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portable instruments

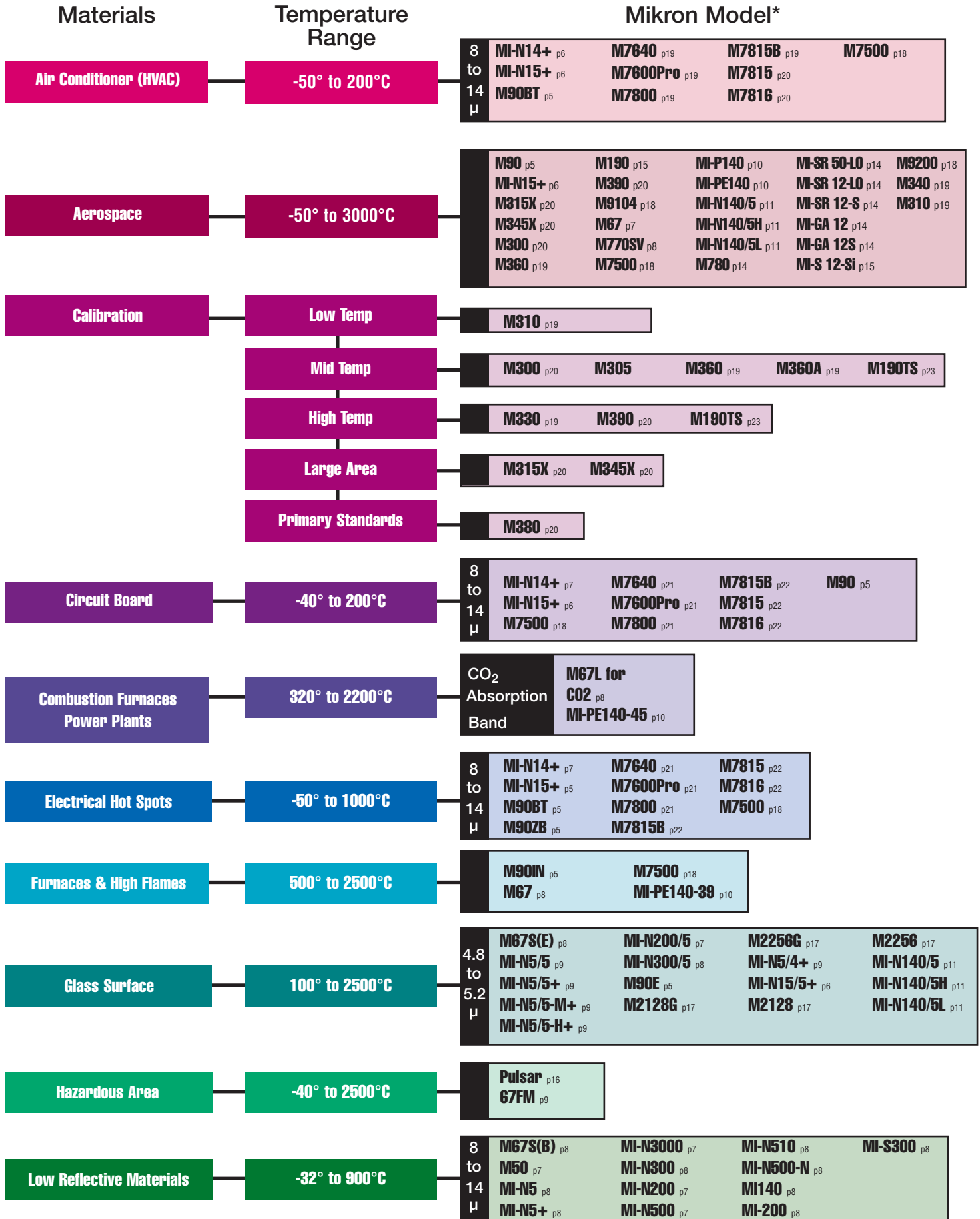
process instruments

thermal imaging systems

blackbody sources

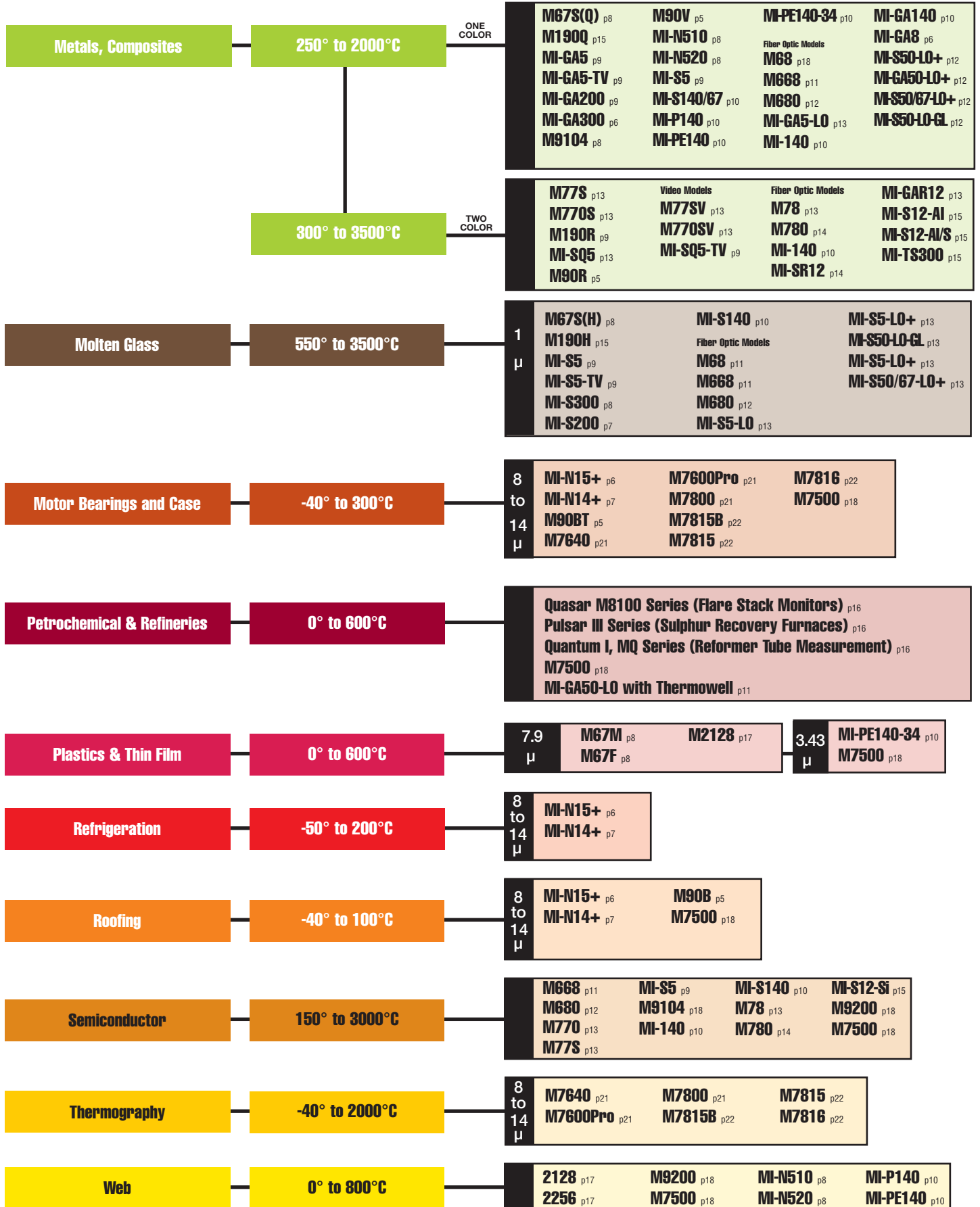
CE

# Applications & Products



\* Models are color coded to correspond with this chart.

