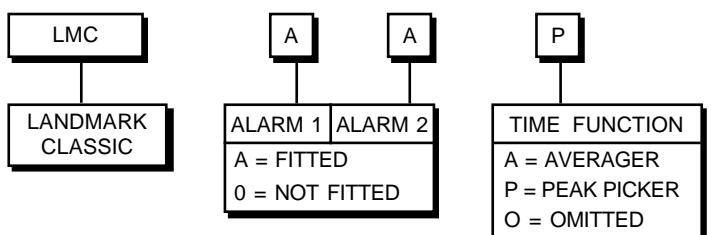
The processor case is constructed from high quality extruded aluminium with a die cast bezel. An optional, clear, moulded door panel is available. The door panel, designed to the requirements of IP65/NEMA 4, is removable and provides environmental protection in hostile locations, as well as a degree of tamper proofing.

Landmark Classic Processor fitted with cover panel



ORDERING INFORMATION

LANDMARK® CLASSIC has a unique model number which describes the processor model. The model number, consisting of the various options available, can be used for selection and ordering purposes.



For example: LMC-A-A-P is a **LANDMARK® CLASSIC** processor with alarms 1 and 2, and peak picker modules fitted.

LANDMARK® TECHNIC is a high precision, digital, DIN-rail mounted signal processing unit, providing economic conditioning of any System 4 thermometer output signal - ideal for both end user and OEMs.

- Standard DIN-rail mounting - requires no panel space
- Time functions - average, peak picker and track and hold as standard
- Industry standard 4 to 20mA output
- Remote input for Track and Hold
- Emissivity/non-greyness adjustment
- Alarm output
- Set up performed using a PC and configuration software
- Indicator (LMi) and power supply are also available

LANDMARK® TECHNIC has standard electrical outputs and is DIN-rail mounted for easy integration into OEM's and end user process control systems.

RS232C serial communications are included providing a remote interface between the processor and a PC for configuring the system parameters.

REAL TIME PROCESSING

The **Averager** function is used to smooth unwanted variations or rapidly fluctuating changes in the measured signal. The Averager time constant can be adjusted from 50ms to 512s (63%) in 15 steps.

The **Peak Picker** function is used when measuring the temperature of intermittent targets or where the hot target surface is obscured by cool areas. The **Peak Picker** decay rate is adjustable from 0.25%/s to 512%/s in 12 steps.

The **Track and Hold** function is also provided with remote reset via voltage free relay or switch contacts.

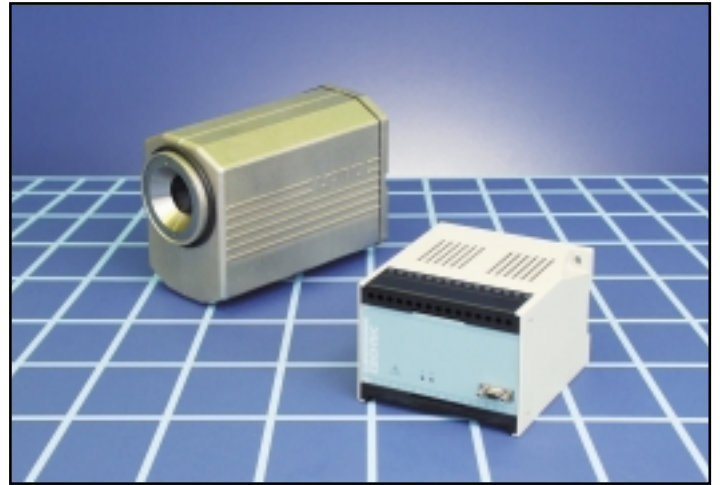
POWER SUPPLY

The **DPU** power supply unit provides the power supply (30V d.c. nominal) which the **LANDMARK® TECHNIC** processor requires. The **DPU** can be DIN-rail mounted alongside the **LANDMARK® TECHNIC**. Several models are available to cover all input voltages.

LANDMARK® INDICATOR

The **LMi** is an easy to read digital panel meter providing continuous indication of measured temperature. Up to two alarms (high or low) may be set, providing a voltage free relay output. A visual display on the front panel indicates when an alarm has been tripped. Alarm thresholds are set via the front panel.

It also provides scaleable 4 to 20mA output to match the input range of your process control system.



Landmark Technic Processor and System 4 thermometer



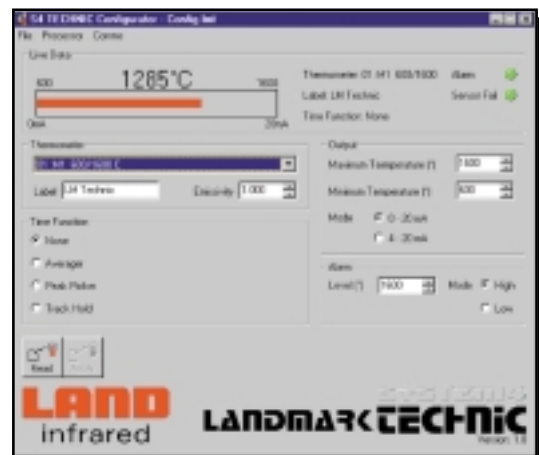
Landmark Technic Processor connections

CONFIGURATION

The temperature measurement system is readily configured using the LM Technic Configuration Software and a PC.

The PC is connected to the RS232C port on the LM Technic front panel to perform the configuration.

Once configured, the PC is disconnected from the LM Technic and the LM Technic can be left to operate. The system configuration is stored in non volatile memory.



LANDMARK® BASIC is a simple, low cost, DIN-rail mounted signal processing unit, providing economic conditioning of any System 4 thermometer output signal - ideal for both end user and OEMs.

- Standard DIN-rail mounting - requires no panel space
- Time functions - average and peak picker as standard
- Provides easy access to your thermometer's emissivity/non-greyness control
- Digital panel meter with alarm is available (LMi)
- Industry standard 4 to 20mA output to suit all industries and control systems

LANDMARK® BASIC has standard electrical outputs and DIN-rail hardware, designed to allow easy integration into OEM's and end user process control systems.

LANDMARK® BASIC enables adjustment of emissivity/non-greyness and time functions from your control room - not out on your sensor.

LANDMARK® BASIC signal processing features an adjustable averager and peak picker with remote reset.

REAL TIME PROCESSING

The **Averager** function is used to smooth unwanted variations or rapidly fluctuating changes in the measured signal.

The **Averager** time constant can be adjusted, via the control mounted on the front of the **BASIC** processor, from 175ms to 4s (10 to 90%).

The **Peak Picker** function is used when measuring the temperature of intermittent targets or where the hot target surface is obscured by cool areas. The **Peak Picker** decay rate is adjustable from 1 to 5000% of span per second. A remote reset function is provided from voltage free relay or switch contacts.

POWER SUPPLY

The **DPU** power supply unit provides the power supply (30V d.c. nominal) which the **LANDMARK® BASIC** processor requires. The **DPU** can be DIN-rail mounted alongside the **LANDMARK® BASIC**. Several models are available to cover all input voltages.

LANDMARK® INDICATOR

The **LMi** is an easy to read digital panel meter providing continuous indication of measured temperature.

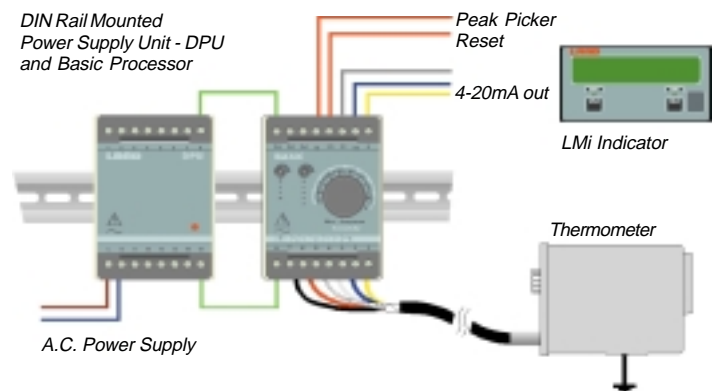
Up to two alarms (high or low) may be set, providing a voltage free relay output. A visual display on the front panel indicates when an alarm has been tripped. Alarm thresholds are set via the front panel.

It also provides scaleable 4 to 20mA output to match the input range of your process control system.



Landmark Basic Processor and DPU Power Unit

Landmark Basic Processor and DPU connections



Landmark Basic Processor controls



SPECIFICATIONS

	Landmark Graphic	Landmark Classic	Landmark Technic	Landmark Basic					
Display	Cold cathode, backlit, 320 x 240 pixels	LCD	Optional LMI Indicator	Optional LMI Indicator					
Outputs	4 to 20mA, 0 to 20mA, 1mV/°	4 to 20mA over temperature range	0 to 20mA or 4 to 20mA	4 to 20mA over temperature range					
Output update	10ms	5ms to 98% (without time function module)	10ms	3ms to 98% (time functions at minimum)					
Emissivity	0.050 to 1.000 in 0.001 steps**	0.20 to 1.00	0.200 to 1.000 in 0.001 steps	0.20 to 1.00					
Non Greyness	0.800 to 1.250 in 0.001 steps	0.800 to 1.250	0.800 to 1.250 in 0.001 steps	0.800 to 1.250					
Peak Picker	Yes	Optional	Yes	Yes					
Averager	Yes	Optional	Yes	Yes					
Track and Hold	Yes	No	Yes	No					
Alarms	Yes	Optional	Yes	No					
Serial Comms.	Optional	No	Yes	No					
Power requirement	90 to 132V a.c. or 180 to 264V a.c 48 to 63 Hz, 35VA (290VA max with 4 thermometers)	90 to 132V a.c. or 180 to 264V a.c 48 to 63 Hz, 35VA	30V d.c. nominal	24 to 30V a.c. 50 to 60Hz or 30 to 45V d.c at 200mA					
Ambient operating temperature	5 to 50°C (specified) 5 to 60°C (max. operating)								
Sealing	To requirements of IP65/NEMA4 (with optional cover fitted)		IP40, IP20 to terminals						
Humidity	0 to 99% non condensing								
Vibration	1g any axis, 10 to 300Hz								
Weight	5.5kg approx.	4.3kg approx.	0.5kg approx	0.2kg approx.					
CE	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)								
System Accuracy	Repeatability*	Accuracy*	Repeatability*	Accuracy*	Repeatability*	Accuracy*	Repeatability*	Accuracy*	
Thermometers	M1 450/1000C	<1K	0.4%K	<1K	0.5%K	<1K	0.4%K	<1K	0.6%K
	M1 600/1600C	<1K	0.25%K	<1K	0.5%K	<1K	0.25%K	<1K	0.6%K
	M1 800/2600C	<2K	0.4%K	<2K	0.75%+1K	<2K	0.4%K	<2K	0.9%+1K
	M2 300/1100C	<1K	2K	<1K	0.25%+2K	<1K	2K	<1K	0.4%+2K
	M3 50/250C ⁽¹⁾	<1.5K	2K	<1.5K	3K	<1.5K	2K	<1.5K	4K
	M4 50/250C ⁽¹⁾	<1K	3K	<1K	3.5K	<1K	3K	<1K	4K
	M4 150/550C	<1K	3.5K	<1K	4.5K	<1K	3.5K	<1K	5.5K
	M5 400/1300C	<1K	0.35%K	<1K	0.7%K ⁽²⁾	<1K	0.35%K	<1K	0.75%K ⁽²⁾
	M5 1000/2500C	<1K	0.5%K	<1K	0.6%K	<1K	0.5%K	<1K	0.65%K
	M6 0/300C	<1K	2K	<1K	0.3%+2.5K	<1K	2K	<1K	0.4%+2.5K
	M6 100/700C	<1K	2K	<1K	0.3%+2.5K	<1K	2K	<1K	0.4%+2.5K
	M7 25/375C ⁽¹⁾	<1.5K	2K	<1.5K	3K	<1.5K	2K	<1.5K	4K
	M8 0/1000C	<1K	3.5K	<1K	4.5K	<1K	3.5K	<1K	5.5K
	R1 600/1600C	<1K	0.45%K	<1K	0.7%K	<1K	0.45%K	<1K	0.75%K
R1 1000/2600C	<2K	0.75%K	<2K	1.1%K	<2K	0.75%K	<2K	1.2%K	

⁽¹⁾ Above 75°C ⁽²⁾ Optimised for glass toughening = 3K at 630°C

* For a definition of 'Repeatability' and 'Accuracy', refer to Land document 'NDA 478'

** Systems are functional, but performance is unspecified at emissivity values <0.200.

SYSTEM 4

System 4 THERMOMETERS offer exceptional flexibility with a choice of single wavelength, ratio, fibroptic and fibroptic ratio models.

Thermometer type, temperature range, spectral response and optical characteristics are chosen to suit any application from 0 to 2600°C.

- Focusable optics - guaranteeing 98% of target energy within the lens graticule. Optics remain focusable during operation
- Additional close-up lenses for 'standard bodied' thermometers for targets as small as 0.45mm
- Flexible fibre optics light guide versions - with optional laser targeting system to define target size and position
- Traceable, individual calibration - giving flexible systems with unrestricted interchangeability
- Long term accurate, reliable and drift-free measurement
- Rugged design with a wide range of mounting accessories

STANDARD BODIED THERMOMETERS

Proven reliable electronics and a high quality optical system are housed in a rugged die-cast aluminium body with a robust electrical connector to provide reliable performance. All thermometers feature through-the-lens sighting.

Adjustable focus with a circular graticule gives precise alignment on to the smallest of targets. Two optical variants are available: Standard and Short-focus.

System 4 Standard Bodied and Fibroptic Thermometers



M1 Thermometers

M1 thermometers are intended for general purpose use in high temperature applications from 450 to 2600°C. They utilize a silicon cell detector and operate at short wavelengths and have a fast response time of 5ms to 95%.

M2 Thermometers

M2 thermometers use the latest generation of germanium detectors and operate at a wavelength of 1.6µm. They extend the measurement range of short wavelength thermometers down to 300°C and have a fast response time of 5ms.

M4 Thermometers

M4 thermometers measure from 50 to 550°C and are used on low temperature, partially obscured, low or uncertain emissivity surfaces such as bright or unoxidized metals. They use lead sulphide detectors in a unique null balance mode to guarantee stability.

M5 Thermometers

The fast speed of response, coupled with small target size and accurate sighting facility make the M5 thermometers ideal for all flat glass, glass toughening and optical fibre preform applications. They measure from 400 to 2500°C.

M6 Thermometers

The unique M6 short wavelength thermometers measure from 0 to 700°C and are designed specifically for lower temperature applications such as metal processing, glass lehr, food, paper, rubber and textiles.

M7 Thermometers

M7 thermometers operate at a waveband selected especially for measurement on plastic films as thin as a few microns, such as Polyethylene and PVC, and measure from 25 to 375°C.

M8 Thermometers

M8 thermometers measure from 0 to 1000°C and are ideal for applications such as food, textiles, paper and plastics. They operate at a waveband which avoids the effects of atmospheric absorption.

R1 Ratio Thermometers

R1 Ratio Thermometers are intended for difficult, high temperature applications where the field of view is not fully filled or where the sight path is obscured. Their range is 600 to 2600°C and can accurately measure temperature of targets with up to 95% obscuration.

FIBROPTIC THERMOMETERS

Fibroptic models have a flexible fibre optics light guide which enables the detector and electronics enclosure to be located in a less hostile environment.

Fibroptic M1 Thermometers

Fibroptic M1 thermometers measure from 600 to 2600°C and combine the flexibility of fibre optics with short wavelength operation. They can be used in high temperature applications such as metals, glass, coke ovens and induction heating.

Fibroptic M2 Thermometers

Fibroptic M2 thermometers are designed for applications from 300 to 1100°C, such as glass mould temperatures where access to the target is restricted, or limited to a few milliseconds.

Fibroptic M3 Thermometers

The Fibroptic M3 thermometer is designed for low temperature applications, with low or uncertain emissivity, such as secondary metals, within the range 50 to 250°C.

Fibroptic R1 Ratio Thermometers

Fibroptic R1 ratio thermometers measure from 600 to 2600°C and provide accurate high temperature measurement of small intermittent targets, such as rod and wire, and tube welding. Other typical applications include kilns and vacuum furnaces.

THERMOMETER MOUNTINGS AND ACCESSORIES

To enable you to measure temperature accurately in even the most severe operating conditions, a complete range of thermometer protection and mounting accessories is available.

Full mechanical and thermal protection for the thermometer and electrical connections is ensured, giving uninterrupted service with minimal maintenance in almost any environment.

JACKET

The corrosion resistant thermometer jacket provides air or water cooling where excessive heat may exist.

The jacket allows quick, no-tools thermometer installation and removal and ensures reproducible alignment.

END CAP

The end cap provides protection for the rear of the thermometer. The ingenious design, featuring a pre-wired thermometer connector and a terminal strip inside the end cap simplifies customer connections on-site.



THERMOMETER CONNECTOR

The thermometer connector is normally supplied pre-wired and terminated in the end cap. A connector pre-wired to 4m of cable must be ordered if the user does not require an end cap for the application.

AIR PURGE

Extensive research has resulted in a highly efficient air purge which keeps condensation, dirt and other deposits off the thermometer lens. The air purge also helps to disperse fumes and smoke from the thermometer sight path.

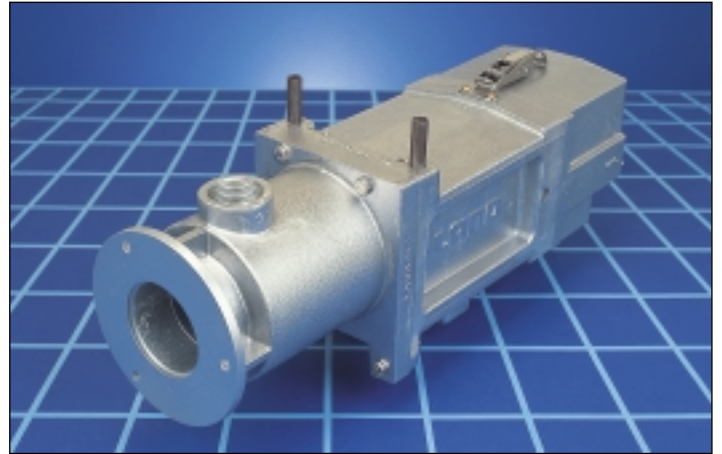
The purge accepts a range of air entry adapters and fittings, and has the added bonus of being suitable for use with both fan or compressed air supplies.

The front flange of the purge also mounts directly onto the Land System 3 range of mounting plates and sighting tubes.

SIGHTING TUBES

A range of Silicon Carbide, Sillimanite and Stainless Steel sighting tubes are available in various lengths up to 1200mm for use in temperatures up to 1550°C.

Open ended sighting tubes (Type STO) are used to ensure a clear view of a solid target through flame, smoke, fumes and dust. Closed-end sighting tubes (Type STC) are used to measure the temperature of a fluid material.



MOUNTING PLATES

Mounting plates enable the thermometer, together with a jacket, purge and sighting tube, to be securely mounted in a safe position to monitor the product or process.

O/N/M mounting plate is a simple, rugged mounting which can be used with all of the sighting tubes.

O/N/AF adjustable mounting plate is for use where accurate sighting is essential. The jacket/ purge fastens to an adjustable circular plate. The O/N/AF mounting is used with the FS6 and FS36 sighting tubes.



FIBROPTIC MOUNTINGS AND ACCESSORIES

QUICK-RELEASE AND AIR PURGE ASSEMBLY

The quick release and air purge/sighting tube assembly attaches to the optic head of the fibroptic thermometer to keep the lens clean.

The assembly can be used with a range of mounting accessories.

MOUNTING PLATE ASSEMBLY

A simple, robust 127mm diameter mounting plate and quick release/air purge assembly permits a range of mounting options.



ANGLE MOUNTING BRACKET ASSEMBLY

A simple mounting bracket serves as an inexpensive mounting for the thermometer optic head. The bracket is designed for bolting to almost any mounting surface.

ADJUSTABLE MOUNTING FLANGE ASSEMBLY

The adjustable mounting flange and quick release/air purge assembly provides accurate alignment of the optic head.

ADJUSTABLE MOUNTING PLATE

An adjustable mounting flange allows alignment of the optic head at any angle up to 45°.

THERMOMETER MOUNTINGS AND ACCESSORIES

Both the Standard bodied and Fibroptic range of mounting accessories are subdivided into three groups which cover all environmental conditions i.e. **INDUSTRIAL**, **NON-HOSTILE** and **LABORATORY**.

INDUSTRIAL

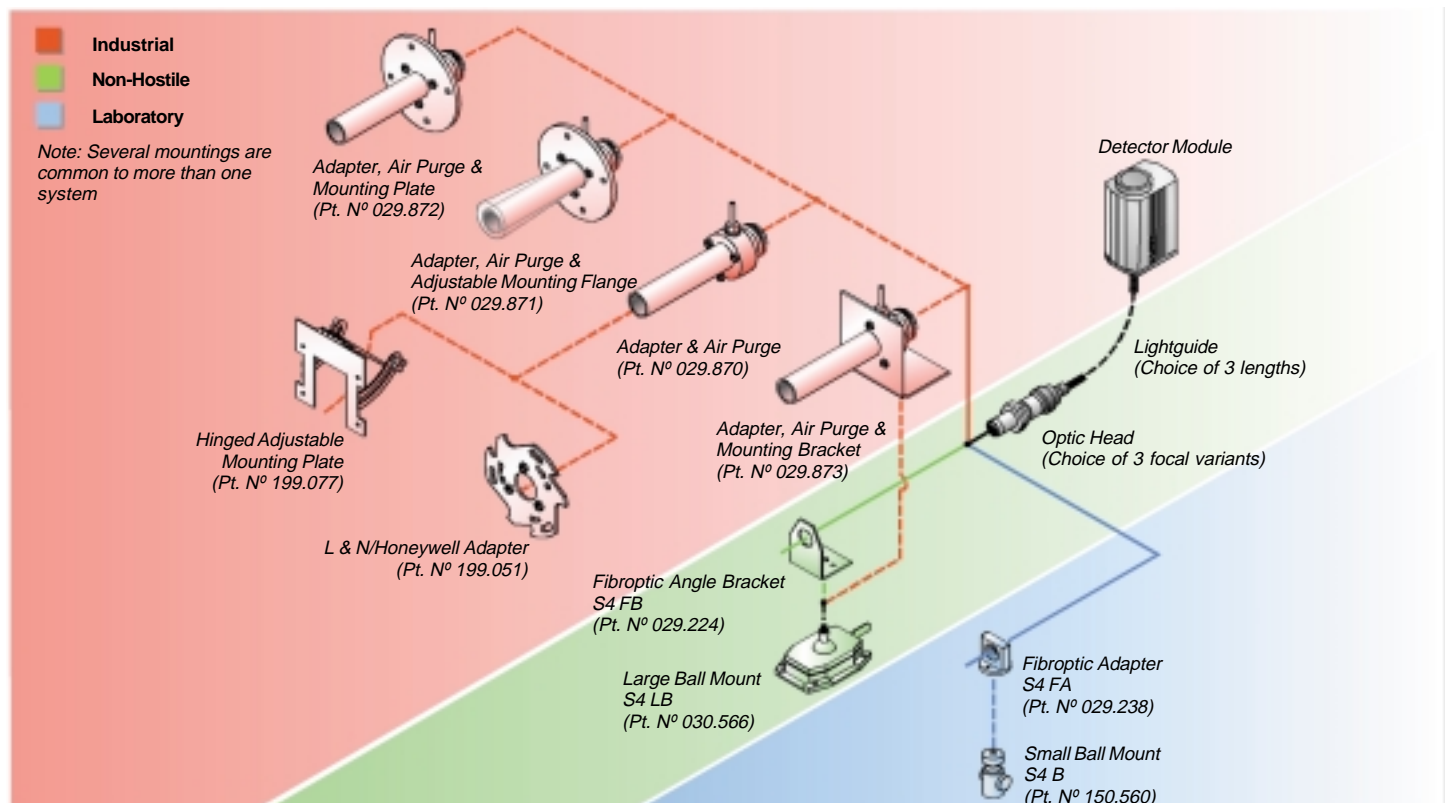
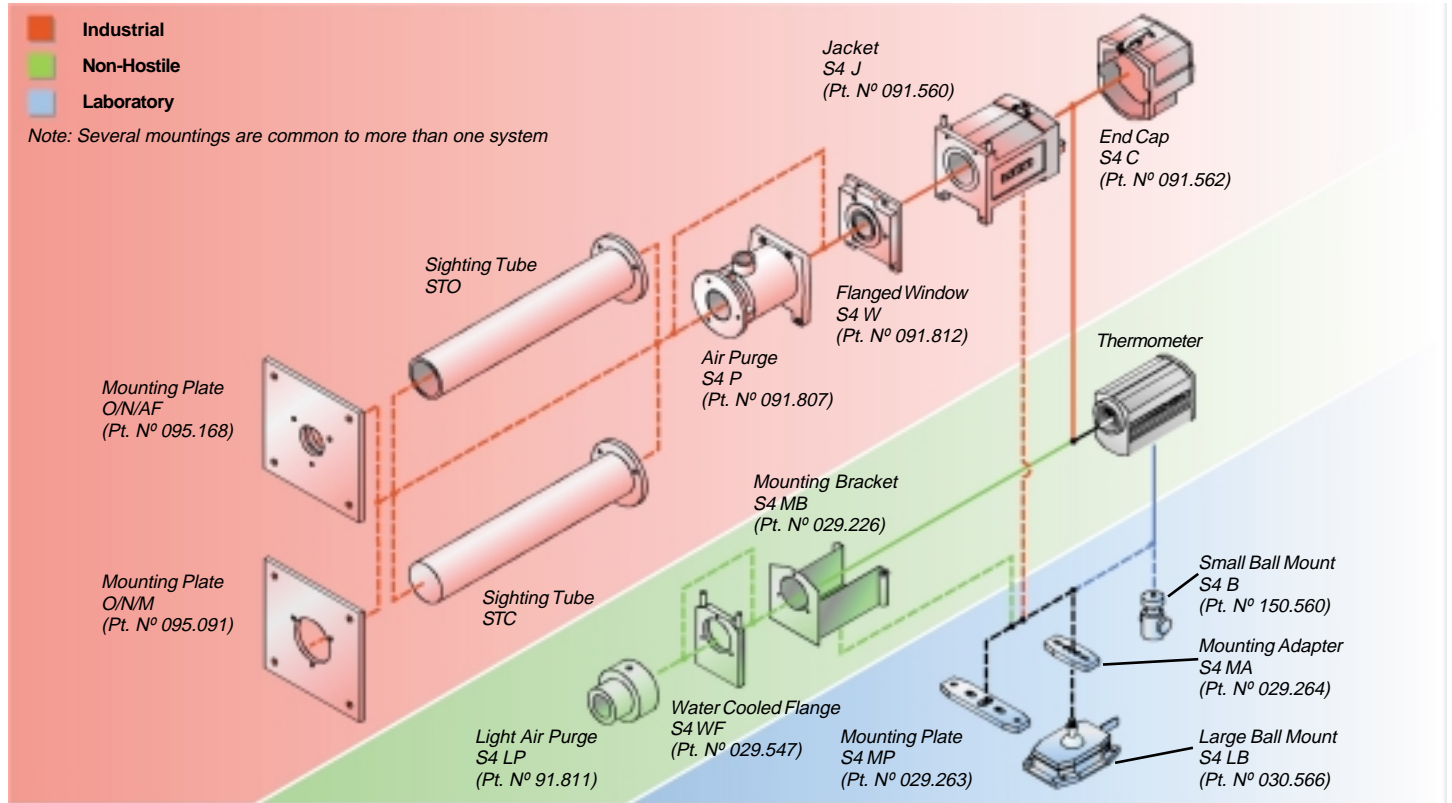
To be used where severe or extreme environmental conditions prevail.

