eurotron
"Excellence in measurements"

MicroCal 200/200+
MicroCal 2000+

High Accuracy
Multifunctional Process Calibrators

MULTIFUNCTION CALIBRATORS

- Portable, Rugged and Easy to Use
- Measures and Sources 14 Type of TCs and 10 RTDs
- 24 Vdc Loop Power Supply
- In-Line Digit Setting
- Pannel Mounting Kit
- **MicroCal PM200** Optional Module to Generate/Measure Pressure
- **CalpMan 2007** Software for Automatic Calibration and Documenting in Compliance with ISO9001

Eurotron Instruments ISO 9001 Certified Quality System

CE

www.eurotron.com

All descriptions are related to a fully optioned instrument. See last page for the different configurations

Bulletin 08-44.3 E MicroCal 200_2000 - ed. 04-2007

MicroCal
To Keep your Test and Process Equipment
Accurately Calibrated for ISO 9000 Compliance

General

The **MicroCal 200/200+** and **MicroCal 2000+** are multifunctional calibrators with insulated channels. The instruments are portable and developed to meet the needs of instrumentation engineers and Quality managers, both in laboratory and in field work.
This units are accurate, rugged, compact and easy to use. They are the ideal solution to simulate and measure simultaneously: Voltage, current, resistance, thermocouple, resistance thermometers, frequency and pulse.
Advanced flexibility and high performance has been achieved using a 32 bit microprocessor and a fast A/D conversion technology. The calibrator's internal memory stores all data for normalized IEC, DIN and JIS thermoelectric sensors for both IPTS68 and ITS90 International Temperature Scale

The microprocessor performs automatic linearization and cold junction compensation to assure high accuracy. It is possible to set the calibrator to execute menu-driven calibration procedures for your instruments in field work.

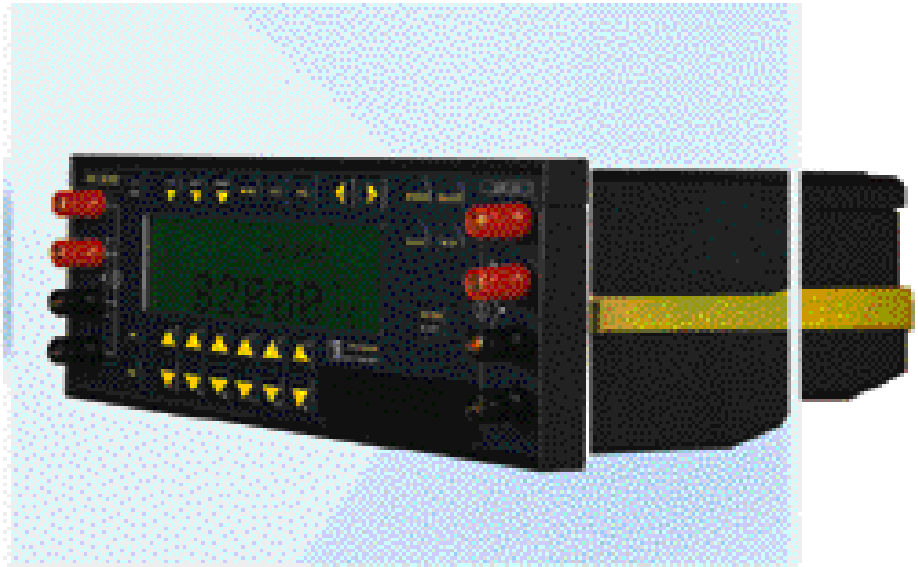
Both Channel 1 (Out) and Channel 2 (In) have the following operative mode capabilities:
- **millivolts**
- **volts**
- **milliamperes (active and passive loop)**
- **Ohms**
- **temperature with thermocouples**
- **temperature with resistance thermometers**
- **frequency**
- **pulse**

Remote auxiliary inputs are available for:
- **Relative humidity and temperature module**
- **Two internal sensors and built-in hand pump pressure module**

The ergonomic case design allows the user the calibrator in three different ways:
- **Portable**
  Two different leather cases, with a cover and shoulder strap, are available upon request for instrument alone or instrument, printer and accessories. These are extremely useful for practical use since they leave one hand free for instrument tuning.
- **Panel mounting**
  It requires a panel cutout of 9.7" x 3.5". The instrument bezel flange butts against the front of the mounting plate; two lateral mounting brackets fit over the instrument rear panel
- **Table top**
  The case is equipped with 2 pivot feet to change the vertical viewing angle when using the instrument on the top of a table.

