Beamex MC6

ADVANCED FIELD CALIBRATOR AND COMMUNICATOR

The impossible made possible:
combining advanced functionality with ease-of-use

HART COMMUNICATION PROTOCOL
PROFIBUS
CMX
LOGiCAL

beamex
A BETTER WAY TO CALIBRATE

The impossible made possible: combining advanced functionality with ease-of-use

Beamex MC6 is an advanced, high-accuracy field calibrator and communicator. It offers calibration capabilities for pressure, temperature and various electrical signals. The MC6 also contains a fieldbus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments.

The usability and ease-of-use are among the main features of the MC6. It has a large 5.7" color touch-screen with a multilingual user interface. The robust IP65-rated dust- and water-proof casing, ergonomic design and light weight make it an ideal measurement device for field use in various industries, such as the pharmaceutical, energy, oil and gas, food and beverage, service as well as the petrochemical and chemical industries.

The MC6 is one device with five different operational modes, which means that it is fast and easy to use, and you can carry less equipment in the field. The operation modes are: meter, calibrator, documenting calibrator, data logger and fieldbus communicator. In addition, the MC6 communicates with Beamex CMX calibration software, enabling fully automated and paperless calibration and documentation.

In conclusion, the MC6 is more than a calibrator.

MC6 main features

Accuracy

High-accuracy, advanced field calibrator and communicator.

Usability

Combines advanced functionality with ease-of-use.

Versatility

Versatile functionality beyond traditional calibration applications.

Communicator

Multi-bus communicator for HART,
FOUNDATION Fieldbus and Profibus PA instruments.

Integration

Automates calibration procedures for paperless calibration management.


beamex
RTD / FF
12:09
RTD Temperature
25.00
25.02

High-accuracy, advanced field calibrator and communicator

Accredited calibration certificate as standard

Each MC6 is delivered with a traceable, accredited calibration certificate as standard. The certificate includes calibration and uncertainty data from the calibration laboratory. The calibration laboratory's Scope of Accreditation can be found on Beamex's website (www.beamex.com).

Summary of accuracy figures

The MC6 has specifications for short-term accuracy and for 1-year total uncertainty. Brief summary of the accuracy figures:

- Pressure accuracy starting from ±(0.005% FS + 0.0125% of reading).
- Temperature – RTD temperature measurement accuracy starting from ±0.011 °C.
- Electric – current measurement accuracy starting from ±(0.75 µA + 0.0075% of reading).

Designed for field use

User-friendly interface

The MC6 has a large 5.7" color touch-screen with high resolution and an effective adjustable backlight. In addition, the MC6 has a membrane keypad. A soft number keypad and alphabetical QWERTY text keypad will appear whenever necessary for easy number/text entries.

Robust, lightweight and ergonomic design

The MC6 has rechargeable lithium-ion polymer batteries, which are durable and charge up quickly. The user interface keeps you up to date on the remaining operation time in hours and minutes, making it easy to follow how long the battery will last. Once the unit is switched on, it is ready to use in just a few seconds. The case is ergonomic and water-/dust-proof (IP65). There are two types of cases available: a slim case when internal pressure modules are not needed and an extended version, which provides room for the internal pressure modules.

USER-INTERFACE **MODES**

1. Meter

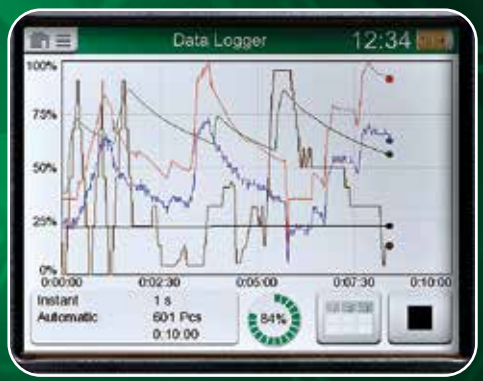
The meter mode is designed for simple and easy measurement of signals. Oftentimes, you may need to measure something quickly and easily. Often a simple multi-meter is used for this purpose, as it is easy to use. Some multifunctional calibrators may be too slow and difficult to use, so it is easier to just choose the simpler meter. The meter mode in MC6 is optimized for this type of simple and easy metering.