NON-HOSTILE

Where the environmental conditions which apply to the measurement application are less severe.

LABORATORY

No adverse environmental conditions prevail, a requirement for thermometer mounting only.



For more than fifty years LAND have supplied temperature measuring and process imaging systems to many different industries all over the world. Now the world leader in non contact thermometry, our expert advice and support is never far away.

WORLDWIDE SUPPORT



Expert advice and support is never far away

WORLD LEADERS

LAND is the world leader in the manufacture of non contact temperature measurement systems, thermal imagers and linescanners.

WORLDWIDE SUPPORT

In addition to the companies established in Europe, USA, Mexico and Japan, LAND is represented by distributors in most of the major industrial countries throughout the world.

Our customers benefit, on a global basis, from practical and expert advice from fully trained technicians who are aware of specific requirements for their country and industry.

APPLICATIONS

LAND have solved many different temperature measurement problems in a wide variety of industries from food to atomic energy, some of which are list below:

- Iron & Steel
- Petrochemical
- Heat Treatment
- Minerals
- Glass
- Maintenance
- Power & Utilities
- Aerospace
- Electronics
- Pharmaceuticals
- Plastics
- Paper
- Rubber
- Textiles
- Non-ferrous Metals

For further information or free advice on specific temperature measurement problems within these or any other industry, contact your nearest Land office.

PRODUCT ASSURANCE

When you specify LAND products you are assured of receiving a completely pretested, calibrated working product. Each instrument is carefully checked to ensure complete compliance with specification and is fully guaranteed. LAND was the first manufacturer of infrared instruments to successfully obtain ISO 9001 Quality Management System Approval for both design and manufacture of non contact infrared temperature measuring equipment.



These products comply with current European directives relating to electromagnetic compatibility and safety (EMC directive 89/336/EEC; Low voltage directive 73/23/EEC).

The Quality Management System of Land Instruments International Ltd. is approved to BS EN ISO9001:2000 for the design and manufacture, stockholding, in-house repair and site servicing of non contact temperature measuring instrumentation. Associated software designed and developed in accordance with TickIT. Calibration certificates are available from our UKAS accredited Calibration Laboratory No. 0034. The Land calibration laboratory complies with the requirements of the international standard BS EN ISO/IEC 17025.



LAND

instruments international

Infrared Temperature Measurement

Land Instruments International • Dronfield S18 1DJ • England • Tel: (01246) 417691 • Fax: (01246) 410585
Email: infrared.sales@landinst.com • Internet: www.landinst.com

Land Instruments International • 10 Friends Lane • Newtown, PA 18940-1804 • U.S.A. • Tel: (215) 504-8000
Fax: (215) 504-0879 • Email: irsales@landinstruments.net • Internet: www.landinstruments.net

France
Land Instruments Sarl
Tel: (1) 34 62 05 45 • Fax: (1) 30 56 51 12
Email: commercial@landinst.fr

Japan
Land KK
Tel: 06 6330 5153 • Fax: 06 6330 5338
Email: ikeland@silver.ocn.ne.jp

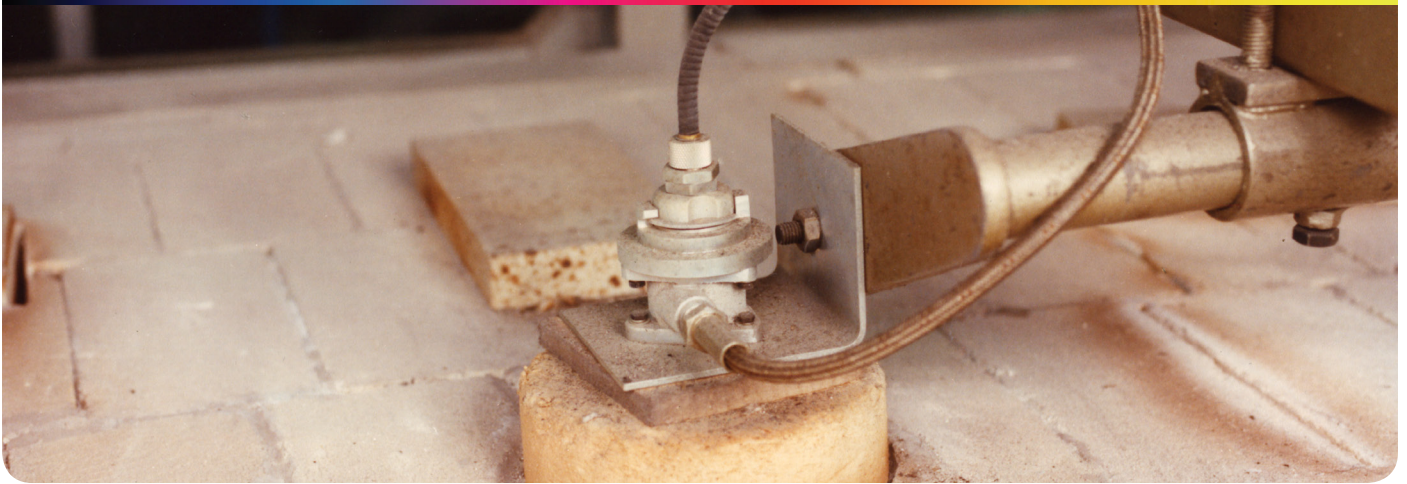
Germany
Land Instruments GmbH
Tel: 02171/7673-0 • Fax: 02171/7673-9
Email: infrarot@landinst.de

Spain
Land Instruments International
Tel: 91 630 0791 • Fax: 91 630 2918
Email: land-infrared@landinst.es

Italy
Land Instruments Srl
Tel: 02/99040423 • Fax: 02/99040418
Email: infrared@landinst.it

Mexico
Land Instruments International
Tel: 52 55 9171 1466 • Fax: 52 55 9171 1477
Email: ventas@landinstruments.net

High Temperature Measurement in the Glass Industry



Fibre-optic Model FG Two-wire Fibre-optic Thermometer

The Land Fibre-optic Model FG radiation thermometer is a fibre optics based 2-wire temperature sensor which has been specifically designed to solve measurement problems and improve control of process temperatures in the glass industry.

Model FG is primarily intended for monitoring and controlling glass or refractory temperatures in the forehearth, but also in the regenerator, tank and refiner.

It can be used to monitor and safeguard vulnerable refractory materials such as the crown, detect possible firing imbalance at the port arch, for example, and to give improved control of bulk glass temperatures.

Thermocouple Replacement

Model FG fulfils the industry's need for a simple, cost effective alternative to other types of radiation thermometers which normally require water cooling. It also readily permits upgrade from existing thermocouple installations.

Features & Benefits

- Accurate and reliable measurement up to 1650°C/3000°F – ideally suited to control of process temperatures in the glass industry
- 2-wire 4-20mA current loop system – ensures simple installation
- 200°C ambient temperature limit on optic head – minimal services and no water cooling required
- Built-in test facility - ensure optimal performance
- No on-line calibration required – Long term, drift free operation
- Calibration traceable to National Standards, backed by ISO9001 Quality Management System – measurement accuracy assured

Several models are available with measurement spans to suit the particular application. However, it can also be used for cost effective temperature measurement in a range of other applications.

LAND

Non-Contact Temperature
Measurement Solutions

AMETEK®

Land Instruments International Ltd • Dronfield S18 1DJ • England
Email: land.infrared@ametek.co.uk • www.landinst.com • Tel: +44 (0) 1246 417691 • Fax: +44 (0) 1246 410585

AMETEK Land, Inc. • 150 Freeport Rd • Pittsburgh, PA 15238 • U.S.A.
Email: irsales@ametek.com • www.ametek-land.com • Tel: +1 (412) 826 4444 • Fax: +1 (412) 826 4460

For a full list of international offices, please visit www.landinst.com



0034



001



LABORATORY
ACCREDITATION
BUREAU
ACCREDITED
ISO/IEC 17025:2005

REGISTERED
ISO 9001
MANAGEMENT SYSTEM

Applies in the UK

Applies in the USA

Measurement Ranges	
Model	Temperature Range
FG 9.8/13C	980 to 1300°C
FG 18/24F	1800 to 2400°F
FG 10/14C	1000 to 1400°C
FG 12/16.5C	1200 to 1650°C
FG 22/30F	2200 to 3000°F
Accuracy	
Interchangeability	±2°C/4°F
Resolution	0.1°C
Linearisation Conformity	<0.5°
Temperature Coefficient	<0.04°C/°C - mid span <0.07°C/°C - extremities
Absolute	5°C
General Specifications	
Output	4 to 20 mA (linear)
Response Time	0.5 s (to 98%)
Spectral Response	0.7 to 1.0 µm
Emissivity	0.10 to 1.00 adjustable (factory set to 1.00)
Field of View	100:1 + 10 mm/0.4 in
Dimensions	
Processor	160 x 75 x 55 mm / 6.3 x 2.9 x 2.2 in
Optic Head	106.5 x Ø 18.5 mm / 4.2 x Ø 0.7 in
Ambient Temperature Limits	
Optic Head	200°C/400°F
Light Guide	175°C/350°F
Processor	10 to 60°C/50 to 140°F
Power	
Power Requirement	24V d.c. (nominal) 18 to 40V d.c.
Over Voltage Protection	250V a.c.

Easy Installation ①

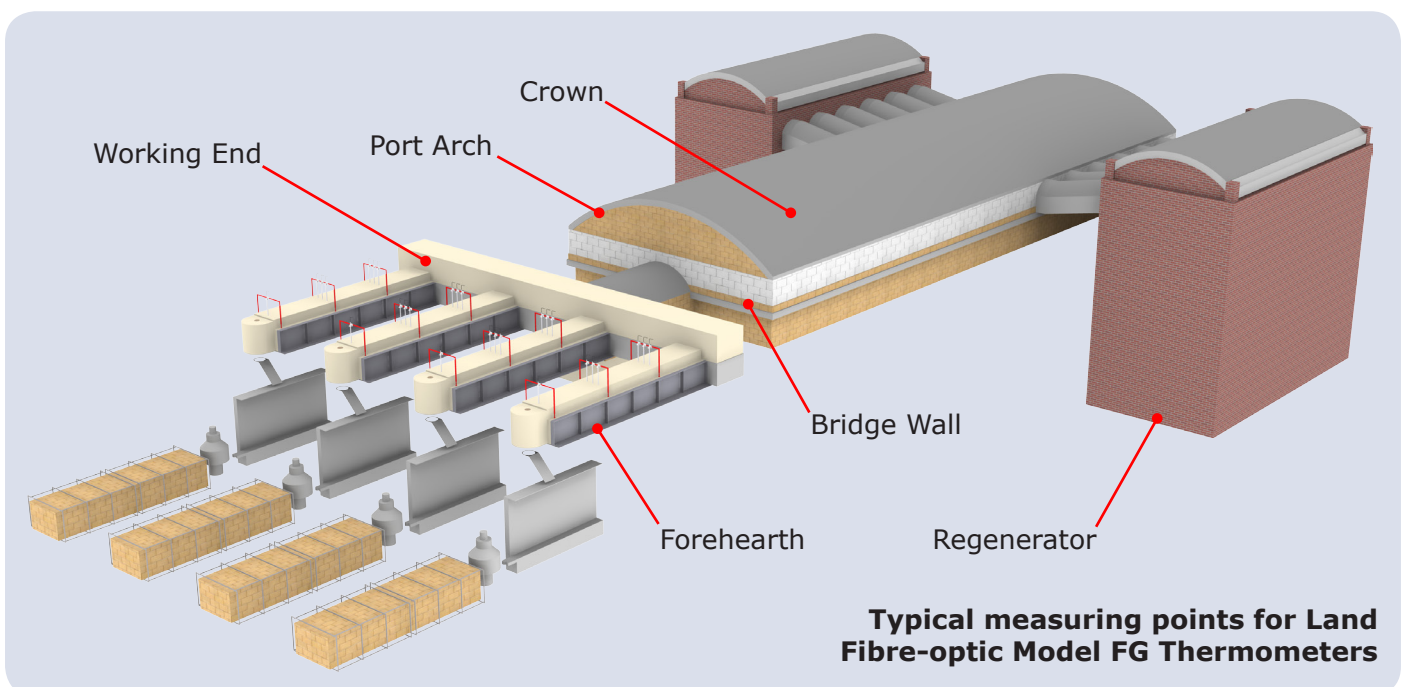
A versatile adjustable mounting assembly, complete with quick release adapter and air purge, provides ease of installation and removal for inspection purposes.

Signal Processing ②

The signal processor unit is located remotely from the high ambient temperatures encountered at the optic head, linked by a sealed 6.1m/20ft long fibre optics light guide eliminating the need for water cooling.

The processor provides high accuracy linearisation of the detector signal, adjustable emissivity compensation, a self test function and a low drift 4-20mA output suitable for use with process computers and distributed control systems.

Model FG Thermometer and Mounting Assembly



Typical measuring points for Land Fibre-optic Model FG Thermometers

LAND



THERMOMETER

MOUNTINGS AND ACCESSORIES



0034





The new Standard Bodied and Fibroptic range of temperature measurement systems from Land Infrared includes a comprehensive range of thermometer mounting and protection accessories to suit any measurement environment. All mountings and accessories feature quick and tool-free installation and removal. The range of accessories can be sub-divided into three groups **INDUSTRIAL**, **NON-HOSTILE** and **LABORATORY**. These groups provide a classification which equate to the given environmental conditions.

SELECTING MOUNTINGS AND ACCESSORIES

The following information will help determine which specific mountings and accessories are necessary to maintain measurement accuracy and reliability of performance of the thermometer.

Cooling Jacket - Standard Thermometers

The thermometer cooling and protection jacket provides benefits where there is a requirement for:

- Thermal protection of the thermometer i.e high ambient temperatures
- Mechanical protection of the thermometer i.e risk of damage
- Full environmental protection of the thermometer i.e water or smoke ingress

End Cap - Standard Thermometers

The End Cap provides benefits where there is a requirement for:

- Full environmental protection of the thermometer electrical connections i.e water ingress

Air Purge

The Air Purge clears dust, steam and smoke from the thermometer sight path to ensure accurate temperature measurement.

An Air Purge is required to:

- Clear the sight path
- Prevent build-up of debris on the thermometer lens
- Protect the lens from flame or gas impingement

Mounting Bracket/Plate/Adapter

The range of brackets, plates and adapters are used where there is a need for:

- Fixed, robust installation
- Thermal protection
- Mechanical protection
- Angular adjustment (accurate sighting)

Sighting Tubes

Sighting Tubes are used for:

- Viewing the target through flame, smoke, fumes etc.

INDUSTRIAL For full details of Standard Body INDUSTRIAL Mountings and Accessories refer to pages 4 - 7.

For Fibroptic INDUSTRIAL Mountings and Accessories, refer to pages 12 and 13.

To be used where severe or extreme environmental conditions prevail.

- High or low ambient temperatures
- Smoke, steam, fumes present in the atmosphere i.e. requirement for thermometer purge
- Exposure to exceptional environmental conditions i.e. inside a furnace
- Potential damage from personnel or other equipment

NON-HOSTILE For full details of Standard Body NON-HOSTILE Mountings and Accessories refer to pages 8 and 9.

For Fibroptic NON-HOSTILE Mountings and Accessories refer to page 14.

Where the environmental conditions which apply to the measurement application are less severe i.e. Non-Hostile.

- Room temperature operating conditions i.e. none or minimal requirement for thermometer cooling
- Absence of large amounts of smoke, steam, fumes etc i.e potential for air purging to maintain accuracy of reading only
- No unusual environmental conditions
- No possibility of damage from personnel or other equipment i.e no requirement for heavy-duty mountings

LABORATORY For full details of Standard Body LABORATORY Mountings and Accessories refer to page 10.

For Fibroptic LABORATORY Mountings and Accessories refer to pages 14 and 15.

No adverse environmental conditions prevail, a requirement for thermometer mounting only.

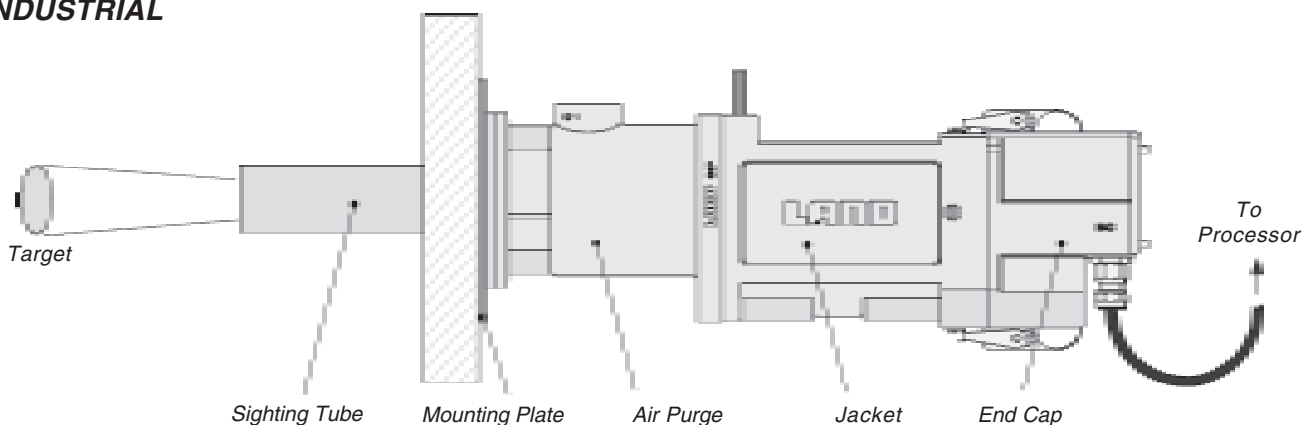
AIR SUPPLY SYSTEMS For full details of AIR SUPPLY SYSTEMS refer to page 15.

Note: Pt. No. - Land Part Number code - please specify when enquiring or ordering.

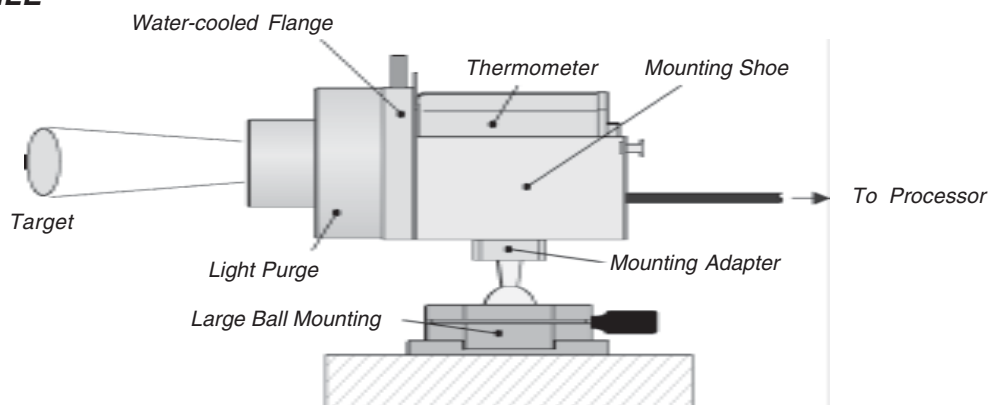
All dimensions are given in inches.

COMPLETE STANDARD BODIED THERMOMETER SYSTEMS

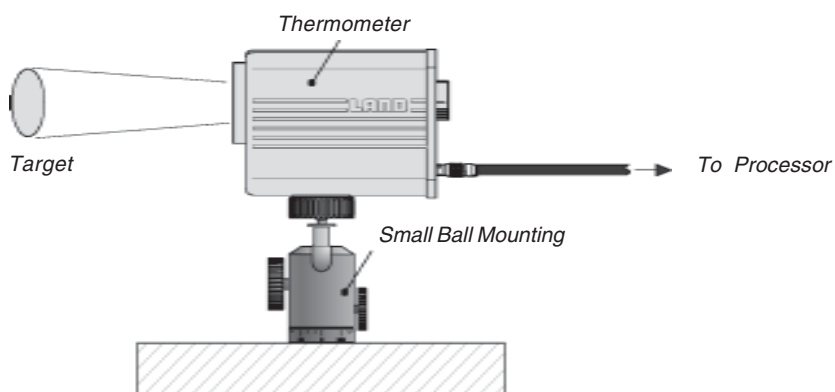
INDUSTRIAL



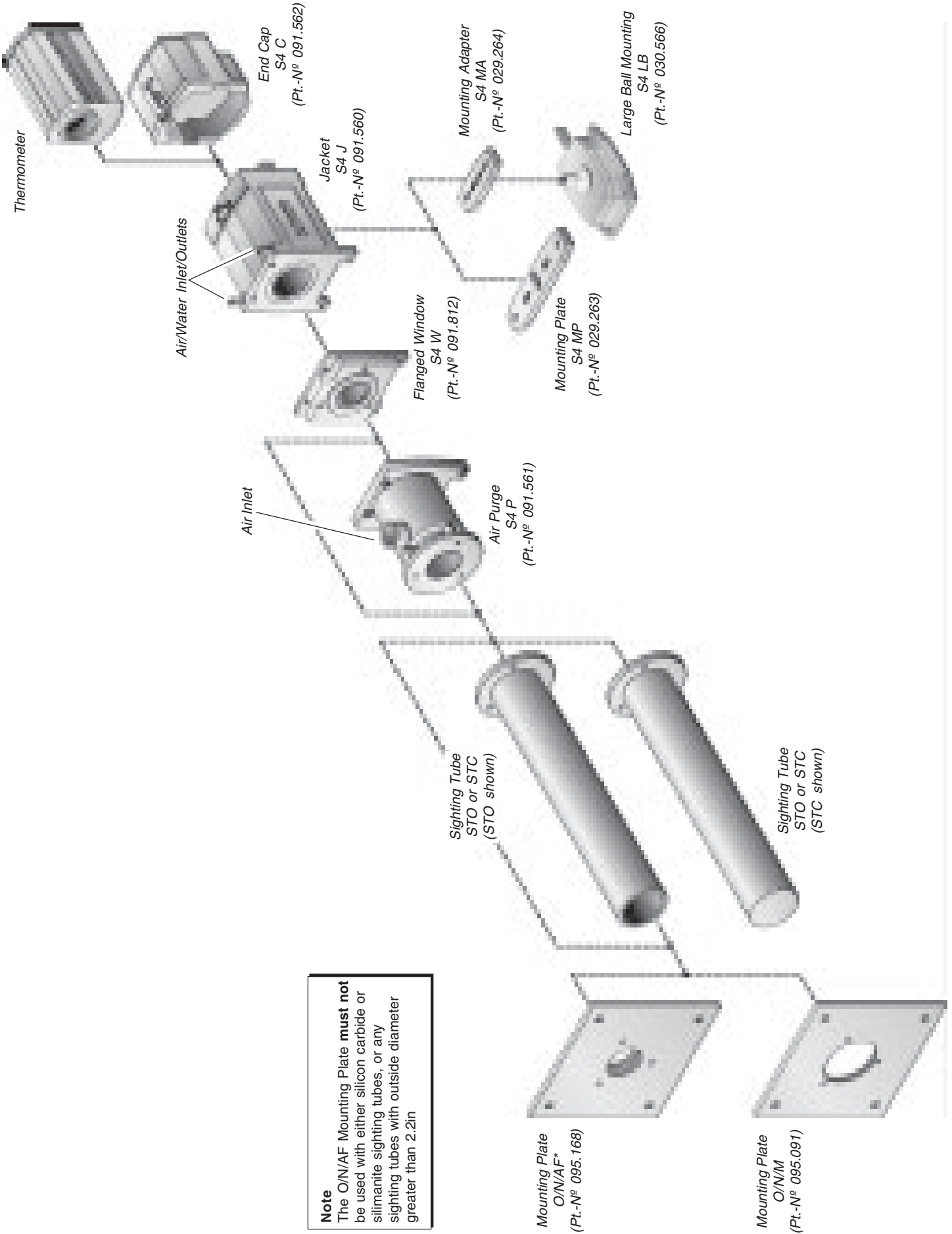
NON-HOSTILE



LABORATORY



INDUSTRIAL



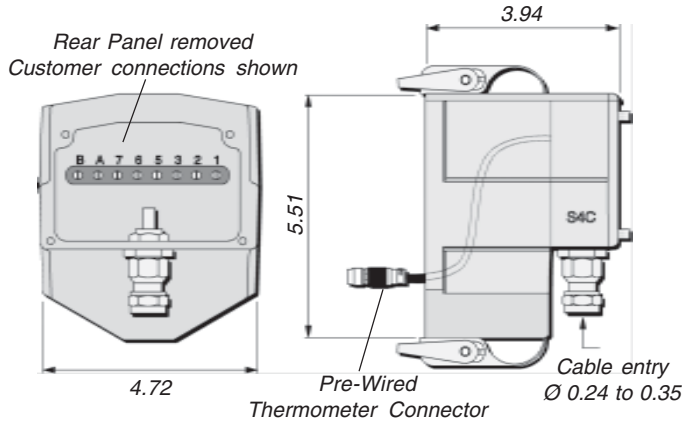
THERMOMETER COOLING JACKET, END CAP AND PURGE

End Cap S4 - C (Pt.No. 091.562)

The End Cap provides full environmental protection for the electrical connections to the thermometer. Customer connections are made to the terminal strip inside the cap. The pre-wired thermometer connector plug is integral to the cap.

