



### General

Pressure, by definition, is a parameter derived by the combination of a mass measurement imposed upon an area. It is commonly expressed in terms of weight per unit area.

Pressure can also be expressed in terms of height of a liquid column (eg. mmH<sub>2</sub>O) that produces the same pressure at its base.

Pressure measurements are always expressed as the difference between the measured pressure and some basic pressure.

The **Gauge Pressure** is the pressure measured with reference to the atmospheric pressure.

The **Absolute Pressure** is the pressure measured with reference to the zero gauge pressure, or to a perfect vacuum.

The **Differential Pressure** is the difference between two pressures measured by a pressure gauge.

### Primary Pressure Standards

Primary Pressure Standards, such as dead-weight testers, are directly traceable to the physical standards of length and mass and any errors must either be eliminated or evaluated.

Within the deadweight tester the area of the piston and cylinder (or the ball and nozzle) can be measured and directly traceable to the physical standard of length. The weights can be measured directly traceable to the physical standard of mass.

The only other pressure measurement device that fulfils this definition of primary is the "U" tube manometer. All other devices for measuring pressure are considered as secondary.

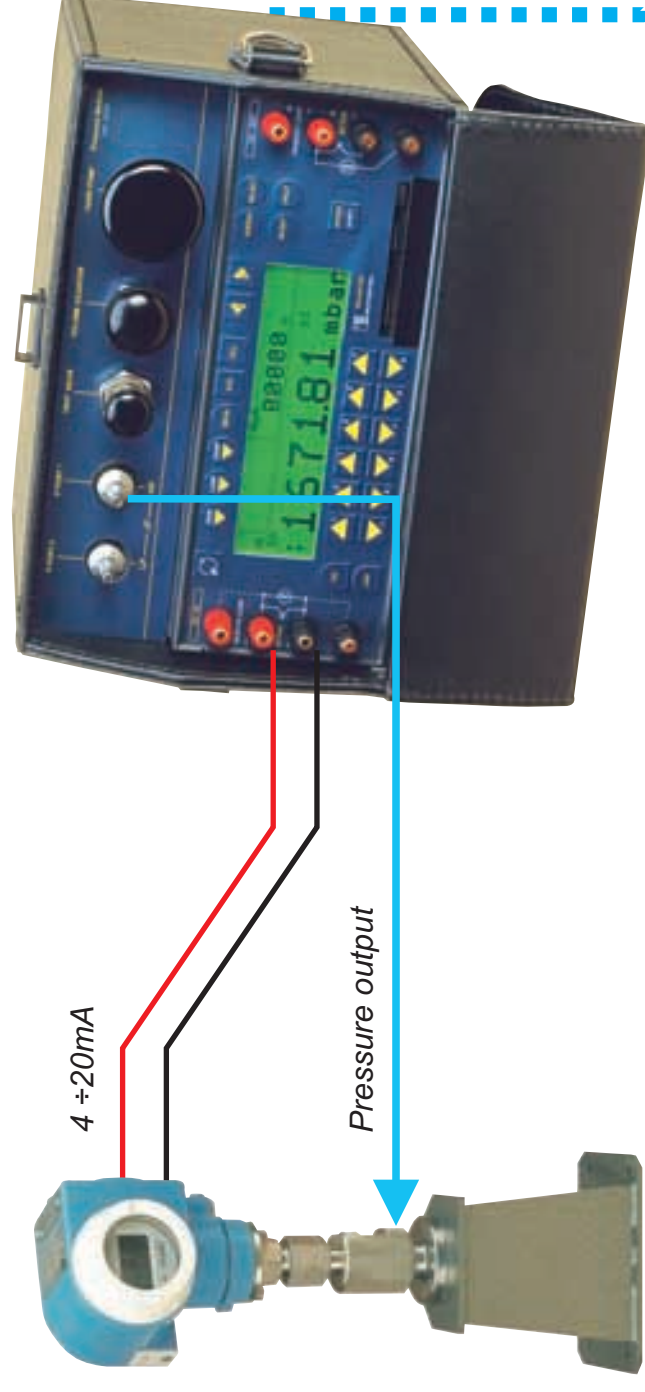
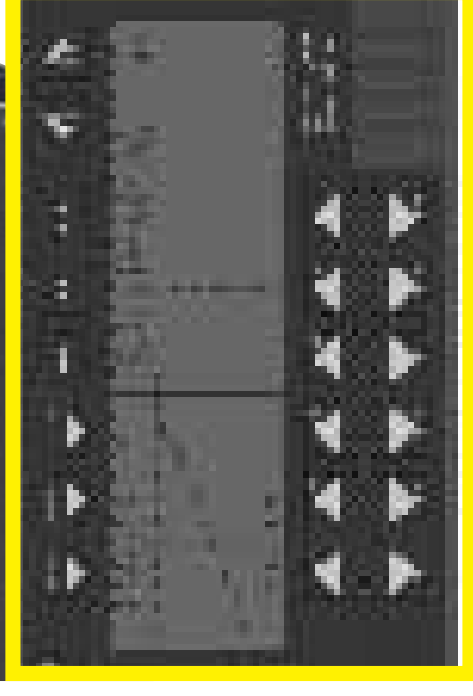
### Secondary Pressure Standards

