

**LAMPIRAN**



# LAMPIRAN 1 PERALATAN INFRA VIEW JNT TECHNICAL SERVICES INC.

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## Infrared Boiler Thermometer for Boiler Temperature Monitoring



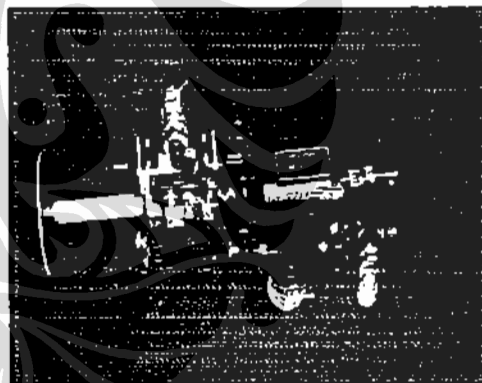
Infra-View® Infrared Boiler Thermometer is a patented remote sensing infrared detector supplied with a rugged protective-cooling jacket that can be permanently flange mounted on any port, door or penetration into the boiler or furnace. In addition, a portable version can be configured to be used for on-site testing purposes in order to maximize boiler efficiency.

- Infrared Boiler Thermometer
- Boiler Thermometer
- Boiler Temperature Monitoring
- Flue Exit Gas Temperature
- Furnace and Gas Temperature Monitoring
- FEGT
- Temperature Profiling
- Gas Temperature Monitoring

## Infra-View® Patented Infrared Boiler / Furnace Thermometers



### Infra-View Boiler Thermometer



Infra-View can optimize your boiler by monitoring flue gas temperatures for Startup, Sootblower and Slag Control, Low NOx, Fire Ball Centering, FEGT Monitoring.

[Request Literature or Quote Now](#)



85 Industrial Ave • Little Ferry, NJ 07643  
Phone: 201-641-2130 • Fax: 201-641-2309

design by WebFoot

## Infra-View<sup>®</sup> patented Infrared Boiler / Furnace Thermometers



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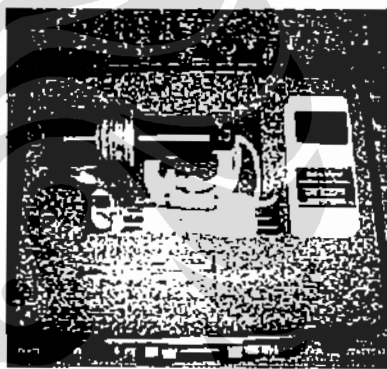
## Infra-View<sup>®</sup> Infrared Boiler Thermometers

Infra-View<sup>®</sup> Infrared Thermometers are remote sensing infrared detectors that are permanently flange mounted on any port, door or penetration into the boiler or furnace. The Infra-View patented design is supplied with a rugged protective cooling jacket that is factory assembled and pre-piped with an air cooler, purging and filtering system designed to work in most severe service environments. Customer supplied compressed air and two wire shielded signal cable is all that is necessary for operation when integrated in a 4-20 mA signal loop supplied from a DCS, digital or analog recording device. The Infra-View<sup>®</sup> infrared "non-contact" sensor monitors flue gas temperatures in the boiler or furnace ranging from 250°F to 3,000°F (higher end temperature available).



(click on photo to enlarge)

Infra-View<sup>®</sup> mounted on boiler with an air actuated valve held open with cooling/purge air and spring to close on loss of plant air



(click on photo to enlarge)

Infra-View<sup>®</sup> Compact Portable Infrared Boiler Thermometer with data logging software and battery pack

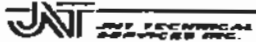
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## Infra-View<sup>®</sup> Infrared Boiler/Furnace Thermometer Performance and Control Applications

**Startup Temperature:** Monitor flue gas temperature ramp from 250°F to 1,000°F for boiler startup preventing overfiring that could damage superheat tubes or underfiring that could potentially send wet steam to the steam turbine damaging buckets