Quality System
Research, development, production, inspection and certification activities are defined by methods and procedures of the Eurotron Quality System inspected for compliance and certified ISO9001 by GASTEC, a Dutch notified body.

EMC Conformity
The instrument case, made in shock-resistant injection molded ABS + polycarbonate has an internal metal coating to fulfill the prevision of the directive 89/336/CEE Electromagnetic Compatibility.

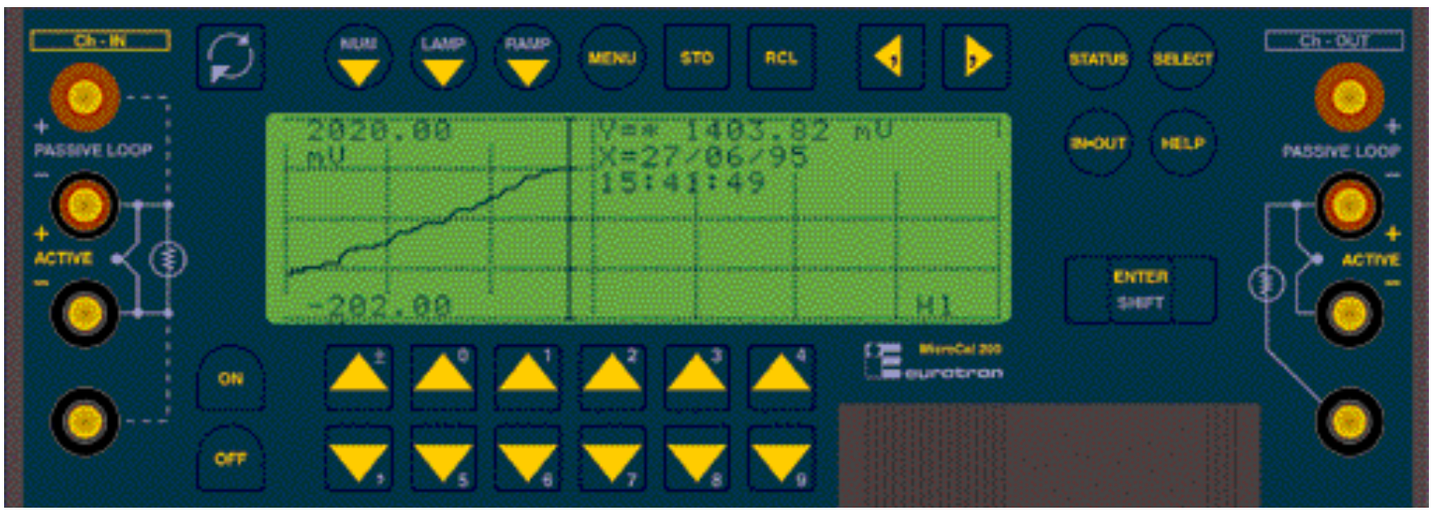


Instrument Highlight

Comparative Table	MicroCal 200	MicroCal 200+	MicroCal 2000+
Accuracy	±0.02% rdg	± 0.01%rdg	± 0.0035% rdg
32-bit microprocessor and flash memory for firmware upgrading through serial interface	●	●	●
All normalized IEC, DIN, JIS thermocouples	●	●	●
Pt, Ni, Cu resistance thermometers	●	●	●
mA, mV, V, W, frequency, pulse, counter	●	●	●
IPTS 68 and ITS 90 linearization	●	●	●
Current output mode directly on active or passive loops	●	●	●
Bidirectional serial interface	Option	●	●
Communication bus for extension to pressure and other optional modules	●	●	●
Optional dedicated external impact type printerOptionOptionOption	●	●	●
Pannel mounting brackets	Option	Option	Option
Traceable Report of Calibration		●	●
RAM extension with PCMCIA memory card		●	●
Non-volatile memory with real-time clock	Option	●	●
Logging and direct real-time graph with movable cursor to read the required actual value	Option	Option	●
mV and V I/O display	6 digits	6 digits	6 ½ digits (0.1 µV)

Display & Keyboard

The large graphic display with back light allows a simultaneous indication of the measured and the simulated value (large digit), together with all data related to the signal as: engineering unit, type of sensor or signal, temperature scale, cold junction selection, battery level, etc.
A swap key allow to change the position of the IN and OUT parameters on the display.
The operative set-up mode is simplified by a sequence of menu pages that only require <Select> and <Enter> instructions.
A full set of instruction pages are memory stored for direct operator assistance.
The relevant instruction may be recalled through the <Help> key.



