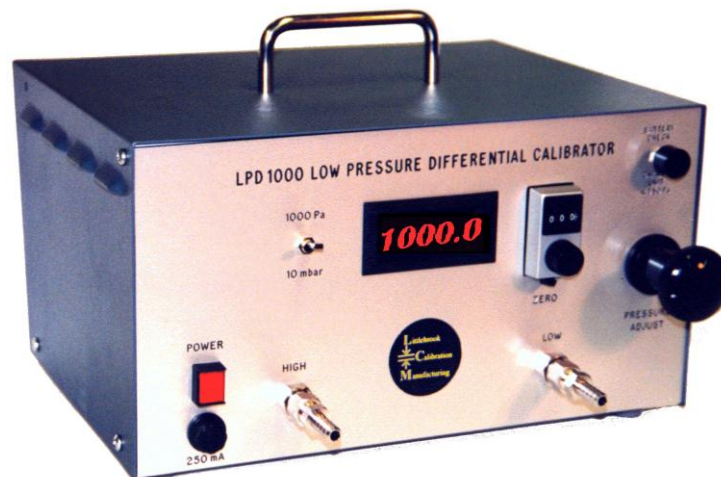




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**LPD1000**  
**LOW DIFFERENTIAL PRESSURE CALIBRATOR**  
**0 TO 1000 Pascal**



**USER MANUAL 001**

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**Littlebrook Calibration & Manufacturing (LCM) 1999**

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## CONTENTS OF CARTON

- 1] Quantity 1 LPM1000 Low differential Pressure Calibrator.
- 2] Quantity 1 meter Red Hose.
- 3] Quantity 1 meter Blue Hose.
- 4] Quantity 1 Lamp (Spare) On/Off Switch indicator.
- 5] Quantity 1 32mm 250 mA fuse (Spare).
- 6] Quantity 2 Parker Tube to Hose Connector 4B2HF4-316
- 7] Quantity 2 Parker Union 4SC4-316

## SAFETY

- **The operator must not use this calibrator for any other purpose than those stated. Only use non-corrosive dry gas as a pressure medium, do not use any other medium without consulting with LCM.**
- **Do not apply a differential pressure greater than 1000 mbar (100 kPa)**
- **Applying an excessive pressure greater than that stated, can cause injury to persons, damage to the instrument and user system equipment.**
- **The users of this instrument must familiarize themselves with all recommended procedures in this manual before use.**

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<b>CONTENTS</b>		<b>Page</b>
<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
1.1	Specifications	1 - 2
<b>2.0</b>	<b>INSTALLATION</b>	
2.1	Charging / Power Supply	3
2.2	Pressure Fittings & Hoses	3
<b>3.0</b>	<b>OPERATION</b>	
3.1	Key & Display Functions	4
3.2	General Operation Procedures	5
3.3	Applications	6
3.4	Monitor Output	7
3.5	Temperature Co-efficient Corrections	8
<b>4.0</b>	<b>CALIBRATION</b>	
4.1	Procedure	9
<b>5.0</b>	<b>MAINTENANCE</b>	
5.1	General	10
5.2	Cleaning	10
5.3	Fuse Replacement	10
5.4	Silica-Gel Replacement	11
5.5	Storage	11
5.6	Replacement Pressure Fittings	12
<b>6.0</b>	<b>PRESSURE CONVERSION FACTORS</b>	<b>13</b>

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## 1.0 INTRODUCTION

The LCM LPD1000 is a low pressure calibrator specifically designed to cater for the Low Pressure On-site calibration requirements of Field Instrumentation Engineers & Technicians. The robust design caters for use over a wide range of environmental temperatures and still maintain effective low pressure measurement accuracy.

### 1.1 Specifications

★ **Pressure Range**

Measurement & Generation 10 mbar switchable to 1000 Pascal.

