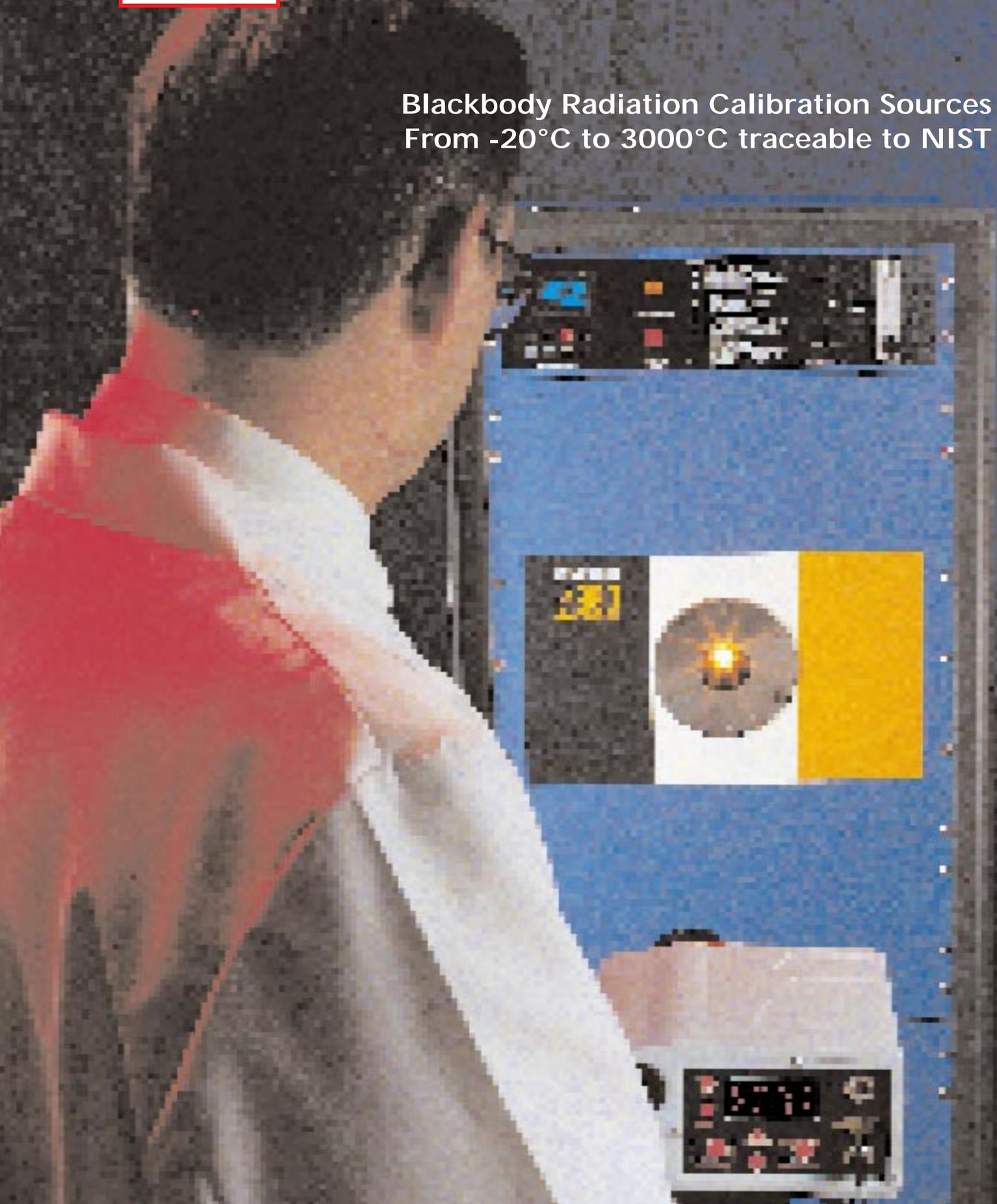




# MIKRON<sup>®</sup>

Blackbody Radiation Calibration Sources  
From  $-20^{\circ}\text{C}$  to  $3000^{\circ}\text{C}$  traceable to NIST



## Mikron Blackbody Radiation Calibration Sources

Mikron has been designing and building blackbody calibration sources since 1970. These precision instruments have been installed in several national standards institutions, and are used across industry and research for the calibration of infrared thermometers, radiometers, heat flux meters, thermal imaging systems and spectrographic analyzers. Our parallel manufacture of infrared thermometers, and the application of these instruments and thermal imaging systems has contributed much to Mikron's knowledge and expertise in the field of infrared, radiometric measurement. This expertise is embodied in the ground-breaking innovation and breadth of product performance described in the following pages.

