

Beamex MC5-IS

INTRINSICALLY SAFE MULTIFUNCTION CALIBRATOR



Made for extreme environments



Made for extreme environments



MC5-IS: designed for use in potentially explosive environments

The ATEX- and IECEx- certified MC5-IS is designed for use in potentially explosive environments, such as offshore platforms, oil refineries, chemical and petrochemical plants where inflammable gases may be present. There is probably no other intrinsically safe calibrator that can outperform the MC5-IS in terms of functionality. It is a documenting, multifunction calibrator that has calibration capabilities for pressure, temperature, electrical and frequency signals. Its modular design allows configuration based on your specific needs.



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Main features of MC5-IS

Safe and robust field calibrator

The ATEX- and IECEx- certified, IP65-rated MC5-IS with impact protectors and membrane keyboard is robust and made for tough use.

Accuracy guaranteed

The MC5-IS is a highly accurate all-in-one calibrator. It is delivered with a traceable, accredited calibration certificate.

Communication with calibration software

Using the MC5-IS together with calibration software provides you with a complete documenting calibration system that produces calibration certificates automatically.

Unmatched functionality

No other intrinsically safe calibrator can outperform the MC5-IS in terms of functionality.



Additional features

Accuracy guaranteed

The MC5-IS is among the most accurate process calibrators available. As proof of this, each MC5-IS calibrator is delivered with a traceable, accredited calibration certificate.

Made for tough use

The IP65-rated robust casing, along with integrated impact protectors, makes the MC5-IS an ideal calibrator for use in wet and dusty environments subject to wide temperature variations.

Modularity means versatility

The MC5-IS is an extremely versatile calibrator with many different functions. The modular construction of the MC5-IS provides flexibility for the user. For instance, the MC5-IS can be ordered as a pressure or temperature stand-alone calibrator, and then later expand it into a data-logging, documenting multifunction calibrator.

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Communication with calibration software

Using the MC5-IS together with calibration software provides you with a complete documenting calibration system that produces calibration certificates automatically. The benefits of the system include automated calibration procedures and paperless calibration management.

Calibrate safely

The MC5-IS is an intrinsically safe, ATEX- certified (EEx ia IIC T4 and ATEX directive II 1 G) multifunction calibrator. It is designed for use in potentially explosive environments, such as offshore platforms, oil refineries, chemical and petrochemical plants where inflammable gases may be present.

Fieldbus instruments must also be calibrated

Fieldbus installations are growing rapidly worldwide. Beamex is the first company in the world to answer to this demand. We have introduced the MC5-IS fieldbus calibrator, which provides capability for calibrating Foundation Fieldbus H1 or Profibus PA transmitters. It offers the safest possible way to calibrate fieldbus transmitters.

Specifications

GENERAL SPECIFICATIONS

GENERAL	
Display	96 x 72 mm (3.78" x 2.83"), 320 x 240 pixels, LCD
Weight	1.7 – 2.3 kg (3.7 – 5.1 lbs)
Dimensions	245 mm (9.6") x 192 mm (7.5") x 74 mm (2.9") (d/w/h)
Case protection	IP65 (dust and water proof)
Keyboard	Membrane protected individual keys
Battery type	Rechargeable NiMH, 1200 mAh, 8.4V DC
Battery operation	Average 5 hours
Charger supply	100...240 VAC, 50-60 Hz
Operating temperature	-10...50 °C (14...122°F)
Storage temperature	-20 to 60 °C (-4 to 140°F)
Humidity	0 to 80% R.H. non-condensing
Measurement sample rate	2.5 / second
Warranty	Standard: 3 years for MC5-IS; 1 year for battery pack. The warranty of the MC5-IS will be extended up to 6 years if the product is calibrated on a yearly basis at Beamex's calibration laboratory.

