

# Beamex MB

METROLOGY TEMPERATURE BLOCK



Portable temperature dry block delivering bath-level accuracy for industrial applications

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# Highly accurate temperature dry block

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# Portable temperature dry block delivering bath-level accuracy for industrial applications

The Beamex metrology temperature block (MB) is a user friendly and highly accurate temperature dry block. It delivers bath-level accuracy in a convenient dry block with temperature ranges from  $-45\text{ °C}$  ...  $+700\text{ °C}$ . It enables you to take laboratory-level accuracy with you out into the field.

## Main features of MB

### High accuracy and stability

With a conventional dry block, you typically needed an external reference sensor if you wanted better accuracy. The Beamex MB has accurate internal temperature measurement and display accuracy up to  $\pm 0.1\text{ °C}$ , so you can get high accuracy even without an external reference sensor. With the unique temperature control techniques the Beamex® MB has excellent stability up to  $\pm 0.005\text{ °C}$ . This kind of stability has usually been found only in baths, not in dry blocks.

### Built-in high-accuracy reference input

In order to receive the best accuracy from the MB, there is a possibility to connect an external reference sensor into the reference sensor connection (R model). This eliminates the need for a separate reference thermometer. The reference sensor measurement is accurate up to  $\pm 0.006\text{ °C}$ . ITS-90 or CVD coefficients can be used to compensate any sensor errors.

### Axial uniformity

With the unique dual zone control and extended well depth, the Beamex MB has an excellent axial uniformity up to  $\pm 0.02\text{ °C}$ .

### Radial uniformity

Radial uniformity is the temperature difference between the holes in the insert. It is naturally crucial that the reference sensor and the sensor being tested are at the same temperature. The Beamex MB offers radial uniformity up to  $\pm 0.01\text{ °C}$ .

### Immersion Depth

The Beamex MB series provides immersion depth up to 203 mm (160 mm in MB140), which, together with the control techniques, provides more stable calibration. Moreover, a deeper immersion depth reduces the stem conduction error (heat loss into the atmosphere), especially in higher temperatures.

### Loading

With the extended well depth and the dual zone temperature control feature, the Beamex MB can correct the effect of loading and provides loading specifications up to  $\pm 0.005\text{ °C}$ .