2. Calibrator

The calibrator mode is designed for calibrating various process instruments. Oftentimes, you need to check and calibrate a certain process instrument/transmitter. Transmitters typically have an input and an output. So you either need to have two devices, or a device capable of doing two things simultaneously. The calibrator mode in MC6 is optimized for this type of use.

3. Data logger

The data logger is designed for logging various measurement results. Often in industry, there is a need to measure signals for shorter or longer periods and to save the results in a 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.



4. Documenting calibrator

The documenting calibrator mode is designed for the process instrument calibration and documenting of the calibration results. In today's process plant, calibrations often have to be documented. Without a documenting calibrator, documentation must be done manually, which takes a lot of precious time and is prone to error. The documenting calibrator mode in MC6 is optimized for use as a documenting process calibrator.

5. Communicator

The communicator mode is designed to communicate with Fieldbus instruments. In today's process plants, smart instrumentation is being used to an increasing degree. Therefore, engineers need to use communicators or configuration software. Most of this instrumentation is HART, FOUNDATION Fieldbus or Profibus PA. The communicator mode in MC6 is optimized for communicator use.

6. Settings

The settings mode allows you to edit the calibrator's various settings.


All Terminals, Max Input: 60 VDC, 30 VAC, 100 mA
Pressure
12:34
beamex

Multi-bus field communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments

Communicator

The communicator mode is a multi-bus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments. All of the communicator electronics for all protocols are built into the MC6, including internal loop power supply with various required impedances for different buses, which means there is no need to use any external loop supply or resistors.

Multi-bus communicator

The MC6 communicator can be used with all types of fieldbus instruments, not only pressure and temperature transmitters. All 3 protocols can be simultaneously installed into an MC6, and therefore the very same device can be used as a HART, FOUNDATION Fieldbus and Profibus PA communicator. With the MC6, you can access all parameters in all blocks of a fieldbus instrument. Its memory stores device descriptions for the fieldbus instruments. When new instruments are introduced on the market, new device description files will be made available and can be easily downloaded into the memory.

Additional features

FEATURE	SPECIFICATION
Scaling	A versatile programmable scaling function allows user to scale any measurement or generation unit into any other unit. Supports also rooting transfer function for flow applications. Also, custom units and custom transfer functions are supported.
Alarm	An alarm that can be programmed with high or low limit, as well as slow rate or fast rate limit.
Leak test	A dedicated function that can be used to analyse a change in any measurement. Can be used for pressure leak testing as well as any stability testing.
Damping	A programmable damping allows user to filter any measurement.
Resolution	Possibility to change the resolution of any measurement by reducing or adding decimals.
Step	A programmable step function for any generation or simulation.
Ramp	A programmable ramp function for any generation or simulation.
Quick access	Possibility to set five (5) quick access buttons in generation to easily generate the programmed values.
Spinner	Possibility to easily step any digit in the generation value up or down.
Additional info	Allow user to see additional information in the screen such as: min, max, rate, average, internal temperature, RTD sensor's resistance, thermocouple's thermovoltage, range min/max, etc.
Function info	Displays more information on the selected function.
Connection diagrams	Displays a picture showing where to connect the test leads with the selected function.
Calibration references	Allows you to document the additional references that were used during the calibration and passes on the information to Beamex CMX calibration software.
Users	Possibility to create a list of persons in the documenting calibrator in order to easily select who did the calibration.
Custom pressure unit	Large number of custom pressure units can be created.
Custom RTD sensor	Unlimited number of custom RTD sensors can be created using the Callendar van Dusen coefficients.
Custom point sets	Unlimited number of custom point sets can be created in calibration of an instrument, or step generation.
Custom transfer function	Unlimited number of custom transfer functions can be created in calibration of an instrument or in scaling function.

Note: All functions are not available in all user interface modes.

