

M90 Series Portable Infrared Thermometers



Mikron 90 Series Portable Infrared Thermometers use cutting edge technology to provide maximum operator convenience and application versatility for rapid and dependable temperature data gathering. Hand held for spot checks or tripod mounted for short term monitoring, these attractively designed instruments have widespread application throughout industry and research. Capability and versatility are expressed in these outstanding features.

- Sharp focussing on targets from 18cm (7.0") to infinity through precision optics.
- Temperature reading on large display in view finder and in window on rear of instrument.
- Emissivity and measurement mode information also displayed in rear window.
- Peak, Valley and Variable Averaging functions selected by push-button.
- Built-in data logging.
- Digital (RS232C) and analog (mV^o or 0-1VDC) outputs for remote recording, printing or computer interface.
- Computer controlled calibration and diagnostic functions.
- Digital emissivity/slope setting.



Model M90R 2-Color Infrared Thermometer

This unique version utilizes the 2-color principle, in which the temperature measurement is made by rationing the radiation intensities of two adjacent wavelengths rather than from absolute intensity as with single band (or single color) instruments. For surfaces behaving as grey bodies, this design approach eliminates a number of factors that

User-oriented Design

The M90 is designed for user convenience and comfort through such features as a focussable view finder, built-in,

Built-in Data Logging

The M90 can store up to 40 single readings in non-volatile memory. The readings are stored using the RUN/HOLD switch. Each time the button is pressed, the unit goes from RUN mode to HOLD mode, and the reading is stored. The button is pressed again to return to RUN and the counter is

Variable Length Averaging

The averaging feature of the M90 allows the user to enter the number of readings to be averaged together. Up to 60 readings may be averaged to smooth readings from a noisy process. The average performed by the M90 is a running

degrade the accuracy of conventional instruments. For example, temperature measurements with the M90R are:

- Independent of emissivity
- Unaffected by dust and other contaminants in the field of view
- Unaffected by dirty viewing windows

selectable filter for hot, bright targets; wrist strap and knurled grips; and left-hand or right-hand operation.

automatically incremented so the next reading may be stored in the next location. The user may single-step through the stored readings to review them. This allows for "snap-shot" readings to be taken in the field and analyzed in the lab or office.

average. This means that each time a new reading is taken, the oldest reading is dropped, so the average is always the average of the most recent readings (the number of readings is determined by user from 2 to 60).

Technical Data

Performance	Temperature Range Measurement Accuracy Field of View Focus Range Instantaneous FOV/ Spatial Resolution Image Update Rate Resolution Detector Spectral Band Focus	Range 1: -40°C to 1200°C (40°F to 2487°F) Range 2: 0°C to 500°C (32°F to 932°F) ±.2% or 2°C or reading 30 cm (14") x 14"(V) 2 mrad 60 frames per second 0.1°C (at 30°C, 60Hz) 160 x 120 Uncooled Focal Plane Array Microbolometer 8.0 to 14.0 µm Manual
Visual Camera	Effective Image Pixels Field of View Sensitivity Focusing Distance Auto Exposure	640 (H) x 480 (V) pixels 27° (H) x 20° (V) 1 lux 50 cm to infinity (20" to infinity) Provided
Laser Pointer	Classification Type	CDRH Class II 650 nm (red) Laser Diode <1 mW 3.5" color LCD display
Presentation	Display Type AD Resolution B&W/Color Image Display	14 bit Several palettes available Date/time; Temperature units °C/°F; Multi-Language; LCD intensity (high/normal/low); Battery Status Indicator; Color Bar; Temperature Range Scale NTSC/PAL composite video signal, S-Video
Image Processing	On-Board Flash Memory Image Storage Functions	Stores up to 4000 images (dependent upon the camera configuration) Save individual images; view thermal image gallery (12 thumbnails); replay images; and create, change, delete and rename directories and image files. Downloading and Image Viewing Software included
Measurement	Measuring Functions Signal to Noise (S/N) Improvement Image Processing Functions Emissivity Correction Environmental Temperature Correction Background Compensation Auto Functions	Off, 22, 23, 216 Variable level/sense; Single-point temperature display; Single-point emissivity display 0.10 to 1.00 (at 0.01 steps) Provided (including interval NUC) Automatic level and sensitivity; level trace and auto gain control
Interfaces	USB-2.0/1.1 Video Output	Transfers images and image data to a personal computer (Requires Windows® XP) Requires Lemo connector, standard RCA adapter or S-Video adapter
Environmental	Operating Temperature Storage Temperature (w/o batteries) Environmental Protection Shock Vibration	-15°C to 50°C, 90% Relative Humidity or less (not condensed) -40°C to 70°C, 90% Relative Humidity or less (not condensed) IP 54 (IEC60529) 30G (IEC60068-2-27) 3G (IEC60068-2-6)
Power Source	Power Consumption Battery Type Battery Operating Time AC operation	Approx. 6W (typical) Li-Ion; rechargeable, field replaceable (spare battery included) AC adapter; Approx. 3 hours (display shows battery status) 100V to 240V, DC 7.2V (nominal)
Physical Characteristics	Camera Dimensions Camera Weight Mounting	203 mm x 228 mm x 101 mm (8" x 9" x 4") 1.3 kg including battery (2.9 lbs. including battery) Standard tripod mount, 1/4" - 20

