

Beamex MC6-T

MULTIFUNCTION TEMPERATURE CALIBRATOR
AND COMMUNICATOR

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Versatile temperature calibration





Versatile temperature calibration

The Beamex MC6-T is an extremely versatile portable automated temperature calibration system. It combines a state-of-the-art temperature dry-block with Beamex MC6 multifunction process calibrator technology. It offers versatility, that no other temperature calibrator can match.

With the ability to generate temperature as well as measure and simulate temperature and electrical signals, it offers a really unique combination of functionality. In addition to temperature calibration abilities, the MC6-T also offers electrical and pressure calibration capability, all in one device.

The MC6-T provides superior metrological performance and accuracy for temperature calibrations, while being robust, light and easy to carry field calibrator.

The calibrator is designed for industrial environments and it is designed to minimize the impact of varying environmental conditions and AC power fluctuations.

A large multilingual color touch screen, combined with numerical and graphical views, provides an easy to use system available in multiple languages.

The MC6-T has a built-in field communicator for HART, FOUNDATION Fieldbus H1 and Profibus PA instruments. This enables calibration, configuration and trimming of modern smart instruments with a single device, without the need to carry a separate field communicator.

MC6-T is a documenting calibrator that communicates with calibration management software to enable a fully digitalized, paperless calibration process and documentation database. Thanks to the internal rechargeable battery, the process calibrator functionality in the MC6-T can be used also without mains voltage. The mains voltage is needed only for heating and cooling.

MC6-T includes several unique safety features, such as a tilt sensor, warning light and stand-alone overheating protection.



MC6-T comes in two versions:

With all its functionality, the MC6-T can be considered a mobile calibration laboratory, replacing a large number of conventional separate single-function calibration equipment, making it easy to carry it with you out in the field.

MC6-T150

Generate temperatures between -30 ... 150 °C (-22 ... 302 °F)



MC6-T660

Generate temperatures between 50 ... 660 °C (122 ... 1220 °F)





beamex MC6-T



Please read user manual for safe use of the equipment
All terminals max input
80 VDC, 30 VAC, 100mA

Terminal block with labels: Q RTD R2, TC1, TC2, R1, Q RTD, R3, V, mA, Hz, mA Feedback, IN.

MC6-T150
-30...150 °C

115 / 230 VAC, 50...60 Hz
MAX 300 W
FUSES: 250 V, T 3,15 A 250 V
115 V, T 3,15 A 250 V

MAINS SWITCH
ON / OFF

Automatic documenting calibrator – digitalize your calibration process

Superior metrological specifications and performance

MC6-T660 features an active triple zone temperature control technology for superior temperature gradient. MC6-T150 features a dual zone heating and cooling for optimum temperature control. The multizone temperature control technology ensures an excellent temperature gradient and compensates for the heat loss caused by the temperature sensors installed in the insert.

MC6-T offers excellent accuracy and stability. The unique temperature control algorithm provides fast heating and cooling without overshoots, improving efficiency and saving time. The adjustable control speed let you optimize for the speed and accuracy.

An accredited calibration certificate is included as standard as evidence of the accuracy.

Made for industrial use

MC6-T is designed for demanding industrial environments. It is designed to minimize the effects of varying environmental conditions, typical in process industry field conditions.

It is also designed to minimize the effects of any mains voltage fluctuations, and it remains very stable in spite of changes in AC mains power voltage.

As MC6-T is a portable, small, lightweight and robust device, ideal for industrial field usage. Being a multifunctional device, it replaces several traditional single-function devices. It is easier to carry just one device with you.

With the optional carrying case, you can take the MC6-T and required accessories conveniently with you out to the field.

Enhanced usability

MC6-T offers a large 5.7-inch backlit multilingual color touch screen user interface that can be easily used with bare fingers, gloved hands or any stylus. Direct numerical and QWERTY keyboards make it very easy and fast to enter data. There is no need to use clumsy arrow keys to enter a set point, just enter the temperature set point value. User interface can also be used with the membrane keys.

The user interface is divided into different operation modes for enhanced usability. The user interface offers numerical and graphical information.

Extensive process calibrator functionality

MC6-T includes a built-in multifunctional process calibrator, based on the Beamex MC6 technology. The process calibrator can calibrate temperature, electrical and pressure signals.

It offers three simultaneous RTD / resistance and two thermocouple measurement channels. It can also simulate RTD and thermocouples signals, for calibrating temperature transmitters and other temperature instruments. It can also measure and generate various DC electrical signals.

So, in addition to calibrating temperature sensors and temperature loops, you can calibrate different kinds of process instruments.

MC6-T offers also a connection for Beamex external pressure modules (EXT) and can also be used for various pressure calibrations.

Digital transformation of your calibration process

MC6-T is a documenting calibrator and communicates with calibration software. This enables a digitalized and fully paperless calibration process. Send an unlimited number of workorders from the calibration software, perform the calibration with MC6-T using automatic documentation, and finally send results back to the calibration software for viewing, analysis and storage.

You may also have the Beamex calibration software connected with your maintenance system, for a fully paperless flow of workorders and calibration data between the systems.