Real Time Graphic Logging

MicroCal 200/200+
6 digit display

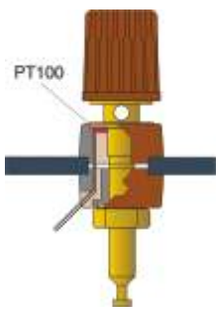
MicroCal 2000+
6 ½ digit display

Firmware
The firmware is stored inside a flash memory and allows a fast and easy upgrade of the instrument using a standard PC. Firmware includes the following capabilities:

- multiple measurement and generation mode
- signal processing: filter, average, min, max
- PC downloadable test procedure
- DataLogger and graphic recorder
- switch test routine
- ramping and stepping for dynamic testing
- user definable linearization
- user entry of probe specific calibration coefficients.

Scale Factor - Square Root
All non-temperature ranges are fully programmable to read both input and output values in terms of engineering units. Four programmable alphanumeric characters are available on the display to show the symbol of the parameter being measured (i.e. mbar, % RH, % CO, etc.) The unit allows the mA reading and output to be related to flow when using a DP transmitter across a calibrated flange.

Rj Compensation
Accurate and fast response compensation, through a special low thermal capacity design of binding posts, incorporates a thin film, high accuracy Pt100 as cold junction reference. The internal reference allows the maximum accuracy for the 14 to 130°F temperature range. An external Pt100 sensor can be connected for special application (from 14 to +210°C). It is possible to manually set the compensation temperature (from -58 to +210°F) by keyboard.



Transmitter Simulation
The calibrator can be connected to your system inputs to simulate 4-20 mA transmitters. It has an adequate power to drive 20 mA into a load of 1000 Ω in source mode. For fast loop checks, preprogrammed steps can be recalled to output 4, 8, 12, 16 and 20 mA or % equivalent. Since the instrument has two separate channels. It is possible to read the error directly in % (In/Out). The operator can set and change temperature values while obtaining the equivalent output mA. The mA mode may be connected directly either on passive or on active current loops.

Frequency - Counts
The "Out" mode is designed to generate zero based square pulse, with an adjustable amplitude, at a frequency up to 20 KHz. A preset number of pulses may be programmed and transmitted to test or to calibrate totalizers and counters. The instrument can be configured to measure frequency and count pulse (totalizer mode). Technical units in Hz, pulse/h and pulse/m. The threshold is adjustable from 0 to 20 V with 0.01 V resolution.

Calculated Readings
The units allow measurements of unstable input signals through a programmable averaging or min, max identification. A hold feature is also included from a keyboard or external contact instructions.

Programmable Signal Converter
The instrument can be used as a temporary signal converter replacement. Any input signal (including remote auxiliary inputs) can be converted into any of the available output signals. The galvanic insulation between the input and output channels allow to use this feature in field work applications as well.

ORDERING CODE

MicroCal 200
3916 - A - B - C - D

MicroCal 200+
3918 - A - B - C - D

MicroCal 2000+
3928 - A - B - C - D

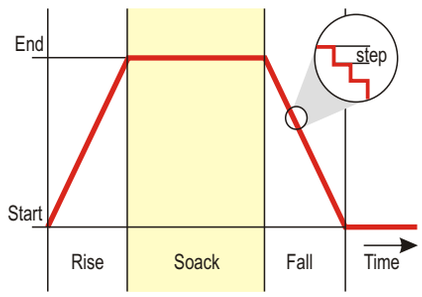
Each instrument is supplied with USB cable, PC Software Package (Linman, Logman), leather carrying case with shoulder strap, Report of Calibration and instruction manual.

