

# Microcal 16 Plus

Multifunction Calibrator  
Two High accuracy  
Channels with double  
input setting



## MULTIFUNCTION CALIBRATOR

- Accuracy up to  $\pm 0.005\%$  of reading
- Light, rugged and ergonomic
- Ready to use on field and in laboratory
- Push & Lock connectors, TC e Banana (4 mm)
- Two High accuracy Channels with double input setting
- Auto-detect rtd wires
- Set the generated values with alphanumeric Key-Pad
- Large graphic display backlit
- HART Protocol
- Bluetooth Interface
- Rubber protection holster
- Generate ramp and cycles
- Measure and simulate simultaneously for certificate the transmitters
- Measure and simulate simultaneously of Tc, rtd,Hz, mA e V
- External pressure sensors
- Measurement data recording
- CFR21 Part 11 compliant





MULTIFUNCTION  
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## MicroCal 16 Plus Multifunction calibrator

### General

The hand-held indicator-simulator MicroCal 16 Plus is a multifunction instrument designed to check and calibrate your test and process equipment. MicroCal 16 Plus meets, in a modern and practical way, the everyday needs of Quality and Maintenance instrumentation engineers, both in laboratory and on field with the HART modem communication and CFR21 Part 11 compliant.

Accurate, compact, rugged, easy to use; the ideal solution to measure and simulate: millivolt, volt, milliampere (active and passive loop), ohm, temperatures with thermocouples, temperatures with resistance thermometers, frequency and pressure (with ext. sensors).

MicroCal 16 Plus is a portable calibrator able to measure and to generate simultaneously on 2 isolated channel that the user could be set IN/OUT or IN/IN (to calibrate probes)

MicroCal 16 Plus has a wide backlit display with high contrast to be used for application in dark room. Full protected by the sheath, a keypad in lexan protects it from dirties and numerical keypad knocked up is usable even using protective gloves.

MicroCal 16 Plus is able to set the HART transmitters with a external modem HART, and it is CFR21 Part 11 compliant for the pharmaceutical market.

MicroCal 16 Plus is able to measure and generate voltage, current (active and passive loop), frequency, pressure (with ext. sensors), resistance signals and also resistive probes and thermocouples.





# MicroCal 16 Plus

## Multifunction calibrator

### Advanced Features

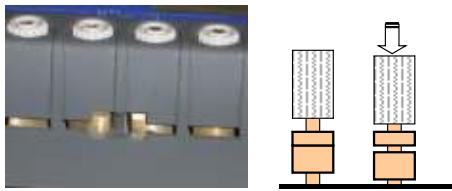
#### "Push&Lock" system

This unique system is used by pushing on the terminal's top, by inserting:  
 - Wires with a diameter up to 3 mm,  
 - Compensated thermocouple connectors,  
 - Pin terminal on front panel,

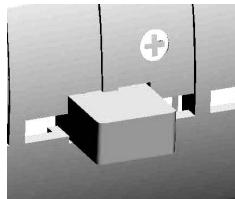
Wires are tighten between 2 brass plates which provide an great thermal gradient, so that allows a very good cold junction compensation for thermocouples.

Microcal 16 allows 4mm connectors and also security connectors to be connected on the front panel.

#### Push&Lock connector



#### Mini-din connector



#### Display

MicroCal 16 Plus dual display indicates permanently the measurement value, and also the emitted value, the gauge and the used functions.

On the top date, time and also external temperature are also indicated.

During measuring average, maximum, minimum and the number of measurements are displayed on the left. While for emission this part of screen displays all details of ramps, steps and constant value emission functions.

Drop-down menus are used with the navigator, and an on-line help is available to make easier connections of probes and wires.



#### File Menu:

User can save up to 10 full configurations of the instruments and recall them whenever. Configurations can be saved and recalled in function of user and of use. Configurations include all programming done on instrument, as the range.

#### Contrast adjustment:

Screen's contrast can be adjusted whenever to fit with measurement environment

#### Screen Backlighting:

Time of backlighting can be programmed to save battery

**Autonomy:** MicroCal 16 Plus autonomy is 6 hours in the worst condition of use

#### Scaling:

In measurement and simulation, scaling allows process signals to be displayed in % of FS or in all other unit. This function also allows sensors to be corrected after a calibration

#### Relative measurement:

Programming of a reference value different from the one of the instrument (NUL function)

Substracting of constant value by measuring or programming it from a measured value(TARE function)

#### Square root:

In current measurement and simulation, this function allows to take into account a quadratic signal coming from transmitter of type ?P

#### Statistical functions:

Average, minimum, maximum and also number of measurements done are always displayed.

Reset key allows values to be updated.

#### Simulation Menu:

Simulation value is set by entering value on keypad or by changing the according digit with the cursor

#### Ramps generation:

Starting, ending and length time values of simple or cyclic ramps can be set to do simulation.