Using the MC6-T in conjunction with Beamex CMX calibration software, enables you to minimize any ALCOA related data integrity issues. MC6-T identifies users with their electronic signature and protects data against any tampering.



USER INTERFACE MODES - ENHANCED USABILITY

Temperature Calibrator

The Temperature Calibrator mode is optimized for easy and fast usage of the temperature generation and measurement. The desired temperature can be quickly entered using the virtual numerical keyboard. The internal or external reference probe can also be easily measured. The temperature values can be viewed in numerical or graphical view. Additional measurement or generation channels can also be measured simultaneously.



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Calibrator

The Calibrator mode is designed for calibrating various process instruments, such as transmitters or indicators. Transmitters typically have an input and an output. So, you either need to have two devices, or one device capable of doing two things simultaneously. The calibrator mode in MC6 is optimized for this type of use. The calibrator also offers different tools making the work easier.



Data Logger

The Data Logger is designed for logging various measurement channels simultaneously. Often in industry, there is a need to measure signals for shorter or longer periods and to save the results in memory for later analysis. This may be related to trouble-shooting, surveillance or calibration. The data logger mode in MC6 is optimized for this type of use. It is also possible to generate or simulate signals during the data logging.





Documenting Calibrator

The Documenting Calibrator mode is where you can automate your calibrations and make them fully paperless. Work orders from calibration software can be sent to Documenting Calibrator and the calibration results can be sent back to software. With paperless calibration, there is no need for manual error-prone pen and paper documenting, this improves the efficiency of calibration and improves the quality of results.



Communicator

The Communicator mode is designed to communicate with smart field instruments. MC6-T supports HART, FOUNDATION Fieldbus or Profibus PA protocols. In today's process plants, smart instrumentation is being used to an increasing degree. Therefore, engineers need to use communicators or configuration software. With the field communicator built-in to the calibrator, there is no need to carry a separate communicator.



Settings

The Settings mode allows you to edit the various settings of the calibrator. These settings include for example language selection, power management, regional settings, date & time and different maintenance settings.

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Truly multifunctional - carry less

Built-in Field Communicator

MC6-T includes a field communicator for HART, FOUNDATION Fieldbus H1 and Profibus PA instruments. All protocols are modular, so you can choose the ones you need, and you can also add protocols later on as the requirements arise. With the help of the built-in communicator, you can configure and trim/adjust your smart instruments with a single MC6-T without the need to carry a separate field communicator with you. The communicator includes built-in loop supply and required impedances for the communications, so there is no need for separate power supply or impedances.

Stability control adds confidence in temperature calibration

In temperature calibration, stability is a very important feature. Temperature changes slowly and the user must be sure that the readings are stable. MC6-T follows the stability and 2 sigma standard deviation of the temperature measurements and makes sure that only readings that are within the stability requirements are being used. This takes the guessing out of the picture and adds confidence in calibration, ensuring the best calibration uncertainty even for a novice user. The stability control is used for the reference sensor as well as the sensors to be calibrated.

Advanced safety features

The MC6-T includes several advanced safety features. The unit has a red indicator light whenever the block is hot, as well as indication in the display. For safety reasons the MC6-T660 units has a tilt/orientation sensor. This will warn the user if the unit is tilted so much that calibration uncertainty is jeopardized. Also, it will switch off heating and turn on the fan if the unit is tilted too much, or if it falls on side. There is also processor independent stand-alone overheat protectors that will prevent overheating.

Short and sanitary sensor calibration

In some industries, such as food and beverage and pharmaceutical, short and sanitary temperature sensors are used. These kinds of sensors, sometimes provided with a flange, are difficult to calibrate with traditional temperature dry-blocks. The MC6-T150 is designed so that it enables the calibration of short and flanged sanitary sensors. A dedicated insert used together with a special very short reference sensor with flexible cable. The cover of the block includes grooves for the reference sensor cable, allowing a sensor with a flange being accurately calibrated.

External controllers

MC6-T supports communication with external temperature and pressure controllers. It can be used to automate temperature calibration with another (Beamex models or selected non-Beamex models) temperature block. For example, use it with your Beamex FB temperature dry block to extend the temperature range. Or use MC6-T to control your existing temperature block to automate the calibration process. Also, MC6-T can be used to automate pressure calibration by controlling an external pressure controller, such as Beamex POC8. This enables automatic calibration of various pressure instruments with MC6-T.

Internal rechargeable battery

MC6-T includes an internal rechargeable battery pack. This unique feature allows you to use all other functions, except the temperature control, without mains voltage. For example, you can use the process calibrator functionality, field communicator, or communication with software, without the need to have mains power available.

Carry less

Being a truly multifunctional device, the MC6-T can replace a large amount of conventional single-function devices. MC6-T includes a temperature dry block, temperature calibrator, electrical calibrator, pressure calibrator, multibus field communicator, loop supply, note pad, and many more. Using MC6-T allows you to carry less.