# Beamex MB series specifications

	MB140	MB155	MB425	MB700
<b>Temperature range at 23 °C</b>	-45 °C to 140 °C (-49 °F to 284 °F)	-30 °C to 155 °C (-22 °F to 311 °F)	35 °C to 425 °C (95 °F to 797 °F)	50 °C to 700 °C <sup>3)</sup> (122 °F to 1292 °F)
<b>Display accuracy</b>	±0.1 °C Full range	±0.1 °C Full range	±0.1 °C to 100 °C ±0.15 °C to 225 °C ±0.2 °C to 425 °C	±0.2 °C to 425 °C ±0.25 °C to 660 °C
<b>Stability</b>	±0.005 °C Full range	±0.005 °C Full range	±0.005 °C to 100 °C ±0.008 °C to 225 °C ±0.01 °C to 425 °C	±0.005 °C to 100 °C ±0.01 °C to 425 °C ±0.03 °C to 700 °C
<b>Axial uniformity 40 mm (1.6 in)</b>	±0.08 °C to -35 °C ±0.04 °C to 0 °C ±0.02 °C to 50 °C ±0.07 °C to 140 °C	±0.025 °C to 0 °C ±0.02 °C to 50 °C ±0.05 °C to 155 °C	±0.05 °C to 100 °C ±0.09 °C to 225 °C ±0.17 °C to 425 °C	±0.09 °C to 100 °C ±0.22 °C to 425 °C ±0.35 °C to 700 °C
<b>Radial uniformity</b>	±0.01 °C Full range	±0.01 °C Full range	±0.01 °C to 100 °C ±0.02 °C to 225 °C ±0.025 °C to 425 °C	±0.01 °C to 100 °C ±0.025 °C to 425 °C ±0.04 °C to 700 °C
<b>Loading effect (with a 6.35 mm reference probe and three 6.35 mm probes)</b>	±0.02 °C to -35 °C ±0.005 °C to 100 °C ±0.01 °C to 140 °C	±0.005 °C to 0 °C ±0.005 °C to 100 °C ±0.01 °C to 155 °C	±0.01 °C Full range	±0.02 °C to 425 °C ±0.04 °C to 700 °C
<b>Hysteresis</b>	±0.025 °C	±0.025 °C	±0.04 °C	±0.07 °C
<b>Immersion depth</b>	160 mm (6.3 in)	203 mm (8 in)	203 mm (8 in)	203 mm (8 in)
<b>Resolution</b>	0.001 °C / °F			
<b>Display</b>	LCD, °C or °F, user-selectable			
<b>Key pad</b>	Ten key with decimal and +/- button. Function keys, menu key, and °C / °F key.			
<b>Insert OD dimensions</b>	30.0 mm (1.18 in)	30.0 mm (1.18 in)	30.0 mm (1.18 in)	29.2 mm (1.15 in)
<b>Cooling time</b>	44 min: 23 °C to -45 °C 19 min: 23 °C to -30 °C 19 min: 140 °C to 23 °C	30 min: 23 °C to -30 °C 25 min: 155 °C to 23 °C	220 min: 425 °C to 35 °C 100 min: 425 °C to 100 °C	235 min: 700 °C to 50 °C 153 min: 700 °C to 100 °C
<b>Heating time</b>	32 min: 23 °C to 140 °C 45 min: -45 °C to 140 °C	44 min: 23 °C to 155 °C 56 min: -30 °C to 155 °C	27 min: 35 °C to 425 °C	46 min: 50 °C to 700 °C
<b>Size (H x W x D)</b>	366 x 203 x 323 mm (14.4 x 8 x 12.7 in)			
<b>Weight</b>	14.2 kg (31.5 lb)	14.6 kg (32 lb)	12.2 kg (27 lb)	14.2 kg (31.5 lb)
<b>Power requirements</b>	230 VAC (±10%), 550 W 115 VAC (±10%), 550 W	230 VAC (±10%), 550 W 115 VAC (±10%), 550 W	230 VAC (±10%), 1025 W 115 VAC (±10%), 1025 W	230 VAC (±10%), 1025 W 115 VAC (±10%), 1025 W
<b>Computer interface</b>	RS-232			
<b>Calibration</b>	Accredited calibration certificate provided			
<b>Environmental operating conditions</b>	5 °C to 40 °C, 0% to 80% RH (non-condensing)			
<b>Specifications valid in environmental conditions</b>	18 °C...28 °C			
<b>Warranty</b>	Warranty 1 Year			

3) Calibrated to 660 °C; reference thermometer recommended at higher temperatures.

R MODEL SPECIFICATIONS	MB
<b>Resistance range</b>	0 Ω to 400 Ω
<b>Resistance accuracy <sup>1)</sup></b>	0 Ω to 20 Ω: ±0.0005 Ω 20 Ω to 400 Ω: ±25 ppm of reading
<b>Characterizations</b>	ITS-90, CVD, Resistance
<b>Temperature accuracy (100 Ω PRT) <sup>2)</sup></b>	Below zero: ±(0.006 °C + 0.001% of temperature reading) Above zero: ±(0.006 °C + 0.003% of temperature reading)
<b>Sensor connection</b>	4-wire, 6-pin Lemo
<b>Calibration</b>	Accredited calibration certificate provided

1) Measurement accuracy specifications apply within the specified environmental operating conditions and assume 4-wires for PRTs.

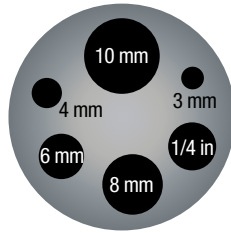
2) The built-in reference thermometer readout accuracy does not include the sensor probe accuracy.

# Inserts

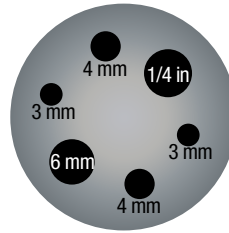
## INSERTS FOR MB MODELS

INSERT	MODEL	DESCRIPTION
MH1	All models	Multihole, metric / reference; ¼", 3 mm, 4 mm, 6 mm, 8 mm, 10 mm
MH2	All models	Multihole, metric / reference; ¼", 2x3 mm, 2x4 mm, 6 mm
B	All models	Blank
Special	All models	Special

Please contact Beamex for custom inserts.