Number of ramps can also be adjusted in case of cyclic ramps for any signals.

#### Steps simulation:

2 modes are proposed.

Program mode: Starting value, number

of steps and the length time have to be set

Manual mode: User has about a hundred of preset values

In current simulation, user will have some additional preset values in function of range and according to 0%, 25%, 50%, 75% and 100% from selected gauge. Choice is done between gauges:

0-20mA: linear or quadratic

4-20mA: linear or quadratic

#### Transmitter function:

MicroCal 16 Plus is able to be used as a transmitter.

Measurement input is copied on the output with scaling.

#### Memory:

MicroCal 16 Plus can record data automatically or on user request. 10.000 data can be stored and displayed on the screen as curve or list, and is possible download this data with DATACAL Light software.

#### Calibration software:

DATACAL software, with Micorcal16 Plus, is able to certificate all the transmitters and trasducers. With the software is possible to have a calibration certificate.

#### CFR21 Part 11:

The MicroCal 16 Plus is CFR21 Part 11 compliant, Password, logins, can be configured on the unit.

#### HART protocol:

MicroCal 16 Plus can work with HART Protocol instruments.: Connection of 1 to 15 analogue sensors with 24V volts power supply

Compatibility with Protocols « HART 5 » and « HART 6 ». Setting and configuration of these sensors through the MicroCal 16 Plus. Loop supply with insertion of 250 internal resistance.

Verify hart menu option: Verification of the current loops and the detectors (manually or automatically). All the information is stored into the Verification report.

Loop current and detectors can be adjusted from the MicroCal 16 Plus

HART Instrument status: Some informations about the behaviour of the instrument under test can be displayed: overload loop, out of limit variable...etc.



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Table of ranges and accuracies

Sensor	Measurement			Generation		
	Range	Resolution	Accuracy/1 yr'	Range	Resolution	Accuracy/1 yr
K	- 250 to - 200°C	0,2°C	0,50°C	- 250 to - 50°C	0,2°C	0,15% R
	- 200 to - 120°C	0,05°C	0,15°C	- 50 to + 120°C	0,1°C	0,06°C
	- 120 to + 1372°C	0,05°C	0,0050% R + 0,08°C	+ 120 to + 1020°C	0,05°C	0,005% R + 0,05°C
T	- 250 to - 200°C	0,2°C	0,50°C	+ 1020°C to + 1370°C	0,05°C	0,007% R + 0,05°C
	- 200 to - 100°C	0,05°C	0,05% R + 0,06°C	- 250 to - 100°C	0,2°C	0,1% R + 0,05°C
	- 100 to + 80°C	0,05°C	0,015% R + 0,07°C	- 100 to + 0°C	0,05°C	0,02% R + 0,06°C
	+ 80 to + 400°C	0,05°C	0,06°C	+ 0 to + 400°C	0,05°C	0,055°C
J	- 210 to - 120°C	0,05°C	0,15°C	- 210 to + 0°C	0,05°C	0,03% R + 0,08°C
	- 120 to + 60°C	0,05°C	0,005% R + 0,07°C	+ 0 to + 50°C	0,05°C	0,05% R + 0,07°C
	+ 60 to + 1200°C	0,05°C	0,0025% R + 0,08°C	+ 60 to + 1200°C	0,05°C	0,005% R + 0,04°C
R	- 50 to + 0°C	0,5°C		- 50 to + 0°C	0,5°C	0,35% R + 0,4°C
	+ 0 to + 150°C	0,2°C	+ 0,60°C + 0,60°C	+ 0 to + 350°C	0,2°C	+ 0,4°C
	+ 150 to + 1768°C	0,1°C	+ 0,3°C	+ 350 to + 1768°C	0,1°C	+ 0,25°C
S	- 50 to + 150°C	0,5°C	0,80°C	- 50 to + 0°C	0,5°C	0,25% R + 0,4°C
	+ 150 to + 1450°C	0,2°C	0,30°C	+ 0 to + 350°C	0,2°C	0,30°C
	+ 1450 to + 1768°C	0,1°C	0,35°C	+ 350 to + 1768°C	0,1°C	0,25°C
B	+ 400 to + 900°C	0,2°C	0,005% R + 0,4°C	+ 400 to + 900°C	0,2°C	0,005% R + 0,4°C
	+ 900 to + 1820°C	0,1°C	0,005% R + 0,2°C	+ 900 to + 1820°C	0,1°C	0,005% R + 0,2°C
U	- 200 to - 100°C	0,05°C	+ 0,13°C	- 200 to + 400°C	0,05°C	+ 0,09°C
	- 100 to + 660°C	0,05°C	+ 0,08°C	+ 400°C to + 600°C	0,05°C	+ 0,11°C
N	- 240 to - 190°C	0,2°C	0,25% R	- 240 to - 200°C	0,2°C	0,15% R
	- 190 to - 110°C	0,1°C	0,1% R	- 200 to + 10°C	0,1°C	+ 0,10°C
	- 110°C to + 0°C	0,05°C	0,04% R + 0,06°C	+ 10 to + 250°C	0,05°C	+ 0,08°C
	+ 0 to - 400°C	0,05°C	0,08°C	+ 250 to + 1300°C	0,05°C	
	+ 400°C to + 1300°C	0,05°C	0,005% R + 0,06°C			0,008% R + 0,05°C