**Soot Blower Control:** Record time vs temperature histories to improve boiler performance and control of soot blower operation and duration. Monitor thermal transients during cleaning to improve heat transfer on boiler tubes from under cleaning which could lead to slagging conditions. Monitor boiler gas temperature for comparison to steam outlet temperature for determining soot blower activation

**Low NO<sub>x</sub> Applications:** Sense temperature "window" set points between 1,600°F and 2,100°F for the injection of low NO<sub>x</sub> enhancers with urea or ammonia in Selective Noncatalytic Reduction Systems

**Reduce Slagging / Ash Fusion:** Monitor maximum allowable temperature in the boiler superheat/reheat section for ash fusion alarm point annunciation

**FEGT High Temperature Alarm:** Monitor highest temperature and maximum load condition for most efficient operation and prevent boiler waterwall, reheat and superheat tube failure

**Reduce Fuel Consumption on Startup:** Monitor fuel changeover based on temperature rather than load thereby reducing startup time by hours. This saving alone will pay for the Infra-View

**Fluidized Bed Boilers:** Determine optimal temperature for pulverized limestone injection on flue gas desulfurization systems and general operating conditions. Measure bed temperature for optimal operating efficiency

**Primary Furnace Area (B&W/FW):** Monitor flue gas temperature in separate sections of boilers with division walls to ensure temperature balance

**Retractable Thermoprobes:** Replace high maintenance mechanical chain driven thermoprobes with low maintenance Infra-View non-contact infrared temperature monitor that has no moving parts

**Fireball Centering (ABB-CE):** Identify fireball centering problems on tangentially fired boilers for control with burner corner dampers by locating two Infra-View Boiler thermometers on same side of boiler

**Waste /Refuse Incinerators:** Monitor compliance temperature for incineration of toxic wastes at 1800°F. Infra-View can be certified to NIST standards

**Black Liquor Recovery Boilers in Pulp/ Paper Mills**  
The application of the Infra-View<sup>®</sup> Boiler Thermometer on Black Liquor Recovery Boilers in the Pulp & Paper industry can provide the operator with the following benefits. When installed ahead of the superheater it replaces the traversing Thermo probe (tm) while at the same time giving a more consistent and accurate measurement of the superheater inlet temperature. When installed at the superheater inlet the Infra-View<sup>®</sup> provides the operator with an accurate measurement of the combustion gasses in the upper furnace. This information is useful for the operator to adjust combustion conditions. The installation of the Infra-View<sup>®</sup> between the superheater and the generating bank provides the operator real time temperature data to determine the amount of pluggage in the superheater and to tell how close the flue-gases temperature is to the ash (salt cake) sticky temperature. The temperature of the gas in the recovery boiler is critical to its efficient operation and performance. Excessive temperatures can cause smelting or cindering of black liquor particles and can fuse to superheat and reheat tubes thereby decreasing the heat rate of the boiler from plugging of heat transfer surfaces

**Infra-View<sup>®</sup> Patented**  
**Infrared Boiler /**  
**Furnace Thermometers**



**Infra-View<sup>®</sup> Specifications**

The Infra-View<sup>®</sup> Infrared Sensor is a two wire 4-20 mA output intelligent device powered by 24 VDC with a maximum loop impedance of 700 ohms. The Infra-View has remote online addressability and accuracy to  $\pm 1\%$  of the reading up to 3,000°F and is factory calibrated to an NIST certified standard in accordance with MIL-STD-45662. The sensor has a 30:1 field of view (FOV) indicating that 30ft from the sight tube there is a 1ft diameter field. Multiple sensors can be combined in a network configuration and terminated into a Distributed Control System(DCS). The sensor has the following adjustments that can be performed remotely for system maintenance and customization over two wire loop using HART<sup>®</sup> industrial protocol. The HART<sup>®</sup> signals combine simultaneous digital communication over standard 4-20 mA output cable. By utilizing the Infra-View programming software and RS-232 port or USB adapter, the following maintenance and customization features can be modified while units are online.

