MICROCAL 2000 SYSTEM

LIGHTWEIGHT FIELD OR LAB PROCESS CALIBRATION STANDARD

Here's a calibrator that was tailor-made for an instrumentation engineer or quality manager. Portable or panel mount, The MicroCal 2000+ system goes any place required in both the laboratory and in the field.

The MicroCal 2000+ is an advanced, multi-function calibrator representing the most versatile and powerful piece of calibration equipment on the market today. Using a 32-bit microprocessor and a fast A/D conversation technology, the MicroCal 2000 achieves advanced flexibility and high performance with two insulated channels.

The practical case design supports the MicroCal 2000's rugged, compact and accurate construction in a way that makes these calibrators the ideal solution for measuring and simulating: millivolts, volts, milliamperes, ohms, thermocouples and resistance thermometers. Combining the integral or external pressure supply (PM2000 module) to a signal calibrator, allows for complete ISO9000 calibration of virtually any system.

Supporting software for DOS/Windows is included to transfer a selection of calibration routines from a PC to the internal memory of the MicroCal 2000 to automate field calibrations; download logged data from internal memory to PC, and permit highly accurate temperature measurement with a calibrated Pt100.

THE SIGNAL CALIBRATOR

The MicroCal 2000+ hand-held portable calibrator incorporates two channels of high accuracy measurement and simulation with simultaneous function capability of millivolt, volt, milliampere (active and passive loop), Ω, thermocouple, RTD and frequency.

The MicroCal 2000+ has a two line backlighted display for the simultaneous reading of input and output signals, making it the perfect tool for calibrating signal conditioners, panel meters, controllers, recorders and scada systems.



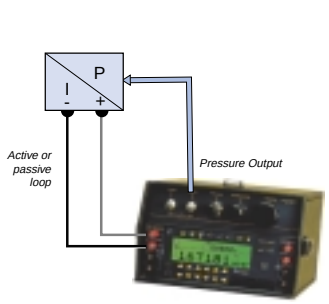
- **Advanced Technology**
  Powerful 32 bit microprocessor and advanced A/D conversion
- **RJ Compensation**
  A high accuracy thin film RTD designed into the binding post to give quick compensation exactly where you need it
- **Frequency Generation**
  Zero based square wave source with adjustable amplitudes and frequency up to 20Khz
- **Printer Option**
  Optional external impact printer for printing calibration data on-site for you or your customers
- **Highest Accuracy**
  0.005% of reading, not full scale, for unmatched portable accuracy
- **Graphical Display**
  Large high contrast display to view real time graph of measured values with mouse pointer to locate exact point of interest

THE PM2000 PRESSURE MODULE

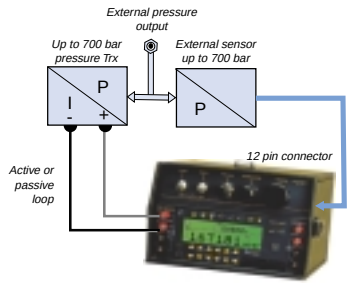
Incorporating the two-channel pressure module with our Microcal 2000+ provides complete flexibility for all of your pressure calibration needs, including differential pressure measurements with 0.025% accuracy. The Microcal PM2000 system is an electronic pressure secondary standard that uses full temperature and linearity characterization to grant overall highly stable long-term performances.



Typical Pressure Calibration Applications



Two-wire pressure to current Trx calibration



Pressure to current Trx calibration using external sensor

- **Laboratory Accuracy**
  Pressure accuracy of ±0.025% of reading
- **Advanced Pressure Module**
  Gauge, differential, and absolute pressure measurement and generation, available in a variety of configurations to suit your needs
- **Multifunction Display**
  Simultaneous display of pressure and electrical signal values on the graphic LCD display with trending capabilities
- **Internal or External Pumps**
  Use internal pumping capabilities from vacuum to 300 psi, or use external pumps and sensors up to 15,000 psi
- **Transmitter Test Function**
  Pressure transmitter test function with direct reading of % error
- **Loads of FREE Software**
  CalpMan software for documenting test and calibration activity and printing calibration certificates, LinMan software for customized linearization tests, and LogMan software for even more advanced long-term datalogging tests

