masibus

mCAL MC12

Multifunction Calibrator

mCAL model MC12 Multifunction Calibrator is the compact, rugged and easy to use hand held device with graphical user interface for precise measuring and sourcing of electrical and physical parameters

Masibus **MC12** Multifunction Calibrator is designed to provide the best accuracy in all modes of operation.

MC12 has Source and Measurement capability with independent parameter and range selection for Source and Measure. MC12 has mA/ V/ mV/ mA (24V)/ Switch-test / RTD/ TC/ Frequency/ Pulse measurement capability and also has mA/ V/ mV/ mA (2W)/ Resistance/ RTD/ TC/ Frequency/ Pulse source capability.
There is an isolation between measure and source/ measure sections.

MC12 Multifunction Calibrator has easy to operate short cut keys SCR1 and SCR2 for input selection for measure and source/ measure respectively.

Automatic step/ramp output with Auto/Man selection, data logging, Max/Min/Average values, scaling to Engineering units and filter settings enhances the use of Multifunction Calibrator.

It has been designed to give maximum Battery life on full charge, the backlight is adjustable for power saving and the display can be programmed to automatically enable the glance screen when not in use

MC12 comes with a Mini USB connector for charging, logged data retrieval and firmware upgrade. Standard accessories provided are patch cables, charger, USB cable, instruction manual, logged data retrieval software CD and calibration certificate, all in an attractive carrying case.

Features

- Compact, handheld, User friendly menu
- Easy to read Color Graphical TFT LCD display
- Rechargeable lithium Ion battery with enhanced power control for prolonged battery life
- Measure: mA/ V/ mV/ mA (24V)/ Switch-test / RTD/ TC/ Frequency/ Pulse
- Source: mA/ V/ mV/ mA(2W)/ Resistance/ RTD/ TC/ Frequency/ Pulse
- 24 VDC Loop power Supply to power transmitters and loops
- Step/Ramp functions with Auto/Man selection
- Universal Serial Bus (USB) communication port for charging, data retrieve and firmware upgrade
- Data Logging to measure long time drift
- Other Features: Max/Min/Average, filter settings, tare facility, adjustable backlight, alarm annunciation (on display and buzzer), glance screen mode
- Continuity Test
- Pulsed RTD transmitter compatible
- HART loop resistor

Applications

- Calibrating and checking temperature indicator/ controllers, recorders, temperature transmitters, single conditioners, etc.
- Laboratory and Site calibration purpose
- Drift test of Transmitters and Transducers
- Simulation of resistance for position indicators
- Sources mV signals for load cell amplifiers
- Check flow measurement instruments vide frequency/ pulse parameters

TECHNICAL SPECIFICATIONS

Electrical Measurement Parameters and Accuracy

Parameter	Range	Resolution	Accuracy
V	0 to 30.00 VDC	0.001 V	±0.02% of reading ± 2 count
mA	0 to 24.000 mA	0.001 mA	±0.02% of reading ± 2 count

Electrical Simulation Parameters and Accuracy

Parameter	Range	Resolution	Accuracy
V	0 to 12.000 VDC	0.001 V	±0.02% of reading ± 2 count
mA	0 to 24.000 mA	0.001 mA	±0.02% of reading ± 2 count

Thermocouple/mV Measurement /Simulation Resolution and Accuracy

TC Type	Range	Resolution	Accuracy
E	-200.0 to 1000.0 °C	0.1 °C	0.3 °C
J	-200.0 to 1200.0 °C	0.1 °C	0.3 °C
K	-200.0 to 1372.0 °C	0.1 °C	0.3 °C
T	-200.0 to 400.0 °C	0.1 °C	0.3 °C
B	450.0 to 1800.0 °C	0.1 °C	0.3 °C
R	0.0 to 1750.0 °C	0.1 °C	0.3 °C
S	0 to 1750.0 °C	0.1 °C	0.3 °C
N	-200.0 to 1300.0°C	0.1 °C	0.3 °C
mV	-10.000 to 80.000 mV	0.001 mV	±0.02% of reading ± 4uV
	-10.00 to 250.00 mV	0.01mV	±0.02% of reading ± 0.02mV