**Maintenance and Customization Features**

1. Condition signal to smooth out reading by adjusting the averaging mode out to 55 seconds.
2. Adjust Peak/Valley Hold to 10 minutes for recording high/low temperature trends.
3. Program Alarm Set Point (NO/NC settings with third wire)
4. Vary temperature ranges for any high and low set point between 250°F and 3,000°F (121°C and 1,649°C)

**SmartSensor Technical Specification**

Infra-View<sup>®</sup> Infrared Boiler/ Furnace Thermometer is a patented "non-contact" remote sensing infrared thermometer housed in a rugged, compact protective cooling jacket. The unit flange mounts to any port, door or penetration into the boiler or furnace and measures flue gas temperatures from 250°F to 3,000°F via a 4 - 20 mA output to any DCS, digital or analog recording device.

- Power Requirement: 24 VDC 4 - 20 mA integrated loop (DCS Powered)
- Cooling Requirement: 15 SCFM (Standard Plant Air)
- Ambient Operating Temp: 250°F Max.
- Field of View (FOV): 30:1 (i.e., 3 ft spot @ 90 ft)

- Response Time: 100 msec(600 readings/min.)
- Data Output: Digital 4-20 mA Loop Powered
- Accuracy: 1% of Reading (Max. Error + 30°F) NIST Calibration Cert. Avail
- Measured Temperature Range: 250°F to 3,000°F
- Infrared Spectral Response: Heated CO2 Gas
- Weight: 20 lbs (9Kg)with Infra-View® Valve: 27 lbs (12 Kg)
- Length Overall: 21" (53 cm) with Infra-View® Valve:24"(61 cm)
- Infra-View® Sensor: Intelligent 2 wire 4- 20 mA loop powered digital device that is field addressable utilizing HART® protocol preset to specifically detect infrared emissions from heated boiler/ furnace flue gas containing CO2 . On line maintenance and customization can be performed with a laptop or PC with Infra-View® Software and serial port adapter, anywhere along two-wire loop without data output interference. (Infra-View® Software is optional)

#### **On-Line Programming Functions with Infra-View® Software**

- 1) Peak Hold Mode: Measures highest temperature in FOV and holds reading from 0 - 10 min.
- 2) Average Mode: Measures average temperature in FOV. Displays updated reading every 0 - 55 sec. (Stabilizes rapid signal output fluctuations)
- 3) Programmable annunciation alarm set point from 250°F to 3,000°F
- 4) Selectable temperature range (low and high end)
- 5) Fahrenheit or Celsius Outputs (250°F/ 120°C to 3,000°F/ 1650°C)
- 6) Internal Ambient temperature monitoring of sensor to prevent thermal overheating and damage.
- 7) Complete graphing function of temperature vs. time analysis.
- 8) On line temperature data logging function into ASCII database for export to Excel or Lotus 1-2-3 format. Descriptions and tag nomenclatures available.

**Infra-View® Protective Cooling Jacket:** Durable protective housing with flange connection supplied with integral cooling jacket, sight tube and air purge assembly. Protective cooling jacket is pre-piped at factory and includes air cooler, air filter and additional air purge connections for extreme environmental conditions. (Included)

**Infra-View® Valve:** Optional line of sight air actuated integral stainless steel valve mounted and pre-assembled on sight tube and designed to fail close on loss of air, in order to protect Infra-View® sensor. (Factory assembly only)



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LAMPIRAN 2 PERALATAN INFRA RED TH9100 XX NEC San-ei  
Instruments, Ltd.