# Applications & Products



# Infrared Technology

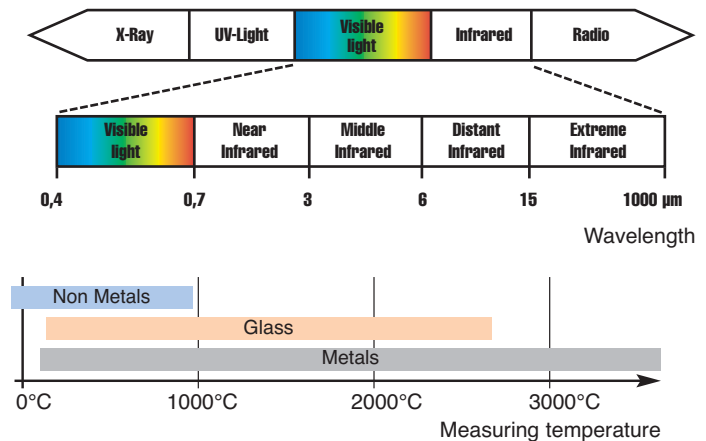
## Five IR Design Questions

- Temperature (Critical, Min, Max)
- Target (Distance, Size, Material)
- Time (Speed of Measurement, of Target)
- Obstructions (Dust, Windows, Objects)
- Heat Source (Type, Placement)

## Infrared Temperature Measurement

The non-contact temperature measurement or pyrometry is an optical measurement based on the property of all materials to send out electromagnetic radiation (infrared radiation). The infrared thermometer (pyrometer) uses this radiation to determine the temperature. The pyrometer aims with the optics at a certain spot of the object and determines the temperature of this spot. Today typically spectral responses of pyrometers are in the near, middle and distant infrared.

## Electromagnetic Spectrum



## Selection of the Correct Mikron Pyrometer

To choose the correct pyrometer for a certain application different properties of the measuring object have to be taken into consideration, such as temperature, material and size.

## The Temperature Range

MIKRON pyrometers measure temperatures from -100 to 4000°C. The selection of the temperature range depends on the application.

## The Spectral Range

The material of the measured object demands the correct selection of the optimum spectral range of the pyrometer for a certain application. Therefore the correct spectral range is one of the most important features. Typical spectral ranges are:

- 0.8-1.1 μm: Measurement of molten glass, metals, ceramics (Δ 600°C)
- 1.45-1.8 μm: Measurement of metals, ceramics (Δ 250°C)
- 2.0-2.8 μm: Measurement of metals (Δ 75°C)
- 5.14 μm: Measurement of glass surfaces (Δ 100°C)
- 8-14 μm: Measurement of non-metal surfaces and coated metals (Δ -40°C)

## The Spot Size

The spot size of a pyrometer is determined by the dimensions of the measured object. At least it has to be as big as the measured object. The spot sizes (M) depends on the pyrometer type and the measuring distance (a). For M and a please see data sheets.

If a distance ratio is mentioned instead of "M" and "a" the following calculation for the spot size has to be done: Distance ratio = distance / spot size (10 : 1 e.g. means: at a distance 500mm the spot size is 50mm).

Example:

## Sighting

For easy alignment of the pyrometers to the measuring object, different sighting systems are available:

- LED aiming
- Laser aiming
- Through-the-lens-sighting
- TV camera

## The Design

The pyrometers are available in different designs:

- Compact pyrometer with integrated lens
- Fiber optic pyrometers (LO); benefit of this design: fiber optic and optical head can be used in high ambient temperatures without cooling.

## Output

Different pyrometers provide different outputs. Analog outputs and digital interfaces are available. Some pyrometers have various switchable outputs, others can be offered with different outputs, the required output has to be selected when ordering. The required digital interface always has to be chosen.

- Analog output 4-20mA or 0-20mA
- Analog output 10 mV/°C
- Analog output 0-5 V
- Analog output thermocouple type J or K
- Digital interface RS232 or RS485



# Portable Infrared Thermometers

Mikron portable infrared thermometers are lightweight, hand-held and are the ideal general purpose instruments for non-contact temperature measurement. They are used most often in the areas of preventative maintenance, quality assurance and short term process monitoring.

## M90 Series








- Through-lens sighting
- Sharp focussing on targets
- 10 different spectral responses
- Minimum measurable target diameter: 1.0mm (0.04")
- Temperature display in eyepiece and rear window
- Built-in data logging
- M90R for 2/color
- M90ZB for small areas at a distance


	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>M90R-1</b> 700° to 2000°C	2 color near 0.9µm	±0.70% of reading	60:1	0.5s	RS232 1mV/°C, 1mV/°F, 0 to 1 volt	
<b>M90R-2</b> 900° to 3000°C	2 color near 0.9µm	±0.70% of reading	180:1			
<b>M90R-3</b> 1200° to 3500°C	2 color near 0.9µm	±0.70% of reading	180:1			
<b>M90V</b> 800° to 3000°C	0.65 (same as optical pyrometers)	±0.25% of reading	300:1			
<b>M90H</b> 600° to 3000°C	0.78 to 1.06 µm	±0.40% of reading	180:1			
<b>M90Q</b> 250° to 2000°C	1.0 1.60 µm	±0.50% of reading ±1°C	60:1			
<b>M90IN</b> 350° to 2000°C	special spectral response to avoid flame	±0.50% of reading ±1°C	180:1			
<b>M90G</b> 0° to 500°C	8 to 14 µm	±0.8% of reading ±1°C	20:1			1.0s
<b>M90B</b> -50° to 1000°C	8 to 14 µm	±0.8% of reading ±2°C	40:1			0.75s
<b>M90BT</b> -50° to 1000°C	8 to 14 µm	±1.0% of reading ±1°C	90:1			
<b>M90ZB</b> -50° to 1000°C	8 to 14 µm	±1.0% of reading ±1°C	180:1			
<b>M90ZF</b> 0° to 500°C <b>M90F</b> 50° to 600°C	7.9 µm	±1.0% of reading ±2°C	40:1	1.0s		
<b>M90E</b> 300° to 1500°C	4.8 to 5.2 µm	±1.0% of reading	60:1			
<b>M90E-1</b> 800° to 2500°C	4.8 to 5.2 µm	±1.0% of reading	90:1			
<b>M90D</b> 500° to 1500° <b>M90D-1</b> 800° to 2500°C	3.86 µm	±1.0% of reading	90:1			
<b>M90L</b> 600° to 2200°C	CO <sub>2</sub> absorption band	±1.0% of reading	40:1			

The black data is for all type in the row. Colored data is only valid for the respective type of pyrometer.

