eurotron

MicroCal 20 series

2 channels multifunction calibrators
MicroCal 20 DPC – MicroCal P20 – MicroCal 20T

Instruction Manual

MM850432 ed.1b

INTRODUCTORY NOTE

ATTENTION: THIS MANUAL MUST BE REFERRED TO INSTRUMENTS WITH SERIAL NUMBER **62768** AND FIRMWARE VERSION **4B005** ONWARDS.

*This manual has been with all the information you need to install, operate and maintain the two channels multifunction Calibrators **MicroCal 20 DPC** series and its accessories.*

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__MicroCal 20 DPC__ Calibrator uses sophisticated analogic and digital technologies. Any maintenance operation must be carried out by qualified personnel __ONLY__. __Eurotron__ supplies instructions and operative procedures for any operation on the instrument. We recommend to contact our technicians for any support requirements.

__MicroCal 20 DPC__ is fully tested in conformity with the directive n°89/336/CEE Electromagnetic Compatibility. __Eurotron__ shall not be liable in any event, technical and publishing error or omissions, for any incidental and consequential damages, in connection with, or arising out of the use of this book.

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1   GENERAL

MicroCal 20 DPC series are two insulated channels, multifunction calibrators. They are hand-held instruments developed to meet all the needs of instrumentation engineers and Quality managers, both in laboratory and in fieldwork. These units are accurate, rugged, compact and easy to use. They are the best solution to simulate and measure electrical and physical parameters: Voltage, current, resistance, thermocouple, resistance thermometers, pressure, frequency and pulse.
Advanced flexibility and high performance has been achieved using 32-bit microprocessor and a fast A/D conversion technology. The calibrators memory, has stored inside all data for normalised 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 procedure for your instruments in fieldwork.

7 different models are available to meet different needs about test and calibration:

Model	CH1	CH2	Pressure internal	Pressure external	Basic Accuracy	HART protocol	EC module
MicroCal 20 MAV	IN (V, mA)	OUT (V, mA)	NO	OPT.	±0.02% rdg	OPT.	OPT.
MicroCal 20 DPC basic	IN	OUT	NO	OPT.	±0.02% rdg	OPT.	OPT.
MicroCal 20 DPC plus	IN	OUT	OPT.	OPT.	±0.01% rdg	OPT.	OPT.
MicroCal 20 DPC XP	IN	IN/OUT	OPT.	OPT.	±0.006% rdg	OPT.	OPT.
MicroCal P20 basic	NO	NO	OPT.	OPT.	±0.01% rdg	OPT.	OPT.
MicroCal P20 plus	IN (V, mA)	NO	OPT.	OPT.	±0.01% rdg	OPT.	OPT.
MicroCal 20T	IN	IN	NO	NO	±0.01% rdg	OPT.	OPT.

Both Channel 1 (IN) and Channel 2 (IN/OUT) have the following operative mode capability: **millivolts, volts, milliamperes (active and passive loop), ohms, temperature with thermocouples, temperature with resistance thermometers, frequency, and pulse.**
Optional single or dual sensors Pressure inputs can be installed inside the calibrator for gauge, absolute and differential measurements.
An external pressure sensor can be installed for measurements up to 700 bar.
Optional auxiliary measurements (EC module) with integrated sensors are: **Relative humidity and temperature, Barometric pressure sensor.**

Report of Calibration
Each MicroCal is factory calibrated and certified against Eurotron Standards, which are periodically certified by an Internationally recognised Laboratory to ensure traceability, and shipped with a Report of Calibration stating the nominal and actual values and the deviation errors.

EMC Conformity
The instrument fulfils the prevision of the directive 89/336/CEE Electromagnetic Compatibility.

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.

1.1 Safety warning

HIGH-PRESSURE

UNCONTROLLED RELEASE OF HIGH PRESSURE IS HAZARDOUS TO PERSONEL AND MAY CAUSE DAMAGE TO EQUIPMENT. BEFORE CONNECTION OF ANY PRESSURE COMPONENT TO THE CALIBRATOR BE SURE THAT THE COMPONENTS ARE ISOLATED FROM THE PRESSURE SUPPLY AND ANY INTERNAL PRESSURE IS RELEASED SLOWLY.

! WARNING !

DON'T APPLY A PRESSURE HIGHER THAN 125% FULL SCALE TO THE CALIBRATOR.

IF AN EXCESSIVE PRESSURE, HIGHER THAN THE STATED ONE, IS APPLIED, PERSONNEL MAY RECEIVE INJURIES THAT COULD, IN EXTREME CIRCUMSTANCES BE LETHAL. FURTHERMORE, POSSIBLE SERIOUS DAMAGES CAN OCCUR TO THE INSTRUMENT, THE USER'S SYSTEM AND EQUIPMENT.

RECHARGEABLE NI-MH BATTERIES

RECHARGEABLE BATTERIES MUST BE RECYCLED OR DISPOSED FOR PROPERLY. MAY EXPLODE IF DAMAGED OR DISPOSED OF IN FIRE. DO-NOT SHORT-CIRCUIT.

CAUTION: USE CHARGER SUPPLIED BY EUROTRON INSTRUMENTS ONLY.

! WARNING !

PRIMARY ELEMENTS (I.E. THERMOCOUPLES, RESISTANCE THERMOMETERS, ETC.) ARE NORMALLY LINKED TO ELECTRICAL POTENTIALS EQUAL OR NEAR TO THE GROUND POTENTIAL. HOWEVER, IN SOME APPLICATIONS, THERE MAY BE PRESENT A COMMON MODE VOLTAGE TO EARTH.

CHECK FOR VOLTAGE BETWEEN INPUT TERMINALS AND GROUND, AS THIS VOLTAGE CAN BE TRANSMITTED TO OTHER DEVICES CONNECTED TO THE CALIBRATOR.

1.2   Ordering code

1.2.1   MicroCal 20 DPC code

Cat. **3925 A B-CC-DDD-E**

Each instrument is supplied complete of: battery charger, instruction manual, and Eurotron Report of calibration.

Table A   **Channels**
   MAV   **MicroCal 20 DPC MAV** – CH1 IN mA/V + CH2 OUT mA/V + External sensor connector
   BASIC   **MicroCal 20 DPC BASIC** – Multifunction CH1 IN + CH2 OUT + External sensor connector
   plus   **MicroCal 20 DPC plus** - Multifunction CH1 IN + CH2 OUT + 1 or 2 internal pressure sensors + External sensor connector
   XP   **MicroCal 20 DPC XP** - Multifunction CH1 IN + CH2 IN/OUT + 1 or 2 internal pressure sensors + External sensor connector

Table B   **Line charger**
   1   120V 50/60Hz with USA plug
   2   230V 50/60Hz with Schuko plug
   3   230V 50/60Hz with UK plug
   4   230V 50/60Hz with European plug
   5   100V 50/60Hz with USA/Japan plug

Table C   **Internal pressure sensor ±0.025% FS**

Plus XP	MAV BASIC	
0	0	No Internal pressure sensors – Only external
--	2	100 mbar Gauge sensor - res. 0.001mbar
--	3	500 mbar Gauge sensor - res. 0.01mbar
--	5	2 bar Gauge sensor - res. 0.01mbar
--	5A	2 bar Absolute sensor - res. 0.01mbar
--	6	7 bar Gauge sensor - res. 0.1mbar
--	7	20 bar Gauge sensor - res. 0.1mbar
--	7A	20 bar Absolute sensor - res. 0.1mbar

IMPORTANT: MAV & BASIC models cannot install internal pressure sensors. Plus and XP models can install 1 or 2 internal pressure sensors

Table D   **Options**
   0   None
   1   HART potocol
   2   EC module (T+RH%+Barometric internal sensors)
   3   Extended memory card

Table E   **Calibration certificate**
   1   Eurotron report

1.2.2   MicroCal 20T code

Cat. **3120 A – BBB - C**

Each instrument is supplied complete of: dual input channels, battery charger, instruction manual, and Eurotron Report of calibration.

Table A	Line charger
1	120V 50/60Hz with USA plug
2	230V 50/60Hz with Schuko plug
3	230V 50/60Hz with UK plug
4	230V 50/60Hz with European plug
5	100V 50/60Hz with USA/Japan plug

Table B	Options
0	None
1	HART potocol
2	EC module (T+RH%+Barometric internal sensors)
3	Extended memory card

Table C	Calibration certificate
1	Eurotron report

1.2.3   MicroCal P20 code

Cat. **3240 A B-CC-DDD-EEE-F**

Each instrument is supplied complete of: battery charger, instruction manual, and Eurotron Report of calibration.

Table A	Channels
BASIC	**MicroCal 20 DPC BASIC** – Only pressure measurements 1 or 2 internal pressure sensors + External sensor connector
plus	**MicroCal 20 DPC plus** – Volt, Current, and Pt100 CH1 IN + 1 or 2 internal pressure sensors + External sensor connector

Table B	Internal pressure sensor ±0.025% FS
0	No Internal pressure sensors – Only external
2	100 mbar Gauge sensor - res. 0.001mbar
3	500 mbar Gauge sensor - res. 0.01mbar
5	2 bar Gauge sensor - res. 0.01mbar
5A	2 bar Absolute sensor - res. 0.01mbar
6	7 bar Gauge sensor - res. 0.1mbar
7	20 bar Gauge sensor - res. 0.1mbar
7A	20 bar Absolute sensor - res. 0.1mbar

Table C	Line charger
1	120V 50/60Hz with USA plug
2	230V 50/60Hz with Schuko plug
3	230V 50/60Hz with UK plug
4	230V 50/60Hz with European plug
5	100V 50/60Hz with USA/Japan plug

Table D	Options
0	None
1	HART potocol
2	EC module (T+RH%+Barometric internal sensors)
3	Extended memory card

Table F   **Calibration certificate**
    1   Eurotron report

1.3   Accessories

EXTERNAL PRESSURE MODULES - AISI 316SS - ±0.025% F.S.
GAUGE
BB480009	from -100 to 100 mbar (1.5 PSI)	res. 0.001mbar
BB480010	from -500 to 500 mbar (7 PSI)	res. 0.01mbar
BB480011	from -0.95 to 1 bar (15 PSI)	res. 0.01mbar
BB480012	from -0.95 to 2 bar (30 PSI)	res. 0.01mbar
BB480013	from -0.95 to 7bar (100 PSI)	res. 0.1mbar
BB480014	from -0.95 to 20 bar (300 PSI)	res. 0.1mbar
BB480015	from -0.95 to 35 bar (500 PSI)	res. 1mbar
BB480016	from 0 to 70 bar (1000 PSI)	res. 1mbar
BB480017	from 0 to 150 bar (2000 PSI)	res. 1mbar
BB480018	from 0 to 350 bar (5000 PSI)	res. 10mbar
BB480019	from 0 to 700 bar (10000 PSI)	res. 10mbar

ABSOLUTE
BB480020	from 0 to 2 bar (30 PSI)	res. 0.01mbar
BB480021	from 0 to 20 bar (300 PSI)	res. 0.1mbar

HAND PUMPS
F3280013	External pneumatic hand pump –0.8 to 2 bar
F3280002	External pneumatic hand pump –0.8 to 20 bar
F3280010	External pneumatic hand pump –0.95 to 40 bar
F3280015	External Hydraulic hand pump 700 bar
F3280016	External Hydraulic hand pump 1000 bar

SOFTWARE
BB530203	RS232 adapter cable
BB260198	LogMan
BB260199	LinMan
BB260167	CalpMan 2000
BB530204	MicroCal T series communication module

MISCELLANEOUS
EE300040	Electrical signal test lead kit
BB300122	Tc cable connection kit
BB880043	Vinyl protection carrying case with shoulder strap
BB880048	ABS carrying case
BB880033	Aluminium carrying case
BB880049	Rubber holster with shoulder strap

1.5 Technical specifications

1.5.1 MicroCal 20 DPC

IN/OUT Voltage

RANGE	RES.	ACCURACY MAV model	ACCURACY BASIC model
-20 to 200 mV	1 μV	±(0.02% rdg + 3 μV)	±(0.02% rdg + 3 μV)
-0.2 to 2 V	10 μV	±(0.02% rdg + 10 μV)	±(0.02% rdg + 10 μV)
-2 to 20 V	100 μV	±(0.02% rdg + 0.1 mV)	±(0.02% rdg + 0.1 mV)

RANGE	RES.	ACCURACY Plus model	ACCURACY XP model
-20 to 200 mV	1 μV	±(0.01% rdg + 3 μV)	±(0.006% rdg + 3 μV)
-0.2 to 2 V	10 μV	±(0.01% rdg + 10 μV)	±(0.006% rdg + 10 μV)
-2 to 20 V	100 μV	±(0.01% rdg + 0.1 mV)	±(0.01% rdg + 0.1 mV)

Input impedance:
>10 MΩ for ranges up to 2000 mV f.s.
>500 kΩ for ranges up to 20 V f.s.

Output impedance (emf output): less than 0.5 Ω with a maximum current of 0.5 mA
Output noise (at 300 Hz):
<2 μVpp for ranges up to 200 mV f.s.,
<10 μVpp for ranges up to 2000 mV f.s.
<80 μVpp for ranges up to 20 V f.s.

IN/OUT Current

Input mode

RANGE	RES.	ACCURACY Plus / XP models	ACCURACY MAV / BASIC models
-5 to 50 mA	0.1 μA	±(0.01% rdg + 0.4 μA)	±(0.02% rdg + 0.4 μA)

Input impedance: <20 Ω at 1 mA

Output mode

RANGE	RES.	ACCURACY Plus / XP models	ACCURACY MAV / BASIC models
0 to 50 mA	0.1 μA	±(0.01% rdg + 0.4 μA)	±(0.02% rdg + 0.4 μA)

Note: limited to 21 mA max on passive current loop (the Microcal supply the Tag).

IN/OUT Resistance and RTDs

Resistance input mode

RANGE	RES.	ACCURACY BASIC model
0 to 500 Ω	1 mΩ	±(0.02% rdg + 12 mΩ)
0 to 5000 Ω	10 mΩ	±(0.02% rdg + 120 mΩ)

RANGE	RES.	ACCURACY Plus model	ACCURACY XP model
0 to 500 Ω	1 mΩ	±(0.008% rdg + 12 mΩ)	±(0.01% rdg + 12 mΩ)
0 to 5000 Ω	10 mΩ	±(0.008% rdg + 120 mΩ)	±(0.01% rdg + 120 mΩ)

Resistance output mode

RANGE	RES.	ACCURACY BASIC model
0 to 500 Ω	1 mΩ	±(0.02% rdg + 20 mΩ)
0 to 5000 Ω	10 mΩ	±(0.02% rdg + 200 mΩ)

RANGE	RES.	ACCURACY Plus model	ACCURACY XP model
0 to 500 Ω	1 mΩ	±(0.008% rdg + 20 mΩ)	±(0.01% rdg + 20 mΩ)
0 to 5000 Ω	10 mΩ	±(0.008% rdg + 200 mΩ)	±(0.01% rdg + 200 mΩ)

RTDs IN/OUT mode

RTD TYPE	RANGE	RES.	ACCURACY Plus / XP models (% rdg)	ACCURACY BASIC models (% rdg)
Pt100 IEC	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*	±(0.02% +0.05°C) *±(0.02% +0.09°F)*
Pt100 OIML	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*	±(0.02% +0.05°C) *±(0.02% +0.09°F)*
Pt100 α=.3926	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*	±(0.02% +0.05°C) *±(0.02% +0.09°F)*
Pt100 α=.3902	-200 / 650°C -330 / 1210°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*	±(0.02% +0.05°C) *±(0.02% +0.09°F)*
Pt100 JIS	-200 / 600°C -330 / 1120°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*	±(0.02% +0.05°C) *±(0.02% +0.09°F)*
Pt100 SAMA	-200 / 600°C -330 / 1120°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*	±(0.02% +0.05°C) *±(0.02% +0.09°F)*
Pt200	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.15°C) *±(0.01% +0.27°F)*	±(0.02% +0.15°C) *±(0.02% +0.27°F)*

Pt500	-200 / 850°C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-330 / 1570°F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Pt1000 IEC	-200 / 850°C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-330 / 1570°F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Pt1000 OIML	-200 / 850°C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-330 / 1570°F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Cu10	-70 / 150°C	0.1 °C	±(0.01% +0.4°C)	±(0.02% +0.4°C)
	-100 / 310°F	0.1 °F	*±(0.01% +0.7°F)*	*±(0.02% +0.7°F)*
Cu100	-180 / 150°C	0.1 °C	±(0.01% +0.05°C)	±(0.02% +0.05°C)
	-300 / 310°F	0.1 °F	*±(0.01% +0.09°F)*	*±(0.02% +0.09°F)*
Ni100	-60 / 180°C	0.1 °C	±(0.01% +0.05°C)	±(0.02% +0.05°C)
	-80 / 360°F	0.1 °F	*±(0.01% +0.09°F)*	*±(0.02% +0.09°F)*
Ni120	-0 / 150°C	0.1 °C	±(0.01% +0.05°C)	±(0.02% +0.05°C)
	32 / 310°F	0.1 °F	*±(0.01% +0.09°F)*	*±(0.02% +0.09°F)*

Connections: 2, 3 and 4 wires

Source resistance effects: ±1 µV error for 1000Ω source resistance

Rtd and Ω simulation excitation current: from 0.100 to 2 mA without incremental error

Rtd and Ω measurement excitation current: 0.2 mA

Rtd cable compensation: up to 100 m Ω (for each wire)

Rtd cable compensation error (Pt100): ±0.005°C/ Ω of total wire

Maximum load resistance: 1000 Ω at 20 mA

IN Frequency/Pulse

RANGE	RESOL.	ACCURACY BASIC / Plus / XP models
1 to 200 Hz	0.001 Hz	±(0.005% rdg + 0.001 Hz)
1 to 2000 Hz	0.01 Hz	±(0.005% rdg + 0.01 Hz)
1 to 20000 Hz	0.1 Hz	±(0.005% rdg + 0.1 Hz)

Input impedance:

IN/OUT Thermocouples

TC TYPE	RANGE	RESOL.	ACCURACY Plus / XP models	ACCURACY BASIC models
Tc J	-210 to 1200 °C	0.01 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-35 to 2200 °F	0.01 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Tc K	-270 to 1370 °C	0.01 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-450 to 2500 °F	0.01 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Tc T	-270 to 400 °C	0.01 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-450 to 760 °F	0.01 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Tc R	-50 to 1760 °C	0.1 °C	±(0.01% +0.2°C)	±(0.02% +0.2°C)
	-60 to 3200 °F	0.1 °F	*±(0.01% +0.4°F)*	*±(0.02% +0.4°F)*
Tc S	-50 to 1760 °C	0.1 °C	±(0.01% +0.2°C)	±(0.02% +0.2°C)
	-60 to 3200 °F	0.1 °F	*±(0.01% +0.4°F)*	*±(0.02% +0.4°F)*

Tc B	50 to 1820 °C	0.1 °C	±(0.01% +0.3°C)	±(0.02% +0.3°C)
	140 to 3300 °F	0.1 °F	*±(0.01% +0.6°F)*	*±(0.02% +0.6°F)*
Tc C	0 to 2300 °C	0.1 °C	±(0.01% +0.2°C)	±(0.02% +0.2°C)
	32 to 4150 °F	0.1 °F	*±(0.01% +0.4°F)*	*±(0.02% +0.4°F)*
Tc G	0 to 2300 °C	0.1 °C	±(0.01% +0.3°C)	±(0.02% +0.3°C)
	32 to 4150 °F	0.1 °F	*±(0.01% +0.6°F)*	*±(0.02% +0.6°F)*
Tc D	0 to 2300 °C	0.1 °C	±(0.01% +0.3°C)	±(0.02% +0.3°C)
	32 to 4150 °F	0.1 °F	*±(0.01% +0.6°F)*	*±(0.02% +0.6°F)*
Tc U	-200 to 400 °C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-330 to 760 °F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Tc L	-200 to 760 °C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-330 to 1400 °F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Tc N	-270 to 1300 °C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-450 to 2380 °F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Tc E	-270 to 1000 °C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	-450 to 1840 °F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*
Tc F	0 to 1400 °C	0.1 °C	±(0.01% +0.1°C)	±(0.02% +0.1°C)
	32 to 2560 °F	0.1 °F	*±(0.01% +0.2°F)*	*±(0.02% +0.2°F)*

Note: 0.1°C resolution with temperature lower than –200°C

Selection °C/°F/K: through the configuration procedure

Resolution: 0.01°C / 0.01°F

Temperature scale: ITS90 and IPTS68 selectable

Reference junction compensation:
        internal automatic from -10 °C to +55 °C
        external adjustable from -50 °C to +100 °C
        remote with external Pt100 from -10°C to +100 °C (only on XP model)

Rj compensation drift: ± 0.002°C/°C (from -10 °C to +45 °C)

Rj accuracy: ±0.05°C @ 25°C / ±0.005 °C/°C

Input impedance (Tc ranges): >10 MΩ

Pressure (option)

Pressure media: AISI 316 SS compatible fluids (water, gas, and oil)

Temperature compensation: Automatic with built-in calibration matrix from 0°C to 50°C.

Engineering units: mbar, bar, Pa, hPa, kPa, MPa, kg/cm2, kg/m2, psi, mmH2O, cmH2O, mH2O, Torr, atm, lb/ft2, inH2O, ftH2O, inH2O@4°C, ftH2O@4°C, mmHg, cmHg, mHg, inHg, programmable.

Internal sensors

RANGE	RESOL.	ACCURACY
-100 to 100 mbar	0.001mbar	±0.025 % F.S.
-500 to 500 mbar	0. 01mbar	±0. 025 % F.S.
-0.95 to 2 bar	0.01mbar	±0. 025 % F.S.
0 to 2 bar (ABS)	0.01mbar	±0. 025 % F.S.

-0. 95 to 7 bar	0.1mbar	±0. 025 % F.S.
-0. 95 to 20 bar	0.1mbar	±0. 025 % F.S.
0 to 20 bar (ABS)	0.1mbar	±0. 025 % F.S.

Overpressure: 125% F.S.
Port: 1/8 BSPF (female)

External sensors

PART No.	RANGE	RESOL.	ACCURACY
BB480009	-100 to 100 mbar	0.001 mbar	±0. 025 % F.S.
BB480010	-500 to 500 mbar	0. 01 mbar	±0. 025 % F.S.
BB480012	-0.95 to 2 bar	0.01 mbar	±0. 025 % F.S.
BB480020	0 to 2 bar (ABS)	0.01 mbar	±0. 025 % F.S.
BB480013	-0. 95 to 7 bar	0.1 mbar	±0. 025 % F.S.
BB480014	-0. 95 to 20 bar	0.1 mbar	±0. 025 % F.S.
BB480021	0 to 20 bar (ABS)	0.1 mbar	±0. 025 % F.S.
BB480015	-0. 95 to 35 bar	1 mbar	±0. 025 % F.S.
BB480016	0 to 70 bar	1 mbar	±0. 025 % F.S.
BB480017	0 to 150 bar	1 mbar	±0. 025 % F.S.
BB480018	0 to 350 bar	10 mbar	±0. 025 % F.S.
BB480019	0 to 700 bar	10 mbar	±0. 025 % F.S.

Overpressure: 125% F.S.
Port: ¼ BSPM (male)
Connection wire length: 2 meters

Environmental condition module (option)
Temperature:
 Sensor type: Pt100
 Range:
 Accuracy:
Relative Humidity:
 Sensor type:
 Range: 0 to 95% RH
 Accuracy: ±2% RH
Pressure:
 Sensor type:
 Range:
 Accuracy: ±2 mbar

Math functions
Calculation functions: hold, max, min, offset, zero, average
In/Out data memory: 10 data with manual or automatic recall
Convert function: displays the electrical equivalent of the engineering unit

Scale factor: setting with zero and span programmable
Square root: in combination with scale factor

Current loop power supply
Voltage: 24Vdc
Max. current:
Max. voltage input:
Electronic protection for short-circuit

Transmitter
Sources: Voltage, current, Temperature, Resistance
Response time: 0.1 / 1 / 10 sec selectable

Ramp / Cycle
Sources: Voltage, Current, Temperature, Resistance
Sampling time: MAX. 0.1 sec

DataLogger
Sources: Voltage, Current, Temperature, Resistance
Sampling time: MAX. 1 sec
Memory: >1500 readings complete with date and time

General
Accuracy: the above accuracies are stated for 365 days and includes non-linearity, hysteresis, and repeatability. The average temperature coefficient, inside the temperature compensated range is ±0.002 of rdg/°C (w.t.r. +23°C / +73°F).
Compensation temperature range: 0 to 45°C (+32 to +113°F)
Calibration: self learning technique with automatic procedure
Channel 1-Channel 2 insulation: 250 Vdc
Common mode rejection: 140 dB at ac operation
Normal mode rejection: 60 dB at 50/60 Hz
Temperature stability: *for temperature exceeding the band +18°C to 28°C*
 Span: ±8 ppm/°C
 Zero: ±0.2 μV/°C
Measurement sampling time: 250 ms
Display: graphic LCD display with automatic and manual backlight device
Digital interface: full bi-directional RS232
Internal data memory: standard 512 kb – Optional 8Mb with internal card
Power supply: external charger and rechargeable Ni-MH battery
Battery life (typical):
 10 h on Tc and mV input/output (backlight Off)
 4 h with 20 mA simulation (backlight Off)
Recharging time (typical): 5 h at 90% and 6 h at 99% with instrument switched off.
Battery charge indication: bar graph on the LCD display (flashing on charge)

Line operation: 100V - 120 V - 230V - 240 Vac with the external battery charger
Line transformer insulation: 2500 Vac
Sealing: IP54
Operating environment temperature range: from -10 °C to +55 °C
Storage temperature range: from 0 °C to +60 °C (excluding batteries)
Humidity: max 95%RH non condensing
Case: Injection moulded polycarbonate case
Weights: net 1.4 Kg   gross 2.5 Kg
Dimensions: 290x98x57 mm
Warranty: 2 Years. Contract extension up to 5 Years (pressure sensors not included).

1.5.2　MicroCal P20

IN/OUT Voltage

RANGE	RES.	ACCURACY Plus model
-20 to 200 mV	1 μV	±(0.01% rdg + 3 μV)
-0.2 to 2 V	10 μV	±(0.01% rdg + 10 μV)
-2 to 20 V	100 μV	±(0.01% rdg + 0.1 mV)

Input impedance:
> >10 MΩ for ranges up to 2000 mV f.s.
> >500 kΩ for ranges up to 20 V f.s.

Output impedance (emf output): less than 0.5 Ω with a maximum current of 0.5 mA
Output noise (at 300 Hz):
> <2 μVpp for ranges up to 200 mV f.s.,
> <10 μVpp for ranges up to 2000 mV f.s.
> <80 μVpp for ranges up to 20 V f.s.

IN/OUT Current
Input mode

RANGE	RES.	ACCURACY Plus model
-5 to 50 mA	0.1 μA	±(0.01% rdg + 0.4 μA)

Input impedance: <20 Ω at 1 mA

Output mode

RANGE	RES.	ACCURACY Plus model
0 to 50 mA	0.1 μA	±(0.01% rdg + 0.4 μA)

Note: limited to 21 mA max on passive current loop (the Microcal supply the Tag).