Two Camlock fasteners secure the cap to the thermometer jacket for use in a hostile environment.

Weight: 3.42lb



Thermometer Connector (Pt.No. 029.673)

The thermometer connector is normally prewired and terminated in the end cap. A connector prewired to cable must be ordered if the user does not require an end cap.

Air Purge S4 - P (Pt.No. 091.561)

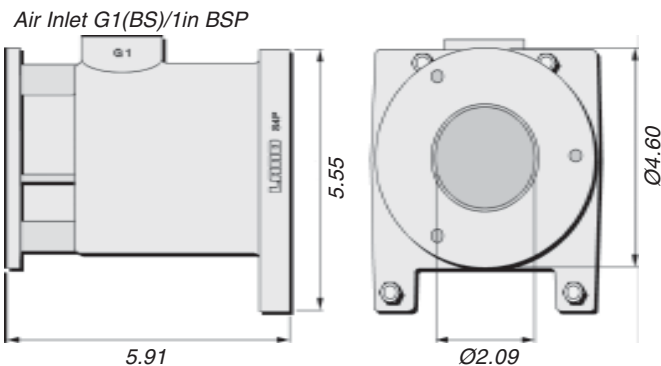
Air purge units use a stream of clean air to keep condensation, dirt and other deposits from the thermometer lens/window. The air stream also helps to disperse steam, fumes or smoke from immediately in front of the thermometer. The units are robust, trouble free and easily fitted between jacket and mounting plate or straight onto the jacket if a universal mounting is used. The only requirement is clean and dry air supply.

Inlet pressure: 350N/m² / 3.5mBar (0.05 psi)

Flow rate: 60l/min / 2cfm < 2cfm

Pipe thread: G1 (BS), for fan air supply

Weight: 3.2lb



Cooling Jacket S4 - J (Pt.No. 091.560)

The cooling jacket contains an effective air or water cooling facility for use in environments where excessive heat may damage or affect the thermometer. The thermometer fits inside and is held in place by two retaining clips.

Water cooled: Flow \leq 1 l/min / 0.2 Gal/min

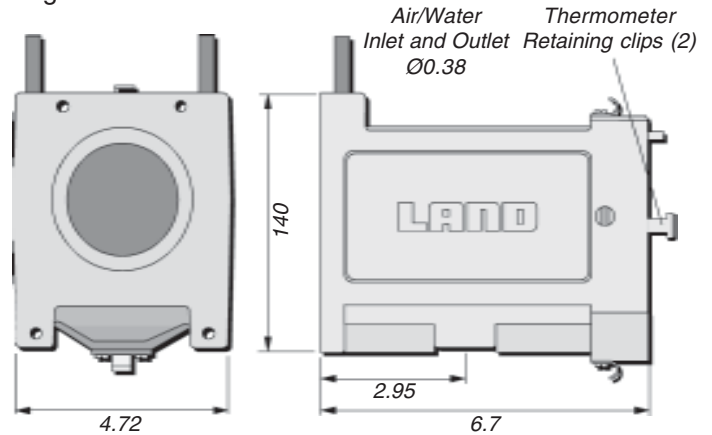
(exceeding the recommended flow may cause over-cooling leading to condensation problems)

Air cooled: Flow < 450 l/min / 16cfm

Maximum working pressure: 700kNm²/7Bar (100psi)

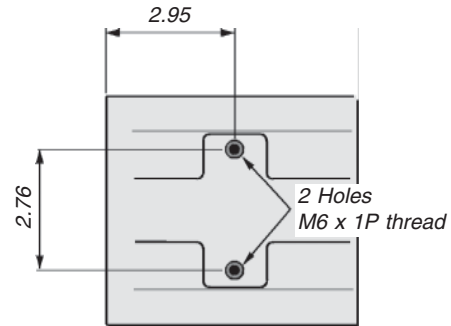
Plain pipe connections: \varnothing 0.375

Weight: 4.85lb

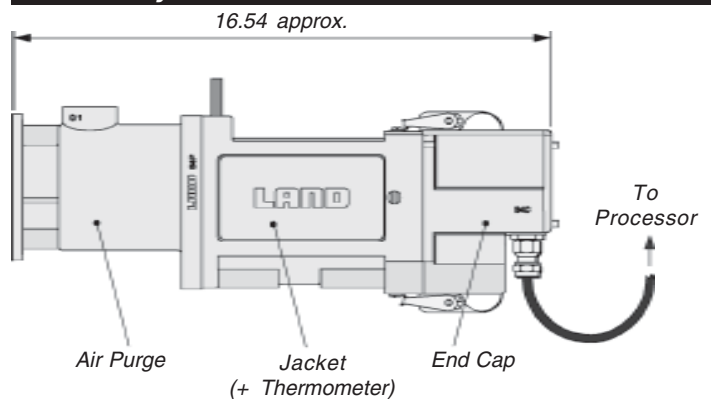


Mounting holes underside of S4 J Jacket

Two holes (M6 x 1P) in the base of the Cooling Jacket (S4 J) permit mounting directly to a flat surface or to an alternative mounting i.e. S4 MA or MP.



Assembly

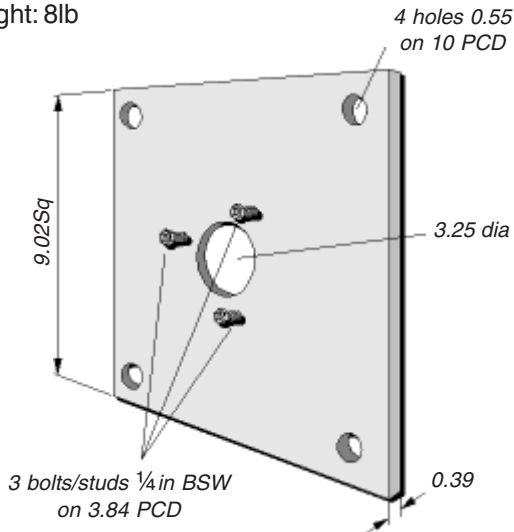


Total Weight 15.2lb

THERMOMETER MOUNTINGS AND BRACKETS

Mounting Plate O/N/M (Pt.No.095.091)

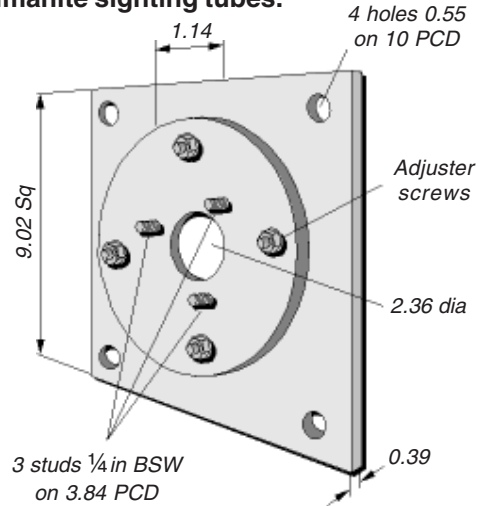
The mounting plate has four fixing holes, three studs for the jacket or purge, and a centre thermometer hole. It is ideal for mounting System 4 thermometer systems.
Weight: 8lb



Adjustable Mounting Plate O/N/AF (Pt.No.095.168)

The jacket or purge fastens to a circular plate, which with the adjustment of four screws can move up to 7.5° with respect to the main plate. For use where accurate sighting is essential.
Weight: 11lb

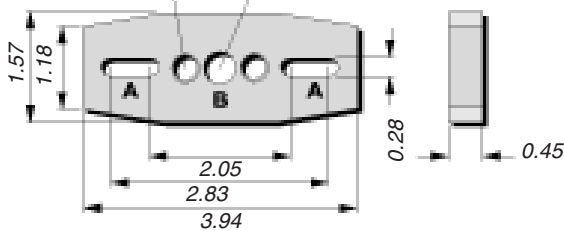
This plate is not suitable for use with either silicon carbide or sillimanite sighting tubes.



Mounting Adapter S4 MA (Pt.No. 029.264)

When the ball mounting is used with the cooling jacket this adapter provides a stable plate on which to attach the jacket.

2 holes CSK Ø0.41 1 hole M12 x 1.5P

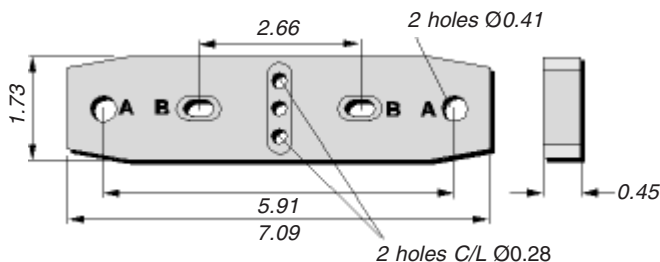


Mounting Options

- A Jacket (S4 J)
- B Large Ball Mount (S4 LB)

Mounting Plate S4 MP (Pt.No. 029.263)

The mounting plate can be used to mount the jacket to a flat surface using holes A. It has holes at centers identical to those of the jacket (B). Two 1/4 in BSW, 1/2 in long screws (112.467) are supplied with the plate to secure it to the jacket.

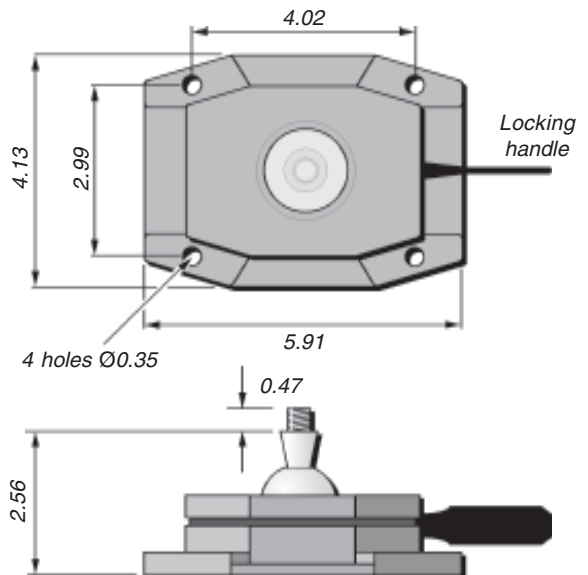


Mounting Options

- A Mounting Holes
- B Jacket (S4 J)

Large Ball Mounting S4 LB (Pt.No. 150.577)

The ball mounting is used with the Mounting adapter (S4 MA). Four holes permit fixing to flat surface. A locking handle secures the ball mount at the required orientation for accurate sighting.



WINDOW ASSEMBLY AND SIGHTING TUBES

Sighting Tubes

Sighting tubes are made from metal or refractory materials and are either open ended (Type STO) or closed (Type STC).

Type STO tubes are used when viewing a solid target through flame, smoke, fumes etc. The closed end of the type STC tube is used as the target. A thermometer used with an STC tube can replace a sheathed thermocouple.

To attach the sighting tubes to a mounting plate a steel adapter (Type STA) is cemented into refractory sighting tubes. The STA is drilled to fit the studs on the mounting plate (O/N/M).

Replacement Sighting Tubes can be purchased without the STA adapter fitted. Contact Land Infrared for details.

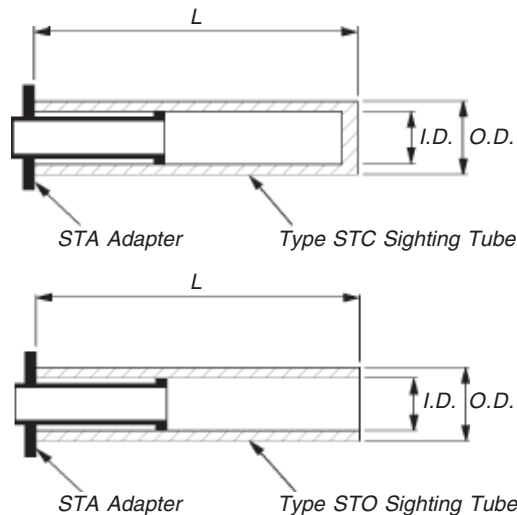
There are 3 types of tube material with varying lengths. For exact dimensions and ordering references please refer to the table adjacent.

Silicon Carbide Tubes (STO & STC)

These are either open ended or closed, and can be used in temperatures up to 2700°F/1500°C. They have high mechanical strength, good resistance to thermal shock and very high thermal conductivity.

Sillimanite Tubes (STO only)

These are suitable for use in temperatures up to 2800°F/1550°C and are fairly resistant to thermal shock. Sillimanite liner tubes are also available.



Stainless Steel Tubes

A low temperature tube for use up to a maximum of 1470°F/800°C. The exact temperature will depend upon length and operating conditions. Used mainly to protect the thermometer window from physical damage and to direct purge air along the sight path. Stainless Steel sighting tubes come complete with own type F adapter.



Sighting Tube Information

Type	Dimensions in			Adapter Type	Part No.	
	L	OD	ID			
Silicon Carbide STC	17.7	3.0	2.5	STA	091.410	
	23.6	3.0	2.5	STA	091.411	
	29.5	3.0	2.5	STA	091.412	
	35.4	3.0	2.5	STA	091.413	
	41.3	3.0	2.5	STA	091.414	
Silicon Carbide STO	17.7	3.0	2.5	STA	091.415	
	23.6	3.0	2.5	STA	091.416	
	29.5	3.0	2.5	STA	091.417	
	35.4	3.0	2.5	STA	091.418	
	41.3	3.0	2.5	STA	091.419	
Sillimanite STO	23.6	2.75	2.4	STA	091.420	
	29.5	2.75	2.4	STA	091.421	
	35.4	2.75	2.4	STA	091.422	
	41.3	2.75	2.4	STA	091.423	
	47.2	2.75	2.4	STA	091.424	
Sillimanite liner tubes	14.0	3.74	3.2	-	118.270	
	20.0	3.74	3.2	-	118.271	
Stainless Steel	FS6	6.0	2.25	2.12	F	091.458
	FS36	36.0	2.25	2.12	F	N/S

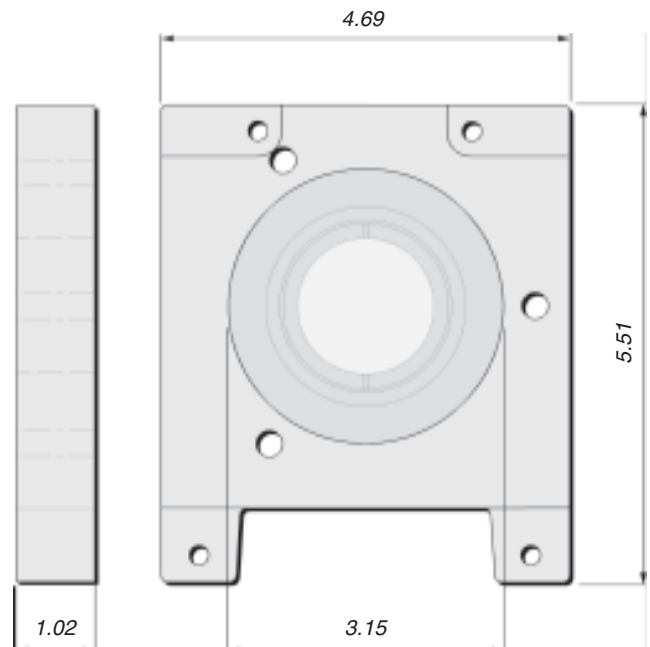
Window Assembly S4 W (Pt.No.091.812)

The Window Assembly is required for use on pressure vessels, vacuum furnaces and other applications where controlled atmospheres are encountered. Refer to Land Infrared for suitability in a particular application.

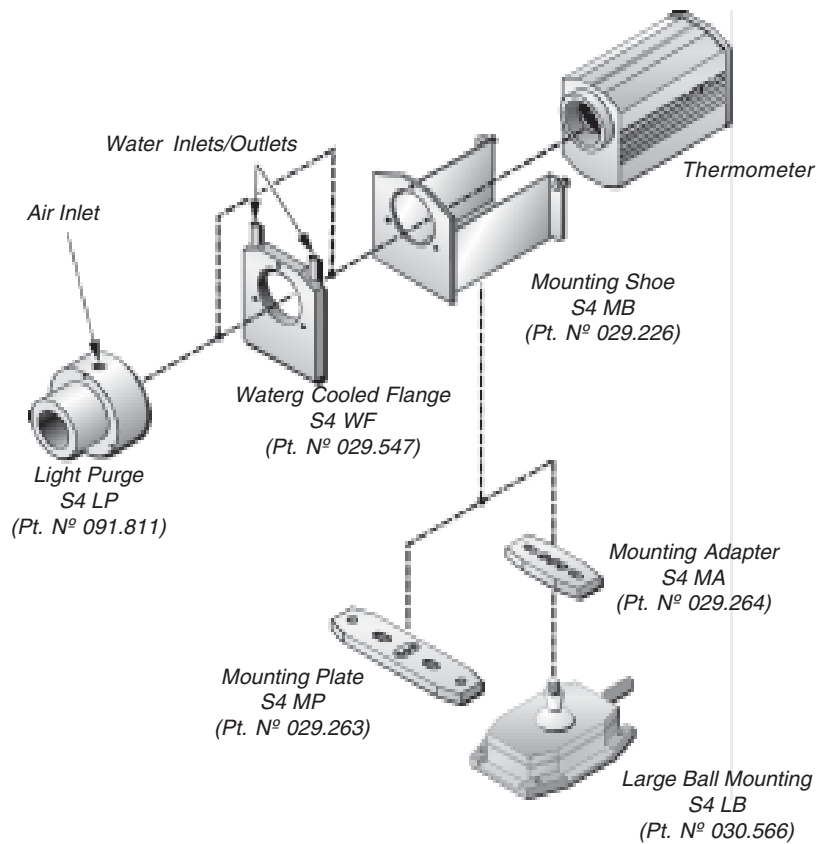
Two versions are available:-

- S4 W (Quartz) Pt. No. 091.812
For System 4 M1, M2, M4 thermometers
- S4 W (Fluorite) Pt. No. 092.519
For System 4 M5, M6, M7 thermometers and UNO U5 thermometers

Replacement seals: Pt. No. 001.431



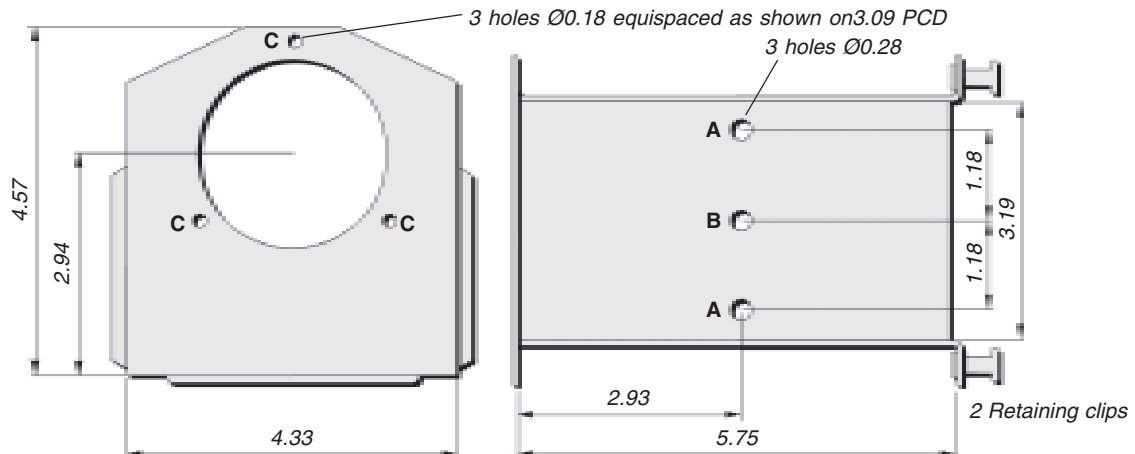
NON - HOSTILE



THERMOMETER MOUNTINGS AND ACCESSORIES

Mounting Shoe S4 MB (Pt. No. 029.226)

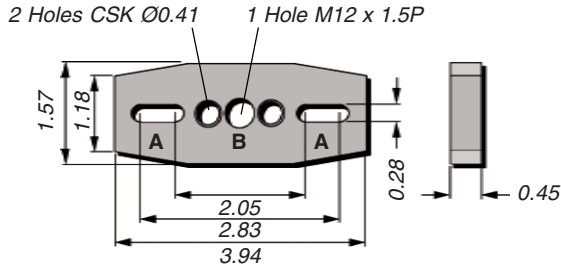
The thermometer is held inside the Mounting Shoe using retaining clips similar to those on the S4 J jacket. The holes on the front permit mounting of the S4 LP purge or S4 WF flange.



- Mounting Options**
- A Mounting Plate (S4 MP)/Mounting Adapter (S4 MA)
 - B Thermometer Base (To secure only)
 - C Water Cooled Flange (S4 WF)/Light Purge (S4 LP)

Mounting Adapter S4 MA (Pt.No. 029.264)

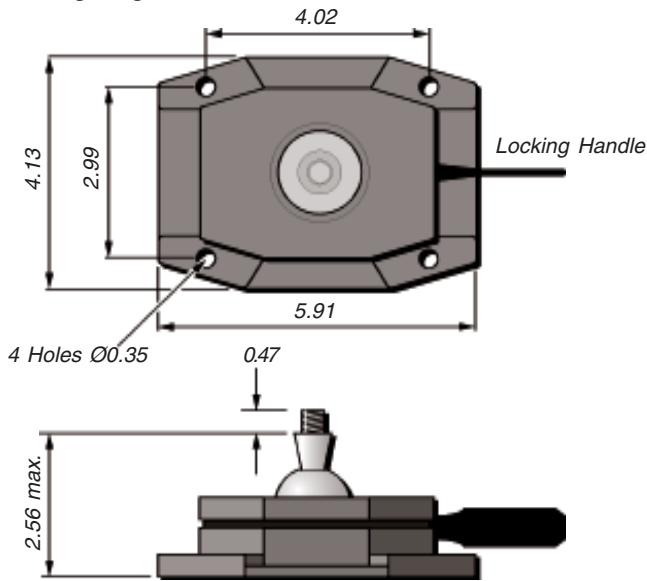
When the ball mounting is used with the mounting shoe (S4 MB), this adapter provides a stable plate on which to attach the shoe.