MICROCAL 2000+ ELECTRICAL SPECIFICATIONS

SENSOR OR PARAMETER		RANGE	RESOLUTION	ACCURACY (% OF RDG)
TC TYPE J	°C	-190 to 1200	0.01	±(0.005% +0.1)
	°F	-310 to 2192	0.1	±(0.005% +0.18)
TC TYPE K	°C	-160 to 1300	0.01	±(0.005% +0.1)
	°F	-256 to 2372	0.1	±(0.005% +0.18)
TC TYPE T	°C	-130 to 400	0.01	±(0.005% +0.1)
	°F	-238 to 752	0.1	±(0.005% +0.18)
TC TYPE R	°C	150 to 1760	0.01	±(0.005% +0.2)
	°F	302 to 3092	0.1	±(0.005% +0.36)
TC TYPE S	°C	170 to 1760	0.01	±(0.005% +0.2)
	°F	338 to 3200	0.1	±(0.005% +0.36)
TC TYPE B	°C	920 to 1820	0.01	±(0.01% +0.3)
	°F	1688 to 3308	0.1	±(0.01% +0.54)
TC TYPE C	°C	0 to 2300	0.1	±(0.01% +0.2)
	°F	32 to 4172	0.1	±(0.01% +0.36)
TC TYPE N	°C	0 to 1300	0.1	±(0.005% +0.1)
	°F	32 to 2372	0.1	±(0.005% +0.18)
TC TYPE E	°C	-200 to 1000	0.01	±(0.005% +0.1)
	°F	-328 to 1832	0.1	±(0.005% +0.18)

MICROCAL 2000+ ELECTRICAL SPECIFICATIONS, CONTINUED

SENSOR OR PARAMETER		RANGE			RESOLUTION	ACCURACY (% OF RDG)
PT 100	°C	-200	to	850	0.01	±(0.005% +0.05)
A = 385	°F	-328	to	1562	0.1	±(0.005% +0.09)
PT 100	°C	-200	to	650	0.01	±(0.005% +0.05)
α = 392	°F	-328	to	1210	0.1	±(0.005% +0.09)
PT 200	°C	-200	to	850	0.01	±(0.005% +0.15)
	°F	-328	to	1562	0.1	±(0.005% +0.27)
PT 500	°C	-200	to	530	0.01	±(0.005% +0.1)
	°F	-328	to	986	0.1	±(0.005% +0.18)
PT 1000 IEC	°C	-200	to	850	0.01	±(0.01% +0.1)
	°F	-328	to	1562	0.1	±(0.01% +0.18)
MV		-20	to	200mV	0.11µV	±(0.0035% +2 µV)
MV		-0.2	to	2 V	1µV	±(0.005% +10 µV)
V		-2	to	20 V	10µV	±(0.005% +0.08mV)
MA (IN)		-5	to	50mA	0.1µA	±(0.005% +0.4 µV)
MA (OUT)		0	to	50mA	0.1µA	±(0.005% +0.4 µV)
Ω (IN)		0	to	500Ω	1mΩ	±(0.005% +12 mΩ)
		0	to	5000Ω	0.01Ω	±(0.005% +120 mΩ)
Ω (OUT)		0	to	500Ω	1mΩ	±(0.005% +20 mΩ)
		0	to	5000Ω	0.01Ω	±(0.005% +200 mΩ)
FREQUENCY		1	to	200 Hz	0.001 Hz	±(0.005% + 0.001 Hz)
		1	to	2000 Hz	0.01 Hz	±(0.005% + 0.001 Hz)
		1	to	20000 Hz	0.1 Hz	±(0.005% + 0.001 Hz)
PULSE COUNTER		0	to	106 counts	1 count	infinite
PULSE		0	to	6000 pulse/min	1 pulse/min	1 c/m
		0	to	36000 pulse/min	1 pulse/hr	1 c/m