IN/OUT Resistance and RTDs
Resistance input mode

RANGE	RES.	ACCURACY Plus model
0 to 500 Ω	1 mΩ	±(0.01% rdg + 12 mΩ)
0 to 5000 Ω	10 mΩ	±(0.01% rdg + 120 mΩ)

Resistance output mode

RANGE	RES.	ACCURACY Plus model
0 to 500 Ω	1 mΩ	±(0.01% rdg + 20 mΩ)
0 to 5000 Ω	10 mΩ	±(0.01% rdg + 200 mΩ)

RTDs IN/OUT mode

RTD TYPE	RANGE	RES.	ACCURACY Plus model (% rdg)
Pt100 IEC	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Pt100 OIML	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Pt100 α=.3926	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Pt100 α=.3902	-200 / 650°C -330 / 1210°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Pt100 JIS	-200 / 600°C -330 / 1120°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Pt100 SAMA	-200 / 600°C -330 / 1120°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Pt200	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.15°C) ±(0.01% +0.27°F)
Pt500	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.1°C) ±(0.01% +0.2°F)
Pt1000 IEC	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.1°C) ±(0.01% +0.2°F)
Pt1000 OIML	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.1°C) ±(0.01% +0.2°F)
Cu10	-70 / 150°C -100 / 310°F	0.1 °C 0.1 °F	±(0.01% +0.4°C) ±(0.01% +0.7°F)
Cu100	-180 / 150°C -300 / 310°F	0.1 °C 0.1 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Ni100	-60 / 180°C -80 / 360°F	0.1 °C 0.1 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)
Ni120	-0 / 150°C 32 / 310°F	0.1 °C 0.1 °F	±(0.01% +0.05°C) ±(0.01% +0.09°F)

Connections: 2, 3 and 4 wires
Source resistance effects: ±1 μV error for 1000Ω source resistance
Rtd and Ω simulation excitation current: from 0.100 to 2 mA without incremental error
Rtd and Ω measurement excitation current: 0.2 mA
Rtd cable compensation: up to 100 mΩ (for each wire)
Rtd cable compensation error (Pt100): ±0.005°C/Ω of total wire

Maximum load resistance: 1000 Ω at 20 mA

IN Frequency/Pulse

RANGE	RESOL.	ACCURACY Plus model
1 to 200 Hz	0.001 Hz	±(0.005% rdg + 0.001 Hz)
1 to 2000 Hz	0.01 Hz	±(0.005% rdg + 0.01 Hz)
1 to 20000 Hz	0.1 Hz	±(0.005% rdg + 0.1 Hz)

Input impedance:

Pressure (option)

Pressure media: AISI 316 SS compatible fluids (water, gas, and oil)
Temperature compensation: Automatic with built-in calibration matrix.
Engineering units: mbar, bar, Pa, hPa, kPa, MPa, kg/cm2, kg/m2, psi, mmH2O, cmH2O, mH2O, Torr, atm, lb/ft2, inH2O, ftH2O, inH2O@4°C, ftH2O@4°C, mmHg, cmHg, mHg, inHg, programmable.

Internal sensors

RANGE	RESOL.	ACCURACY
-100 to 100 mbar	0.001mbar	±0.25 % F.S.
-500 to 500 mbar	0. 01mbar	±0.25 % F.S.
-0.95 to 2 bar	0.01mbar	±0.25 % F.S.
0 to 2 bar (ABS)	0.01mbar	±0.25 % F.S.
-0. 95 to 7 bar	0.1mbar	±0.25 % F.S.
-0. 95 to 20 bar	0.1mbar	±0.25 % F.S.
0 to 20 bar (ABS)	0.1mbar	±0.25 % F.S.

Overpressure: 125% F.S.
Port: 1/8 BSPF (female)

External sensors

PART No.	RANGE	RESOL.	ACCURACY
BB480009	-100 to 100 mbar	0.001 mbar	±0.25 % F.S.
BB480010	-500 to 500 mbar	0. 01 mbar	±0.25 % F.S.
BB480012	-0.95 to 2 bar	0.01 mbar	±0.25 % F.S.
BB480020	0 to 2 bar (ABS)	0.01 mbar	±0.25 % F.S.
BB480013	-0. 95 to 7 bar	0.1 mbar	±0.25 % F.S.
BB480014	-0. 95 to 20 bar	0.1 mbar	±0.25 % F.S.
BB480021	0 to 20 bar (ABS)	0.1 mbar	±0.25 % F.S.
BB480015	-0. 95 to 35 bar	1 mbar	±0.25 % F.S.
BB480016	0 to 70 bar	1 mbar	±0.25 % F.S.

BB480017	0 to 150 bar	1 mbar	±0.25 % F.S.
BB480018	0 to 350 bar	10 mbar	±0.25 % F.S.
BB480019	0 to 700 bar	10 mbar	±0.25 % F.S.

Overpressure: 125% F.S.
Port: ¼ BSPM (male)
Connection wire length: 2 meters

Environmental condition module (option)
Temperature:
        Sensor type: Pt100
        Range:
        Accuracy:
Relative Humidity:
        Sensor type:
        Range: 0 to 95% RH
        Accuracy: ±2% RH
Pressure:
        Sensor type:
        Range:
        Accuracy: ±2 mbar

Math functions
Calculation functions: hold, max, min, offset, zero, average
In/Out data memory: 10 data with manual or automatic recall
Convert function: displays the electrical equivalent of the engineering unit
Scale factor: setting with zero and span programmable
Square root: in combination with scale factor

Current loop power supply
Voltage: 24Vdc
Max. current:
Max. voltage input:
Protected for short-circuit

DataLogger
Sources: Voltage, Current, Temperature, Resistance
Sampling time: 1 sec
Memory: >1500 readings complete with date and time

General
Accuracy: the above accuracies are stated for 365 days and includes non-linearity, hysteresis, and repeatability. The average temperature coefficient, inside the temperature compensated range is ±0.002 of rdg/°C (w.t.r. +23°C / +73°F).

Compensation temperature range: 0 to 45°C (+32 to +113°F)
Calibration: self learning technique with automatic procedure
Common mode rejection: 140 dB at ac operation
Normal mode rejection: 60 dB at 50/60 Hz
Temperature stability: *for temperature exceeding the band +18°C to 28°C*
      Span: ±8 ppm/°C
      Zero: ±0.2 μV/°C
Measurement sampling time: 250 ms
Display: graphic LCD display with automatic and manual backlight device
Digital interface: full bi-directional RS232
Power supply: external charger and rechargeable Ni-MH battery
Battery life (typical):
      10 h on Tc and mV input/output (backlight Off)
      4 h with 20 mA simulation (backlight Off)
Recharging time (typical): 5 h at 90% and 6 h at 99% with instrument switched off.
Battery charge indication: bar graph on the LCD display (flashing on charge)
Line operation: 100V - 120 V - 230V - 240 Vac with the external battery charger
Line transformer insulation: 2500 Vac
Sealing: IP54
Operating environment temperature range: from -10 °C to +55 °C
Storage temperature range: from 0 °C to +60 °C (excluding batteries)
Humidity: max 95%RH non condensing
Case: Injection moulded polycarbonate case
Weights: net 1.4 Kg   gross 2.5 Kg
Dimensions: 290x98x57 mm
Warranty: 2 Years. Contract extension up to 5 Years (pressure sensors not included).

1.5.3   MicroCal 20T

IN Voltage

RANGE	RES.	ACCURACY
-20 to 200 mV	1 μV	±(0.01% rdg + 3 μV)
-0.2 to 2 V	10 μV	±(0.01% rdg + 10 μV)
-2 to 20 V	100 μV	±(0.01% rdg + 0.1 mV)

Input impedance:

>10 MΩ for ranges up to 2000 mV f.s.

>500 kΩ for ranges up to 20 V f.s.

Output impedance (emf output): less than 0.5 Ω with a maximum current of 0.5 mA

Output noise (at 300 Hz):

<2 µVpp for ranges up to 200 mV f.s.,

<10 µVpp for ranges up to 2000 mV f.s.

<80 µVpp for ranges up to 20 V f.s.

IN Current

Input mode

RANGE	RES.	ACCURACY
-5 to 50 mA	0.1 μA	±(0.01% rdg + 0.4 μA)

Input impedance: <20 Ω at 1 mA

Output mode

RANGE	RES.	ACCURACY
0 to 50 mA	0.1 μA	±(0.01% rdg + 0.4 μA)

Note: limited to 21 mA max on passive current loop (the Microcal supply the Tag).

IN Resistance and RTDs

Resistance input mode

RANGE	RES.	ACCURACY
0 to 500 Ω	1 mΩ	±(0.01% rdg + 12 mΩ)
0 to 5000 Ω	10 mΩ	±(0.01% rdg + 120 mΩ)

RTDs IN mode

RTD TYPE	RANGE	RES.	ACCURACY

			Plus model (% rdg)
Pt100 IEC	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Pt100 OIML	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Pt100 α=.3926	-200 / 850°C -330 / 1570°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Pt100 α=.3902	-200 / 650°C -330 / 1210°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Pt100 JIS	-200 / 600°C -330 / 1120°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Pt100 SAMA	-200 / 600°C -330 / 1120°F	0.01 °C 0.01 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Pt200	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.15°C) *±(0.01% +0.27°F)*
Pt500	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.1°C) *±(0.01% +0.2°F)*
Pt1000 IEC	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.1°C) *±(0.01% +0.2°F)*
Pt1000 OIML	-200 / 850°C -330 / 1570°F	0.1 °C 0.1 °F	±(0.01% +0.1°C) *±(0.01% +0.2°F)*
Cu10	-70 / 150°C -100 / 310°F	0.1 °C 0.1 °F	±(0.01% +0.4°C) *±(0.01% +0.7°F)*
Cu100	-180 / 150°C -300 / 310°F	0.1 °C 0.1 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Ni100	-60 / 180°C -80 / 360°F	0.1 °C 0.1 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*
Ni120	-0 / 150°C 32 / 310°F	0.1 °C 0.1 °F	±(0.01% +0.05°C) *±(0.01% +0.09°F)*

Connections: 2, 3 and 4 wires

Source resistance effects: ±1 µV error for 1000Ω source resistance

Rtd and Ω simulation excitation current: from 0.100 to 2 mA without incremental error

Rtd and Ω measurement excitation current: 0.2 mA

Rtd cable compensation: up to 100 m Ω (for each wire)

Rtd cable compensation error (Pt100): ±0.005°C/ Ω of total wire

Maximum load resistance: 1000 Ω at 20 mA

IN Thermocouples

TC TYPE	RANGE	RESOL.	ACCURACY Plus model

Tc J	-210 to 1200 °C	0.01 °C	±(0.01% +0.1°C)
	-35 to 2200 °F	0.01 °F	*±(0.01% +0.2°F)*
Tc K	-270 to 1370 °C	0.01 °C	±(0.01% +0.1°C)
	-450 to 2500 °F	0.01 °F	*±(0.01% +0.2°F)*
Tc T	-270 to 400 °C	0.01 °C	±(0.01% +0.1°C)
	-450 to 760 °F	0.01 °F	*±(0.01% +0.2°F)*
Tc R	-50 to 1760 °C	0.1 °C	±(0.01% +0.2°C)
	-60 to 3200 °F	0.1 °F	*±(0.01% +0.4°F)*
Tc S	-50 to 1760 °C	0.1 °C	±(0.01% +0.2°C)
	-60 to 3200 °F	0.1 °F	*±(0.01% +0.4°F)*
Tc B	50 to 1820 °C	0.1 °C	±(0.01% +0.3°C)
	140 to 3300 °F	0.1 °F	*±(0.01% +0.6°F)*
Tc C	0 to 2300 °C	0.1 °C	±(0.01% +0.2°C)
	32 to 4150 °F	0.1 °F	*±(0.01% +0.4°F)*
Tc G	0 to 2300 °C	0.1 °C	±(0.01% +0.3°C)
	32 to 4150 °F	0.1 °F	*±(0.01% +0.6°F)*
Tc D	0 to 2300 °C	0.1 °C	±(0.01% +0.3°C)
	32 to 4150 °F	0.1 °F	*±(0.01% +0.6°F)*
Tc U	-200 to 400 °C	0.1 °C	±(0.01% +0.1°C)
	-330 to 760 °F	0.1 °F	*±(0.01% +0.2°F)*
Tc L	-200 to 760 °C	0.1 °C	±(0.01% +0.1°C)
	-330 to 1400 °F	0.1 °F	*±(0.01% +0.2°F)*
Tc N	-270 to 1300 °C	0.1 °C	±(0.01% +0.1°C)
	-450 to 2380 °F	0.1 °F	*±(0.01% +0.2°F)*
Tc E	-270 to 1000 °C	0.1 °C	±(0.01% +0.1°C)
	-450 to 1840 °F	0.1 °F	*±(0.01% +0.2°F)*
Tc F	0 to 1400 °C	0.1 °C	±(0.01% +0.1°C)
	32 to 2560 °F	0.1 °F	*±(0.01% +0.2°F)*

Note: 0.1°C resolution with temperature lower than –200°C

Selection °C/°F/K: through the configuration procedure
Resolution: 0.01°C / 0.01°F
Temperature scale: ITS90 and IPTS68 selectable
Reference junction compensation:
        internal automatic from -10 °C to +55 °C
        external adjustable from -50 °C to +100 °C
        remote with external Pt100 from -10°C to +100 °C (only on XP model)
Rj compensation drift: ± 0.002°C/°C (from -10 °C to +45 °C)
Rj accuracy: ±0.05°C @ 25°C / ±0.005 °C/°C
Input impedance (Tc ranges): >10 MΩ

Environmental condition module (option)
Temperature:
        Sensor type: Pt100
        Range:
        Accuracy:
Relative Humidity:
        Sensor type:
        Range: 0 to 95% RH
        Accuracy: ±2% RH
Pressure:
        Sensor type:
        Range:
        Accuracy: ±2 mbar

Math functions
Calculation functions: hold, max, min, offset, zero, average
In/Out data memory: 10 data with manual or automatic recall
Convert function: displays the electrical equivalent of the engineering unit
Scale factor: setting with zero and span programmable
Square root: in combination with scale factor

Current loop power supply
Voltage: 24Vdc
Max. current:
Max. voltage input:
Protected for short-circuit

DataLogger
Sources: Voltage, Current, Temperature, Resistance
Sampling time: 1 sec
Memory: >1500 readings complete with date and time

General
Accuracy: the above accuracies are stated for 365 days and includes non-linearity, hysteresis, and repeatability. The average temperature coefficient, inside the temperature compensated range is ±0.002 of rdg/°C (w.t.r. +23°C / +73°F).
Compensation temperature range: 0 to 45°C (+32 to +113°F)
Calibration: self learning technique with automatic procedure
Channel 1-Channel 2 insulation: 250 Vdc
Common mode rejection: 140 dB at ac operation
Normal mode rejection: 60 dB at 50/60 Hz
Temperature stability: *for temperature exceeding the band +18°C to 28°C*
        Span: ±8 ppm/°C
        Zero: ±0.2 μV/°C
Measurement sampling time: 250 ms
Display: graphic LCD display with automatic and manual backlight device
Digital interface: full bi-directional RS232
Power supply: external charger and rechargeable Ni-MH battery
Battery life (typical):
        10 h on Tc and mV input/output (backlight Off)

       4 h with 20 mA simulation (backlight Off)
Recharging time (typical): 5 h at 90% and 6 h at 99% with instrument switched off.
Battery charge indication: bar graph on the LCD display (flashing on charge)
Line operation: 100V - 120 V - 230V - 240 Vac with the external battery charger
Line transformer insulation: 2500 Vac
Sealing: IP54
Operating environment temperature range: from -10 °C to +55 °C
Storage temperature range: from 0 °C to +60 °C (excluding batteries)
Humidity: max 95%RH non condensing
Case: Injection moulded polycarbonate case
Weights: net 1.4 Kg   gross 2.5 Kg
Dimensions: 290x98x57 mm
Warranty: 2 Years. Contract extension up to 5 Years (pressure sensors not
included).

2   DESCRIPTION

MicroCal 20 DPC (Documenting Process Calibrator) series are hand-held, high accuracy, process multifunction calibrators.
General features include: dual (simultaneous IN-OUT or simultaneous IN-IN) insulated channels, two internal pressure sensors, external pressure modules, automatic calibration procedure, large graphic and back lighted display.

Dual input channels
Same models only, have both channels (CH1 and CH2) settable for simultaneous input. You can use the calibrator as a two channels high accuracy thermometer for TCs and RTDs certification.

4-wire resistance thermometer
Resistance and temperature with resistance thermometer may be measured on a 2, 3 and 4 wire connections for best accuracy and resolution (0.01°C).
Eurotron Patent n.206327 is used for the active simulation circuit.

Rj compensation
Accurate and fast response compensation, through a special low thermal capacity design of binding posts, incorporating a thin film high accuracy Pt100 as cold junction reference. The internal reference allows the maximum accuracy for the -10°C to +55°C temperature range. It is possible to set manually the compensation temperature (from -50 to +100°C) by keyboard.

Frequency - Counts
Simulation mode is designed to generate a zero based square pulse, with an adjustable amplitude, at a frequency up to 20 KHz. A pre-set number of pulses may be programmed and transmitted to test or calibrate totalizers and counters. The instrument can be configured to measure frequency and count pulse (totalise mode). Technical units in Hz, pulse/h and pulse/m.

Internal pressure sensors
Optional one or two built-in pressure sensors are available to cover main pressure application including gauge, differential, absolute, and vacuum. The calibration matrix pressure/temperature is stored in internal non volatile memory.

External pressure modules
Each unit is equipped with a connector for external pressure "smart" modules. A wide selection of modules are available as accessories for ranges up to 700bar. The calibration matrix pressure/temperature is stored in internal non volatile memory.

Built-in environmental module
Ambient temperature, Relative Humidity, and Barometric pressure sensors can measure environmental condition (EC) parameters to be included in calibration report.

Firmware
The firmware is stored on a flash memory and allows a fast and easy upgrade of the instrument using a RS232 and PC software.

Simulation capability
- Auto-ramp and Auto-step capability with Start, End, and Step programmable parameters;
- Single and continuous cycle with Start, End, Rises, Soaks, and Falls programmable parameters;

- the signal value setting uses a unique in-line single-digit setting mode or a direct numeric entry;
- direct keyboard access to n.10 programmable memory stored values;

Programmable signal converter (TRX)
The instrument can be used as a temporary signal converter replacement. Any input signal (including pressure and remote auxiliary inputs) can be converted into any of the available output signals (V and mA). The galvanic insulation between the input and output channels allow also to use of this feature on the process.

Calculator
A special calculator function is integrated in **MicroCal 20 DPC**. You can read the value from the input channel, operate on it, and then write the result on the output channel. All standard math functions are included.

Scale factor - Math functions
All non temperature ranges are fully programmable to read both input and output values in terms of engineering unit. Four programmable alphanumeric characters are available on the display to show the symbol of the parameter (i.e. mbar, % RH, % CO, etc.). Square root function is used to calibrate DP flow transmitters.
An advanced Math library is available to create non linear conversion routines to be applied to input and/or output signals. You can use the PC software to write and download your special formula.
Tare function is available to zeroing sensor offset.

Data logging
The calibrator can be used as a two channel datalogger. The graphic mode allows you to display the trend; the Replay function allows you to generate the electrical signal using the data stored. The LogMan PC software permits storage of data on the hard-disk.

Switch test
Temperature, signal and pressure switches can be tested using this advanced procedure. The calibrator will hold the display reading when the contact is closed or opened.

Multilingual user interface
It displays any text or menu in the most common language.

Over-Voltage protection
The unit is equipped with an advanced system including thermal fuse (auto repair do not need replacement), high voltage suppressor and resistor-diode voltage limiter.

HART communication
MicroCal 20 DPC has a built-in option for HART calibration and maintenance. No external adapter is required. It support the most popular HART transmitters with device specific commands (pls. check updated list on web site). The flash memory firmware allows to upgrade to latest models simply using PC software and RS232 cable.

MicroCal T Dry-block communication module
You can combine **MicroCal 20 DPC** with the MicroCal T series for automatic temperature calibrator. It includes the firmware upgrade to enable capability and the connection cable.

Documenting process calibrator
The **MicroCal 20 DPC** has a RS232 interface to download up to 100 procedures created with CalpMan 2000 software. With expanded memory, the **MicroCal 20 DPC** can store a large number (up to 4000) calibration procedures.

CalpMan 2000 software

The Calibration Procedure Manager software is able to transfer calibration routines (test points, error and warning bands, etc.) from a PC to the internal memory of the instrument in order to automate field calibrations. Select the appropriate tag number by keyboard directly, the calibrator will ask you step by step for all operation and test and calibration data ("As found" and "As left" values) can be memory stored. Upload your calibration data back to your PC. Print reports or export data.

CalpMan 2000 calibration procedure manager, is designed to support all Eurotron portable calibrators. It includes an instrumentation database which makes it quick and easy to generate and manage calibration procedures, set and read data from Eurotron calibrators, store the data on a database and generate a calibration report.
Eurotron CalpMan 2000 help you to document the calibration/inspection activities.

LogMan Software
WindowsTM software to download logged data from internal memory to PC. Data can be saved on disks, loaded from disks, exported in Excel format file.

LinMan Software
WindowsTM software to setup the instrument with TCX, RTDX special linearization. The program allows highly accurate temperature measurement with a calibrated Pt100/TC loading the coefficients of the Calibration Report.

Extended memory disk-on-chip
Calibration procedure and data logging can be stored on the internal standard memory. The unit is equipped with internal slot for flash memory card to extend the basic capacity up to 8Mbytes.

1. Channel 1 Multiconnection binding post

2. Channel 2 Multiconnection binding post

3. LCD graphic display

4. Automatic backlight sensor

5. Keyboard

6. HP Pressure input - 1/8" BSPF

7. LP Pressure input - 1/8" BSPF

8. RS232 connector – Female MiniDIN 6pin

9. Battery charger connector

10. External pressure module connector – Female MiniDIN 8pin

11. Environmental Module (Temperature, Relative Humidity, Barometric)

12. Digital In/Out connector

2.1   Keyboard

Documenting Process Calibrator

[△], [▽] keys	5 keys allows you to change (increase/decrease) the relative digit for Channel 2 output mode. Numeric pad is used when numeric entry is required. Character pad is used when text entry is required, to each pressing the letter changes among the related 3 or 4 ones.
[➡],[⬆],[⬇],[⬅]	the arrow keys allow highlighting menu items or selecting one
SELECT	enter in channels setup. Decimal point when in calculator or numeric input mode.
RCL/STO	recall or memory store up to 10 (from 0 to 9) display page. The memories store the channels data and setup. Move cursor up when in configuration and setup menu.
ON/OFF	Switch the instrument on and off.
DISPLAY	Recall display mode. Cancel numeric value when in calculator or numeric input mode. Move cursor to the previous menu level when in configuration and setup menu.
MENU	Recall setup and configuration menu. Transfer the value to output channel when in calculator mode.
CAL PROC	Recall documenting procedures. Enter in the selected menu option. Copy the input value to calculator when in calculator mode.
CALC	Enter in Calculator mode. Arithmetic functions (+, -, x, /, etc) when in calculator mode.
HOLD/ZERO	Data hold and zeroing. Move cursor down when in configuration and setup menu. Enter changes when are in setup mode. Enter when in calculator mode.
STATUS	Display auxiliary measuring channels (e.g. environmental temperature, pressure and relative humidity). Return in measuring mode when in select or menu mode without changes.

2.2 Display
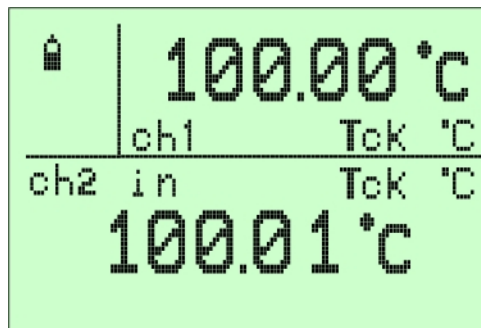
The figure shows the features of a typical display. The display shown is in MEASURE and SOURCE mode.
The other parts of the display are as follows:

- **Status box**: show the operative mode symbols (see the table below).
- **Channel 1 box**: show the CH1 measured value, engineering unit and input mode.
- **Secondary value**: show the measure or source value (CH2, Pressure, etc), engineering unit and input or output mode.

Symbols	Description
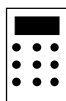
Numeric Pad active:
When this symbol appear on display, the instrument is waiting for a numeric input (e.g. in calculator mode)
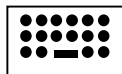
Characters Pad active:
When this symbol appear on display, the instrument is waiting for a string input

Battery level:
This animated symbol will show the level of charge of the rechargeable batteries.

H   **Data Hold:**
This symbol appears on display when the measures are freezed by pressing the [**HOLD**] key.

Z   **Zero function:**
This symbol appears on display when the [**HOLD**] key is keep pressed for more than 2 seconds. It shows that the relative measuring is active.

L   **Data Logger**:
This symbol appears on display when data jogging is active.

R   **Replay**:
This symbol appears on display when the simulation of data function is active

2.3 Power supply

MicroCal 20 can be powered from:
- internal rechargeable Ni-MH battery.
- External battery charger, supplied as a standard accessory (the batteries must be installed).

The Ni-MH rechargeable batteries allows a long time operation and do not need maintenance. The same batteries power both the instrument and the external pressure modules.
Battery life (typical):
     10 h on Tc and mV input/output (backlight Off)
     4 h with 20 mA simulation (backlight Off)
Recharging time (typical): 5 h at 90% and 6 h at 99% with instrument switched off.

During operation a fully battery symbol "≠" will be displayed on the display. This symbol means that the batteries are completely full. When the batteries will be discharged the symbol "–" will appear and the instrument still has about 20 minutes operation capability to end the running analysis.
The battery symbol indicates that a full charge is required. Use only the dedicated battery charger supplied by Eurotron together the instrument.

CAUTION: OLD BATTERIES CAN LEAK AND CAUSE CORROSION. NEVER LEAVE RUN DOWN BATTERIES IN THE INSTRUMENT

WARNING

THE INSTRUMENT IS SHIPPED WITH AN AVERAGE LEVEL OF BATTERY CHARGE. AFTER UNPACKING, A FULL CHARGE OF THE BATTERY IS RECOMMENDED, BY CONNECTING THE INSTRUMENT TO THE MAIN LINE THROUGH THE BATTERY CHARGER (OFF CONDITION) FOR 8/10 HOURS.

2.4 Electrical connections

Appropriate extension wires should be used between the thermocouple (or instrument under calibration) and the **MicroCal 20 DPC** unless the thermocouple leads allows direct connection. Make sure that both thermocouple and compensating cable are connected with the correct polarity.
If in doubt, the polarity of the compensating leads can be checked by connecting a length of lead to the indicator, shortening the free ends of the wires together and noting that the indicator reading increases when the wire connection is heated. Color codes of compensating cables change in different countries. Check the appropriate table.
For Rtd connection use a cable of adequate gauge to lower the overall input resistance.
The use of a cable with a good resistance balance between conductors is also necessary.