Mounting Options	
A	Jacket (S4 MB)
B	Large Ball Mount (S4 LB)

Large Ball Mounting S4 LB (Pt.No. 150.577)

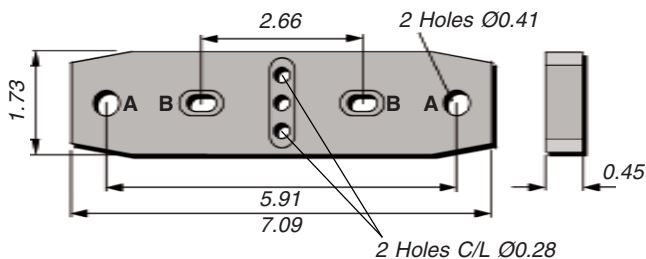
The large ball mounting attaches to the thermometer using the mounting adapter (S4 MA using Mounting Option B). Four holes (Ø0.35) permit fixing to a flat surface. A locking handle secures the ball mount at the required orientation for accurate sighting.



Mounting Plate S4 MP (Pt.No. 029.263)

The mounting plate can be used to mount the shoe to a flat surface. It has three sets of mounting holes as specified below.

Two ¼in BSW, ½in long screws (112.467) are supplied with the plate to secure it to the shoe.

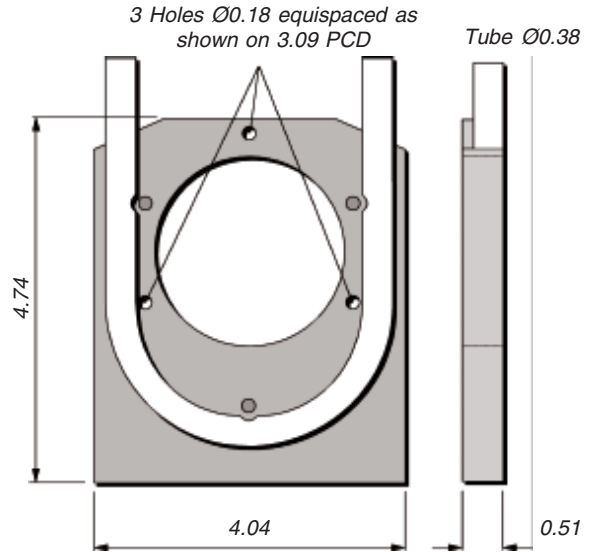


Mounting Options	
A	Mounting Holes
B	Jacket (S4 MB)

Water cooled flange S4 WF (Pt. No. 029.547)

Some applications do not require the strong physical protection and high efficiency cooling of the S4 J jacket, but some cooling may still be necessary to protect the thermometer. In these circumstances the water-cooled flange is recommended. It is mounted to the front face of the mounting shoe, and will ensure that the internal temperature of the thermometer does not exceed the recommended operating temperature upper limit.

Water flow: <1 l/min / 13 Gal/hr
Pipe connections: Ø0.375



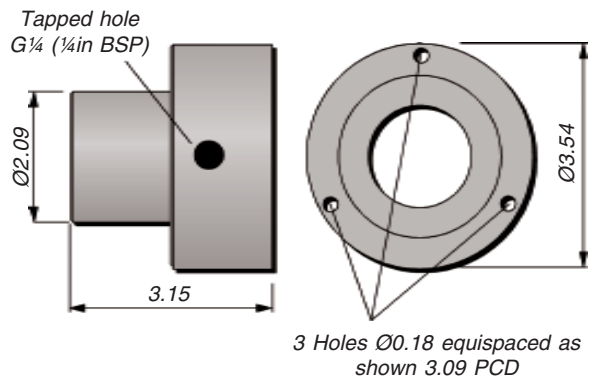
Light Purge S4 LP (Pt.No. 091.811)

This small, highly efficient purge attaches to the mounting shoe (S4 MB) and is used to keep the thermometer lens/window clean.

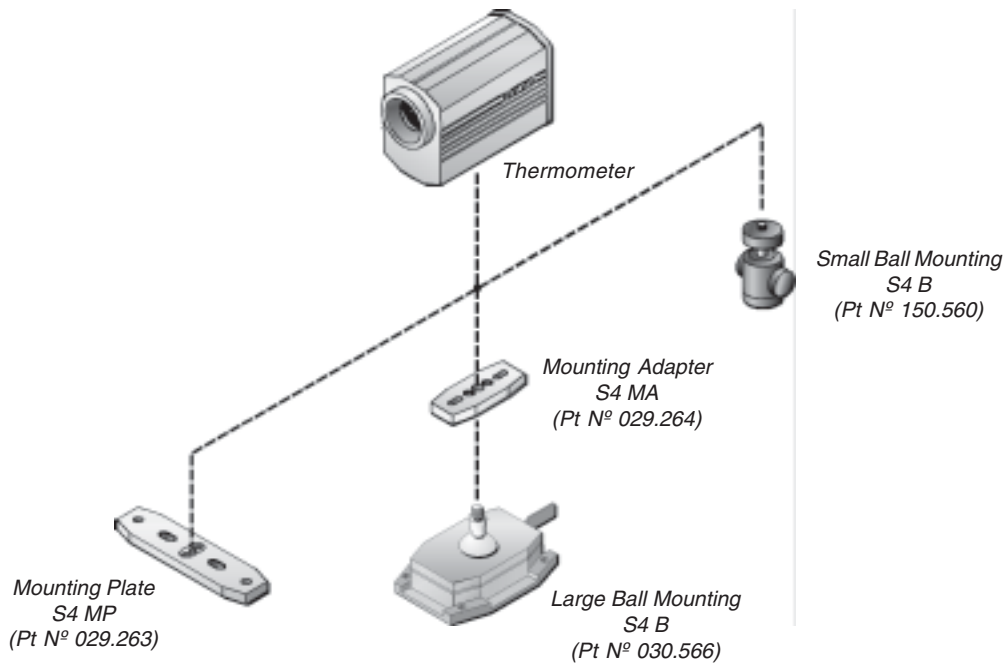
Inlet pressure: 3750N/m²

Flow rate: 140 l/min

Hole: G¼ (¼in BSP)



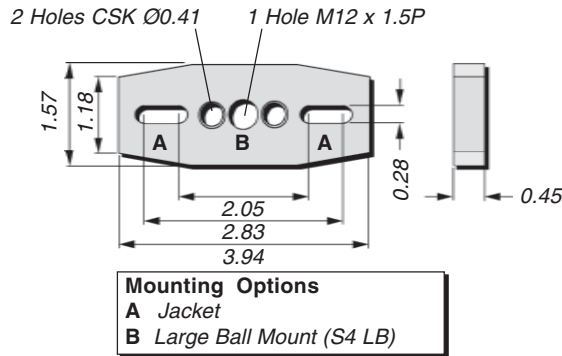
LABORATORY



THERMOMETER MOUNTINGS AND ACCESSORIES

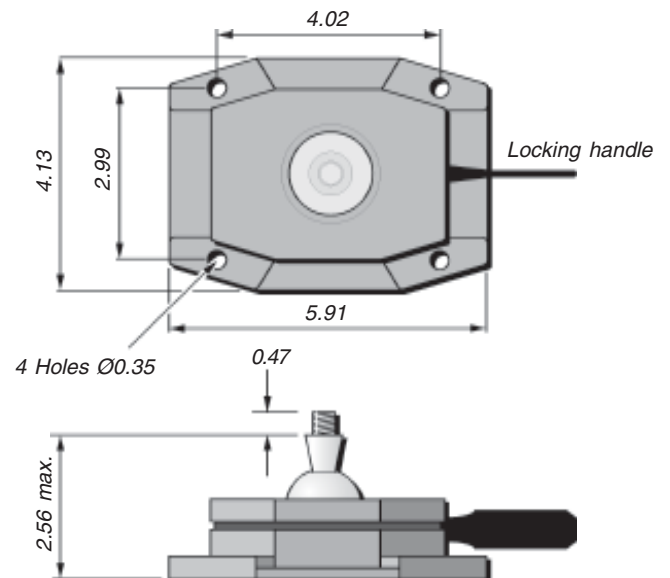
Mounting Adapter S4 MA (Pt.No. 029.264)

When the ball mounting is used with the thermometer this adapter fits to the thermometer base (A) using the screws provided, and couples using the centre hole (B) to the Large Ball Mounting (S4 LB). Two ¼in BSW, ½in long r/head screws (112.467) are supplied with the adapter to secure it to the thermometer.



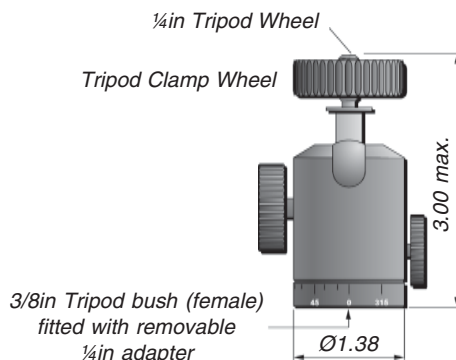
Large Ball Mounting S4 LB (Pt.No.150.577)

The large ball mounting attaches to the thermometer using the mounting adapter (S4 MA using Mounting Option B). Four holes (Ø0.35) permit fixing to a flat surface. A locking handle secures the ball mount at the required orientation for accurate sighting.

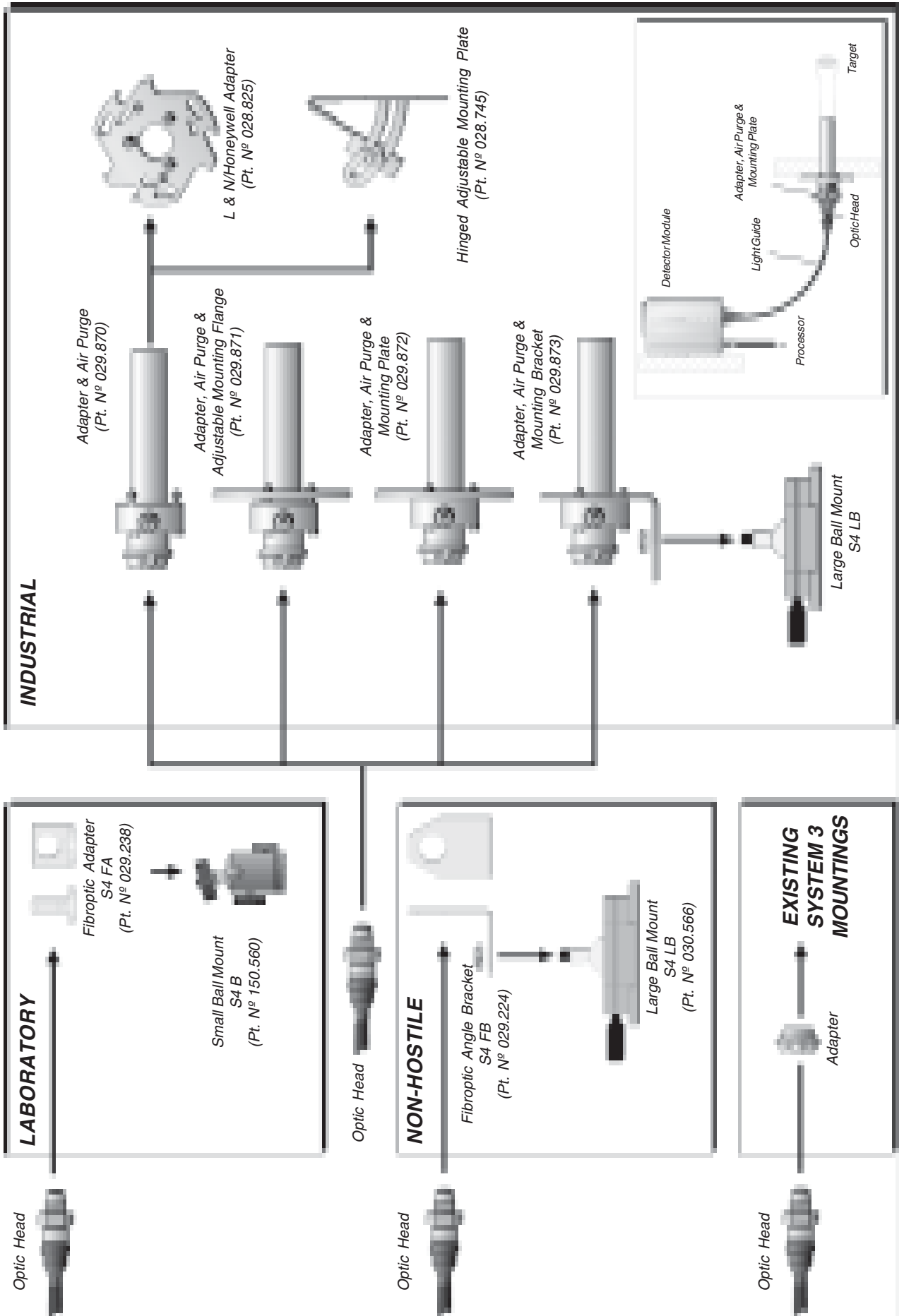


Small Ball Mounting S4 B (Pt.No.150.560)

The S4 B can be used with the thermometer only, for accurate sighting. It is identical to a standard tripod mounting.



COMPLETE FIBROPTIC THERMOMETER SYSTEMS

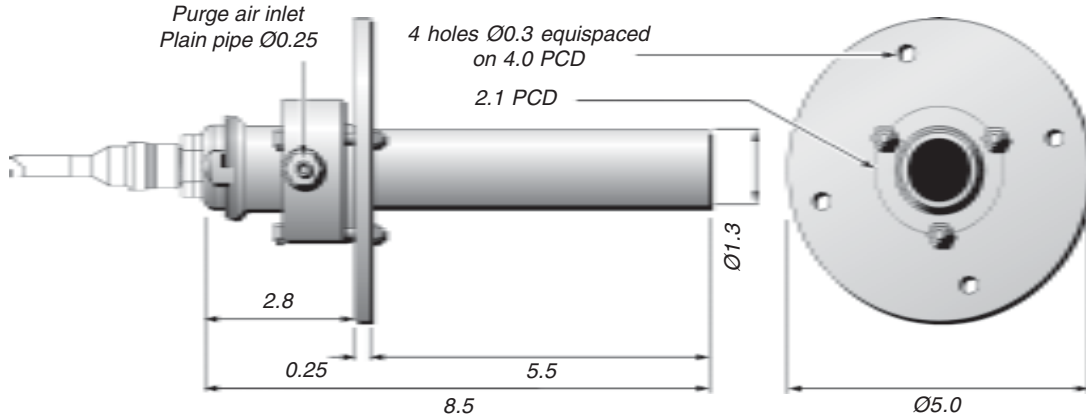


INDUSTRIAL

Quick Release Adapter, Air Purge & Adjustable Mounting Flange (Pt.No. 029.871)

The adapter, air purge and adjustable mounting flange assembly attaches to the optic head, and provides a mounting using the four holes through the circular plate. Three studs link the main plate to a smaller plate which provide adjustment to ensure accurate alignment on to the target surface; particularly useful when sighting onto a small target. The quick-release adapter which forms an integral part of this assembly allows rapid, no tools removal of the optic head for routine maintenance.

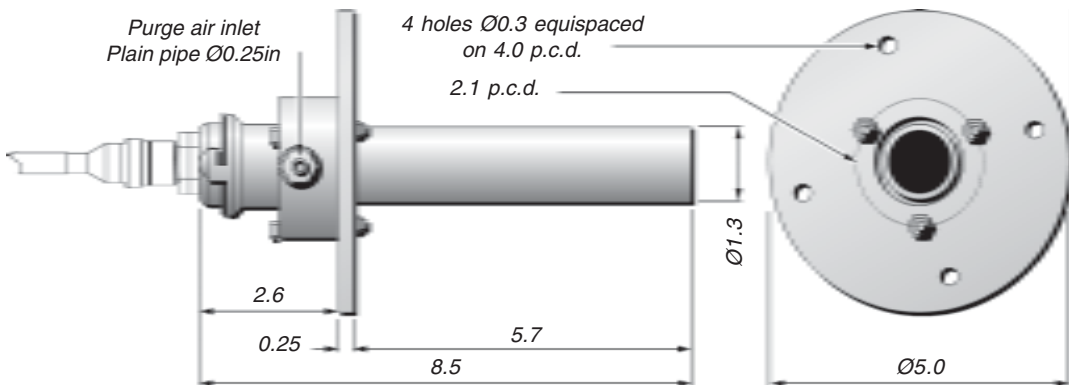
Air purge flow rate: 60 litre/min (2.12ft³/min), Air purge pressure: 0.1 Atmosphere (0.1bar)



Adapter, Air Purge & Mounting Plate (Pt.No. 029.872)

The adapter, air purge and mounting plate assembly attaches to the optic head, and provides a mounting using the four holes through the circular plate. The quick-release adapter which forms an integral part of this assembly allows rapid, no tools removal of the optic head for routine maintenance.

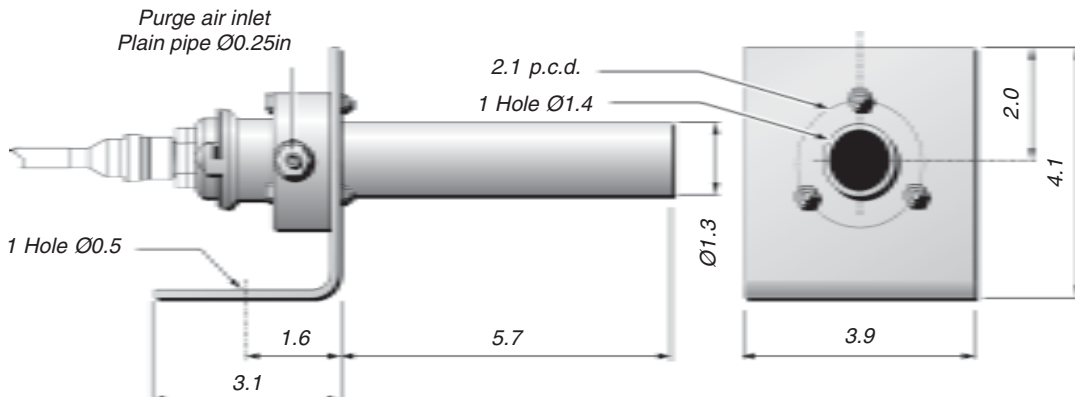
Air purge flow rate: 60 litre/min (2.12ft³/min), Air purge pressure: 0.1 Atmosphere (0.1bar)



Adapter, Air Purge & Mounting Bracket (Pt.No. 029.873)

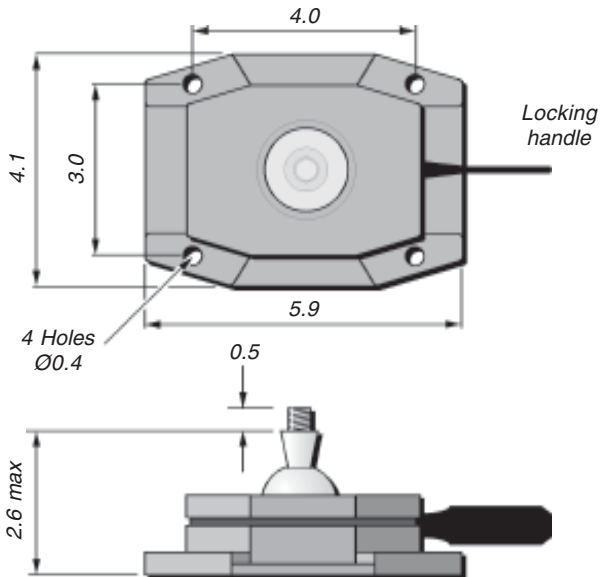
The adapter, air purge and mounting bracket assembly attaches to the optic head, and provides mounting using the single hole in the base of the bracket. Alternatively, the bracket will attach to the large ball-mounting (S4 LB) to provide adjustment to ensure accurate alignment on to the target surface; particularly useful when sighting onto a small target. The quick-release adapter which forms an integral part of this assembly allows rapid, no tools removal of the optic head for routine maintenance.

Air purge flow rate: 2.12ft³/min, Air purge pressure: 0.1 Atmosphere (0.1bar)



Large Ball Mounting S4 LB (Pt.No.150.577)

The ball mounting can be used with either the mounting bracket assembly (029.873) or the fiberoptic angle bracket (S4 FB) to provide adjustable mounting for accurate sighting. A locking handle secures the ball mount at the required orientation.

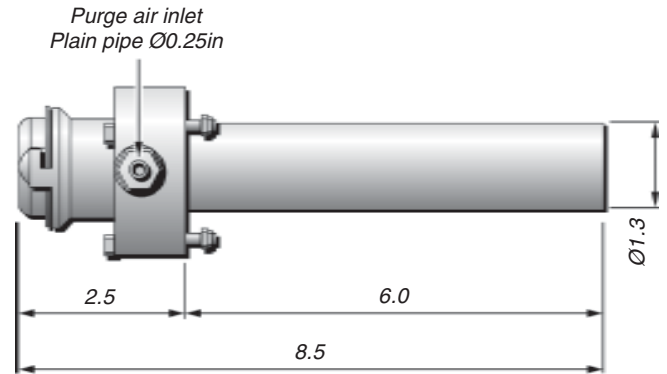


Quick Release Adapter & Air Purge (Pt.No. 028.870)

The air purge is used where a clear sight path has to be maintained, by using the purging air to maintain the lens free from dust, dirt etc. The purge connects to the optic head with a quick-release adapter (supplied) which allows rapid, no tools removal of the optic head for routine maintenance. The purge is secured on the installation using either a mounting adapter or plate (see below).

Air purge flow rate: 60 litre/min (2.12ft³/min)

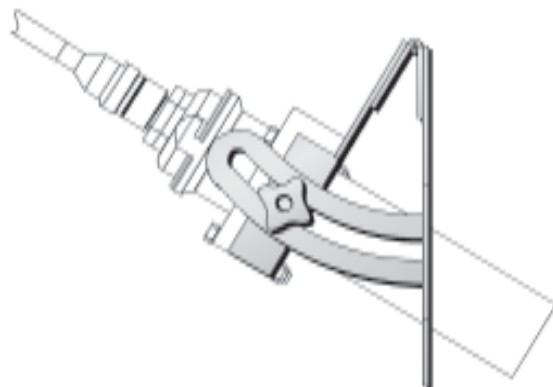
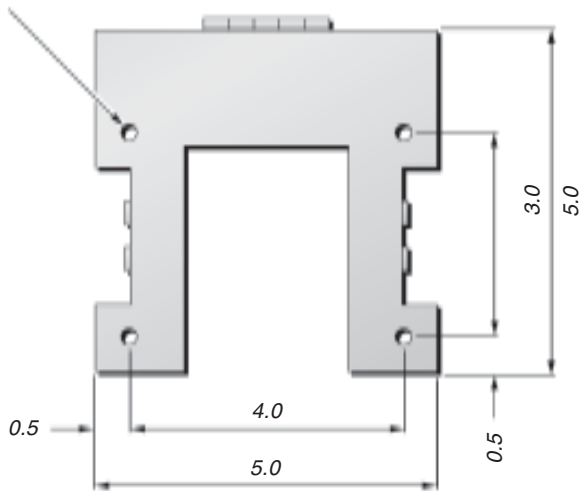
Air purge pressure: 0.1 Atmosphere (0.1bar)



Hinged Adjustable Mounting Plate (Pt.No. 028.745)

The hinged adjustable mounting plate enables the head/adapter/purge assembly to be mounted securely at a fixed location. It has 45° adjustment for accurate sighting onto the target and can be easily adjusted at any time.

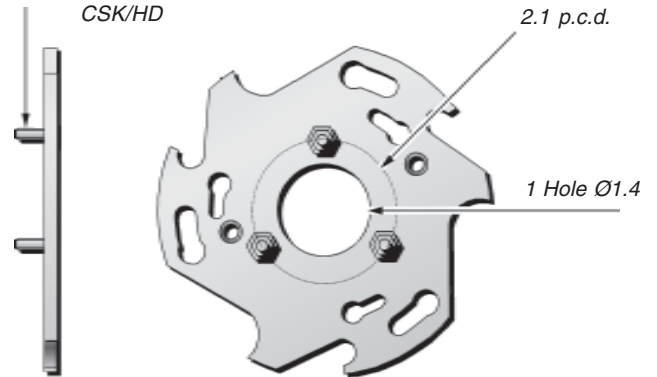
4 Holes Ø0.3



L&N/Honeywell Adapter (Pt.No. 028.825)

This adapter permits the optic head/adapter/purge assembly to be mounted (using the range of holes and slots provided) onto existing thermometer mountings (including competitors) or to a convenient structure for sighting the measurement target area.