Standard Accessories: (2) Li-Ion Batteries, Smart Battery Charger, AC Adapter and DC Interface Cable, USB Cable, Lens Cap, Shippable Carrying Case, Neck Strap, Operating Manual on CD, Lemo to RCA or Lemo to S-Video Adapter. **Several add-on lenses available at additional cost.**

M7816DV Thermal and Visual Imager

The M7816DV represents another milestone in innovative infrared thermometry. It is an extremely lightweight, high-performance handheld IR camera offering capabilities normally found in models costing much more.

This fully-radiometric camera is ergonomically designed for comfortable one-handed point-and-shoot operation and features 1600x120 resolution at a 60Hz refresh rate.

The M7816DV measures the passive infrared radiation emitted by the target surface and converts this radiation into a two-dimensional image relating to the temperature distribution at the target surface. The images and image data can then be transferred to an external device using the USB port.

This temperature distribution can be viewed in full color or grayscale through the flip-up 3.5 inch TFT LCD display, which is located on the top of the IR camera.

The on-board diagnostic software provides an intuitive menu system, which can be accessed using the button control panel located on the back of the camera.

Completely self-contained in a highly-durable housing, the M7816DV is both dust-proof and weather resistant, suitable for indoor or outdoor use. It is battery operated, uses advanced uncooled UFPA microbolometer technology, and stores 14-bit images and data to internal flash memory.



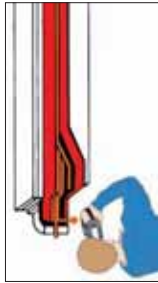
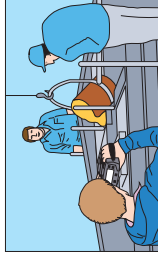
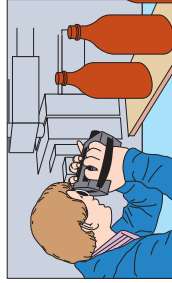
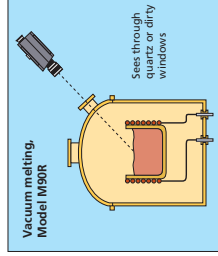
DualVision™: Visual and Thermal Composite Image Functionality



What is DualVision™?

DualVision™ is the ability to display a thermal image over a visual image, on the M7816DV's 3.5" LCD. The temperature range of the thermal image over the visual image can be adjusted, allowing the operator to fine-tune the display, and pin-point problems faster! Both types of images can be saved and downloaded to a computer via USB.

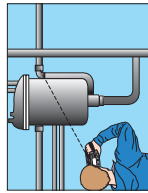
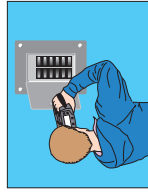
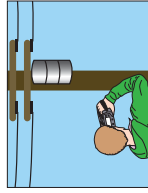
At left, the M7816DV LCD is shown with thermal image overlaid on the visual image. The camera user may adjust the thermal image to show the entire thermal image, or just the hottest/problem areas.



Foundry (high temperature metals), Model M90R or M90V

Forehearth/Glass Furnace (Gob temperature) Model M90V or M90H

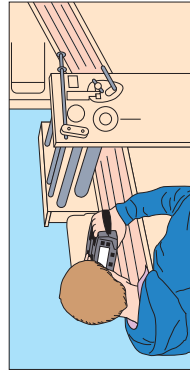
Typical Preventive Maintenance Applications



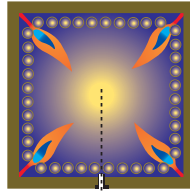
Transformer

Electrical Hot Spots

Steam Traps



Plastic industry, Model M90F or M90ZF



Cross section view of utility furnace, Model M90L



M90 tripod mounted for precision aiming

Battery Operation

Long life, rechargeable and replaceable batteries that provide instrument off after a spot check reading. The M90 can be up to 16 hours of continuous operation are enhanced by the M90 battery saver feature that automatically switches the rechargeable or alkaline AA batteries may be field installed.