MH1



MH2

## STANDARD ACCESSORIES

- Power Cord
- RS-232 Cable
- User Guide
- Accredited Calibration Certificate
- LEMO Connector for reference sensor (R models only)
- Block Insulator (in MB140, MB155 and MB425)
- Tongs (insert removal tool)

## OPTIONAL ACCESSORIES

- Transport Case for temperature block
- Inserts

# Beamex MB

## METROLOGY TEMPERATURE BLOCK

The Beamex metrology temperature block (MB) is a highly accurate temperature dry block. It delivers bath-level accuracy in a convenient dry block. It enables you to take laboratory level accuracy with you out into the field. The unique dual zone control technology enables excellent stability and uniformity. Immersion depth up to 203 mm and temperature ranges from  $-45\text{ °C}$  ...  $+700\text{ °C}$ .

### Compact and user-friendly

The MB is a compact, lightweight, portable calibrator with a large graphical display, multilingual interface and full numerical keyboard. Calibration is quick and simple.

### Accuracy guaranteed

- MB140 / MB140R with range  $-45\text{ °C}$  ...  $+140\text{ °C}$
- MB155 / MB155R with range  $-30\text{ °C}$  ...  $+155\text{ °C}$
- MB425 / MB425R with range  $+35\text{ °C}$  ...  $+425\text{ °C}$
- MB700 / MB700R with range  $+50\text{ °C}$  ...  $+700\text{ °C}$

The R models include an internal reference thermometer with a connection for an external reference sensor.

### Smart reference probes

Beamex smart reference probes are high-quality and extremely stable reference PRT probes with an integrated memory to store the individual probe coefficients. They are available in two versions: 300 mm straight version or a  $90^\circ$  bent version.



### Main features

- ▶ High accuracy – a dry block that delivers bath-level accuracy
- ▶ The unique dual zone control technology enables excellent stability and uniformity
- ▶ Immersion depth up to 203 mm
- ▶ Wide temperature range from  $-45\text{ °C}$  to  $+700\text{ °C}$
- ▶ Accredited calibration as standard
- ▶ Part of the Beamex ICS integrated calibration solution

# Beamex FB

FIELD TEMPERATURE BLOCK



Lightweight, highly accurate temperature dry block for industrial field use

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655367875684653400

# An ideal temperature block for industrial field use





# Lightweight, highly accurate temperature dry block for industrial field use

The Beamex field temperature block (FB) is an ideal temperature block for industrial field use. It is lightweight and easy to carry. It is an extremely quick dry block, yet it provides excellent accuracy.

## Main features of the Beamex FB

### Lightweight, portable

The Beamex FB field temperature block is ideal for industrial field use. It only weighs about 8 kg, and it is small enough to carry around.

### Speed

The Beamex FB is extremely quick to reach various temperatures, i.e. it cools down to  $-25\text{ }^{\circ}\text{C}$  in 15 minutes and heats up to  $+660\text{ }^{\circ}\text{C}$  in 15 minutes. This saves time and increases productivity.

### Accuracy and performance

The Beamex FB is an easily portable unit that also provides excellent calibration accuracy. The display accuracy is up to  $\pm 0.2\text{ }^{\circ}\text{C}$  and its control technology provides great stability up to  $\pm 0.01\text{ }^{\circ}\text{C}$ . The dual zone controlled block provides excellent axial uniformity up to  $\pm 0.04\text{ }^{\circ}\text{C}$  and radial uniformity up to  $\pm 0.01\text{ }^{\circ}\text{C}$ .

### Smart reference sensors

The Beamex FB has an internal reference thermometer (in R models), which enables connections to the Beamex smart reference sensors. These sensors have a memory that contains all of the sensor correction data. This enables the use of the reference sensor as a real plug-and-play.

### Accredited calibration

Each Beamex FB field temperature block is delivered with an accredited calibration certificate.