FEATURES OF MODULES

FEATURE	INT	EXT	E	ET	RJ
Internal pressure modules	●				
External pressure modules		●			
Current measurement			●		
Voltage measurement			●		
Low voltage measurement			●		
Frequency measurement			●		
Pulse counting			●		
Switch sensing			●		
RTD measurement / simulation				●	
Resistance measurement / simulation				●	
TC measurement / simulation				●	
Low voltage measurement / generation				●	
Voltage generation				●	
Frequency generation				●	
Pulse generation				●	
Internal TC reference junction compensation					●

INT = Internal pressure module
 EXT = External pressure module
 E = Electrical measuring module
 ET = Electrical and temperature module
 RJ = Thermocouple reference junction module

INTERNAL & EXTERNAL PRESSURE MODULES

INTERNAL MODULES ¹⁾	EXTERNAL MODULES	RANGE ²⁾	RESOLUTION	ACCURACY ³⁾ (±)	1 YEAR UNCERTAINTY (±) ⁴⁾
INT B-IS	EXT B-IS	80 to 120 kPa a 800 to 1200 mbar a 11.6 to 17.4 psi a	0.01 0.1 0.001	0.03 kPa 0.3 mbar 0.0044 Psi	0.05 kPa 0.5 mbar 0.0073 psi
INT10mD-IS	EXT10mD-IS	±1 kPa diff ±10 mbar diff ±4 iwc diff	0.0001 0.001 0.001	0.05% Span	0.05% Span + 0.1% RDG
INT100m-IS	EXT100m-IS	0 to 10 kPa 0 to 100 mbar 0 to 40 iwc	0.0001 0.001 0.001	0.015% FS + 0.0125% RDG	0.025% FS + 0.025% RDG
INT400mC-IS	EXT400mC-IS	±40 kPa ±400 mbar ±160 iwc	0.001 0.01 0.001	0.01% FS + 0.0125% RDG	0.02% FS + 0.025% RDG
INT1C-IS	EXT1C-IS	±100 kPa ±1 bar -14.5 to 15 psi	0.001 0.00001 0.0001	0.007% FS + 0.0125% RDG	0.015% FS + 0.025% RDG
INT2C-IS	EXT2C-IS	-100 to 200 kPa -1 to 2 bar -14.5 to 30 psi	0.001 0.00001 0.0001	0.005% FS + 0.01% RDG	0.01% FS + 0.025% RDG
INT6C-IS	EXT6C-IS	-100 to 600 kPa -1 to 6 bar -14.5 to 90 psi	0.01 0.0001 0.001	0.005% FS + 0.01% RDG	0.01% FS + 0.025% RDG
INT20C-IS	EXT20C-IS	-100 to 2000 kPa -1 to 20 bar -14.5 to 300 psi	0.01 0.0001 0.001	0.005% FS + 0.01% RDG	0.01% FS + 0.025% RDG
INT60-IS	EXT60-IS	0 to 6000 kPa 0 to 60 bar 0 to 900 psi	0.1 0.001 0.01	0.005% FS + 0.0125% RDG	0.01% FS + 0.025% RDG
INT100-IS	EXT100-IS	0 to 10 MPa 0 to 100 bar 0 to 1500 psi	0.0001 0.001 0.01	0.005% FS + 0.0125% RDG	0.01% FS + 0.025% RDG
INT160-IS	EXT160-IS	0 to 16 MPa 0 to 160 bar 0 to 2400 psi	0.0001 0.001 0.01	0.005% FS + 0.0125% RDG	0.01% FS + 0.025% RDG
-	EXT250-IS	0 to 25 MPa 0 to 250 bar 0 to 3700 psi	0.001 0.01 0.1	0.007% FS + 0.0125% RDG	0.015% FS + 0.025% RDG
-	EXT600-IS	0 to 60 MPa 0 to 600 bar 0 to 9000 psi	0.001 0.01 0.1	0.007% FS + 0.01% RDG	0.015% FS + 0.025% RDG
-	EXT1000-IS	0 to 100 MPa 0 to 1000 bar 0 to 15000 psi	0.001 0.01 0.1	0.007% FS + 0.01% RDG	0.015% FS + 0.025% RDG

Temperature coefficient ±0.001% Rdg/ °C outside 15...35 °C (59...95 °F)

INT10mD-IS / EXT10mD-IS < ±0.002% Span/ °C outside 15...35 °C (59...95°F)

1) The MC5-IS calibrators can hold three internal pressure modules.