The sequence of products in this catalog is broadly arranged in ascending order of maximum source temperature, with overall capability from  $-20^{\circ}\text{C}$  to  $3000^{\circ}\text{C}$ , but also includes models which are distinguished by their portability or some unique feature, other than temperature range. In addition, we have included descriptions of special purpose, custom designed models for which Mikron is noted, such as large area sources, sources for airborne application and for use in vacuum environments. All our blackbody calibration sources, whether standard or custom, are designed for the highest emissivity possible, commensurate with aperture size and target configuration; excellent target surface uniformity; and superior accuracy. After testing and a burn-in period, accuracy is determined radiometrically, with NIST traceable certification where applicable.

In a separate, but related, blackbody calibration source category, the catalog also describes Mikron's unique family of fixed temperature, Freezing Point of Metal sources. These high precision instruments provide calibration assurance hitherto only obtainable from National Standards Institutes. In combination with our M190 series of Calibration Transfer Standards, also described, Mikron is able to provide the industrial user and researcher with a complete hierarchy of calibration traceability, from working units in the field, through secondary and transfer standards to primary, Freezing Point Standards.

### MIKRON M340

$-20^{\circ}\text{C}$  to  $150^{\circ}\text{C}$

The M340 is a portable blackbody calibration source covering the range from sub-zero to  $100^{\circ}\text{C}$  with  $0.1^{\circ}\text{C}$  resolution. The thermoelectric heating/cooling mechanism is utilized to achieve a compact and easy-to-use blackbody source. The M340 has unusually high temperature stability and a stabilization time of only 10 minutes. Source temperature is closely controlled by a self-tuning PID controller which displays temperature in a digital readout.



M340

*Precision Low Temperature*

#### Specifications:

**Temperature Range:**  $-20$  to  $150^{\circ}\text{C}$  or  $-4^{\circ}\text{F}$  to  $300^{\circ}\text{F}$

**Accuracy:**  $\pm 0.3^{\circ}\text{C}$

**Temperature Resolution:**  $0.1$  degree

**Stability:**  $0.1^{\circ}\text{C}$  per 8 hour period

**Aperture Diameter:**  $51\text{mm}$  ( $2.0''$ )

**Source Non-uniformity:**  $\pm 0.1^{\circ}\text{C}$  for  $45\text{mm}$  ( $1.8''$ ) of center diameter

**Emissivity:**  $0.99 + 0.005 - 0.000$

**Temperature Sensor:** Precision platinum RTD

**Method of Control:** Digital self-tuning PID controller

**Warm-up Time:** 6 minutes from ambient to  $-15^{\circ}\text{C}$  or  $100^{\circ}\text{C}$

**Operating Ambient Temperature:**  $5$  to  $40^{\circ}\text{C}$   
( $40$  to  $104^{\circ}\text{F}$ )

**Power Requirements:**  $115\text{VAC} \pm 5\%$   $50/60\text{Hz}$   
 $300\text{w max.}$  ( $230\text{VAC}$  optional)

**Dimensions:**  $167\text{mm H} \times 280\text{mm W} \times 280\text{mm D}$

**Weight:**  $6.5\text{kg}$  ( $14.5$  lbs.)

#### Optional Features:

RS232C or RS485 serial communication output

### MIKRON M310, M315

**Ambient  $+5^{\circ}\text{C}$  to  $350^{\circ}\text{C}$  (optional TO  $450^{\circ}\text{C}$ )**

The M310 is a highly compact portable blackbody calibration source with a built-in digital indicating controller that can be set at any temperature between ambient  $+10^{\circ}\text{C}$  and  $350^{\circ}\text{C}$ . Once set, the source temperature is controlled to within  $\pm 0.2^{\circ}\text{C}$  by an internal RTD sensor. The unit has an emissivity of  $+0.99$ . The M310 is easy to transport to a calibration location, either in laboratory or in the plant. It has a dedicated PID controller with  $1^{\circ}\text{C}$  resolution.



M310

*General Purpose*



**M315**

*General Purpose*

The M315 is a higher temperature 2-piece version of the M310. The calibration source and the digital indicating controller are contained in separate housings to allow greater flexibility in positioning the instrument within an installation, e.g. long path calibration.

