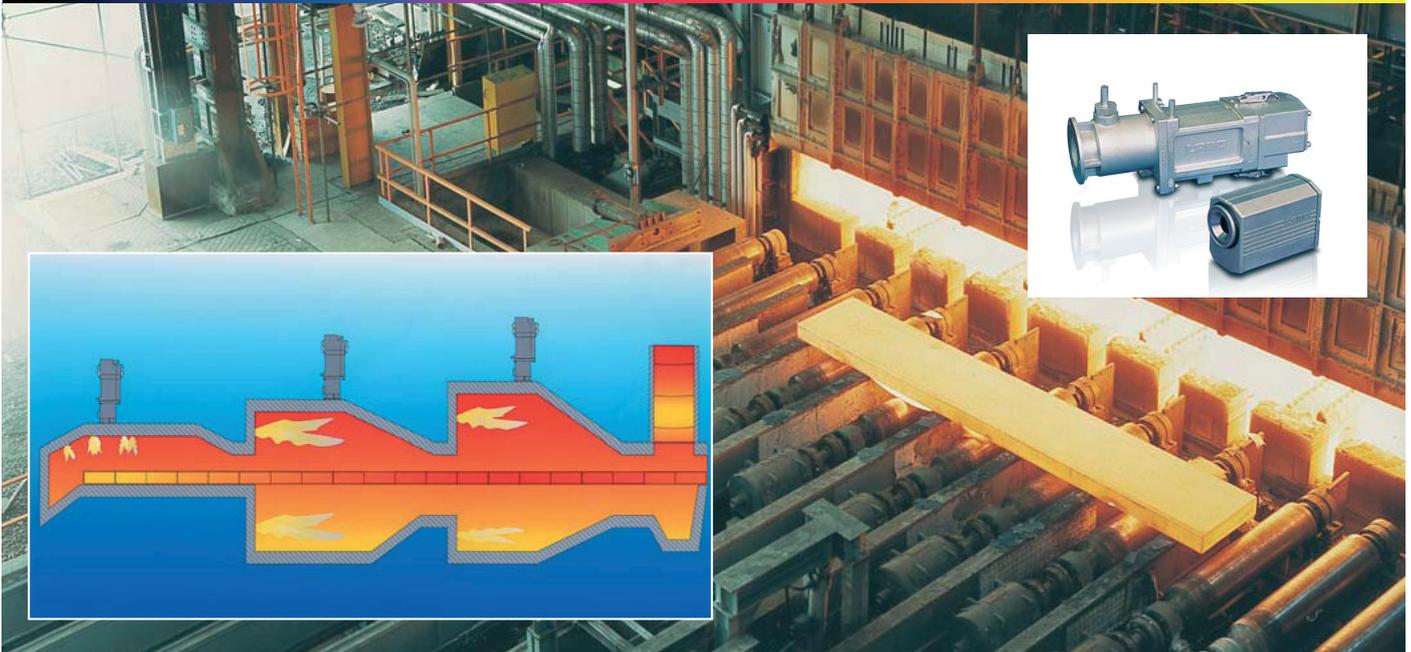


# High Temperature Measurement in the Reheat Furnace



## Furnace Thermometer System

**A radiation thermometer system, using two sensors, provides a continuous true temperature of the reheat furnace load and with it the possibility of big savings in operation costs.**

### The Measurement

The first sensor, a radiation thermometer operating at a wavelength of  $3.9\mu\text{m}$ , measures the apparent temperature of the furnace load. The output from this thermometer contains a component which is due to radiation from the hot background being reflected from the load. A second sensor measures the background temperature. The outputs from the two sensors are applied to a thermometers signal processor which continuously computes the true load temperature corrected for the background radiation.

### The System

The primary channel input to the signal processor is from a Furnace Thermometer System (FTS) which is designed specifically for this measurement. The secondary (background) channel input to the signal processor is obtained either from a second FTS thermometer or from a type R or type S thermocouple, via a transmitter.

The processor corrects for background reflection and load emissivity. It provides a current output, linear with the true load temperature, or a simulated thermocouple type R or S output.

A digital display of the true load temperature is provided on the processor front panel.

The standard Serial Communications facility gives digital RS232C or RS485 outputs and allows access for system parameters adjustments from a remote computer.

### The Application

High system measurement accuracy (typically better than  $+20^\circ\text{C}/+36^\circ\text{F}$  at  $1000^\circ\text{C}/1830^\circ\text{F}$ ) is obtained in gas-fired (natural/blast furnace/coke oven) steel reheat furnaces - even in the first heating zone.