# Portable Infrared Thermometers




	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MI-S8+, MI-GA8+</b>  <ul style="list-style-type: none"> <li>• 4 temperature ranges</li> <li>• High accuracy</li> <li>• Viewfinder with display for temperature or emissivity</li> <li>• Focusable precision optics</li> <li>• Small spot sizes min. 0.8mm</li> <li>• Digital display on the housing</li> </ul>	600° to 2500°C 300° to 1300°C	0.6 to 1.1 μm 1.45 to 1.8 μm	±1% reading ±1°C	min 300:1 (min 0.8)	1ms 1ms	RS232
<b>MI-S8GS+</b>  <ul style="list-style-type: none"> <li>• Very fast portable</li> <li>• Very small spot sizes</li> <li>• Maximum value storage</li> <li>• Temperature indicator inside the view finder</li> </ul>	1000° to 2000°C	0.55 μm	±1% reading ±1°C	min 300:1 (min 0.8)	500ms	RS232
<b>MI-N15+</b>  <ul style="list-style-type: none"> <li>• Temperature ranges between -32 and 900°C</li> <li>• Three different spectral ranges</li> <li>• Laser targeting light</li> <li>• Built-in data logging</li> <li>• Low-cost versions</li> </ul>	-32° to 900°C	8 to 14 μm	±1% reading ±1°C	50:1	150ms	RS232C 1mV/°C
<b>MI-N15/5+</b>  <ul style="list-style-type: none"> <li>• Temperature ranges between 150 and 1800°C</li> <li>• Three different spectral ranges</li> <li>• Laser targeting light</li> <li>• Built-in data logging</li> <li>• Low-cost versions</li> </ul>	150° to 1800°C	5.14μm	±1% reading ±1°C	50:1	150ms	RS232 Analog output 1mV/°C
<b>MI-GA15+</b>  <ul style="list-style-type: none"> <li>• Temperature ranges between 250 and 1800°C</li> <li>• Three different spectral ranges</li> <li>• Laser targeting light</li> <li>• Built-in data logging</li> <li>• Low-cost versions</li> </ul>	250° to 1800°	1.45 to 1.8 μm	0.6%	200:1 (min. 1.25)	20ms	RS232

# Portable Infrared Thermometers




		TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MI-N14+</b>	 <ul style="list-style-type: none"> <li>• Temperature ranges between -32 and 600°C</li> <li>• Three different spectral ranges</li> <li>• Laser targeting light</li> <li>• Built-in data logging</li> <li>• Low-cost versions</li> </ul>	-32° to 600°C	8 to 14 μm	1%	30:1	300ms	RS232

# Industrial Fixed Mount Thermometers

Mikron has a wide selection of industrial fixed mount non-contact temperature sensors to fill any need. Select from low cost, compact models, highly advanced fiber optic and 2/color instruments, flexible single color non-contact pyrometers, and high speed ultra precision digital units with multi-channels.









		TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MI-N3000</b>	 <ul style="list-style-type: none"> <li>• Low cost</li> <li>• Fixed emissivity</li> <li>• Integrated air purge (option)</li> <li>• 3 Measuring ranges</li> </ul>	0° to 500°C	8 to 14 μm	1.5% of range	5:1	300ms	10mV/°C Thermocouple Type J or K
<b>M50</b>	 <ul style="list-style-type: none"> <li>• Designed for use in multiple locations</li> <li>• Low cost</li> <li>• Choice of air purge cooling jackets</li> <li>• Hermetically sealed</li> </ul>	0° to 570°F -20° to 300°C	6.5 to 14 μm	±1.5% of full scale ±3°C whichever is greater	6:1	80ms (63%)	10mV/°C 10mV/°F Thermocouple Type J or K
<b>MI-200 Series</b>	 <ul style="list-style-type: none"> <li>• High accuracy due to digital signal processing</li> <li>• Emissivity programmable from 0.05 up to 1.0</li> <li>• Fast, precise, compact</li> <li>• Maximum value storage</li> <li>• LED targeting light</li> </ul>	-25° to 1652°F -32° to 900°C  572° to 4532°F 300° to 2500°C	8 to 14 μm  5.14 μm 0.8 to 1.1 μm 1.45 to 1.8 μm	0.5% of reading	40:1 to 136:1	20ms adjustable to 10s	4-20mA

# Industrial Fixed Mount Thermometers

	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MI-300 Series</b>  <ul style="list-style-type: none"> <li>• Compact 2-wire temperature sensor</li> <li>• Adjustable emissivity</li> <li>• Integrated LED-targeting</li> <li>• Easy to install and connect</li> </ul>	-4° to 932°F -20° to 500°C  572° to 4532°F 300° to 2500°C	8 to 14 μm  5.14 μm 0.8 to 1.1 μm 1.45 to 1.8 μm	1.5% of range	15:1 to 60:1	10ms	4-20mA
<b>MI-N510, MI-N520</b>  <ul style="list-style-type: none"> <li>• Ultra small sensing lead</li> <li>• Adjustable measuring ranges</li> <li>• Relay contact for alarm</li> <li>• Max./min. value storage</li> <li>• Sensing head can be used to 180°C</li> </ul>	-40° to 700°C	8 to 14 μm	1% of reading	2:1 or 10:1	180ms adjustable to 30s	4-20mA 0 to 5 V Thermocouple Type J or K RS232 RS485
<b>M67, M67S Series</b>  <ul style="list-style-type: none"> <li>• Rugged self-contained</li> <li>• Most flexible</li> <li>• Variable focus optical system</li> <li>• Compatible with existing instrumentation</li> <li>• Wide array of protective hardware</li> </ul>	<b>M67S(A)</b> -40° to 100°C  <b>M67B</b> 0° to 1000°C  <b>M67K</b> 0° to 500°C  <b>M67F</b> 200° to 600°C  <b>M67M</b> 50° to 500°C  <b>M67E</b> 100°C to 1300°C  <b>M67D</b> 300° to 1750°C  <b>M67L</b> 320° to 2800°C  <b>M67H</b> 500° to 3000°C  <b>M67Q</b> 220° to 1100°C  <b>M67P</b> 250° to 1650°C	7 to 20 μm  8 to 14 μm  7 to 10 μm  7.9 μm  narrow band centered at 3.43  4.8 to 5.2 μm  narrow band centered at 3.86  CO <sup>2</sup> absorption band  0.78 to 1.06 μm  1.0 to 1.6 μm  2.0 to 2.6 μm	0.5% of full scale ±1°C whichever is greater	15:1  15:1  15:1 or 30:1  15:1 or 30:1  5:1 or 8:1  15:1 or 30:1  30:1  30:1  180:1  30:1 or 90:1  30:1	100ms to 10s           50ms to 10s  100ms to 10s	4-20mA






<sup>1</sup> With dynamical adaptation at low signal levels

# Industrial Fixed Mount Thermometers

	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>M67FM</b>   <ul style="list-style-type: none"> <li>• Intrinsicly safe</li> <li>• Rugged self-contained</li> <li>• Most flexible</li> <li>• Variable focus optical system</li> <li>• Compatible with existing instrumentation</li> <li>• Wide array of protective hardware</li> </ul>	-40° to 100°C	7 to 20 μm	0.5% of full scale ±1°C whichever is greater	15:1	100ms	4-20mA thru a barrier
	0° to 1000°C	8 to 14 μm		15:1 or 30:1		
	0° to 500°C	7 to 10 μm		15:1 or 30:1		
	0° to 600°C	7.9 μm		15:1 or 30:1		
	400° to 1300°C	4.8 to 5.2 μm		30:1		
	450° to 1750°C	narrow band centered at 3.86		30:1		
	425° to 2200°C	CO <sub>2</sub> absorption band		30:1		
	550° to 3000°C	0.78 to 1.06 μm		90:1 or 180:1	50ms	
	230° to 1100°	1.0 to 1.6 μm		30:1 or 90:1	100ms	
	250° to 1650°C	2.0 to 2.6		30:1	100ms	
<b>MI-N5, MI-N5/5, MI-N5/4</b>   <ul style="list-style-type: none"> <li>• Digital pyrometer with 2-wire analog output</li> <li>• 8 Selectable measuring ranges</li> <li>• 3 Fixed optics</li> <li>• MI-N5/5 for glass surface measurement</li> <li>• 2 temperature ranges between 300 and 2500°C</li> <li>• Measurement through flames (spectral range 3.9μm)</li> <li>• No influence of waste gas on the measurement</li> </ul>	-32° to 900°C	8 to 14 μm	0.6% of reading	3 fixed optics 50:1 (min 2)	80ms adjustable up to 5s	4-20mA
	100° to 2500°C	5.14 μm		3 fixed optics 50:1 (min 2.5)		
	300° to 2500°C	3.9 μm				
<b>MI-N5+, MI-5/5+, MI-5/4+</b>   <ul style="list-style-type: none"> <li>• Digital pyrometer with 4-20 mA analog output</li> <li>• 8 Selectable measuring ranges</li> <li>• 3 Fixed optics</li> <li>• See Red and Blue above</li> </ul>	-32° to 900°C	8 to 14 μm	0.6% of reading	3 fixed optics 50:1 (min 2)	80ms adjustable up to 5s	4-20mA RS232 RS485
	100° to 2500°C	5.14 μm		3 fixed optics 50:1 (min 2.5)		
	300° to 2500°C	3.9 μm				
<b>MI-S5, MI-GA5</b>   <ul style="list-style-type: none"> <li>• Very fast</li> <li>• Analog output and digital interface</li> <li>• Laser aiming or through-lens sighting (optional)</li> <li>• Integrated TV camera (optional)</li> </ul>	650° to 3000°C	0.8 to 1.1 μm	0.3% to 0.5% of reading	160:1 or 200:1	≤2ms	4-20mA RS232 RS485
	250° to 3000°C	1.45 to 1.8 μm				