**Specifications:**

- Temperature Range:** Ambient +5°C to 350°C or 662°F (optional to 450°C or 842°F)
- †Accuracy:** ±0.25% of reading ±1°C
- Temperature Resolution:** 1 degree
- Stability:** 0.5°C per 8 hour period
- Aperture Diameter:** 76mm (3.0")
- Emissivity:** 0.99 + 0.005 – 0.000
- Temperature Sensor:** Precision platinum RTD
- Method of Control:** Digital PID controller
- Warm-up Time:** 30 minutes from ambient to 300°C
- Operating Ambient Temperature:** 0° to 44°C (30° to 110°F)
- Power Requirements:** 115VAC ±10% 50/60Hz 300w max. (230VAC optional)
- Dimensions:**
  - Blackbody Module (M310):** 167mm H x 280mm W x 280mm D
  - Blackbody Source or Control Module (M315):** 167mm H x 210mm W x 280mm D
- Weight:**
  - Blackbody Module:** 4.5kg (9.5 lbs.)
  - Control Module (M315 only):** 2.5kg (5.5 lbs.)
- Optional Accessories:** RS232C or RS485 serial communication output

**MIKRON M316**

Ambient +10°C to 300°C

The 2-piece M316 features maximum portability and flexibility for field calibration or verification without need to remove the sensor from its location. The calibration source is contained within a compact, lightweight, hand-held housing, permitting the operator to position the source more easily in hard to reach locations. The indicating controller is carried via handle or a convenient shoulder strap.

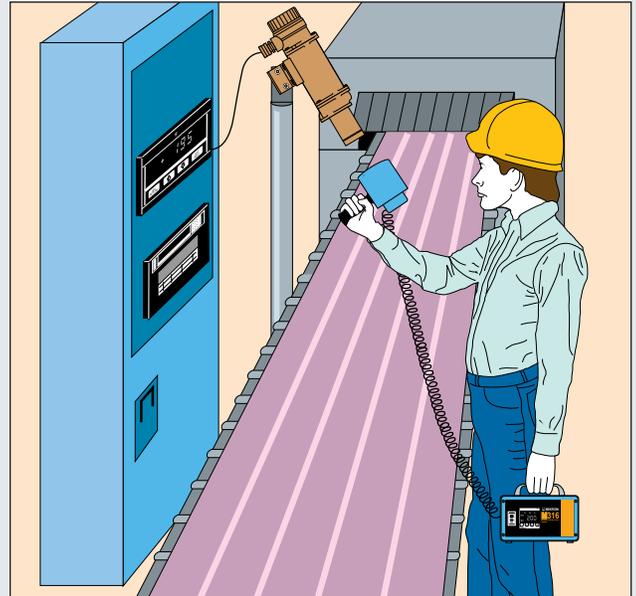
**Specifications:**

**Temperature Range:** Ambient +10°C to 300°C or 570°F



**M316**

*Portable*



- †Accuracy:** ±0.5% of reading ±1°C
- Temperature Resolution:** 1 degree
- Stability:** 0.5°C per 8 hour period
- Aperture Diameter:** 57mm (2.25")
- Emissivity:** +0.99 + 0.005 – 0.000
- Temperature Sensor:** Precision platinum RTD
- Method of Control:** Digital PID controller
- Warm-up Time:** 10 minutes from room temperature to 200°C
- Operating Ambient Temperature:** 0° to 50°C (32° to 122°F)
- Method of Mounting:**
  - Blackbody Module:**
    - a. handle grip
    - b. 1/4 – 20 tapped hole for tripod mount
  - Control Module:** Bench mount or shoulder strap for field use
- Power Requirements:** 115VAC ± 10% 50/60Hz 300 watts max (230VAC optional)
- Dimensions:**
  - Blackbody Module:** 203mm H x 89mm W x 98mm D
  - Control Module:** 102mm H x 178mm W x 127mm D
- Weight:**
  - Blackbody Module:** 0.9kg (2.0 lbs.)
  - Control Module:** 0.70kg (1.5 lbs.)

**MIKRON M320**

Ambient +5°C to 300°C

This unique unit features dual cavities providing calibration sources for 2 temperature points within the calibration range, thus eliminating the waiting period between temperature measurements encountered with single cavity units.

