Beamex MC6-Ex

INTRINSICALLY SAFE ADVANCED FIELD CALIBRATOR AND COMMUNICATOR

The world's most accurate documenting calibrator and communicator for hazardous areas

HART COMMUNICATION PROTOCOL
FOUNDATION fieldbus
PROFIBUS
CMX
LOGiCAL
Ex
IEC
IECEx
SGS
beamex
A BETTER WAY TO CALIBRATE

Made for extreme environments

MC6-Ex: designed for use in extreme environments

No other Ex-calibrator can outperform the MC6-Ex in terms of functionality and accuracy. The ATEX, IECEx and North American certified MC6-Ex is designed for use in potentially explosive environments, such as offshore and on-shore oil and gas platforms, oil refineries, chemical and petrochemical plants where inflammable gases may be present. It can also be used in the pharmaceutical industry, within energy production and gas processing industry.

With MC6-Ex no hot-work permits are needed nor additional safety equipment, such as gas detectors. The risk of harming other Ex equipment or damaging their safety protection circuits are limited. MC6-Ex is a very safe and easy choice when entering any hazardous zone, as it is approved for the tightest zone, Zone 0.

The MC6-Ex is an advanced, high-accuracy calibrator and communicator with outstanding functionality. It is a documenting, multifunction calibrator and communicator that offers calibration capabilities for pressure, temperature and various electrical signals. It also contains a fieldbus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments.

The robust IP65-rated dust- and water-proof casing, ergonomic design and ease-of-use make it an ideal measurement device for field use. The smart battery pack is field replaceable NiMH and it can be charged either inside or outside the calibrator. The MC6-Ex 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-Ex communicates with Beamex LOGiCAL cloud-based calibration software and CMX calibration management software, enabling fully automated and paperless calibration and documentation. The MC6-Ex can also be part of the paperless integration to the customer's own ERP system.

Main features of MC6-Ex

Accuracy

High-accuracy, advanced field calibrator and communicator.

Usability

Combines advanced functionality with ease-of-use.

Safety

Approved for Ex ia IIC T4 Ga – classification.

Versatility

Versatile functionality beyond traditional calibration applications.

Communicator

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

Internal loop supply

MC6-Ex features an internal loop supply for transmitters, so no additional supplies are needed.

Integration

Automates calibration procedures for paperless calibration management.


TC1
TC2
R1
OUT
IN
SUPPLY
Ω
RTD
MEAS.
SENSE
3W
V, mA
Hz
V, Hz
HART
FF, PA
Com
mA
TC, mV
See user manual for input and output parameters
II 1 G
Meter
Calibrator
Documenting
Calibrator
15:05
7:56
Data Logger
Communicator
Settings
beamex
MC6-Ex

Additional features

Accuracy guaranteed

The MC6-Ex is probably the most accurate advanced process calibrator and communicator available. As proof of this, each MC6-Ex calibrator 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). The MC6-Ex has specifications for 1-year total uncertainty.

1 Year Uncertainty figures:

- Pressure uncertainty starting from ±(0.01 % FS + 0.025 % of reading).
- Temperature – RTD temperature measurement uncertainty starting from ±0.015 °C.
- Electrical – current measurement uncertainty starting from ±(1 µA + 0.01 % of reading).

Safe calibration in extreme environments

The MC6-Ex is an intrinsically safe, ATEX, IECEx and North American certified Ex ia IIC T4 Ga – classified advanced multifunction field calibrator. It is designed for use in extreme environments, such as offshore platforms, oil refineries, chemical and petrochemical plants where inflammable gases may be present. The robust IP65-rated dust- and water-proof casing, along with integrated impact protectors, makes the MC6-Ex an ideal calibrator for use in wet and dusty environments subject to wide temperature variations.

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

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-Ex, 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.

The MC6-Ex **multi-bus 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-Ex, and therefore the very same device can be used as a HART, FOUNDATION Fieldbus and Profibus PA communicator. With the MC6-Ex, all parameters in all blocks of a fieldbus instrument can be accessed. 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.