**NEW**

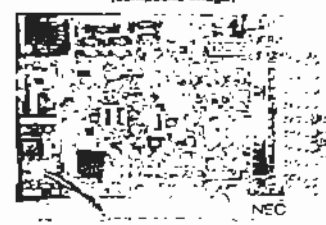
**Infrared Thermal Imager  
Thermo Tracer  
TH9100 Pro**

**NEC**

**Features Visual and Thermal Image Composite Function!**



Composition



**New Features**  
 Infrared/visual image composition  
 High grade silver metallic color body  
 LCD window automatically switches on when opened  
 Easy-to-find shaded point cursor  
 Simple deletion of thermal image using thumbnail display  
 File operation available during RUN

**Easy Operation**  
 Easy-to-use Joystick Control  
 Multilingual Menu  
 (English, French, German, Italian, Japanese, Korean, Portuguese, Russian, Spanish, Simplified Chinese, Traditional Chinese)  
 Full-auto Function

**High Resolution**  
 0.06°C at 30°C (60Hz)  
 0.02°C at 30°C (36x (TH9100P1M))

**Portable**  
 Small lightweight 1.7kg (including LCD & battery)  
 Battery Operation Time approx. 150 min \*

**Robust Body**  
 Dust/splash-proof IP54  
 Shock-proof 29.4m/sec (30G)  
 Vibration-proof 29.4m/sec (30G)

**Built-in motor drive lens with visual camera.**  
 Record thermal & visual images simultaneously and display the composition image for easy identification of thermal hotspots.

**Clear Image**  
 New reflective transmissive LCD for use in both bright and low light situations

**Moving image recording**  
 Recording Time  
 Approx. 27 sec (at 60Hz/sec)  
 Approx. 55 sec (at 30Hz/sec)  
 Approx. 168 sec (at 10Hz/sec)

\* at 20°C ambient temperature LCD mount requirement is P121 and stand 2.



**NEC San-ei Instruments, Ltd.**

## Specifications

Measuring range	TH9100PMV	TH9100PVM	
	Range 1	-20 to 100°C	-40 to 120°C
	Range 2	0 to 250°C	0 to 500°C
	Range 3 (optional)	100 to 800°C	200 to 2000°C
Precision	Range 4 (optional)	200 to 2000°C	
	Range 1	±0.08°C (at 30°C 50%/s) ±0.02°C (at 30°C 1.5s)	±0.08°C (at 30°C 50%/s) ±0.02°C (at 30°C 1.5s)
Accuracy	±0.2°C or ±2% of reading whichever greater		
Detector	Uncooled focal plane array (microbolometer)		
Special range	8 to 14µm		
IR D.V.	1.2mrad		
Focusing range	30cm to infinity		
Field of view	21.7°(H) × 16.6°(V)		
Frame rate	60 frames/sec		
Display	View finder and 3.5 inch LCD monitor with auto switch		
Thermal image pixels	320 (H) × 240 (V) pixels		
A/D resolution	14 bits		
Measuring functions	Run/Freeze		
S/N improvement	1.2, 1.4, 1.8, 2.2, 2.84 and spatial filter ON/OFF		
Alarm	Screen display and alarm sound ON/OFF		
Interval measurement	Recording on built-in real time memory: 1.00 to 3600 sec interval Recording on memory card: 5 to 3600 sec interval (interval error) 10 to 3600 sec. (thermal & visual image) Trigger function provided		
Emissivity correction	0.10 to 1.00 (at 0.01 step). Emissivity table provided		
Ext. temp. correction	Provided (including interval NUC)		
User setup	Pre-registration of environmental setup (max. 10 setups)		
Background comp.	Provided		
Auto functions	Full automatic (level, sense, focus) Level trace, auto-gain control		
Display functions	Thermal/visual composite image display Display color: color/monochrome, positive/negative Gradation: 16, 32, 64, 128, 256 Color palette: ramp, brightness, shine, reverse, medical, line Thermal band display: class, 4 bands Thermal display: 12 thermal images display Multi-sense display, Battery life indicator Lute-profile: X, Y line profile (waveform display) Multi-panel menu		
Image processing functions	Variable level/sense Multi-point temperature display (10pts) Multi-point emissivity display (10pts) 3x display Max/Min (peak hold) temperature display Alarm (full screen or specified box) Digital zoom: 2, 4 times (Run/Freeze) Box setting (max. 5 boxes)		
Annotation	Text and voice annotation (30 sec per image)		
Storage device	Compact flash memory card for: Thermal image in SIT or BMP file format Visual image in SIT or JPEG file format Thermal/visual composite image in BMP file format		
Mouse operating	Real-time memory: 1664 images (max. 50Hz)		
Video signal output	NTSC/PAL composite video signal, 5-video		
Interface	IEEE1394 RS-232C		
Operating temperature	-15 to 50°C, 90% RH or less (not condensed)		
Storage temp./humidity	-20 to 70°C, 90% RH or less (not condensed)		
Power supply	AC adaptor: 100V to 240V, DC 7.2V (nominal)		
Power consumption	Approx. 6W (typ.)		
Shock and vibration	29m/sec² (IEC60068-2-27), 70-min/sec² (IEC60068-2-6)		
Environmental protection	IP54 (IEC60529)		
Dimensions	Approx. 108 (W) × 113 (H) × 189 (D) mm (including protection)		
Weight	Approx. 1.1kg (excluding LCD & battery) Approx. 1.7kg (including LCD & battery)		
Standard accessories	AC adaptor, battery pack (2x3x), battery charger, compact flash memory card, grip belt, neck strap, lens cap, carrying case, viewer software, operation manual		