**Specifications:**

- Temperature Range Each Cavity:** Ambient +10°C to 300°C or 570°F
- †Accuracy:** ±0.25% of reading ± 1°C
- Temperature Resolution:** 1 degree
- Stability:** 0.5°C per 8 hour period
- Aperture Diameter:** 76mm (3.0")
- Emissivity:** +0.99 + 0.005 – 0.000
- Temperature Sensor:** Precision platinum RTD
- Method of Control:** 2 independent digital PID controllers
- Warm-up Time:** 30 minutes from ambient to 200°C

† Accuracy calibration performed radiometrically, the uncertainty of emissivity and transfer standard are already included.



M320

Dual Cavity

**Operating Ambient Temperature:** 0° to 44°C  
(30° to 110°F)

**Power Requirements:** 115VAC ±10% 50/60Hz 300 watts  
max (230VAC optional)

**Dimensions:**

**Blackbody Module:**

167mm H x 280mm W x 280mm D

**Control Module:**

167mm H x 210mm W x 280mm D

**Weight:**

**Blackbody Module:** 7.5kg (17 lbs.)

**Control Module:** 2.5kg (5.4 lbs.)

**Optional Features:**

RS232C or RS485 serial communication output

### MIKRON M300

100°C to 1150°C

This blackbody calibration source features a unique uniformly heated spherical cavity with a near ideal emissivity of 0.999 or better. The M300 will deliver any temperature between 100°C and 1150°C. A convenient microprocessor-based, self-tuning digital PID controller holds the selected temperature to within 1°C assuring high †Accuracy calibration of infrared thermometers, thermal imaging equipment, etc.

**Specifications:**

**Temperature Range:** 200° to 1150°C or 392° to 2100°F

†**Accuracy:** ±0.25% of reading ±1°C

**Temperature Resolution:** 1 degree

**Stability:** 0.5°C per 8 hour period

**Heated Cavity Shape:** Spherical

**Aperture Diameter:** 51mm (2.0")

**Emissivity:** 0.999 ±0.0005

**Method of Control:** Digital self-tuning PID controller

**Warm-up Time:** 1 hour from room temperature to 1000°C

**Operating Ambient Temperature:** 0° to 44°C (32° to 110°F)



M300

Large Aperture

**Cooling:** Fan cooled, air inlet on back panel

**Power Requirements:** 230VAC ±10% 50/60Hz  
1.5kw max. (115VAC optional)

**Dimensions:** 64cm H x 50cm W x 55cm D

**Weight:** 80kg (175 lbs.)

**Optional Features:**

RS422/485 serial communication output

**Optional Accessories:**

Water cooled aperture wheel assembly

Universal mounting flange

### MIKRON M305

100°C to 1000°C

The M305 blackbody calibration source design achieves significant weight and size reduction over the M300 with only minor sacrifices in specification and performance, making it an ideal unit where portability is required or space is limited. The spherical cavity yields an emissivity of 0.995 over the temperature range of 100 to 1000°C with an aperture of 25mm. An integrally mounted PID controller completes this versatile calibrator.



M305

General Purpose Medium Temperature

**Specifications:**

**Temperature Range:** 100° to 1000°C or 210° to 1830°F

†**Accuracy:** ±0.25% of reading ±1 digit

**Temperature Resolution:** 1degree

**Stability:** 1°C per 8 hour period

**Aperture Diameter:** 25mm (1.0")

**Heated Cavity Shape:** Spherical

**Emissivity:** 0.995 +0.0005 - 0.0000

**Sensor:** Precision platinum thermocouple

**Method of Control:** Digital self-tuning PID controller

**Warm-up Time:** 40 minutes from ambient to 800°C

**Operating Ambient Temperature:** 0° to 44°C  
(32° to 110°F)

**Cooling:** Fan cooled, air inlet on back panel

**Power Requirements:** 115VAC ±10% 50/60Hz  
1.0kw max. (230VAC optional)

**Dimensions:** 270mm H x 430mm W x 370mm D

**Weight:** 25kg (55 lbs.)

**Optional Features:**

RS422/485 serial communication output

**Optional Accessories:**

Water cooled aperture wheel assembly

Universal mounting flange

## MIKRON M360

M360: 50°C to 1100°C

M360A: 50°C to 750°C

The M360 blackbody calibration source uniquely combines portability with wide temperature range, high emissivity and remarkable resolution. An optional precision machined aperture wheel assembly allows different sizes of aperture diameter for applications requiring specific radiating aperture or for verifying field of view of radiometers or infrared thermometers. The source and the controller are housed in separate modules which allows the source to be positioned in a location remote from the controller such as in an environmental test chamber, or to be used in tests which involve long path lengths. Each module is fitted with a carrying handle and can be comfortably carried to manufacturing plant or field research locations.