MICROCAL PM 2000 PRESSURE SPECIFICATIONS

PRESSURE RANGES	
INTERNAL SENSORS	-25"Hg vacuum to 300 psi
EXTERNAL SENSORS	0 to 15,000 psi
OVERPRESSURES	125% of F.S. without calibration derating of the active sensor
PRESSURE MEDIA	
INTERNAL SENSORS	Compatible with non-reducing, non-corrosive, non-condensing and non-explosive gases
PRESSURE CONNECTIONS	Quick release coupling
INTERNAL PRESSURE ACCURACY (BUILT-IN SENSORS)	±0.05% or ±0.025% of reading as specified
KEYBOARD SELECTABLE TECHNICAL UNITS	mbar, bar, Pa, hPa, MPa, kg/cm$_2$, kg/m$_2$, psi, mmH_2O, cmH_2O, mH_2O, torr, atm lb/ft^2, inH_2O, inH_2O^4, ftH_2O, ftH_2O^4, mmHg, cmHg, mHg, inHg, custom
SCALE FACTOR AND SQUARE ROOT	For direct flow measurement
RESPONSE TIME	2 readings per second
DISPLAY	High contrast graphic LCD display with backlight
DATA MEMORY	Up to 1500 data records. It can be extended up to 300,000 data records using the PCMCIA memory card
CASE	
PRESSURE MODULE	Aluminum
SIGNAL CALIBRATOR	ABS with internal metal coating
SYSTEM	Leather case to contain complete system
DIMENSIONS	
MODULE ONLY	9.8 x 2.4 x 6.8 in.
PM SYSTEM	9.8 x 6.1 x 6.8 in.
PM SYSTEM AND LEATHER CASE	10.6 x 6.7 x 10.5 in.
WEIGHT	
MODULE ONLY	Net 6.6 lb.
PM SYSTEM	15.4 lb.

MICROCAL 2000 GENERAL SPECIFICATIONS

REFERENCE JUNCTION COMPENSATION	
INTERNAL AUTOMATIC	-10 to 55°C (14 to 131°F)
EXTERNAL ADJUSTABLE	-50 to 100°C (-58 to 212°F)
REMOTE WITH EXTERNAL PT100	-10 to 100°C (14 to 212°F)
RJ COMPENSATION DRIFT	±0.015°C/°C (-10 to 55°C)
COMMON MODE REJECTION	>140 dB at AC operation
NORMAL MODE REJECTION	>70 dB at 50 or 60 Hz
TEMPERATURE STABILITY (FOR TEMPERATURE VALUES EXCEEDING THE BAND 21 TO 25°C (71 TO 77°F)	
FULL SCALE	±3 ppm/°C
ZERO	±0.2 µ V/°C
OUTPUT IMPEDANCE (EMF OUTPUT)	Less than 0.5Ω with maximum current of 0.5mA
INPUT IMPEDANCE	>10 MΩ
SOURCE RESISTANCE EFFECTS	±1 µV error for 1000 ohms source resistance
RTD AND Ω SIMULATION CURRENT	From 0.01mA to 2mA
RTD AND Ω MEASUREMENT CURRENT	0.4mA
RTD TERMINALS	2-, 3-, and 4-wire
RTD CABLE COMPENSATION	Up to 100Ω
RTD CABLE COMPENSATION ERROR (PT100)	±0.005°C/Ω of total wire
MAXIMUM LOAD RESISTANCE	1000Ω at 20mA
DISPLAY	Graphic LCD 240 x 64 dot display with backlit device
MEASUREMENT SAMPLING TIME	250 ms
CHANNEL 1 - CHANNEL 2 INSULATION	50V DC
IN/OUT DATA MEMORY	20 data with manual or auto recall
LOGGING MODE	>1500 input data items (optional memory card for memory extension)
SCALE FACTOR	5 programs with programmable zero and span within -399999 and +999999
SQUARE ROOT	In combination with scale factor
POWER SUPPLY	Main-line power supply or rechargeable Ni-cad battery with external charger
RECHARGING TIME	4 hours at 90% and 6 hours at 99% with the instrument switched off
LINE OPERATION	115V ±10% 50/60 Hz
LINE TRANSFORMER INSULATION	2500V AC
ENVIRONMENT TEMPERATURE RANGE	-10 to 55°C (+14 to 131°F)
STORAGE TEMPERATURE RANGE	-30 to 60°C (-22 to 140°F)
CASE	Injection molded ABS with internal metal coating
DIMENSIONS (DIN SIZE)	10.4 x 3.8 x 6.8 in. (264 x 96 x 172 mm)
WEIGHTS	
NET	8.8 lb. (4 kg)
GROSS	12.1 lb. (5.5 kg)