A Secondary Pressure Standard, is calibrated and certified by comparison with a Primary Standard and can be used in routine field and laboratory tests and calibration activities to fulfil ISO 9000 requirement.

The **MicroCal PM200 System** is an Electronic Pressure Standard System that uses a technique of a full temperature and linearity characterisation to grant overall highly stable long term performances (accuracy, repeatability, hysteresis, temperature effect and resolution).

Compact, rugged and with a friendly user's operative mode is the most versatile and powerful calibrator on the market today.

A Report of Calibration is supplied with each instrument to state the traceability in accordance with International standards.



- **Overpressures:** 125% of f.s. without calibration derating of the active sensor

- **Pressure media:** Internal sensors: compatible with non-reducing, non-oxidant, non-condensing and non explosive gases

External sensors:Gauge sensors compatible with all 316SS gases. Differential wet/wet sensors with a maximum line pressure of 35 bar.

- **Pressure connections :** Quick release coupling

- **Accuracy (built-in sensors) :** mod.3222:  $\pm(0.05\% \text{ rdg} + 0.006\% \text{ f.s.})$  for each sensor

mod.3226:  $\pm(0.025\% \text{ rdg} + 0.006\% \text{ f.s.})$  for each sensor  
The above relative accuracy is stated for 90 days and includes nonlinearity, hysteresis and repeatability. The average temperature coefficient, inside the temperature compensated range, is  $\pm 0.002\%$  of reading for °C (w.t.r. + 23 °C/ +73°F)

- **Accuracy (external sensors) :**  $\pm 0.1\%$  f.s. Standard

- $\pm 0.05\%$  f.s. on request

- **Keyboard selectable technical units:** mbar, bar, Pa, hPa, MPa, kg/cm<sup>2</sup>, kg/m<sup>2</sup>, psi, mmH<sub>2</sub>O, cmH<sub>2</sub>O, mH<sub>2</sub>O, torr, atm, lb/ft<sup>2</sup>, inH<sub>2</sub>O, inH<sub>2</sub>O<sub>4</sub>, ftH<sub>2</sub>O, inH<sub>2</sub>O<sub>4</sub>, mmHg, cmHg, mHg, inHg, custom.