3 Screws M4 x 0.39
CSK/HD



Quick Release Adapter (Pt.No. 029.591)

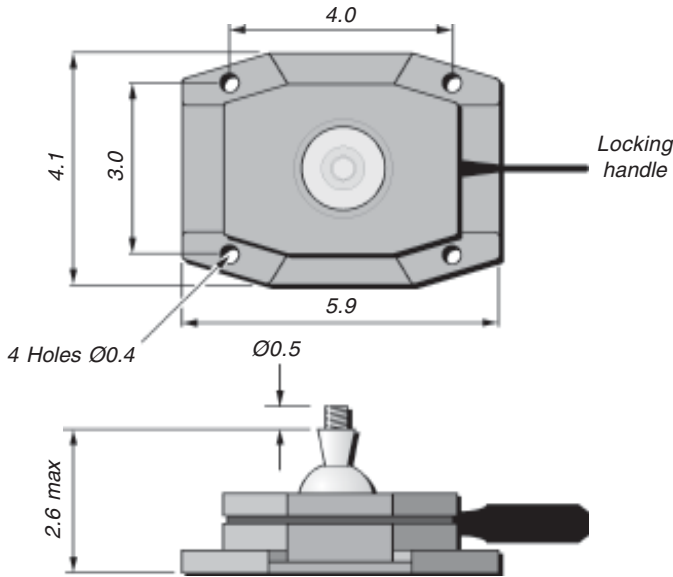
The quick release adapter allows no tools removal of the optic head from the air purge or mounting for routine maintenance. It permits a System 4 optic head to be mounted onto existing System 3 mountings.



NON-HOSTILE

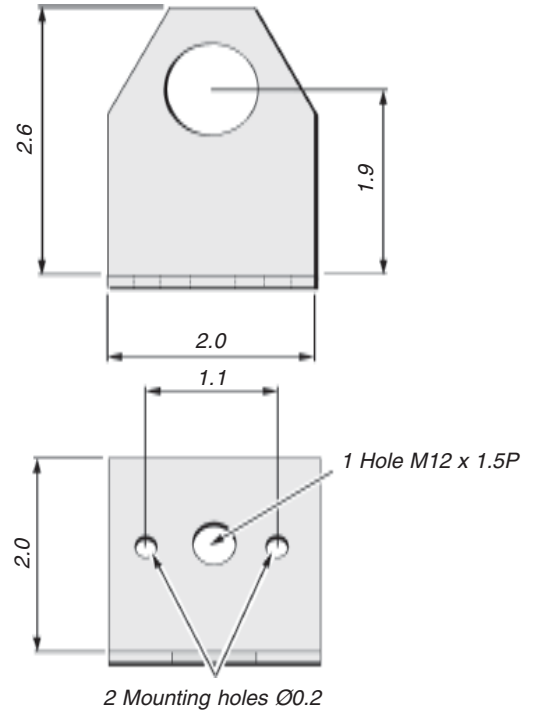
Large Ball Mounting S4 LB (Pt.No.150.577)

The ball mounting is used with the Fibroptic Angle Bracket (S4 FB) to provide adjustable mounting for accurate sighting. Four holes (Ø0.35) permit fixing to a flat surface. A locking handle secures the ball mount at the required orientation.



Fibroptic Angle Bracket S4 FB (Pt.No.029.224)

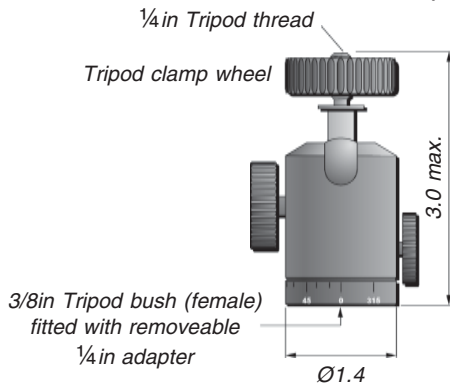
The Fibroptic Angle Bracket enables the optic head to be mounted either as a stand-alone in applications which require no purging, protection or special mounting considerations; or with the Large Ball Mounting (S4 LB) where accurate sighting is essential.



LABORATORY

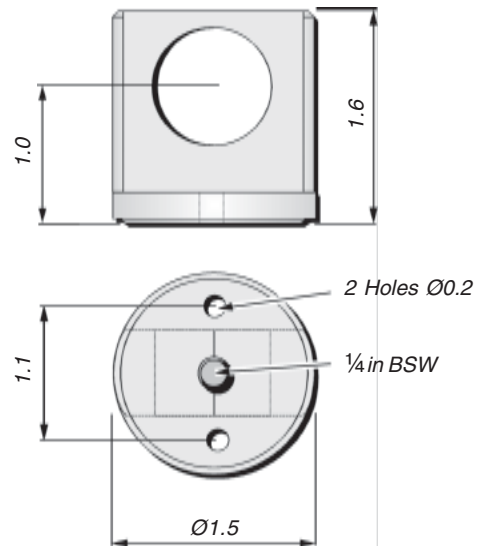
Small Ball Mounting S4 B (Pt.No. 150.560)

The S4 B is used with the Fibroptic Adapter (S4 FA) for mounting the optic head only, where accurate sighting is essential. It is identical to a standard tripod mounting.



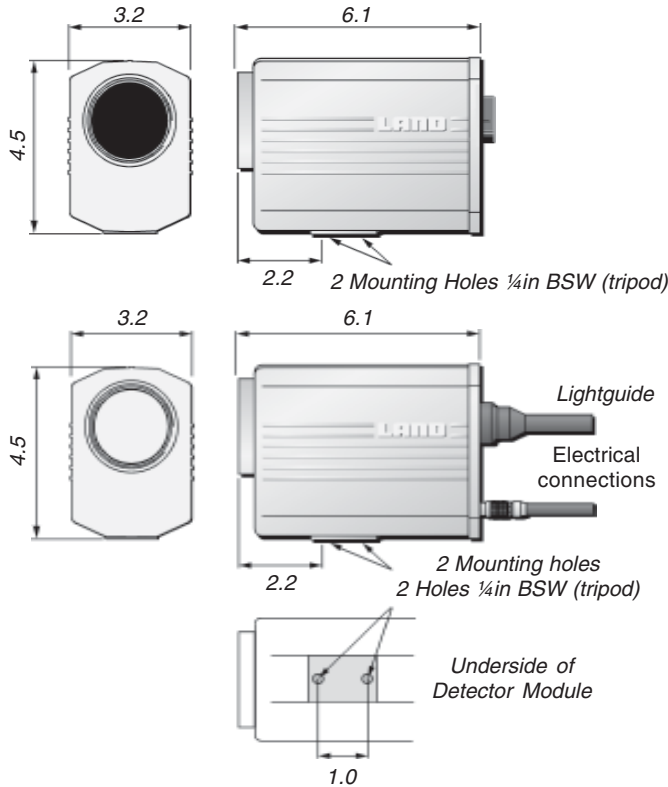
Fibroptic Adapter S4 FA (Pt.No.029.238)

The Fibroptic Adapter enables the optic head to be mounted as a stand-alone, in applications which require no purging, protection or special mounting considerations. A single 1/4 inch thread bolt hole can attach to the Small Ball Mounting (S4 B) or a standard tripod mounting. Two further holes in the base permit mounting to a flat surface.



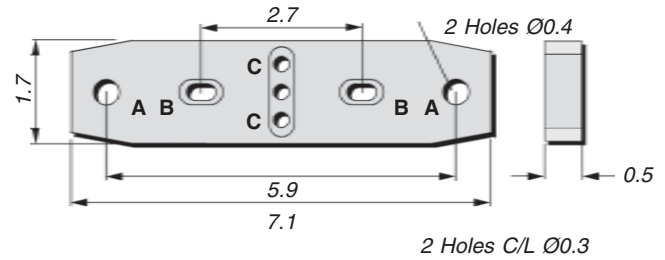
Thermometer and Detector Module

The thermometer and detector module has two holes on the underside. It will mount directly onto a tripod or the Small Ball Mounting (S4 B); or can be used with the Large Ball Mounting (S4 LB) with the Mounting Adapter (S4 MA); or fixed to a flat surface using the Mounting Plate (S4 MP).



Mounting Plate S4 MP (Pt.No. 029.263)

The mounting plate attaches to the thermometer or detector module using holes C, and mounts to a flat surface using holes A or B. It is supplied with two screws (1/4in BSW, 1/2in long screws, 112.467) to fit the thermometer base.



Mounting Options
A Mounting holes
B Mounting holes
C Detector module base

AIR SUPPLY SYSTEMS

Air purges use a stream of air to disperse dust and fumes from the thermometer sight path and to prevent dirt settling on the lens or window.

Clean dry air must be supplied to the purges, and jackets with integral purge and a diffuser.

Any foreign material in the air supply will potentially block the diffuser, reduce the purge efficiency and deposit material on the lens or window.

To achieve the necessary cleanliness standards, the air system should be designed to recommended guidelines. A filter system should be fitted in every air line which feeds a purge.

LAND can supply an automatic drain air filter system with optional low flow alarm for use with correctly engineered compressed air systems.

A relatively clean, dry compressed air supply of 25 to 150 lb/in²/1.75 to 10.5 kg/cm² is required for use with the system A/A air filter system.

System A/A (LF and HF)

There are two types of restrictor available; low flow (LF) and high flow (HF). Low Flow (LF) is for use when only purging is required, the high flow (HF) when both purging and cooling are required.

The optional flow alarm detects a low flow rate. This can be linked to a warning device i.e. Klaxon or annunciator lamp to alarm once the flow falls below the required rate.

System A/A/LF (Pt. No. 004.449)

System A/A/LF with Low flow alarm (Pt. No. 003.939)

System A/A/HF (Pt. No. 004.450)

System A/A/HF with Low flow alarm (Pt. No. 003.940)

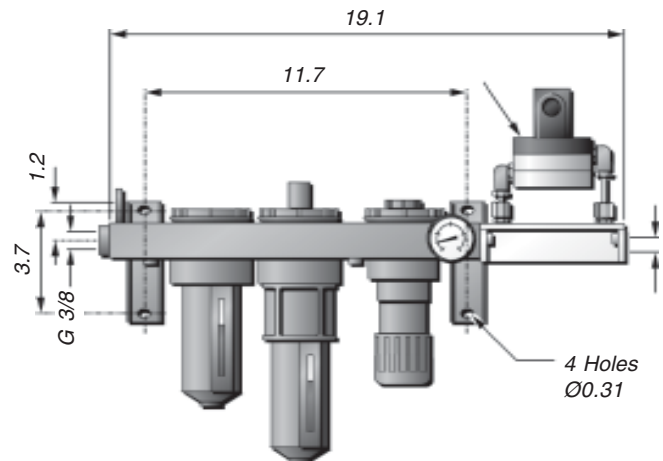
Fixing Details

The following are pipe dimensions recommended for use with the A/A system:

3/8in dia. bore up to 7m/23ft long

1/2in dia. bore 7m to 27m/23ft to 90ft long

3/4in dia. bore 27m to 210m/90ft to 700ft long



Note: Replacement filters and other spares are available from Land Infrared.

For more than fifty years LAND have supplied temperature measuring systems and instruments to many different industries all over the world. Now the world leader in non contact thermometry, our expert advice and support is never far away.



WORLD LEADERS

LAND is the world leader in the manufacture of non contact temperature measurement systems, thermal imagers and linescanners.

WORLDWIDE SUPPORT

In addition to the companies established in Europe, USA, Mexico and Japan, LAND is represented by distributors in most of the major industrial countries throughout the world.

Our customers benefit, on a global basis, from practical and expert advice from fully trained technicians who are aware of specific requirements for their country and industry.

CALIBRATION

LAND operate an extensive calibration service. All calibrations made are traceable to National Standards. Calibration certificates are available from our UKAS accredited calibration laboratory 0034.

In the USA a traceable calibration certificate can be issued complying with the National Institute of Standards and Technology (NIST).

A consultancy service is also available for those companies who wish to establish their own in-house calibration facility.

APPLICATIONS

LAND have solved many different temperature measurement problems in a wide variety of industries from food to atomic energy, some of which are list below:

- Iron & Steel
- Petrochemical
- Heat Treatment
- Minerals
- Glass
- Maintenance
- Power & Utilities
- Aerospace
- Electronics
- Pharmaceuticals
- Plastics
- Paper
- Rubber
- Textiles
- Non-ferrous Metals

For further information or free advice on specific temperature measurement problems within these or any other industry, contact your nearest Land office.

PRODUCT ASSURANCE

When you specify LAND products you are assured of receiving a completely pretested, calibrated working product. Each instrument is carefully checked to ensure complete compliance with specification and is fully guaranteed. LAND was the first manufacturer of infrared instruments to successfully obtain ISO 9001 Quality Management System Approval for both design and manufacture of non contact infrared temperature measuring equipment.

 These products comply with current European directives relating to electromagnetic compatibility and safety (EMC directive 89/336/EEC; Low voltage directive 73/23/EEC).

The Quality Management System of Land Instruments International Ltd. Is approved to BS EN ISO9001:2000 for the design and manufacture, stockholding, in-house repair and site servicing of non contact temperature measuring instrumentation. Associated software designed and developed in accordance with TickIT. Calibration certificates are available from our UKAS accredited Calibration Laboratory No. 0034. The Land calibration laboratory complies with the requirements of the international standard BS EN/IEC 17025.



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Infrared Temperature Measurement

Land Instruments International • Dronfield S18 1DJ • England • Tel: (01246) 417691 • Fax: (01246) 410585
Email: infrared.sales@landinst.com • Internet: www.landinst.com

Land Instruments International • 10 Friends Lane • Newtown, PA 18940-1804 • U.S.A. • Tel: (215) 504-8000
Fax: (215) 504-0879 • Email: irsales@landinstruments.net • Internet: www.landinstruments.net

France
Land Instruments Sarl
Tel: (1) 34 62 05 45 • Fax: (1) 30 56 51 12
Email: commercial@landinst.fr

Japan
Land KK
Tel: 06 6330 5153 • Fax: 06 6330 5338
Email: ikeland@silver.ocn.ne.jp

Germany
Land Instruments GmbH
Tel: 02171/7673-0 • Fax: 02171/7673-9
Email: infrarot@landinst.de

Spain
Land Instruments International
Tel: 91 630 0791 • Fax: 91 630 2918
Email: land-infrared@landinst.es

Italy
Land Instruments Srl
Tel: 02/99040423 • Fax: 02/99040418
Email: infrared@landinst.it

Mexico
Land Instruments International
Tel: 52 55 9171 1466 • Fax: 52 55 9171 1477
Email: ventas@landinstruments.net

Product Specification

Linescanner	LSPHD-50	LSPHD-52
Measurement range	150 to 750°C/302 to 1382°F	500 to 1100°C/932 to 2012°F
Spectral response	5µm nominal	
Scan angle	80° (software adjustable to 40°)	
Scan speed	10 to 150Hz (adjustable in 1Hz increments)	
Measurement Points	1000 per scanline	
System accuracy	±2°C/ 3.6°F	±3°C/6.4°F
Ambient temperature	5 to 60°C/ 41 to 140°F (specified) 5 to 70°C/ 41 to 158°F (operating)	
Environmental Sealing	IP65	
Single Point Thermometer		
	SOLOnet SN5	
Measurement range	200 to 1100°C/392 to 2012°F	
Spectral response	5 µm	
System accuracy	0.35% K	
Ambient temperature	5 to 60°C/ 41 to 140°F (specified) 0 to 70°C/ 32 to 158°F (operating)	
Environmental Sealing	IP65 / NEMA 4X	

Intelligent Scanning

Intelligent scanning solutions aim to solve problems by providing more than just a measurement. Land is able to provide a custom solution according to your requirements; this includes custom temperature ranges, application specific mountings, and bespoke communications protocols.

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Land Instruments International Ltd • Dronfield S18 1DJ • England
Email: land.infrared@ametek.co.uk • www.landinst.com • Tel: +44 (0) 1246 417691 • Fax: +44 (0) 1246 410585

AMETEK Land, Inc. • 150 Freeport Rd • Pittsburgh, PA 15238 • U.S.A.
Email: irsales@ametek.com • www.ametek-land.com • Tel: +1 (412) 826 4444 • Fax: +1 (412) 826 4460

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**Non-Contact Temperature
Measurement Solutions**

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PROCESS & ANALYTICAL INSTRUMENTS



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Temperature Measurement Solutions for the Glass Toughening Industry

Toughened Glass Processing Temperature Measurement Solutions

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PROCESS & ANALYTICAL INSTRUMENTS

The LAND Glass Toughening System is an integrated solution meeting the temperature measurement requirements of glass toughening plants across the world. Importantly, the system provides high accuracy measurements independent of the surface coatings applied to the glass.

Measurement Challenge

A challenge for plants running multiple glass types with a variety of coatings has been how to accurately measure the glass temperature with a minimum input from the operator, particularly with the increased volume of low-E glass.

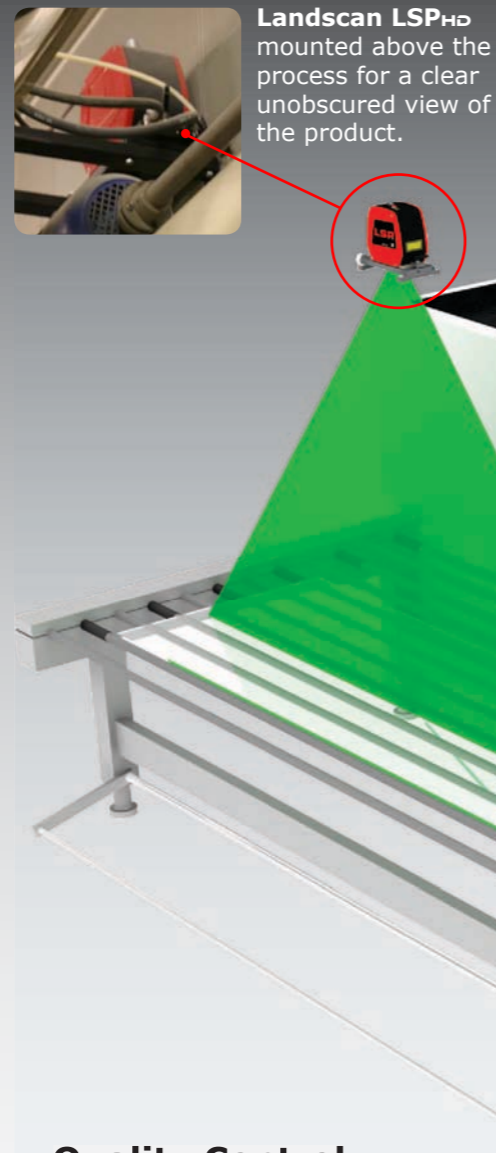
LAND has solved this problem by implementing a compact single point thermometer into the overall system which views the glass from underneath; the dedicated glass toughening software uses this signal to compensate the measured temperature values providing accurate measurements independent of surface coating.

System Overview

The Landscan Glass Toughening System incorporates the LSP_{HD} 5 scanner which samples the glass surface up to 150,000 times per second, using a high performance optical system, detecting even the smallest variations in temperature and the SoloNet Spot Thermometer mounted underneath the roller bed to view the uncoated glass.

Features & Benefits

- Suitable for all coatings - an optional single point thermometer makes it possible to make accurate measurements on low E glass
- Data Exchange - processed data can be transferred via a simple cross-platform TCP/IP protocol
- Fully configurable alarms - can be set to alert operators instantly to product quality issues
- Designed for harsh industrial environments - sealing to IP65 / NEMA4, ensuring ultimate measurement reliability and availability
- Ultra hard, sapphire glass scanner window protects your instrument and ensures long service life
- Simple installation - via a single cable connection, reduces installation costs and complexity



Landscan LSP_{HD} mounted above the process for a clear unobscured view of the product.

SoloNet Thermometer mounted in protective enclosure viewing the underside of the glass

Quality Control

The LAND Glass Toughening System allows for greater quality control throughout the full glass toughening process

- Ensures that the minimum required toughening temperature can be achieved across the entire bed
- Product quality issues can be detected without destructive testing
- Product traceability can be improved through long term data storage

Process Control

The LAND Glass Toughening System provides improved process control by:

- Minimising wasted energy by preventing over-heating of the glass, allowing the plant to run more cost efficiently
- Checking for uniform heating of the entire bed

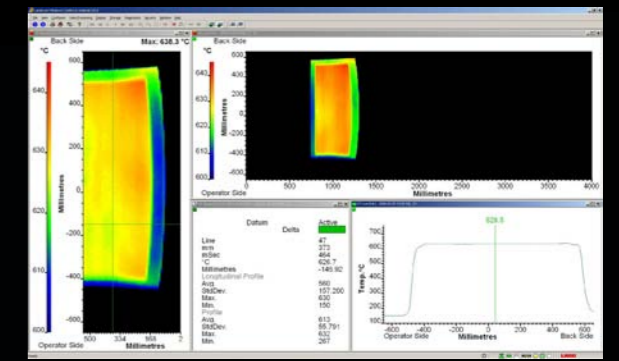
User Display & Control Software (WCA)

Landscan WCA Software provides flexible display capabilities to allow simultaneous display and processing of multiple live data streams with historical data.

The package includes powerful post processing features such as auto-size product to window, multi-window linked cursors and the facility to automatically compare the most recent product with a known good product.

The product file associated with each bed is stored into a proprietary binary data format for subsequent analysis.

The system can be expanded with optional support of multiple client workstations - accessing both live and historical data through the data server workstation. If live visualisation is not required, an offline Client software is available to provide access to historical data for quality control purposes.



Typical software view showing a thermal map and temperature profile (automotive glass)

LSP_{HD} high speed thermal scanner



SoloNet spot digital thermometer

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Measuring temperature of Optical Fibre Drawing Tower Furnace



In order to draw high quality low loss optical fibre with the required strength and attenuation, the temperature of the drawing tower furnace must be stable and precisely controlled.

The furnace lining can get close to melting point so its temperature is monitored and used as the heating control parameter.

Measurement Problems

Graphite resistance and Induction-heated zirconia furnaces operating at high temperatures, typically 2200°C/4000°F, make contact methods of temperature measurement impractical.

The thermometer requires a small target size to view between the coils in an induction heated furnace, or sight down a narrow tube on to the zirconia susceptor.

In the case of a graphite resistance type furnace the thermometer has to sight through a quartz window, down through a narrow tube onto the heating element.

Experience has shown outstanding benefits by using short wavelength thermometers, for this application in order to achieve maximum accuracy.

A silicon cell detector gives high stability, rapid response and high rate of change of output with temperature.

A small target size is offered, with a measurement spot size of 4mm diameter at the focus distance of 450mm.

The thermometer provides high level signal to noise output for retransmission to a readout or control system.

Individually calibrated thermometers are available with traceability to National Standards. UKAS or NIST Calibration certificates are available.

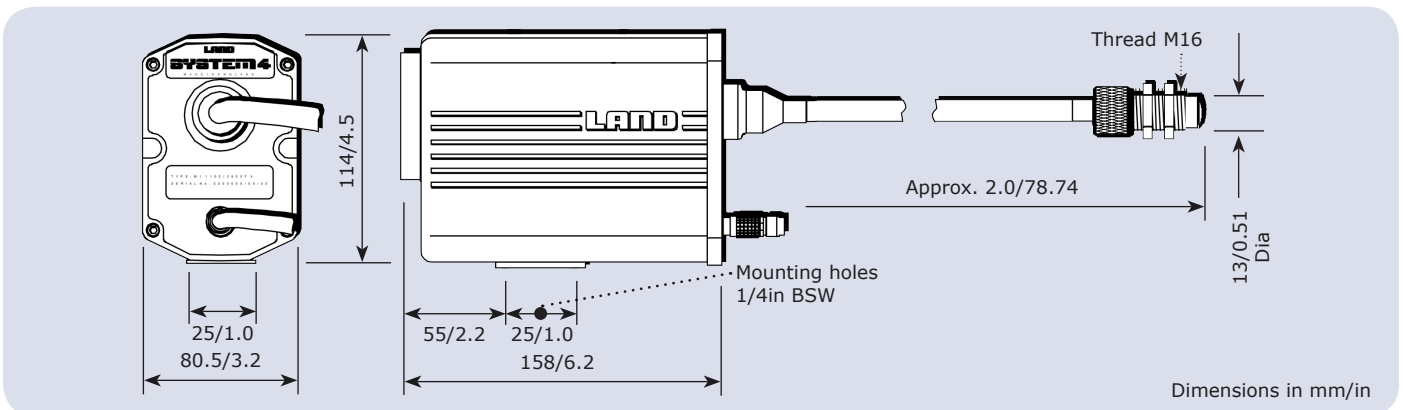
Features

- 2m light guide length
- Small target capability
- Rugged, flexible, modular design
- Accurate, reliable, drift-free measurement
- Industry standard outputs to suit any process monitoring, recording or control system
- Standard industry mounting

Specifications DTT Drawing Tower Thermometer

Model:	DTT 800/2600C	DTT 1500/4700F
Temperature range Operating: Specified:	800 to 2600°C 1000 to 2600°C	1500 to 4700°F 1830 to 4700°F
Wavelength:	1µm	
Response time:	Adjustable 5ms to 5s (0 to 95%)	
Emissivity:	Emissivity adjustable 0.10 to 1.00	
Output:	4 to 20mA	
Field of view (Nominal):	112:1	
Target dia: DT1 optic head:	4mm at 450mm	0.15in at 17.7in
Accuracy Repeatability: Absolute:	≤2°C/4°F ≤0.75%K	
Stability Temperature:	0.3°/°amb	
Time:	2°C/year	4°F/year
Vibration:	3g any axis, 10 to 300Hz	
Humidity:	0 to 99% non condensing	
Sealing:	To IP65 requirements	To NEMA 4X requirements
Ambient temperature Optic head: Lightguide:	200°C 200°C	392°F 392°F
Detector Specified: Operating:	0 to 70°C -10 to 80°C	32 to 158°F 14 to 176°F
Weight:	1.7kg	3.75lb
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)	

Specifications



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Land Instruments International Ltd • Dronfield S18 1DJ • England
Email: land.infrared@ametek.co.uk • www.landinst.com • Tel: +44 (0) 1246 417691 • Fax: +44 (0) 1246 410585

AMETEK Land, Inc. • 150 Freeport Rd • Pittsburgh, PA 15238 • U.S.A.
Email: irsales@ametek.com • www.ametek-land.com • Tel: +1 (412) 826 4444 • Fax: +1 (412) 826 4460

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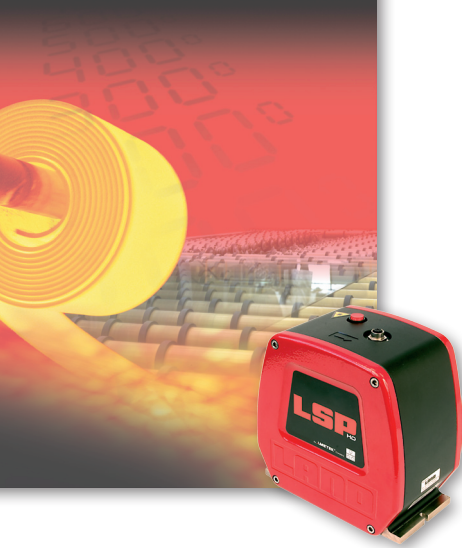
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REGISTERED
ISO 9001
MANAGEMENT SYSTEM

Applies in the USA

LAND

Thermal Imaging and Temperature Profiles for Continuous Process Monitoring and Quality Control



LSP_{HD} 10

600 to 1400 °C / 1112 to 2552 °F

LSP_{HD} 11

700 to 1500 °C / 1292 to 2732 °F

Compact, high performance linescanners which provide high definition thermal imaging from a combination of fast scan speeds and high resolution optics. The real-time processed data is provided via an industrial ethernet connection which is plug and play, installed by means of a single cable connection, which reduces installation time and costs.