Table A	Options:	
0	None	
3	TTL/RS232 insulated converter	
Table B	Line setting - Line cord plug	
1	120 V 50/60Hz - USA plug	
2	230 V 50/60Hz - Schuko plug	
3	230 V 50/60Hz - UK plug	
4	230 V 50/60Hz - European plug	
5	100 V 50/60Hz - USA/Japan plug	
9	special	
Table C	Accessories	
0	None	
6	Brackets for panel mounting	
Table D	Report of Calibration	
1	Eurotron certificate	

4 Wire Resistance Thermometer
Although resistance and temperature with resistance thermometer may be measured with 2 or 3 wire standard connections. The instrument is also designed for 4-wire measurements for higher accuracy and the ability to use as a reference for your calibrations.

Remote Temperature Probe
A high accuracy probe is available on request for general purpose temperature measurement and/or remote cold junction compensation.

Simulation Capability
Menu-driven set up to generate:
- a continuous or step ramp output where the total time, the starting point, the final point and the size of the steps are requested by the set-up procedure to run the program;
- a continuous programmable cycle rises, soaks, falls; (see figure)
- the signal value setting uses unique in-line, single-digit setting mode or a
- direct numeric entry;
- direct keyboard access to n. 20
- programmable memory stored values.



Report of Calibration
Each MicroCal unit is factory calibrated and certified against the highest Eurotron Standards, which are periodically certified by an Internationally recognized laboratory to ensure performance. The units are also shipped with a Report of Calibration stating the nominal and actual values and the deviation errors.

MicroCal PM200 Pressure Module
An optional pressure module is available with one or two internal sensors. The MicroCal PM200 is an intelligent module and it is used to extend the MicroCal capability to pressure in/out. MicroCal PM200 can incorporate pressure/vacuum pump, volume adjuster and ventilation valve. External sensors can be used to measure pressure up to 700bar. See MicroCal PM200 bulletin for more specifications.

MicroCal PM200
Multifunction electrical signals
+ pressure calibrator

CalPMan 2007 Software

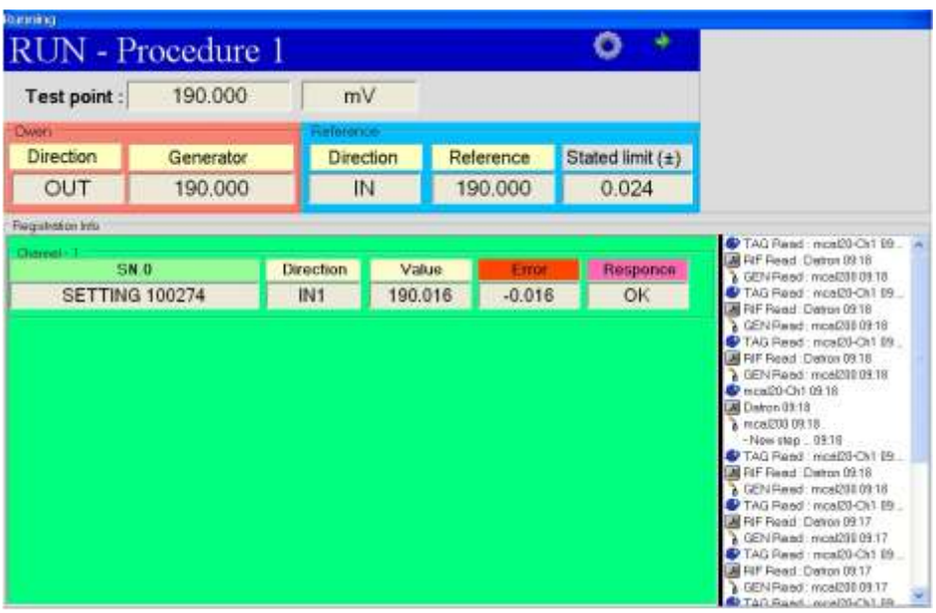
For over 20 years, Eurotron Instruments has combined its own ISO 9001, electric, thermoelectric and pressure measurements, and development of software application experiences. CalpMan 2007 has been designed to be used industries, where there are both laboratory and maintenance on field needs. The CalPMan 2007 is a Windows™ 2000/XP software designed to plan, manage and document all the calibrations and the certifications of the process instrumentation. The software can manage the automatic procedures of the Eurotron calibrators.