Specifications

GENERAL SPECIFICATIONS

FEATURE	VALUE
Dimensions	322 mm x 180 mm x 298 mm (12,68" x 7,09" x 11,73")
Weight	MC6-T150: 9.4 kg (20.7 lbs) MC6-T660: 8.6 kg (18.96 lbs)
Display	5.7" Diagonal 640 x 480 TFT LCD Module
Touch Panel	5-wire resistive touch screen
Keyboard	Membrane keyboard
Backlight	LED backlight, adjustable brightness
Power requirements	230 V \pm 10%, 50/60 Hz, 380 W (MC6-T150), 1560 W (MC6-T660) 115 V \pm 10%, 50/60 Hz, 380 W (MC6-T150), 1560 W (MC6-T660)
Fuse size (MC6-T660)	230 V: T 8A 250V / 115 V: T 16A 250V
Fuse size (MC6-T150)	230 V: T 3.15A 250V / 115 V: T 3.15A 250V
Max. input voltage	30 V AC, 60 V DC
Operating temperature	0 ... 45 °C (32 ... 113 °F)
Operating humidity	0 ... 90% R.H. non condensing
Storage temperature	-20 ... 60 °C (-4 ... 140 °F)
Computer interface	USB
Calibration certificate	Accredited calibration certificate
Warmup time	Specifications valid after a 5 minute warmup period
Battery type	Rechargeable lithium-ion polymer, 4300 mAh, 11.1 V
Charging time	Approximately 4 hours
Battery operation time	10 ... 16 hours
Battery operated functions	All functions except temperature control and R3 measurement
Safety	Directive 2014/35/EU, EN 61010-1:2010
EMC	Directive 2014/30/EU, EN 61326-1:2013
RoHS compliance	RoHS II Directive 2011/65/EU, EN 50581:2012
Drop	EN 61010-1:2013
Warranty	Warranty 3 years, 1 year for battery pack. Warranty extension programs available.

MEASUREMENT, GENERATION AND SIMULATION FUNCTIONS

- Temperature generation
- Pressure measurement (internal barometric and external pressure modules)
- Voltage measurement (\pm 1 V and $-1 \dots 60$ VDC)
- Current measurement (\pm 100 mA) (internal or external supply)
- Frequency measurement (0 ... 50 kHz)
- Pulse counting (0 ... 10 Mpulse)
- Switch state sensing (dry/wet switch)
- Built-in 24 VDC loop supply (low impedance, HART impedance or FF/PA impedance)
- Voltage generation (\pm 1 V and $-3 \dots 24$ VDC)
- Current generation (0 ... 55 mA) (active/passive, i.e. Internal or external supply)
- Resistance measurement, three simultaneous channels (0 ... 4 k Ω)
- Resistance simulation (0 ... 4 k Ω)
- RTD measurement, three simultaneous channels
- RTD simulation
- TC measurement, two simultaneous channels (universal connector/mini-plug)
- TC simulation
- Frequency generation (0 ... 50 kHz)
- Pulse queue generation (0 ... 10 Mpulse)
- HART communicator
- FOUNDATION Fieldbus communicator
- Profibus PA communicator

(Some of the above functions are optional)

TEMPERATURE SPECIFICATIONS

FEATURE	MC6-T150	MC6-T660
Temperature range at 23 °C (73 °F)	-30 ... 150 °C (-22 ... 302 °F)	50 ... 660 °C (122 ... 1220 °F)
Display uncertainty with internal reference ¹⁾	±0.15 °C	±0.2 °C at 50 °C ±0.3 °C at 420 °C ±0.5 °C at 660 °C
Stability ²⁾	±0.01 °C	±0.02 °C at 50 °C ±0.03 °C at 420 °C ±0.04 °C at 660 °C
Axial uniformity at 40 mm	±0.05 °C	±0.05 °C at 50 °C ±0.25 °C at 420 °C ±0.40 °C at 660 °C
Axial uniformity at 60 mm	±0.07 °C	±0.10 °C at 50 °C ±0.40 °C at 420 °C ±0.60 °C at 660 °C
Radial uniformity Difference between borings	±0.01 °C	±0.01 °C at 50 °C ±0.05 °C at 420 °C ±0.08 °C at 660 °C
Loading effect with internal reference sensor With 4 pcs 6 mm sensors	± 0.08 °C	±0.02 °C at 50 °C ±0.08 °C at 420 °C ±0.15 °C at 660 °C
Loading effect with external 6 mm reference sensor With 3 pcs 6 mm sensors	±0.005 °C	±0.01 °C at 50 °C ±0.02 °C at 420 °C ±0.03 °C at 660 °C
Hysteresis	±0.03 °C	±0.15 °C
Display resolution	0.001 °C /°F / K	0.001 °C /°F / K
Immersion depth	150 mm (5.9 in)	150 mm (5.9 in)
Insert outer dimensions	30 mm (1.18 in)	24.5 mm (0.96 in)
Heating time	23 to 150 °C: 19 min -30 to 150 °C: 23 min	50 to 660 °C: 15 min
Cooling time	150 to 23 °C: 17 min 23 to -30 °C: 23 min 150 to -30 °C: 37 min	660 to 50 °C: 35 min 660 to 100 °C: 25 min
Stabilization time ³⁾	5 to 10 min	10 min

1) Includes 1-year uncertainty in typical use

2) 30 minutes stability (2 sigma) after the device has reached the setpoint and has stabilized