The M360A model differs from the M360 only in its higher accuracy, resolution and stability specification. The enhanced performance of the M360A is achieved through the use of a special controller with output characterization capability.



M360

*Precision Medium Temperature*



M360A

*Ultra Precision*

### Specifications:

**Temperature Range:** Model M360: 50° to 1100°C or 200° to 2000°F; Model M360A: 50° to 750°C or 120° to 1400°F

**Accuracy:** Model M360:  $\pm 0.2\%$  of reading  $\pm 1^\circ\text{C}$ ;  
Model M360A:  $\pm 0.05\%$  of reading  $\pm 0.1^\circ\text{C}$

**Temperature Resolution:** Model M360: 1degree  
Model M360A: 0.1degree

**Stability:** Model M360: 0.5°C per 8 hour period;  
Model M360A: 0.05°C per 8 hour period

**Heated Cavity Shape:** Spherical  
**Aperture Diameter:** 25.0mm (1.0")

**Aperture Solid Angle:** 20°

**Emissivity:** 0.999  $\pm 0.0005$

**Uniformity of Temperature:** To within  $\pm 0.1\%$  of controller setting

**Temperature Sensor:** Model M360: Thermocouple type S; Model M360A: Platinum RTD

**Method of Control:** Digital self-tuning PID controller

**Slew Rate:** 15°C/minute

**Cooling:** Fan cooled

**Warm-up Time:** 40 minutes from ambient to 700°C

**Operating Ambient Temperature:** 0° to 44°C (32° to 110°F)

**Power Requirements:** 115VAC  $\pm 5\%$  50/60Hz  
1.0kw max. (230VAC optional)

### Dimensions:

**Blackbody Module:** 305mm H x 273mm W x 368mm D

**Control Module:** 167mm H x 280mm W x 280mm D

### Weight:

**Blackbody Module:** 15kg (33 lbs.);

**Control Module:** 5.0kg (11 lbs.)

### Optional Features:

RS422/485 serial communication output (M360)

RS232C serial communication output (M360A)

### Optional Accessories:

Water cooled aperture wheel assembly

Universal mounting flange

## MIKRON M335

300°C to 1500°C

The M335 Blackbody Calibration Source is a general purpose high temperature source which provides a very quick heat-up time of only 20 minutes to reach 1400°C. A self-tuning digital PID Controller with adjustable set point holds the temperature to within 1°C. An independent over temperature alarm and control system prevents heating element burnout; an internal fan keeps the cabinet surface at safe, comfortable temperature.



M335

*High Temperature (Fast Response)*

### Specifications:

**Temperature Range:** 300° or 1500°C (570° - 2730°F)

**Accuracy:**  $\pm 0.4\%$  of reading  $\pm 1$ digit

**Temperature Resolution:** 1degree

**Stability:** 1°C per 8 hour period;

**Aperture Diameter:** 19mm (0.75")

**Heated Cavity Shape:** Closed end tube 19mm (0.75") dia  
x 150 mm (5.90") long with 75 mm (2.95") heated length

**Emissivity:** 0.99  $\pm 0.003$  - 0.000

**Sensor:** Precision platinum thermocouple  
**Method of Control:** Digital self-tuning PID controller  
**Warm-up Time:** 30 minutes from ambient to 1200°C  
**Operating Ambient Temperature:** 0° to 44°C  
 (32° to 110°F)  
**Cooling:** Fan cooled, air inlet on back panel  
**Power Requirements:** 115VAC ±10% 50/60Hz  
 3.0kw max. (230VAC optional)  
**Dimensions:** 29cm H x 49.5cm W x 55cm D  
**Weight:** 28kgs (62 lbs.)

**Optional Features:**  
 RS422/485 serial communication output

**Optional Accessories:**  
 Water cooled aperture wheel assembly  
 Universal mounting flange

**MIKRON M330**  
 300°C to 1700°C

The M330 blackbody calibration source can deliver any temperature between 300° and 1700°C. A closed end tube with a 25mm aperture diameter is heated by specially manufactured elements which provide



M330  
 High Temperature

excellent uniformity and a heat-up time of 80 minutes to reach 1600°C. A self-tuning digital PID controller with adjustable set point holds the temperature to within 1°C at 1600°C, assuring high accuracy calibration. An independent over temperature alarm and cutout system prevents heating element burnout. An internal fan keeps the cabinet surface at a safe, comfortable temperature.