Note: temperature standard ITS-90

Frequency Measurement

Range	Resolution
0.0143 to 9.9999	0.0001 Hz
10 to 99.999Hz	0.001 Hz
100 to 999.99Hz	0.01 Hz
1000 to 9999.9 Hz	0.1 Hz
10000 to 50000 Hz	1 Hz

Feature	Specification
Trigger Level	0 to 12V in 1 V Steps
Accuracy	±0.01% of Reading ± 1 count
Supported units	Hz, KHz, cph, cpm, sec, msec, usec

Pulse Counting

Feature	Specification
Range	0 to 999999 pulses
Trigger Level	0 to 12V in 1 V Steps

Frequency Generation

Range	Resolution
0.0005 to 0.5Hz	0.00001 Hz
0.5 to 50 Hz	0.0001 Hz
50 to 500 Hz	0.001 Hz
500 to 5000 Hz	0.01 Hz
5000 to 10000 Hz	0.1 Hz

Feature	Specification
Output Amplitude positive Square wave	0 to 12VPP (±0.5V)
Output Amplitude symmetric Square wave	0 to 6 VPP (±0.5V)
Accuracy	±0.02% of Reading ± 2 count
Duty Cycle	1 to 99% (up to 500Hz)
Supported units	Hz, KHz, cph, cpm, sec, msec, usec

Pulse Generation

Feature	Specification
Range Resolution	0 to 999999 pulses
Resolution	1 Pulse
Output Amplitude positive Square wave	0 to 12VPP (±0.5V)
Output Amplitude symmetric Square wave	0 to 6 VPP (±0.5V)
Pulse Frequency	0.0005 to 10000Hz
Duty Cycle	1 to 99% (up to 500Hz)

Measurement & Simulation Range

Parameters	Range	Resolution	Accuracy
Resistance (Ohms)	0 to 400 Ω	0.01Ω	4 Wire Measurement ±0.02% of reading ±0.01Ω 3 Wire Measurement: ±0.02% of reading ±0.015Ω Simulation: ±0.02% of reading ± 0.02Ω
	400 to 4000Ω#	0.1Ω	4 Wire Measurement: ±0.02% of reading ±0.1Ω 3 Wire Measurement: ±0.02% of reading ±0.15Ω Simulation: ±0.02% of reading ± 0.15Ω
Pt10 to Pt1000	-200 to 200 °C	Pt10 to Pt400: 0.01°C Pt500, Pt1000: 0.1°C	4 wire Measurement: ±0.15°C Simulation*: ±0.15 °C
	200 to 600 °C		4 wire Measurement: ±0.2 °C Simulation*: ±0.25 °C
	600 to 850 °C		4 wire Measurement: ±0.3 °C Simulation*: ±0.35 °C
Ni100	-60 to 180 °C	0.01 °C	4 wire Measurement: ±0.1 °C
Ni120	-80 to 260 °C	0.01 °C	Simulation*: ±0.15 °C
Cu10 to Cu100	-200 to 260 °C	0.01 °C	4 wire Measurement: ±0.2°C Simulation*: ±0.8°C

Note: # For 4 wire Resistance measurement 0.01Ω resolution available in 0 to 1600 ohm range
*Accuracy is valid with an excitation current >0.2mA (0...400 ohm), >0.1mA (400...4000 ohm)
** Read accuracy is based on 4-wire input. For 3-wire RTD measurements, assuming all three RTD leads are matched, add 1.0°C (Pt10 and Cu10), 0.6°C (Pt50 and Cu50), and 0.4°C (other RTD types) to the specifications

Compatible RTD Types

Pt10 (385)	Pt400 (385)	Ni100 (672)	Cu10 (427)
Pt50 (385)	Pt500 (385)	Ni100 (618)	Cu50 (427)
Pt100 (385)	Pt1000 (385)	Ni120 (672)	Cu100 (427)
Pt200 (385)	Pt100 (3926)		