The black data is for all type in the row. Colored data is only valid for the respective type of pyrometer.

# Industrial Fixed Mount Thermometers

	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MI-S140, MI-GA140</b>  <ul style="list-style-type: none"> <li>• Fast, fully digital, highly accurate</li> <li>• Focusable optics for non-contact temperature measurements on metals, ceramics, graphite, etc.</li> <li>• Extremely small spot size</li> <li>• Precision thru-lens sighting or laser targeting</li> <li>• Emissivity enhancer option</li> </ul>	550° to 3300°C 250° to 2500°C	0.7 to 1.1 μm 1.45 to 1.8 μm	<1500°C 0.3% +1°C ≥1500°C 0.5%	300:1	<1ms adjustable up to 10s	0/4-20mA RS232/RS485 (switchable), Profibus-DP (option), PID controller (optional)
<b>MI-S140/67</b>  <ul style="list-style-type: none"> <li>• Special version of the MI-S140 with extremely short wavelength for measurements of metals with high emissivity.</li> <li>• Fully digital, very fast</li> <li>• Viewfinder or laser targeting</li> <li>• Very small spot sizes</li> <li>• Emissivity enhancer option</li> </ul>	1100° to 3500°C	0.676 μm	<1500°C 0.3% +1°C ≥1500°C 0.5%	300:1	<1ms adjustable up to 10s	0/4-20mA RS232/RS485 (switchable), Profibus-DP (option)
<b>MI-P140</b>  <ul style="list-style-type: none"> <li>• Fast response</li> <li>• Highly accurate, fully digital</li> <li>• Extremely small spot sizes</li> <li>• Focusable optics</li> <li>• Optimized thru-lens viewfinder or laser targeting</li> <li>• Emissivity enhancer option</li> </ul>	50° to 1300°C	2 to 2.8 μm	<400°C 2°C ≥400°C 0.4% +1°C	40:1 to 430:1	1.5ms adjustable up to 10s	0/4-20mA RS232 or RS485 (switchable)
<b>MI-PE140</b>  <ul style="list-style-type: none"> <li>• Fast response</li> <li>• Highly accurate, fully digital</li> <li>• Extremely small spot sizes</li> <li>• Focusable optics</li> <li>• Optimized thru-lens viewfinder or laser targeting</li> <li>• Emissivity enhancer option</li> </ul>	5° to 1200°C	3 to 5 μm	<400°C 2.5°C ≥400°C 0.4% +1°C	40:1 to 134:1	1.5ms adjustable up to 10s	0/4-20mA RS232 or RS485 (switchable)
<b>MI-PE140-34, MI-PE140-45, MI-PE140-39</b>  <ul style="list-style-type: none"> <li>• Special version of MI-PE140</li> <li>• Measuring of thin PE and PP foils</li> <li>• Measuring of combustion flames and hot gases containing CO<sub>2</sub></li> <li>• Measuring of objects in flame heated furnaces, sees through clean combustion flames and hot gases</li> <li>• Emissivity enhancer option</li> </ul>	50° to 500°C 400° to 2000°C 20 to 1450°C	3.43 μm CO <sub>2</sub> hot band 3.9 μm	<400° C 2°C ≥400°C 0.3% +1°C	50:1 200:1 200:1	1.5ms <sup>1</sup> adjustable up to 10s	0/4-20mA RS232 or RS485 (switchable)





<sup>1</sup> With dynamical adaption at low signal levels

# Industrial Fixed Mount Thermometers





	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MI-N140/5, MI-N140-5H, MI-N140-5L</b>  <ul style="list-style-type: none"> <li>• For glass surface measurement</li> <li>• Laser targeting light or thru viewfinder</li> <li>• Focusable optics with small spot size</li> <li>• <b>High speed version</b></li> <li>• <b>Better field of view</b></li> </ul>	250° to 2500°C	5.14 μm	<1300°C 0.6% of reading or 2°C 1% of reading or 3°C ≥1300°C 0.8% of reading 1.2% of reading	150:1 <b>150:1</b> 180:1	<40ms <b>10ms</b> <40ms adjustable up to 10s	0/4-20mA, RS232 or RS485 (switchable)
<b>MI-P140-LO</b>  <ul style="list-style-type: none"> <li>• Fully digital, very fast</li> <li>• View finder or laser targeting light</li> <li>• Very small spot sizes</li> <li>• Focusable optics</li> </ul>	100° to 750°C	2 to 2.6 μm	<400°C 2°C ≥400°C 0.3% + 1°C	Optical head I min 35:1 Optical head II min 80:1	1.5ms <sup>1</sup> adjustable up to 10s	0/4-20mA, RS232 or RS485 (switchable)
<b>M68 Series</b>  <ul style="list-style-type: none"> <li>• Fiber optic model</li> <li>• Unaffected by RF or EM interference</li> <li>• Field interchangeable sensor, lens assemblies, fiber optic cable</li> <li>• Functions in high ambient temperature environments without cooling</li> <li>• Mini lens assembly for limited space</li> </ul>	600° to 5400°F 350° to 3000°C	0.78 to 1.6 μm	±0.75% of full scale	1:1 to 180:1	10ms	4-20mA
<b>MI-GA50-LO with Thermowell</b>  <ul style="list-style-type: none"> <li>• High accuracy and extended life</li> <li>• Durable water and dust proof housing</li> <li>• Cover wide temperature span</li> <li>• Optional explosion proof enclosure</li> <li>• Protective thermowell available in several sizes and materials</li> </ul>	300° to 3500°C in 13 models	0.7 to 1.1 μm 1.45 to 1.8 μm 0.676 μm	0.3% up to 1500°C 0.5% ≥ 1500°C	n/a	1 to 10s	4-20mA Thermocouple Types K, S, RB, W
<b>M668</b>  <ul style="list-style-type: none"> <li>• Fiber optic IR thermometer</li> <li>• User selectable temperature range and output</li> <li>• Focusable optics</li> <li>• Interchangeable fiber optic cables</li> <li>• High accuracy and stability</li> <li>• M668L features integral targeting light</li> </ul>	392° to 7200°F 200° to 4000°C	0.78 to 1.6 μm	±0.5% of reading	1:1 to 300:1	50ms to 10s	4-20mA Thermocouple Types K, S, RB, W

The black data is for all type in the row. Colored data is only valid for the respective type of pyrometer.