3) Typical time to stability



TC MEASUREMENT & SIMULATION

TC1 measurement & simulation / TC2 measurement

TYPE	RANGE (°C)	RANGE (°C)	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY (±) ⁽²⁾
B ⁽³⁾	0...1820	0...200	⁽⁸⁾	⁽⁴⁾
		200...500	1.5 °C	2.0 °C
		500...800	0.6 °C	0.8 °C
		800...1820	0.4 °C	0.5 °C
R ⁽³⁾	-50...1768	-50...0	0.8 °C	1.0 °C
		0...150	0.6 °C	0.7 °C
		150...400	0.35 °C	0.45 °C
		400...1768	0.3 °C	0.4 °C
S ⁽³⁾	-50...1768	-50...0	0.7 °C	0.9 °C
		0...100	0.6 °C	0.7 °C
		100...300	0.4 °C	0.55 °C
		300...1768	0.35 °C	0.45 °C
E ⁽³⁾	-270...1000	-270...-200	⁽⁸⁾	⁽⁴⁾
		-200...0	0.05 °C + 0.04% RDG	0.07 °C + 0.06% RDG
		0...1000	0.05 °C + 0.003% RDG	0.07 °C + 0.005% RDG
J ⁽³⁾	-210...1200	-210...-200	⁽⁸⁾	⁽⁴⁾
		-200...0	0.06 °C + 0.05% RDG	0.08 °C + 0.06% RDG
		0...1200	0.06 °C + 0.003% RDG	0.08 °C + 0.006% RDG
K ⁽³⁾	-270...1372	-270...-200	⁽⁸⁾	⁽⁴⁾
		-200...0	0.08 °C + 0.07% RDG	0.1 °C + 0.1% RDG
		0...1000	0.08 °C + 0.004% RDG	0.1 °C + 0.007% RDG
		1000...1372	0.012% RDG	0.017% RDG
N ⁽³⁾	-270...1300	-270...-200	⁽⁸⁾	⁽⁴⁾
		-200...-100	0.15% RDG	0.2% RDG
		-100...0	0.11 °C + 0.04% RDG	0.15 °C + 0.05% RDG
		0...800	0.11 °C	0.15 °C
		800...1300	0.06 °C + 0.006% RDG	0.07 °C + 0.01% RDG
T ⁽³⁾	-270...400	-270...-200	⁽⁸⁾	⁽⁴⁾
		-200...0	0.07 °C + 0.07% RDG	0.1 °C + 0.1% RDG
		0...400	0.07 °C	0.1 °C
U ⁽⁵⁾	-200...600	-200...0	0.07 °C + 0.05% RDG	0.1 °C + 0.07% RDG
		0...600	0.07 °C	0.1 °C
L ⁽⁵⁾	-200...900	-200...0	0.06 °C + 0.025% RDG	0.08 °C + 0.04% RDG
		0...900	0.06 °C + 0.002% RDG	0.08 °C + 0.005% RDG
C ⁽⁶⁾	0...2315	0...1000	0.22 °C	0.3 °C
		1000...2315	0.018% RDG	0.03 °C + 0.027% RDG
G ⁽⁷⁾	0...2315	0...60	⁽⁸⁾	⁽⁴⁾
		60...200	0.9 °C	1.0 °C
		200...400	0.4 °C	0.5 °C
		400...1500	0.2 °C	0.3 °C
		1500...2315	0.014% RDG	0.02% RDG
D ⁽⁶⁾	0...2315	0...140	0.3 °C	0.4 °C
		140...1200	0.2 °C	0.3 °C
		1200...2100	0.016% RDG	0.024% RDG
		2100...2315	0.45 °C	0.65 °C

Resolution 0.01°C.

With internal reference junction please see separate specification.

Also other thermocouple types available as option, please contact Beamex.

¹⁾ Accuracy includes hysteresis, nonlinearity and repeatability (k=2).

²⁾ Uncertainty includes reference standard uncertainty, hysteresis, nonlinearity, repeatability and typical long term stability for mentioned period (k=2).

³⁾ IEC 584, NIST MN 175, BS 4937, ANSI MC96.1

⁴⁾ ±0.007% of thermovoltage + 4 µV

⁵⁾ DIN 43710

⁶⁾ ASTM E 988 - 96

⁷⁾ ASTM E 1751 - 95e1

⁸⁾ ±0.004% of thermovoltage + 3 µV

Measurement input impedance	> 10 MΩ
Simulation maximum load current	5 mA
Simulation load effect	< 5 µV/mA
Supported units	°C, °F, Kelvin, °Ré, °Ra
Connector	TC1: Universal TC connector , TC2: TC Miniplug