**+industry leading 150 Hz scan speed
1000 samples at all scan frequencies+**

Steel Applications - Key Benefits

- + Process Investigation**
Displays can be used to identify and analyse problems.
- + Process Development**
Process modelling to improve process control
- + Quality Control**
Accurate thermal records are a critical aspect of product quality information
- + Process Control**
Provide real time displays of the product's thermal images in a variety of different display formats.

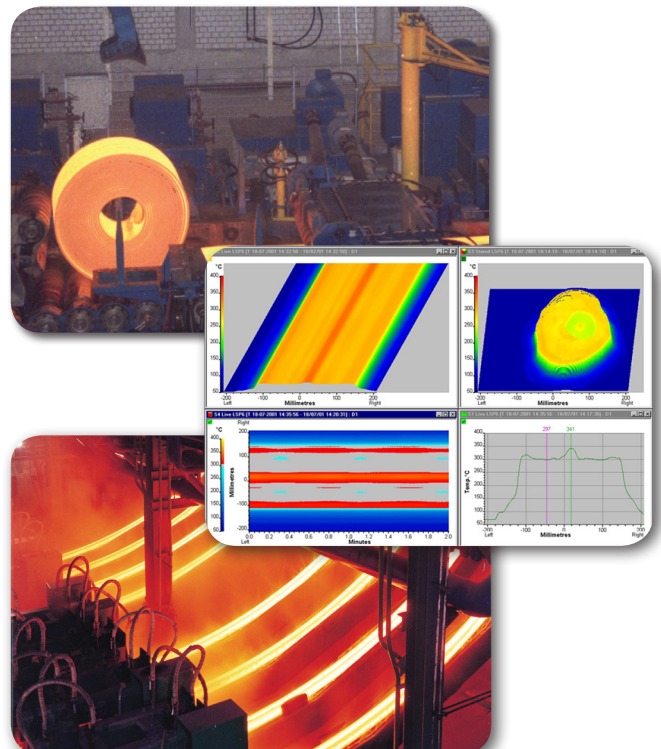
Photos (Top to bottom): Hot Strip Coiler, Thermal map - Hot Strip Mill, Continuous Caster

Key Applications - Steel

- + Continuous Caster
- + Reheat Furnace - Exit
- + Hot Strip Mill -
Roughing Mill Entry/Exit, Coil Box,
Edge Heaters
- + Hot Plate Mill -
Roughing Mill Entry/Exit

LSP_{HD} - Key Features

- + High resolution, optical system
- + Designed for operation in harsh industrial environments
- + Plug and play installation via a single Ethernet cable connection
- + Range of data output formats



Performance Specifications LSP_{HD} 10 (P/No. 804817) / LSP_{HD} 11 (P/No. 804818)

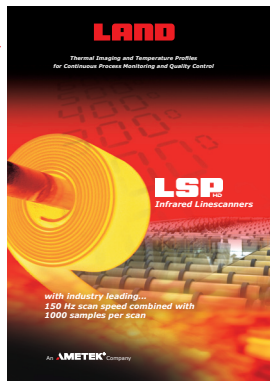
Temperature Range:	LSP_{HD} 10 600 to 1400 °C / 1112 to 2552 °F	LSP_{HD} 11 700 to 1500 °C / 1292 to 2732 °F
Wavelength:	1 µm	
Measurement Accuracy (1):	±2°C / 3.6°F	
Repeatability:	<0.5°C / <0.9°F	
Temp. Resolution typical:	<1°C / <1.8°F	
Drift with ambient temp:	≤ 1° indicated / 10° ambient	
Emissivity:	0.20 to 1.00	
Speed of Response:	≤ 1 µs	
Scan angle:	80° (software adjustable to 40° in 1° steps)	
Scan Speed:	10 to 150 Hz (User adjustable in 10 Hz steps)	
Samples/scan:	1000	
Field of View:	500:1 with user focusable optics (smallest spot size Ø 2mm/0.08 in) <i>static to 95% radiance</i>	
	1118:1 with user focusable optics (smallest spot size Ø 2mm/0.08 in) <i>static to 50% radiance</i>	
Focus Distance:	1m / 39.7 in to infinity (continuously adjustable by the user)	
Connection (signal/power):	Industrial Ethernet via M12 Connector / Power over Ethernet	
Signal Processing:	Up to 14 user configurable zones with min. / max. / average / quantile / average threshold	
Inputs/Outputs:	PoE (IEEE 802.3at) enabled TCP/IP Industrial Ethernet	
Ambient Temperature	5 to 60°C / 41 to 140°F (specified) 5 to 70°C / 41 to 158°F (operating)	
Dimensions (w x h x d):	206 x 209 x 100 mm / 8.1 x 8.2 x 3.9 inches	
Alignment Laser:	Class 2, maximum output 1.0 mW at 635 nm, IEC60825-1:2001 / Indicating scan plane & extent	
Environmental Sealing:	IP65	
EMC:	EN 61326 Class A; Low Voltage Directive EN61010-1	

Notes: (1) Applies 5 to 95% of range

LSP_{HD} Overview

A complete overview of the entire product range, including the key features and benefits of all models.

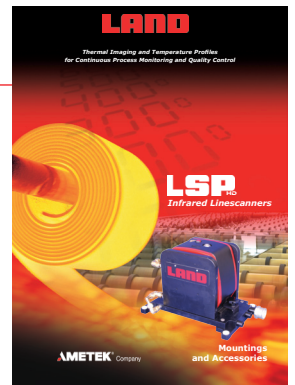
Ref **LSP_{HD} Overview 0210**



LSP_{HD} Mountings and Accessories

A complete overview of the entire range of mountings and accessories for the entire LSP_{HD} product range

Ref. **LSP_{HD} M&A 0210**



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Email: land.infrared@ametek.co.uk • www.landinst.com • Tel: +44 (0) 1246 417691 • Fax: +44 (0) 1246 410585

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Email: irsales@ametek.com • www.ametek-land.com • Tel: +1 (412) 826 4444 • Fax: +1 (412) 826 4460

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Non-Contact Temperature Measurement Solutions

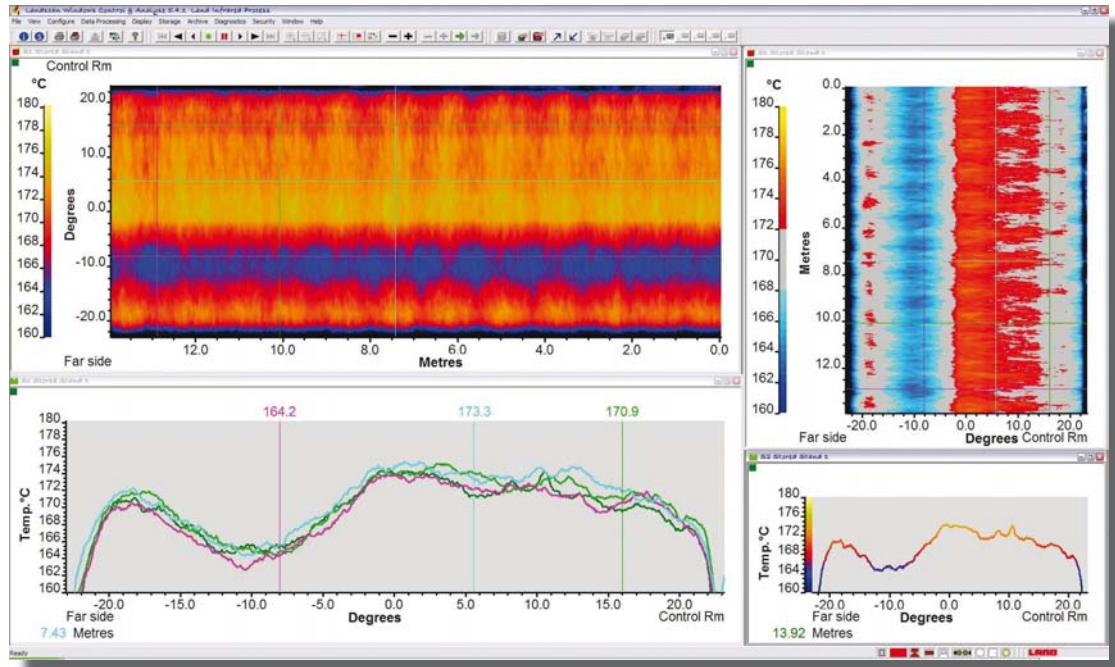


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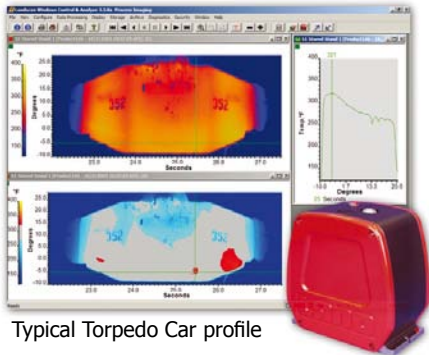
Process thermal images and temperature profiles
for continuous process monitoring and quality control

LSP Series Infrared Linescanners

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Process thermal images and temperature profiles
for continuous process monitoring and quality control



Typical Torpedo Car profile

The compact LSP infrared linescanners provide affordable, highly accurate process imaging and temperature measurement in a wide range of applications from 20 to 1400 °C / 68 to 2552 °F.

There is a choice of two LANDSCAN Control processors to provide an interface between the LANDSCAN Head and either a customer process control system or a LAND Data Server running the LANDSCAN Windows Control & Analyse software

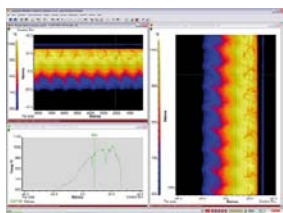
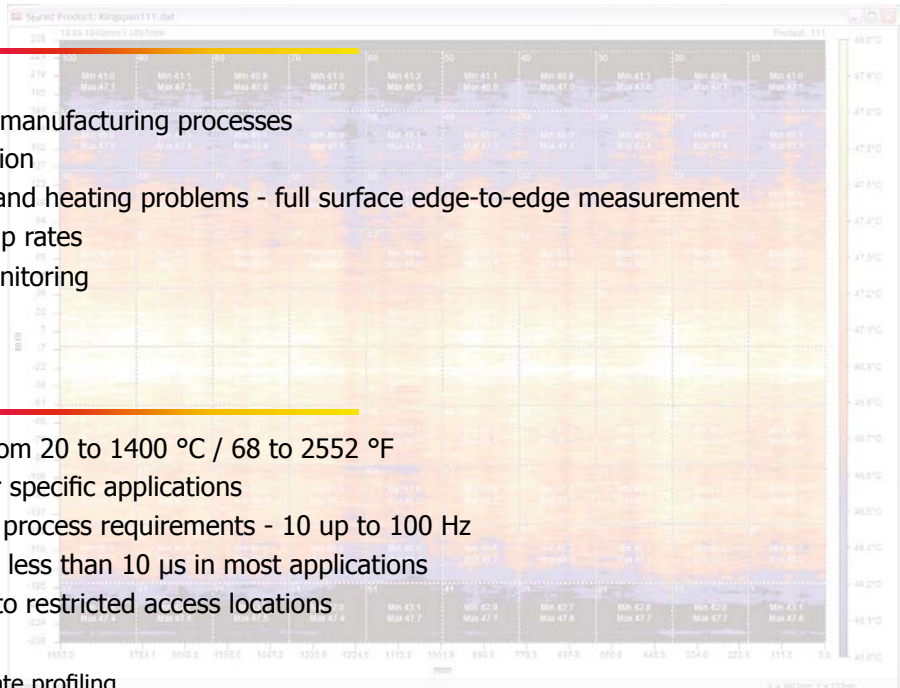
Key Benefits

- Improved product quality
- Closer control of heating and manufacturing processes
- Straightforward plant integration
- Detection of product defects and heating problems - full surface edge-to-edge measurement
- Reduced set-up time and scrap rates
- Automated quality control monitoring

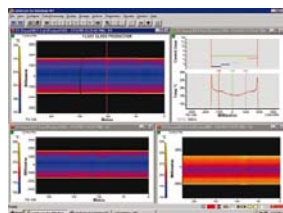
Key Features

- Temperature measurement from 20 to 1400 °C / 68 to 2552 °F
- Choice of 5 scanner heads for specific applications
- Adjustable scan speed to suit process requirements - 10 up to 100 Hz
- Fast measurement response - less than 10 μ s in most applications
- Compact size - ideally suited to restricted access locations

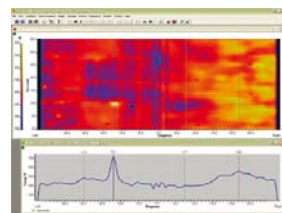
- Laser alignment to ensure accurate profiling
- Durable sapphire window on all low temperature models
- Wide scan angle up to 80°
- Variable focus on the LSP10, LSP20 and LSP21 models
- Single cable connection between scanner head and processor
- Choice of signal processing units



Typical Steel Concast profile



Typical Glass Floatline profile



Typical Cement Kiln profile



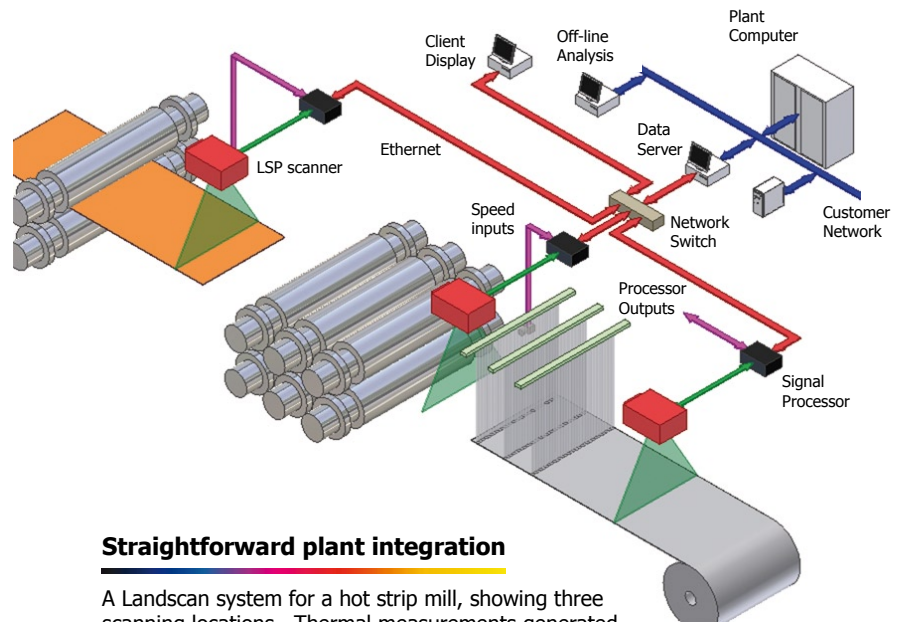
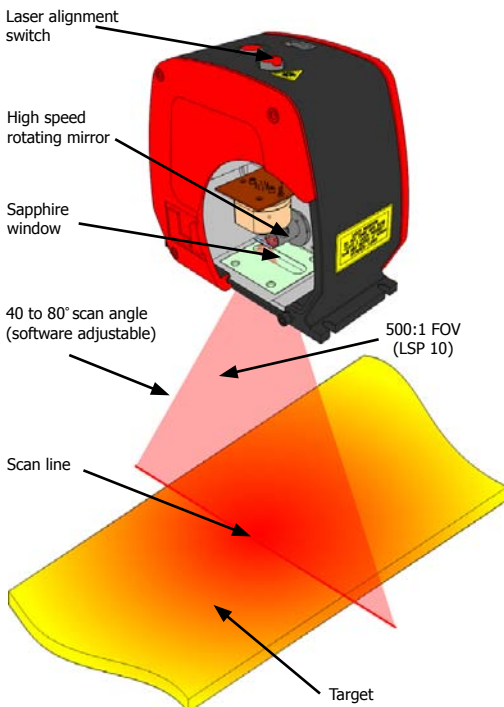
Typical LSP installation

Industry	Application	Typical Temperature Measurement Range	Recommended Scanner
Cement	Rotary Kilns	20 to 250 °C / 68 to 482 °F 50 to 400 °C / 122 to 752 °F 100 to 600 °C / 212 to 1112 °F	LSP 60 LSP 61 LSP 62
Conveyors	Cement, Asphalt, Coke	20 to 250 °C / 68 to 482 °F 50 to 400 °C / 122 to 752 °F 100 to 600 °C / 212 to 1112 °F	LSP 60 LSP 61 LSP 62
Glass	Float, Automotive, Holloware, Forming, Toughening/tempering, Annealing	150 to 750 °C / 302 to 1382 °F 500 to 1100 °C / 932 to 2012 °F	LSP5FL & LSP50 LSP 52
Iron & Steel	Hot Strip and Plate Mills, Beam, Billet and Sections, Rod and Wire, Continuous casting, Annealing, Galvanising and Galvanneal, R&D	600 to 1400 °C / 1112 to 2552 °F 200 to 850 °C / 392 to 1562 °F 300 to 1000 °C / 572 to 1832 °F	LSP 10 LSP 20 LSP 21
Iron & Steel	Torpedo cars, Ladle safety	50 to 400 °C / 122 to 752 °F 100 to 600 °C / 212 to 1112 °F	LSP 61 LSP 62
Plastics	PVC, Polycarbonates, Polypropylene, Polyethylene, PET, Cellulose acetate and Polystyrene, Thermoforming	50 to 350 °C / 122 to 662 °F	LSP 71
Others	Paper, Non-wovens, Cold Rolling, Coating Processes, Building Products	20 to 600 °C / 68 to 1112 °F	LSP 60, 61 & 62

Designed for industrial environments

The LSP series head is extremely compact and has a minimized depth and base 'footprint' for installation in restricted spaces. A built-in laser targeting system aids alignment on to the target. A scan speed of 100 Hz can tackle even the fastest moving products; enabling high resolution, temperature profile information to be produced.

LSP Scanner - Key components



Straightforward plant integration

A Landscan system for a hot strip mill, showing three scanning locations. Thermal measurements generated by the scanner are sent to a dedicated processor. The processor can produce a number of control outputs in accordance with a customer-configured model for real-time process control applications. All thermal measurement data is sent to a data server via an Ethernet link. Connection to the customer network enables the plant computer to control data storage and the data server to archive older data. Off-line analysis terminals enable access to stored data for quality assurance.

Signal Processing and Analysis Software

The scanner head connects directly to a processor (choice of 2), via a single cable. Two control processors are available providing both serial and Ethernet outputs of temperature data. These processors can interface directly to a local process control system or a LAND data server running Landscan Windows Control and Analyse (WCA) software. The Landscan Windows Control and Analyse (WCA) software provides detailed temperature measurement information, analysis tools and product storage for further investigation and quality control purposes.

Specifications

All LSP Models

Parameter

Scan angle:	80° (software adjustable to 40°)
Scan speed:	Adjustable, 10 to 100 Hz (in 10 Hz steps)
System accuracy:	±2 °C / 4 °F all models (±3 °C / 5.4 °F LSP 52 and LSP 62 only)
Repeatability:	±0.5 °C/ 0.9 °F
Emissivity:	0.20 to 1.00
Focus/Field of View:	LSP 5FL, 50, 52, 60, 61, 62 & 71 Fixed focus Target distance: <1200 mm/47.2 in, target size 12 mm/0.5 in Target distance: >1200 mm/47.2 in, Field of View 100:1 LSP 10, 20 & 21 Variable focus from 1 m / 39 in to infinity; Field of View: LSP 10 and 21, 500:1 (Minimum spot size 2 mm / 0.08 in at 1 m / 39 in) Field of View: LSP 20, 300:1 (Minimum spot size 3.3 mm / 0.13 in at 1 m / 39 in) Note: Field of View figures are static to 95 % radiance
Ambient temperature:	5 to 60 °C/41 to 140 °F (specified) 5 to 70 °C/41 to 158 °F (operating)
Dimensions (w x h x d):	206 x 209 x 100 mm / 8.1 x 8.2 x 3.9 inches
Alignment:	Class 2, max. output 1.0 mW at 635 nm, IEC60825-1:2001
Environmental Sealing:	IP65
EMC:	EN 61320:1999 Class A (immunity and emission); IEC 1010 (safety)

LSP 10, LSP 20 and LSP 21

Parameter	LSP10	LSP 20	LSP 21
Measurement range:	600 to 1400 °C/1112 to 2552 °F	200 to 850 °C/392 to 1562 °F	300 to 1000 °C/572 to 1832 °F
Spectral response:	1 µm	2.4 µm	1.9 µm
Speed of response:	≤1 µs	≤1 µs	≤1 µs
Drift with ambient temp:	≤1° indicated / 10° ambient	≤1° indicated / 10° ambient	≤1° indicated / 10° ambient

LSP 5FL, LSP 50 and LSP 52 - for Glass applications

Parameter	LSP 5FL	LSP 50	LSP 52
Measurement range:	150 to 750 °C/302 to 1382 °F	150 to 750 °C/302 to 1382 °F	500 to 1100 °C/932 to 2012 °F
Spectral response:	5 µm	5 µm	5 µm
Speed of response:	<7 µs	<7 µs	<7 µs
Drift with ambient temp:	≤2° indicated / 10° ambient	≤2° indicated / 10° ambient	≤3° indicated / 10° ambient

LSP 60, LSP 61 and LSP 62

Parameter	LSP 60	LSP 61	LSP 62
Measurement range:	20 to 250 °C/68 to 482 °F	50 to 400 °C/122 to 752 °F	100 to 600 °C/212 to 1112 °F
Spectral response:	3 to 5 µm	3 to 5 µm	3 to 4.2 µm
Speed of response:	≤10 µs	≤5 µs	≤5 µs
Drift with ambient temp:	≤1° indicated / 10° ambient	≤1° indicated / 10° ambient	≤2° indicated / 10° ambient

LSP 71 - for Plastics applications

Type	LSP 71
Measurement range:	50 to 350 °C/122 to 662 °F
Spectral response:	3.4 µm
Speed of response:	≤10 µs
Drift with ambient temp:	≤1° indicated / 10° ambient

Temperature Profiles in specific applications

Further, more detailed information exists for the following specific applications:

- Ladle Safety
- Continuous Strip Processing
- Hot Mill
- Float Glass
- Automotive Glass
- Plastics Thermo-forming

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Email: infrared.sales@landinst.com • www.landinst.com

AMETEK Land, Inc. • 150 Freeport Rd. • Pittsburgh, PA 15238 • U.S.A. • Tel: +1 (412) 828 9040
Email: irsales@landinstruments.net • www.landinstruments.net

France
Land Instruments Sarl
Tel: (1) 34 62 05 45 • Fax: (1) 30 56 51 12
Email: commercial@landinst.fr

Japan
Land Instruments Ltd
Tel: 06 6330 5153 • Fax: 06 6330 5338
Email: info@landinst.jp

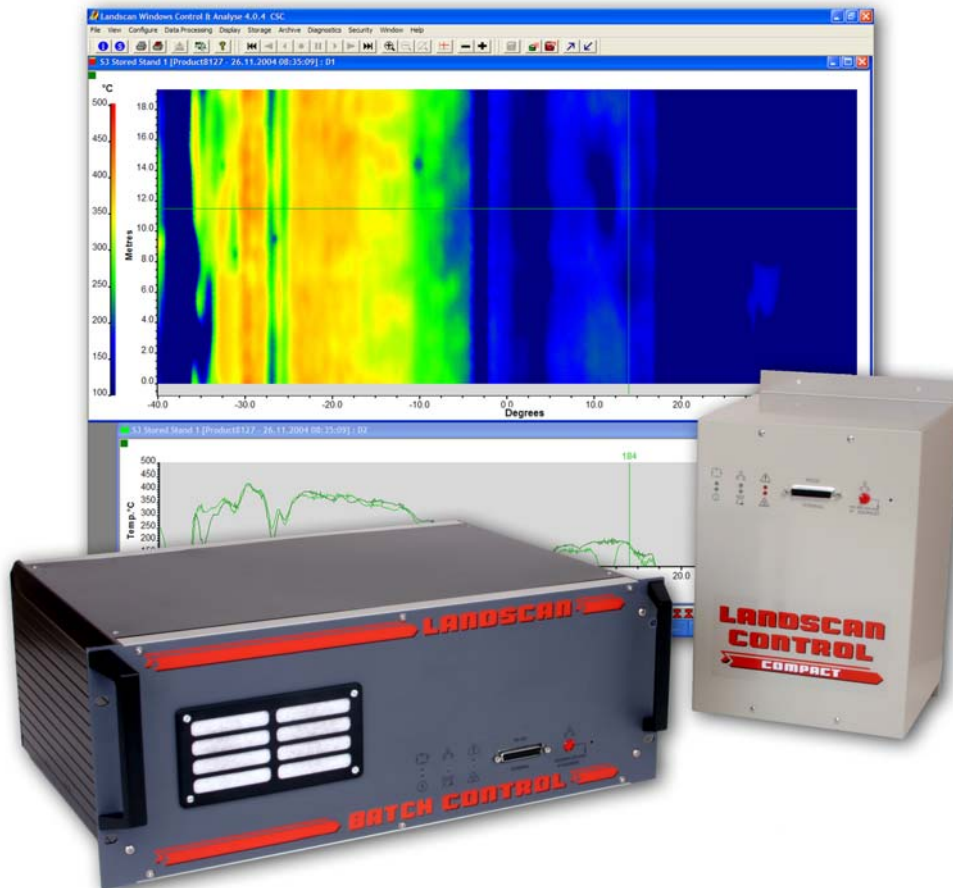
Germany
Land Instruments GmbH
Tel: 02171/7673-0 • Fax: 02171/7673-9
Email: infrarot@landinst.de

Spain
Land Instruments International
Tel: 91 630 0791 • Fax: 91 630 2918
Email: land-infrared@landinst.es

Italy
Land Instruments Srl
Tel: 02/99040423 • Fax: 02/99040418
Email: info@landinst.it

Mexico
Land Instruments International
Tel: 52 55 5281 1165 • Fax: 52 55 5281 5364
Email: ventas@landinstruments.net

LAND



LANDSCAN Control Processors

Infrared Linescanner
Control Signal Processors



Landscan Control signal processors provide the essential interface between the compact, high speed range of LSP infrared linescanners and industrial process control computers.