Communication with calibration software

Using the MC6-Ex together with calibration management software provides a complete documenting calibration system that produces calibration certificates automatically. The benefits of the system include automated calibration procedures and paperless calibration management. The MC6-Ex can also be part of the paperless integration to the customer's own ERP system.

User-friendly interface

The MC6-Ex has a large 5.7" color touch-screen with high resolution and an effective adjustable backlight. In addition, the MC6-Ex has a membrane keypad. A soft number keypad and alphabetical QWERTY text keypad will appear whenever necessary for easy number/text entries. The smart battery pack is field replaceable NiMH and it can be charged either inside or outside the calibrator.

Modularity means versatility

The MC6-Ex is an extremely versatile calibrator with many different functions. The modular construction of the MC6-Ex provides flexibility for the user. It 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.

Automated temperature and pressure calibrations

The MC6-Ex can communicate with selected pressure controllers and temperature dry-blocks to automate calibrations. MC6-Ex can send setpoints to controllers and read the output from the device under test automatically. Controllers can be used only in safe area.

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

GENERAL			
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	2.5…2.9 kg (5.5…6.4 lb)		
Dimensions	207 mm x 231 mm x 80 mm (D x W x H)		
Battery Pack type	Rechargeable NiMh, 4200 mAh, 9.6 V		
Charging time	10 hours from 0 to 100% at 0…30 °C (32…86 °F)		
Charger supply	100…240 VAC, 50–60 Hz		
Battery operation	4…8 h (Heavy / Normal usage)		
Operating temperature	–10…50 °C		
Operating temperature while charging batteries	0…40 °C		
Storage temperature	–20…60 °C		
Specifications valid	–10…50 °C, unless other mentioned		
Humidity	0 to 80% R.H. non condensing		
Warmup time	Specifications valid after a 5 minute warmup period		
Max. input voltage	30 V AC, 30 V DC		
Ex Safety	ATEX directive 2014/34/EU		
Ex marking	⟨Ex⟩ II 1 G	Ex ia IIC T4 Ga	Ta = –10 °C…+50 °C
Ex marking (North America):	Class I, Zone 0, AEx ia IIC T4 GA Class I, Division 1, Groups A-D, T4 Tamb –10 °C to +50 °C, Intrinsically Safe, Sécurité intrinsèque		
ATEX Certification	EN 60079-0:2012/A11:2013	EN 60079-11:2012	Certificate No. EESF 18 ATEX 071X
IEC Certification	IEC 60079-0:2017, Edition:7.0	IEC 60079-11:2011, Edition:6.0	Certificate No. IECEx EESF 18.0033X
North American Certification (SGS):	UL 913, 8th Ed. Rev. October 16, 2015 UL 60079-0 6th Ed. Rev. July 26, 2013 CAN/CSA C22.2 No. 60079-0:15 Rev. October 2015 UL 60079-11, 6th Ed. 02/15/2013 CAN/CSA C22.2 No. 60079-11:14 Certificate No SGSNA/18/SUW00222		
Rohs Compliance	RoHS II Directive 2011/65/EU, EN 50581:2012		
Safety	Directive 2014/30/EU, EN 61010-1:2010, EN 61010-2-030:2010		
EMC	Directive 2014/30/EU, EN 61326-1:2013, EN 61000-3-2-:2014, EN 61000-3-3:2013		
Ingress protection	IP 65, IEC/EN 60529		
Drop test	1 meter drop test		
Max Altitude	3000 m (9842 ft)		
Display update rate	3 / second		
Warranty	Warranty 3 years. 1 year for battery pack. Additional warranty extension programs available.		