Two software versions are available: the **CalpMan 2007** and the **CalpMan 2007 Advanced.**
The main features are:
- Easy to use;
- Compliant with ISO9001 requirements;
- Standards and instruments expired date management;
- Automatic procedure run
- Built-in communication with documenting calibrators
- Traceable and editable calibration documents
- Database backup/Restore ability

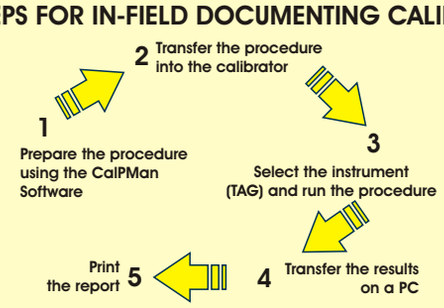
The **CalpMan 2007 Advanced** has the following advanced features:
- Up to 3 instruments of simultaneous management;
- Advanced control of the test point;
- Multi-parameter procedures run;
- Simultaneous certification of more than one temperature sensors;
- Password manager and advanced data security ability.

OFF-LINE Procedure

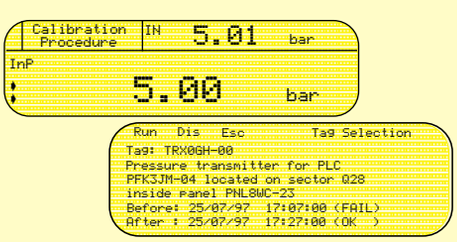
The **CalPMan 2007** can also manage the off-line procedures with all the Eurotron documenting calibrators. The test data can be transferred directly into the instrument and the test can run by the calibrator itself without any connection to a computer. The final results will be stored into the instrument, and they can be transferred from it directly into the CalPMan 2007 database. As transferred, is it possible to print out the certificates and manage the instrument database.



FIVE STEPS FOR IN-FIELD DOCUMENTING CALIBRATION



The MicroCal 200/200+ and 2000+ Series are documenting calibrators able to load test strategies using the CalPMan 2007 software. It can run them and store the results automatically, calculate the errors, highlight the out of range points, and download data on a PC to store them and to generate different reports. The calibrator internal memory can store a whole week procedures.



SPECIFICATIONS

IN/OUT parameters:	Signal type:	mV, V, mA, Ω, KΩ, frequency, pulses
	thermocouples type:	J, K, T, R, S, B, N, C, E, U, L, F, G, D
	resistance thermometers:	Pt100 IEC, OIML, USLAB, US, SAMA, JIS, Pt200, 500, 1000, 1000 OIML, Ni100, Ni120, Cu10, Cu100
Reference junction compensation:	internal automatic:	from -10 °C to +55 °C (14°F to 130°F)
	external adjustable:	from -50 °C to +100 °C (-58°F to 210°F)
	remote with external Pt100:	from -10°C to +100 °C (14°F to 210°F)
Rj compensation drift:	± 0.015°C/°C (from -10 °C to +55 °C)	
Rj compensation error:	internal :	±0.15°C (±0.3°F)
	remote :	±0.3°C (±0.6°F)
Common mode rejection:	>140 dB at ac operation	
Normal mode rejection:	>70 dB at 50 or 60 Hz	
Temperature stability:	MicroCal 200/200+: for temperature exceeding the band +18°C to +28°C (from +64 °C to +84 °F)	
	full scale:	± 8 ppm/°C
	zero:	± 0.2 mV /°C
	MicroCal 2000+: for temperature exceeding the band +21°C to +25°C (from +70 °C to +77 °F)	
	full scale:	± 3 ppm/°C
	zero:	± 0.2 mV /°C
Output impedance (emf output):	< 0.5 Ω with 0.5 mA maximum current	
Input impedance (mV, V and Tc ranges):	>10 MΩ	
Input impedance (mA ranges):	<140 Ω @ 1 mA	
Source resistance effects:	±1 mV error for 1000 Ω source resistance	
Rtd and Ω simulation excitation current:	MicroCal 200/200+:	from 0.01 to 5 mA
	MicroCal 2000+:	from 0.01 to 2 mA
Rtd and Ω measurement excitation current:	~ 0.4 mA @ 400Ω	
	~ 0.04 mA @ 4000Ω	
Rtd connection:	2, 3, and 4 wires	
Rtd cable compensation:	up to 100 Ω (each wire)	
Rtd cable compensation error (Pt100):	±0.005°C/ Ω of total wire	
Maximum load resistance:	1000 Ω @ 20 mA	
Display:	graphic LCD 240 x 64 dots display with LED backlight device	
Measurement sampling time:	250 ms	
Output noise (at 300 Hz):	<2 mVpp for ranges up to 200 mV f.s.,	
	<10 mVpp for ranges up to 2 V f.s.	
	<80 mVpp for ranges up to 20 V f.s.	
Digital interface:	full bidirectional TTL (a RS232 adapter normal or insulated, is available as an option)	
Channel 1_Channel 2 insulation:	50 Vdc	
Calculation functions:	hold, max, min, offset, average	
Selection °C/°F/K:	through the configuration procedure	
In/Out data memory:	20 data with manual or automatic recall	
Logging mode:	1500 input data items (optional memory card for memory extension)	
Convert function:	displays the electrical equivalent of the engineering unit	
Scale factor:	5 different settings with zero and span programmable within -399999 and +999999	
Square root:	in combination with scale factor	
Calibration:	self learning technique with automatic procedure	
Power supply:	external charger and rechargeable Ni-Cd battery	
Self contained operation:	6h on Tc and mV input/output (backlight Off)	
	3.5h with 20 mA simulation (backlight Off)	
Recharging time:	5h at 90% and 6h at 99% with instrument switched off. The battery charging is active only with the instrument switched off.	
Line operation:	100 - 120 - 230 Vac through the external battery charger	
Line transformer insulation:	2500 Vac	
Firmware release identification:	release code on the display	
Operating environment temperature range:	from -10 °C to +55 °C (from 14 °C to 130 °F)	
Storage temperature range:	from -30 °C to +60 °C (from -22 °C to 140 °F)	
Case:	Injection moulded ABS with internal metal coating	
Dimensions:	264 x 96 x 172 mm (10.4"x3.8"x6.8") DIN size	
Weights:	nett: 8.8 lb. gross: 12.1 lb.	