### Usability

The large LCD display, function keys and multilingual, menu-based user interface makes the Beamex FB easy to use. A graphic and audible stability indicator lets you know when a block is stable. The HOT warning light indicates when the block is hot (over  $+50\text{ }^{\circ}\text{C}$ ). It blinks as long as the block is too hot to touch, even when the unit is switched off or when the mains cable is disconnected.

### Part of the Beamex ICS integrated calibration solution

The communication port enables communication with selected Beamex MC calibrators for automation calibration and documentation, making the Beamex FB products part of the Beamex ICS integrated calibration solution. Combined with the Beamex MC6 calibrator, loop calibrations are possible with conventional, HART and Fieldbus temperature transmitters with sensors.



# Beamex FB series specifications

	FB150	FB350	FB660
<b>Temperature range at 23 °C</b>	-25 °C to 150 °C (-13 °F to 302 °F)	33 °C to 350 °C (91 °F to 662 °F)	50 °C to 660 °C (122 °F to 1220 °F)
<b>Display accuracy</b>	±0.2 °C Full range	±0.2 °C Full range	±0.35 °C at 50 °C ±0.35 °C at 420 °C ±0.5 °C at 660 °C
<b>Stability</b>	±0.01 °C Full range	±0.02 °C at 33 °C ±0.02 °C at 200 °C ±0.03 °C at 350 °C	±0.03 °C at 50 °C ±0.05 °C at 420 °C ±0.05 °C at 660 °C
<b>Axial uniformity at 40 mm (1.6 in)</b>	±0.05 °C Full range	±0.04 °C at 33 °C ±0.1 °C at 200 °C ±0.2 °C at 350 °C	±0.05 °C at 50 °C ±0.35 °C at 420 °C ±0.5 °C at 660 °C
<b>Radial uniformity</b>	±0.01 °C Full range	±0.01 °C at 33 °C ±0.015 °C at 200 °C ±0.02 °C at 350 °C	±0.02 °C at 50 °C ±0.05 °C at 420 °C ±0.10 °C at 660 °C
<b>Loading effect (with a 6.35 mm reference probe and three 6.35 mm probes)</b>	±0.006 °C Full range	±0.015 °C Full range	±0.015 °C at 50 °C ±0.025 °C at 420 °C ±0.035 °C at 660 °C
<b>Hysteresis</b>	±0.025 °C	±0.03 °C	±0.01 °C
<b>Immersion depth</b>	150 mm (5.9 in)		
<b>Insert OD dimensions</b>	30 mm (1.18 in)	25.3 mm (0.996 in)	24.4 mm (0.96 in)
<b>Heating time</b>	16 min: 23 °C to 140 °C 23 min: 23 °C to 150 °C 25 min: -25 °C to 150 °C	5 min: 33 °C to 350 °C	15 min: 50 °C to 660 °C
<b>Cooling time</b>	15 min: 23 °C to -25 °C 25 min: 150 °C to -25 °C	32 min: 350 °C to 33 °C 14 min: 350 °C to 100 °C	35 min: 660 °C to 50 °C 25 min: 660 °C to 100 °C
<b>Resolution</b>	0.01 °C / °F		
<b>Display</b>	LCD, °C or °F user-selectable		
<b>Size (H x W x D)</b>	290 mm x 185 mm x 295 mm (11.4 x 7.3 x 11.6 in)		
<b>Weight</b>	8.16 kg (18 lb)	7.3 kg (16 lb)	7.7 kg (17 lb)
<b>Power requirements</b>	230 V (±10%) 50/60 Hz, 575 W 100 V to 115 V (±10%) 50/60 Hz, 635 W	230 V (±10%), 50/60 Hz, 1800 W 100 V to 115 V (±10%), 50/60 Hz, 1400 W	230 V (±10%), 50/60 Hz, 1800 W 100 V to 115 V (±10%), 50/60 Hz, 1400 W
<b>Computer interface</b>	RS-232	RS-232	RS-232
<b>Calibration</b>	Accredited calibration certificate provided		
<b>Environmental operating conditions</b>	0 °C to 50 °C, 0% to 90% RH (non-condensing)		
<b>Specifications valid in environmental conditions</b>	13 °C...33 °C		
<b>Warranty</b>	Warranty 1 Year		

