



## uCAL

## UC12

## Universal Calibrator



**uCAL** model **UC12** Universal 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 **UC12** Universal Calibrator is designed to provide the best accuracy in all modes of operation.

**UC12** has source and measurement capability with independent parameter and range selection for source and measure. UC12 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.

**UC12** Universal 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 Universal 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

**UC12** 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
- Available with EMI/EMC compliance
- 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	0.5 °C
R	0.0 to 1750.0 °C	0.1 °C	0.5 °C
S	0 to 1750.0 °C	0.1 °C	0.5 °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 simulation: ±0.02% of reading ± 0.02Ω
	400 to 4000Ω <sup>#</sup>	0.1Ω	4 Wire measurement: ±0.02% of reading ±0.1Ω, 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		Power Supply	
Display mode	<b>Measure:</b> mA/ V/ mV/ mA(24V)/ Switch-test / RTD/ TC/ Frequency/ Pulse <b>Source:</b> mA/ V/ mV/ mA(2W)/ Resistance/ RTD/ TC/ Frequency/ Pulse	Battery type	Rechargeable Li-ion battery pack, 3000mAh 3.7V
Supported units for RTD/ TC type	°C/ °F/ °K	Charging time	<5 hours max
RTD measurement current	300 uA	Charger supply	100-240 VAC, 50/60 Hz; Output 5V DC@1A
Maximum resistance excitation current (simulation-resistance/ RTD mode)	3 mA (0...650 Ω measure/source with I exec 2.0V/ Rsim (650...4000Ω)	Battery life on full charge	>17 hours for RTD/Ω/TC/V/mV measure/source with minimum backlight. >9 hours for mA generation with minimum backlight.(24VDC @12mA)
Settling time (pulsed currents RTD simulation)	>1 ms	Battery status indication	Battery symbol displayed with % power remaining
CJC error (for thermocouple) internal reference junction	≤ ±0.5 °C	<b>Physical</b>	
CJC selection	Manual/ Internal/ External *	Dimensions	185.6 mm (L) x 97.1 mm (W) x 41.3 mm (H)
Max. input voltage (EM terminal) temperature coefficient	30 VDC ≤30 ppm	Housing material	ABS plastic
Input impedance	TC/ mV/ V/ Frequency/ Pulse >1MΩ mA =10 Ω	Electrical terminals: Measure:-V/mA/mA(24V)/ switch/Frq/Pulse	Two nos., 4 mm safety sockets
Response time	Input <100ms, Output <100ms	RTD Terminals/Electrical Terminals: Source:- V/mA/mA(2W)/Frq./ Pulse	Four nos., 4 mm safety sockets
Load impedance	>4.7KΩ for TC/mV/V/Pulse/frequency O/P <750Ω for mA O/P	Measure /Source:- Resistance/ RTD	
Display update rate	10 readings / sec	TC Terminals:- TC/mV (measure /Source)	Thermocouple minijack socket (cu type)
Isolation	500VDC between measure section & source/ measure section	Weight	<500 grams
Data logging	Logged data is stored in a user defined file in internal memory Periodic logging: 150000 readings max	Protection	IP20
Communication Interface	USB 2.0	<b>Environmental</b>	
*with RTD sensor at RTD terminal for external CJC		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
<b>Display &amp; Keys</b>		<b>Accessories</b>	
Display	3.2" TFT LCD, 262K color, graphical, 48.6 mm x 64.8 mm, 240x320 pixels, white LED backlight	Calibration certificate	
Keys	9 membrane keys	User guide	
<b>Special Features</b>		3 Sets of 4mm to 4mm banana cable	
Loop power output	24V DC, ±10% (24mA maximum)	3 Sets of 4mm crocodile cable	
HART mA loop resistor	250 Ω ± 20%	1 Test lead Cu-Cu (Miniature TC Plug Cu type to 4mm test lead)	
Special function	Step/Ramp functions: Automatic/Manual. √x, x <sup>2</sup> : for mA/V measure/source	USB A Male to USB mini B Male cable for PC communication and charging.	
Continuity test	Audible sounds when resistance measure value crosses the specified threshold. (selectable up to 100Ω)	5 VDC@1A charging adaptor	
Automatic wire detection	Automatic detection RTD measure wire connection. (2-wire, 3-wire or 4-wire)	Carrying bag	
Switch test	<ul style="list-style-type: none"> <li>Potential free contacts Trigger level : 24V, 24mA (2V)</li> <li>Voltage level detection Trigger level : 0 to 30V in 1V steps</li> </ul>	Data logging software CD - mCAL	
		<b>Directive Conformity*</b>	
		Electromagnetic compatibility directive 2014/30/EU	EN 61326-1:2013
		Low voltage directive 2014/68/EU	EN 61010-1:2010
		*(Applicable only for CE marked)	

## Ordering Code

Model	CE Compliance	
UC12	X	
	N	NO
	Y	YES