RTD MEASUREMENT & SIMULATION

R1 & R2 & R3 measurement

SENSOR TYPE	RANGE (°C)	RANGE (°C)	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY (±) ⁽²⁾
Pt50(385)	-200...850	-200...270 270...850	0.025 °C 0.009% RDG	0.03 °C 0.012% RDG
Pt100(375) Pt100(385) Pt100(389) Pt100(391) Pt100(3926)	-200...850	-200...0 0...850	0.011 °C 0.011 °C + 0.009% RDG	0.015 °C 0.015° + 0.012% RDG
Pt100(3923)	-200...600	-200...0 0...600	0.011 °C 0.011 °C + 0.009% RDG	0.015 °C 0.015 °C + 0.012% RDG
Pt200(385)	-200...850	-200...-80 -80...0 0...260 260...850	0.007 °C 0.016 °C 0.016 °C + 0.009% RDG 0.03 °C + 0.011% RDG	0.01 °C 0.02 °C 0.02 °C + 0.012% RDG 0.045 °C + 0.02% RDG
Pt400(385)	-200...850	-200...-100 -100...0 0...850	0.007 °C 0.015 °C 0.026 °C + 0.01% RDG	0.01 °C 0.02 °C 0.045 °C + 0.019% RDG
Pt500(385)	-200...850	-200...-120 -120...-50 -50...0 0...850	0.008 °C 0.013 °C 0.025 °C 0.025 °C + 0.01% RDG	0.01 °C 0.02 °C 0.045 °C 0.045 °C + 0.019% RDG
Pt1000(385)	-200...850	-200...-150 -150...-50 -50...0 0...850	0.007 °C 0.018 °C 0.022 °C 0.022 °C + 0.01% RDG	0.008 °C 0.03 °C 0.04 °C 0.04 °C + 0.019% RDG
Ni100(618)	-60...180	-60...0 0...180	0.009 °C 0.009 °C + 0.005% RDG	0.012 °C 0.012 °C + 0.006% RDG
Ni120(672)	-80...260	-80...0 0...260	0.009 °C 0.009 °C + 0.005% RDG	0.012 °C 0.012 °C + 0.006% RDG
Cu10(427)	-200...260	-200...260	0.012 °C	0.16 °C

Measurement channel R3 is operational only when the mains power is connected.

R1 Simulation

SENSOR TYPE	RANGE (°C)	RANGE (°C)	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY (±) ⁽²⁾
Pt50(385)	-200...850	-200...270 270...850	0.055 °C 0.035 °C + 0.008% RDG	0.11 °C 0.11 °C + 0.015% RDG
Pt100(375) Pt100(385) Pt100(389) Pt100(391) Pt100(3926)	-200...850	-200...0 0...850	0.025 °C 0.025 °C + 0.007% RDG	0.05 °C 0.05 °C + 0.014% RDG
Pt100(3923)	-200...600	-200...0 0...600	0.025 °C 0.025 °C + 0.007% RDG	0.05 °C 0.05 °C + 0.014% RDG
Pt200(385)	-200...850	-200...-80 -80...0 0...260 260...850	0.012 °C 0.02 °C 0.02 °C + 0.006% RDG 0.03 °C + 0.011% RDG	0.025 °C 0.035 °C 0.04 °C + 0.011% RDG 0.06 °C + 0.02% RDG
Pt400(385)	-200...850	-200...-100 -100...0 0...850	0.01 °C 0.015 °C 0.027 °C + 0.01% RDG	0.015 °C 0.03 °C 0.05 °C + 0.019% RDG
Pt500(385)	-200...850	-200...-120 -120...-50 -50...0 0...850	0.008 °C 0.012 °C 0.026 °C 0.026 °C + 0.01% RDG	0.015 °C 0.025 °C 0.05 °C 0.05 °C + 0.019% RDG
Pt1000(385)	-200...850	-200...-150 -150...-50 -50...0 0...850	0.006 °C 0.017 °C 0.023 °C 0.023 °C + 0.01% RDG	0.011 °C 0.03 °C 0.043 °C 0.043 °C + 0.019% RDG
Ni100(618)	-60...180	-60...0 0...180	0.021 °C 0.019 °C	0.042 °C 0.037 °C + 0.001% RDG
Ni120(672)	-80...260	-80...0 0...260	0.021 °C 0.019 °C	0.042 °C 0.037 °C + 0.001% RDG
Cu10(427)	-200...260	-200...260	0.26 °C	0.52 °C

For platinum sensors ITS-90 and Callendar van Dusen coefficients can be programmed. Also other RTD types available as option, please contact Beamex.

FEATURE	SPECIFICATION
RTD Measurement current	Pulsed, bi-directional 1 mA (0..500 Ω), 0.2 mA (> 500 Ω)
4-wire connection	Measurement specifications valid
3-wire measurement	Add 10 mΩ
Max resistance excitation current	5 mA (0...650 Ω). $I_{exc} \times R_{sim} < 3.25 \text{ V}$ (650...4000 Ω)
Min resistance excitation current	> 0.2 mA (0...400 Ω). > 0.1 mA (400...4000 Ω)
Simulation settling time with pulsed excitation current	< 1 ms
Supported units	°C, °F, Kelvin, °Ré, °Ra

Internal reference junction TC1 & TC2

RANGE (°C)	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
0...45 °C	±0.10 °C	±0.15 °C

Specifications valid in temperature range: 15...35 °C.

Temperature coefficient outside of 15...35 °C: ±0.005 °C/ °C.

Specifications assumes that calibrator has stabilized in environmental condition, being switched on, for minimum of 90 minutes. For a measurement or simulation done sooner than that, please add uncertainty of 0.15 °C.

In order to calculate the total uncertainty of thermocouple measurement or simulation with internal reference junction used, please add the relevant thermocouple uncertainty and the reference junction uncertainty together as a root sum of the squares.