MicroCal 20 calibrator is designed to be insensitive to transients or noise, the following recommendations should be followed to reduce ac pick up in the signal leads and to ensure a good performance. The input leads should not be run near ac line wiring, transformers and heating elements. Input/output leads should, if possible, be twisted and shielded with the shield grounded at the end of the cable. When shielded cables are used the shield must be connected to the negative terminal.

The following figure shows some examples of input/output wiring of the instrument:
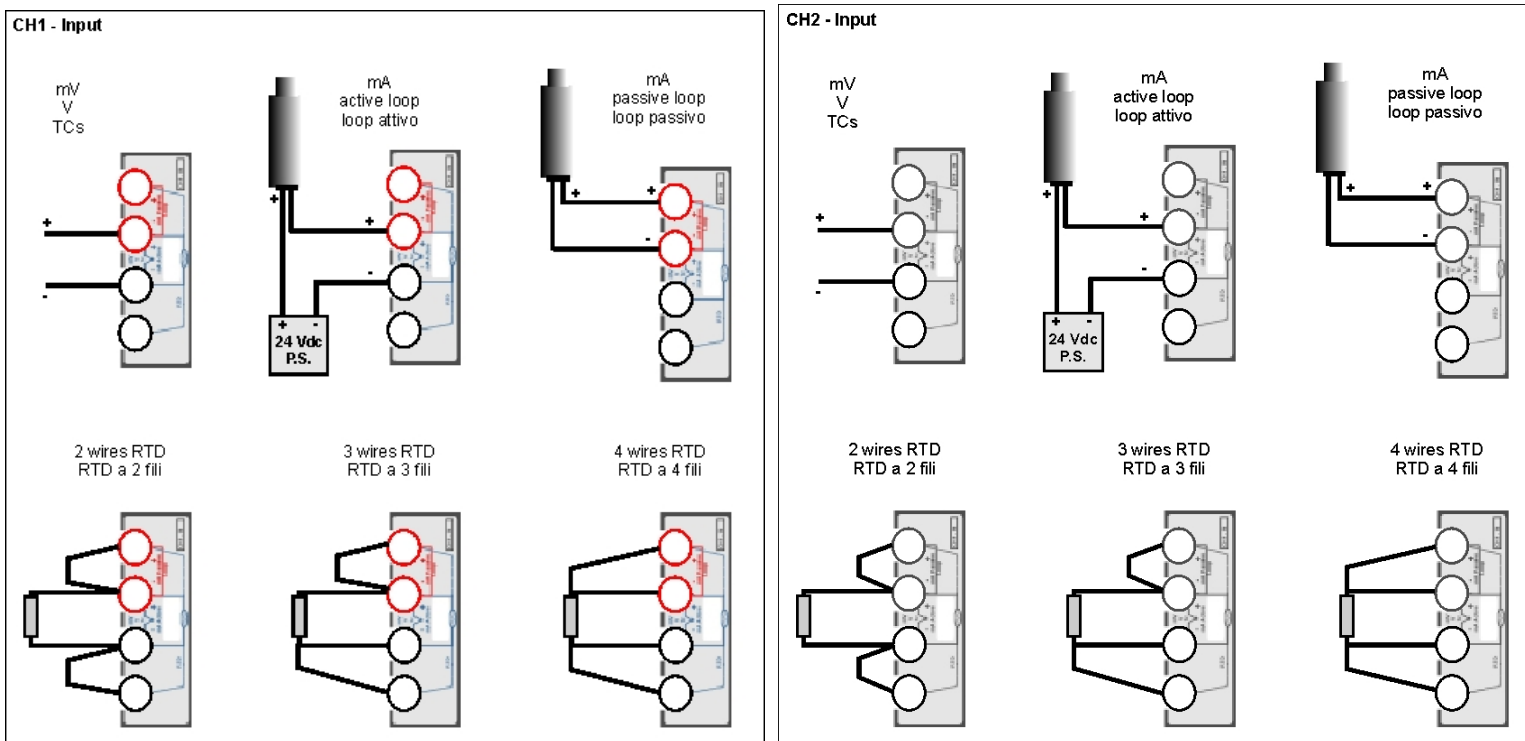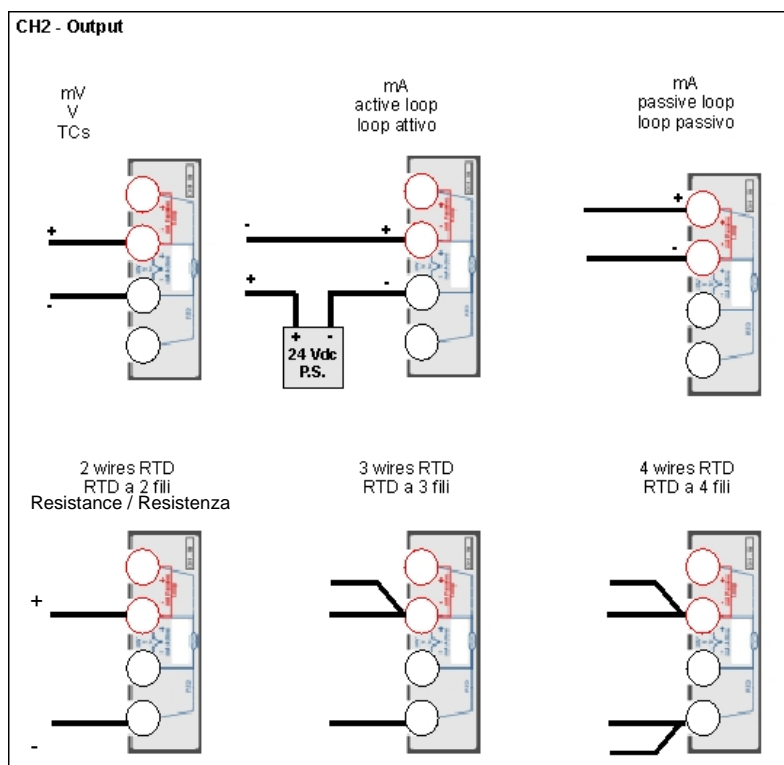
For a better understanding of the appropriate connection when using the instrument to simulate current into industrial 2-wire loop please, note the meaning of the terminal used.

Passive loop
This type of connection is to be used when the external loop is not equipped with the loop power supplied. The calibrator can be, as an example, connected directly to a recorder, controller, etc. with input circuits configured for current measurements.

Active loop
This type of connection must be used when the external loop is equipped with its loop power supplied. The power supply is not required to be disconnected. The loop circuit must be opened and the calibrator connections are placed in series on the loop.

2.4.1   Multi-connection binding post
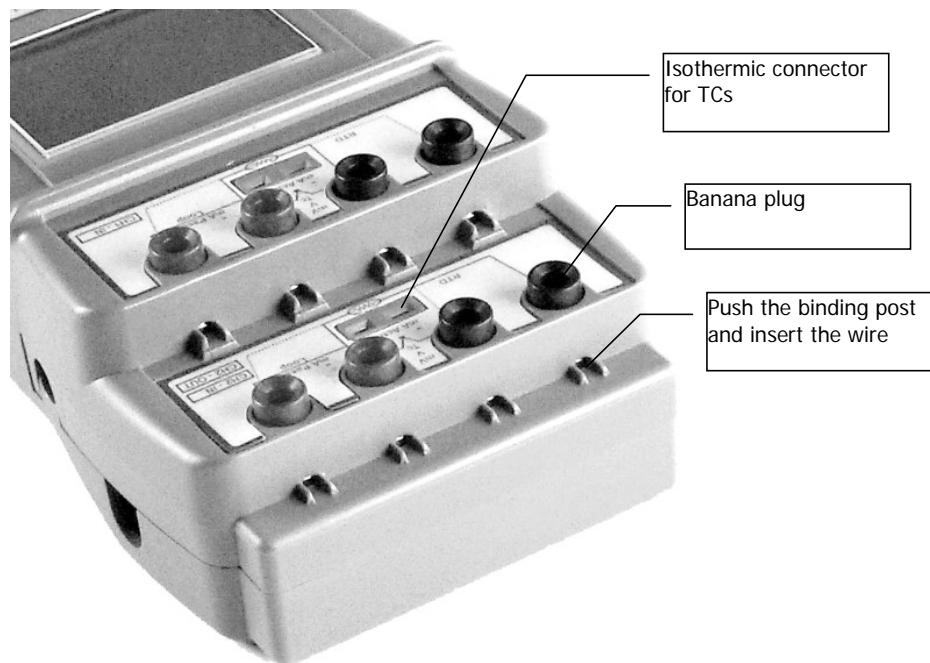
The MicroCal 20 includes 3 different connection systems:

- **Standard banana plugs**
- **Mini isothermal TC's connector**
- **Push & Lock system for wires**

Isothermic connector for TCs

Banana plug

Push the binding post and insert the wire

2.4.2   Alarm output connections

Function not available

3 GETTING STARTED

3.1 Unpacking

Remove the instrument from its packing case and remove any shipping ties, clamps, or packing materials.
Carefully follow any instructions given on any attached tags.
Inspect the instrument for scratches, dents, damage to case corner etc. that may have occurred during shipment.
If any mechanical damage is noted, report the damage to the shipping carrier and then notify **Eurotron** directly or its nearest agent, and retain the damaged packaging for inspection.
A label indicates the model and the serial number of the instrument. Refer to this number for any inquiry for service, spare parts supply or application and technical support requirements. **Eurotron** will keep a database with all information regarding your instrument.

3.2 Charge the battery

Before you use the calibrator for the first time, charge the battery pack for 8/10 hours by connecting the external battery charger.

3.3 Power up

Press the [**ON/OFF**] key to switch the instrument on and off. The instrument needs some seconds to check the hardware and to run the autocalibration procedure.

3.4 Automatic channel protections

The unit is protected against over-voltage and over-current inputs, by firmware and by thermal fuses.
The thermal fuses do not need replacement when activated. They automatically restore the input channels after some minutes.
The firmware is designed to load the last instrument settings.

IMPORTANT

WHEN THERMAL FUSES ACTIVATE, YOU SHOULD DISCONNECT THE ELECTRICAL CONNECTIONS FROM THE UNIT AND SWITCH THE INSTRUMENT OFF FOR ABOUT 2 MINUTES. THE THERMAL FUSES WILL BE AUTOMATICALLY RESTORED AND YOU CAN RESUME YOUR WORK.

3.5 Date and time setting

Before you use the calibrator for the first time, adjust the current data and time of the unit.

- Switch the instrument ON by pressing the [**ON/OFF**] key.

- Press the [**MENU**] key.

```
        MENU                      MENU                    Date/Time
 Configuration             Display                  Date
 Unit                      Date/Time                Time
 Ramp                      Baud [9600]
 Data logger               Rejection [60 Hz]
 Auxiliary                 User [Advanced]
Press <➡> to SET          Press <➡> to SET          Press <➡> to SET
```
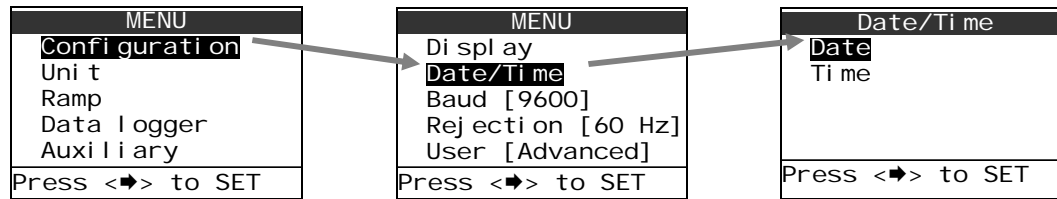
- Press the [⬆] and [⬇] keys to highlight the "**Date**" option. Press the [➡] key to set the system date.

```
        Date
 DD [01]
 MM [08]
 YY [03]
 Format [USA]

Press <➡> to SET
```

- Press the [⬆] and [⬇] keys to highlight the parameter to set. Press the [➡] key to modify the value.

```
       DD                   MM                    YY                   Format
 1                   6                    1                    Euro
 2                   7                    2                    USA
 3                   8                    3
 4                   9                    4
 5                   10                   5
Press <➡> to SET    Press <➡> to SET     Press <➡> to SET     Press <➡> to SET
```

- Press the [⬅] key to return to the previous menu.

```
    Date/Time                Time
 Date                  12H
 Time                  24H



Press <➡> to SET      Press <➡> to SET
```

- Press the [⬆] and [⬇] keys to highlight the time display mode (12H or 24H). Press the [➡] key to set the system time.

```
        Time
  HH [2]
  MM [30]



Press <➡> to SET
```
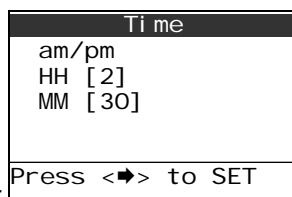
```
        Time
  am/pm
  HH [2]
  MM [30]



Press <➡> to SET
```
or ⎿_____⎿ if "12H" mode is selected

- Press the [⬆] and [⬇] keys to highlight the parameter to set. Press the [➡] key to modify the value.

```
        HH
  1
  2
  3
  4
  5
Press <➡> to SET
```

```
        MM
  29
  30
  31
  32
  33
Press <➡> to SET
```
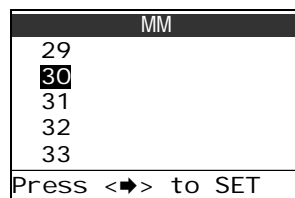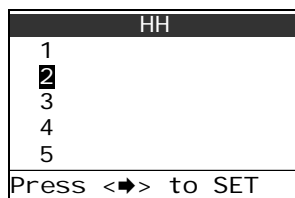
- Press the [**ESC**] key to return in measuring mode.

3.6   Using the backlight

An automatic backlight system uses the sensor positioned on the keyboard.
To manually switch on and off the backlight proceed as follows:

- Press the [**MENU**] key. Enter in configuration mode by highlight "**Configuration**" option (use the [⬆] and [⬇] keys) and press the [➡] key.

- Press the [⬆] and [⬇] keys to highlight the "**Display**" option. Press the [➡] key.

- Highlight the "**Light**" option and press the [➡] key to change the Backlit configuration.

```
        Light
  Auto
  On
  Off


Press <➡> to SET
```
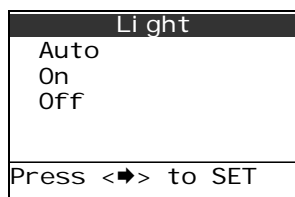
- Use the [⬆] and [⬇] keys to highlight the desired backlight mode (AUTO, ON, OFF). Press the [➡] key to store the changes.

- Press [**ESC**] key to return in measuring mode.

3.7   Adjust the display contrast

To increase or decrease the contrast, proceed as follows:

- Press [**MENU**].
- Press the [▲] and [▼] keys to increase and decrease contrast.
- Press [**ESC**] key to return in measuring mode.

3.8 Change display mode

The operator can select 10 display pages to visualize the measure and source channels.
To change the page press and release the [**DISPLAY**] key.

```
 SELECT Display
  Ch1 & Ch2
  Ch1 & Pressure
  Difference
  Ch1
  Ch2                  ↓
Press <➡> to SET
```
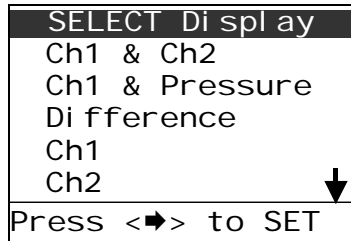
Press the [⬆] and [⬇] keys to highlight the display mode. Available selections are: Ch1&Ch2, Ch1&ChP, Difference, Ch1, Ch2, ChP, Graph

Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

15.2000 Ch1 mA Ch2 Out TcK Rji °C 100.02	19.9800 Ch1 mA ChP PI mbar 100.02	Ch1 100.0 Ch2 101.2 Dif -1.2	100.02 Ch1 TcK Rji °C
Ch1&Ch2	*Ch1&ChP*	*Difference*	*Ch1*
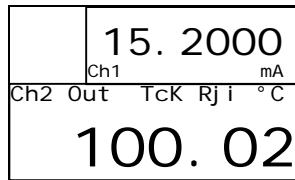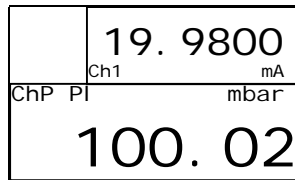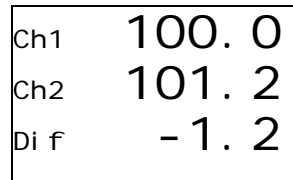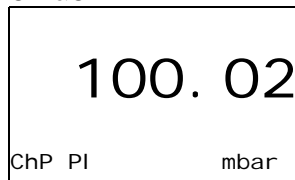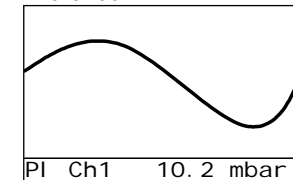
100.02 Ch2 Out TcK Rji °C	100.02 ChP PI mbar	 PI Ch1 10.2 mbar
Ch2	*ChP*	*2 channels Real time graph*

4 OPERATIONS

The operating mode (i.e., Source, measure) is shown on the display. Channel 1 can only measure electrical parameters; Channel 2 can Sourcing or Measuring (XP model only)

electrical parameter. If internal or external pressure sensors are installed, an additional Pressure channel can be set.

When you turn the calibrator ON, it powers up with the last configuration.

Please refer to Chapter 2.4 for electrical connections.

4.1 Data Hold

Press the [**HOLD/ZERO**] key to freeze the measure. The symbol "H" is displayed in the status box.
Press the [**HOLD/ZERO**] key to release the measure. The symbol "H" is removed from the status box.

4.2 Zeroing measure

To zero a measure on one of the 2 channels, you have to press [**HOLD/ZERO**] key until the numeric pad symbol ⌨ appears in status box. Now you have to press one of the numeric keys towards up way [△] to zero a measure of the channel in the upper part of the display. Otherwise, press [▽] to zero a measure of the channel in the lower part of the display. Consequently, "Z" appears on the related channel (see par.2.2); to vanish this symbol, the only way is to restart the instrument.

```
        0. 0000
      Z ch1           mA
 ch2  Out   TcK  Rji  °C

       100. 02
```

4.3 Storing

MicroCal can store up to 10 configurations with related measures.

- Press [**RCL/STO**] until "Sto" and ⌨ appear in the status box
- Press a number corresponding to the desired memory position

After memorization of a setup and measure values, those symbols in the status box disappear.

To recall one of the memories:

- Press for a short time [RCL/STO], "RcI " and [icon] appear in the status box
- Press a number corresponding to the desired memory position

After recalling a memory, the measure is in hold function (hence, "H" appears).

4.4 Calculator

MicroCal 20 implements a calculator function that allows performing simple mathematical operations or transferring a value to output channel.

- Press [**CALC**], the calculator box and the related symbol appear

```
 ▦ |  0. 0000
0. 000000
              100. 02
```
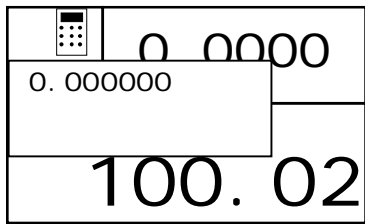
- Insert the first value of the operation by means of numeric pad, select the operation by pressing [**CALC**] (+, -, *, /), insert the second value of the operation, press [**=**] to show the result

NOTE: TO INSERT DECIMAL DIGITS, PRESS [SELECT] TO ACT ON DECIMAL DIGITS. BY PRESSING [IN], THE VALUE OF IN CHANNEL IS COPIED IN THE CALCULATOR; BY PRESSING [OUT], THE CALCULATOR VALUE IS SENT TO THE OUTPUT CHANNEL.

Example: 23 x 4.5

```
 ▦ |  0. 0000          ▦ |  0. 0000          ▦ |  0. 0000
23. 000000             23. 000000  *         103. 000000
                        4. 500000
       100. 02                100. 02               100. 02
```
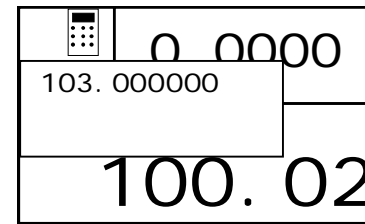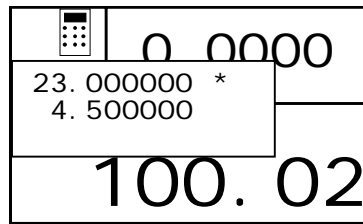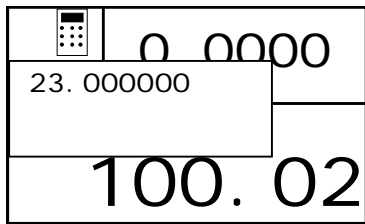
4.5 Measure mode

4.5.1 Temperature with Thermocouples

The calibrator can support 14 standard of thermocouples. See table on Technical Specifications chapter.

Switch the calibrator ON.

Select the channel to be configured, proceeding as follows:

- Press the [**SELECT**] key until "**SELECT CH1**" or "**SELECT CH2**" is shown.

If you choose the **Channel 1** settings, the calibrator will display:

```
      SELECT Ch1
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```
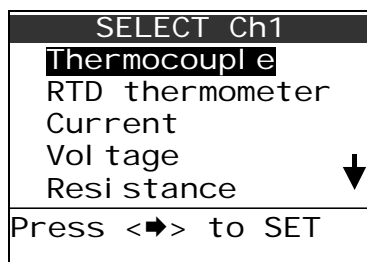
If you choose the **Channel 2** settings, the calibrator will display:

N.B. Channel 2 can measure only on MicroCal 20DPC XP or MicroCal 20T models.

```
      SELECT Ch2
 Out
 In
 Off


Press <➡> to SET
```

- Press the [↑] and [↓] keys to highlight the "**In**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.
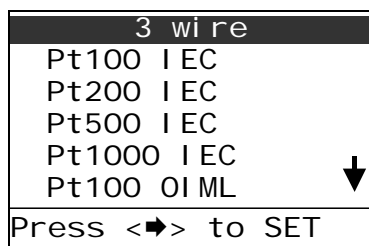
```
      SELECT Ch2
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```

- Press the [↑] and [↓] keys to highlight the "**Thermocouple**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
       Thermocouple
  Rji
  Rje
  Rjr


Press <➡> to SET
```
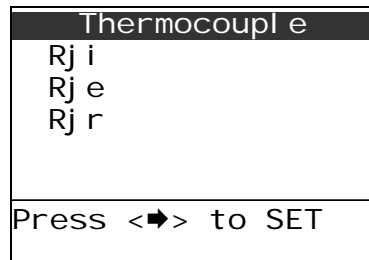
- Press the [⬆] and [⬇] keys to highlight the reference joint (Rj) mode.
  - **Rji**   Internal reference. The temperature is automatically compensated by the internal sensor.
  - **Rje**   External reference. The temperature is compensated with the value programmed in "Menu – Unit – Temperature – Rj Ch1 ext" menu.
  - **Rjr**   Remote reference. The temperature is compensated using the channel 2 as RTD input. This option is available only on **MicroCal 20DPC XP** and **MicroCal 20T** models.
- Press the [➡] key. Press the [**ESC**] key to return in measure mode without changes.

```
            Rji
  TcK
  TcJ
  TcT
  TcR
  TcS                  ⬇
Press <➡> to SET
```
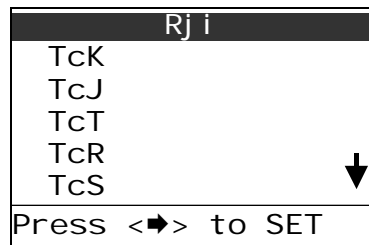
- Press the [⬆] and [⬇] keys to highlight the requested type of thermocouple.
- Press the [➡] key to confirm the selection and going in measuring mode. Press the [**ESC**] key to return in measure mode without changes.

4.5.2   External Cold Joint Reference Setting

- Press the [**MENU**] key. The following page is shown:

```
            MENU
  Configuration
  Unit
  Ramp
  Data logger
  Auxiliary
Press <➡> to SET
```
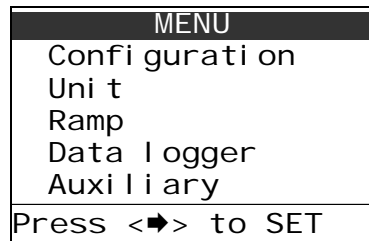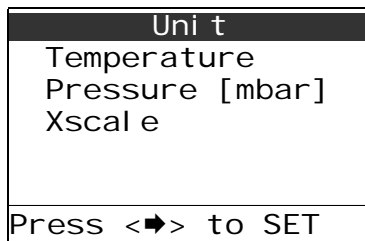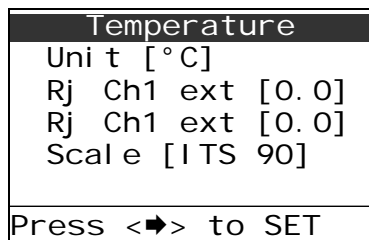
- Press the [⬆] and [⬇] keys to highlight the "**Unit**" option.
- Press the [➡] key to confirm the selection. Press the [**ESC**] key to return in measure mode without changes.

```
        Unit
 Temperature
 Pressure [mbar]
 Xscale


Press <➡> to SET
```
Select the "**Temperature**" option.

```
      Temperature
 Unit [°C]
 Rj Ch1 ext [0.0]
 Rj Ch2 ext [0.0]
 Scale [ITS 90]

Press <➡> to SET
```
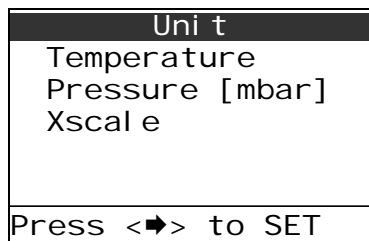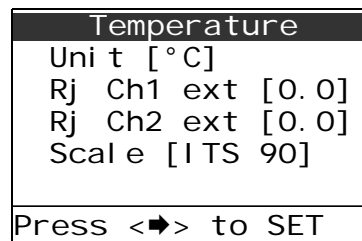
- Press the [⬆] and [⬇] keys to highlight the "**Rj Ch1 ext**" option for channel 1 setting or highlight the "**Rj Ch2 ext**" option for channel 2 setting.
- Press the [➡] key to confirm the selection.