Specifications

GENERAL SPECIFICATIONS

FEATURE	VALUE
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
Weight	Extended case: 1.5…2.0 kg (3.3…4.4 lb) Flat case: 1.5 kg (3.3 lb)
Dimensions	Extended case: 200 mm × 230 mm × 70 mm (D × W × H) (7.87 in × 9.06 in × 2.76 in) Flat case: 200 mm × 230 mm × 57 mm (D × W × H) (7.87 in × 9.06 in × 2.24 in)
Battery type	Rechargeable lithium-ion polymer, 4200 mAh, 11.1V
Charging time	Approximately 4 hours
Charger supply	100…240 VAC, 50–60 Hz
Battery operation	10…16 hours
Operating temperature	–10…45 °C (14…113 °F)
Operating temperature while charging batteries	0…30 °C (32…86 °F)
Storage temperature	–20…60 °C (–4…140 °F)
Specifications valid	–10…45 °C, unless other mentioned
Humidity	0…80% R.H. non condensing
Warmup time	Specifications valid after a 5 minute warmup period.
Max. input voltage	30 V AC, 60 V DC
Display update rate	3 readings/second
Safety	Directive 2014/35/EU, EN 61010-1:2010
EMC	Directive 2014/30/EU, EN 61326-1:2013
Ingress protection	IP65
RoHS compliance	ROHS II Directive 2011/65/EU, EN 50581:2012
Drop	IEC 60068-2-32. 1 meter (3.28 ft)
Vibration	IEC 60068-2-64. Random, 2 g, 5…500 Hz
Max altitude	3,000 m (9,842 ft)
Warranty	Warranty 3 Years. 1 year for battery pack. Warranty extension programs are also available.

MEASUREMENT, GENERATION AND SIMULATION FUNCTIONS

- Pressure measurement (internal/external pressure modules)
- Voltage measurement (±1 V and –1…60 VDC)
- Current measurement (±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 (±1 V and –3…24 VDC)
- Current generation (0…55 mA) (active/passive, i.e. Internal or external supply)
- Resistance measurement, two simultaneous channels (0…4 kΩ)
- Resistance simulation (0…4 kΩ)
- RTD measurement, two 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)

PRESSURE MEASUREMENT

INTERNAL MODULES	EXTERNAL MODULES	UNIT	RANGE [3]	RESOLUTION	ACCURACY [1] (±)	1 YEAR UNCERTAINTY (±) [2]
PB	EXT B	kPa a mbar a psi a	70 to 120 700 to 1200 10.15 to 17.4	0.01 0.1 0.001	0.03 kPa 0.3 mbar 0.0044 psi	0.05 kPa 0.5 mbar 0.0073 psi
P10mD	EXT10mD	kPa diff mbar diff iwc diff	±1 ±10 ±4	0.0001 0.001 0.001	0.05% Span	0.05% Span + 0.1% RDG
P100m	EXT100m	kPa mbar iwc	0 to 10 0 to 100 0 to 40	0.0001 0.001 0.001	0.015% FS + 0.0125% RDG	0.025% FS + 0.025% RDG
P400mC	EXT400mC	kPa mbar iwc	±40 ±400 ±160	0.001 0.01 0.001	0.01% FS + 0.0125% RDG	0.02% FS + 0.025% RDG
P1C	EXT1C	kPa bar psi	±100 ±1 –14.5 to 15	0.001 0.00001 0.0001	0.007% FS + 0.0125% RDG	0.015% FS + 0.025% RDG
P2C	EXT2C	kPa bar psi	–100 to 200 –1 to 2 –14.5 to 30	0.001 0.00001 0.0001	0.005% FS + 0.01% RDG	0.01% FS + 0.025% RDG
P6C	EXT6C	kPa bar psi	–100 to 600 –1 to 6 –14.5 to 90	0.01 0.0001 0.001	0.005% FS + 0.01% RDG	0.01% FS + 0.025% RDG
P20C	EXT20C	kPa bar psi	–100 to 2000 –1 to 20 –14.5 to 300	0.01 0.0001 0.001	0.005% FS + 0.01% RDG	0.01% FS + 0.025% RDG
P60	EXT60	kPa bar psi	0 to 6000 0 to 60 0 to 900	0.1 0.001 0.01	0.005% FS + 0.0125% RDG	0.01% FS + 0.025% RDG
P100	EXT100	MPa bar psi	0 to 10 0 to 100 0 to 1500	0.0001 0.001 0.01	0.005% FS + 0.0125% RDG	0.01% FS + 0.025% RDG
P160	EXT160	MPa bar psi	0 to 16 0 to 160 0 to 2400	0.0001 0.001 0.01	0.005% FS + 0.0125% RDG	0.01% FS + 0.025% RDG
–	EXT250	MPa bar psi	0 to 25 0 to 250 0 to 3700	0.001 0.01 0.1	0.007% FS + 0.0125% RDG	0.015% FS + 0.025% RDG
–	EXT600	MPa bar psi	0 to 60 0 to 600 0 to 9000	0.001 0.01 0.1	0.007% FS + 0.01% RDG	0.015% FS + 0.025% RDG
–	EXT1000	MPa bar psi	0 to 100 0 to 1000 0 to 15000	0.001 0.01 0.1	0.007% FS + 0.01% RDG	0.015% FS + 0.025% RDG