Table IN - OUT Range

Sensor or parameter	Total range	Accuracy Range	Resolution	MicroCal 200 Accuracy (% of rdg)	MicroCal 200+ Accuracy (% of rdg)	MicroCal 2000+ Resolution	MicroCal 2000+ Accuracy (% of rdg)
Tc J	-210 ... 1200°C	-190 ... 1200°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	-350 ... 2200°F	-310 ... 2192°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Tc K	-270 ... 1370°C	-160 ... 1260°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	454 ... 2500°F	-256 ... 2300°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Tc T	-270 ... 400°C	-130 ... 400°C	0.01°C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	-454 ... 760°F	-238 ... 752°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Tc R	-50 ... 1760°C	150 ... 1760°C	0.1 °C	±(0.02% + 0.2 °C)	± (0.01% + 0.2 °C)	0.01°C	±(0.005% + 0.2 °C)
	-60 ... 3200°F	302 ... 3200°F	0.1 °F	±(0.02% + 0.36°F)	± (0.01% + 0.36 °F)	0.1 °F	±(0.005% + 0.36°F)
Tc S	-50 ... 1760°C	170 ... 1760°C	0.1 °C	±(0.02% + 0.2 °C)	± (0.01% + 0.2 °C)	0.01°C	±(0.005% + 0.2 °C)
	-60 ... 3200°F	338 ... 3200°F	0.1 °F	±(0.02% + 0.36°F)	± (0.01% + 0.36 °F)	0.1 °F	±(0.005% + 0.36°F)
Tc B	50 ... 1820°C	920 ... 1820°C	0.1 °C	±(0.02% + 0.3 °C)	± (0.01% + 0.3 °C)	0.01°C	±(0.01% + 0.3 °C)
	140 ... 3310°F	1688 ... 3308°F	0.1 °F	±(0.02% + 0.54°F)	± (0.01% + 0.54 °F)	0.1 °F	±(0.01% + 0.54°F)
Tc C	0 ... 2300°C	0 ... 2000°C	0.1 °C	±(0.02% + 0.2 °C)	± (0.01% + 0.2 °C)	0.1 °C	±(0.01% + 0.2 °C)
	32 ... 4172°F	32 ... 3632°F	0.1 °F	±(0.02% + 0.36°F)	± (0.01% + 0.36 °F)	0.1 °F	±(0.01% + 0.36 °F)
Tc G	0 ... 2300°C	190 ... 2300°C	0.1 °C	±(0.02% + 0.3 °C)	± (0.01% + 0.3 °C)	0.1 °C	±(0.01% + 0.3 °C)
	32 ... 4172°F	374 ... 4172°F	0.1 °F	±(0.02% + 0.54°F)	± (0.01% + 0.54 °F)	0.1 °F	±(0.01% + 0.54 °F)
Tc D	0 ... 2300°C	0 ... 2130°C	0.1 °C	±(0.02% + 0.3 °C)	± (0.01% + 0.3 °C)	0.1 °C	±(0.01% + 0.3 °C)
	32 ... 4172°F	32 ... 3866°F	0.1 °F	±(0.02% + 0.54°F)	± (0.01% + 0.54 °F)	0.1 °F	±(0.01% + 0.54 °F)