```
     Rj Ch1 ext
 20.0
```
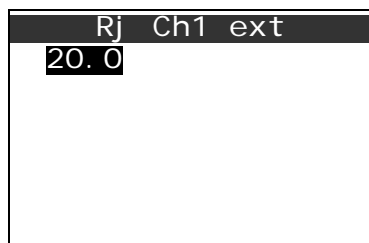
```
     Rj Ch1 ext
 0.0


 25.0
```
Use the numeric pad (red keys) to insert the temperature value (e.g. 25.0°C)
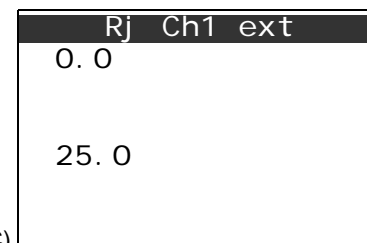
- Press [**ENTER**] to confirm or [⬅] to go to the upper menu level without changes.
- Press the [**ESC**] key to return in measure mode without changes.

4.5.3   Temperature with RTDs

The calibrator can support 14 standard of resistance thermometers. See table on Technical Specifications chapter.
Two, Three, or Four wire RTD connections can be performed for high accuracy measurements. Refer to the electrical connection chapter.

- Press the [**SELECT**] key until "**SELECT CH1**" or "**SELECT CH2**" is shown.

If you choose the Channel 1 setting the calibrator will display:

If you choose the Channel 2 setting the calibrator will display:

N.B. Channel 2 can measure only on MicroCal 20DPC XP or MicroCal 20T models.

```
     SELECT Ch1
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance           ↓
Press <➡> to SET
```

```
     SELECT Ch2
 Out
 In
 Off


Press <➡> to SET
```

- Press the [↑] and [↓] keys to highlight the "**In**" parameter.

- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
     SELECT Ch2
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance           ↓
Press <➡> to SET
```

- Press the [↑] and [↓] keys to highlight the "**RTD thermometer**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
    RTD thermometer
 3 wire
 4 wire



Press <➡> to SET
```
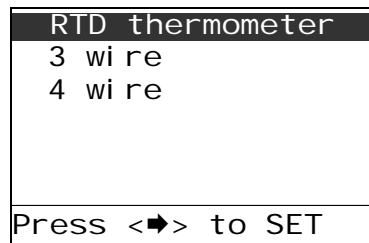
- Press the [↑] and [↓] keys to highlight the connection for your RTD.

IMPORTANT
PLEASE SELECT 4 WIRE CONNECTION IF YOU HAVE A 2 WIRE RTD AND USE THE ELECTRICAL CONNECTION AS SHOWN ON 2.4 CHAPTER.

- Press the [➡] key to confirm the selection. Press the [**ESC**] key to return in measure mode without changes.

```
        3 wire
  Pt100 IEC
  Pt200 IEC
  Pt500 IEC
  Pt1000 IEC
  Pt100 OIML              ↓
Press <➡> to SET
```

- Press the [↑] and [↓] keys to highlight the requested type of RTD.
- Press the [➡] key to confirm the selection and going in measuring mode. Press the [**ESC**] key to return in measure mode without changes.
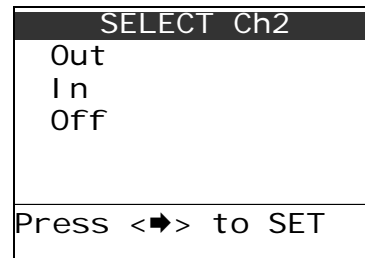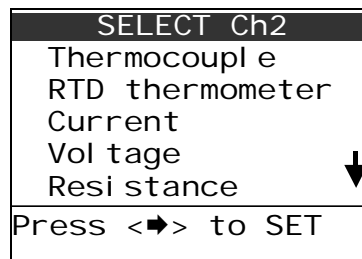
4.5.4   Temperature Scale Setting

- Press the [**MENU**] key. The following page is shown:
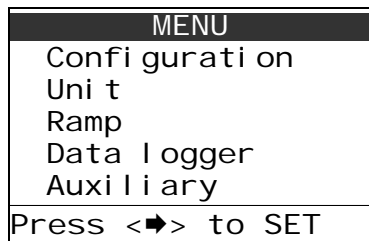
```
        MENU
  Configuration
  Unit
  Ramp
  Data logger
  Auxiliary
Press <➡> to SET
```
Select the "**Unit**" option
```
         Unit
  Temperature
  Pressure [mbar]
  Xscale


Press <➡> to SET
```
Select the "**Temperature**" option

```
     Temperature
  Unit [°C]
  Rj Ch1 ext [0.0]
  Rj Ch1 ext [0.0]
  Scale [ITS 90]

Press <➡> to SET
```
Select the "**Scale**" option
```
     Temperature
  ITS 90
  IPTS68




Press <➡> to SET
```
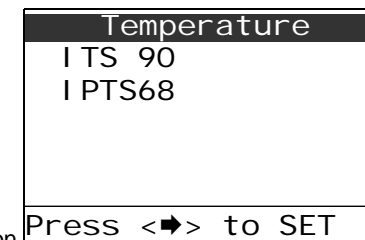
- Press the [↑] and [↓] keys to highlight the temperature scale used (ITS90 or IPTS68).
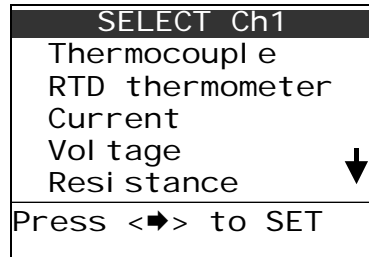- Press the [➡] key to confirm the selection and going in measuring mode. Press the [**ESC**] key to return in measure mode without changes.

4.5.5   Temperature Unit Setting

- Press the [**MENU**] key. The following page is shown:
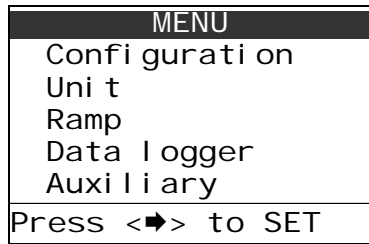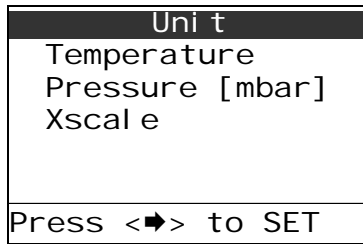
```
        MENU
  Configuration
  Unit
  Ramp
  Data logger
  Auxiliary
Press <➡> to SET
```
Select the "**Unit**" option

```
        Unit
  Temperature
  Pressure [mbar]
  Xscale



Press <➡> to SET
```
Select the "**Temperature**" option.

```
     Temperature
  Unit [°C]
  Rj Ch1 ext [0.0]
  Rj Ch1 ext [0.0]
  Scale [ITS 90]

Press <➡> to SET
```
Select the "**Unit**" option.

```
     Temperature
   °C
   °F
   K



Press <➡> to SET
```
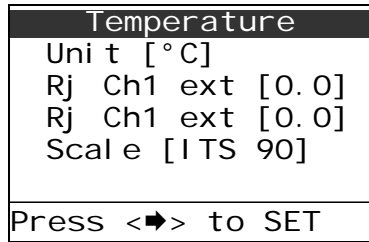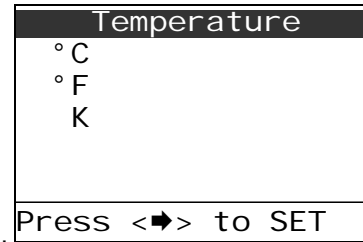
- Press the [⬆] and [⬇] keys to highlight the engineering unit you would like to use in temperature sourcing and measuring.
- Press the [➡] key to confirm the selection and going in measuring mode. Press the [**ESC**] key to return in measure mode without changes.

4.5.6 Current

- Press the [**SELECT**] key until "**SELECT CH1**" or "**SELECT CH2**" is shown.

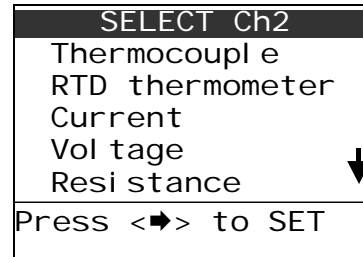If you choose the Channel 1 setting the calibrator will display:

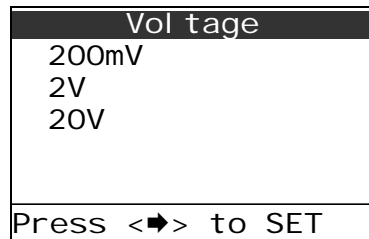If you choose the Channel 2 setting the calibrator will display:

N.B. Channel 2 can measure only on MicroCal 20DPC XP or MicroCal 20T models.

```
     SELECT Ch1
  Thermocouple
  RTD thermometer
  Current
  Voltage
  Resistance        ⬇
Press <➡> to SET
```

```
     SELECT Ch2
  Out
  In
  Off



Press <➡> to SET
```

- Press the [⬆] and [⬇] keys to highlight the "**In**" parameter.

- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.
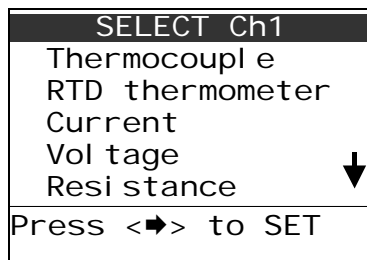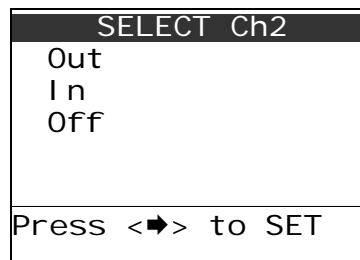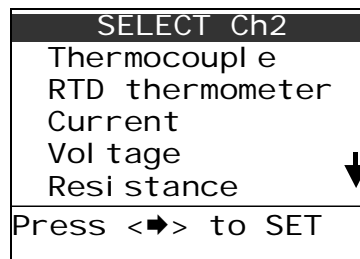
```
   SELECT Ch2
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```
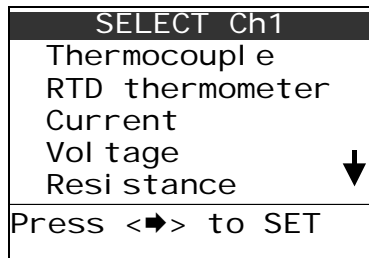
- Press the [⬆] and [⬇] keys to highlight the "**Current**" parameter.

- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
      Current
 Active loop
 Passive loop



Press <➡> to SET
```
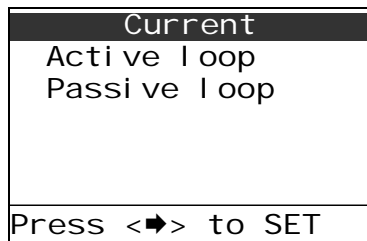
- Press the [⬆] and [⬇] keys to choose the loop mode.
    - **Active current loop**: select this option if you are connecting to an active current loop (your circuit provide to supply the loop)
    - **Passive current loop**: select this option if you are connecting to a passive current loop (the calibrator provide to supply the loop).

IMPORTANT
ACTIVE LOOP SELECTION ALLOWS TO SWITCH OFF THE INTERNA POWER SUPPLY.
SELECT THIS FUNCTON WHEN YOU DO NOT NEED THE LOOP SUPPLY TO MAXIMIZE THE MICROCAL BATTERY LIFE.

- Press the [➡] key to confirm the selection and go to measuring mode. Press the [**ESC**] key to return in measure mode without changes.

4.5.7 Voltage

- Press the [**SELECT**] key until "**SELECT CH1**" or "**SELECT CH2**" is shown.

If you choose the Channel 1 setting the calibrator will display:

If you choose the Channel 2 setting the calibrator will display:

N.B. Channel 2 can measure only on MicroCal 20DPC XP or MicroCal 20T models.

```
    SELECT Ch1
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```

```
    SELECT Ch2
 Out
 In
 Off


Press <➡> to SET
```

- Press the [↑] and [↓] keys to highlight the "**In**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
    SELECT Ch2
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```
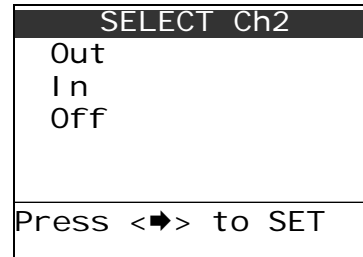
- Press the [↑] and [↓] keys to highlight the "**Voltage**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
     Voltage
 200mV
 2V
 20V



Press <➡> to SET
```

- Press the [↑] and [↓] keys to choose the range.
- Press the [➡] key to confirm the selection and go to measuring mode. Press the [**ESC**] key to return in measure mode without changes.
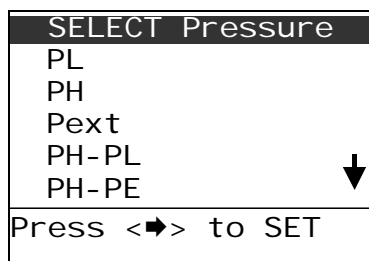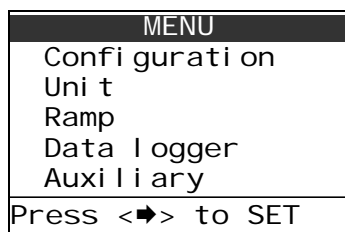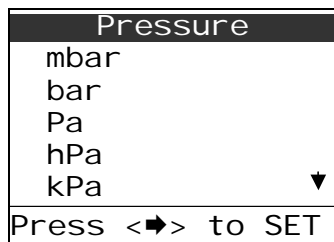
4.5.8   Math Functions

- Press the [**SELECT**] key until "**SELECT CH1**" or "**SELECT CH2**" is shown.

If you choose the Channel 1 setting the calibrator will display:

If you choose the Channel 2 setting the calibrator will display:

N.B. Channel 2 can measure only on MicroCal 20DPC XP or MicroCal 20T models.

```
     SELECT Ch1
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance        ↓
Press <➡> to SET
```

```
     SELECT Ch2
 Out
 In
 Off


Press <➡> to SET
```

- Press the [⬆] and [⬇] keys to highlight the "**In**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
     SELECT Ch2
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance        ↓
Press <➡> to SET
```

- Press the [⬆] and [⬇] keys to highlight the "**Math Functions**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
  Math Function
 XScale
 LinMan [ ]



Press <➡> to SET
```
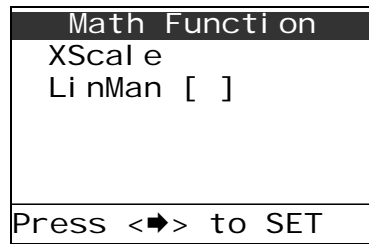
- Press the [⬆] and [⬇] keys to highlight the type of Mathematic functions you have to use.
    - **XScale**: allows to perform a linear or square scaling for your input parameter (e.g. For transforming a 4/20 mA input to a –1 to 2 bar reading on the display)
    - **LinMan**: you can transfer from PC (using the optional LinMan PC software) special linearization sensor tables (e.g. The RTD calibration ohm vs. °C table or the polynomial coefficients). Please refer to LinMan software paragraph for the complete procedure.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

If you have select "**XScale**" option, the display will show:

```
  Math Function
 X1
 X2
 X3
 X4

Press <➡> to SET
```
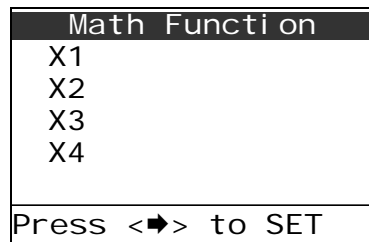
- Press the [⬆] and [⬇] keys to choose the Xscale function.
- Press the [➡] key to confirm the selection and go to measuring mode. Press the [**ESC**] key to return in measure mode without changes.

(for Xscale function, see par.4.3)
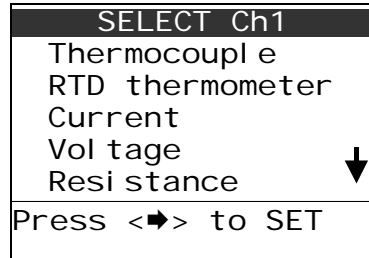
If you have select "**LinMan**" option, the display will show the list of all sensor linearizations you have created using the optional PC software LinMan.

```
     LinMan
 My Sensor 1
 My Sensor 2
 My Sensor 3
 My Sensor 4
 My Sensor 5
Press <➡> to SET
```
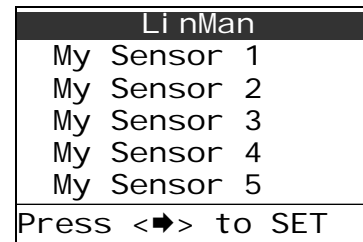
- Press the [⬆] and [⬇] keys to choose the sensor name.
- Press the [➡] key to confirm the selection and go to measuring mode. Press the [**ESC**] key to return in measure mode without changes.

4.5.9 Pressure

- Press the [**SELECT**] key until "**SELECT Pressure**" is shown.

```
┌──────────────────────────┐
│     SELECT Pressure      │
│  PL                      │
│  PH                      │
│  Pext                    │
│  PH-PL                   │
│  PH-PE              ↓     │
├──────────────────────────┤
│Press <➡> to SET          │
└──────────────────────────┘
```
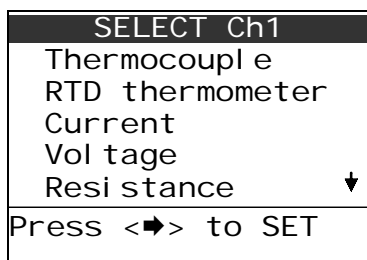
- Press the [⬆] and [⬇] keys to highlight the sensor to be displayed.

- Press the [➡] key to confirm the selection and going in measuring mode. Press the [**ESC**] key to return in measure mode without changes.

4.5.10   Pressure Unit Setting

- Press the [**MENU**] key. The following page is shown:
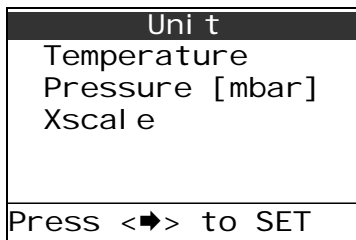
```
┌──────────────────────────┐
│           MENU           │
│  Configuration           │
│  Unit                    │
│  Ramp                    │
│  Data logger             │
│  Auxiliary               │
├──────────────────────────┤
│Press <➡> to SET          │
└──────────────────────────┘
```
Select the "**Unit**" option.
```
┌──────────────────────────┐
│           Unit           │
│  Temperature             │
│  Pressure [mbar]         │
│  Xscale                  │
│                          │
│                          │
├──────────────────────────┤
│Press <➡> to SET          │
└──────────────────────────┘
```
Select the "**Pressure**" option.

```
┌──────────────────────────┐
│        Pressure          │
│  mbar                    │
│  bar                     │
│  Pa                      │
│  hPa                     │
│  kPa               ↓     │
├──────────────────────────┤
│Press <➡> to SET          │
└──────────────────────────┘
```

- Press the [⬆] and [⬇] keys to highlight the engineering unit you would like to use in pressure sourcing and measuring.
- Press the [➡] key to confirm the selection and going in measuring mode. Press the [**ESC**] key to return in measure mode without changes.
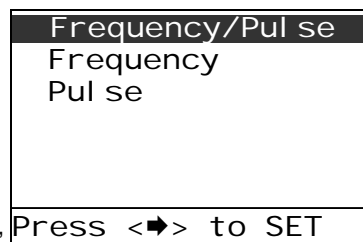
4.5.11   Pressure Zeroing

- To zeroing the pressure channel, hold down the [**HOLD/ZERO**] key for 4 seconds while in pressure display mode. The symbol ⌗ is displayed in the status box. Press the [△], [▽] key if you need to zero the upper or the lower display.

4.5.12 Resistance

- Press the [**SELECT**] key until "**SELECT CH1**" or "**SELECT CH2**" is shown.

If you choose the Channel 1 setting the calibrator will display:

If you choose the Channel 2 setting the calibrator will display:

N.B. Channel 2 can measure only on MicroCal 20DPC XP or MicroCal 20T models.

```
    SELECT Ch1
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```

```
    SELECT Ch2
 Out
 In
 Off


Press <➡> to SET
```

- Press the [↑] and [↓] keys to highlight the "**In**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
    SELECT Ch2
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```
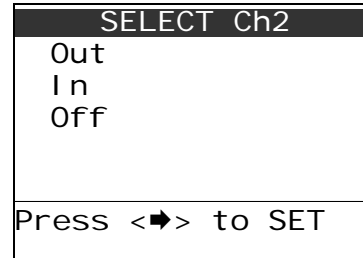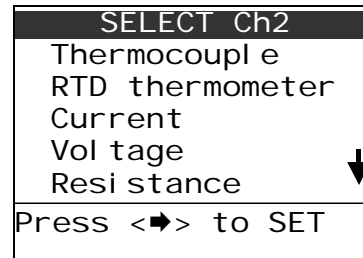
- Press the [↑] and [↓] keys to highlight the "**Resistance**" parameter.
- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

```
         Resistance
  3 wire
  4 wire



 Press <➡> to SET
```
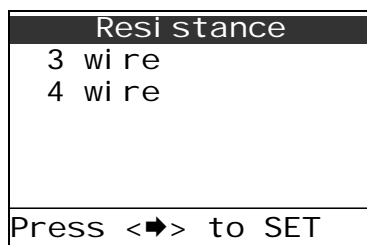
- Press the [⬆] and [⬇] keys to highlight the connection for your resistance.

<div style="text-align:center">

IMPORTANT
PLEASE SELECT 4 WIRE CONNECTION IF YOU HAVE A 2 WIRE RESISTANCE AND USE THE ELECTRICAL CONNECTION AS SHOWN ON 2.4 CHAPTER.

</div>

- Press the [➡] key to confirm the selection. Press the [**ESC**] key to return in measure mode without changes.

```
          3 wire
  500ä
  5kä



 Press <➡> to SET
```
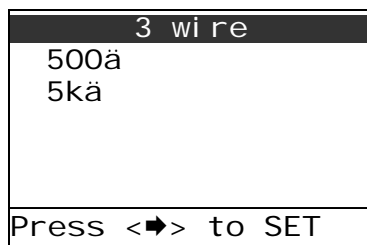
- Press the [⬆] and [⬇] keys to highlight the range.
- Press the [➡] key to confirm the selection and going in measuring mode. Press the [**ESC**] key to return in measure mode without changes.

4.5.13   Frequency/Pulse: measure

<div style="text-align:center">

IMPORTANT
MEASURE OF FREQUENCY OR PULSES IS POSSIBLE ONLY ON CHANNEL 1

</div>

- Press the [**SELECT**] key until "**SELECT CH1**" is shown

```
      SELECT Ch1
  Thermocouple
  RTD thermometer
  Current
  Voltage
  Resistance       ⬇
 Press <➡> to SET
```
Select "**Frequency/Pulse**"

```
    Frequency/Pulse
  Frequency
  Pulse



 Press <➡> to SET
```
select "**Frequency**" o "**Pulse**"

- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes

If you select Frequency as a input:

```
       Frequency
 Range
 Trigger level [2]



Press <➡> to SET
```

- Select "**Trigger level**" to define the threshold level (Volt)
- Select "**Range**" to define the frequency level

```
       Frequency
 200Hz
 2kHz
 20kHz



Press <➡> to SET
```

- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes

If you select Pulse as a input:

Se scegliete "**Pulse**" come input, lo strumento mostra:

```
         Pulse
 Measure
 Trigger level [2]
 Time
 Mode [One shot]


Press <➡> to SET
```

- Select "**Trigger level**" to define the threshold level (Volt)
- Define the time, in seconds, used to perform the measure, with "**Time**"
- Select the mode for the measure of pulses: "**One shot**" or "**Continuous**", depending on which kind of measure you want: over a single time range or continuously.
- Select Measure to start the measure. The instrument comes back automatically to the measuring page and channel 1 measures a value expressed in p/t

NOTE
ABOUT THE GENERATION OF FREQUENCY/PULSE, SEE PAR. 4.6.2

4.6 Source mode: signals generation

The calibrator can generate (source) all the electrical signals as shown in technical specifications paragraph.