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VOLTAGE MEASUREMENT

IN (-1...60 V)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
-1.01...1 V	0.001 mV	3 μV + 0.003% RDG	5 μV + 0.006% RDG
1...10 V	0.01 mV	0.125 mV + 0.003% RDG	0.25 mV + 0.006% RDG
10...60.6 V	0.1 mV	0.125 mV + 0.003% RDG	0.25 mV + 0.006% RDG

Input impedance	> 2 MΩ
Supported units	V, mV, μV

TC1 & TC2 (-1...1 V)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
-1.01...1.01 V	0.001 mV	3 μV + 0.004% RDG	4 μV + 0.007% RDG

Input impedance	> 10 MΩ
Supported units	V, mV, μV
Connector	TC1: Universal TC connector , TC2: TC Miniplug

¹⁾ Accuracy includes hysteresis, nonlinearity and repeatability (k=2).

²⁾ Uncertainty includes reference standard uncertainty, hysteresis, nonlinearity, repeatability and typical long term stability for mentioned period (k=2).

VOLTAGE GENERATION

OUT (-3...24 V)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
-3...10 V	0.00001 V	0.05 mV + 0.004% RDG	0.1 mV + 0.007% RDG
10...24 V	0.0001 V	0.05 mV + 0.004% RDG	0.1 mV + 0.007% RDG
Maximum load current		10 mA	
Short circuit current		>100 mA	
Load effect		< 50 μ V/mA	
Supported units		V, mV, μ V	

TC1 (-1...1 V)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
-1...1 V	0.001 mV	3 μ V + 0.004% RDG	4 μ V + 0.007% RDG
Maximum load current		5 mA	
Load effect		< 5 μ V/mA	
Supported units		V, mV, μ V	

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CURRENT MEASUREMENT

IN (-100...100 mA)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
-25...25 mA	0.0001 mA	0.75 μ A + 0.0075% RDG	1 μ A + 0.01% RDG
\pm (25...101 mA)	0.001 mA	0.75 μ A + 0.0075% RDG	1 μ A + 0.01% RDG
Input impedance		< 10 Ω	
Supported units		mA, μ A	
Loop supply		Internal 24 V \pm 10% (max 55 mA), or external max 60 VDC	

CURRENT GENERATION

OUT (0...55 mA)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
0...25 mA	0.0001 mA	0.75 μ A + 0.0075% RDG	1 μ A + 0.01% RDG
25...55 mA	0.001 mA	1.5 μ A + 0.0075% RDG	2 μ A + 0.01% RDG
Internal loop supply		24 V \pm 5%. Max 55 mA.	
Max load impedance w. internal supply		24 V / (generated current). 1140 Ω @ 20 mA, 450 Ω @ 50 mA	
Max external loop supply		60 VDC	
Supported units		mA, μ A	

¹⁾ Accuracy includes hysteresis, nonlinearity and repeatability (k=2).

²⁾ Uncertainty includes reference standard uncertainty, hysteresis, nonlinearity, repeatability and typical long term stability for mentioned period (k=2).

FREQUENCY MEASUREMENT

IN (0.0027...50000 Hz)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
0.0027...0.5 Hz	0.000001 Hz	0.000002 Hz + 0.001% RDG	0.000002 Hz + 0.002% RDG
0.5...5 Hz	0.00001 Hz	0.00002 Hz + 0.001% RDG	0.00002 Hz + 0.002% RDG
5...50 Hz	0.0001 Hz	0.0002 Hz + 0.001% RDG	0.0002 Hz + 0.002% RDG
50...500 Hz	0.001 Hz	0.002 Hz + 0.001% RDG	0.002 Hz + 0.002% RDG
500...5000 Hz	0.01 Hz	0.02 Hz + 0.001% RDG	0.02 Hz + 0.002% RDG
5000...51000 Hz	0.1 Hz	0.2 Hz + 0.001% RDG	0.2 Hz + 0.002% RDG

Input impedance	>1 MΩ
Supported units	Hz, kHz, cph, cpm, 1/Hz(s), 1/kHz(ms), 1/MHz(μs)
Trigger level	Dry contact, wet contact -1...14 V
Minimum signal amplitude	1.0 Vpp (<10kHz), 1.2 Vpp (10...50 kHz)

FREQUENCY GENERATION

OUT (0.0005...50000 Hz)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
0.0005...0.5 Hz	0.000001 Hz	0.000002 Hz + 0.001% RDG	0.000002 Hz + 0.002% RDG
0.5...5 Hz	0.00001 Hz	0.00002 Hz + 0.001% RDG	0.00002 Hz + 0.002% RDG
5...50 Hz	0.0001 Hz	0.0002 Hz + 0.001% RDG	0.0002 Hz + 0.002% RDG
50...500 Hz	0.001 Hz	0.002 Hz + 0.001% RDG	0.002 Hz + 0.002% RDG
500...5000 Hz	0.01 Hz	0.02 Hz + 0.001% RDG	0.02 Hz + 0.002% RDG
5000...50000 Hz	0.1 Hz	0.2 Hz + 0.001% RDG	0.2 Hz + 0.002% RDG