2) Every internal/external pressure module's range may also be displayed in absolute pressure if the barometric module (B) is installed.

3) 'Accuracy' includes hysteresis, nonlinearity, repeatability and reference standard uncertainty (k=2).

4) '1 Year Uncertainty' includes hysteresis, nonlinearity, repeatability and typical long-term stability for mentioned period (k=2).

All intrinsically safe external pressure modules (EXT-IS) are also compatible with Beamex MC2, MC2-IS, MC4, MC5, MC5P and MC6.

Supports the following pressure units as standard:

Pa, hPa, kPa, MPa, mbar, bar, lbf/ft², psi, gf/cm², kgf/cm², kp/cm², at, mmH₂O, cmH₂O, mH₂O, iwc, ftH₂O, mmHg, cmHg, mHg, inHg, mmHg(0 °C), inHg(0 °C), mmH₂O(4 °C), inH₂O(4 °C), ftH₂O(4 °C), inH₂O(60°F), mmH₂O(68°F), inH₂O(68°F), ftH₂O(68°F), torr, atm.

INT B-IS / EXT B-IS; M5 (10/32") female.

INT10mD-IS and EXT10mD-IS; Two M5 (10/32") female threads with a hose nipple included.

INT100m-IS/EXT100m-IS – INT20C-IS/EXT20C-IS; G1/8" (ISO228/1) female. A conical 1/8" BSP male with 60° internal cone adapter included for Beamex hose set.

INT60-IS, INT100-IS, INT160-IS; G1/8" (ISO228/1) female. EXT60-IS, EXT100-IS, EXT160-IS, EXT250-IS, EXT600-IS, EXT1000-IS; G ¼" (ISO228/1) male.

Wetted parts AISI316 stainless steel, Hastelloy, Nitrile rubber.

Maximum overpressure;

B module; 1200 mbar abs. 10mD module; 200 mbar. EXT600; 900 bar. EXT1000; 1000 bar.

For all other modules, the maximum overpressure is twice the nominal range.

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ELECTRICAL MODULE (E)

FUNCTION	RANGE	RESOLUTION	1 YEAR UNCERTAINTY (\pm) ⁽¹⁾
mV measurement ²	± 250 mV	0.001 mV	0.02% RDG + 5 μ V
V measurement ³	± 30 V	0.00001–0.001 V	0.02% RDG + 0.25 mV
mA measurement ⁴	± 100 mA	0.0001–0.001 mA	0.02% RDG + 1.5 μ A
Hz measurement ⁵	0.0028 to 50000 Hz	0.000001– 0.1 Hz	0.01% RDG
Pulse counting ⁵	0 to 9 999 999 pulses	1 pulse	N/A
mA Sink	0 to 25 mA	0.0001 mA	0.02% RDG + 1.5 μ A

Temperature coefficient < $\pm 0.001\%$ RDG / °C outside of 15...35 °C (59...95°F)

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

2) Bias current < 10 nA

3) Impedance > 1 M Ω

4) Impedance < 7.5 Ω

5) MC5-IS; Impedance > 1 M Ω . Frequency measurement minimum amplitude 1 Vpp (< 10 kHz),

3 Vpp (10...50 kHz). Pulse counting minimum amplitude 1 Vpp (pulse length > 50 μ s),

3 Vpp (pulse length 50 μ s...10 μ s).

Trigger level range -1...+15 V.