- Press the [**SELECT**] key until "**SELECT CH2**" is shown.

```
        SELECT Ch2
 Out
 In
 Off


Press <➡> to SET
```

```
                    OUT
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```
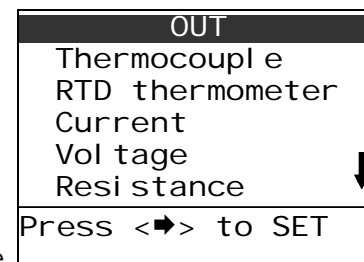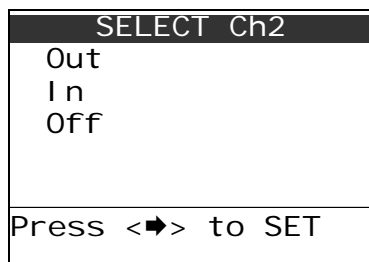
Select the "**OUT**" option. The display shows the following page

---

NOTE
PROCEED AS DESCRIBED IN THE MEASURE PAR. 4.5 FOR THE SELECTION OF VARIETIES OF SIGNAL GENERATIONS

To insert the numeric value for a generated signal, it is enough to insert it directly using [△], [▽] (numeric pad). Each key is located immediately below the digit it acts on: a single click of [△] increases the digit of 1 unit, vice versa a single click of [▽] decreases this digit of 1 unit.

On the other hand, it is possible to insert a value with calculator function:
- Press [**CALC**], the calculator box and the related symbol appear
- Insert a value with the numeric pad
- Confirm by pressing [**MENU**], the value is then transcribed on the output channel
- Press [**ESC**] to exit from calculator function

```
                   0.000
 0.000000


              10.00
```

Example:

```
              0.000
 210.000000


           10.00
```



```
              0.000
           Ch1          mA
 Ch2 out    RTD °C 4w
 210.00
```
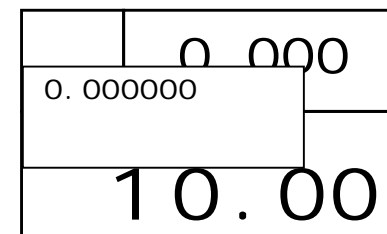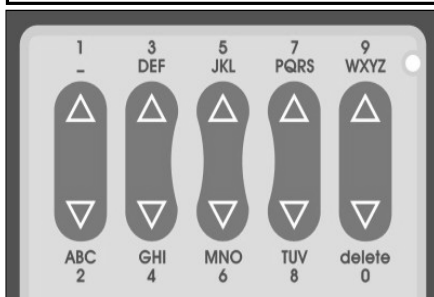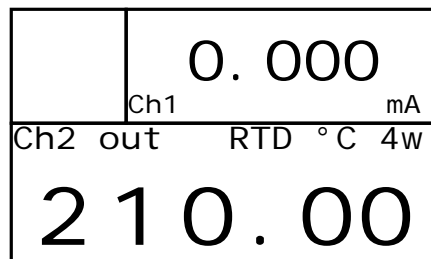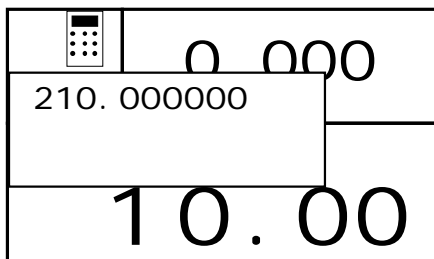
To insert the value "210.00", we need to act on numeric pad or with the calculator function

4.6.1 Temperature generator: MicroCal T series

MicroCal 20 is able to command a temperature generator of MicroCal T series by Eurotron. In that way, it is possible to set the temperature directly from the calibrator.
Among possible uses, for instance it is possible to realize a system which receives a signal from a temperature transmitter and turns it back on the furnace; moreover, scaling functions are always available.

NOTE
THE CONNECTION TO MICROCAL T IS PERFORMED BY MEANS OF THE RS232 SERIAL PORT (6 MINIDIN FEMALE CONNECTOR ON THE LEFT SIDE)

- Press [**SELECT**] until "**Select CH2**" appears
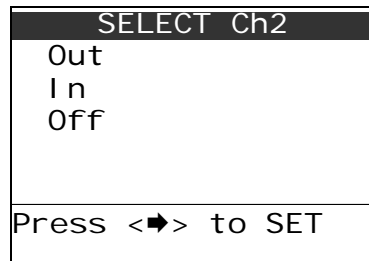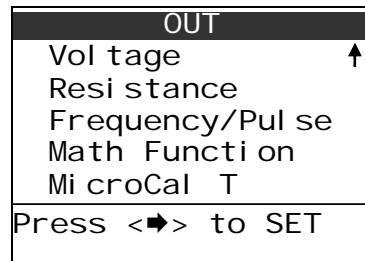
```
    SELECT Ch2
 Out
 In
 Off


Press <�> to SET
```
Select "**OUT**":
```
        OUT
 Voltage              ↑
 Resistance
 Frequency/Pulse
 Math Function
 MicroCal T
Press <�> to SET
```
select the proper generator :
```
     MicroCal T
 T100




Press <�> to SET
```
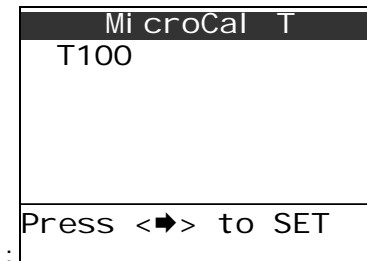
- Select the desired temperature as Out

4.6.2 Frequency/Pulse: generation

- Press [**SELECT**] until "**Select CH2**" appears

```
    SELECT Ch2
 Out
 In
 Off


Press <�> to SET
```
Select "**OUT**"
```
        OUT
 Voltage              ↓
 Resistance
 Frequency/Pulse
 Math function
 Microcal T
Press <�> to SET
```
select **Frequency/Pulse**
```
  Frequency/Pulse
 Frequency
 Pulse




Press <�> to SET
```
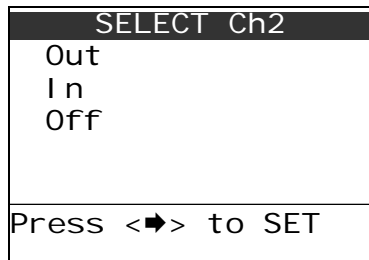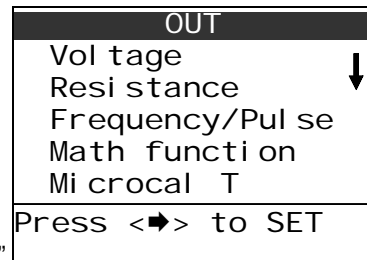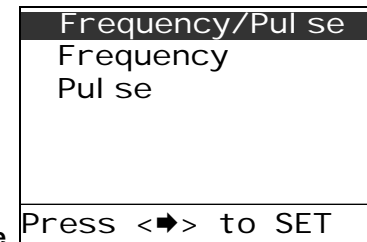
- select "**Frequency**" or "**Pulse**"

- Press the [�th] key to select the option. Press the [**ESC**] key to return in measure mode without changes

If you select "**Frequency**" as output, the display shows:

```
       Frequency
 Square
 Sinusoidal
 Triangular
 Amplitude [5]
 Sin offset [0]
Press <➡> to SET
```
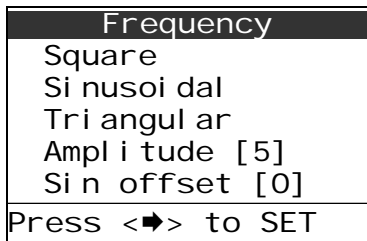
- Select the **Amplitude**
- Select the offset with "**Sin offset**"
- Select the desired waveform: square, sinusoidal, triangular
  - Select the range for the frequency :

```
       Frequency
 200Hz
 2kHz
 20kHz


Press <➡> to SET
```
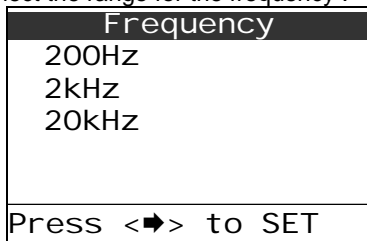
- Press the [➡] key to select the option and to enter measure mode

If you select "**Pulse**" as input, the display shows:

```
         Pulse
 OnOff
 Time
 Mode [One shot]
 Amplitude [5]

Press <➡> to SET
```
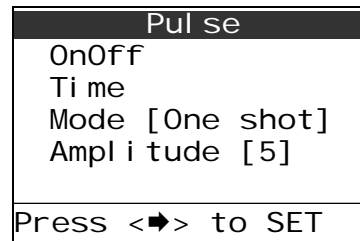
- Define the time (minutes and seconds), over that the generation is performed with **Time**
- Select the mode for pulse generation: "**One shot**" or "**Continuous**", depending on which kind of generation you want: over a single time range or continuously
- Select the **Amplitude**
- Select **OnOff.** The instrument comes back automatically at the measuring page and channel 2 expresses the value in p/t. Hence it is possible to directly set the number of pulses in time unit.

When the instrument is in the measures page, it appears in Hold mode. Unlocking hold by pressing [**HOLD**], the generation starts with those previously set parameters.

4.7   X-Scaling setting

The calibrator can measure voltage or current and simply display it or convert it using the "XScale" function and then display the measured value via a conversion factor.

- Press the [**MENU**] key. The following page is shown:

```
         MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select the "**Unit**" option
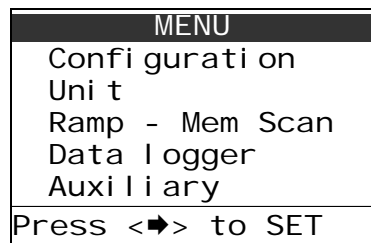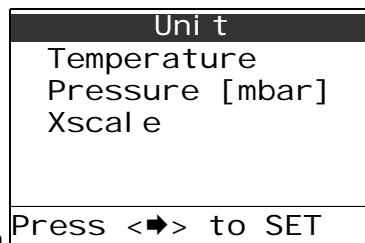
```
         Unit
 Temperature
 Pressure [mbar]
 Xscale


Press <➡> to SET
```
Select the "**XScale**" option.

```
         XScale
    X1
    X2
    X3
    X4


 Press <➡> to SET
```
Select one of the 4 available functions. (e.g. X1)

```
               X1
    Unit [°C]
    Source [50 mA]
    In Low [4.000]
    In High [20.000]
    X Low [0.0]
 Press <➡> to SET
```

Select and program each of the 8 variables:

- **Unit**: 5 characters length can be programmed for the engineering unit
- **Source**: select the voltage or the current input range [200mV, 2V, 20V, 50mA]
- **In Low**: Change this value with the Zero scale
- **In High**: Change this value with the Input Full Scale
- **x Low**: Change this value with the Displayed low scale
- **x High**: Change this value with the Displayed High scale
- **Function**: Change this value with the linearization function [linear, square, sqrt, log]
- **Digits**: Change this value with the number of digits to be displayed [0, 1, 2, 3, 4]

- Press the [**ESC**] key to return in measuring mode.

4.8   Cycle & Ramp

The output channel can be programmed to simulate a ramp.

The procedure uses the Channel 2 output configuration.

NOTE
BEFORE RUN THE PROCEDURE THE CH2 HAS TO BE SET AS OUTPUT (SEE PAR. 4.6)

- Press the [**MENU**] key. The following page is shown:

```
         MENU
 Configuration
 Unit
 Ramp - Mem scan
 Data logger
 Auxiliary
Press <➡> to SET
```

```
 Ramp - Mem scan
 Ramp
 Mem scan



Press <➡> to SET
```

```
         Ramp
 OnOff
 n. cycles [0]
 From [0]
 To [1]
 Step [0.1]
Press <➡> to SET
```
Press the [⬇] key to display other variables

```
         Ramp
 Step [0.1]
 T up [10]
 T soak up [3]
 T down [5]
 T soak down [0]
Press <➡> to SET
```

Select each parameter and set it properly to define the characteristics of the ramp signal

---

NOTE
ENGINEERING UNITS ARE REFERRED TO THE OUTPUT TYPE PREVIOUSLY SET ON CH2 (MV, V, MA, ETC.)
TIMES ARE EXPRESSED IN SECONDS

- **On/Off**: RUN and STOP the simulation
- **From**: Minimum output level
- **To**: Maximum output level
- **Step**: Ramp step
- **T up**: Interval to go from Minimum to Maximum levels
- **T soak up**: Waiting time on maximum level
- **T down**: Interval to go from Maximum to Minimum levels
- **T soak down**: Waiting time on minimum level
- **N. Cycles**: 0 = continuous simulation ; 1 to 999 = number of ramp simulations (cycles)

See the following explanatory figure:
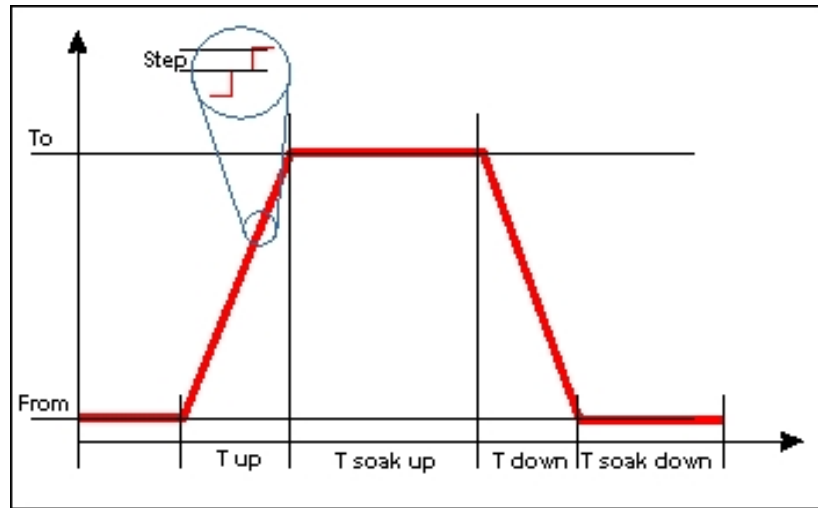
- Select the "**On/Off**" key to run the procedure. Press [**ESC**]: the display shows a page like that:

```
 15. 2000
Ch1              mA
Ch2  Ramp  à     mV

 100. 02
```
The "**ramp**" massage is displayed on the channel 2 while the ramp is running.

The phases of the ramp are signed by the arrows beside the "ramp" message: $\uparrow$ = ascent, $\rightarrow$ = soak up, $\downarrow$ = slope down, $\leftarrow$ = soak down

- Press the [**HOLD**] key to pause and to continue the procedure.

Example:
Ch2 on V
From=0, to=1, step=0.1, t up=5, t soak up=3, t down=4, t soak down=4

The simulation starts from 0V, goes to 1V in 5sec with 0.1V steps. After the ascent, the signal is kept at 1V for 3sec and goes down to 0V in 4sec. After other 2sec, the cycle is redone for a number of times equal to "n.cycles".

4.9   Data Logging

See par.6.1.1 as this function is strictly related to communication with PC

4.10 Graph

The graphic display allows showing the real time trend for two channels.
The procedure uses channels configuration. Before run the procedure the channels to be graph has to be set.

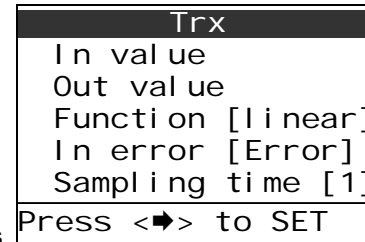- Press the [**MENU**] key. The following page is shown:

```
      MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select the "**Auxiliary**" option

```
     Auxiliary
 Trx
 Graph
 Switch Test
 Leak Test
 Math            ↓
Press <➡> to SET
```
Select the "**Graph**" option

```
      Graph
 Source [Ch1]
 In Low [0.00]
 In High [100.00]
 Time

Press <➡> to SET
```

- **Source**: Select the graph channel source. Available settings are: CHP (if internal and/or external pressure sensor are installed), CH1, CH2.
- **In Low**: Set the graph Low scale
- **In High**: Set the graph full scale
- **Time**: Set the sampling time (expressed in min. and sec.)

- To display the graphic, select the graphic display mode by pressing the [**DISPLAY**] key and selecting the "**Graph**" item.

4.11 Transmitter simulator

The calibrator can be programmed for simulate a signal or a pressure transmitter. The input signal is transformed to a 0-20mA or a 4-20mA output signal.
The procedure uses channel configuration. Before run the procedure the source channel has to be set.

- Press the [**MENU**] key. The following page is shown:

```
        MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select the "**Auxiliary**" option

```
      Auxiliary
 Trx
 Graph
 Switch Test
 Leak Test
 Math           ↓
Press <➡> to SET
```
Select the "**Trx**" option
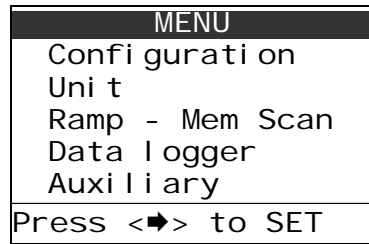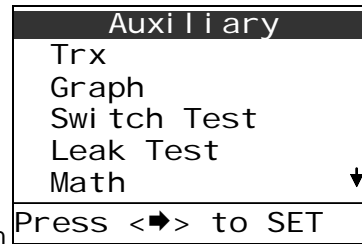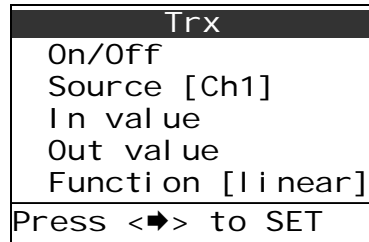
```
        Trx
 On/Off
 Source [Ch1]
 In value
 Out value
 Function [linear]
Press <➡> to SET
```
Press the [↓] key to display the other variables

```
        Trx
 In value
 Out value
 Function [linear]
 In error [Error]
 Sampling time [1]
Press <➡> to SET
```

- **On/Off**: RUN and STOP the function

- **In value**: Allows to program the low and full scale for the Trx source

- **Out value**: Allows to program the low and full scale for the mA output (max. range 0 to 50mA)

- **Source**: Input channel (Ch1, P1, P2, PE, PA, RH%, T)

- **Function** : Linearization mode (Linear, square, sqrt, log)

- **In error**: Error message for input out of range (out=L/H, error)

- **Sampling time**: It is possible to choose the interval between input data acquisition (0.1, 1 or 10 seconds)

4.12   Memory Scan

The output channel (CH2) can be programmed for simulating a sequence of 10 values. This procedure uses the Channel 2 as output channel and the 1-9 memories.
Before run this feature, you have to set output values using **consecutive memories** (see par. 4.3) and set channel 2 as output. .

- Press the [**MENU**] key. The following page is shown:

```
        MENU
  Configuration
  Unit
  Ramp - Mem Scan
  Data logger
  Auxiliary
Press <➡> to SET
```
Select "**Ramp-Mem Scan**"

```
  Ramp - Mem Scan
  Ramp
  Mem Scan



Press <➡> to SET
```
Select the "**Mem Scan**"

```
      Mem Scan
  On/Off
  From Mem [1]
  To Mem [8]
  Time [2]
  Mode [AUTO]
Press <➡> to SET
```
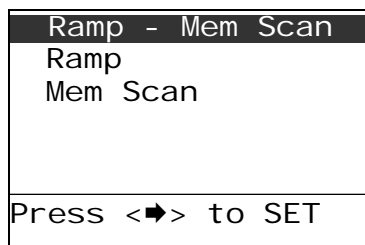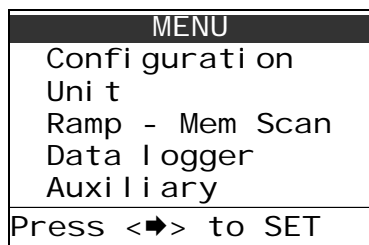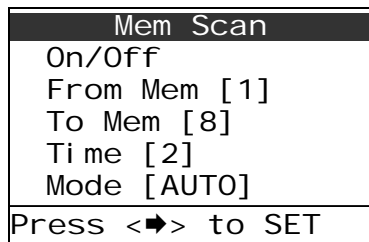
Set the parameters for simulation procedure

- **On/Off**: runs and ends the function
- **Mode**: AUTO: automatic sequence using the "Time" value as interval time – MANUAL: require to press the [**HOLD**] key to go to the next step
- **From Mem**: First memory to be simulated.
- **To Mem**: Last memory to be simulated
- **Time**: interval time between 2 steps

IMPORTANT

BEFORE RUN THE PROCEDURE, BE SURE TO HAVE ALL MEMORIES WITH THE SAME OUTPUT PARAMETERS. IF THE STORED MEMORIES HAVE DIFFERENT PHYSICAL PARAMETERS (EG. MV AND MA) YOU COULD SERIOUSLY DAMAGE THE LOAD.

- Select the "**On/Off**" key to run the procedure. The display shown the following page:
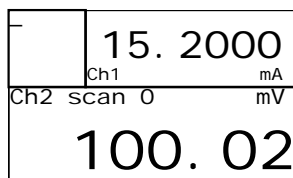
```
 ‾
    15.2000
  Ch1            mA
Ch2 scan 0       mV

   100.02
```
The message "**scan**" is displayed in the status box when the sequencer is running. A number shows the current step.

- If the sequencer is programmed in "AUTO" mode, press the [**HOLD**] key to pause and to continue the procedure.
- If the sequencer is programmed in "MANUAL" mode, press the [**HOLD**] key to go to next step.

4.13 Switch Test

Verifying functions are available for measurement's instruments of temperature or pressure.

- Press [**MENU**], the following page is shown:

```
        MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select "**Auxiliary**"

```
      Auxiliary
 Trx
 Graph
 Switch Test
 Leak Test
 Math              ↓
Press <➡> to SET
```
Select "**Switch Test**"

```
    Switch Test
 Pressure
 Temperature



Press <➡> to SET
```
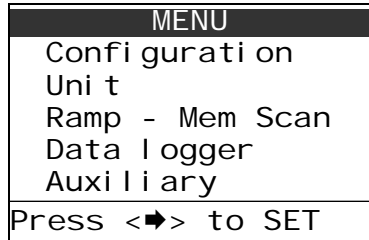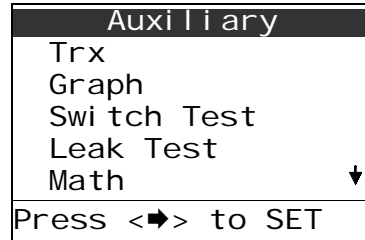
```
        Pressure
 PI
 Ph
 Pe


Press <➡> to SET
```
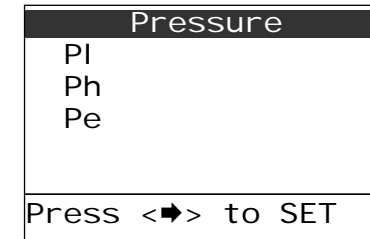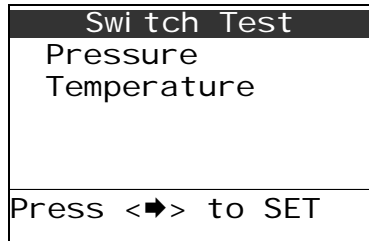
If you have to verify the switch on a pressure, select "**Pressure**" and the type of the sensor to use, internal or external:

If you have to verify the switch on a temperature, select "**Temperature**" and choose the proper channel.

- Confirm and then perform the test, verifying whether the contact is **Close** or **Open**

```
    Switch Test

    10.0 mbar
   Contact Open
    0.0  mbar


```

```
    Switch Test

    0.0 mbar
   Contact Close
    15.0  mbar


```
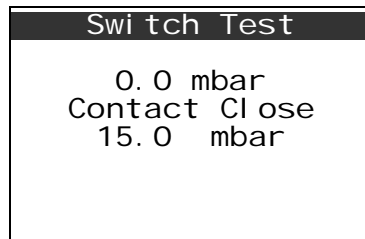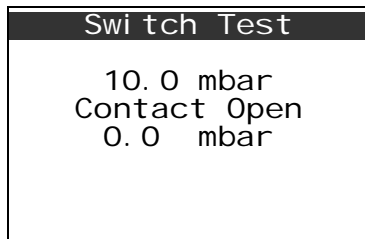
During a switch test, at the first line you can read the measure in real time. The second line shows the status of the switch and the third line indicates the measure held at the moment of switch commutation.

4.14 Leak Test

It is possible to perform a leak test of pressure (only in models with pressure sensors).
MicroCal 20 carries out 4 different pressure readings at settable interval times (T1..T4). At the end, the difference between the last and the first readings, with the aim of giving a leak measure.
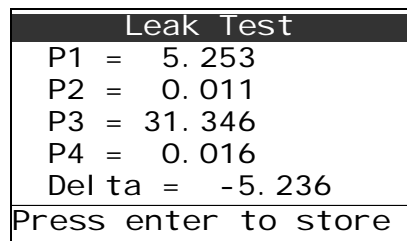
- Press [**MENU**], the following page is shown:

```
       MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select "**Auxiliary**"

```
     Auxiliary
 Trx
 Graph
 Switch Test
 Leak Test
 Math            ↓
Press <➡> to SET
```
Select "**Leak Test**"

```
     Leak Test
 OnOff [off]
 Channel  [Pe]
 T1 [10]
 T2 [60]
 T3 [60]         ↓
Press <➡> to SET
```
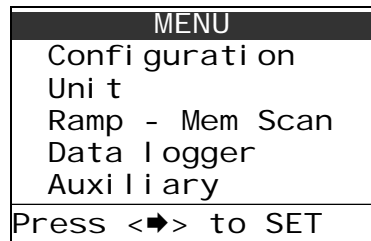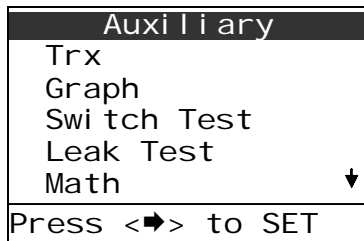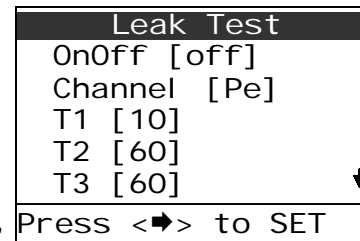
- **OnOff**: starti/ends the test
- **Channel**: specify where to perform the test
- **T1..T4**: interval times (in sec.) between the readings

```
      Leak Test
 P1 =   5.253
 P2 =   0.011
 P3 = 31.346
 P4 =   0.016
 Delta =  -5.236
Press enter to store
```

- Press [**MENU**] to store the results of the test in a log file.

4.14.1 Leak Test: file

Results of leak test can be stored in a text file with progressive numeration: "Leak test N.txt", where N is the number of files.
This file is stored in the instrument memory in the "log" folder accessible with Utilities Manager. See chap. 6.