**Specifications:**

**Temperature Range:** 300° to 1700°C or 572° to 3100°F  
**Accuracy:** ±0.25% of reading ±1 digit  
 (for temperatures above 600°C)  
**Temperature Resolution:** 1degree  
**Stability:** 1°C per 8 hour period  
**Aperture Diameter:** 25mm (1.0")  
**Aperture Solid Angle:** 12.5°  
**Emissivity:** 0.99 + 0.005 – 0.000  
**Cavity:** Closed end tube 50mm ID x 300mm long  
 with 125mm heated length  
**Sensor:** Precision platinum thermocouple – type B  
**Method of Control:** Digital self-tuning PID controller  
**Warm-up Time:** 80 minutes from ambient to 1600°C  
**Operating Ambient Temperature:** 0° to 44°C  
 (32° to 110°F)

**Power Requirements:** 230VAC ±10%  
 50/60Hz 2.0kw max. (115VAC optional)  
**Cooling:** Fan cooled, air inlet on back panel  
**Dimensions:** 64cm H x 50cm W x 55cm D  
**Weight:** 80kg (175 lbs.)

**Optional Features:**  
 RS422/485 serial communication output

**Optional Accessories:**  
 Water cooled aperture wheel assembly  
 Universal mounting flange

**MIKRON M350**  
 300° to 1100°C

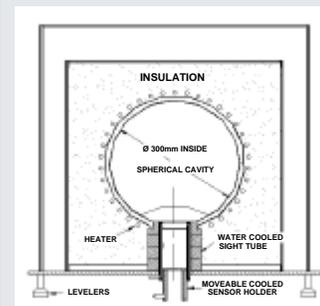
The Model M350 blackbody source is specifically designed for direct and unambiguous calibration of heat flux meters up to 100KW/m2 of flux density. A 60mm diameter opening allow the insertion of heat flux sensors deep into water cooled sight tube to directly exposing the sensor to 180° of radiance emitted from a spherical shape cavity. For best result M350 is designed for vertical mounting, to minimize the air eddy currents within the cavity, to insure a high degree of radiance uniformity. The large interior diameter of cavity of 300mm ensures that spectral irradiance to the surface of sensor is near perfect approximation to Planck's law. The large opening of water cooled sight tube can easily accept popular heat flux sensors manufactured by Schmidt-Boelter, Gordon or others. An independent water flow meter with alarm and cutout system insures that the sight tube is adequately cooled before the insertion of heat flux sensors

A fully digital high accuracy self tuned PID controller with adjustable set point holds the temperature within 0.25°C of set point assuring high stability and accuracy. The controller and all necessary safety components are enclosed in a 19" rack mount.