Specifications are subject to change without prior notice.

## Visual Camera

Pixels	0.41Mega pixels
Effective image pixels	752 (H) × 480 (V) pixels
Field of view	30.1° (H) × 22.7° (V)
Sensitivity	1 lux
Focusing distance	30cm to infinity
Auto exposure	Provided
Video signal	NTSC/PAL

## Viewer Software



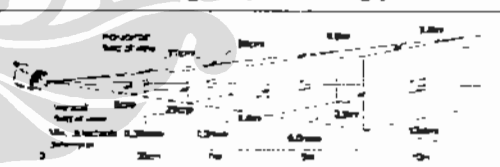
- Thermal image display
- Thermal image histogram (Histogram Editor)
- Thermal image copy
- Image preview
- Setup & Functions
- Level, Sense, Sense, Voice setup
- Selection of thermal or visual image
- Color bars, Gradation, Page
- Exit
- Image save (BMP or JPEG)
- Select help

## Options

TH91-300	High temperature range for TH9100PMV-T R.C. 100 to 800°C, R.C. 200 to 2500°C
TH91-302	High temperature range for TH9100PVM-T R.C. 200 to 2000°C
TH91-313	USB interface with TH91-227 remote program *1
TH91-302	Telephone line (20, 10, 97MHz & 8.27V) with visual camera
TH91-303	Wide angle lens (4.2° (H) × 3.2° (V)) with visual camera
TH91-305	Close-up lens (55mm, 30mm) & 22mm (V) W.D. 75mm
TH91-306	Close-up lens (37mm, 1.7mm) & 8mm (V) W.D. 13mm
TH91-307	External lens adaptor for TH91-344 wide angle lens, TH91-347 close up lenses.
TH91-454	Rechargeable battery pack (Li-ion) 7.2V 1800mAh
TH91-340	Battery charger for 1001REV (2 battery slots)
TH91-038	Battery charger for 220240V (2 battery slots)
TH91-334	AC adaptor (100V 10W AC)
TH91-360	AC adaptor (110V AC) 1A
TH91-369	AC adaptor (220/240V AC) CE
TH91-315	Remote controller
TH91-398-L05	5m cable for remote controller TH91-315
TH91-347	LCD remote controller (TH91-347-L, connecting cable is required)
TH91-347-L05	5m cable for LCD remote controller TH91-347
TH91-347-L10	10m cable for LCD remote controller TH91-347
TH91-347-L15	15m cable for LCD remote controller TH91-347
TH91-347-L20	20m cable for LCD remote controller TH91-347
TH91-368	RS232C Cable
TH91-348	S-video cable
TH91-713	Report Generator Software *2
TH91-711	Image Processor Software (TH91-713 is required) *2
TH91-712	Image Processor Pro Software *2
TH91-717	IEEE1394 Data Capture Software *2
MicroSpec	Thermal Imaging Software *2
MicroSpec RT	Real-Time Thermal Data Acquisition & Analysis Software *2
eMotion	Recorder, Trigger and Measurement Software *2
Trigger Box	Trigger box for station