This txt file has a structure like that in the picture:

4.15 Alarms

It is possible to enable or disable alarm's thresholds initially set up by the firm (system alarms) or set custom alarm definable by the user.
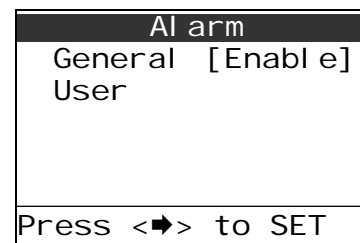


```
📄 leak test 1.txt - Blocco note    _ □ ×
 File  Modifica  Cerca  ?
T1 =   10    P1 =  -0.012
T2 =   60    P2 =  -0.012
T3 =   60    P3 =  -0.005
T4 = 120    P4 =  -0.012
Delta =    0.000
```

- Press [**MENU**], the following page is shown:

```
       MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select "**Auxiliary**"

```
     Auxiliary
 Graph
 Switch Test
 Leak Test
 Math
 Alarm
Press <➡> to SET
```
Select "**Alarm**"
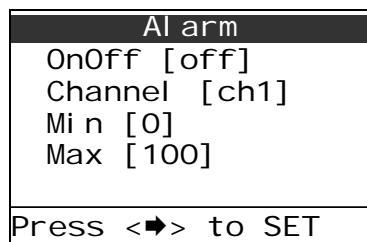
```
       Alarm
 General [Enable]
 User


Press <➡> to SET
```
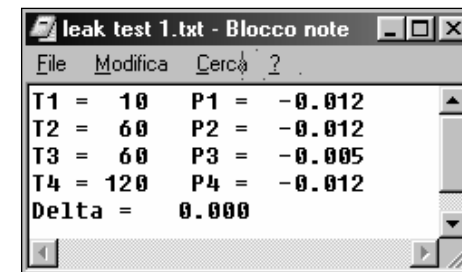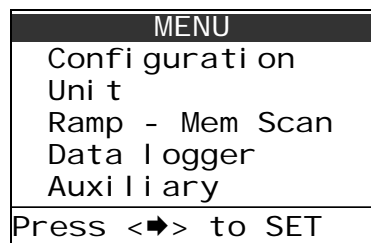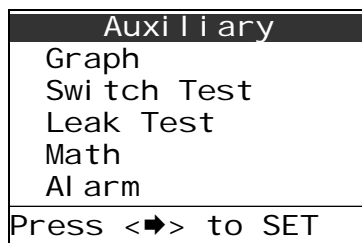
- Select **General** and then **Enable** or **Disable** the general system alarms

NOTE: WHEN YOU DISABLE THE ALARMS, AT NEXT TURNING ON THE SELECTION WILL BE LOSE AND ALARMS BECOME ACTIVE.
See par.10.1 about error messages.

- Select **User** to set alarms definable by the user:

```
       Alarm
 OnOff [off]
 Channel [ch1]
 Min [0]
 Max [100]

Press <➡> to SET
```

  - Set the channel where to have threshold alarms with Channel
  - Set Min and Max threshold
    NOTA: UNIT MEASURE IS REFERRED TO THE USED CHANNEL

- Enable the alarm with "**OnOff**"

NOTE: IN CASE OF THRESHOLD OVERCOMING, AN ACOUSTIC SIGNAL IS EMITTED UNTIL THE SIGNAL COMES BACK RETURN UNDER THRESHOLD OR THE ALARM IS DISABLED.

4.16   Switching on settings (Power On)

It is possible to set how the instrument turns on through the "**Power On**" function

- Press [**MENU**]

```
>       MENU        <
Configuration
Unit
Ramp - Mem scan
Data logger
Auxiliary
Press <➡> to SET
```
Select "**Configuration**"

```
      Configuration
Display
Power On [RestoreCh
Date/Time
Rejection [50 Hz]
Baud rate [9600]
Press <➡> to SET
```
Select "**Power On**"

```
>     Power On      <
Safe
Restore Ch
Restore val


Press <➡> to SET
```
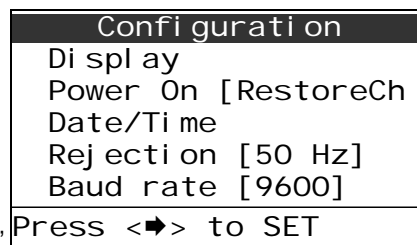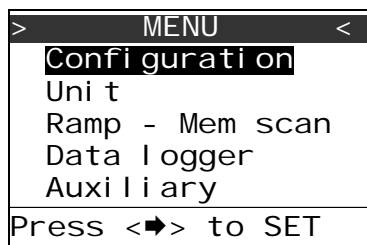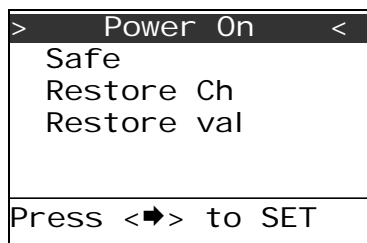
- **Safe**: Ch1 = voltage, Ch2 = off. This way avoids any risk of damage for the instrument

- **Restore Ch**: it restores the last channel settings

- **Restore val**: it restores the last channel settings and the channel 2 output value

5 SERIAL COMMUNICATION

5.1 RS232 communication port

MicroCal has a standard RS232 serial port for communicating with a PC.
Connect the serial cable BB530203 to the MicroCal 20 mini-din connector on the left side as in the figure below:

5.2 Baud Rate setting

To change the baud rate on the instrument, press the [**MENU**] key.

MENU	MENU	MENU
Configuration	Baud [9600]	9600
Unit	User [Advanced]	19200
Ramp	Date/Time	38400
Data logger	Display	57600
Auxiliary	Rejection [60 Hz]	115200
Press <Æ> to SET	Press <➡> to SET	Press <➡> to SET
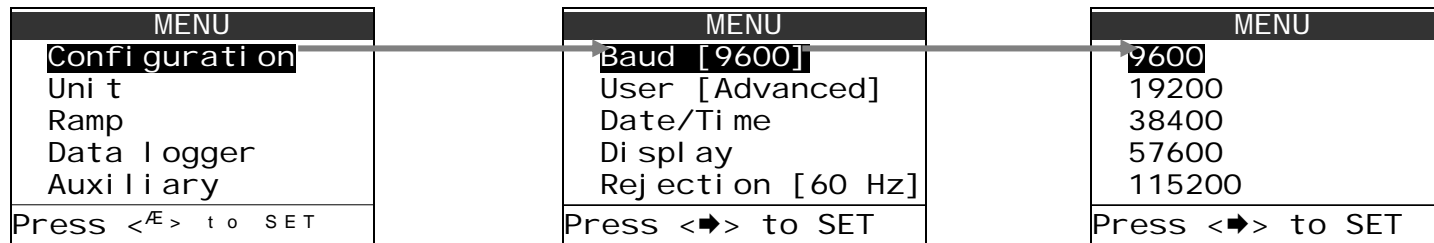
- Press the [⬆] and [⬇] keys to highlight the required baud rate value.

- Press the [➡] key to select the option. Press the [**ESC**] key to return in measure mode without changes.

5.2 Firmware upgrade : STFlash

The instrument has embedded in its memory a software (firmware) which is loaded at every turning on and which allows operating. This firmware can be changed and substituted; this guarantees a continuous upgrade of the instrument and the exploitation of its possibilities.
To upgrade the firmware, you need the **ST167Flash** program and a file with extension "HFW", which represents the firmware itself that has to be transferred to the instrument.

This software is compatible with all versions of Windows. The program needs the following minimum requirements of the Personal Computer:

- Pentium CPU with at least 16MB of RAM
- 20MB free space on hard-disc
- Monitor with resolution 800x600

- Microsoft mouse or compatible

To install the program, follow the procedure:
- Insert the CD-ROM
- From "Start" menu, select "Run…"
- Insert the filename "D:Setup.exe" (eventually, substitute the letter "D" with the proper ID of your CD-ROM drive)
- Follow the instructions showed on the screen by the installation program

After installing the program, run it from "Programs" menu:
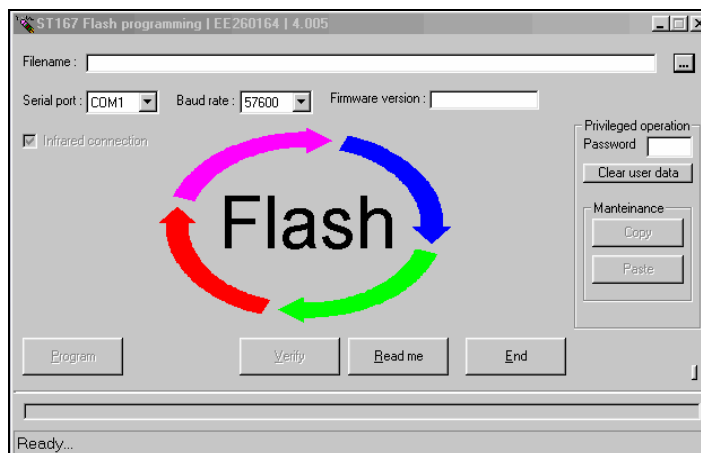
- Connect the instrument to PC through the serial communication cable (BB530203) and turn it on and enter the Firmware Upgrade mode by pressing [**MENU**]+[**ON**]
- Select the right COM port (**Serial port**)
- Select the same communication velocity (expressed in Baud) either on PC (**Baud rate**) and on the instrument

ATTENTION
SET THE SAME BAUD RATE EITHER ON **PC** AND THE INSTRUMENT, OTHERWISE NO COMMUNICATION HAPPENS. IN CASE OF COMMUNICATION PROBLEMS, TRY TO DECREASE THE BAUD RATE.

- Insert in the field "Filename" the position where the file with "HFW" extension is, it means the firmware that has to be transferred to the instrument.
- Press "Program" and wait the complete data transfer
- Press "END" to quit the program
NOTE: EVENTUALLY, PRESS "READ ME" TO READ AN HELP ONLINE.

ATTENTION
IN CASE OF FAILED PROCEDURE, TURN THE INSTRUMENT OFF BY PRESSING [**ON/OFF**] FOR ABOUT **10**SECS AND REPEAT THE OPERATION.

6 SOFTWARE

The **MicroCal 20** software package allows using the **MicroCal 20** at its best, using all its capabilities.
Three separate programs are available:

LinMan Software
Windows^{TM} software to setup the calibrator for special sensor linearization.
Two data input mode are available: a complete 2-dimension table (mV to °C, mA to mbar, ohm to °C, etc.) or RTD Pt100 polynomial coefficients.
This software allows you to insert the calibration corrections for your Pt100 working standards and minimize the errors in temperature measurements.

LogMan Software
WindowsTM software to download logged data from MicroCal internal memory to PC. Data can be saved on disks, loaded from disks, exported in Excel format file.

CalpMan 2000 software
Perform you test and calibration procedures by using a single database system for Standards, Tags, Procedures and Calibration data.
Both on-line and off-line procedures can be performed with CalpMan 2000 windows software and Microcal 20 series calibrators.

Off-line procedures
Prepare the calibration procedure on the PC with CalpMan 2000.
Upload one or more Tag calibration routines (test points, error band, etc.) from a PC to the internal memory of the instrument in order to automate in-field tests and calibrations.
Select the appropriate tag name using the keyboard of the calibrator, the calibrator will ask you step by step for all operation and test and calibration data ("As found" and "As left" values) can be memory stored.
Download your calibration data back to your PC. Print reports or export data.

On-line procedures
CalpMan 2000 calibration procedure manager is also designed to support all Eurotron portable calibrators.
It includes an instrumentation (Standards and Tags) database which makes it quick and easy to generate and manage calibration procedures, set and read data from Eurotron calibrators, store the data on a database and generate a calibration report.

NOTE**: FOR ON-LINE PROCEDURE, PLEASE REF. TO THE MM850290 CALPMAN 2000 INSTRUCTION MANUAL.**

6.1 MicroCal 20 DPC Utilities Manager

This software allows interfacing MicroCal with a PC through a serial cable (see ch.5)
From this software it is possible to run both **LogMan** and **LinMan**.

The software is Windows compatible. The program requires the following minimum configuration for your PC:
- Pentium CPU
- 20 Mbytes free space on hard disk
- Color monitor 800x600
- CD-ROM drive

- Microsoft mouse or a compatible one

In order to install the program, follow the below procedure:
- Insert the disk in a CD-ROM drive;
- From the Windows Start Menu, select **<RUN…>**;
- Enter the filename D:SETUP.EXE (eventually, substitute the letter "D" for the disk drive that contains disk)
- Follow the on screen instructions

Once installed, an icon appears in your Windows programs list.

- Connect the MicroCal to a PC through the serial cable

After executing the program, you can see a menu like that:
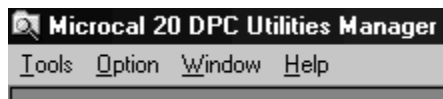
Firstly, set up the serial port properly through **Option** menu. Usually, on the back of PC, you can see COM1 and COM2 ports; be sure that the connection port is the same in the program.

ATTENTION
SET THE SAME COMMUNICATION RATE (IN BAUD) BOTH ON PC AND ON YOUR INSTRUMENT
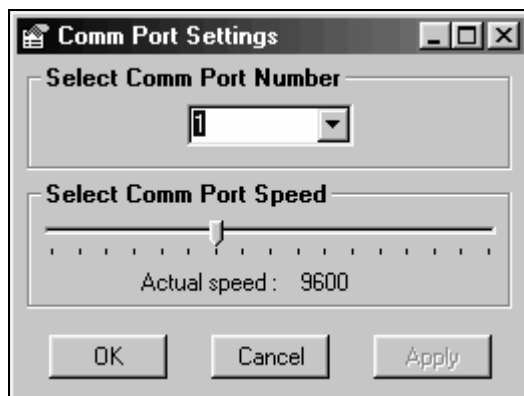
Always in Option menu it is eventually possible to set up the communication language.

Next paragraphs illustrate LogMan and LinMan softwares.

6.1.1 Data logger: data storing

This section of **Utilities Manager** allows downloading on PC data stored in the internal memory of your MicroCal.
First of all, you should have a data file realized with the instrument itself (Data Logging)

The calibrator can be programmed for memory store input channels measurements. Each measure is recorded complete of the current data and time.
The procedure uses channels configuration. Before run the procedure the channels to be logged have to be set.

- Press the [**MENU**] key. The following page is shown:
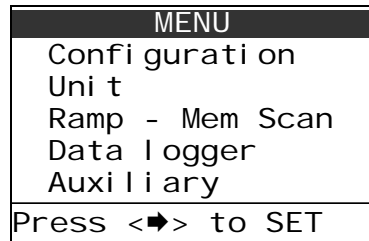
```
       MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select the "**Data logger**" option

```
      Data Logger
 On/Off
 Source
 Time
 Name [MyLog]

Press <➡> to SET
```

```
         Source
 Ch1
 Ch2
 Pl
 Ph
 Pe              ↓
Press <➡> to SET
```
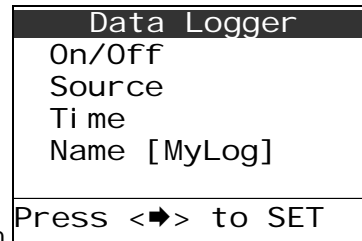
  - **On/Off**: RUN and STOP the logging
  - **Source**: Select the channels for recording. Available settings are: T+RH%+P, (only if optional environmental module is installed), PL+PH+Pe (if internal and/or external pressure sensor are installed), CH1+CH2.
  - **Time**: Data Acquisition interval (from 1 second to 60 minutes).
  - **Name**: File name. Use keypad to input the file name.
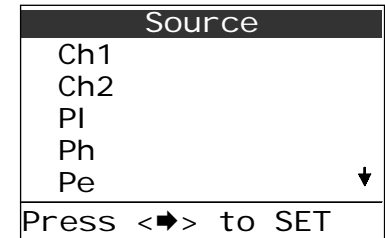
- Select the "**On/Off**" key to run the procedure. The display shows the following page:
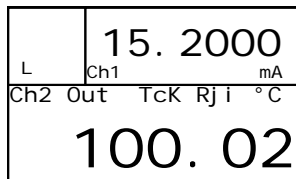
```
      15.2000
 L   Ch1          mA
 Ch2 Out  TcK Rji °C

      100.02
```
The symbol "**L**" on the message box is displayed if data logging is running.

- Return back to menu and in Data Logger item select newly "**On/Off**" to stop the procedure.

6.1.2 Data logger: data simulation (Replay)

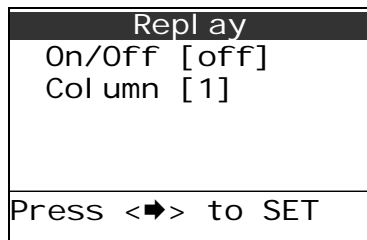Replay function allows recalling stored data in a log file.

- Press [**MENU**]:

```
       MENU
 Configuration
 Unit
 Ramp - Mem Scan
 Data logger
 Auxiliary
Press <➡> to SET
```
Select "**Data logger**"
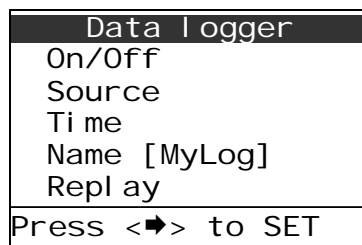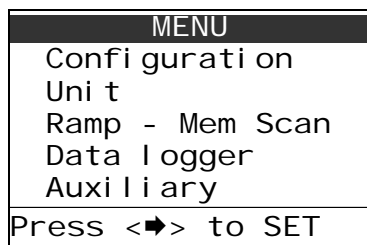
```
     Data logger
 On/Off
 Source
 Time
 Name [MyLog]
 Replay
Press <➡> to SET
```
select a desired log file specifying the **Name**

- Select **Replay**:

```
       Replay
 On/Off [off]
 Column [1]



Press <➡> to SET
```
select the proper number of column, it means the signal to simulate among those previously stored. Indeed, a log file is divided in many data columns depending on how many fields (Sources) are active during storing phase.

- Select the "**On/Off**" key to run the procedure

NOTE: SET CHANNEL 2 AS OUT IF YOU WANT TO GENERATE A SIGNAL

The display shows the following page:
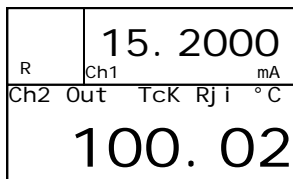
```
      15.2000
 R  Ch1         mA
Ch2 Out  TcK Rji °C

     100.02
```
The symbol "**R**" on the message box is displayed during the data Replay.

- Return to the menu, Data Logger / Replay and select newly "On/Off" to eventually end the procedure. Otherwise, the function stops after simulation of all data stored.

6.1.3   LogMan

NOW IT IS POSSIBLE TO MOVE TO SOFTWARE SECTION: RUN UTILITIES MANAGER

- Select **Help** menu and the **Enter registration code**
- Insert the code supplied with the software package

After the registration, the software is completely ready for use. Otherwise, it works just as a demo version and no data transfer is possible.
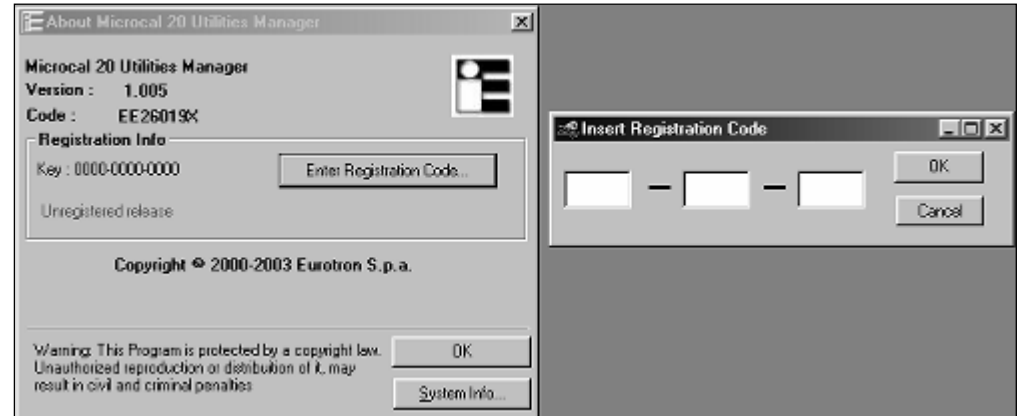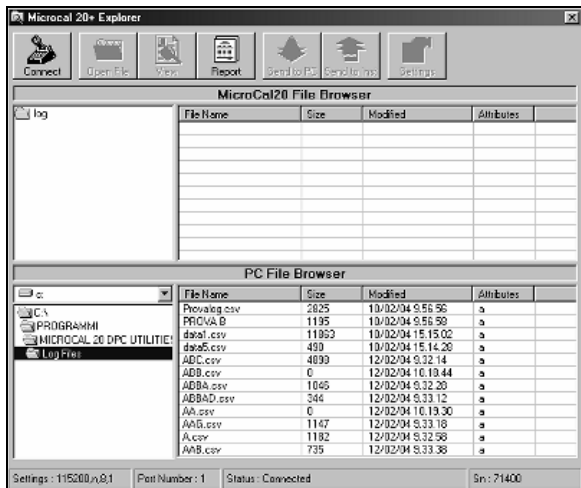
- Run **LogMan** from Tools menu:
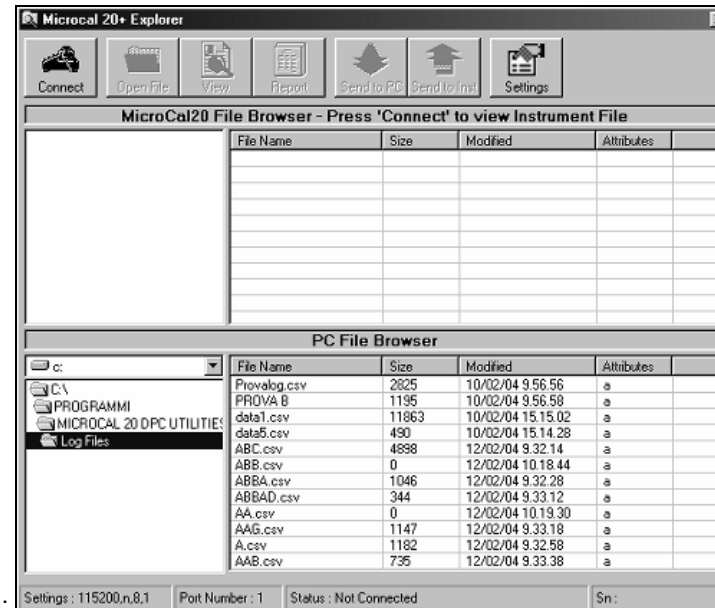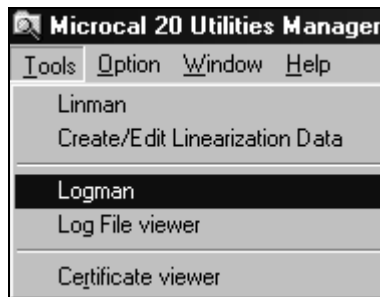
then an **Explorer** window appears:

- Be sure that the instrument is connected and switched on, press the button **Connect**

The figure shows the Explorer window after a connection

The window is a complete image of the content of the memory of instrument and PC.
In the upper side, you can see the browser for log files into MicroCal memory.
In the lower side is instead shown a browser for PC files. Because of choosing LogMan, the PC browser is automatically opened at "Log files" folder.

NOTE: EVEN FROM EXPLORER WINDOW IT IS POSSIBLE TO SET THE PARAMETERS FOR THE SERIAL PORT BY MEANS OF SETTINGS

BUTTON (THESE SETTINGS WILL BE JUST TEMPORARY)

To transfer files from the instrument to PC or vice versa, you have to select them (one or more at the same time) and

press the button which defines the direction for data transfer to PC Send to PC or to the instrument Send to Inst

After the data transfer, the files will appear in the related browser.

NOTE: IF IN THE OPTION MENU "SET DOUBLE CLICK FUNCTION" IS SET AS "TRANSFER SELECTED FILES", FOR DATA TRANSFER IT IS ENOUGH A SIMPLE DOUBLE CLICK

To show the content of a file, it is enough to select it and click on the **View** button. After a brief wait, due to data transfer, a window for the visualization is opened with the detail of the performed memorization.

NOTE: IF IN THE OPTION MENU "SET DOUBLE CLICK FUNCTION" IS SET AS "LAUNCH ASSOCIATED APPLICATION", TO SHOW THE FILE IT IS ENOUGH A SIMPLE DOUBLE CLICK

Log File: example of visualization

ATTENTION
THE VISUALIZATION OF THE FILENAME IN THE EXPLORER WINDOW DOES NOT IMPLY THAT DATA INSIDE THEM ARE TRANSFERRED TO PC.
**TO VISUALIZE THE CONTENT, YOU HAVE TO KEEP ACTIVE THE CONNECTION TO MICROCAL**


▪ To save a file, click on **Save** button and specify name and position of the file in Excel format ("xls" extenstion)
▪ To delete a file, either on PC or on the instrument, you have to select it and press "Canc" button on PC.

6.1.4 Certificates

Utilities Manager implements the feature of visualize calibration certificates of the instrument that are stored inside its memory.

• From Explorer window, press Report button
• A window appears that, usually, allows choosing between certificates related to electrical part and that one related to pressure components. After that, select the certificate you want to see and confirm with OK.
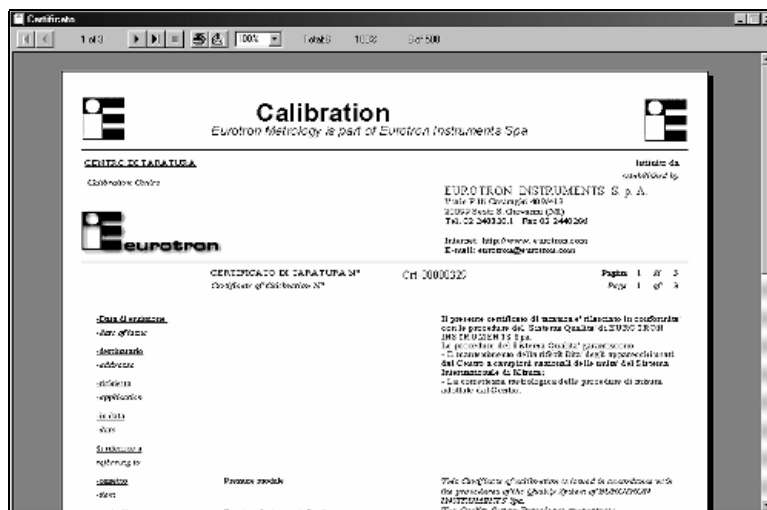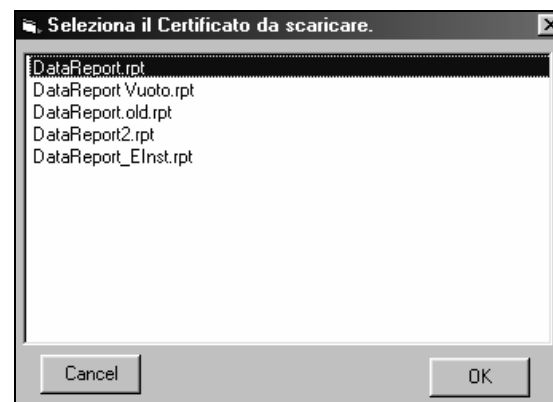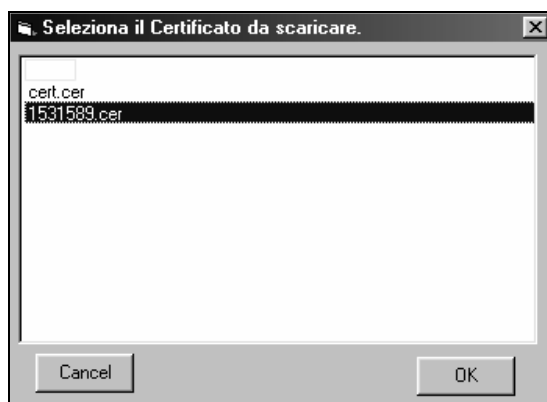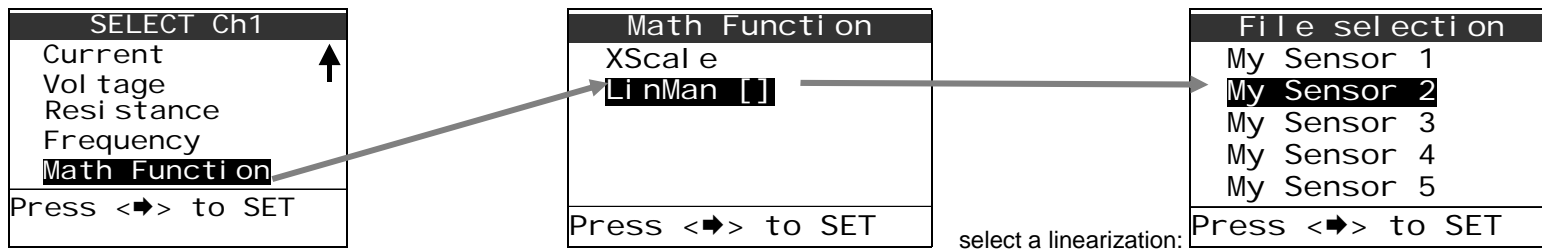
Certificates: example of visualization

- eventually press the button

- to export a certificate press . Then, select the proper format for export (Word, txt, etc…) and the destination

6.1.5   Linearization functions: LinMan

This section of Utilities Manager allows defining customized linearizations, it means defining new sensors types. To select the proper linearization, see par.4.1.8 about math functions:

```
┌─────────────────────┐      ┌─────────────────────┐      ┌─────────────────────┐
│     SELECT Ch1      │      │    Math Function    │      │    File selection   │
│ Current          ▲  │      │ XScale              │      │ My Sensor 1         │
│ Voltage             │      │ LinMan []           │      │ My Sensor 2         │
│ Resistance          │      │                     │      │ My Sensor 3         │
│ Frequency           │      │                     │      │ My Sensor 4         │
│ Math Function       │      │                     │      │ My Sensor 5         │
│ Press <➡> to SET    │      │ Press <➡> to SET    │      │ Press <➡> to SET    │
└─────────────────────┘      └─────────────────────┘      └─────────────────────┘
```

select a linearization:

By all means, before selecting a linearization on your instrument, you have to define it and transfer it in the instrument through LinMan: for that purpose, proceed as following.