TEMPERATURE ELECTRICAL MODULE (ET)

FUNCTION	RANGE	RESOLUTION	1 YEAR UNCERTAINTY (\pm) ⁽¹⁾
mV generation ⁽²⁾	± 250 mV	0.001 mV	0.02% RDG + 4 μ V
V generation ⁽³⁾	-2.5 to 10 V	0.00001–0.0001 V	0.02% RDG + 0.1 mV
mA sink	0 to 25 mA	0.0001 mA	0.02% RDG + 1 μ A
Hz generation ⁽⁴⁾	0.00028 to 50 000 Hz	0.000001 - 0.1 Hz	0.01% RDG
Pulse generation ⁽⁵⁾	0 to 9 999 999 pulses	1 pulse	N/A
Ohm simulation ⁽⁶⁾	1 to 4000 Ω	0.0–0.1 Ω	0.04% RDG or 30 m Ω ⁽⁷⁾
Ohm measurement ⁽⁸⁾	0 to 4000 Ω	0.001–0.1 Ω	0.02% RDG + 3.5 m Ω
mV measurement ⁽⁹⁾	± 250 mV	0.001 mV	0.02% RDG + 4 μ V

Temperature coefficient < $\pm 0.001\%$ RDG / °C outside of 15...35 °C (59...95°F)

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

2) Load effect < 5 μ V/mA. Maximum output current 1 mA.

3) Load effect < 100 μ V/mA. Maximum output current 1 mA (0...10 V)

4) Amplitude range 0...5 Vpp (positive), 0...5 V (symmetric). Amplitude setting accuracy up to 5kHz \pm (200 mV + 5% of set value).

Waveforms: square wave (positive / symmetric) and sinewave (above 40 Hz).

5) Pulse generation frequency range 0.1...1000 Hz. Amplitude range 0...5 Vpp (positive), 0...5 V (symmetric).

6) Valid with measurement current 0.2...2 mA (1...250 Ω), 0.05 < I_{meas} • Rsim < 0.5 V (250...4000 Ω). Ω /RTD simulation settling time 1 ms.

7) Whichever is greater.

8) Specification valid with 4 wire connection. In 3 wire connection add 10 m Ω .

9) Bias current < 10 nA.

THERMOCOUPLE MEASUREMENT AND SIMULATION

TYPE	RANGE (°C)	RANGE (°C)	1 YEAR UNCERTAINTY (±) ⁽¹⁾
B ²	0...1820	0...200	⁽³⁾
		200...500	2.0 °C
		500...800	0.8 °C
		800...1820	0.6 °C
R ²	-50...1768	-50...0	1.0 °C
		0...150	0.7 °C
		150...1400	0.5 °C
		1400...1768	0.6 °C
S ²	-50...1768	-50...0	1.0 °C
		0...50	0.7 °C
		50...1500	0.6 °C
		1500...1768	0.7 °C
E ²	-270...1000	-270...-200	⁽³⁾
		-200...0	0.08% RDG + 0.07 °C
		0...600	0.015% RDG + 0.07 °C
		600...1000	0.026% RDG
J ²	-210...1200	-210...-200	⁽³⁾
		-200...0	0.07% RDG + 0.08 °C
		0...1200	0.02% RDG + 0.08 °C
K ²	-270...1372	-270...-200	⁽³⁾
		-200...0	0.1% RDG + 0.1 °C
		0...1000	0.02% RDG + 0.1 °C
		1000...1372	0.03% RDG
N ²	-270...1300	-270...-200	⁽³⁾
		-200...-100	0.2% RDG
		-100...0	0.05% RDG + 0.15 °C
		0...750	0.01% RDG + 0.15 °C
		750...1300	0.03% RDG
T ²	-270...400	-270...-250	⁽³⁾
		-250...-200	0.7 °C
		-200...0	0.1% RDG + 0.1 °C
		0...400	0.01% RDG + 0.1 °C
U ⁴	-200...600	-200...0	0.1% RDG + 0.15 °C
		0...600	0.01% RDG + 0.15 °C
L ⁴	-200...900	-200...0	0.07% RDG + 0.13 °C
		0...900	0.02% RDG + 0.13 °C
C ⁵	0...2315	0...900	0.4 °C
		900...2000	0.045% RDG
		2000...2315	1.2 °C
G ⁶	0...2315	0...70	⁽³⁾
		70...200	1.0 °C
		200...1600	0.5 °C
		1600...2000	0.7 °C
		2000...2315	1.0 °C
D ⁵	0...2315	0...1000	0.4 °C
		1000...2000	0.04% RDG
		2000...2315	1.2 °C