TECHNICAL SPECIFICATIONS

General Specifications

Display Mode	**Measure:** mA/ V/ mV/ mA(24V)/ Switch-test / RTD/ TC/ Frequency/ Pulse **Source:** mA/ V/ mV/ mA(2W)/ Resistance/ RTD/ TC/ Frequency/ Pulse
Supported units for RTD/ TC type	°C/°F/°K
RTD Measurement Current	300 uA
Maximum Resistance excitation current (simulation-Resistance/ RTD mode)	3 mA (0...650 Ω measure/source with I exec 2.0V/ Rsim (650....4000Ω)
Settling time (pulsed currents RTD Simulation)	>1 ms
CJC error (For Thermocouple) Internal Reference Junction	≤± 0.5 °C
CJC selection	Manual/ Internal/ External *
Max. input voltage (EM Terminal)	30 VDC
Temperature Coefficient	≤30 ppm
Input Impedance	TC/ mV/ V/ Frequency/ Pulse >1MΩ mA =10 Ω
Response time	Input <100ms, Output <100ms
Load impedance	>4.7KΩ for TC/mV/V/Pulse/frequency O/P <750Ω for mA O/P
Display update rate	10 readings / sec
Isolation	500VDC between measure section & source/ measure section
Data logging	Logged data is stored in a user defined file in internal memory Periodic logging: 150000 readings max
Communication Interface	USB 2.0

*with RTD sensor at RTD terminal for External CJC

Display & Keys

Display	3.2" TFT LCD, 262K Color, Graphical, 48.6 mm x 64.8 mm, 240x320 pixels, White LED Backlight
Keys	9 Membrane Keys

Special Features

Loop power output	24V DC, ±10% (24mA maximum)
HART mA Loop Resistor	250 Ω ± 20%
Special Function	Step/Ramp functions: Automatic/Manual. √x, x^2 : for mA/V measure/source
Continuity Test	Audible sounds when resistance measure value crosses the specified threshold. (selectable up to 100Ω)
Automatic Wire detection	Automatic detection RTD measure wire connection. (2-wire, 3-wire or 4-wire)
Switch Test	• Potential free contacts Trigger level : 24V, 24mA (2V) • Voltage level detection Trigger level : 0 to 30V in 1V steps

Power Supply

Battery Type	Rechargeable Li-ion battery pack, 4400mAh 3.7V
Charging Time	<8 hours max
Charger supply	100-240 VAC, 50/60 Hz; Output 5V DC@1A
Battery Life on full charge	>24 hours for RTD/Ω/TC/V/mV measure/source with minimum backlight. >12 hours for mA generation with minimum backlight.(24VDC @12mA)
Battery Status Indication	Battery symbol displayed with % power remaining

Physical

Dimensions	185.6 mm (L) x 97.1 mm (W) x 41.3 mm (H)
Housing Material	ABS Plastic
Electrical Terminals: Measure:-V/mA/mA(24V)/ switch/Frq/Pulse	Two nos., 4 mm safety sockets
RTD Terminals/Electrical Terminals: Source:- V/mA/mA(2W)/Frq./ Pulse Measure /Source:- Resistance/ RTD	Four nos., 4 mm safety sockets
TC Terminals:- TC/mV (measure /Source)	Thermocouple minijack socket (cu type)
Weight	<500 grams
Protection	IP20

Environmental

Operating temperature	0 to 55 °C
Operating temperature while charging batteries	0 to 45 °C
Storage temperature	-20 to 60 °C
Relative Humidity	30% to 90% RH non-condensing
Warm-up time	5 Minutes

Accessories

- Calibration Certificate
- User Guide
- 3 Sets of 4mm to 4mm banana cable
- 3 Sets of 4mm Crocodile cable
- 1 Test lead Cu-Cu(Miniature TC Plug Cu type to 4mm test lead)
- USB A Male to USB mini B Male cable for PC communication and charging.
- 5 VDC@1A Charging Adaptor
- Carrying Bag
- Data Logging Software CD - mCAL

Ordering Code

Model
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