- **Scale factor and square root:**

for direct flow measurement

- **Response time:**

2 readings for second (nominal)

- **Display:** High contrast graphic LCD display with backlight device

- **Battery life:**

4 hours without printing and backlight

- **Data memory:**

Up to 1500 data records. It can be extended up to 300.000 data records using the PCMCIA memory card installed in the MicroCal 200+

- **Operating temperature:** from -5°C to +50°C (+23°F to +122°F)

- **Temperature compensated range:** from +0°C to +45°C (+23°F+113°F)

- **Reference temperature:** +23°C  $\pm 1^\circ\text{C}$  (+73°F  $\pm 1^\circ\text{F}$ )

- **Storage temperature:** from -20°C to +60°C (-4°F +140°F)

- **Case:**

Pressure module : Aluminium

Signal Calibrator : ABS with internal metal coating

System : Leather case to contains all the system

- **Dimensions:**

250 x 60 x 172 mm (module only)

250 x 156 x 172 mm (PM system)

270 x 170 x 267 mm (PM system + leather case)

- **Weight:** net 3 kg (module only) 7 kg (PM system)

**Instrument Highlight**

**Unique handy field operation**  
The leather case contains both the Pressure Module and the Signal calibrator and is extremely useful for a practical use since it allows to leave one hand free for instrument under test.

**Pressure Units**  
Most common pressure units can be selected for readout (see list under specifications). Additional units can be included on request.

**Auto Zero**  
The display offset can be reset by activating a soft key.

**Multifunction system**  
Two channel calibrator measure millivolt, Volt, milliampere, ohm, temperature with thermocouples and resistance temperature detectors, frequency, counts, pressure are all the available standard.

**Safe operation with toxic gases**  
All In/Out pneumatic connectors are fast coupling type and equipped with a self shut-off feature. A plastic/rubber tube can be connected to the exhaust port to keep the operator in safe environment.

**Built-in pressure pump**  
The instrument can be specified with an internal hand pump capable of generating -0.8 to +20 bar gauge pressure, a volume adjuster for fine control, a ventilation valve for pressure release and a group of solenoid valves for pressure/vacuum switchover and pump limit for safety.

**Peak**  
To measure the low and high peak values. It may also be used to measure pressure pulses.

**Switch test**  
A pressure switch test facility is included and the display will automatically hold trigger points (open or closed).

**Leak Test**  
Provides pressure decay data on a programmable Time period.

**Filter/Damp**  
Introduces a digital filter for unstable readings.

**Powerful data logging capability**  
Data logging can be performed automatically. The instrument is able to visualise the real-time graph of the measured parameter. Flash memory + 1 Mbytes PCMCIA memory card allow repetitive storage of complete displayed values of above 300000 data records.

**Temperature Compensated**  
To eliminate temperature effects the instrument and the sensors are temperature compensated in the range from 0°C to +45°C (+32°F to +113°F)

**Pressure Media Internal sensors**  
The instrument is supplied as a standard for all non-reducing, non-oxidant, non-condensing and non-explosive gases.

**External sensors**  
Gauge sensors are compatible with all 316SS gases. Differential wet/wet sensors have a maximum line pressure of 35 bar.

**Pressure ports**  
Pressure ports are available for each installed internal sensor. All pressure ports uses special, quick coupling, and auto-closing connectors.

**Traceable Certification**  
Report of Calibration stating the nominal and actual values and the deviation errors with a traceability declaration and references.



**Quality System**  
Research, development, product inspection, and certification activities are defined by method and procedures of the Eurotron Quality System inspected for compliance and certified ISO 9001 by GASTEC

**EMC Conformity**  
The equipment is fully tested in conformity with the directive n. 89/336/CEE Electromagnetic Compatibility.

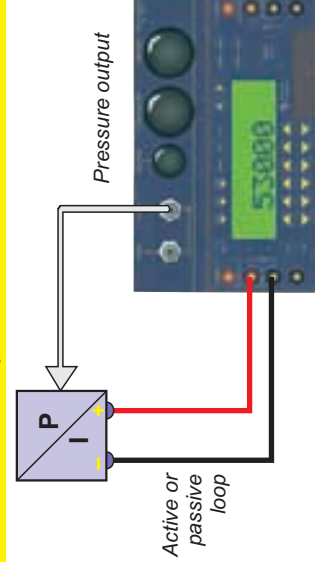
**MicroCal PM200 System**  
Is a true multifunction and multipurpose calibrator with two insulated, simultaneous and independent channels.