Tc U	-200 ... 400°C	-160 ... 400°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	-330 ... 760°F	-256 ... 752°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Tc L	-200 ... 760°C	-200 ... 760°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	-330 ... 1400°F	-328 ... 1400°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Tc N	-270 ... 1300°C	0 ... 1300°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	-450 ... 2380°F	32 ... 2372°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Tc E	-270 ... 1000°C	-200 ... 1000°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	-454 ... 1840°F	-328 ... 1832°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Tc F	0 ... 1400°C	0 ... 1400°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	32 ... 2560°F	32 ... 2552°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Pt100 IEC	-200 ... 850°C	-200 ... 850°C	0.01°C	±(0.02% + 0.05°C)	± (0.01% + 0.05 °C)	0.01°C	±(0.005% + 0.05°C)
OIML, a 3926	-330 ... 1570°F	-328 ... 1562°F	0.1 °F	±(0.02% + 0.09°F)	± (0.01% + 0.09 °F)	0.1 °F	±(0.005% + 0.09°F)
Pt100	-200 ... 650°C	-200 ... 650°C	0.01°C	±(0.02% + 0.05°C)	± (0.01% + 0.05 °C)	0.01°C	±(0.005% + 0.05°C)
a 3902	-330 ... 1210°F	-328 ... 1210°F	0.1 °F	±(0.02% + 0.09°F)	± (0.01% + 0.09 °F)	0.1 °F	±(0.005% + 0.09°F)
Pt100 JIS	-200 ... 600°C	-200 ... 600°C	0.01°C	±(0.02% + 0.05°C)	± (0.01% + 0.05 °C)	0.01°C	±(0.005% + 0.05°C)
SAMA	-330 ... 1120°F	-328 ... 1112°F	0.1 °F	±(0.02% + 0.09°F)	± (0.01% + 0.09 °F)	0.1 °F	±(0.005% + 0.09°F)
Pt 200	-200 ... 850°C	-200 ... 850°C	0.1 °C	±(0.02% + 0.15°C)	± (0.01% + 0.15 °C)	0.01°C	±(0.005% + 0.15°C)
	-330 ... 1570°F	-328 ... 1562°F	0.1 °F	±(0.02% + 0.27°F)	± (0.01% + 0.27 °F)	0.1 °F	±(0.005% + 0.27°F)
Pt 500	-200 ... 850°C	-200 ... 530°C	0.1 °C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
	-330 ... 1570°F	-328 ... 986°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
Pt1000 IEC	-200 ... 850°C	-200 ... 850°C	0.01°C	±(0.02% + 0.1 °C)	± (0.01% + 0.1 °C)	0.01°C	±(0.005% + 0.1 °C)
OIML	-330 ... 1570°F	-328 ... 1562°F	0.1 °F	±(0.02% + 0.18°F)	± (0.01% + 0.18 °F)	0.1 °F	±(0.005% + 0.18°F)
CU10	-70 ... 150°C	-70 ... 150°C	0.1 °C	±(0.02% + 0.4 °C)	± (0.01% + 0.4 °C)	0.1 °C	±(0.01% + 0.4 °C)
	-100 ... 310°F	-94 ... 302°F	0.1 °F	±(0.02% + 0.72°F)	± (0.01% + 0.72 °F)	0.1 °F	±(0.01% + 0.72°F)
CU100	-180 ... 150°C	-180 ... 150°C	0.1 °C	±(0.02% + 0.05°C)	± (0.01% + 0.05 °C)	0.1 °C	±(0.01% + 0.05°C)
	-300 ... 310°F	-292 ... 302°F	0.1 °F	±(0.02% + 0.09°F)	± (0.01% + 0.09 °F)	0.1 °F	±(0.01% + 0.09°F)
Ni100	-60 ... 180°C	-60 ... 180°C	0.1 °C	±(0.02% + 0.05°C)	± (0.01% + 0.05 °C)	0.1 °C	±(0.01% + 0.05°C)