MEASUREMENT, GENERATION AND SIMULATION FUNCTIONS

- Pressure measurement (internal/external pressure modules)
- Voltage measurement (±500 mV and ±30 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 loop supply
- Voltage generation (±500 mV and –1.5…10.5 VDC)
- Current generation (0…25 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…3 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 [2]	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
PB-Ex	EXT B-IS	kPa a mbar a psi a	70 to 120 700 to 1200 10.15 to 17.4	0.01 0.1 0.001	0.05 kPa 0.5 mbar 0.0073 psi
P10mD-Ex	EXT10mD-IS	kPa diff mbar diff iwc diff	±1 ±10 ±4	0.0001 0.001 0.001	0.05% Span + 0.1% RDG
P100m-Ex	EXT100m-IS	kPa mbar iwc	0 to 10 0 to 100 0 to 40	0.0001 0.001 0.001	0.025% FS + 0.025% RDG
P400mC-Ex	EXT400mC-IS	kPa mbar iwc	±40 ±400 ±160	0.001 0.01 0.001	0.02% FS + 0.025% RDG
P1C-Ex	EXT1C-IS	kPa bar psi	±100 ±1 –14.5 to 15	0.001 0.00001 0.0001	0.015% FS + 0.025% RDG
P2C-Ex	EXT2C-IS	kPa bar psi	–100 to 200 –1 to 2 –14.5 to 30	0.001 0.00001 0.0001	0.01% FS + 0.025% RDG
P6C-Ex	EXT6C-IS	kPa bar psi	–100 to 600 –1 to 6 –14.5 to 90	0.01 0.0001 0.001	0.01% FS + 0.025% RDG
P20C-Ex	EXT20C-IS	kPa bar psi	–100 to 2000 –1 to 20 –14.5 to 300	0.01 0.0001 0.001	0.01% FS + 0.025% RDG
P60-Ex	EXT60-IS	kPa bar psi	0 to 6000 0 to 60 0 to 900	0.1 0.001 0.01	0.01% FS + 0.025% RDG
P100-Ex	EXT100-IS	MPa bar psi	0 to 10 0 to 100 0 to 1500	0.0001 0.001 0.01	0.01% FS + 0.025% RDG
P160-Ex	EXT160-IS	MPa bar psi	0 to 16 0 to 160 0 to 2400	0.0001 0.001 0.01	0.01% FS + 0.025% RDG
–	EXT250-IS	MPa bar psi	0 to 25 0 to 250 0 to 3700	0.001 0.01 0.1	0.015% FS + 0.025% RDG
–	EXT600-IS	MPa bar psi	0 to 60 0 to 600 0 to 9000	0.001 0.01 0.1	0.015% FS + 0.025% RDG
–	EXT1000-IS	MPa bar psi	0 to 100 0 to 1000 0 to 15000	0.001 0.01 0.1	0.015% FS + 0.025% RDG

[1] Uncertainty includes reference standard uncertainty, hysteresis, nonlinearity, repeatability and typical long term stability for mentioned period (k=2).
[2] 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 2 gauge/differential pressure modules and one barometric (PB) module.
There is a connection for external pressure modules.

SUPPORTED PRESSURE UNITS
Pa, kPa, hPa, MPa, mbar, bar, gf/cm^2, kgf/cm^2, kgf/m^2, kp/cm^2, lbf/ft^2, psi, at, torr, atm, ozf/in^2, 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)	1 YEAR UNCERTAINTY (±) [1]
B[2]	0…1820	0…200 200…500 500…800 800…1820	[3] 2.0 °C 0.8 °C 0.5 °C
R[2]	–50…1768	–50…0 0…150 150…400 400…1768	1.0 °C 0.7 °C 0.45 °C 0.4 °C
S[2]	–50…1768	–50…0 0…100 100…300 300…1768	0.9 °C 0.7 °C 0.55 °C 0.45 °C
E[2]	–270…1000	–270…-200 –200…0 0…1000	[3] 0.07 °C + 0.06% RDG 0.07 °C + 0.005% RDG
J[2]	–210…1200	–210…–200 –200…0 0…1200	[3] 0.08 °C + 0.06% RDG 0.08 °C + 0.006% RDG
K[2]	–270…1372	–270…–200 –200…0 0…1000 1000…1372	[3] 0.1 °C + 0.1% RDG 0.1 °C + 0.007% RDG 0.017% RDG
N[2]	–270…1300	–270…–200 –200…–100 –100…0 0…800 800…1300	[3] 0.2% RDG 0.15 °C + 0.05% RDG 0.15 °C 0.07 °C + 0.01% RDG
T[2]	–270…400	–270…–200 –200…0 0…400	[3] 0.1 °C + 0.1% RDG 0.1 °C
U[4]	–200…600	–200…0 0…600	0.1 °C + 0.07% RDG 0.1 °C
L[4]	–200…900	–200…0 0…900	0.08 °C + 0.04% RDG 0.08 °C + 0.005% RDG
C[5]	0…2315	0…1000 1000…2315	0.3 °C 0.027% RDG
G[6]	0…2315	0…60 60…200 200…400 400…1500 1500…2315	[3] 1.0 °C 0.5 °C 0.3 °C 0.02% RDG
D[5]	0…2315	0…140 140…1200 1200…2100 2100…2315	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) Uncertainty includes reference standard uncertainty, hysteresis, nonlinearity, repeatability and typical long term stability for mentioned period (k=2).
2) IEC 60584, NIST MN 175, BS 4937, ANSI MC96.1
3) ±0.007% of thermovoltage + 4 µV
4) DIN 43710
5) ASTM E 988 - 96
6) ASTM E 1751 - 95e1