- Run Utilities Manager and select "**Create/edit linearization data**" from **Tools** menu

A new window allows defining a new linearization, it means to set unit and input scale, output unit, decimals and function name.
A numeric table allows defining numeric values which permit to obtain the linearization function.
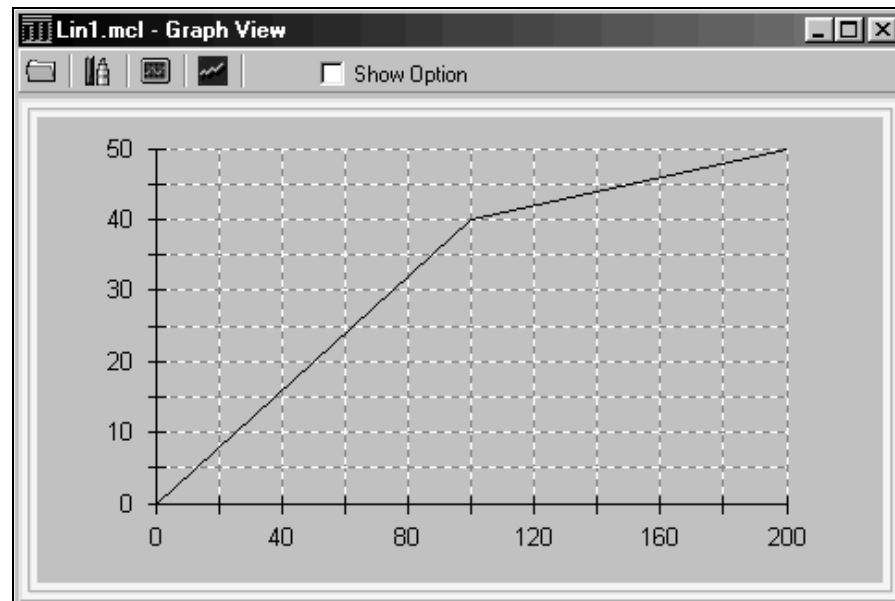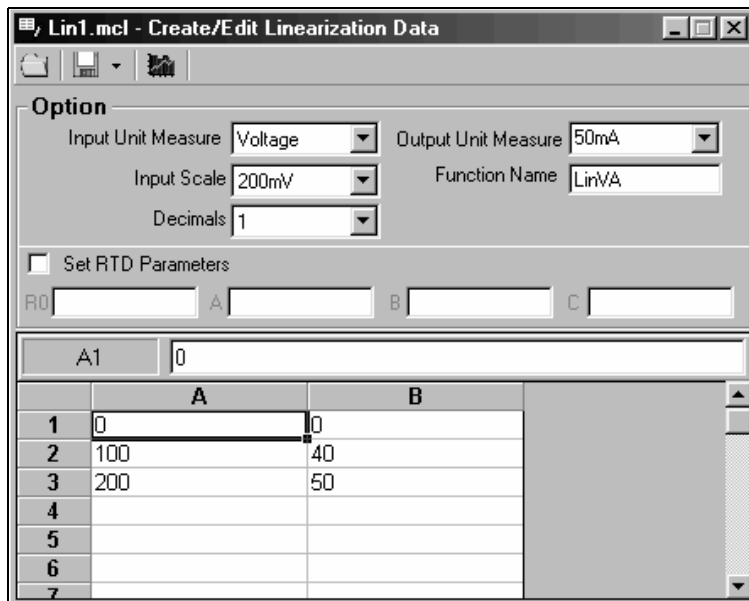
If you want to insert polynomial coefficients for a RTD, you have to select "**Set RTD parameters**" and insert proper numerical values.
Example: for a Pt100 in the range from 0°C to 850°C, the parameters are the following: R0=100 (resistance in ohm at 0°C), A=3.90802 $\cdot 10^{-3}$°C^{-1}, B=-5.802 $\cdot 10^{-7}$°C^{-2}, C=0

After defining linearization points, it is possible to show the related graphic through the icon [icon] or to save the related file ("mcl" extension) with [icon]. Besides, you can load a

linearization file for eventual changes with [icon].

To transfer a linearization file to the instrument, it must appear in the Lin folder. In order to do that it is possible just to drag and drop it or to click on the 3rd icon of Explorer "**Send file to instrument**" and select the proper file ("mcl").

- Run **LinMan** from **Tools** Menu:
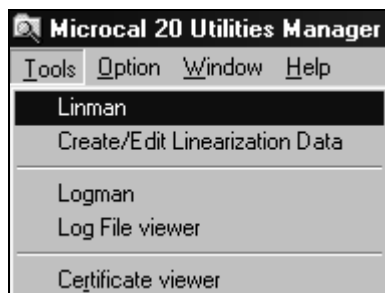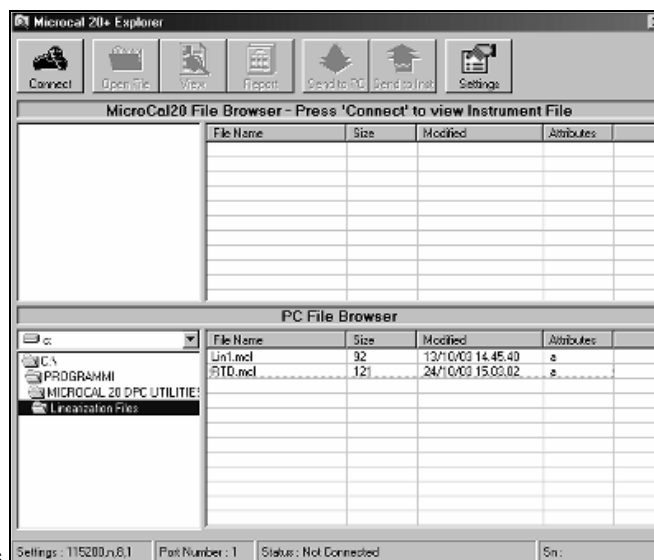
then an **Explorer** window appears

- Be sure that the instrument is connected and switched on, press the button **Connect** [Connect]

The figure shows the Explorer window after a connection

The window is a complete image of the content of the memory of instrument and PC.
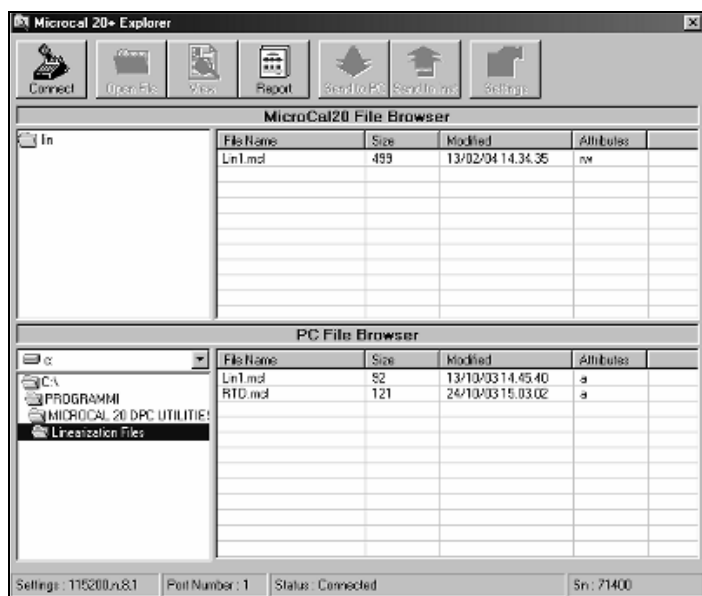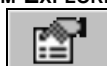In the upper side, you can see the browser for linearization files into MicroCal memory.
In the lower side is instead shown a browser for PC files. Because of choosing LinMan, the PC browser is automatically opened at "Linearization files" folder.

NOTE: EVEN FROM EXPLORER WINDOW IT IS POSSIBLE TO SET THE PARAMETERS FOR THE SERIAL PORT BY MEANS OF

SETTINGS BUTTON **(THESE SETTINGS WILL BE JUST TEMPORARY)**

To transfer files from the instrument to PC or vice versa, you have to select them (one or more at the same

time) and press the button which defines the direction for data transfer to PC or to the instrument

After the data transfer, the files will appear in the related browser.

NOTE: IF IN THE OPTION MENU "SET DOUBLE CLICK FUNCTION" IS SET AS "TRANSFER SELECTED FILES", FOR DATA TRANSFER IT IS ENOUGH A SIMPLE DOUBLE CLICK

To show the content of a file, it is enough to select it and click on the **View** button . After a brief wait, due to data transfer, a window for the visualization is opened with the detail of the performed memorization.

NOTE: IF IN THE OPTION MENU "SET DOUBLE CLICK FUNCTION" IS SET AS "LAUNCH ASSOCIATED APPLICATION", TO SHOW THE FILE IT IS ENOUGH A SIMPLE DOUBLE CLICK

NOTE: NOW IT IS POSSIBLE TO USE THE LINEARIZATION FROM "MATH FUNCTION", AS SEEN ABOVE.

6.2   CalpMan 2000: Off-Line procedures

Standard Agencies and Quality Auditors require the collection, organization and analysis of traceability documents. **CalpMan** is able to transfer a selection of calibration routines from a PC to the internal memory of the instrument in order to simplify field calibrations selecting the suitable tag number.
When a plant has a large number of process instruments, checks and field calibrations are really important in order to keep the compliance with ISO 9000 requirements.
MicroCal with CalpMan can be used as a traditional calibrator in order to check an instrument under test. In this case, we conventionally speak of procedure on-line, as the connection between calibrator, instrument and PC is still active. For the definition of the procedure and about the software, see the CalpMan 2000 manual.

However, MicroCal 20 allows storing inside itself all parameters needed for calibration procedures: in this case, we speak about off-line procedures as the MicroCal is disconnected from PC and it can be moved on the field to perform the required procedures. About procedures off-line, see the following chapter. Anyway, the CalpMan2000 manual is still useful for the definition of the procedure.

6.2.1 Transfer calibration parameters

Use CalpMan 2000 to define the calibration procedure: there is no differences between the definition of a calibration procedure on-line and off-line. Follow the instructions shipped with the software.

ATTENTION
AS A PROCEDURE IS TRANSFERRED ON THE CALIBRATOR, PAY ATTENTION TO THE DEFINITION OF COM PORTS FOR ACTUAL AND REFERENCE VALUES.

- Select a proper Tag from CalpMan, like the example:

To transfer data on the calibrator, you need an **Upload** of information. Hence, be sure that the instrument is switched on and properly connected to PC through serial port.

- Select "**Upload**" through "**Offline**" button and wait for data transfer

Eventually, even from Offline button, it is possible to set the serial port parameters from **Options**. When necessary, select the options "Delete measure after download" or "Delete all measure before upload"
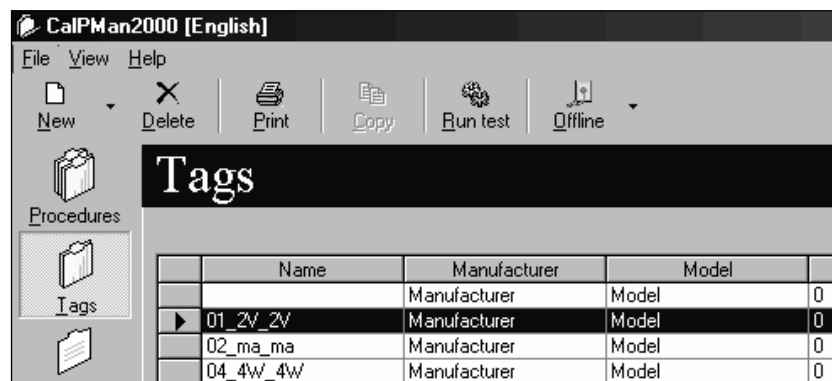
Delete All Measure after DownLoad
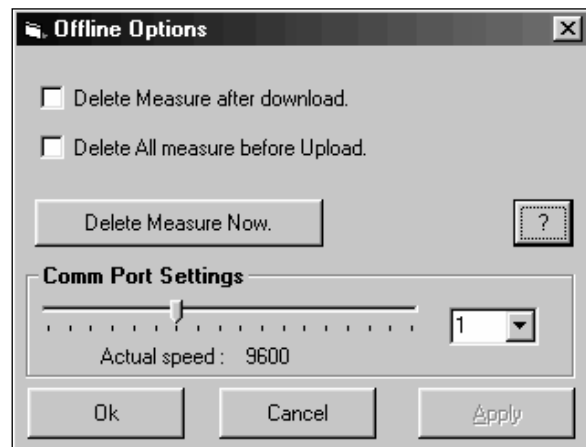
Select this option to delete, from the calibrator memory, all Tags' calibration results after the data transfer in the CalpMan 2000 data base.
The previous saved procedures will remain in the Calibrator memory.

Delete All Measure before UpLoad
Select this option to delete, from the calibrator memory ALL OFF-LINE data. Deleted data include: Tag calibration results "as found" + "as left", Tag definition, and Calibration procedures.

Delete Procedure Memory
Press this key to delete, from the calibrator memory ALL OFF-LINE data. Deleted data include: Tag calibration results "as found" + "as left", Tag definition, and Calibration procedures

NOTE: AFTER UPLOADING DATA OF A CALIBRATION PROCEDURE, IT IS POSSIBLE TO FIND RELATED FILES IN "PROC" FOLDER FROM AN EXPLORER WINDOW OF UTILITIES MANAGER. (SEE PAR.6.1)

7 CALIBRATION PROCEDURES

Eurotron with **CalpMan**, coupled with the powerful **MicroCal 20** calibrator, grants the possibility to keep these instruments under control.
The calibration data for the required instruments can be stored into the **MicroCal 20** memory following the instructions detailed in this manual.
The data of each calibration procedure can be stored together with the name of the TAG, with engineering units, process info, calibration points and a two allowed levels of error.
The calibrator can be used as a generator or as a recorder or both; its input and output terminals can be used to generate, receive and compare info.
After the calibration check, **MicroCal 20** will indicate if the checked instrument is within its specifications or if it has to be verified; and a decision can be made by the plant technicians.
The status of every instrument before and after its calibration can be recorded and recalled later.
Benefits to be gained from this system are:

- Optimization of the Maintenance period. By keeping a record of the time required between necessary adjustments, the optimum maintenance period can be determined.
- Print of the Report of Calibration. A calibration report can be printed for each TAG.
- Aid in maintenance planning. Data can be used to analyze the time and cost required for instrument calibrations and can aid in planning manpower, specifying supplier, etc.

Test and calibration data can be memory stored and downloaded to a PC to document the calibration activity that allows building a quality control chart/data bank from a single calibration sheet to a detailed historical report.
Each instrument, called "Tag", to be calibrated/inspected is identified by 16 alphanumeric characters.
Three additional lines of 16 characters are available for a more detailed description of the instrument to be calibrated. A typical example is shown below:

```
Tag                      = Pressure Trx 128
Auxiliary information     = High temp trap
                            Area n.21T68
                            Stafford Station
```

The overall capabilities of the combination between **MicroCal 20** + **CalpMan** software are the following :

- **MicroCal 20** can store up to 100 Tags

- Each Tag can be tested in different calibration steps (**T**est **P**oint)

- Each Tag can be identified with an alphanumeric code of 16 characters

- Plant location/Plant section can be identified with three additional lines, everyone of 16 alphanumeric characters

- The Operator/Inspector's name can be written with up to 16 alphanumeric characters

- The Test procedure can be prepared in a PC and downloaded into a **MicroCal 20** when required

- The Test procedure can be eventually directly loaded on the field and downloaded into the PC

- Direct test of analog / digital signal and pressure indicators

- Direct test of Signal and Pressure Transmitters with comparison between input and electrical signal output
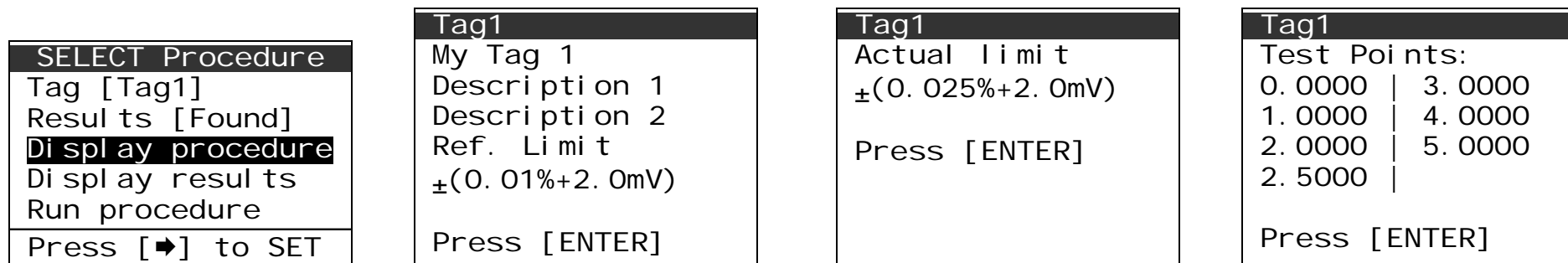
- Direct test of Pressure Transmitters at actual programmed test points or with an automatic calculation of actual errors with inlet pressure in an acceptable deviation band from the Test Point level.

NOTE
PARAMETERS OF AN OFF-LINE PROCEDURE MUST BE FIRSTLY TRANSFERRED ON THE MICROCAL: SEE PAR.6.2

- Press [**CAL PROC**] and select the proper Tag from Tag item (in this example, the file is associated to the procedure is "Tag1")

```
 SELECT Procedure
Tag   []
Results [Found]
Display procedure
Display results
Run procedure
Press [➡] to SET
```

```
    Tag Selection
Tag1
Tag 2
Tag 3


Press [➡] to SET
```

```
 SELECT Procedure
Tag [Tag1]
Results [Found]
Display procedure
Display results
Run procedure
Press [➡] to SET
```

- Once loaded data calibration, it is possible to check them selecting "**Display procedure**". One or more pages appear, interchangeable by pressing [**ENTER**]:

```
 SELECT Procedure
Tag [Tag1]
Results [Found]
Display procedure
Display results
Run procedure
Press [➡] to SET
```

```
Tag1
My Tag 1
Description 1
Description 2
Ref. Limit
±(0.01%+2.0mV)

Press [ENTER]
```

```
Tag1
Actual limit
±(0.025%+2.0mV)

Press [ENTER]
```

```
Tag1
Test Points:
0.0000 | 3.0000
1.0000 | 4.0000
2.0000 | 5.0000
2.5000 |

Press [ENTER]
```

Even from "Select procedure", it is possible to set the procedure as "**As found**" or "**As Left**", it means to state whether the instrument is as found or as left after a calibration

```
      Result
 Found
 Left



 Press [➡] to SET
```

- Now it is possible to run the procedure by pressing "**Run procedure**" and to wait for its completion:

```
OFF_VtoV        1/1
 Ref:5.0000V+0.0125
 Ref:Out +5.0000 V
 Act:In  +5.0002 V
 Limit:   +0.0035
 Error:   +0.0002
 Procedure complete
 Press [ENTER]
```
When the Reference and/or the Actual values are out of limits, the correspondent values will be in reverse mode.

Eventually, abort the procedure by pressing [**ESC**] key. A confirmation message will be shown on display.

- Finally, press [**ENTER**] as required at the end of the procedure. The calibrator returns to the measuring mode.

- Returning to procedure menu by pressing [**CAL PROC**] and selecting "Display results", it is possible to check step by step the results of the calibration (press [**ENTER**] to change the results pages).

```
 SELECT Procedure
 Tag [Tag1]
 Results [Found]
 Display procedure
 Display results
 Run procedure
 Press [➡] to SET
```

8 APPLICATIONS

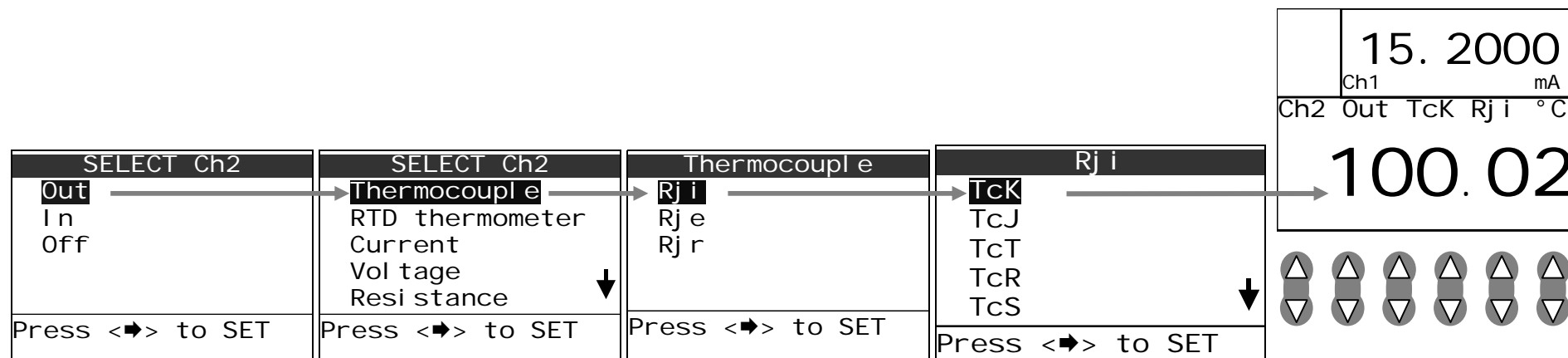## 8.1 Calibrating a temperature indicator
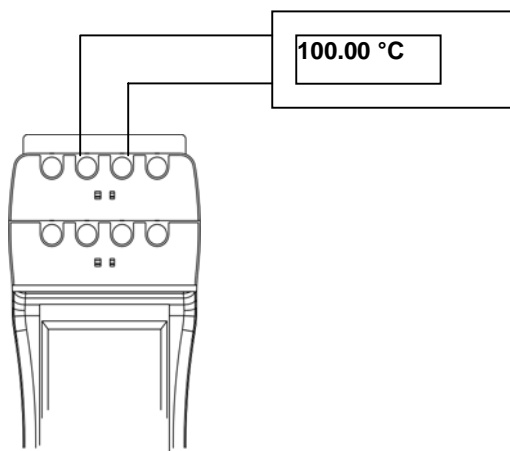
The following procedures will be used to test and calibrate temperature indicators.

100.00 °C

- Switch the calibrator ON
- Connect the instruments as in figure.
- Set the CH2 in output mode and configure it for the desired TC or RTD type (e.g. TC type K).

To configure the channel, proceed as follows:

Press the [**SELECT**] key until "**Select Ch2**" is shown.

```
        15. 2000
Ch1                    mA
Ch2 Out TcK Rji    ° C

        100. 02
```

SELECT Ch2	SELECT Ch2	Thermocouple	Rji
Out	Thermocouple	Rji	TcK
In	RTD thermometer	Rje	TcJ
Off	Current	Rjr	TcT
	Voltage		TcR
	Resistance ↓		TcS ↓
Press <➡> to SET	Press <➡> to SET	Press <➡> to SET	Press <➡> to SET

Change the output value by using the 6 [$\triangle\triangledown$] keys (You can also use the calculator mode to insert the value).

8.2   Calibrating a TC temperature transmitter

Tc to 4-20mA Transmitter

OUT

IN

CH2 - OUT

CH1 - IN
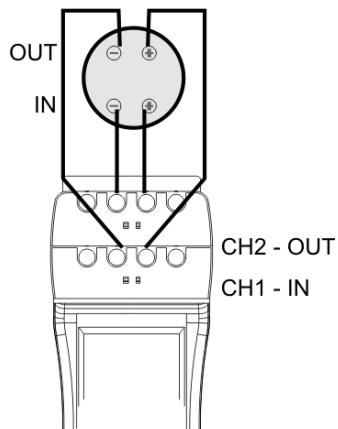
The following procedures will be used to calibrate and test temperature to mA transmitter.

EXAMPLE: Transmitter has a TC type K input; 2-wire 4/20 mA output on 0 to 600°C

Switch the calibrator ON

Connect the instruments as in figure (the calibrator will supply the transmitter).

Set the CH2 in output mode and configure it for TC type K with internal Rj compensation.

```
    SELECT Ch2           SELECT Ch2          Thermocouple             Rji
 Out               Thermocouple          Rji               TcK
 In                RTD thermometer       Rje               TcJ
 Off               Current               Rjr               TcT
                   Voltage                                 TcR
                   Resistance                              TcS
Press <➡> to SET  Press <➡> to SET    Press <➡> to SET   Press <➡> to SET
```

```
 15. 2000
Ch1              mA
Ch2 Out TcK Rji  °C

 100.02
```

Configure one of the available XScale memory (e.g. X1) for: 4-20mA input and 0 to 600°C display.

```
    MENU               Unit               XScale                X1
 Configuration     Temperature          X1                Unit [°C]
 Unit              Pressure [mbar]      X2                Source [50 mA]
 Ramp              Xscale               X3                In Low [4.000]
 Data logger                            X4                In High [20.000]
 Auxiliary                                                X Low [0.0]
Press <➡> to SET  Press <➡> to SET    Press <➡> to SET   Press <➡> to SET
```

Select "**Unit**" parameter and change the engineering unit to "°C"

Select "**Source**" parameter and change it to "50 mA" F.S. input.

Select "**In Low**" parameter and change it to "4" mA input.

Select "**In High**" parameter and change it to "20" mA input.

Select "**X Low**" parameter and change it to "0" °C display @ 4mA.

Select "**X High**" parameter and change it to "600" °C display @ 20mA.

Select "**Function**" parameter and change it to "linear".

Select "**Decimal**" parameter and change it to "2" decimal digits.

Set the CH1 in input mode and configure it as XScale (e.g. X1).
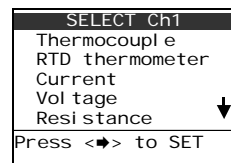
```
   SELECT Ch1
 Thermocouple
 RTD thermometer
 Current
 Voltage
 Resistance          ↓
Press <➡> to SET
```
press the [↓] key until the "**Math Function**" option is highlighted:

```
      100. 13
Ch1  X1          ° C
Ch2 Out TcK Rji  ° C

      100. 00
```

```
   SELECT Ch1
 Current            ↑
 Voltage
 Resistance
 Frequency
 Math Function
Press <➡> to SET
```
```
  Math Function
 XScale
 LinMan [ ]



Press <➡> to SET
```
```
  Math Function
 X1
 X2
 X3
 X4

Press <➡> to SET
```
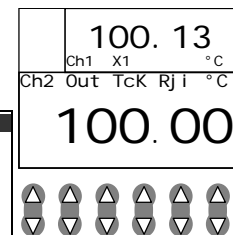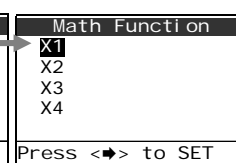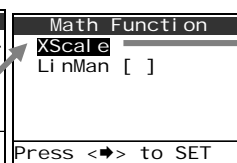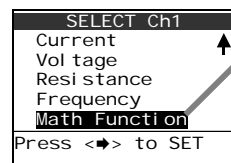
Change the output value by using the 6 [Δ∇] keys (You can also use the calculator mode to insert the value).

Read on the upper display the transmitter output.