Thermocouples: PlatineL, Mo, NiMo/NiCo, G, D, L, C: for specifications refer to the instruction manual

Accuracy is warranted for reference junction (RJ) at 0°C

With use of internal RJ (except couple B) add a additional uncertainty of 0.3°C

CJC localisation can be selected by keypad programming, except for couple B:

External at 0°C, internal (temperature compensation of instrument's terminals) or by temperature programming

Measurement			
Range	Resolution	Accuracy / 1 yr	Remark
±100mV	1 µV	0,005% R + 2 µV	Rin > 10 MΩ
±1V	10 µV	0,005% R + 8 µV	Rin > 10 Mohm
±10V	100 µV	0,007% R + 80 µV	Rin = 1MOhm
±50V	1 mV	0,007% R + 0,5 mV	Rin = 1MOhm

Generation			
Range	Resolution	Accuracy / 1 yr	Remark
±100mV	1 µV	0,005% R + 3 µV	Load 1KOhm
±1V	10 µV	0,005% R + 20 µV	Load 2KOhm
±10V	100 µV	0,007% R + 200 µV	Load 4KOhm
±50V	1 mV	0,007% R + 0,5 mV	Load 4KOhm



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Table of ranges and accuracies

Sensor	Range	Resolution Measurement	Accuracy Measurement / 1 yr	Resolution Generation	Accuracy Generation / 1yr
Pt 50 ( $\alpha = 3850$ )	- 220°C + 1 200°C	0,01°C	0,006 % R+ 0,04°C	0,01°C	0,006 % R+ 0,04°C
Pt 100 ( $\alpha = 3850$ )	- 220°C + 1 200°C	0,01°C	0,006 % R+ 0,03°C	0,01°C	0,006 % R+ 0,035°C
JPt 100 ( $\alpha = 3916$ )	- 200°C + 510°C	0,01°C	0,006 % R+ 0,03°C	0,01°C	0,006 % R+ 0,035°C
Pt 100 ( $\alpha = 3926$ )	- 210°C + 850°C	0,01°C	0,006 % R+ 0,03°C	0,01°C	0,006 % R+ 0,035°C
Pt 200 ( $\alpha = 3851$ )	- 220°C + 600°C	0,01°C	0,006 % R+ 0,04°C	0,01°C	0,006 % R+ 0,04°C
Pt 500 ( $\alpha = 3850$ )	- 220°C + 1 200°C	0,01°C	0,006 % R+ 0,03°C	0,01°C	0,006 % R+ 0,04°C
Pt 1 000 ( $\alpha = 3851$ )	- 220°C + 1 200°C	0,01°C	0,006 % R+ 0,03°C	0,01°C	0,006 % R+ 0,035°C
N 100 ( $\alpha = 618$ )	- 60°C + 180°C	0,01°C	0,006 % R+ 0,05°C	0,01°C	0,006 % R+ 0,04°C
N 120 ( $\alpha = 672$ )	- 40°C + 205°C	0,01°C	0,006 % R+ 0,05°C	0,01°C	0,006 % R+ 0,04°C
N 1 000 ( $\alpha = 618$ )	- 60°C + 180°C	0,01°C	0,006 % R+ 0,05°C	0,01°C	0,006 % R+ 0,04°C
Qu 10 ( $\alpha = 427$ )	- 70°C + 150°C	0,1°C	0,006 % R+ 0,18°C	0,1°C	0,006 % R+ 0,1°C
Qu 50 ( $\alpha = 428$ )	- 50°C + 150°C	0,01°C	0,006 % R+ 0,05°C	0,01°C	0,006 % R+ 0,05°C

Resistive probes measurements in 2,3 or 4 wires: automatic recognition of number of connected wires, with indication on screen

Temperature coefficient: < 10 % of accuracy /°C.