ORDERING INFORMATION

MICROCAL 2000+	Process Calibrator
PM2000-2-1-2	Pressure module, dual-sensor, -25”Hg to 30 psi, -25”Hg to 300 psi, built-in pump
PM2000-2-3-0	Pressure module, single-sensor, -25”Hg to 300 psi
TP1-25	External pump (-28”Hg to 360 psi)
LTP1-30	External pump (-28”Hg to 30 psi)

SOFTWARE FOR THE MICROCAL 2000 SYSTEM

These three new software programs enhance the use of the high performance, two channel MicroCal 2000 System to its fullest potential, allowing for fixed data to be manipulated and stored in virtually any manner.

LOGMAN: LOGGING DATA MANAGER



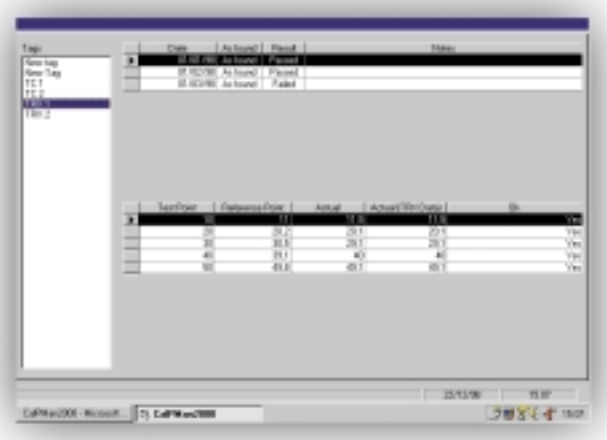
Allows the user complete management of the data coming from the MicroCal 2000's memory. Data can be downloaded to a PC, viewed as numerical values or in a graphical mode and saved on disk. Data can be exported into spreadsheet programs and printed out.

LINMAN: LINEARIZATION DATA MANAGER



This program gives the user the ability of creating their own sensor linearizations for use with the MicroCal 2000 system. It is designed to change the calibrator's linearization data to accommodate ºC/signal points for thermocouples and RTDs. It is also possible to enter engineering unit/signal points. Linman interpolates inserted points, and by selecting Pt X or Tc X, and downloading data into the MicroCal 2000, it enables use of a special linearized sensor in both simulation and measurement. The program's structure is the same as LOGMAN, and can be used on the MicroCal 2000's keyboard.

CALPMAN: CALIBRATION PROCEDURE MANAGER



As standard agencies and quality auditors require the collection, organization and analysis of traceability documents, Calpman transfers a selection of calibration routines from a PC to the internal memory of the MicroCal 2000 to simplify field calibrations by selecting the appropriate tag numbers. The data of each calibration procedure can be stored into the calibrator's RAM, together with a tag name, engineering unit, process information, calibration points and a two level error band. The calibrator can be used as a recorder, a generator or both, and its input and output terminals can be used to generate, receive and compare information.

After the calibration check, MicroCal 2000 will indicate if the checked instrument is within its specifications or has to be calibrated. The status of every instrument, both before and after its calibration, can be stored and recalled later for traceability documents.