Calibration

Factory and field calibration is made easy by the built-in "learn" mode which instructs the M90 to match its calibration to laboratory standards. Initiated by easily accessed D.I.P.

M7816DV

**Economical, Fully Radiometric, Hand-Held
160x120 Resolution Thermal Imager**



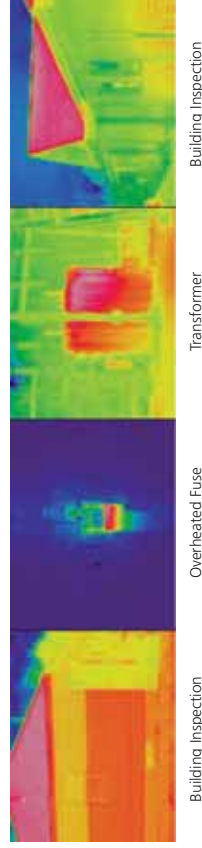
Economically priced, easy-to-use, high performance infrared camera with high quality flip-up 3.5" LCD, laser pointer, and digital visual recording for demanding PPM applications



Key Features

- 160 x 120 Resolution UFPA Detector
- Resolution of 0.1°C (at 30°C 60 Hz)
- Temperature Range -40°C to 500°C
- Focus Range of 12" to Infinity
- Weighs 2.9 lbs. with Battery
- Digital Visual Recording
- Laser Pointer
- Revolutionary DualVision Image Composite Functionality
- Transfers Images Using USB 2.0/1.1
- 3.5" Flip-up LCD

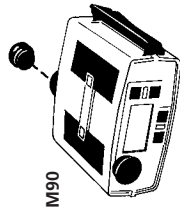
M7816 Sample Images:



Building Inspection Overheated Fuse Transformer Building Inspection



Close Focus Lens Attachment



M90

Optional Close Focus Lens Attachment

With close focus lens attachment the focussable distance of the M90 series can be reduced to 178mm (7.0"). These lenses can be added in the field with no change in calibration accuracy. See table below for minimum measurable target diameters.

Metallic Case

The standard M90 housing is manufactured from a rigid and durable ABS plastic, which is suitable for the large proportion of application environments. For more severe working conditions, such as glass works, foundries and steel mills, additional levels of protection are available. The first level is a cast metal housing in place of the standard ABS housing. This provides excellent protection against rough handling and incorporates rubber feet to buffer shock and vibration.

Shoulder Strap

This accessory allows the Model M90 to be held by the shoulder for an extra measure of safety and convenience.

Close Focus Lens Part #	Useable with Models	Close Focus Working Distance	Minimum Measurable Target Diameter
14040-1H	M90Q, M90H-1, M90R-1	53.0cm (21.0")	6.0mm (0.24")
	M90H, M90R-2	to 35.5cm (14.0")	2.0mm (0.08")
14040-2H	M90V		1.2mm (0.05")
	M90Q, M90H-1, M90R-1	33.0cm (13.0")	3.6mm (0.15")
	M90H, M90R-2	to 21.5cm (8.5")	1.2mm (0.05")
14040-1H and 14040-2H	M90V		0.72mm(0.030")
	M90Q, M90H-1, M90R-1	24.0cm (9.5")	3.2mm (0.13")
	M90H, M90R-2	to 17.8cm (7.0")	1.06mm(0.05")
	M90V		0.65mm(0.025")