Benefits

- Improved product quality and operating profitability
- Closer control of heating and manufacturing processes
- Detect product defects and heating problems quickly
- Reduced set-up time and scrap rate
- Automated quality monitoring

Features

- 0.1°C temperature resolution (LSC-B)
- 40 to 80° adjustable scan angle (LSC-B)
- Choice of signal processing units to suit the application
- Choice of mounting arrangement
- Single cable connection between scanner and processor
- Powerful, versatile, software system with single and multiple channel digital/analog input and outputs

LANDSCAN Control Processors



Landscan Control processors offer the user a wide choice of process monitoring and control options

Choice of Control Processors

There are two Landscan infrared linescanner Control signal processors to choose from to suit your particular requirements:

- Landscan Control Compact LSC-C
- Landscan Control Batch LSC-B

Landscan Control Compact (LSC-C) is a simple, economic back-of-panel mountable unit, and Landscan Control Batch (LSC-B) is a 19in rack mountable unit.

Typical Applications

Choose the Landscan Control processor to best suit your application:

Landscan Control Compact

- Continuous, linear moving products and where limited auxiliary inputs and outputs are required.

Landscan Control Batch

- Linear products such as hot steel strip, galvanising/galvanneal and float glass; discrete and rotary products such as automotive glass, fibre board, torpedo car protection and thermoformed plastic sheet and where flexible inputs and outputs are required.

Process Control

The outputs from the LSP linescanner head are transmitted to a Landscan Control signal processor. The processor can be configured using the Landscan Configuration software supplied as part of the system.

Once configured Landscan Control processor provides communications, by serial or Ethernet connection, with the plant PLCs. Additional display, analysis and data storage functionality is provided by a PC server operating the Windows based Landscan Control and Analyse (WCA) software system.

The Landscan Control Batch LSC-B processor provides optional OPC communications.

Refer to the Landscan Software brochure for further information on Landscan WCA.



LANDSCAN Control Compact

Linescanner Signal Processor

The linear output from the LSP linescanner head is converted by the signal processor into a data string of 1000 readings per scan line with a maximum frequency of 100 scan lines per second.

The Landscan Control processor provides all the calculations required, such as zone output and alarms for each line.

Landscan WCA software also provides further analysis, image display and data storage.

The processors can communicate with the Landscan WCA software and at other computer levels using TCP/IP protocol for process control purposes.

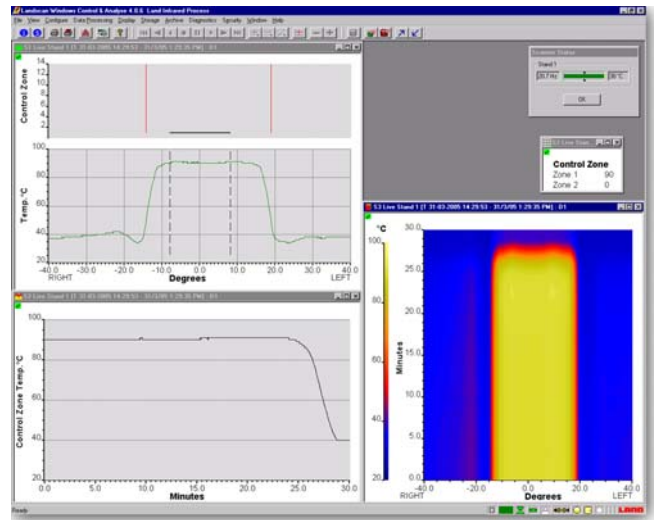
Landscan setup software provides basic functionality to the Control processors for monitoring the scanner measurement parameters.

Landscan Control Compact

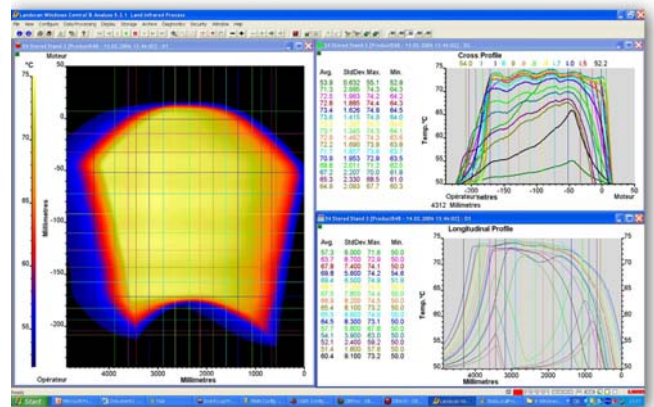
Landscan Control Compact LSC-C is an economic, single channel processor designed for linear measurement.

LSC-C processors can incorporate an additional, optional DAIO board (digital/analog input/output).

The processors are designed to operate with all LSP scanner types, and provide the necessary power supplies, laser on/off, external emissivity and internal ambient temperature control signals.

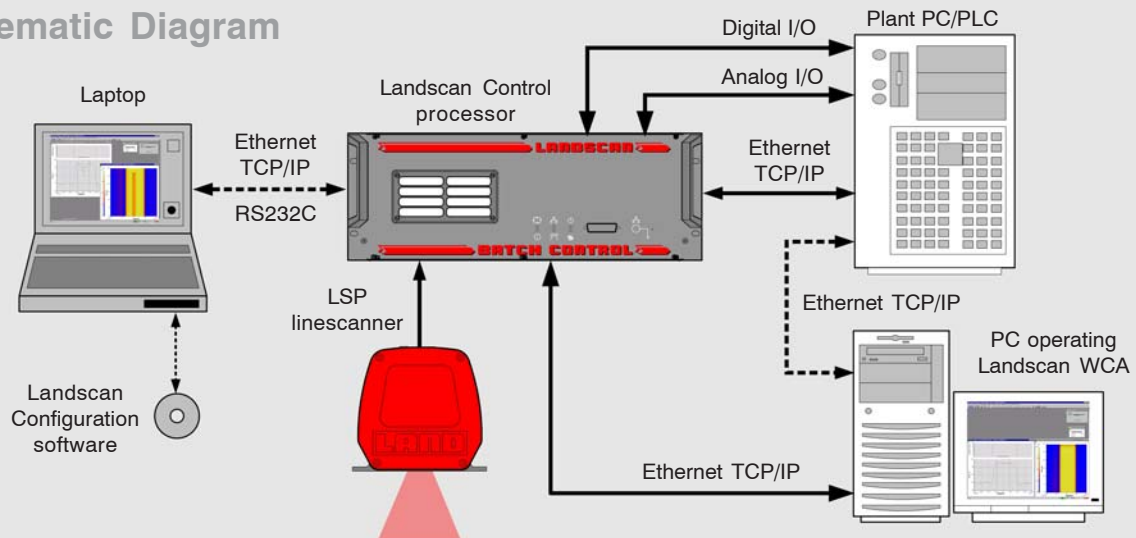


Typical Landscan WCA screen showing a simple profile with single control zone indicating temperature, history trace and 2D map



Typical Landscan WCA screen showing a 2D map with 16 horizontal and vertical profiles, together with calculated Average, Minimum, Maximum and Standard Deviation on all profiles

Schematic Diagram



LANDSCAN

Control Batch

Landscan Control Batch is an extremely powerful signal processor which can be configured specifically to suit the particular process control application

- **Linear** - the product passes in a straight line through the scanner head field
- **Product** - discrete, individual products
- **Rotary** - the product is rotating as it passes through the scanner field of view

Landscan Control LSC-B has the functionality of the LSC-C and more. It has additional product orientated functionality and the option of up to 3 additional DAIO boards. Each DAIO board can generate up to 4 20mA outputs for zone temperatures and product position, and 4 relay outputs for temperature alarms.

Two of the DAIO boards also handle analog (V/mA) or digital inputs for signals such as product speed, reference temperatures and signals from HMD's or other switches for product detection.

LSC-B can detect the beginning and the end of a product and stores the measured data internally.

LSC-B can calculate area temperatures, based on this two dimensional temperature array. This functionality is particularly useful in industries such as plastics thermoforming and glass tempering where the product is heated by a number of individual heaters; or in applications where the product needs temperature monitoring by areas.

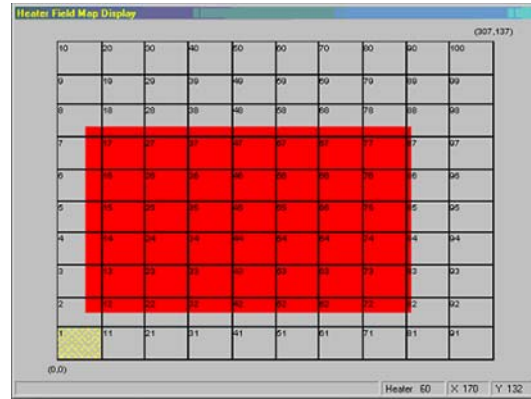
Additionally, the LSC-B can operate as an OPC server. All area or group temperature information is available for the heater control PC. Refer to LAND for further information.

The LSC-B can also interface with digital incremental encoders to correct the non linear image from rotary thermoforming machines into the original shape. LSC-B is able to take into account the machine acceleration, velocity and deceleration during the index. (The thermoforming industry brochure provides further information.)

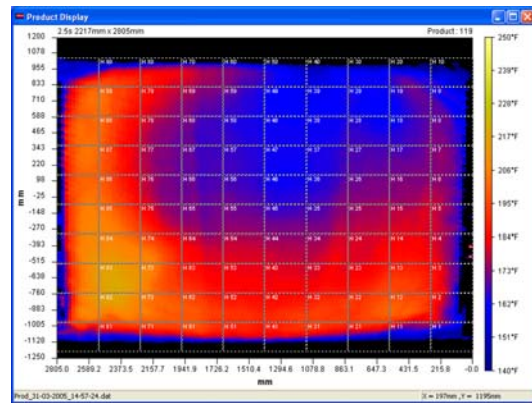
Heater Field Map

The heater field map display shows a graphical representation of the current heater field configuration.

The relative dimensions of the oven, product and individual heaters are set by the user. The user can map and configure individual heaters within a heater field, and can set high, low and average alarm trigger levels within a heater group. Temperature data for each detected product can be overlaid and statistical data then calculated for each grid element.



Above: Heater Field grid. Below: heater field grid overlaid on a typical Map Display



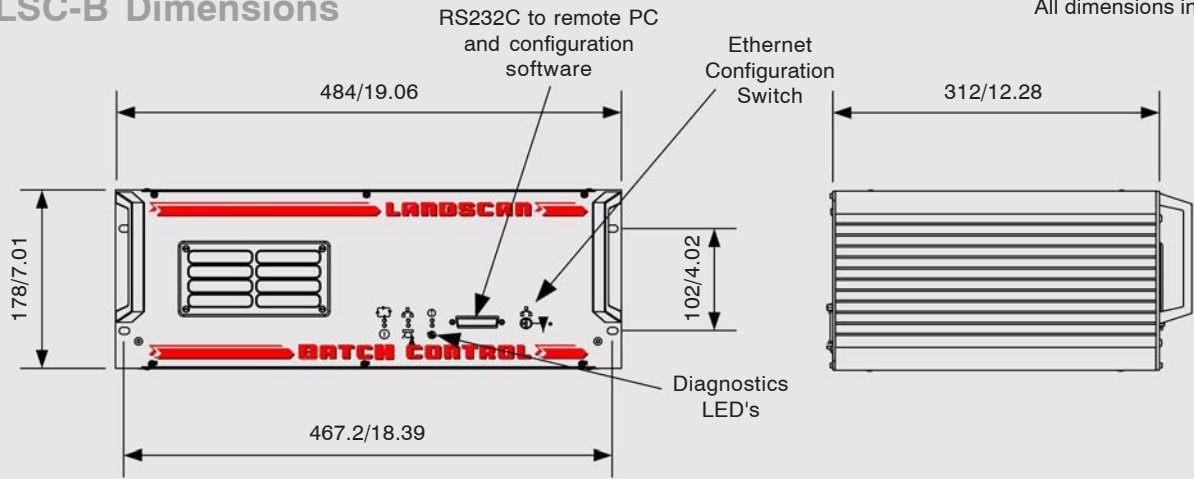
Landscan Control Batch LSC-B 19in rack mount processor with multi-channel inputs/outputs for linear, rotary and discrete products

Summary of Landscan Control Functions

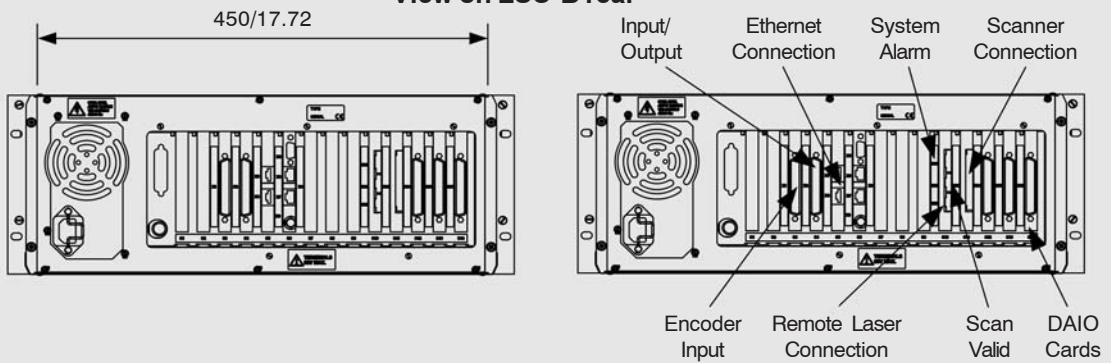
	LSC-C	LSC-B
Inputs:		Scan valid, fast temperature
Data structure:		1000 samples per line, up to 100 lines per second
Processing format:	One line at a time	One line at a time; products up to 50,000 lines; processing time = 10% of product time
Processing capability:	Up to 14 user definable cross product zones (min, max, mean, high/low alarms)	Up to 500 user definable product areas (min, max, mean, high/low alarms)
Processor Configuration (Data display, Product Storage):	Landscan Configuration software, Landscan WCA (multi-processor capability)	
Data outputs:	Serial, TCP/IP	Serial, TCP/IP, OPC (optional)
Ethernet ports:	Single port – one client	Dual ports – up to 4 clients

LSC-B Dimensions

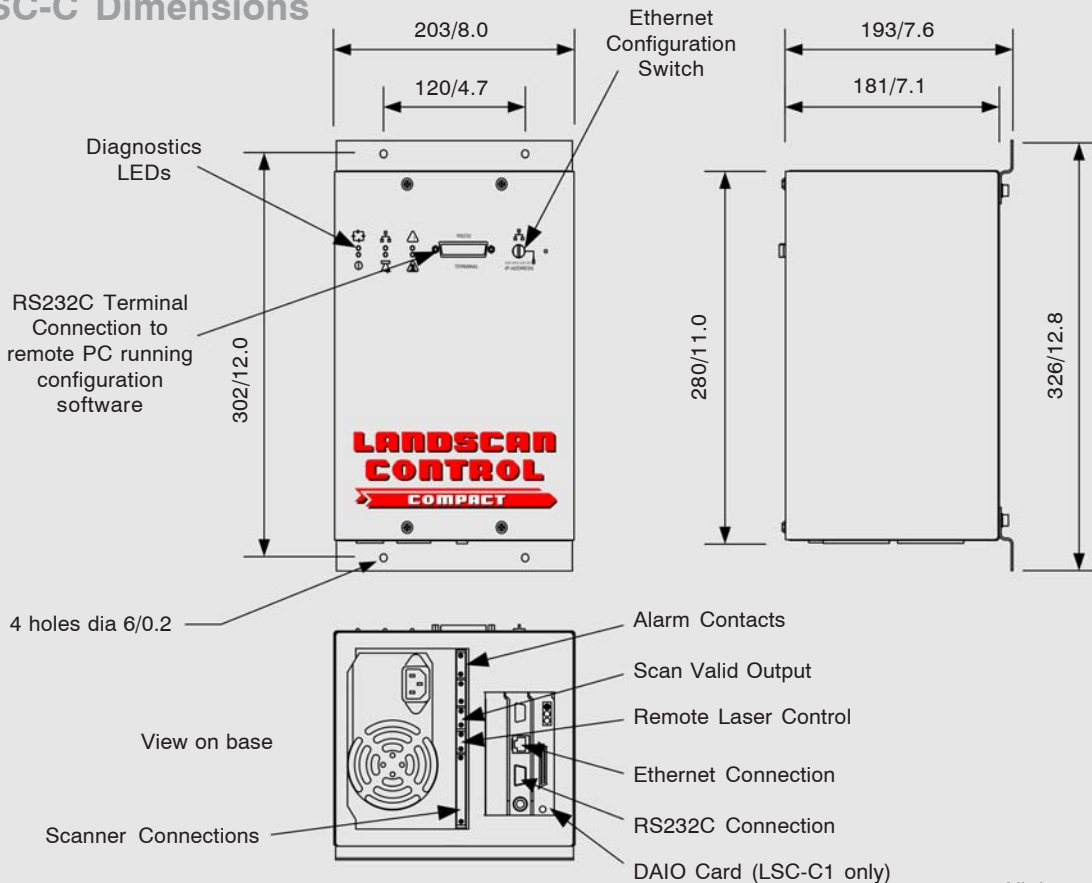
All dimensions in mm/in



View on LSC-B rear



LSC-C Dimensions



All dimensions in mm/in

Processor Specifications

	LSC-C Compact	LSC-B Batch
Enclosure type:	Panel/surface mount	19in rack mount
Fast Temperature Input: Input error:	4 to 20mA input, linear <0.15°C (full range, 600°C/1112°F span)	
Scan valid input:	Link selectable between TTL and RS485	
Scan valid retransmission output: Minimum load:	5V ±20% 10kohms	
IATS display resolution:	1°C (range -10 to 90°C/14 to 194°F)	
Emissivity:	0.2 to 1.00	
Current output error:	<0.3% of span (0 to 20mA) max load 500ohms	
Voltage input error:	<0.2% of span	
Current input error:	<0.2% of span	
System alarm:	Relay contact, NO/NC 50V d.c., 500mA	
Laser On/Off:	External contact	
Ambient operating temperature:	10 to 50°C/50 to 122°F	
Ambient temperature drift:	<0.025% of reading per 10°C/50°F (all inputs/outputs)	
Power requirement:	100 to 240V 50/60Hz, 250W	
d.c. power output:	24 ±1V d.c., 1.5A peak 1A continuous	31 ±1V d.c., 1.5A peak, 1A continuous
Connections Scanner head: Ethernet: Serial: Digital/analog inputs/outputs:	Phoenix de-mountable plugs RJ45 2x RJ45 D25 socket front mounted D37 socket	
Maximum cable length Scanner: Data only:	15m/49ft 300m/984ft	150m/492ft

DAIO boards

Processor Type	Max No. DAIO boards	Analog Outputs (mA)	Digital Outputs	Analog Inputs (V/mA)	Digital Inputs
Landscan Control Compact (LSC-C0)	0	-	-	-	-
Landscan Control Compact (LSC-C1)	1	4	4	4	4
Landscan Control Batch	3	12	12	8	8



Input/outputs

Current Output:	0 to 20mA or 4 to 20mA, 500 Ohms max
Analog Inputs:	0 to 20mA or voltage 1/2/5/10V d.c.
Digital Inputs:	Active high; 4V d.c. to isolated 0V Closed Contact; connected to isolated 24V
Digital Output:	Relay contact NO/NC, 50V d.c. max, 500mA

Bi-directional Communications

Ethernet Communications

Ethernet standard:	IEEE frame type
Connection:	Rear panel RJ 45 connector
Cable type:	10 BASE-T/100 BASE-T Cat. 5UTP
Transmission distance:	100m/328ft, with repeater 457m/1499ft
Communication protocol:	TCP/IP
Ethernet transfer rate:	Auto-select 100M bits/s or 10M bits/s

Serial Communications

Type:	RS 232C (3 wire)
Connectors:	25 D-connector (setup - front panel)
Baud Rate:	115200 (fixed)

Ordering Information

Processor Type	Model No.	No. of DAIO Boards	Part No.
Landscan Control Compact	LSC-C0	0	092.677
Landscan Control Compact	LSC-C1	1	800010
Landscan Control Batch	LSC-B000	0	092.739
Landscan Control Batch	LSC-B100	1	092.740
Landscan Control Batch	LSC-B110	2	092.741
Landscan Control Batch	LSC-B111	3	092.742
Landscan Control Batch-P	LSC-B000-P	0 + Encoder Card	092.743
Landscan Control Batch-P	LSC-B100-P	1 + Encoder Card	092.744
Landscan Control Batch-P	LSC-B110-P	2 + Encoder Card	092.745
Landscan Control Batch-P	LSC-B111-P	3 + Encoder Card	092.746

Optional Extras

Sensors and Position Pack Connection for LSC-B-P

Encoder Sensor Assembly			031.834
Digital Sensor Assembly			031.835
Position Pack Connection			031.850
Processor Upgrade Kit	DAIO card upgrade	4 D/A out + 4 D/A in	031.788

For further information please contact the appropriate office or
visit our web site at: www.landinst.com

Land Instruments International

Infrared Temperature Measurement

Dronfield S18 1DJ, England
Telephone: (01246) 417691
Facsimile: (01246) 410585
Email: infrared.sales@landinst.com
Internet: www.landinst.com

Land Instruments Sarl

Infrared Temperature Measurement

7 Parc des Fontenelles
78870 Bailly, France
Téléphone: (1) 34 62 05 45
Télécopie: (1) 30 56 51 12
Email: commercial@landinst.fr
Internet: www.landinst.fr

Land Instruments GmbH

Infrared Temperature Measurement

Fixheider Str. 6
51381 Leverkusen, Germany
Telefon: 02171/7673-0
Telefax: 02171/7673-9
Email: infrarot@landinst.de
Internet: www.landinst.de

Land Instruments Srl

Infrared Temperature Measurement

Via dell'Industria, 2
20037 Paderno Dugnano,
Milano, Italy
Telefono: 02/99040423
Telefax: 02/99040418
Email: info@landinst.it
Internet: www.landinst.it

Land Instruments Ltd

31-27 Toyotsuchou, Suita
Osaka 564-0051, Japan
Telephone: 06 6330 5153
Facsimile: 06 6330 5338
Email: info@landinst.jp
Internet: www.landinst.jp

Land Instruments International

Av. Horacio 1132 Planta Baja "B"
Col. Polanco
11550 Mexico, D.F.
Telephone: 52 55 5281 1165
Facsimile: 52 55 5281 5364
Email: ventas@landinstruments.net
Internet: www.landinstruments.net

Land Instruments International

Infrared Temperature Measurement

Chile, 10-Edificio Madrid 92
28290 Las Matas, Madrid, Spain
Telephone: 91 630 0791
Facsimile: 91 630 2918
Email: land-infrared@landinst.es
Internet: www.landinst.es

AMETEK Land, Inc.