Similarly, high accuracy measurements can be achieved in many furnaces fired on light or heavy oil. Close consultation with Land Infrared is advisable for best results on oil-fired furnaces.

The system is also suitable for use on a wide variety of other furnace applications where background reflections are affecting single sensor system measurements.

# LAND

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# Specifications

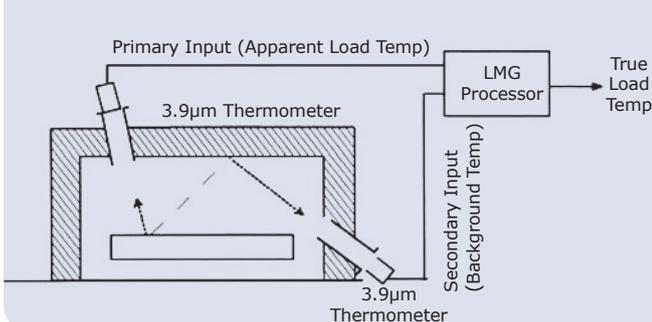
## System Specification

Primary Sensor	FTS 500/2000C	FTS 900/3600C
Secondary sensor:  or:	FTS 500/2000C (permits background compensated measurements to 2000°C)  Type R or Type S zone thermocouples (permits background compensated measurements to 1500°C)	FTS 900/3600C (permits background compensated measurements to 3600°F)  Type R or Type S zone thermocouples (permits background compensated measurements to 2732°F)
Measurement range Primary input: Secondary input a) thermometer: b) thermocouple:	500 to 2000°C  500 to 2000°C Type R or S, 0 to 1500°C, via 4-20mA linear transmitter	900 to 3600°F  900 to 3600°F Type R or S, 32 to 2732°F, via 4-20mA linear transmitter
Update time:	0.5s (to 95%)	
Emissivity range:	0.300 to 1.000 adjustable in 0.001 increments	
Outputs:	0 to 20mA, 4 to 20mA or 1mV/°	
Out of range warning:	Voltage-free alarm contacts change status when either primary or secondary input is out of measurement range	
Signal Processor Single system: Dual system:	LMG-M 1100-2 (accepts one primary input and one secondary input) LMG-M 1111-2 (accepts two primary inputs and two secondary inputs)	

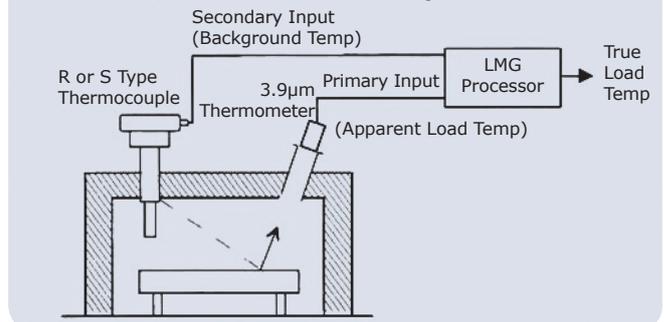
## FTS Thermometer Specification

Model:	FTS 500/2000C	FTS 900/3600F
Temperature range:	500 to 2000°C	900 to 3600°F
Wavelength:	Narrow band centred on 3.9µm	
Response time:	100ms (to 95%)	
Field of view:	100:1	
Focus range:	0.5m to infinity variable focus	19.5in to infinity variable focus
Min. target diameter:	5mm	0.2in
Target size:	>98% energy within graticule image	
Accuracy Interchangeability: Repeatability: Absolute:	<2K <2K 0.5%K over core range of 800 to 1250°F, 1%K over full range of 500 to 2000°C	<2K <2K 0.5%K over core range of 1500 to 2300°F, 1%K over full range of 900 to 3600°F
Stability:	<0.025%T(K)/°C	<0.014%T(K)/°F
Vibration:	3g any axis, 10 to 300Hz	
Humidity:	0 to 99% non condensing	
Sealing:	To IP65 requirements	To NEMA 4X requirements
Ambient temperature:	0 to 70°C	32 to 158°F
Weight:	1.7kg	3.75lb
CE:	EN 50-082-2 (immunity), EN 50-081-1 (emission), IEC 1010 (safety)	

### 2 Thermometer Schematic



### 1 Thermometer and 1 Thermocouple Schematic



### Sighting