Technical Data

Performance	<p>Temperature Range: -40°C to 120°C (40°F to 248°F)</p> <p>Measurement Accuracy: ±2% or 2°C of reading</p> <p>Field of View: 2.1" (H) x 1.6" (V)</p> <p>Focus Range: 30 cm to infinity (12 to infinity)</p> <p>Instantaneous FOV / Spatial Resolution: 60 frames per second</p> <p>Image Update Rate: 0.06°C (at 30°C 60Hz)</p> <p>Resolution: 320 x 240 Uncooled Focal Plane Array Microbolometer</p> <p>Detector: 8.0 to 14.0 µm</p>
Visual Camera	<p>Effective Image Pixels: 752 (H) x 480 (V) pixels</p> <p>Field of View: 34.6° (H) x 25.9° (V)</p> <p>Sensitivity: 1 lux</p> <p>Focusing distance: 30 cm to infinity (12 to infinity)</p> <p>Auto Exposure: Provided</p> <p>Class: CDRH Class II</p> <p>Type: 660 nm (red) Laser Diode 0.5 mW</p> <p>Display Type: 3.5 color LCD display</p> <p>AD Resolution: 14 bit</p> <p>B&W/Color Image: Several palettes available</p> <p>Display: Date/Time; Temperature units °C/°F; Multi-Language; LCD Intensity (high/normal/low); Battery Status Indicator; Color Bar; Temperature Range Scale</p> <p>Video Output: NTSC/PAL composite video signal, S-Video</p>
Laser Pointer	<p>Run/Freeze: Off, 32, 38, 316</p> <p>Signal to Noise (S/N) Improvement: Variable level/sense; single xed-point temp. display and Emiss. Correction</p> <p>Image Processing Functions: 0.10 to 1.00 (at 0.01 steps)</p> <p>Emissivity Correction: Provided (including interval NUC)</p> <p>Environmental Temperature Correction: Provided</p> <p>Background Compensation: Provided</p> <p>On-Board Flash Memory: Stores up to 1,300 images (dependent upon the camera con guration)</p> <p>Image Storage Functions: Save individual images or thermal/visual composites with or without text annotation; view thermal image gallery (12 thumbnails); replay images; and create, change, delete and rename directories and image les.</p>
Image Processing	<p>Download and Image Viewing Software included</p> <p>Software: Transfers images and image data to a personal computer</p> <p>USB-2: (Requires Windows™ XP)</p> <p>LEMO Connector: Requires RCA adapter or S-Video adapter</p>
Environmental	<p>Operating Temperature: -15°C to 50°C 90% Relative Humidity or less (not condensed)</p> <p>Storage Temperature (without batteries): -40°C to 70°C 90% Relative Humidity or less (not condensed)</p> <p>Environmental Protection: IP 54 (IEC60529)</p> <p>Shock: 30G (IEC60068-2-27)</p> <p>Vibration: 3G (IEC60068-2-6)</p>
Power Source	<p>Power Consumption: Approx. 6W (typical)</p> <p>Battery Type: Li-Ion; rechargeable, eld replaceable (spare battery included)</p> <p>Battery Operating Time: Approx. 2 hours 30 minutes (display shows battery status)</p> <p>AC operation: AC adaptor: 100V to 240V, DC 7.2V (nominal)</p> <p>Power Saving: Manual and/or automatic standby mode</p>
Physical Characteristics	<p>Camera Dimensions: 203.2 mm x 228.6 mm x 101.6 mm (8 x 9 x 4)</p> <p>Camera Weight: 1.2 kg including battery (2.9 lbs. including battery)</p> <p>Tripod Mounting: Standard, 1/4 - 20</p>
Optional	<p>Lenses: Telephoto 2.0, Wide Angle, SpyGlass™</p>

Camera Features (Front)

Camera Features (Back)

Mikron reserves the right to change specifications to meet the latest changes in technology and improvements at any time without notice. These changes will be cted in subsequent editions of our literature when warranted.

For More Information Call:
1-888-506-3900

Mikron Infrared, Inc.
 1101 Elevation Street, Suite 3
 Hancock, MI 49930
 Tel: (906) 487-6060
 Fax: (906) 487-6066
 E-Mail: info@mikroninfrared.com
 Internet: www.mikroninfrared.com

General Specifications, all Models

Focusing: 50cm (20") to infinity. M902B starts at 100cm (40").

View Finder: 9" sighting, eye piece adjustable, illuminated temperature display in view finder. High temperature eye protection filter, built-in and selectable in high temperature models.

Operating Modes: Run, Peak, Valley, Average, Hold.

Emissivity Range: 0.1 to 1.00 in 0.01 steps, digitally set.

Slope Adjust: 850 to 1,150 in .001 step digitally set, for M90R Series only

Digital Output: RS-232, 2400 baud, to printer, data logger or computer.

Analogue Output: 1mV/°C, 1mV/°F or 0-1 volt, field selectable.