	-80 ... 360°F	-76 ... 356°F	0.1 °F	±(0.02% + 0.09°F)	± (0.01% + 0.09 °F)	0.1 °F	±(0.01% + 0.09°F)
Ni120	0 ... 150°C	0 ... 150°C	0.1 °C	±(0.02% + 0.05°C)	± (0.01% + 0.05 °C)	0.1 °C	±(0.01% + 0.05°C)
	32 ... 310°F	32 ... 302°F	0.1 °F	±(0.02% + 0.09°F)	± (0.01% + 0.09 °F)	0.1 °F	±(0.01% + 0.09°F)
mV (L)		-20 ... +200mV	1 µV	±(0.02% + 2 µV)	± (0.01% + 2 µV)	0.1 µV	±(0.0035% + 1 µV)
mV (H)		-0.2 ... +2 V	10 µV	±(0.02% + 10 µV)	± (0.01% +10 µV)	1 µV	±(0.005% + 10 µV)
V		-2 ... +20 V	0.1 mV	±(0.02% + 0.08mV)	± (0.01% + 0.08mV)	10 µV	±(0.005% + 0.08mV)
mA (In)		-5 ... +50 mA	0.1 µA	±(0.02% + 0.4 µA)	± (0.01% + 0.4 µA)	0.1 µA	±(0.005% + 0.4 µA)
mA (Out)		0 ... +50 mA	0.1 µA	±(0.02% + 0.4 µA)	± (0.01% + 0.4 µA)	0.1 µA	±(0.005% + 0.4 µA)
Ω IN		0 ... 500 Ω	1 mΩ	±(0.02% + 12 mΩ)	± (0.01% +12 mΩ)	1 mΩ	±(0.005% + 12 mΩ)
		0 ... 5000 Ω	0.01 Ω	±(0.02% +120 mΩ)	± (0.01% +120 mΩ)	0.01 Ω	±(0.005% +120 mΩ)
Ω OUT		0 ... 500 Ω	1 mΩ	±(0.02% + 20 mΩ)	± (0.01% + 20 mΩ)	1 mΩ	±(0.005% + 12 mΩ)
		0 ... 5000 Ω	0.01 Ω	±(0.02% +200 mΩ)	± (0.01% +200 mΩ)	0.01 Ω	±(0.005% +120 mΩ)
Frequency		1 ... 200 Hz	0.001 Hz	±(0.005% + 0.001 Hz)	±(0.005% + 0.001 Hz)	0.001 Hz	±(0.005% + 0.001 Hz)
		1 ... 2000 Hz	0.01	±(0.005% + 0.001 Hz)	±(0.005% + 0.001 Hz)	0.01 Hz	±(0.005% + 0.001 Hz)
		1 ... 20000 Hz	0.1 Hz	±(0.005% + 0.001 Hz)	±(0.005% + 0.001 Hz)	0.1 Hz	±(0.005% + 0.001 Hz)
Pulse counter		0 ... 10^6 counts	1 count	infinite	infinite	1 count	infinite
Pulse (Out)		0 ... 6000 pulse/min	1 pulse/min	1 pulse / min	1 pulse / min	1 pulse / min	1 pulse / min
		0 ... 36000 pulse/h	1 pulse/h	1 pulse / min	1 pulse / min	1 pulse / h	1 pulse / min

Note:
- The MicroCal 200/200+ relative accuracies shown above are stated for 360 days and the operative conditions are from +64°F to +82°F
- The MicroCal 2000+ relative accuracies shown above are stated for 360 days and the operative conditions are from +70°F to +77°F
- Typical 90 days relative accuracy can be estimated by dividing the "% of reading" specifications by 1.6.
- Typical 2 years relative accuracy can be estimated by multiplying the "% of reading" specifications by 1.4.
- All input ranges: additional error ±1 digit.
- Eurotron traceability chart and uncertainty can be supplied on request.

Specifications may change without notice