Measurement input impedance	> 10 MΩ
Simulation maximum load current	1 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)	1 YEAR UNCERTAINTY (±) [1]
Pt50(385)	–200…850	–200…270 270…850	0.03 °C 0.012% RDG
Pt100(375) Pt100(385) Pt100(389) Pt100(391) Pt100(3926)	–200…850	–200…0 0…850	0.015 °C 0.015 °C + 0.012% RDG
Pt100(3923)	–200…600	–200…0 0…600	0.015 °C 0.015 °C + 0.012% RDG
Pt200(385)	–200…850	–200…–80 –80…0 0…260 260…850	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	0.01 °C 0.02 °C 0.045 °C + 0.019% RDG
Pt500(385)	–200…850	–200…–120 –120…–50 –50…0 0…850	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	0.008 °C 0.03 °C 0.04 °C 0.04 °C + 0.019% RDG
Ni100(618)	–60…180	–60…0 0…180	0.012 °C 0.012 °C + 0.006% RDG
Ni120(672)	–80…260	–80…0 0…260	0.012 °C 0.012 °C + 0.006% RDG
Cu10(427)	–200…260	–200…260	0.16 °C

R1 Simulation

SENSOR TYPE	RANGE (°C)	RANGE (°C)	1 YEAR UNCERTAINTY (±) [1]
Pt50(385)	–200…850	–200…270 270…850	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	0.05 °C 0.05 °C + 0.014% RDG
Pt100(3923)	–200…600	–200…0 0…600	0.05 °C 0.05 °C + 0.014% RDG
Pt200(385)	–200…850	–200…–80 –80…0 0…260 260…850	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	0.015 °C 0.03 °C 0.05 °C + 0.019% RDG
Pt500(385)	–200…850	–200…–120 –120…–50 –50…0 0…850	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	0.011 °C 0.03 °C 0.043 °C 0.043 °C + 0.019% RDG
Ni100(618)	–60…180	–60…0 0…180	0.042 °C 0.037 °C + 0.001% RDG
Ni120(672)	–80…260	–80…0 0…260	0.042 °C 0.037 °C + 0.001% RDG
Cu10(427)	–200 …260	–200…260	0.52 °C

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

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

FEATURE	SPECIFICATION
RTD Measurement current	Pulsed, bi-directional 0.2 mA
4-wire connection	Measurement specifications valid
3-wire measurement	Add 13.5 mΩ
Max resistance excitation current	2 mA (0…200 Ω), 1 mA (200…400 Ω), 0.5 mA (400…2000 Ω), 0.25 mA (2000…4000 Ω). Iexc × Rsim < 1.0 V
Min resistance excitation current	≥ 0.1 mA
Simulation settling time with pulsed excitation current	< 2 ms
Supported units	°C, °F, Kelvin, °Ré, °Ra

INTERNAL REFERENCE JUNCTION

TC1 & TC2

RANGE	1 YEAR UNCERTAINTY (±) [1]
–10…50 °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 Internal Reference Junction uncertainty together as a root sum of the squares.