The accuracy in table above is given for a sensor connection in 4 wires

Take into account peculiar error of temperature sensor used and implementation conditions

Measurement current: 0,01mA to 1mA

Establishing time: <1ms for simulation (simulation on quick transmitters)

Measurement			
Range	Resolution	Accuracy / 1yr	Remarks
400 Ohm	1 mOhm	0,006% R+ 8 mOhm	4 wires
3600 Ohm	10 mOhm	0,006% R+ 50 mOhm	4 wires
50 Kohm	100 mOhm	0,008% R+ 1 Ohm	4 wires

Generation			
Range	Resolution	Accuracy / 1yr	Remarks
400 Ohm	10 mOhm	0,006% R+ 8 mOhm@1mA	Int da 0,1 a 1 mA
3600 Ohm	100 mOhm	0,006% R+ 50 mOhm @0,1 mA	Int da 0,1 a 1 mA
50 KOhm	1 Ohm	0,008% R+ 1 Ohm	Int da 5 µA a 50µA

Measurement		
Range	Resolution	Accuracy / 1 yr
10 kHz	< 0,01 Hz	0,01% R
100 KHz	0,1 Hz	0,01

Threshold triggering: 1V

Unite scale: pulse/min or Hz

Measurement on frequency signal and on dry contacts

Measurement for counting will be done on defined time or on infinite

Generation		
Range	Resolution	Accuracy / 1 yr
1000 Hz	0,01 Hz	0,01% R
100 kHz	1 Hz	0,01% R

Unite scale: pulse/min or Hz

Pulse emissions

Dry contact simulation

Max amplitude: 20V selectable by user



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Measurement			
Range	Resolution	Accuracy/1yr	Remarks
0-20mA	0,1µA	0,007%R+0,8µA	Rn<300m
4-20mA	0,1µA	0,007%R+0,8µA	Rn<300m
100mA	0,1µA	0,009%+2µA	Rn<300m

Generation		
Range	Resolution	Accuracy / 1 yr
24mA	1 µA	0,007% + 0,8 µA
4-20 mA	1 µA	0,007% + 0,8 µA
0-20 mA	1 µA	0,007% + 0,8 µA

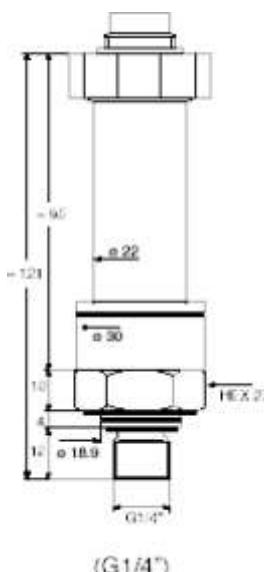
	0%	25%	50%	75%	100%
4-20mA linear	4	8	12	16	20
0-20mA linear	0	5	10	15	20
4-20mA quad.	4	5	8	13	20
0-20Ma quad.	0	1,25	5	11,25	20
4-20mA Valves	3,8-4 -4,2		12		19,20,21

### External pressure sensors:

Range (Bar)	ABS	Relative
0 - 1	X	X
0 - 3	X	X
0 - 10	X	X
0 - 30	X	X
0 - 100	X	
0 - 300	X	
0 - 1000	X	

Resolution: 0,02% f.s.

Accuracy: 0,05% f.s. be0°C and 40°C; -0,1% f.s. between -10°C + 10°C and 40°C to 80°C



### Ordering Codes:

MicroCal 16 Plus- A - 1 - 1\ENG

Instruction manual (english)

Traceable calibration certificate

Rubber holster

1-Battery pack+charger EU

2-Battery pack+charger UK

3-Battery pack+charger USA

4-Battery pack+charger Schuko

# MicroCal 16 Plus

## Multifunction calibrator

### Technical specification:

Measure and generate Tc, rtd, mV and mA

Automatic ramps or steps outputs with function for valves verification

Scale function

Continuity test

250 series resistor for HART devices.

Scale function

5 languages menu

Supply: Ni-MH battery pack with charger

Autonomy: up to 6 hours

Reference condition: 23°C ± 5°C, relative humidity: 45% to 75 %

Nominal using conditions: -10°C up to + 50°C, relative humidity: 20 % up to 80 % without condensation.

USB Interface

Bluetooth interface

Connection for external pressure sensor

Limit stocking and transporting conditions: - 30°C up to + 60°C (without battery).

Dimensions: 210mm x 110mm x 50mm

Weight: 900g

Electrical security according to EN 61010

Electromagnetic compatibility of electrical equipment according to EN61326

### Accessories:

External pressure sensors:

- 0 - 1 Bar (g;abs)
- 0 - 3 Bar (g;abs)
- 0 - 10 Bar (g;abs)
- 0 - 30 Bar (g;abs)
- 0 - 100 Bar (abs)
- 0 - 300 Bar (abs)
- 0 - 1000 Bar (abs)

- Transport case for MicroCal 16 Plus (AN605)0

- USB link for MicroCal 16 Plus(ER 49504-000)

- Set of 6 measuring cables with removable (ACL9311)

- External modem HART

- DATACAL Light software

- DATACAL software

### Standard supply:

MicroCal 16 Plus is supplied in standard with 6 testing leads, a quick battery charging system, traceable calibration certificate and an instruction manual

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