Resolution 0.01 °C.

With internal reference junction (module RJ) add 0.1 °C uncertainty.

Other thermocouple types also available as an option.

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

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

3) ±(0.02% of thermovoltage + 4 µV)

4) DIN 43710

5) ASTM E 988 - 96

6) ASTM E 1751 - 95e1

REFERENCE JUNCTION MODULE (RJ)

RANGE (°C)	1 YEAR UNCERTAINTY (±) ⁽¹⁾
-10...50 °C	0.1 °C

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

RTD MEASUREMENT AND SIMULATION

FUNCTION	RANGE (°C)	RANGE (°C)	MEASUREMENT 1 YEAR UNCERTAINTY (±) ¹⁾	SIMULATION 1 YEAR UNCERTAINTY (±) ¹⁾
Pt-sensors	-200 to 850 °C	-200 to 0 °C	0.06 °C	0.1 °C
		0 to 850 °C	0.025% RDG + 0.06 °C	0.025% RDG + 0.1 °C

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

RTD TYPES AVAILABLE AS STANDARD				
Pt50 (385)	Pt400 (385)	Pt100 (3923)	Pt100 (3926)	Cu10 (427)
Pt100 (385)	Pt500 (385)	Pt100 (391)	Ni100 (618)	
Pt200 (385)	Pt1000 (385)	Pt100 (375)	Ni120 (672)	

To improve uncertainty with PRT (platinum RTD) sensors, the MC5-IS includes a standard possibility that allows you to create customized PRT sensors using the Callendar van Dusen correction coefficients. The easy-to-use Beamex PRT Tool PC software is used to create the sensor and to send it to the MC5-IS. Up to 100 customized PRT sensors can be stored in MC5-IS at one time.

This function may be also used to create new, non-supported PRT sensors in the MC5-IS. Both measurement and simulation can be done with the customized sensors.

STANDARD ACCESSORIES

- Accredited calibration certificate
- User guide
- Computer cable
- Battery charger / eliminator
- Internal NiMH battery pack
- Test leads and clips
- Appropriate pressure T-hose with internal low pressure modules
- CD-ROM with user manual, software tools and product information

OPTIONAL ACCESSORIES

- Soft carrying case
- Hard carrying case
- Spare battery pack

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Safe and robust field calibrator

The ATEX- and IECEx- certified, IP65-rated MC5-IS with impact protectors and membrane keyboard is robust and made for tough use.

Accuracy assured

The MC5-IS is a highly accurate all-in-one calibrator. It is delivered with a traceable, accredited calibration certificate.

Communication with calibration software

Using the MC5-IS together with calibration software provides you with a complete documenting calibration system that produces calibration certificates automatically.

Unmatched functionality

No other intrinsically safe calibrator can outperform the MC5-IS in terms of functionality.



Main features

- ▶ Highly accurate all-in-one calibrator
- ▶ Designed for use in potentially explosive environments
- ▶ Calibration capabilities for pressure, temperature, electrical and frequency signals
- ▶ Certified in accordance with the ATEX directive and IECEx scheme
- ▶ HART Foundation Fieldbus H1 and Profibus PA support