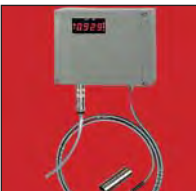



# Industrial Fixed Mount Thermometers

	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>M680</b>  <ul style="list-style-type: none"> <li>• High accuracy fiber optic IR thermometer</li> <li>• Multi channel</li> <li>• Ultra precision</li> <li>• Precision optics</li> <li>• Automatic calibration when cables are replaced</li> </ul>	302° to 7232°F 150° to 4000°C	.078 to 1.06 μm	±0.2% of reading ±1°C	1:1 to 300:1	25ms (2 channel) 50 ms (4 channel)	4-20mA 0-20mA 0-5V 0-10V 1-5V 2-10V RS232
<b>MI-S50-LO+, MI-GA50-LO+</b>  <ul style="list-style-type: none"> <li>• Very fast digital fiber optic</li> <li>• Two optical heads available</li> <li>• Very small spot sizes</li> </ul>	550° to 3300°C 300° to 2500°C	0.8 to 1.1 μm 1.45 to 1.8 μm	0.3% up to 1500°C 0.5% > 1500°C	Optical head I min 100:1 Optical head II min 200:1	<1ms adjustable up to 10s	0/4-20mA RS232 or RS485 (switchable)
<b>MI-S50/67-LO+</b>  <ul style="list-style-type: none"> <li>• Very fast digital fiber optic</li> <li>• Two optical heads available</li> <li>• Very small spot sizes</li> <li>• Extremely short wavelength for measurements of metal with high emissivity</li> </ul>	1100° to 3500°C	0.676 μm	<1500°C 0.3% +1°C >1500°C 0.5%	Optical head I min 100:1 Optical head II min 200:1	<1ms adjustable up to 10s	0/4-20mA, RS232 or RS485 (switchable)
<b>MI-S50-LO-GL</b>  <ul style="list-style-type: none"> <li>• Two wire form digital fiber optic infrared thermometer</li> <li>• High accuracy</li> <li>• Integrated air purge</li> <li>• Quick release for optical head</li> <li>• Specially designed for the glass industry</li> </ul>	600° to 1800°C	0.8 to 1.1 μm	<1500°C 0.3% +1°C >1500°C 0.5% +1°C	Optical head I min 100:1 Optical head II (focusable) min 200:1	250ms adjustable up to 10s	4-20mA

# Industrial Fixed Mount Thermometers





		TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>M77, M77S</b>  <ul style="list-style-type: none"> <li>• 2 Color pyrometer</li> <li>• Precision focusable optics</li> <li>• Through lens sighting and variable focus</li> <li>• Adjustable slope</li> <li>• M78 is fiber optic version</li> </ul>	R	1292° to 5432°F 700° to 3000°C	near 1µm	±0.5% of full scale	15:1 to 180:1	40ms	4-20mA
	R1	600° to 2550°F 350° to 1400°C	near 1µm	±1% of full scale	15:1 to 90:1	40ms	4-20mA
<b>M770S</b>  <ul style="list-style-type: none"> <li>• Digital 2 color pyrometer</li> <li>• Precision focusable optics</li> <li>• Adjustable slope</li> <li>• Alarm relay and temperature display</li> <li>• Powerful software for process diagnostics</li> <li>• Fiber optic version available (M780)</li> </ul>	R	1112° to 6332°F 600° to 3500°C	near 1µm	±0.5% of full scale	60:1 to 180:1	7.5ms	4-20mA RS485
	R1	572° to 2200°F 300° to 1200°C	near 1µm	±1% of full scale	60:1	7.5ms	4-20mA RS485
<b>MI-SQ5</b>  <ul style="list-style-type: none"> <li>• Fully digital fast pyrometer</li> <li>• 2 and 1-color design</li> <li>• Maximum value storage</li> <li>• Through-lens, laser aiming sighting or integrated TV camera (optional)</li> </ul>		1112° to 5432°F 600° to 3000°C	Channel 1: 0.9 µm Channel 2: 1.05 µm	0.5% of reading	200:1	≤10ms	4-20mA RS232 RS485
<b>M78</b>  <ul style="list-style-type: none"> <li>• 2 Color pyrometer</li> <li>• Precision focusable optics</li> <li>• Through lens sighting and variable focus</li> <li>• Adjustable slope</li> <li>• Fiber optic version of M77</li> </ul>	R	1292° to 5432°F 700° to 3000°C	Near 1 µm	±0.5% of full scale	15:1 to 180:1	40ms	4-20mA
	R1	600° to 2550°F 350° to 1400°C	Near 1 µm	±1% of full scale	15:1 to 90:1	40ms	4-20mA

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		TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>M780</b>  	<ul style="list-style-type: none"> <li>Digital 2 color pyrometer</li> <li>Precision focusable optics</li> <li>Adjustable slope</li> <li>Alarm relay and temperature display</li> <li>Powerful software for process diagnostics</li> <li>Fiber optic version of M770</li> </ul>	R 1112° to 6332°F 600° to 3500°C	Near 1 μm	±0.5% of full scale	60:1 to 180:1	7.5ms	4-20mA RS485
		R1 572° to 2200°F 300° to 1200°C	Near 1 μm	±1% of full scale	60:1	7.5ms	4-20mA RS485
<b>MI-SR50-LO</b>  	<ul style="list-style-type: none"> <li>Fast, digital fiber optic ratio pyrometer</li> <li>Switchable to a 1-color design</li> <li>Two optical heads available</li> <li>Very small spot sizes</li> </ul>	700° to 3000°C	Channel 1: 0.9 μm  Channel 2: 1.05 μm		Optical head I min 100:1  Optical head II (focusable) min 200:1	<10ms adjustable up to 10s	4-20mA, RS232 or RS485 (switchable)
<b>MI-SR12-LO, MI-GAR12-LO</b>  	<ul style="list-style-type: none"> <li>Highest accuracy</li> <li>Extremely fast response time</li> <li>Very small spot sizes, min 0.018in</li> <li>2-color/single color/metal mode</li> <li>Built-in laser targeting</li> <li>All parameters adjustable at the instrument</li> <li>Fiber optic and optical head withstand up to 482°F</li> </ul>	600° to 3300°C  300° to 2200°C	08 to 1.1 μm  1.28 to 1.7 μm	0.4% of reading + 1.8°F	250:1  Optical head I min 100:1 Optical head II (focusable) min 200:1	≤2ms  2ms <sup>1</sup>	4-20mA RS232 RS485  4-20mA RS232 RS485 (switchable)
<b>MI-S12, MI-S12-S, MI-GA-12, MI-GA-12-S</b>  	<ul style="list-style-type: none"> <li>6 temp. ranges</li> <li>2 different spectral ranges</li> <li>Targeting light or thru-lens sighting</li> <li>Extremely short response time</li> <li>Different optics with spot sizes down to 0.2 mm</li> </ul>	550° to 3500°C  550° to 2500°C  250° to 2300°C  250° to 2300°C	07 to 1.1 μm  0.7 to 1.1 μm  1.45 to 1.8 μm  1.45 to 1.8 μm	<1500°C 0.3% +1°C ≥1500°C 0.5%	6 fixed optics min 900:1 (min 0.1)  3 focusable optics min 800:1 (min 0.4)	1ms adjustable up to 10s	0/4-20mA, RS232 or RS485 (switchable)