8.3   Calibrating a pressure transmitter
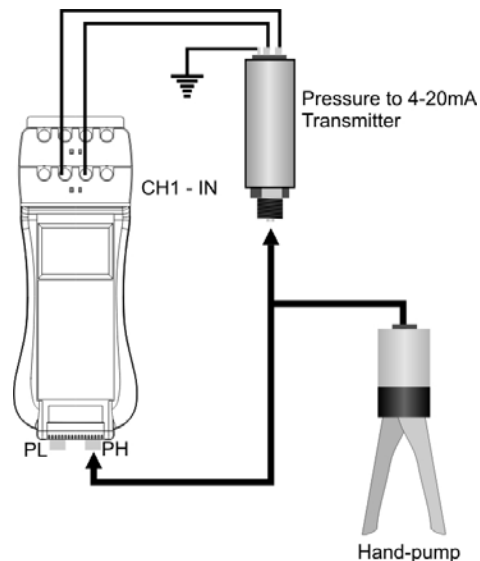
The following procedure is used to test and to calibrate a pressure transmitter 4-20mA

EXAMPLE:

- Connect the instrument like in the figure beside. In this case, the calibrator powers the transmitter, then connect the input channel (1 or 2) as passive loop.

Set one of the available Xscale memories (e.g. X1) for 4-20mA input and a proper pressure range

```
     MENU              Unit                XScale
Configuration     Temperature          X1
Unit              Pressure [mbar]       X2
Ramp              Xscale                X3
Data logger                            X4
Auxiliary
Press <➡> to SET  Press <➡> to SET    Press <➡> to SET
```
then set the parameters of scaling:

```
     X1                X1
Unit [mbar]       In High [20]
Source [50 mA]    Disp Low [0]
In Low [4]        Disp High [100]
In High [20]      Function [linear]
Disp Low [0]      Decimals [2]
Press <➡> to SET  Press <➡> to SET
```
in this case: a pressure value of 0-100mbar corresponds to a linear function in 4-20mA and 2 decimal digits (see par. 4.3)

- Select CH1 or CH2 as input and set it as Xscale (e.g. X1)

```
  SELECT Ch1                          SELECT Ch1         Math Function       Math Function
Thermocouple                        Current           XScale              X1
RTD thermometer                     Voltage           LinMan [ ]          X2
Current                             Resistance                            X3
Voltage                             Frequency                             X4
Resistance                          Math Function
Press <➡> to SET   press [⬇] to select "Math Function":   Press <➡> to SET  Press <➡> to SET   Press <➡> to SET
```

NOTE: AFTER PROPERLY VISUALIZING THE INPUTS ON THE DISPLAY, ZERO THE MEASURE OF PRESSURE (SEE PAR. 3.10).

At this moment, the system is properly set for a calibration procedure.

REMARK: AS THE AIM OF A CALIBRATION PROCEDURE IS THAT ONE TO CHECK AN ERROR, WE SUGGEST SETTING THE DISPLAY IN ORDER TO SHOW OF BOTH CHANNELS AND THE DIFFERENCE BETWEEN THEM, WHICH GIVES US STRAIGHTFORWARDLY AN ERROR VALUE.

8.4   RTDs certifications

Channel 2 on **MicroCal 20 XP** and **MicroCal T20** models only can be set to measure mode. This option allows using the instrument as a 2 channels high accuracy thermometer.
The most important application is to compare one Working Standard with the TC or RTD element using one only instrument. Use the **MicroCal T** series dry-block temperature calibrator to generate the temperature.
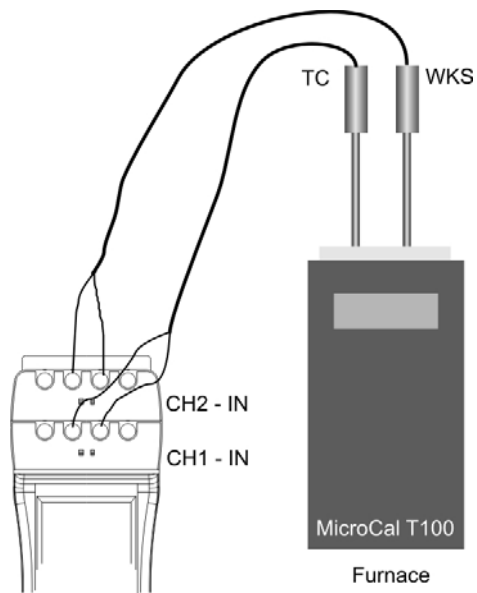
The following procedure is used to certify a RTD

- Connect the instruments like in the figure beside, properly setting the inputs in relation to the RTD or Tc used (see par.4.1.1, 4.1.2, 4.1.3).

Verify calibration points setting the temperatures on a furnace (wait about 10/15 minutes to stabilize each point) and check for eventual errors.

NOTE: if you have the linearization file of a RTD, set the corresponding channel with the proper file (see par.4.1.8), and then proceed to the certification (see par. 6.1.1).

REMARK: AS THE AIM OF A CALIBRATION PROCEDURE IS THAT ONE TO CHECK AN ERROR, WE SUGGEST SETTING THE DISPLAY IN ORDER TO SHOW OF BOTH CHANNELS AND THE DIFFERENCE BETWEEN THEM, WHICH GIVES US STRAIGHTFORWARDLY AN ERROR VALUE.

9   FLOW-CHARTS

9.1   Menu key

Press the [**MENU**] key.
(use the [⬆] and [⬇] keys to move the cursor vertically. Press the [➡] key to enter in the highlighted option. Press the [**ESC**] key to return in measuring mode)

[⬇] **Configuration** [➡]
    [⬇] **Display** [➡]
        [⬇] **Light** [Auto, On, Off]
        [⬇] **Difference** [➡]
            [⬇] **Upper** [Ch1, Ch2, ChP]
            [⬇] **Lower** [Ch1, Ch2, ChP]
        [⬇] **Rotate** [Normal, Rotate]
    [⬇] **Power On** [➡]
        [⬇] Safe
        [⬇] Restore Ch
        [⬇] Restore val
    [⬇] **Date/Time** [DD/MM/YY] [hh:mm]
        [⬇] **Date** [➡] (set the system date)
            [⬇] **DD**
            [⬇] **MM**
            [⬇] **YY**
            [⬇] **Format** [Euro, USA]
        [⬇] **Time** [➡]
            [⬇] **12H** [➡]
                [⬇] **am/pm** [am, pm]
                [⬇] **HH**
                [⬇] **MM**
            [⬇] **24H** [➡]
                [⬇] **HH**
                [⬇] **MM**
    [⬇] **Rejection** [50 Hz, 60 Hz]
    [⬇] **Baud Rate** (baud rate for RS232) [9600, 19200, 38400, 57600, 115200]
    [⬇] **User** (user level) [Advanced, Standard, Lock standard, Factory]

[⬇] **Unit**
    [⬇] **Temperature** [➡]
        [⬇] **Unit** [°C, °F, K]

        [⬇] **Rj Ch1 ext** [0.00]
        [⬇] **Rj Ch2 ext** [0.00]
        [⬇] **Scale** [IPTS 68, ITS 90]
[⬇] **Pressure** [mbar, bar, Pa, hPa, kPa, MPa, kg/cm^2, kg/m^2, mmHg, cmHg, mHg, mmH20, cmH2O, mH2O, atm, psi, psf, inHg, inH2O, inH2O4, ftH2O, ftH2O4]
[⬇] **XScale** [➡]
    [⬇] **X1** [➡]
        [⬇] **Unit** [5chars max]
        [⬇] **Source** [200mV, 2V, 20V, 50mA]
        [⬇] **In Low** [0.00]
        [⬇] **In High** [0.00]
        [⬇] **Disp Low** [0]
        [⬇] **Disp High** [100]
        [⬇] **Function** [Linear, Square, sqrt, log]
        [⬇] **Decimals** [0, 1, 2, 3, 4]
    [⬇] **X2** [➡]
        [⬇] **Unit** [5chars max]
        [⬇] **Source** [200mV, 2V, 20V, 50mA]
        [⬇] **In Low** [0.00]
        [⬇] **In High** [0.00]
        [⬇] **Disp Low** [0]
        [⬇] **Disp High** [100]
        [⬇] **Function** [Linear, Square, sqrt, log]
        [⬇] **Decimals** [0, 1, 2, 3, 4]
    [⬇] **X3** [➡]
        [⬇] **Unit** [5chars max]
        [⬇] **Source** [200mV, 2V, 20V, 50mA]
        [⬇] **In Low** [0.00]
        [⬇] **In High** [0.00]
        [⬇] **Disp Low** [0]
        [⬇] **Disp High** [100]
        [⬇] **Function** [Linear, Square, sqrt, log]
        [⬇] **Decimals** [0, 1, 2, 3, 4]
    [⬇] **X4** [➡]
        [⬇] **Unit** [5chars max]

[⬇] **Source** [200mV, 2V, 20V, 50mA]
[⬇] **In Low** [0.00]
[⬇] **In High** [0.00]
[⬇] **Disp Low** [0]

[⬇] **Disp High** [100]
[⬇] **Function** [Linear, Square, sqrt, log]
[⬇] **Decimals** [0, 1, 2, 3, 4]

[⬇] **Ramp- Mem Scan** [➡]
    [⬇] **Ramp** [➡]
        [⬇] **OnOff**
        [⬇] **N. cycles** [0 .. 100] (0= continuous)
        [⬇] **From** [0.00]
        [⬇] **To** [0]
        [⬇] **Step** [0]
        [⬇] **T up** [10]
        [⬇] **T soak up** [0]
        [⬇] **T down** [0]
        [⬇] **T soak down** [0.00]
    [⬇] **Mem Scan** [➡]
        [⬇] **OnOff**
        [⬇] **From** [1..9]
        [⬇] **To** [1..9]
        [⬇] **Time** [0]
        [⬇] **Mode** [AUTO, MAN]
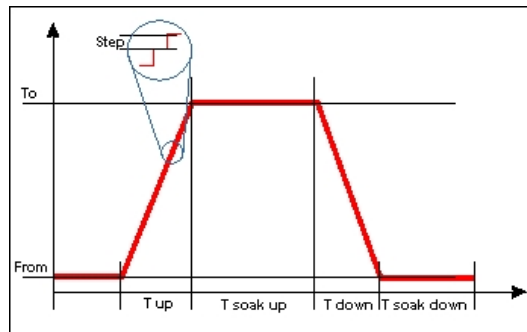
[⬇] **Data logger** [➡]
    [⬇] **OnOff**
    [⬇] **Source** [T+RH+P, P1+P2+PE, Ch1+Ch2]
    [⬇] **Time** [0.00]
    [⬇] **Name** [file name]

[⬇] **Auxiliary** [➡]
    [⬇] **Trx** [➡]
        [⬇] **OnOff**
        [⬇] **Source** [Ch1, P1, P2, PE, PA, RH%, T]
        [⬇] **In values** [➡]
            [⬇] **Low** [0.00]
            [⬇] **High** [0.00]
        [⬇] **Out values** [➡]
            [⬇] **Low** [0.00]
            [⬇] **High** [0.00]
            [⬇] **Fail** [0.00]
        [⬇] **Function** [linear, square, sqrt, log]
        [⬇] **In error** [out=L/H, error]

        [⬇] **Sampling time** [10, 1, 0.1] sec
    [⬇] **Graph** [➡]
        [⬇] **Source** [Ch1, Ch2, ChP]
        [⬇] **In Low** [0.00]
        [⬇] **In High** [0.00]
        [⬇] **Time** [➡]
            [⬇] **Min** [00]
            [⬇] **Sec** [00]
    [⬇] **Switch Test** [➡]
        [⬇] **Pressure** [Pl, Ph, Pe]
        [⬇] **Temperature** [Ch1]
    [⬇] **Leak Test** [➡]
        [⬇] **OnOff**
        [⬇] **Channel**
        [⬇] **T1**
        [⬇] **T2**
        [⬇] **T3**
        [⬇] **T4**
    [⬇] **Math** [➡]

[⬇] **List**
[⬇] **Define**
[⬇] **Alarm[➡]**
    [⬇] **General** [Enable, Disable]
    [⬇] **User**

[⬇] **OnOff**
[⬇] **Channel** [Ch1, Ch2, Pl, Ph, Pe, RH%, T]
[⬇] **Min**
[⬇] **Max**

9.2   Select key

Press the [**SELECT**] key until the channel to be programmed is displayed.
(use the [⬆] and [⬇] keys to move the cursor vertically. Press the [➡] key to enter in the highlighted option. Press the [**ESC**] key to return in measuring mode)

9.2.1   Settings Channel 1

[⬇] **Thermocouple**[➡]
    [⬇] **Rji**[➡]
        [⬇] **TcK**
        [⬇] **TcJ**
        [⬇] **TcT**
        [⬇] **TcR**
        [⬇] **….**
    [⬇] **Rje**[➡]
        [⬇] **TcK**
        [⬇] **TcJ**
        [⬇] **TcT**
        [⬇] **TcR**
        [⬇] **….**
    [⬇] **Rjr**[➡]
        [⬇] **TcK**
        [⬇] **TcJ**
        [⬇] **TcT**
        [⬇] **TcR**
        [⬇] **….**

[⬇] **RTD thermometer**[➡]
    3wire
        [⬇] **Pt100 IEC**
        [⬇] **Pt200 IEC**
        [⬇] **Pt500 IEC**
        [⬇] **Pt1000 IEC**
        [⬇] **Pt100 OIML**
        [⬇] **Pt1000 OIML**
        [⬇] **Pt100 USLAB**
        [⬇] **Pt100 US**
        [⬇] **Pt100 SAMA**

[⬇] **Pt100 JIS**
[⬇] **Cu10**
[⬇] **Cu100**
[⬇] **Ni100**
[⬇] **Ni120**
[⬇] **4wire**
    [⬇] **Pt100 IEC**
    [⬇] **Pt200 IEC**
    [⬇] **Pt500 IEC**
    [⬇] **Pt1000 IEC**
    [⬇] **Pt100 OIML**
    [⬇] **Pt1000 OIML**
    [⬇] **Pt100 USLAB**
    [⬇] **Pt100 US**
    [⬇] **Pt100 SAMA**
    [⬇] **Pt100 JIS**
    [⬇] **Cu10**
    [⬇] **Cu100**
    [⬇] **Ni100**
    [⬇] **Ni120**

[⬇] **Current**[➡]
    [⬇] **Active loop 50mA**
    [⬇] **Passive loop 20mA**
[⬇] **Voltage**[➡]
    [⬇] **200mV**
    [⬇] **2V**
    [⬇] **20V**
[⬇] **Resistance**[➡]
    [⬇] **3wire**[➡]
        [⬇] **500Ω**

[⬇] **5kΩ**
　[⬇] **4wire**[➡]
　　　[⬇] **500Ω**
　　　[⬇] **5kΩ**
[⬇] **Frequency**[➡]
　[⬇] **Range** [➡]
　　　[⬇] **200Hz**
　　　[⬇] **2Khz**
　　　[⬇] **20Khz**
　[⬇] **Trigger level** [0..5]
[⬇] **Pulse**[➡]
　[⬇] **Measure**

[⬇] **Trigger Level** [0..5]
[⬇] **Time**
[⬇] **Mode** [Continuous, One shot]
[⬇] **Math function**[➡]
　[⬇] **XScale**[➡]
　　　X1
　　　X2
　　　X3
　　　X4
　[⬇] **LinMan**[➡]
　　　(linearization files defined by user)

9.2.2　　Settings Channel 2

[⬇] **Out**[➡]
　[⬇] **Thermocouple**[➡]
　　　[⬇] **Rji**[➡]
　　　　　[⬇] **TcK**
　　　　　[⬇] **TcJ**
　　　　　[⬇] **TcT**
　　　　　[⬇] **TcR**
　　　　　[⬇] **….**
　　　[⬇] **Rje**[➡]
　　　　　[⬇] **TcK**
　　　　　[⬇] **TcJ**
　　　　　[⬇] **TcT**
　　　　　[⬇] **TcR**
　　　　　[⬇] **….**
　　　[⬇] **Rjr**[➡]
　　　　　[⬇] **TcK**
　　　　　[⬇] **TcJ**
　　　　　[⬇] **TcT**
　　　　　[⬇] **TcR**
　　　　　[⬇] **….**
　[⬇] **RTD thermometer**[➡]
　　　[⬇] **3wire**[➡]
　　　　　[⬇] **Pt100 IEC**
　　　　　[⬇] **Pt200 IEC**
　　　　　[⬇] **Pt500 IEC**
　　　　　[⬇] **Pt1000 IEC**
　　　　　[⬇] **Pt100 OIML**
　　　　　[⬇] **Pt1000 OIML**
　　　　　[⬇] **Pt100 USLAB**

　　　　　[⬇] **Pt100 US**
　　　　　[⬇] **Pt100 SAMA**
　　　　　[⬇] **Pt100 JIS**
　　　　　[⬇] **Cu10**
　　　　　[⬇] **Cu100**
　　　　　[⬇] **Ni100**
　　　　　[⬇] **Ni120**
　　　[⬇] **4wire**[➡]
　　　　　[⬇] **Pt100 IEC**
　　　　　[⬇] **Pt200 IEC**
　　　　　[⬇] **Pt500 IEC**
　　　　　[⬇] **Pt1000 IEC**
　　　　　[⬇] **Pt100 OIML**
　　　　　[⬇] **Pt1000 OIML**
　　　　　[⬇] **Pt100 USLAB**
　　　　　[⬇] **Pt100 US**
　　　　　[⬇] **Pt100 SAMA**
　　　　　[⬇] **Pt100 JIS**
　　　　　[⬇] **Cu10**
　　　　　[⬇] **Cu100**
　　　　　[⬇] **Ni100**
　　　　　[⬇] **Ni120**
　[⬇] **Current**[➡]
　　　[⬇] **Active loop 50mA**
　　　[⬇] **Passive loop 20mA**
　[⬇] **Voltage**[➡]
　　　[⬇] **200mV**
　　　[⬇] **2V**
　　　[⬇] **20V**

[⬇] **Resistance**[➡]
    [⬇] **3wire**[➡]
        [⬇] **500Ω**
        [⬇] **5kΩ**
    [⬇] **4wire**[➡]
        [⬇] **500Ω**
        [⬇] **5kΩ**

[⬇] **Frequency/Pulse** [➡]
    Frequency [➡]
        [⬇] **Square**[200Hz, 2Khz, 20Khz]
        [⬇] **Sinusoidal** [200Hz, 2Khz, 20Khz]
        [⬇] **Triangular**[200Hz, 2Khz, 20Khz]
        [⬇] **Amplitude**
        [⬇] **Sin Offset**
    Pulse [➡]
        [⬇] **OnOff** [on, off]
        [⬇] **Time** [sec, min]
        [⬇] **Mode** [One shot, continuous]
        [⬇] **Amplitude**
[⬇] **Math function**[➡]
    [⬇] **XScale**[➡]
        X1
        X2
        X3
        X4
    [⬇] **LinMan**[➡]
    (elenco file di linearizzazione definiti dall'utente)
[⬇] **MicroCal T** [T100]
[⬇] **In**[➡]
    [⬇] **Thermocouple**[➡]
        [⬇] **Rji**[➡]
            [⬇] **TcK**
            [⬇] **TcJ**
            [⬇] **TcT**
            [⬇] **TcR**
            [⬇] **….**
        [⬇] **Rje**[➡]
            [⬇] **TcK**
            [⬇] **TcJ**
            [⬇] **TcT**
            [⬇] **TcR**
            [⬇] **….**

[⬇] **Rjr**[➡]
    [⬇] **TcK**
    [⬇] **TcJ**
    [⬇] **TcT**
    [⬇] **TcR**
    [⬇] **….**
[⬇] **RTD thermometer**[➡]
    [⬇] **3wire**[➡]
        [⬇] **Pt100 IEC**
        [⬇] **Pt200 IEC**
        [⬇] **Pt500 IEC**
        [⬇] **Pt1000 IEC**
        [⬇] **Pt100 OIML**
        [⬇] **Pt1000 OIML**
        [⬇] **Pt100 USLAB**
        [⬇] **Pt100 US**
        [⬇] **Pt100 SAMA**
        [⬇] **Pt100 JIS**
        [⬇] **Cu10**
        [⬇] **Cu100**
        [⬇] **Ni100**
        [⬇] **Ni120**
    [⬇] **4wire**[➡]
        [⬇] **Pt100 IEC**
        [⬇] **Pt200 IEC**
        [⬇] **Pt500 IEC**
        [⬇] **Pt1000 IEC**
        [⬇] **Pt100 OIML**
        [⬇] **Pt1000 OIML**
        [⬇] **Pt100 USLAB**
        [⬇] **Pt100 US**
        [⬇] **Pt100 SAMA**
        [⬇] **Pt100 JIS**
        [⬇] **Cu10**
        [⬇] **Cu100**
        [⬇] **Ni100**
        [⬇] **Ni120**
[⬇] **Current**[➡]
    [⬇] **Active loop**[➡]
        50mA
    [⬇] **Passive loop**[➡]
        50mA
[⬇] **Voltage**[➡]

[⬇] **200mV**
[⬇] **2V**
[⬇] **20V**
[⬇] **Resistance**[➡]
    [⬇] **3wire**[➡]
        [⬇] **500Ω**
        [⬇] **5kΩ**
    [⬇] **4wire**[➡]
        [⬇] **500Ω**
        [⬇] **5kΩ**

[⬇] **Math function**[➡]
    [⬇] **XScale**[➡]
        [⬇] **X1**
        [⬇] **X2**
        [⬇] **X3**
        [⬇] **X4**
    [⬇] **LinMan**[➡]
        (linearization files defined by user)

Off

9.2.3   Settings Pressure channel

[⬇] **Pl**
[⬇] **Ph**
[⬇] **Ph-Pl**

[⬇] **Pe**
[⬇] **Pe-Pl**
[⬇] **Pe-Ph**

9.3   Cal Proc key

[⬇] **TagSel** [➡]
    (tag files defined by user)
[⬇] **Results** [Found, Left]

[⬇] **Display procedure**
[⬇] **Display results**
[⬇] **Run procedure**

9.4   Display key

[⬇] **Ch1 & Ch2**
[⬇] **Ch1 & ChP**
[⬇] **Ch2 & ChP**
[⬇] **Difference**

[⬇] **Ch1**
[⬇] **Ch2**
[⬇] **ChP**
[⬇] **Graph**

10 MAINTENANCE

The calibrator has been developed and manufactured using high quality components. A correct, systematic maintenance will prevent damage and will increase substantially the life of the instrument, giving excellent results. Anomalous conditions that require extraordinary maintenance interventions are promptly displayed, either clearly or with an information code.

10.1 Error messages

MicroCal 20 performs the auto-diagnostic procedure when switched on. When measuring it checks also for anomalous conditions. If the calibrator founds trouble, it displays a message on LCD. Sometimes, these messages correspond to an unrecoverable problem and it is necessary to return the instrument to Eurotron for maintenance. Frequently these messages are referred to a recoverable trouble and can be solved by you.
The following table shows the possible **MicroCal 20** error messages:

Error message	Problem	Solutions
Over	Flashes instead of the related engineering unit and it indicates an overcome of the full scale	Insert a value below to the full scale
Under	Flashes instead of the related engineering unit and it indicates an overcome of the zero.	Insert a value above the zero
Open	Indicates that a Tc is badly connected or interrupted	Check the Tc connections
Unsafe	Indicates that a protection occurred	The channel is locked until a new setting of the input
Battery Low	Low batteries (on blank page)	Charge the batteries
File not found in <directory>	A file is missing for calibration procedure or linearization	Look on your PC for that file
File exists or system full	This error can occur during the creation of a Log file	Change filename or free some space into the memory
Log active don't modify	The Log is active, it is impossible to modify parameters	
Authorized persons only	Attempt to enter user level "factory" not allowed	Choose another user level
Danger!! Overcurrent on Ch1 (+ acoustic signal)	Channel 1 is under a too strong current that can damage permanently the instrument	The instrument enters the safe mode. Use less current or disconnect the source
Danger!! Overpressure on PI (+ acoustic signal)	Channel PI is under a too strong pressure that can damage permanently the sensor	Use less pressure or disconnect the source
Replay active not accepted	A forbidden operation was done during the Replay function	Wait for the end of simulation (Replay) or stop it

10.2 Status page

Pressing [**STATUS**], it is possible to visualize one or more pages representing the system's status.
Typically, pages like that beside are shown and eventually other pages showing status of external pressure
sensors or that one of the ambient module. Select a page with [**STATUS**], select a detail with [➡].

```
       Status page 1
     30/09/03 18:30:12
      Build Sep 12 2003



Press <➡> to SET
```

```
       Status page 2
PI

SN 1087358
40000 mbar
Type g
Press <➡> to SET
```

10.3 Protections

When you have a too strong current signal, it is possible to permanently damage the instrument. To avoid
that, the instrument enters a safe mode automatically: the low impedance channel is converted to an high impedance to measure a voltage instead of a current. At the same time, an
acoustic and visible alarm is emitted (see par.10.1)

10.4 Storage

If the instrument is left unused for a long time, it is recommended to remove the batteries.
Store the instrument in the original package, at a temperature from -30°C to +60°C, with R.H. less than 90%.
If the instrument has been unused for a month check the battery voltage, and charge the Ni-MH batteries for at least 12 hours.

10.5 Spare parts

EE620042   Battery pack
BB290041   Battery charger 110V 50/60Hz with USA plug
BB290042   Battery charger 230V 50/60Hz with Schuko plug
BB290043   Battery charger 230V 50/60Hz with UK plug
BB290044   Battery charger 230V 50/60Hz with European plug
BB290045   Battery charger 100V 50/60Hz with USA/Japan plug

See also par.1.3

11   WARRANTY

11.1   Warranty terms

Each instrument is shipped with a Warranty Certificate that indicates the validity conditions of the warranty itself. **Eurotron Instruments** warrants its products against defects in materials and workmanship.
If the unit should malfunction, it must be returned during the warranty period, transportation prepaid, to **Eurotron** for evaluation. Upon examination, if the unit is found to be defective it will be repaired or replaced at no charge.
Eurotron's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of **Eurotron**'s control.
This warranty applies to the original purchaser only. Please include a copy of the original invoice or a small service charge may be applied.

Direct all warranty and repair requests/inquiries to the **Eurotron** Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO **EUROTRON**, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM **EUROTRON**'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS).
The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

11.2   Letter of conformity

Each instrument is shipped with a numbered Letter of Conformity, to grant that the characteristics of the instrument correspond to the required ones, and that the instrument calibration is traceable to the National and International Standards.

Declaration of Conformity

We :　　　Eurotron Instruments S.p.A.

(Supplier's name)

　　　Viale F.lli Casiraghi 409/413 - 20099 Sesto S. Giovanni (MI) - Italy

(Address)

declare under our sole responsibility that the product :

　　　Multifunction Calibrator series MicroCal 20 (MicroCal 20 DPC – MicroCal P20 – MicroCal 20T)

(Name and type)

　　　Cat. 3925

(Model)

to which this declaration relates is in conformity with the following normative documents :

EN 50082-2 (3/95)
　　　IEC 1000-4-2 / IEC 1000-4-4 / IEC 1000-4-11
　　　ENV 50140 - ENV 50141 - ENV 50204

EN 55011

(Title, number and date of issue of normative documents)

following the prevision of directive :

89/336/CEE Electromagnetic Compatibility (EMC)

Sesto S. Giovanni, January 17th, 2003

(Place and date of issue)　　　　　　　　　　　　　　　　(Signature of authorised person)

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