Maximum load current	10 mA
Wave forms	Positive square, symmetric square
Output amplitude positive square wave	0...24 Vpp
Output amplitude symmetric square wave	0...6 Vpp
Duty Cycle	1...99%
Amplitude accuracy	< 5% of amplitude
Supported units	Hz, kHz, cph, cpm, 1/Hz(s), 1/kHz(ms), 1/MHz(μs)

PULSE COUNTING

IN (0...9 999 999 pulses)

FEATURE	SPECIFICATION
Input impedance	>1 MΩ
Trigger level	Dry contact, wet contact -1...14 V
Minimum signal amplitude	1 Vpp (< 10 kHz), 1.2 Vpp (10...50 kHz)
Max frequency	50 kHz
Trigger edge	Rising, falling

¹⁾ Accuracy includes hysteresis, nonlinearity and repeatability (k=2).

²⁾ Uncertainty includes reference standard uncertainty, hysteresis, nonlinearity, repeatability and typical long term stability for mentioned period (k=2).

PULSE GENERATION

OUT (0...9 999 999 pulses)

FEATURE	SPECIFICATION
Resolution	1 pulse
Maximum load current	10 mA
Output amplitude positive pulse	0...24 Vpp
Output amplitude symmetric pulse	0...6 Vpp
Pulse frequency range	0.0005...10000 Hz
Duty cycle	1...99%

RESISTANCE MEASUREMENT

R1 & R2 & R3 (0...4000 Ω)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
-1...100 Ω	0.001 Ω	4.5 mΩ	6 mΩ
100...110 Ω	0.001 Ω	0.0045% RDG	0.006% RDG
110...150 Ω	0.001 Ω	0.005% RDG	0.007% RDG
150...300 Ω	0.001 Ω	0.006% RDG	0.008% RDG
300...400 Ω	0.001 Ω	0.007% RDG	0.009% RDG
400...4040 Ω	0.01 Ω	9 mΩ + 0.008% RDG	12 mΩ + 0.015% RDG

Measurement current	Pulsed, bi-directional 1 mA (0..500 Ω), 0.2 mA (>500 Ω)
Supported units	Ω, kΩ
4-wire connection	Measurement specifications valid
3-wire measurement	Add 10 mΩ

Measurement channel R3 is operational only when the mains power is connected.

RESISTANCE SIMULATION

R1 (0...4000 Ω)

RANGE	RESOLUTION	ACCURACY ⁽¹⁾	1 YEAR UNCERTAINTY ⁽²⁾
0...100 Ω	0.001 Ω	10 mΩ	20 mΩ
100...400 Ω	0.001 Ω	5 mΩ + 0.005% RDG	10 mΩ + 0.01% RDG
400...4000 Ω	0.01 Ω	10 mΩ + 0.008% RDG	20 mΩ + 0.015% RDG

Max resistance excitation current	5 mA (0...650 Ω). $I_{exc} \times R_{sim} < 3.25 \text{ V}$ (650...4000 Ω)
Min resistance excitation current	> 0.2 mA (0...400 Ω). >0.1 mA (400...4000 Ω)
Settling time with pulsed excitation current	< 1ms
Supported units	Ω, kΩ

¹⁾ Accuracy includes hysteresis, nonlinearity and repeatability (k=2).

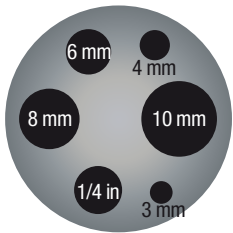
²⁾ Uncertainty includes reference standard uncertainty, hysteresis, nonlinearity, repeatability and typical long term stability for mentioned period (k=2).

Inserts

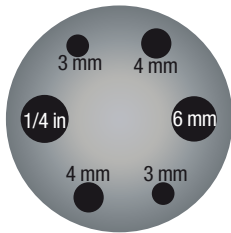
Inserts for MC6-T150

INSERT	DESCRIPTION
MC6-T150 MH1	Multi-hole (3mm, 4mm, 6mm, 8mm, 10mm, 1/4in), comes with two rubber shields
MC6-T150 MH2	Multi-hole (2×3mm, 2×4mm, 6mm, 1/4in), comes with two rubber shields
MC6-T150 MH3	Multi-hole (3×1/4in, 3/16in, 1/8in, 3/8in, 3mm), comes with two rubber shields
MC6-T150 MH4	Multi-hole (2×1/4in, 2×3/16in, 2×3/8in, 3mm), comes with two rubber shields
MC6-T150 B	Blank insert, comes with two blank rubber shields
MC6-T150 S	Special insert. Multiple special inserts available on request, comes with two blank rubber shields
SANITARY BLANK INSERT	Blank insert for short tri-clamp sanitary sensor

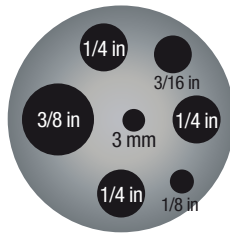
Please contact Beamex for custom inserts.