Ambient Operating Temperature: 0 to 50°C (32 to 122°F), 0 to 90% R.H. non-condensing.

Storage Temperature: -20 to 65°C (-5 to 150°F).

Battery Type: Rechargeable Ni-Cad, type AA.

Battery Life: Continuous operation: 16 hours for type V, H and Q, 8 hours for others.

Weight: 1.1kg (2.5 lbs.) with lens and batteries

Mounting: Built-in tripod socket 1/4-20 tapped hole.

Size: 165mm x 187mm x 76mm (6.5" W x 7.3" L x 3.0" H)

Specifications

Typical Applications	Model	Temperature Range °C/°F (Field Selectable)	Spectral Response (µm)	Field of View of Measurement	Accuracy (NIST traceable) See option 3.	Temperature Resolution	Response Time
Hot and molten metals, foundries, ceramics, hardening, forging, annealing, induction heating, semi-conductor wafers.	M90R-1	700° to 2000° C 1292° to 3632° F	2-color near 9.0µm	60:1 (1")	±0.70% of reading	1"	0.5 sec.
	M90R-2	900° to 3200° C 1652° to 5832° F		180:1 (1/8")			
	M90R-3	1200° to 3500° C 2192° to 6332° F		300:1 (1/4")			
Semi-conductor wafers, induction heating, hot shiny metal surfaces.	M90V	800° to 3000° C 1472° to 5432° F	0.65 (Lense as optical pyrometer)	300:1 (1/4")	±0.25% of reading	1"	1.0 sec.
	M90H	600° to 3000° C 1112° to 5432° F	0.78 - 1.06	180:1 (1/8")	±0.04% of reading	1"	0.75 sec.
Medium to high temperature for ferrous and non-ferrous metals. Uses through glass.	M90Q	250° to 2000° C 482° to 3632° F	1.0 - 1.60	60:1 (1")	±0.50% of reading ±1°C	1"	0.5 sec.
	M90N	350° to 2000° C 662° to 3632° F	*	180:1 (1/8")	±0.50% of reading ±1°C	1"	0.5 sec.
*note: Special spectral response to avoid flame.	M90G	0° to 500° C 32° to 932° F		20:1 (2 1/4")	±0.8% of reading ±1°C	0.1"	1.0 sec.
Life sciences, such as biology, zoology, botany, veterinary medicine, heat loss and research.	M90B	-50° to 1000° C -58° to 1832° F		40:1 (1 1/2")	±0.8% of reading ±2°C	1"	0.75 sec.
General purpose for textile, printing, food, rubber, thick plastic, paints, laminating, maintenance.	M90BT	50° to 1000° C -58° to 1832° F		90:1	±1.0% of reading ±1°C	1"	0.75 sec.
Small spot sizes at a distance. Excellent choice for preventive maintenance and process monitoring 2.5cm (1") spot diameter at 2.3cm (90").	M902B	-50° to 1000° C -58° to 1832° F		180:1	±1.0% of reading ±1°C	1"	0.75 sec.
Small spot sizes at long distances, preventive maintenance, hot spots on electrical switches and panels and power lines. 2.5cm spot diameter at 4.6 meters.	M902F	0° to 500° C 32° to 932° C	7.9	40:1 (1 1/2")	±1.0% of reading ±2°C	1"	1.0 sec.
Thin film plastic, such as polyester, fluorocarbons, etc. Low temperature glass.	M90F	122° to 1112° F		60:1 (1")	±1.0% of reading	1"	1.0 sec.
Glass and ceramic surface such as tempering, annealing, sealing, bending and laminating.	M90E-1	800° to 2500° C 1472° to 4532° F	4.8 - 5.2	90:1 (1/2")			
See through clean combustion flames and hot gases.	M90D	500° to 1500° C 932° to 2732° F	3.86	90:1 (1/2")	±1.0% of reading	1"	1.0 sec.
	M90D-1	500° to 1500° C 932° to 2732° F		40:1 (1 1/2")	±1.0% of reading	1"	1.0 sec.
Combustion flames and hot gases containing CO ₂ .	M90L	600° to 2200° C 1112° to 3992° F	CO ₂ absorption band	40:1 (1 1/2")	±1.0% of reading	1"	1.0 sec.



LUMASENSE TECHNOLOGIES COMPANY
 Oakland, NJ 07436 • Ph: 201.405.0900 • Fax: 201.405.0090 • www.mikroninfrared.com • mikroninfo@lumainc.com