**MicroCal PM200 System**, is primarily used for calibrating transmitters, transducers and systems over the range -0.8 bar to 20 bar gauge, absolute and differential. Used in conjunction with external transducers, the range of the instrument can be extended to 700 bar.

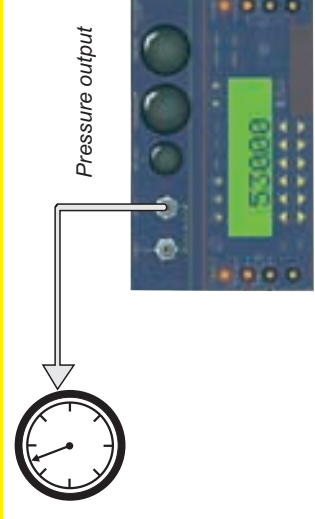
Typical calibration application are as it follows:

- **Gauge, absolute and differential pressure Trx**  
Pressure to voltage ;  
Pressure to current ;
- **Pressure converter/controller**  
Voltage to pressure ;  
Current to pressure ;  
Pressure to pressure ;
- **Pressure switch test**
- **Analogue and digital pressure gauge**
- **Flow meter calibration**

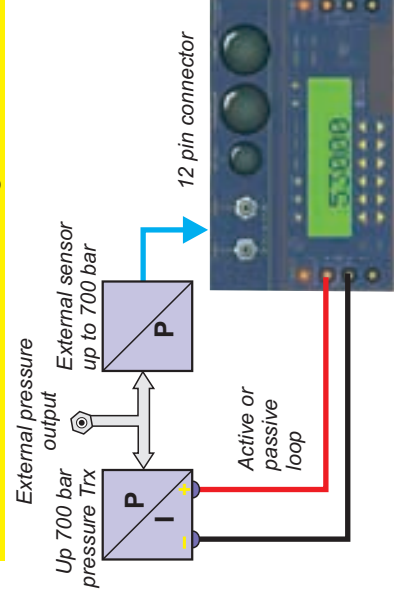
**Two wire pressure to current Trx calibration**



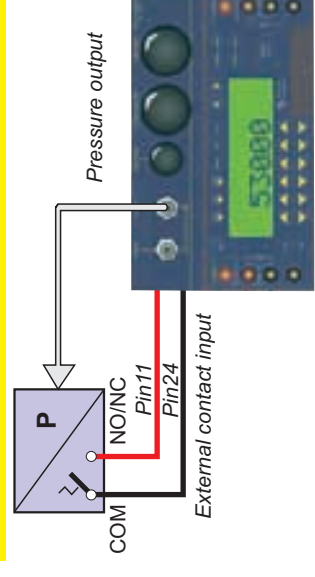
**Analog pressure gauge calibration**



**Pressure to current calibration using external sensor**



**Pressure to switch test**



Serial communication

## High accuracy multifunction calibrator

### MicroCal PM 200 System

MicroCal PM200 system is a universal, multifunction, accurate, rugged, and portable instrument to perform both in laboratory and in field work, all process instrumentation test and calibration. The system consists of a MicroCal 200 series multifunction calibrator and one high accuracy pressure module.

The high accuracy Pressure Module is designed to operate together with standard MicroCal 200 series calibrator extending the overall performances to absolute, relative (gauge) and differential pressure measurements and calibrations.

**Microcal PM200 System** represents the most advanced, powerful and versatile indicator-simulator available on the market today for measurements and simulations of:

- millivolt
- volt
- milliamperes (active and passive loop)
- ohm
- temperature with thermocouples
- temperature with resistance thermometers
- frequency and pulse
- pressure

All most common pressure technical units are selectable through a simple keyboard procedure.

A standard 19" rack format is available on request for installation in laboratory calibration work station. Pressure Module and MicroCal 200 communicate through a dedicated digital port simplifying base calibration and service. MicroCal PM200 System is powered by Ni-Cd rechargeable batteries.