<sup>1</sup> With dynamical adaptation at low signal levels

# Industrial Fixed Mount Thermometers


	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MI-S12-AI, MI-S12-AI/S</b>  <ul style="list-style-type: none"> <li>• Special version of MI-S12, designed for measuring of aluminum</li> <li>• Built-in scanner</li> <li>• Scanning angle adjustable between 0 to 4°</li> <li>• Scanning frequency between 0 to 10Hz</li> </ul>	350° to 900°C 340° to 1050°C	special	<1500°C 0.3% +1°C ≥1500°C 0.5%	5 fixed optics min 60:1 (min 2.2)	<1.5ms adjustable up to 10s	0/4-20mA, RS232 or RS485 (switchable)
<b>MI-S12-Si</b>  <ul style="list-style-type: none"> <li>• Special version of MI-S12 designed for measuring of silicon wafers</li> <li>• Targeting light or thru-lens sighting</li> <li>• Extremely short response time</li> <li>• Different optics with spot sizes down to 0.2 mm</li> </ul>	350° to 1800°C	special	<1500°C 0.3% +1°C ≥1500°C 0.5%	6 fixed optics min 370:1 (min 0.7)	10ms adjustable up to 10s	0/4-20mA, RS232 or RS485 (switchable)
<b>M190 Series</b>  <ul style="list-style-type: none"> <li>• For high precision applications</li> <li>• Field focusable optics</li> <li>• Adjustable emissivity</li> <li>• Use as stand-alone or interface with controller or data acquisition equipment</li> <li>• M190R1 and M190R2 are 2-color versions</li> </ul>	<b>M190H/M190EH</b> 600° to 3000°C	0.78 to 1.06 μm	±0.30% of reading ±1°C	180:1	50ms to 3 sec	4-20mA RS232C
	<b>M190H-1/M190EH-1</b> 300° to 1000°C	0.78 to 1.06 μm	±0.80% of reading ±1°C	40:1	50ms to 3 sec	4-20mA RS232C
	<b>M190V/M190EV</b> 800° to 3000°C	0.65 narrow band	±0.20% of reading	300:1	50ms to 3 sec	4-20mA RS232C
	<b>M190Q/M190EQ</b> 250° to 2000°C	1.0 to 1.6 μm	±0.40% of reading ±1°C	60:1	50ms to 3 sec	4-20mA RS232C
	<b>M190R-1/M190ER-1</b> 700° to 2000°C	2 color near 0.9μm	±0.50% of reading	60:1	50ms to 3 sec	4-20mA RS232C
	<b>M190R-2/M190ER-2</b> 900° to 3000°C	2 color near 0.9μm	±0.50% of reading	180:1	50ms to 3 sec	4-20mA RS232C
<b>MI-TS300, MI-TGA300 Heat Switches</b>  <ul style="list-style-type: none"> <li>• Small, very fast</li> <li>• Adjust switching level via potentiometer</li> <li>• Two optics selectable</li> <li>• Laser aiming (option)</li> <li>• Stainless steel housing</li> </ul>	700° to 1500°C	0.85 to 1.1 μm	n/a	70:1 and 85:1	1ms	transistor switch 20V, 30mA

# Mikron E<sup>2</sup>T Products

Mikron's line of E<sup>2</sup>T infrared thermometers provide reliable temperature measurement in the Petrochemical Industries. The Pulsar II is designed for temperature measurements of High Temperature, Sulphur Recovery and Sulphur Burning Furnaces. The Quasar line of products is designed for Flare Stack Monitoring of Pilots, Flaring and Smoke. Both the Pulsar II and Quasar systems are CSA, CENELEC and ATEX certified for hazardous areas and both systems are designed with custom fixturing to assure long life and reliable measurements in the extreme environments of the Petrochemical Industry. The NEMA 4 explosion-proof housing is CSA certified for Class 1, Div 1 Groups CD; Class 1, Div 2 Groups, ABCD Enclosure Type 4x, ATEX approved EExdIIB T4, Zone 1.



	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>Pulsar Series</b>  <ul style="list-style-type: none"> <li>• (GT) Gas, (RT) Refractory and (FF) Integrated Temperature Measurements</li> <li>• Custom fixtures and accessories designed for maximum instrument life and minimum maintenance.</li> <li>• Choice of 3 spectral filters</li> <li>• NEMA 4X explosion-proof housing</li> <li>• CSA &amp; ATEX certification for hazardous area applications</li> </ul>	401° to 4172°F 205° to 2300°C	0.8 to 5 µm	1%	150:1	.5 or 5 sec. switchable	Dual 4-20mA 1mV Relay SPST
<b>Quasar M8100</b>  <ul style="list-style-type: none"> <li>• For continuous duty monitoring of flare Pilot, Flaring and Smoke</li> <li>• Sight-through optics</li> <li>• 1/4 mile range</li> <li>• NEMA 4X explosion-proof housing</li> <li>• Heavy Duty mounting base</li> <li>• Video output available for non-hazardous areas</li> <li>• Delay circuit</li> </ul>	Pilot	special	n/a	37.5:1 to 300:1	2s to 2 min.	4-20mA
	Flare	special	n/a	37.5:1 to 300:1	2s to 2 min.	4-20mA
	Smoke	special	n/a	37.5:1 to 300:1	2s to 2 min.	4-20mA

# Quantum Products

	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>Quantum I</b>  <ul style="list-style-type: none"> <li>• Portable, easy to hold</li> <li>• Instant warm-up</li> <li>• Measures actual target emissivity</li> <li>• Automatically calculates and corrects for effects of reflected ambient radiance</li> <li>• Built-in micro computer and specialized software</li> </ul>	392° to 5432°F 200° to 3000°C	0.9 to 1.55 µm	±3° (F or C)	240:1	400ms	data logger


# Line Cameras

Implementing a systems approach for thermal process applications requires full knowledge of the customer's applications, available thermal imagers and thermal scanners, customer's existing controls platform, and software requirements, etc. Mikron's staff of engineering and software specialists are available for the design and development of comprehensive turn-key systems for all customer applications.

	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>MikroLine 2128</b>  <ul style="list-style-type: none"> <li>• High speed IR-Line Camera</li> <li>• Alarm function and triggered measurement</li> <li>• Air purge for lens</li> <li>• Water-cooling (ambient 0-120°C)</li> <li>• 128 data points/line at 128 lines/second</li> </ul>	<b>M2128</b> 50° to 550°C or 450° to 1250°C	8 to 14 μm	1K + 1%	40° x 0.3°	4ms	Fiber Optic/ RS232 RS422
	<b>M2128S</b> 0° to 80°C or 50° to 350°C	8 to 14 μm		40° x 0.3°		
	<b>M2128G</b> 450° to 1250°C	4.8 to 5.2 μm		60° x 0.5°		
	<b>M2128GS</b> 250° to 1250°C	4.8 to 5.2 μm		60° x 0.5°		
	<b>M2128H</b> 600° to 1300°C	1.4 to 1.8 μm		60° x 0.5°		
	<b>M2128M</b> 450° to 1250°C	3 to 5 μm		60° x 0.5°		
	<b>M2128MS</b> 200° to 800°C	3 to 5 μm		60° x 0.5°		
<b>MikroLine 2256</b>  <ul style="list-style-type: none"> <li>• High speed IR-Line Camera</li> <li>• 256 data points/line at 512 lines/second max.</li> <li>• Large dynamic range</li> <li>• Air purge for lens</li> <li>• Fiber-optic data transmission</li> <li>• Water-cooling (ambient 0-120°C)</li> </ul>	<b>M2256</b> 50° to 550°C or 450° to 1250°C	8 to 14 μm	1K + 1%	40° x 0.5°	4ms	Fiber Optic/ RS232 RS422
	<b>M2256G</b> 450° to 1250°C	4.8 to 5.2 μm		60° x 0.5°		
	<b>M2256H</b> 600° to 1300°C	1.4 to 1.8 μm		60° x 0.5°		
	<b>M2256M</b> 450° to 1250°C	3 to 5 μm		60° x 0.5°		

# High Resolution Fixed Mount Infrared Imagers





The highly accurate, high resolution M9104 is a multi-range unit for laboratory use and the M9200 to the ideal process instrument.

		TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>M9104</b>  	<ul style="list-style-type: none"> <li>Near-infrared solid state camera with patented detector and video processor</li> <li>Measures 300,000 points 30 times a second</li> <li>Single range for process control and multi-range for laboratory use operates without detector cooling</li> </ul>	custom 1112° to 5432°F 600° to 3000°C	Narrow band pass near infrared filter	±0.5% or 1°C	custom	30 frame/sec.	4-20mA ethernet digital
<b>M9200</b>  	<ul style="list-style-type: none"> <li>Near-infrared solid state camera with patented detector and video processor</li> <li>Measures <b>300,000</b> points <b>60</b> times a second</li> <li>Single and multi range for process control operates without detector cooling</li> </ul>	600° to 1600°C in 4 ranges  800° to 3000°C in 4 ranges	custom  0.650 to 1.080 μm	±0.5% or 1°C	custom	60 frames/sec.	Gigabit, ethernet, optional 4-20mA
<b>M7500</b>  	<ul style="list-style-type: none"> <li>High performance with digital image transfer</li> <li>Remote monitoring via LAN</li> <li>Maintenance-free operation</li> <li>NEMA-4 housing</li> </ul>	<b>M7500L</b> R1: -40° to 120°C R2: 0° to 500°C	8 to 14 μm	±2% or 2°C	21° x 16°	30 frames per second	100 Base T ethernet optional 4-20mA
		<b>M7500HT</b> 200° to 1600°C	8 to 14 μm				
		<b>M7500HF</b> 400° to 1600°C	3.9 μm				
		<b>M7500M</b> R1: 150° to 500°C R2: 200° to 800°C	3 to 5 μm				
		<b>M7500F</b> 200° to 800°C	3.9 μm				
		<b>M7500G</b> 200° to 800°C	4.8 to 5.2 μm				
		<b>M7500HG</b> 400° to 1600°C	4.8 to 5.2 μm				




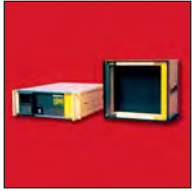

<sup>1</sup> With dynamical adaptation at low signal levels

# Blackbody Sources

Mikron offers the widest selection of blackbody calibration sources providing high emissivity, fast slew rates and unparalleled accuracies. They are essential for checking accuracy of infrared temperature sensors, spectral radiometers, infrared thermal imaging equipment, optical pyrometers, emissivity/reflectivity determination, heat flux meters, etc.




HIGH RESOLUTION NEAR INFRARED IMAGES	TEMP. RANGE	ACCURACY	APERTURE
<p><b>M340</b></p>  <ul style="list-style-type: none"> <li>• For temperature below ambient</li> <li>• Portable</li> <li>• 0.1°C resolution</li> <li>• High temperature stability</li> <li>• High uniformity emitter surface</li> <li>• Fast slew rate</li> </ul>	<p>0° to 300°F -20° to 150°C</p>	<p>±0.3°C thermometric  ±1.0°C radiometric</p>	<p>51mm 2.0"</p>
<p><b>M310</b></p>  <ul style="list-style-type: none"> <li>• Economical, portable</li> <li>• Highly compact, easy to transport</li> <li>• Built-in digital indicating controller</li> <li>• Dedicated PID controller with 0.1°C resolution</li> <li>• Internal RTD sensor</li> </ul>	<p>95° to 662°F ambient +10° to 350°C  (optional) 90° to 842°F ambient +10° to 450°C</p>	<p>±0.25% of reading ±1°C</p>	<p>76mm 3.0"</p>
<p><b>M360A, M360</b></p>  <ul style="list-style-type: none"> <li>• 2-piece unit allows source to be in remote location</li> <li>• Mid temperature</li> <li>• Bench type/portable</li> <li>• Broad application flexibility</li> <li>• Optional water-cooled aperture wheel assembly</li> <li>• 0.1°C resolution up to 1000°C</li> </ul>	<p><b>M360A</b> 122° to 1292°F 50° to 700°C</p> <p><b>M360</b> 122° to 2012°F 50° to 1100°C</p>	<p>±0.25% of reading ±1°C</p> <p>±0.5% of reading ±1°C</p>	<p>25mm 1.0"</p> <p>25mm 1.0"</p>
<p><b>M330</b></p>  <ul style="list-style-type: none"> <li>• Mid temperature</li> <li>• Bench type</li> <li>• Self tuning digital PID</li> <li>• Over-temperature alarm</li> <li>• Unique uniformly heated spherical cavity</li> <li>• 0.1°C resolution</li> </ul>	<p>572° to 3100°F 300° to 1700°C</p>	<p>±0.25% of reading ±1°C</p>	<p>25mm 1.0"</p>

# Blackbody Sources

HIGH RESOLUTION NEAR INFRARED IMAGES	TEMP. RANGE	ACCURACY	APERTURE
<p><b>M300</b></p>  <ul style="list-style-type: none"> <li>• Large 2" aperture</li> <li>• Unique uniformly heated spherical cavity</li> <li>• Near ideal emissivity</li> <li>• Self-tuning digital PID controller</li> <li>• 0.1° resolution up to 1000°C</li> </ul>	<p>392° to 2102°F 200° to 1150°C</p>	<p>±0.25% of reading</p>	<p>51mm 2.0"</p>
<p><b>M390</b></p>  <ul style="list-style-type: none"> <li>• Ultra-High temperature</li> <li>• Produces very high temperature, high emissivity targets</li> <li>• Remote set point setting</li> <li>• 1° resolution</li> <li>• Very high slew rate</li> </ul>	<p>570° to 5430°F 300° to 3000°C</p>	<p>±0.25% of reading ±1 digit</p>	<p>16mm 0.625" 38mm to 1.5"</p>
<p><b>M345X-LC</b></p>  <ul style="list-style-type: none"> <li>• Fast slew rates</li> <li>• Large Areas 4" x 4", 6" x 6"</li> <li>• Temperature resolution 0.01° C (optional) 0.001° C</li> <li>• Moisture free enclosure (optional)</li> </ul>	<p>-40° to 212°F -40° to 100°C</p>	<p>≤30mK</p>	<p>4" x 4" 6" x 6"</p>
<p><b>M315X, M345X</b></p>  <ul style="list-style-type: none"> <li>• Large area</li> <li>• Portable/Bench type</li> <li>• Excellent temperature uniformity</li> <li>• Fast slew rate</li> </ul>	<p><b>M315X</b> ambient +5° to 400°C (Optional to 600°C)</p>	<p>±50mK for temp.&lt;150°C 0.25% of reading ±1°C for temp. &gt;150°C</p>	<p>4" x 4" 12" x 12" 20" x 20"</p>
	<p><b>M345X</b> 14° to 302°F -10° to 150°C</p>	<p>±50mK</p>	<p>4" x 4" 12" x 12" 20" x 20"</p>
<p><b>M380 Series</b></p>  <ul style="list-style-type: none"> <li>• Freezing point blackbody calibration</li> <li>• Fixed point standards for checking transfer standards</li> <li>• 8 models available</li> <li>• Compact bench-type</li> <li>• Controller included</li> </ul>	<p>29.76° to 1084.62°C</p>	<p>0.05°C to 0.5°C</p>	<p>6.0mm or 12.0mm</p>




# Portable Thermal Imaging Systems

Mikron offers a variety of highly sophisticated thermal imaging systems for a wide range of applications which allow the user to see the temperature gradient of an entire surface rather than a single point. Four MiKroScan instruments are lightweight, hand-held IR cameras which offer capabilities normally found in models costing much more.