[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] Every internal/external gauge pressure module's range may be displayed also in absolute pressure if the barometric module (PB or EXT B) is installed/connected.

Maximum number of internal pressure modules is 3 gauge/differential pressure modules and one barometric (PB) module in the extended case. The flat case has room for internal barometric module only. Both cases have connection for external pressure modules.

External pressure modules are also compatible with Beamex MC2, MC4 and MC5 family calibrators.

SUPPORTED PRESSURE UNITS
Pa, kPa, hPa, MPa, mbar, bar, gf/cm², kgf/cm², kgf/m², kp/cm², lbf/ft², psi, at, torr, atm, ozf/in², iwc, inH2O, ftH2O, mmH$_2$O, cmH$_2$O, mH$_2$O, mmHg, cmHg, mHg, inHg, mmHg(0 °C), inHg(0 °C), mmH$_2$O(60°F), mmH$_2$O(68°F), mmH$_2$O (4 °C), cmH$_2$O(60°F), cmH$_2$O(68°F), cmH$_2$O(4 °C), inH$_2$O(60°F), inH$_2$O(68°F), inH$_2$O(4 °C), ftH$_2$O(60°F), ftH$_2$O(68°F), ftH$_2$O(4 °C).
Large number of user pressure units can be created.

TEMPERATURE COEFFICIENT
<±0.001% RDG/ °C outside 15–35 °C (59–95 °F).
P10mD / EXT10mD: < ±0.002% Span/ °C outside 15–35 °C (59–95 °F)

MAX OVERPRESSURE
2 times the nominal pressure. Except following modules;
PB/EXTB: 1200 mbar abs (35.4 inHg abs). P10mD/EXT10mD: 200 mbar (80 iwc).
EXT600: 900 bar (13000 psi). EXT1000: 1000 bar (15000 Psi).

PRESSURE MEDIA
Modules up to P6C/EXT6C: dry clean air or other clean, inert, non-toxic, non-corrosive gases. Modules P20C/EXT20C and higher: clean, inert, non-toxic, non-corrosive gases or liquids.

WETTED PARTS
AISI316 stainless steel, Hastelloy, Nitrile rubber

PRESSURE CONNECTION
PB/EXTB: M5 (10/32") female.
P10mD/EXT10mD: Two M5 (10/32") female threads with hose nipples included.
P100m/EXT100m to P20C/EXT20C: G1/8" (ISO228/1) female. A conical 1/8" BSP male with 60° internal cone adapter included for Beamex hose set.
P60, P100, P160: G1/8" (ISO228/1) female.
EXT60 to EXT1000: G ¼" (ISO228/1) male.

TC MEASUREMENT & SIMULATION

TC1 measurement & simulation / TC2 measurement

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

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). Iexc × Rsim < 3.25 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]
–10…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.