\*1 Specify these options when ordering the main unit (TH9100PMV/OPVM).  
\*2 Compatible with the Microsoft Windows 2000 professional, Windows XP

## Field of View Diagram (Thermal Image)



**CAUTION  
FOR SAFETY**

Please read "WARNING" & "CAUTION" in the operation manual attached to the product carefully for proper operation before using the product.

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### LAMPIRAN 3 PERALATAN UTAMA YANG DIGUNAKAN



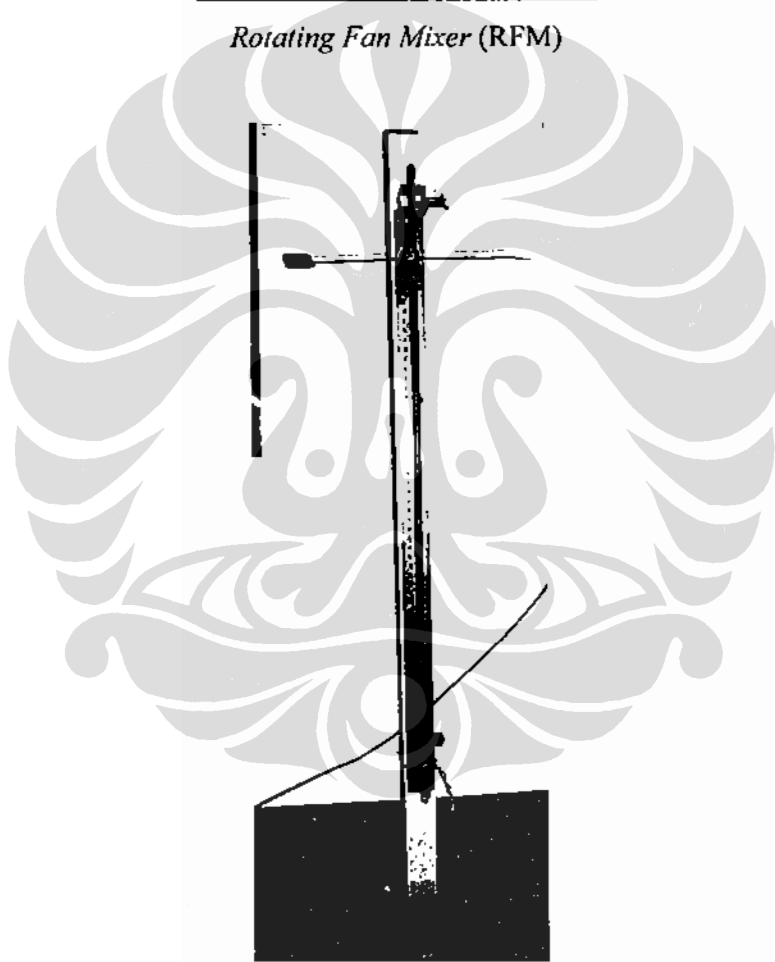
*Rotameter Flame Propagation and Stability Unit P.A. Hilton Ltd. C551*



*Tabung Pembakar (Barrel)*



*Rotating Fan Mixer (RFM)*



Pengatur Ketinggian Termokopel