	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<p><b>M7640</b></p>  <ul style="list-style-type: none"> <li>• High resolution UFPA detector</li> <li>• Revolutionary DualVision Image Composite Functionality</li> <li>• Real-time image recording</li> <li>• Viewfinder and 5.6" Articulating LCD</li> <li>• Automatic level, gain and focus</li> <li>• 640 x 480 detector</li> </ul>	-40° to 500°C optional to 2000°C	8 to 14 μm	±2% or 2°C of reading	21.7°(H) x 16.4°(V)	30 frames per second	RS232C FireWire® IEEE 1394 Compact Flash Memory Card NTSC composite video signal, S-video
<p><b>MiKron Scan M7600 PRO, M7604 PRO</b></p>  <ul style="list-style-type: none"> <li>• High performance 320x240 UFPA detector</li> <li>• Focusing Range of 30cm to infinity</li> <li>• Weighs 3.5 with batteries and LCD</li> <li>• On-board digital visual and voice recording</li> <li>• Multi-spot temperature measurement with emissivity settings</li> <li>• Automatic level, gain and focus</li> </ul>	-40° to 500°C optional to 2000°C  -40° to 500°C optional to 200° to 1600°C	8 to 14 μm  3.9 μm	±2%	21.7°(H) x 16.4°(V)	60 frames per second	FireWire® IEEE 1394 Compact Flash Memory Card, NTSC video, S-video
<p><b>MiKroScan M7800, M7800M</b></p>  <ul style="list-style-type: none"> <li>• Light weight, high performance portable</li> <li>• Self-contained in splash-proof case</li> <li>• Advanced uncooled UFPA microbolometer technology</li> <li>• On-board digital voice recording</li> <li>• MiKroSpec software (optional) for analysis and report generation</li> <li>• S Video out with optional cable</li> </ul>	-40° to 500°C 150° to 500°C 200° to 800°C	8 to 14 μm  3 to 5 μm	±2%	28.9° (H) x 21.9°(V)	60 frames per second	NTSC video, S-video, USB 2.0

The black data is for all type in the row. Colored data is only valid for the respective type of pyrometer.

# Portable Thermal Imaging Systems

	TEMP. RANGE	SPECTRAL RESPONSE	ACCURACY	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<p><b>MiKroScan M7815B</b></p>  <ul style="list-style-type: none"> <li>• Designed for one-handed point and shoot operation</li> <li>• Stores images and data to compact flash memory cards</li> <li>• Fully compatible with MiKroSpec software</li> </ul>	-40° to 120°C	8 to 14 μm	±2%	29° (H) x 22° (V)	60 frames per second	NTSC video, S-video, USB 2.0
<p><b>MiKroScan M7815</b></p>  <ul style="list-style-type: none"> <li>• High-Performance, Fully Radiometric Hand-Held Thermal Imager</li> <li>• Affordable price</li> <li>• Stores images in on-board memory</li> <li>• Transfers images to a remote device using USB 2.0</li> </ul>	-40° to 500°C	8 to 14 μm	±2% or 2°C of reading	21° (H) x 16° (V)	60 frames per second	NTSC video, S-video, USB 2.0
<p><b>MiKroScan M7816</b></p>  <ul style="list-style-type: none"> <li>• Affordable price</li> <li>• Designed for one-handed point and shoot operation</li> <li>• Stores images and data internally</li> <li>• Download images and data via USB</li> <li>• 160 x 120 pixel detector</li> </ul>	-40° to 932°F -40° to 500°C	8 to 14 μm	±2%	18° (H) x 14° (V)	60 frames per second	NTSC video, S-video, USB 2.0

# Precision Transfer Standard

	TEMP. RANGE	SPECTRAL RESPONSE	FIELD OF VIEW	RESPONSE TIME	OUTPUTS
<b>M190-TS Series</b>  <ul style="list-style-type: none"> <li>• Precision Transfer standard use to check accuracy of secondary calibration standards and working sensors</li> <li>• Through-lens sighting</li> <li>• Clear definition and alignment of the field of view</li> <li>• 0.1°C temperature display on</li> </ul>	<b>M190Q-TS</b> 200° to 1200°C	1.0 to 1.6 μm	60:1	50ms	4-20mA 0-10V 0-5V 0-1V RS232C
	<b>M190H-TS</b> 600° to 1800°C	0.78 to 1.06 μm	180:1		
	<b>M190V-TS</b> 1000° to 3000°C	0.65 narrow band	300:1		

Uncertainty °C <small>See notes 1 &amp; 2</small>	0.80	0.90	1.10	1.40	1.60	2.0	2.5	3.2	3.9	4.7	5.5	6.4	8.0	10.0
Temperature °C <small>See note 3</small>	† 231.93	† 419.53	† 660.32	† 961.78	† 1064.18	1200.0	1400.0	1600.0	1800.0	2000.0	2200.0	2400.0	2700.0	3000.0
For M190Q-TS	•	•	•	•	•	•	–	–	–	–	–	–	–	–
Standard Calibration Test Points	For M190H-TS		•	•	•	•	•	•	•	•	•	–	–	–
	For M190V-TS			–	•	•	•	•	•	•	•	•	•	–

- Notes:
1. The maximum uncertainty experienced elsewhere is normally at the middle of two test points. This uncertainty is less than of 1.5 times of average value of uncertainty of two adjacent test points.
  2. Uncertainty values are given for a specified focused distance and ambient temperature of 23°C ±5°C.
  3. † These values are assigned by ITS-90 (International Temperature State of 1990).

## Primary Calibration Laboratory Services

### For Temperatures from -20° to 3000°C. Traceable to NIST

Mikron offers state-of-the-art calibration services for all makes of Infrared Thermometers, Radiometers, Optical Pyrometers, Thermal Imaging Systems.

The proliferation of high accuracy, infrared temperature measurement instrumentation and its growing application in critical industries, such as steel, glass, ceramics, semiconductor, aerospace, environmental sciences, etc., has created the need for qualified primary calibration facilities independent of NIST.

To meet this need, Mikron has established a fully equipped and expertly staffed laboratory to perform calibration services to national standards on all makes of infrared and optical pyrometric temperature measurement and imaging equipment. Normal calibration time is less than 2 weeks from receipt of the instrument.

Mikron's calibration laboratory equipment uses primary standard blackbody sources similar to NIST (freezing point of metal). Calibration procedures and specifications meet NIST and ANSI standards.





Mikron has been an innovative leader in the field of non-contact temperature measurement since 1969. The company provides industrial customers and R&D laboratories with accurate instrumentation ranging from convenient portable units to fixed mount instruments, complete thermal imaging systems, and line scanners. In addition Mikron manufactures the world's largest selection of Black Body Calibration Sources.

Mikron specializes in providing customized products to solve the most difficult non-contact temperature sensing problems across a broad range of industries. The company also offers Value Imageering, a turnkey package consisting of complete engineering, design and installation services to meet the most severe and difficult thermal imaging system requirements.

Mikron also provides Calibration Standards Laboratory Service. This fully equipped and expertly staffed laboratory provides prompt re-calibration of infrared thermometers, radiometers and thermal imaging equipment to assure their accuracy traceable to NIST standards.



**MIKRON**<sup>®</sup>  
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