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

VOLTAGE MEASUREMENT

IN (–30…30 V)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
–30.3 V…–5 V	0.0001 V	0.25 mV + 0.006% RDG
–5 V…–500 mV	0.00001 V	0.25 mV + 0.006% RDG
–500 mV…+500 mV	0.000001 V	5 uV + 0.006% RDG
+500 mV…+5 V	0.00001 V	0.25 mV + 0.006% RDG
+5 V…+30.3 V	0.0001 V	0.25 mV + 0.006% RDG

FEATURE	SPECIFICATION
Input impedance	> 1 MΩ
Supported units	V, mV, µV

CURRENT MEASUREMENT

IN (–100…100 mA)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
–101…–25 mA	0.001 mA	1 uA + 0.01% RDG
–25…25 mA	0.0001 mA	1 uA + 0.01% RDG
+25…+101 mA	0.001 mA	1 uA + 0.01% RDG

FEATURE	SPECIFICATION
Input impedance	< 10 Ω
Supported units	mA, µA

INTERNAL LOOP SUPPLY

FEATURE	SPECIFICATION
Internal Loop supply	19 V ±10% (12 V@max 50 mA)
Internal Loop supply (fieldbus module installed)	19 V ±10% (12 V@max 25 mA)
Output impedance	130 Ω
Output impedance in HART compatible mode	260 Ω
Output impedance in FF/PA compatible mode	130 Ω

FREQUENCY MEASUREMENT

IN (0.0027…50 000 Hz)

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

FEATURE	SPECIFICATION
Input impedance	115 kΩ
Trigger level	Dry contact 1 V, wet contact –1…14 V
Minimum signal amplitude	1.0 Vpp (<10 kHz), 1.2 Vpp (10…50 kHz)
Supported units	Hz, kHz, cph, cpm, 1/Hz(s), 1/kHz(ms), 1/MHz(µs)

1) Uncertainty includes reference standard uncertainty, hysteresis, non-linearity, repeatability and typical long-term stability for the mentioned period (k=2).

SWITCH SENSING

FEATURE	SPECIFICATION
Test Voltage, Dry contact (Trigger level)	2.3 V, 0.1 mA (1 V)
Trigger level, Wet contact	–1…14 V
Input impedance	115 kΩ

VOLTAGE MEASUREMENT

TC1 & TC2 (–500 mV…+500 mV)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
–510…+510 mV	0.001 mV	4 uV + 0.007% RDG

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

VOLTAGE GENERATION

TC1 (–500 mV…+500 mV)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
–500…+500 mV	0.001 mV	4 uV + 0.007% RDG

FEATURE	SPECIFICATION
Maximum load current	1 mA
Load effect	< 5 µV/mA
Supported units	V, mV, µV

VOLTAGE GENERATION

OUT (–1.5…10.5 V)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
–1.5…10.5 V	0.00001 V	0.1 mV + 0.007% RDG

FEATURE	SPECIFICATION
Maximum load current	1 mA
Short circuit current	> 40 mA
Load effect	< 20 µV/mA
Supported units	V, mV, µV

1) Uncertainty includes reference standard uncertainty, hysteresis, non-linearity, repeatability and typical long-term stability for the mentioned period (k=2).

CURRENT GENERATION

OUT (0…25 mA)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
0…25 mA	0.0001 mA	1 uA + 0.01% RDG

FEATURE	SPECIFICATION
Internal loop supply	9.0 V a 1 mA, 6.0 V a 20 mA
Max load impedance (source)	300 Ω @ 20 mA
Max external loop supply	30 VDC
Supported units	mA, µA

FREQUENCY GENERATION

OUT (0.0005…3000 Hz)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
0.0005…0.5 Hz	0.000001 Hz	0.000002 Hz + 0.002% RDG
0.5…5 Hz	0.00001 Hz	0.00002 Hz + 0.002% RDG
5…50 Hz	0.0001 Hz	0.0002 Hz + 0.002% RDG
50…500 Hz	0.001 Hz	0.002 Hz + 0.002% RDG
500…3000 Hz	0.01 Hz	0.02 Hz + 0.002% RDG