Infrared Temperature Measurement

10 Friends Lane
Newtown, PA 18940-1804, USA
Telephone: (215) 504-8000
Facsimile: (215) 504-0879
Email: irsales@landinstruments.net
Internet: www.landinstruments.net

Distributor:

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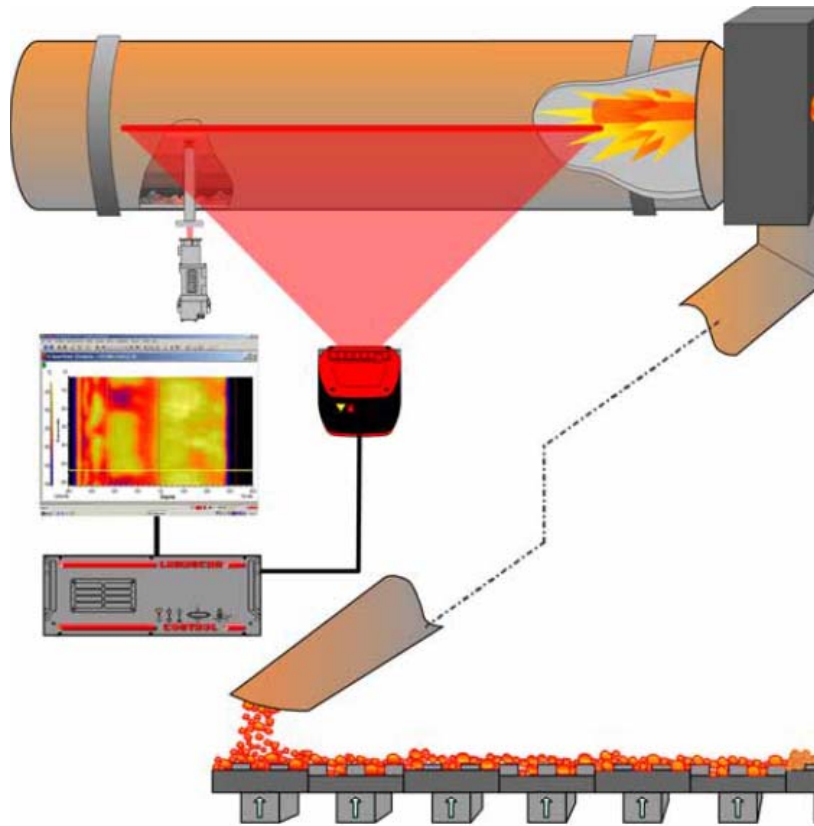


**LABORATORY
ACCREDITATION
BUREAU
ISO 17025**



LAND doc. Number:

Vessel Manager proposal



Cement Kiln Technical Proposal

Quotation Number	001	17-07-2014	First release	TSH	TSH
	Issue	Date	Description	Prepared	Approved

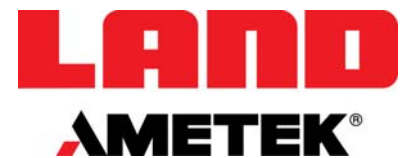


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1 Introduction

LAND Instruments International has over 60 years experience in the fields of

- Infrared Temperature Measurement
- Combustion Efficiency & Environmental Emissions Monitoring

In 2006 LAND became part of the AMETEK Group, which is:

- Global manufacturer of electronic instruments and electromechanical devices
- Annualized sales of more than \$3 billion.
- More than 10,000 employees
- Over 100 manufacturing facilities and 100 sales and service operations worldwide
- Consists of two operating groups:
 - Electronic Instruments - manufacturer of advanced monitoring, testing, calibrating, and display instruments for the process, aerospace, power and industrial markets.
 - Electromechanical – a differentiated supplier of electrical interconnects technical motors and systems, and electric motors for floor care and other specialty applications.

LAND has provided solutions for a diverse range of applications in a variety of industries:

- | | |
|---|---|
| <ul style="list-style-type: none"> • Steel • Glass • Aluminium • Mineral Processing | <ul style="list-style-type: none"> • Power Generation • Utility and Aircraft Gas Turbines • Electronics • A wide range of other industries. |
|---|---|

Specific examples include:

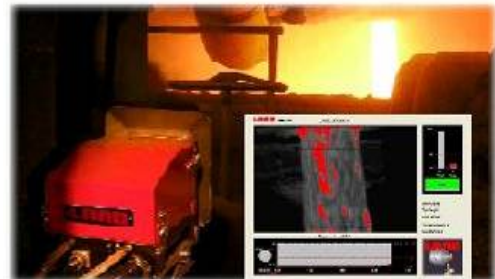
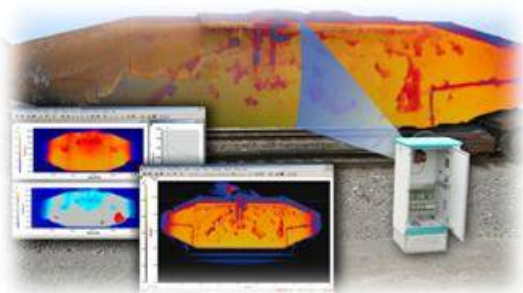
Torpedo Car Monitoring

- Early detection of cracks in refractory
- Early detection of changes of temperature profile
- Hot spot detection, analyzing and tracking
- Increased Plant Safety
 - Reduce break-outs
 - Less risk to operators as manual field work is reduced by automatic scanning and visualization of ladle surface
- Easy to Use Fully Automated Solution
- Historical Database

Slag Detection

Integrated solution giving improved product quality, increased output and process automation for steel plants around the world.

- Accurate detection, measurement and control of slag carry over
- Reduced impurities
- Historical database
- Easy to use fully automated solution
- Lower maintenance on steel making vessel



2 System Overview

2.1 System description

The system described within this proposal comprises the supply of the necessary equipment and services to implement a Kiln scanning system for automatic, remote Kiln scanning monitoring of the outer surface of the Kiln.

The scope of work can be described in the following general terms:

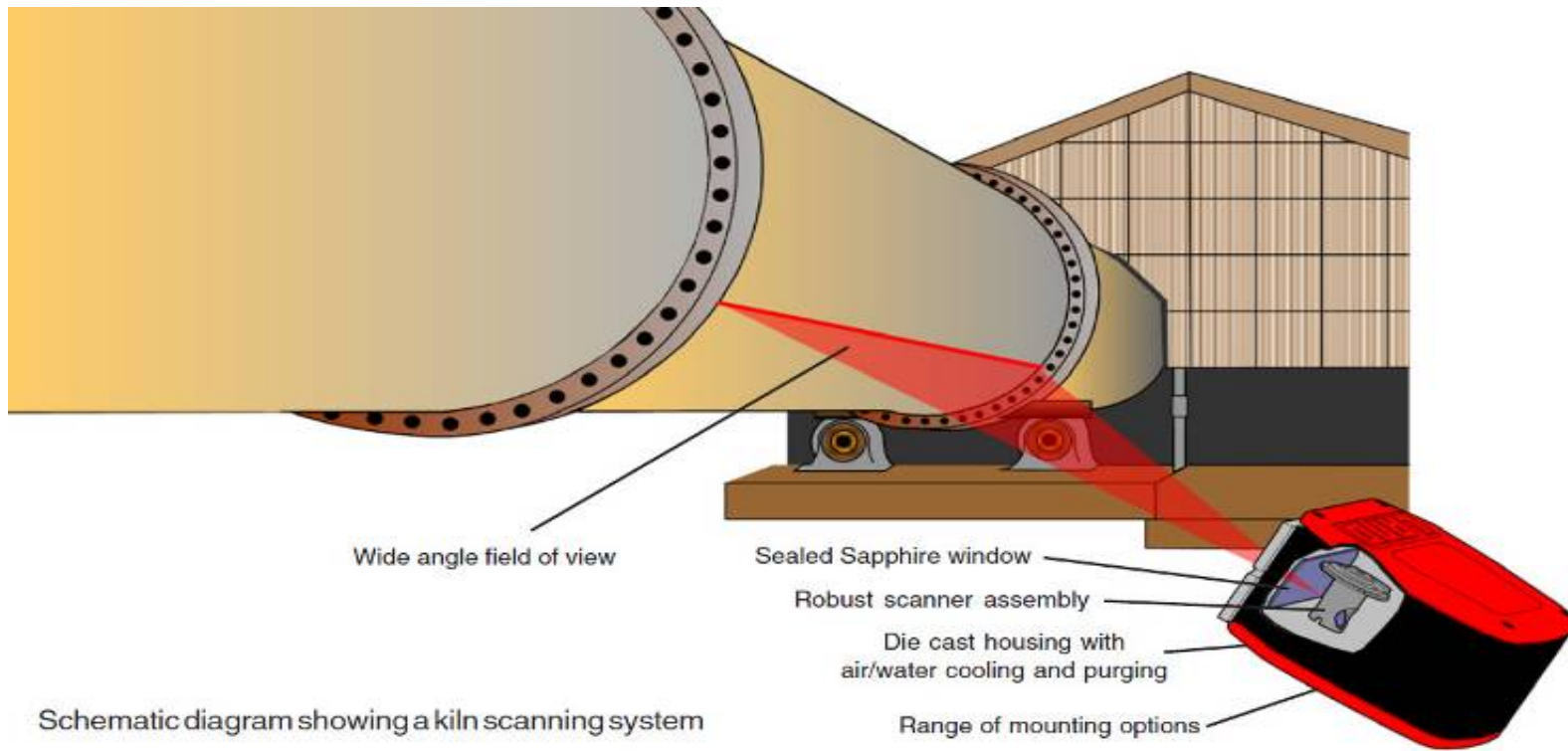
A pre-installation site survey is performed to identify a suitable mounting location through the implemented of scanner appropriate scanner installation locations exist for optimum system operation. A suitable location on the Kiln surface will be determine to used by the system for identifying Kiln profile is also proposed at this time.

The plant must be operating normally for project pre-installation site survey to be performed.

The system supplied comprises 1 scanner mounted inside a heavy industrial housing with air purged front window. The scanner is supplied with power (24VDC) and data (Copper Ethernet) from a local connection box containing a power supply, an Ethernet/Fibre switch and a breakout box. The local connection box is connected via fibre optic (Ethernet) back to a single remote connection box located in the control room which converts the signal back to copper Ethernet where it is connected to the Dataserver and archive PC's where the camera data is then processed and analysed by the software suite. Also optional connection to the local connection box is a relay alarm triggered by the software system alarm.

2.2 System schematic

A network schematic for 1 scanner system can be seen below.



3 System Components

3.1 LANDSCAN LSP HD



LANDSCAN LSP-HD Scanner

Temperature measurement range:	50 to 400°C
Accuracy:	±2°C / 3.6°F
Repeatability:	<0.5°C / <0.9°F
Temperature resolution (typical)	<1°C / <1.8°F
Drift with ambient temp:	<1° indicated / 10° ambient
Emissivity:	0.20 to 1.00
Speed of response:	<1µs
Scan angle:	80° (software adjustable to 40° in 1° steps)
Scan speed:	10 to 150Hz (User adjustable in 10Hz steps)
Samples per scan:	1000
FOV:	500:1 with user focusable optics (smallest spot size Ø2mm/0.08 in) static to 95%
Radiance:	1118:1 with user focusable optics (smallest spot size Ø2mm/0.08 in) static to 50% radiance
Focus distance:	1m/39.7 in to infinity (continuously adjustable by user)
Connection (Signal and power):	Industrial Ethernet via M12 connector / PoE
Signal processing:	Up to 14 user configurable zones with Min/Max/Average/Quantile/Average threshold
Inputs/Outputs:	PoE (IEEE 802.3at) enabled TCP/IP Industrial Ethernet
Ambient temperature:	5 to 60°C / 41 to 140°F (specified), 5 to 70°C / 41 to 158°F (specified)
Alignment laser:	Class 2, maximum output 1.0 mW at 635nm, IEC60825- 1:2001 / Indicating scan plane & extent
Environmental sealing:	IP65 / EMC: EN 61320:1999 Class A (immunity and emission); IEC 1010 (safety)

3.2 HEAVY INDUSTRIAL HOUSING



HEAVY INDUSTRIAL HOUSING

Cooling water requirements:	1.5 to 2 litre per min / 0.4 to 0.53 US Gallons per min @ 35°C
Max. water pressure:	5.88 Bar / 85 PSI
Cooling water connection:	1/4" BSP for 9.5mm / 3.8in bore water hose
Air purge requirements:	300 litre per min / 12.36 cuft per min
Air purge connections:	G3/8 suitable for 38mm / 1.5in inner diameter neoprene hose
Ambient Temperature:	Up to 150 °C
Material:	316 S/S
Dimensions:	202 x 450 x 202 mm
Sealing:	IP 65

3.3 LSP-HD CABLE HT-15M

Maximum ambient temperature:	200°C / 390°F
Connections:	Pre-terminated with M12 industrial Ethernet connectors at both ends for connection between LSP-HD and LSP-HD Industrial power supply
Cable type:	PoE - Single cable connection for power and data.

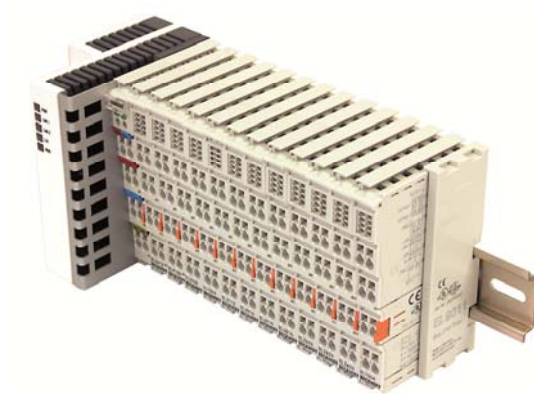
3.4 LSP-HD INDUSTRIAL POWER SUPPLY



LSP-HD INDUSTRIAL POWER SUPPLY

Power Supply:	90 to 264VAC
LSP-HD connections:	Bulkhead M12 4 pin D-Coded Industrial Ethernet socket
Downstream connections:	4xRJ45, 1x Multimode F/O with SC connectors
Ambient Temperature:	0 to 50 °C

3.5 LSP-HD I/O PROCESSOR



LSP-HD I/O PROCESSOR

Analogue outputs:	12 x 4-20mA outputs - 12 x control zone temperature
Analogue inputs:	2 x 4-20mA inputs - 1 x emissivity - 1 x strip speed
Digital outputs:	6 x Volt free (dry) contact closures - 1 x product detected - 1 x LSP-HD ambient temperature warning - 1 x WCA software system OK - 1 x I/O System OK - 1 x LSP-HD System OK

4 Commissioning, Training and Support

4.1 Site Acceptance test and Commissioning

Commissioning is provided by our experienced team of application engineers.

This should take place at a time when the plant is operational. The commissioning includes:

- Instrument configuration
- Verification of communications with other plant equipment
- Functional Testing
- Validation of Signals

4.2 Training

LAND can provide a training program to include:

- Operator Training
- Maintenance and Installation training

LAND can provide all course material; the site must inform LAND of the number of personnel involved in the training. The training normally takes place immediately after the system commissioning.

4.3 Maintenance & Support:

Technical support and maintenance services are available from:

Ametek LAND ASIA Shanghai - 9:00 to 17:00 (Local Time) Monday to Friday
Ametek LAND UK - 8:00 to 17:00 (Local Time) Monday to Friday
Ametek LAND US Pittsburgh - 9:00 to 17:00 (Local Time) Monday to Friday

5 Purchaser responsibility

- Purchaser agrees to ensure that during the pre-installation and commissioning visits the site is operating normally (in the way that it will operate upon completion of the project). Full ladles should be passing through the monitoring station location in the normal fashion and the suppliers engineer should be given access to the site.
- Purchaser agrees to ensure that any installation recommendations made during the pre-installation visit are closely followed.
- Purchaser agrees to both supply and arrange fitting of the correctly formatted ladle ID's described in section 4. This should be in accordance with the recommendation made by the supplier at the pre-installation visit and kick off meeting.
- Purchaser agrees to ensure that the end user follows the recommended maintenance and operation procedures upon successful completion of the commissioning to ensure continuous, reliable operation of the system.
- Purchaser agrees to ensure remote internet access is available on site at the monitoring station for remote access and troubleshooting

Specifications - CYCLOPS 160B

Measurement Range	200 to 1400°C/392 to 2552°F (operating) 200 to 1300°C/392 to 2372°F (specified)	Response time	30ms
Indication	4-digit LCD in viewfinder; external backlit LCD display	Display update time	0.5s
		Accuracy	≤0.25% + 2°C
Measuring modes	Continuous, Average, Peak, Valley	Repeatability	≤1°C
		Operating temperature range	0 to 50°C/32 to 122° F
Datalogging modes	Classic, Historic, Burst	Power requirement	One MN1604/6LR61/PP3 battery
Optical system	9° field of view; 1/3° measurement area (180:1 to 98% energy); eyepiece adjustable - 3.75 to +2.5 diopters	Output	RS232C. Bluetooth®
		Weight	0.83kg/1.8lb
Focusing range	1m/39.3in to infinity 460 to 630mm/18.1 to 24.8in with optional 217mm/8.5in fixed focus close-up lens	Sealing	IP40
		Standard accessories	Lens cap, protection window, battery, wrist strap
Minimum target size	5mm at 1m/0.19in at 39.3in 2.0mm/0.08in 0.5mm/0.2in with optional close-up lens	Optional accessories	Close-up lenses, Data logger DL-1000, HP iPAQ, rugged waterproof carry case, Long eye relief eyepiece
		Spectral response	1.6µm with advanced spectral filtering
Emissivity adjustment	0.10 to 1.20 in 0.01 step graduations		

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LAND



CYCLOPS 160B

High precision portable infrared thermometer



LAND™

Non-Contact Temperature
Measurement Solutions



**LABORATORY
ACCREDITATION
BUREAU
ACCREDITED**
ISO/IEC 17025:2005

REGISTERED
ISO 9001
MANAGEMENT SYSTEM

Land Instruments International Ltd
Dronfield S18 1DJ, England • Tel: +44 (0) 1246 417691 • Fax: +44 (0) 1246 410585
Email: infrared.sales@landinst.com • www.landinst.com

AMETEK Land, Inc.
150 Freepoint Rd., Pittsburgh, PA 15238, U.S.A. • Tel: +1 412 826 4444 • Fax: +1 412 826 4460
Email: irsales@ametek.com • www.landinstruments.net

France
Tel: (1) 30 68 89 80
Fax: (1) 30 68 89 99
Email: land.france@ametek.com
www.landinst.fr

Japan
Tel: +06 6330 5153
Fax: +06 6330 5338
Email: info@landinst.jp
www.landinst.jp

China - Beijing
Tel: +86 10 85262111 Ext 39
Fax: +86 10 85262141 Ext 39
Email: infrared.sales@landinst.com
www.landinst.com

Germany
Tel: +44 02171 7673-0
Fax: +44 02171 7673-9
Email: info.land-de@ametek.de
www.landinst.de

Spain
Tel: +91 630 0791
Fax: +91 630 2918
Email: land-infrared@landinst.es
www.landinst.es

Russia
Tel: +7 (495) 660 8208
Fax: +7 (495) 660 8206
Email: alexander.kalinin@ametek.com
www.ametekinstruments.ru

Italy
Tel: +39 02 946931
Fax: +39 02 94693850
Email: info.land@ametek.it
www.landinst.it

Mexico
Tel: +52 55 52811165, 52807933
Fax: +52 55 52815364
Email: ventas@ametek.com
www.landinstruments.net

CYCLOPS 160B

The new family of Bluetooth enabled portable infrared thermometers

Land **Cyclops 160B** is a general purpose, high precision, portable infrared thermometer, designed for accurate measurement of temperatures in the range 200 to 1400°C/392 to 2552°F.

The measured temperature is displayed in four simultaneous modes: continuous, peak, mean and valley, with user selected mode for the viewfinder display.

Accurate sighting is ensured by the clear, wide angle (9°) field of view and small, clearly defined (1/3°) measurement area. Focusing is variable from 1m to infinity, with close focus options available using auxiliary lenses.

Emissivity compensation is provided via the icon-based menu system.

The operating waveband has been carefully chosen to minimise errors due to uncertainty in emissivity and the effects of atmospheric vapour components.

The **Cyclops 160B** provides wired RS232 serial communications and also features user-friendly Bluetooth® wireless technology communications.

Optics

Reflex optical system gives a precise definition of the target spot and simultaneous backlit display of user selected values in the viewfinder.

Menu Controls

Simple, easy to use controls to select required mode from the icon based menu.

Trigger

2-position trigger to take and store temperature readings.

Connectivity

C160B model offers both wired* and Bluetooth®** wireless technology data logging to DL-1000.

* Wired connection available to DL-1000 PC version only.

** Wireless connection available to DL-1000 iPAQ and PC version.

Features

- Digital signal processing
- High accuracy and repeatability
- Long term, drift free measurement
- Advanced spectral filtering to give enhanced performance
- Robust - ideal for industrial use
- Choice of data logged outputs
- Bluetooth® wireless communications
- Range of optional accessories
- Continuous, Peak, Valley and Averaging modes
- Multi functional display
- Flexible user configuration

Benefits

- No contamination, interference or damage to the process or material
- Accurate, reliable and stable temperature measurement to aid product quality control
- Maximize production rates and efficiency
- Proven, rugged casing ensures ability to withstand hostile environments
- Calibrated and traceable to National Standards - your guarantee of measurement accuracy - backed up by a support network which extends around the world

Multi-function Graphics Panel

The bright, back-lit external display panel provides an indication of status and configuration of the thermometer together with four simultaneous live measurement modes.

The panel displays a simple icon-driven, language-free menu system navigated via keypad controls.



- Mode selection
- Emissivity value
- Window Compensation
- Communication Status
- Battery Status
- Alarm Status
- Bluetooth Status

The user highlights the mode to be displayed in the viewfinder.



Applications

Cyclops 160B is ideal for use in a wide range of industries and applications.

- Steel
- Heat Treatment
 - Welding
 - Tempering
 - Annealing
- Semi-conductors

Flexible Operation

Three data output modes to the DL-1000 Datalogger software are available:

Classic mode - logs a measurement on each trigger release

Historic mode - logs continuous, average, peak and valley readings

Burst mode - logs a stream of measurements to the DL-1000 whilst the trigger is held pressed - approximately 30 to 35 readings/sec, up to a maximum of 999 readings

Data Logger DL-1000

The DL-1000 Data Logging System provides a fast and simple method for logging temperature readings taken using Land Cyclops portable infrared thermometers.

When being used with an iPAQ, stored readings can be transferred using Microsoft ActivSync file transfer utility to a partnership PC. Data can also be transmitted directly to any windows PC with an RS232 or Bluetooth serial part using the PC version of the software. The logged data can then be used for further analysis and trending purposes.



Graphics Panel Menus

When the C160 is switched on the side-mounted LCD graphics panel activates. There are three data logging modes working in both wired and wireless communications format.

Classic mode - All four processed temperatures are displayed continuously on the graphics panel when the trigger is pressed.

Using the keypad the user can highlight their choice, which is then also displayed in the viewfinder.

In Classic mode the highlighted temperature is available serially (wired connection or wireless via Bluetooth).

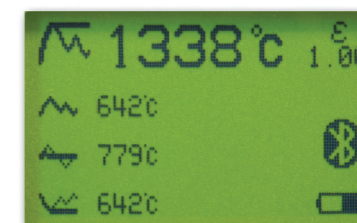
When the trigger is released the last reading is held and logged to the DL-1000.

Peak temperature - maximum from when trigger pressed.

Continuous temperature - 0.5s display/serial updates when the trigger is pressed.

Average temperature - from when trigger pressed. Adjustable time constant.

Valley temperature - minimum from when trigger pressed.



Wire-free communications using Bluetooth® wireless technology

Wireless data logging to Bluetooth®-equipped iPAQ or PC/laptop with connections typically possible across separations of several metres.

Accessories

A range of standard and optional accessories is available including:

Close up lenses to allow temperature measurement of small target areas.

Heat resistant jackets to provide protection against excessive heat and dust.

Long eye relief eyepiece for targeting at distance where access is limited.



Target Size Table

Target distance (m)	100	50	20	10	7	5	2	1
Measurement spot diameter (mm)	576	287	114	57	39	28	11	4.8
Target distance (ft)	328	164	65.6	32.8	22.9	16.4	6.5	3.2
Measurement spot diameter (in)	22.6	11.2	4.48	2.24	1.53	1.10	0.43	0.18

Target size can be reduced to a minimum of 0.5mm/0.02in with optional close-up lenses