### MicroCal PM200 Pressure Module

The high accuracy Pressure Module is designed to operate together with MicroCal 200 series calibrator extending the overall performances to absolute, relative (gauge) and differential pressure measurements and calibrations.

The Pressure Module has been developed using a microcontroller technique to combine high flexibility of performances with a special procedure of calibration using computerised methods and storing into memory the relevant calibration data.

The gauge, absolute and differential pressure measurement uses a temperature compensated silicon piezoresistive transducer individually characterised for linearity and temperature coefficient.

The individual sensor temperature/linearization matrix data are stored in a non-volatile EEPROM resident in the module.

In order to make the calibration activity easy the MicroCal PM200 System can be specified with an internal single or twin pressure transducers up to 20 bar and, as an option, with a built-in hand vacuum/pressure pump, a volume adjuster for fine control, a ventilation valve for pressure release and a pressure port.

As it is important that the maximum pressure for the device under test is not exceeded, a safety LIMITS function may be selected to automatically block the pumping action at the desired set pressure. Two overpressure valve are used to protect the internal sensors (active also with instrument switched off). An external pressure transducer can be connected for pressure up to 700 bar.

### MicroCal 200 calibrators

MicroCal 200 is a high accuracy multifunction instrument with two insulated and independent channels, designed to meet the requirements of instrumentation engineers, both in laboratory and in field work.

Both pressure and electrical parameter readings are indicated on the high contrast backlighted LCD graphic display together with engineering unit, type of sensor or signal, temperature scale, cold junction selection, etc.

The selection of the operative mode is made on the keyboard of the MicroCal 200 through dedicated menu-driven procedures.

Different models are available to satisfy all accuracy needs.

Model	Basic accuracy
MicroCal200 MAV	± 0.02% rdg.
MicroCal200	± 0.02% rdg.
MicroCal200+MAV	± 0.01% rdg.
MicroCal200+	± 0.01% rdg.
MicroCal2000+	± 0.005% rdg.

*Note: for specifications refer to MicroCal 200 series technical bulletin.*

### Hand free operations



## Calibration Procedure Manager

### Automated procedure

Measurements plays a key role: from measuring your products, process and equipment, to measuring your standards against national legal standards. All of these measurements need to be collected and documented to keep the compliance with ISO9000. Automated and periodical calibration offers a number of important benefits. You can do the job faster. You can assure that all operators complete all tests and collect the appropriate test results the same way every time a calibration is performed. Documenting the status of instruments before and after calibration, you can optimize the predictive and preventive maintenance period.

Eurotron has developed two different software: CalpMan, for in field work and CalpMan 2000 for laboratory automated calibrations.

### CalpMan

CalpMan is a powerful, Microsoft Windows™ based, calibration procedure manager. It is able to transfer a selection of calibration procedures from a PC to the internal memory of MicroCal PM200 in order to simplify field calibration selecting the required TAG code. Operator can work without using calculator, pen and notebook; all data are stored directly into the MicroCal PM200 system. Both "before" and "after" data and results of each TAG can be recalled from the instrument, transferred into the PC and printed.

### CalpMan 2000

CalpMan 2000 is a powerful, flexible full-featured automated calibration environment for PCs running Microsoft Windows 95/98™. With it you can create and edit calibration procedures using Eurotron calibrators, run those procedures, collect test data, generate calibration reports and certificate.

CalpMan 2000 supports three basic types of calibrations. The first is manual calibration, where CalpMan 2000 prompts the operator to enter values indicated on the instruments, calculates the error and records the result. The second is semiautomatic calibration, where CalpMan 2000 manage automatically one Eurotron calibrator and the operator enter values indicated on the second one. Finally is the completely automatic calibration, where CalpMan 2000 manage automatically two Eurotron calibrators, programs the test points, collect data, calculates the error and store the results.

Test results can be organized as certificates. Operator can customize it and print the report.

### 19" pannel mounting