R MODEL SPECIFICATIONS	FB
<b>Resistance range</b>	0 Ω to 400 Ω
<b>Resistance accuracy <sup>1)</sup></b>	0 Ω to 42 Ω: ±0.0025 Ω 42 Ω to 400 Ω: ±60 ppm of reading
<b>Characterizations</b>	ITS-90, CVD, IEC-60751, resistance
<b>Temperature accuracy (100 Ω PRT) <sup>2)</sup></b>	±(0.015 °C + 0.008% of temperature reading)
<b>Sensor connection</b>	4-wire, 6-pin Smart Lemo
<b>Calibration</b>	Accredited calibration certificate provided

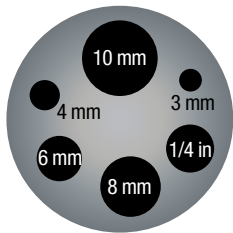
1) Measurement accuracy specifications apply within the specified environmental operating conditions and assume 4-wires for PRTs.  
2) The built-in reference thermometer readout accuracy does not include the sensor probe accuracy.

# Inserts

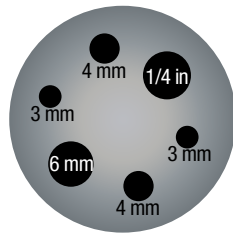
## INSERTS FOR FB MODELS

INSERT	MODEL	DESCRIPTION
MH1	FB150	Multihole, metric / reference; ¼", 3 mm, 4 mm, 6 mm, 8 mm, 10 mm
MH1	FB350, FB660	Multihole, metric / reference; ¼", 4 mm, 6 mm, 8 mm, 10 mm
MH2	All models	Multihole, metric / reference; ¼", 2x3 mm, 2x4 mm, 6 mm
B	All models	Blank
Special	All models	Special

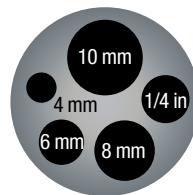
Please contact Beamex for custom inserts.



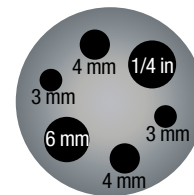
FB150-MH1



FB150-MH2



FB350-MH1, FB660-MH1



FB350-MH2, FB660-MH2

## STANDARD ACCESSORIES

- Power Cord
- RS-232 Cable
- User Guide
- Accredited Calibration Certificate
- LEMO Connector for reference sensor (R models only)
- Block Insulator (in FB150)
- Tongs (insert removal tool)

## OPTIONAL ACCESSORIES

- Transport Case for temperature block
- Inserts

# Beamex FB

## FIELD TEMPERATURE BLOCK

Lightweight, highly accurate temperature dry block for industrial field use. The Beamex field temperature block (FB) is an ideal temperature block for industrial field use. It is lightweight and easy to carry. It is an extremely quick dry block, yet it provides excellent accuracy.

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### Available models

- FB150 / FB150R with range  $-25\text{ }^{\circ}\text{C}$  ...  $+150\text{ }^{\circ}\text{C}$
- FB350 / FB350R with range  $+33\text{ }^{\circ}\text{C}$  ...  $+350\text{ }^{\circ}\text{C}$
- FB660 / FB660R with range  $+50\text{ }^{\circ}\text{C}$  ...  $+660\text{ }^{\circ}\text{C}$

The R models include an internal reference thermometer with a connection for an external reference sensor.

### Smart reference probes

Beamex smart reference probes are high-quality extremely stable reference PRT probes with an integrated memory which stores the individual probe coefficients. They are available in two versions: 300 mm straight version or a 90° bent version.



### Main features

- ▶ Lightweight, portable and quick field block
- ▶ Highly accurate
- ▶ Temperature ranges from a  $-25^{\circ}\text{C}$  to  $+660^{\circ}\text{C}$
- ▶ Dual zone control techniques enable excellent stability and uniformity
- ▶ Accredited calibration certificate as standard
- ▶ Part of the Beamex ICS integrated calibration solution

## BEAMEX SMART REFERENCE PROBES



## Smart reference probes

The Beamex smart reference probe is a high-quality and extremely stable PRT probe with an integrated memory that stores the individual sensor coefficients. The sensor works as plug-and-play with Beamex FB series of temperature blocks (R model). The temperature block automatically reads the sensor coefficients from the sensor and makes the necessary adjustments. This

eliminates the need to enter the coefficients manually. The sensor can also be used with the Beamex MB series of temperature blocks (R model). The sensor coefficients can be manually entered via the MB user interface. The sensor is available as a 300 mm straight version or a 90° bent version, making it an ideal reference sensor for the Beamex temperature block.