FEATURE	SPECIFICATION
Maximum load current	1 mA
Wave forms	Positive square, symmetric square
Output amplitude positive square wave	0…10.5 Vpp
Output amplitude symmetric square wave	0…4 Vpp
Amplitude accuracy	<15% of amplitude
Duty Cycle	3000 Hz (40…60%), 100 Hz (10…90%), 10 Hz (1…99%)
Supported units	Hz, kHz, cph, cpm, 1/Hz(s), 1/kHz(ms), 1/MHz(µs)

RESISTANCE MEASUREMENT

R1 & R2 (0…4000 Ω)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
–1…100 Ω	0.001 Ω	6 mΩ
100…110 Ω	0.001 Ω	0.006% RDG
110…150 Ω	0.001 Ω	0.007% RDG
150…300 Ω	0.001 Ω	0.008% RDG
300…400 Ω	0.001 Ω	0.009% RDG
400…4040 Ω	0.01 Ω	12 mΩ + 0.015% RDG

FEATURE	SPECIFICATION
Measurement current	Pulsed, bi-directional, 0.2 mA
4-wire connection	Measurement specifications valid
3-wire measurement	Add 13.5 mΩ
Supported units	Ω, kΩ

1) Uncertainty includes reference standard uncertainty, hysteresis, non-linearity, repeatability and typical long-term stability for the mentioned period (k=2).

RESISTANCE SIMULATION

R1 (0…4000 Ω)

RANGE	RESOLUTION	1 YEAR UNCERTAINTY (±) [1]
0…100 Ω	0.001 Ω	20 mΩ
100…400 Ω	0.001 Ω	10 mΩ + 0.01% RDG
400…4000 Ω	0.01 Ω	20 mΩ + 0.015% RDG

FEATURE	SPECIFICATION
Max resistance excitation current	2 mA (0…200 Ω), 1 mA (200…400 Ω), 0.5 mA (400…2000 Ω), 0.25 mA (2000…4000 Ω). Iexc × Rsim < 1.0 V
Min resistance excitation current	≥0.1 mA
Settling time with pulsed exitation current	<2 ms
Supported units	Ω, kΩ

1) Uncertainty includes reference standard uncertainty, hysteresis, non-linearity, repeatability and typical long-term stability for the mentioned period (k=2).

STANDARD ACCESSORIES

- Accredited calibration certificate
- User guide
- Safety Information leaflet
- Computer cable
- Battery charger / eliminator
- Internal NiMH battery pack
- Test leads and clips

OPTIONAL ACCESSORIES

- Soft carrying case
- Spare battery pack

SUMMARY

Beamex MC6-Ex

INTRINSICALLY SAFE ADVANCED FIELD CALIBRATOR AND COMMUNICATOR

The Beamex MC6-Ex is ATE, IECEx and North American certified and designed for use in potentially explosive environments, such as offshore platforms, oil refineries, chemical and petrochemical plants where inflammable gases may be present. Beamex MC6-Ex is an advanced, high-accuracy field calibrator and communicator. It offers calibration capabilities for pressure, temperature and various electrical signals. The MC6-Ex also contains a fieldbus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments. The MC6-Ex is one device with five different operational modes, which means that it is fast and easy to use, less equipment needs to be carried in the field. The operation modes are: meter, calibrator, documenting calibrator, data logger and fieldbus communicator. In addition, the MC6-Ex communicates with Beamex calibration management software, enabling fully automated and paperless calibration and documentation.

Guided procedures

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

Safe and accurate Ex-field calibrator

The ATE, IECEx and North American certified, IP65-rated MC6-Ex with impact protectors and membrane keyboard is robust and the most accurate Ex-calibrator on the market.

Paperless calibration

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

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-Ex combines these two; it's a calibrator and a communicator.

Main features

- Highly accurate all-in-one calibrator
- The Beamex MC6-Ex is ATE, IECEx and North American certified and designed for use in potentially explosive environments
- Multi-bus communicator for HART, FOUNDATION Fieldbus and Profibus PA instruments
- Documenting calibration capabilities for pressure, temperature, electrical and frequency signals
- Five operational modes: meter, calibrator, documenting calibrator, data logger and communicator
- Automates calibration procedures for paperless calibration management