M350

Heat Flux Calibration Source

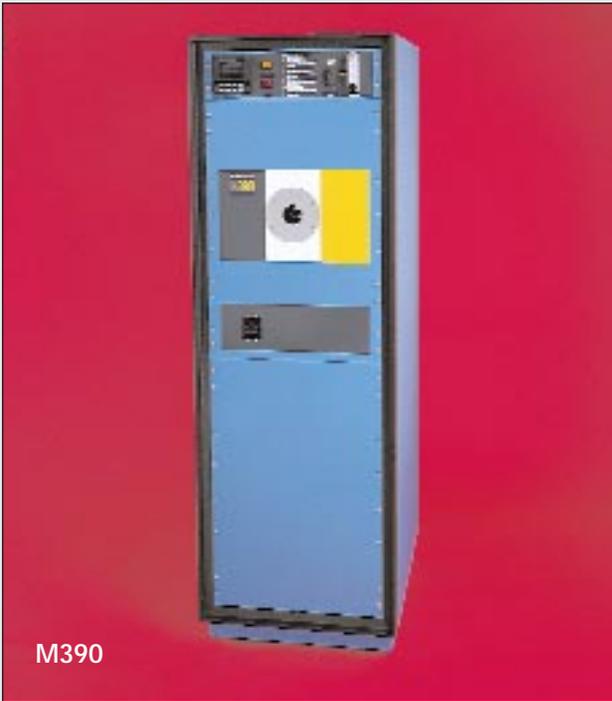


Simplified cross section of heat flux source

**Specifications:**

**Temperature Range:** 300° to 1100°C corresponding to radiant flux of 2 to 100KW/M<sup>2</sup>  
**Accuracy:** ±0.25% of reading ±1°C  
**Temperature Resolution:** 0.1°C for below 1000°C and 1°C above 1000°C  
**Stability:** ± 0.25°C per 8 hour period  
**Source Type:** Cavity 300mm w/water cooled sight tube 60mm inside diameter  
**Aperture Diameter:** 60 mm (water cooled)  
**Cavity/opening aspect ratio:** 5:1  
**Effective total Emissivity:** 0.99  
**Method of Control:** Digital Self-Tuning PID Controller  
**Temperature Sensor:** Precision Type S Thermocouple  
**Operating Ambient Temperature:** 10° to 40°C  
**Power Requirements:** 220VAC ±5%, 50/60 Hz, 4.0KW Max  
**Weight (Source):** 100kg (220 lbs.) approx.  
**Weight (Controller):** 20kg (44 lbs.) approx.  
**Communication output:** RS422 , 4 wire duplex

† Accuracy calibration performed radiometrically, the uncertainty of emissivity and transfer standard are already included.



M390

Ultra High Temperature

**Optional Features:**  
RS422 serial communication output

**MIKRON M390**

600°C to 3000°C

The M390 ultra high temperature blackbody calibrator is without parallel in its capability to produce very high temperature, high emissivity targets and at the same time stabilize at the required temperature within a few minutes of switch-on. The graphite tube target has a 16mm diameter, optionally 25mm (1.00") aperture and an emissivity of 0.995. Target temperature is sensed by a rapid response Mikron infrared fiber optic thermometer which drives a PID controller to regulate the target temperature precisely to the desired value. Remote set point setting is achieved via an RS422 communication port. All safety features to protect equipment and operator are easily accessible.

**Specifications:**

Model	Temperature Range	Aperture Diameter	
		Standard	Option
M390L	300° to 2000°C (570° to 3630°F)	25mm	38mm
M390A	600° to 2300°C (1110° to 4170°F)	16mm	25mm
M390B	600° to 2600°C (1110° to 4710°F)	16mm	25mm
M390C	600° to 3000°C (1110° to 5430°F)	16mm	—

- †**Accuracy:** ±0.25% of reading ±1 digit
- Cavity:** Closed end graphite tube 150mm (6.0") long with 64mm (2.50") heated length
- Source Diameter:** See above table
- Emissivity:** 0.995 ±0.003
- Cooling:** Water cooled, hose connections on rear, 3 lpm (1 gpm)
- Heating Element Type:** Graphite tube with argon gas purge, 80 lph (3cfh)
- Temperature Sensor:** Mikron "Infraducer"
- Method of Control:** Digital PID controller
- Remote Set Point:** RS422 serial communication output
- Warm-up Time:** 5 minutes from ambient to 2300°C
- Operating Ambient Temperature:** 0° to 44°C (32° to 110°F)

**Power Requirements:** 208 or 230VAC ±10% 50/60Hz 15kw  
**Dimensions:** 171cm H x 56cm W x 82cm D  
**Weight:** Approx. 182kg (400 lbs.)

**MIKRON M380 Series**

Primary Standard Freezing Point  
Blackbody Calibration Source

The M380 Series provides fixed point primary calibration standards for checking transfer standards at discrete temperatures from 29.76° to 1084.62°C, thus bringing the precision and assurance of National Standards to every user, economically and with unprecedented simplicity of operation.

M380 Series includes eight models, each dedicated to a particular metal freezing point. The available software, in conjunction with one of Mikron's M190 Transfer



M380

Primary Standard

Model	Metal Material	Freeze Temp.*	Uncertainty
M380-CU	Copper	1084.62°C	0.50°C
M380-AU	Gold	1064.18°C	0.40°C
M380-AG	Silver	961.78°C	0.40°C
M380-AL	Aluminum	660.32°C	0.30°C
M380-ZN	Zinc	419.53°C	0.30°C
M380-SN	Tin	231.93°C	0.20°C
M380-SB	Indium	156.60°C	0.20°C
M380-GA	Gallium	29.76°C**	0.05°C

\*assigned value of ITS 90 \*\*Melt temperature

Standards, facilitates clear and unambiguous determination of the freezing point, which lends itself to automation or use by semi-skilled operators.