### MAIN FEATURES:

- Temperature range -200 °C... 420 °C / 660 °Ct
- High stability, up to  $\pm 0.007$  °C
- 300 mm straight and 90° bent versions
- Accredited calibration certificate with data and ITS-90 coefficients included as standard



MODEL	DESCRIPTION
RPRT-420-300	Reference PRT, max 420 °C, length 300 mm, straight
RPRT-420-230A	Reference PRT, max 420 °C, length 230 mm (before angle), 90° angled
RPRT-660-300	Reference PRT, max 660 °C, length 300 mm, straight
RPRT-660-230A	Reference PRT, max 660 °C, length 230 mm (before angle), 90° angled

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## SPECIFICATIONS

PARAMETER	RPRT-420-300 & RPRT-420-230A	RPRT-660-300 & RPRT-660-230A
Temperature range	-200 to 420 °C	-200 to 660 °C
Nominal resistance at 0.010 °C	100 Ω ±0.5 Ω	100 Ω ±0.5 Ω
Temperature coefficient	0.003925 Ω/Ω/°C	0.0039250 Ω/Ω/°C
Sheath diameter x length	6.35 mm ±0.08 mm x 305 mm ±0.08 mm (0.25 in ±0.003 x 12 in ±0.13 in)	6.35 mm ±0.08 mm x 305 mm ±0.08 mm (0.25 in ±0.003 x 12 in ±0.13 in)
Short-term repeatability <sup>1)</sup>	±0.007 °C at 0.010 °C ±0.013 °C at max temp	±0.007 °C at 0.010 °C ±0.013 °C at max temp
Drift <sup>2)</sup>	±0.007 °C at 0.010 °C ±0.013 °C at max temp	±0.007 °C at 0.010 °C ±0.013 °C at max temp
Hysteresis	±0.010 °C maximum	±0.010 °C maximum
Sensor length	30 mm ±5 mm (1.2 in ±0.2 in)	30 mm ±5 mm (1.2 in ±0.2 in)
Sensor location	3 mm ±1 mm from tip (0.1 in ±0.1 in)	3 mm ±1 mm from tip (0.1 in ±0.1 in)
Sheath material	Inconel 600	Inconel 600
Maximum immersion (nominal)	Straight: 305 mm (12 in) Angled: 210 mm (8.3 in)	Straight: 305 mm (12 in) Angled: 210 mm (8.3 in)
Minimum immersion (<5 mK error)	100 mm (3.9 in)	100 mm (3.9 in)
Minimum insulation resistance	500 MΩ at 23 °C	500 MΩ at 23 °C, 10 MΩ at 670 °C
Transition junction temperature range <sup>3)</sup>	-50 °C to 200 °C	-50 °C to 200 °C
Transition junction dimensions	71 mm x 12.5 mm (2.8 in x .42 in)	71 mm x 12.5 mm (2.8 in x .42 in)
Typical response time	12 seconds	12 seconds
Self heating (in 0 °C bath)	50 mW/°C	50 mW/°C
Lead-wire cable	Teflon cable, Teflon insulated, 24 AWG stranded, silverplated copper	Teflon cable, Teflon insulated, 24 AWG stranded, silver plated copper
Lead-wire length	1.8 m (6 ft)	1.8 m (6 ft)
Lead-wire temperature range	-50 °C to 250 °C	-50 °C to 250 °C
Warranty	Warranty 1 Year	Warranty 1 Year

1) Three thermal cycles from min to max temp, includes hysteresis, 95% confidence

2) After 100 hrs at max temp, 95% confidence

3) Temperatures outside this range will cause irreparable damage. For best performance, transition junction should not be too hot to touch.