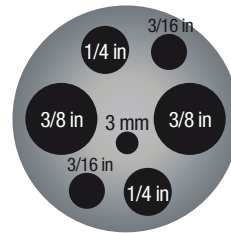
MC6-T150 MH1



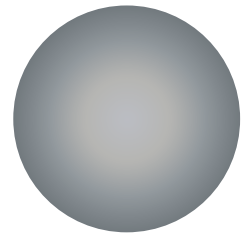
MC6-T150 MH2



MC6-T150 MH3



MC6-T150 MH4



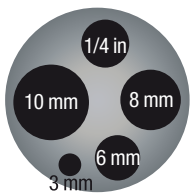
MC6-T150 B

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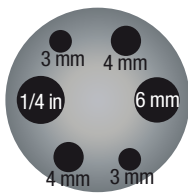
Inserts for MC6-T660

INSERT	DESCRIPTION
MC6-T660 MH1	Multi-hole (3mm, 6mm, 8mm, 10mm, 1/4in)
MC6-T660 MH2	Multi-hole (2×3mm, 2×4mm, 6mm, 1/4in)
MC6-T660 MH3	Multi-hole (2×1/4in, 3/16in, 3/8in, 3mm)
MC6-T660 MH4	Multi-hole (2×1/4in, 2×3/16in, 3/8in, 3mm)
MC6-T660 B	Blank insert
MC6-T660 S	Special insert. Multiple special inserts available on request.

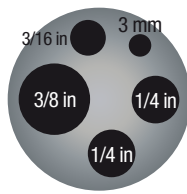
Please contact Beamex for custom inserts.



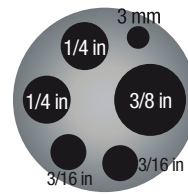
MC6-T660 MH1



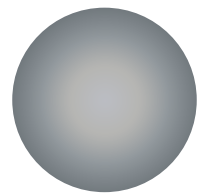
MC6-T660 MH2



MC6-T660 MH3



MC6-T660 MH4



MC6-T660 B

Modularity, options and accessories

MODULARITY AND OPTIONS

- Hardware options:
 - Internal barometric pressure module.
- Firmware options:
 - Data Logger user interface mode
 - HART communicator
 - FOUNDATION Fieldbus communicator
 - Profibus PA communicator
- Pressure and temperature controller communications (please check Beamex for supported models)
- Optional RTD and thermocouple sensor types (please contact Beamex for supported types)



STANDARD ACCESSORIES

- Power cord
- USB cable
- Test clips type 1, 1 pair
- Test clips type 2, 2 pairs
- Test lead Cu-Cu
- Test leads, 3 pairs
- Insert removal tool
- User guide in English
- Accredited calibration certificate

OPTIONAL ACCESSORIES

- Accessory holder kit for MC6-T150
- Accessory holder kit for MC6-T660
- Transport case
- RPRT reference probe
- IPRT Industrial Platinum Resistance Thermometer
- SIRT Short Industrial Resistance Thermometer
- Connector set for barewire applications, 4 pcs.
- Thermocouple plug set, including: R/S, E, J, K, N, T-types. ANSI.
- Thermocouple plug set, including: R/S, E, J, K, N, T-types. IEC.
- Test lead set with 7/8" connector for Foundation Fieldbus.
- Test lead set with M12 connector for Foundation Fieldbus.
- Test lead set with 7/8" connector for Profibus PA.
- Test lead set with M12 connector for Profibus PA.
- EXT pressure module cable.
- Adapter cable to Beamex RPRT sensors, 6-pin female Lemo to banana plugs.
- Adapter cable to MC6 R2-channel or R-model temperature block, Banana plugs to 6-pin male Lemo.



Beamex MC6-T

MULTIFUNCTION TEMPERATURE CALIBRATOR AND COMMUNICATOR

Versatile

The Beamex MC6-T is an extremely versatile portable automated temperature calibration system. It combines a state-of-the-art temperature dry-block with Beamex MC6 multifunction process calibrator technology. It offers versatility, that no other temperature calibrator can match.

Multifunctional

With the ability to generate temperature as well as measure and simulate temperature and electrical signals, it offers a really unique combination of functionality. In addition to temperature calibration abilities, the MC6-T also offers electrical and pressure calibration capability, all in one device.

Great metrological performance

The MC6-T provides superior metrological performance and accuracy for temperature calibrations, while being robust, light and easy to carry field calibrator.

Made for industrial use

The calibrator is designed for industrial environments and it is designed to minimize the impact of varying environmental conditions and AC power fluctuations.

Enhanced usability

A large multilingual color touch screen, combined with numerical and graphical views, provides an easy to use system available in multiple languages.

Field communicator

The MC6-T has a built-in field communicator for HART, FOUNDATION Fieldbus H1 and Profibus PA instruments. This enables calibration, configuration and trimming of modern smart instruments with a single device, without the need to carry a separate field communicator.

Documenting calibrator

MC6-T is a documenting calibrator that communicates with calibration management software to enable a fully digitalized, paperless calibration process and documentation database.



Main features

- ▶ Versatile temperature calibration system
- ▶ Excellent accuracy and metrological performance
- ▶ Great usability
- ▶ Extensive process calibrator functionality
- ▶ Made for industrial field use
- ▶ Includes a multibus field communicator
- ▶ Automatic documenting calibrator – digitalize your calibration process