**Specifications:**

- Cavity Aperture Diameter:** 6.0mm for copper, gold, silver, aluminum and zinc. 12.0mm for tin, indium and gallium
- Aperture Solid Angle:** 15°
- Emissivity:** 0.999 + 0.0005, - 0.0001
- Freeze Metal Purity:** + 99.9999% (Certificate of purity of metal will be supplied.)
- Freeze Point Plateau Duration:** 10 minutes or longer
- Ambient Temperature:** 18° to 28°C
- Power Requirements:** 115VAC ±5% 50/60Hz 1.0KW max. (for 100VAC or 230VAC a separate step up or step down transformer module will be supplied)
- Dimensions:** 213mm H x 280mm W x 380mm D
- Weight:** 10kg (22 lbs.) approx.

**Custom Models**

The blackbody calibrator specifications in this catalog describe standard, production instruments used routinely in industrial process, medical and research environments. However, with the increasing application of infrared measurement technology in the electronics, aerospace and other demanding fields, the need for special blackbody



M345X and M315X Large area low temperature blackbody sources.

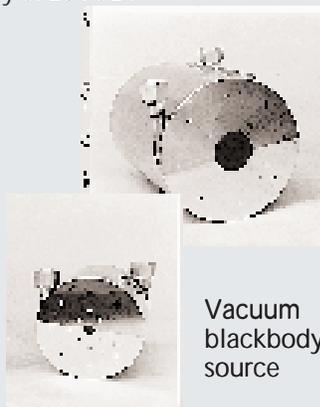
sources has grown commensurately. Mikron has been able to respond to even the most esoteric requirements, including airborne systems, large area sources, ultra-high resolution calibrators and systems to operate in a vacuum. A selection of these non-standard instruments is illustrated here and we will be pleased to receive your specifications with a view to offering a proposal to meet your special requirements. The following brief descriptions will provide an indication of the scope of Mikron's custom engineering.

### Large Area Calibration Sources

The large area, flat sources have been designed for use in calibrating thermal imaging systems, aerial mapping and surveillance equipment and long path spectrophotometers. They have ranged in size from 150mm<sup>2</sup> to 500mm<sup>2</sup> and place special demands on the designer in regard to emissivity and uniformity. Most of these systems have included peltier effect cooling to reduce the time taken to change the source temperature in field use. The airborne systems are powered by the standard aircraft supply of 28VDC.

### Calibration Sources for Vacuum Operation

Where calibration must take place in a vacuum environment or where the source is being used to simulate a condition such as would be encountered in outer space, Mikron has expertise which can be employed to solve the unique problems of maintaining structural integrity and providing forced cooling under such conditions.



Vacuum blackbody source

### Calibration Traceability and Transfer Standards

In order to establish the degree of uncertainty in carrying out a calibration procedure, it is essential to establish calibration traceability of the equipment being used to National Standards. This is achieved through a hierarchy of primary and secondary transfer standards, with the national standards institutes at the top of the tree. The devices which provide the traceable links between national or "primary" standards and the working units in the fields are known as "transfer standards".

Transfer standards consist of Mikron Model M190-TS infrared temperature measuring instruments which are accurately calibrated against the primary blackbody source and



Precision Transfer Standard

are contained in a specially designed case. These instruments are to be used only for calibration purposes, and should be returned to Mikron for checking at 12-month intervals.

### Optional Accessories:

#### Water Cooled Aperture Wheel Assembly

Frequently used in application requiring specific radiating apertures or for verifying field of view of infrared thermometers, radiometers or infrared imaging equipment.

Water or gas cooling capabilities of this assembly ensure minimum contribution of background radiation. Precision machining of aperture wheel allows perfect optical alignment.



To order specify  
PN 14002

Aperture Size  
50mm, 25mm, 12.5mm, 6.25mm,  
3.12mm, and 2mm  
25mm, 12.7mm, 10mm, 7.6mm,  
5mm and 2.5mm

PN 14002-1

### Quality Assurance

Reliability is *never* taken for granted at Mikron. After final assembly, every blackbody source is tested and burned-in for a period of several days and rigorously subjected to thermal cycling and vibration to verify calibration stability before shipment. Every blackbody source has a history file that includes calibration data, production and service information.

### Warranty

Every blackbody source is covered for all defective material and workmanship for one full year after shipment. Heating elements for model M390 are excluded from this warranty.

### Certificate of Calibration

Each blackbody will be furnished with certificate of calibration traceable to NIST.

### Made in U.S.A.

The 300 Series is designed and built by Mikron, the leading innovator in technology of infrared thermometry. Manufacturing facility is located in Oakland, New Jersey.

*Specifications may change from time to time without advance notice.*



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Catalog M300 Rev. D 082703 Printed in U.S.A.



ISO 9001