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…60.6 V	0.01 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 µV/mA
Supported units	V, mV, µV

TC1 (–1…1 V)

RANGE	RESOLUTION	ACCURACY [1]	1 YEAR UNCERTAINTY [2]
–1…1 V	0.001 mV	3 µV + 0.004% RDG	4 µV + 0.007% RDG

Maximum load current	5 mA
Load effect	< 5 µV/mA
Supported units	V, mV, µV

CURRENT MEASUREMENT

IN (-100…100 mA)

RANGE	RESOLUTION	ACCURACY [1]	1 YEAR UNCERTAINTY [2]
–25…25 mA	0.0001 mA	0.75 µA + 0.0075% RDG	1 µA + 0.01% RDG
±(25…101 mA)	0.001 mA	0.75 µA + 0.0075% RDG	1 µA + 0.01% RDG

Input impedance	< 10 Ω
Supported units	mA, µA
Loop supply	Internal 24 V ±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 µA + 0.0075% RDG	1 µA + 0.01% RDG
25…55 mA	0.001 mA	1.5 µA + 0.0075% RDG	2 µA + 0.01% RDG

Internal loop supply	24 V ±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, µA

[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…51000 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
Vawe 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 (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

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). Iexc × Rsim < 3.25 V (650…4000 Ω)
Min resistance excitation current	> 0.2 mA (0…400 Ω). >0.1 mA (400…4000 Ω)
Settling time with pulsed exitation 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).

Modularity, options and accessories

MODULARITY AND OPTIONS

- All electrical / temperature functions are included as standard
- Two case bottom choices:
  – flat (no room for internal pressure modules, only barometer)
  – extended (room for internal pressure modules)
- Optional internal pressure modules (up to four internal pressure modules; three standard and one barometric)
- Optional user-interface modes:
  – Documenting calibrator
  – Data logger
  – HART communicator
  – FOUNDATION Fieldbus communicator
  – Profibus PA communicator
- Pressure / temperature controller communications

STANDARD ACCESSORIES

- Accredited calibration certificate
- User guide
- Computer cable (USB)
- Battery charger / eliminator
- Internal LiPO battery pack
- Test leads and clips

OPTIONAL ACCESSORIES

- Soft carrying case
- Soft accessory case
- Hard carrying case
- Spare battery pack
- Adapter cables for the second RTD channel
- Cable for pressure and temperature controllers
- Appropriate pressure T-hose
  with internal low pressure modules

SUMMARY

Beamex MC6

ADVANCED FIELD CALIBRATOR AND COMMUNICATOR

Beamex MC6 is an advanced, high-accuracy field calibrator and communicator. It offers calibration capabilities for pressure, temperature and various electrical signals. The MC6 also contains a full fieldbus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments. The MC6 is one device with five different operational modes, which means that it is fast and easy to use, and you can carry less equipment in the field. The operation modes are: meter, calibrator, documenting calibrator, data logger and fieldbus communicator. In addition, the MC6 communicates with Beamex CMX calibration software, enabling fully automated and paperless calibration and documentation.

Guided procedures

The MC6 provides automated, guided procedures. For instance, whenever a certain measurement or generation is selected, the user interface shows where to make the connections.

Paperless calibration

The MC6 communicates with calibration software enabling fully automated and paperless calibration and documentation.

One device, five operational modes

How is it possible to combine advanced functionality with ease-of-use? In the MC6 this has been achieved through integrating various operational modes into one device. This means that you only need to learn how to use one device.

Communicator

Smart instrumentation is becoming more and more common in today's process plants. The most widely used smart instrument protocols are HART, FOUNDATION Fieldbus and Profibus PA. Therefore, in addition to a calibrator, an engineer often needs to use a field communicator. The MC6 combines these two; it's a calibrator and a communicator.

Main features

- High-accuracy calibrator for pressure, temperature and electrical signals
- Full multi-bus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments
- Five operational modes: meter, calibrator, documenting calibrator, data logger and communicator
- Combines advanced functionality with ease-of-use
- Automates calibration procedures for paperless calibration management