★ **Resolution:**

0.1 Pascal or 0.001 mbar extendable using external digital voltmeter/recorder feature.

★ **Accuracy**

24 hour  $\pm 0.03$  % of Reading + 0.2 Pascal

6 month  $\pm 0.05$  % of Reading + 0.5 Pascal

★ **Temperature Coefficients**

Zero  $<0.1$  pascal /  $^{\circ}\text{C}$  nulled using a precision graduated 10 turn dial.

Span 130 ppm of reading /  $^{\circ}\text{C}$  (0.13 pascal /  $^{\circ}\text{C}$  at full scale).

★ **Power Supply**

Internal Battery pack for greater than 12 hours continual use with an external Charger.

★ **Output Monitor**

0 –10 Vdc / 0 to 1000 Pascal (10 mbar).

★ **Over Pressure**

1 Bar.

★ **Line Pressure**

Vacuum to 20 Bar.

★ **Size**

H 160mm W 300mm D 232mm.

★ **Weight:**

*6.8 kilos.*

★ **Environment:**

*Operating Temperature Ambient –10 °C to 50 °C.*

*Storage –20 °C to 60 °C.*

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## 2.0 INSTALLATION

**The LPD1000 when received must be charged over-night before use.**

### 2.1 Charging / Power Supply

**Charge the LPD1000 using supplied charger. Use of a dc power supply or non-recommended charger can damage the internal sealed lead acid gel batteries.**

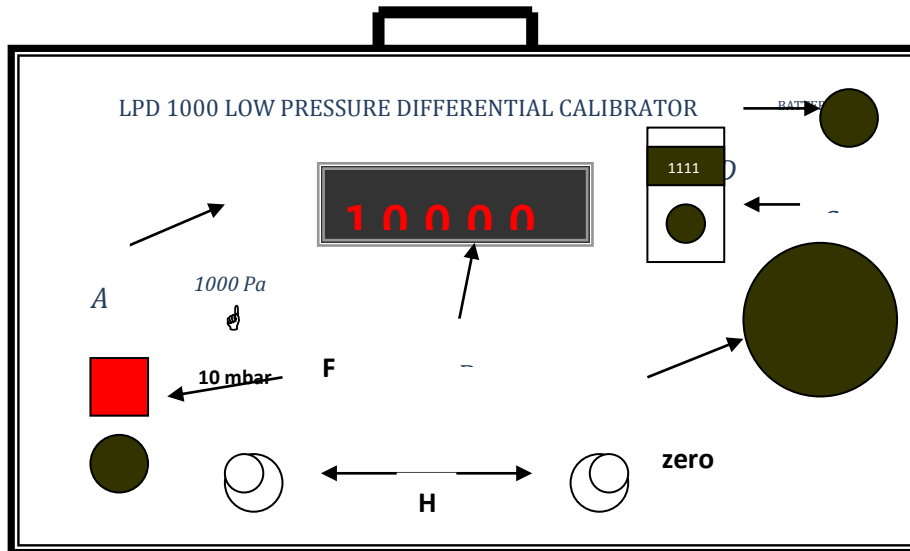
**Plug charger into the rear charger socket of the LPD1000. The charger will indicate green when the batteries are fully charged and the charger has switched to float charge mode.**

### 2.2 Pressure Fittings

**Pressure fittings and 2 one meter flexible red and blue hoses are supplied to enable unit to be place into service immediately. See II CONTENTS OF CARTON.**

**3.0 OPERATION**

**3.1 Key & Display Functions**



- A** Pressure unit adjustment switch ( Pascal or mbar).
- B** LED Display Pressure measurement Display (Pascal or mbar).
- C** Zero adjustment vernier potentiometer.
- D** Battery check momentary switch.
- E** Pressure output adjustment control.
- F** Power on/off Switch and illuminated indicator.
- G** 250 mA fuse holder.
- H** High & Low differential pressure ports.

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### 3.2 General Operation Procedures

*Refer to page 4 for Control/ Key References*

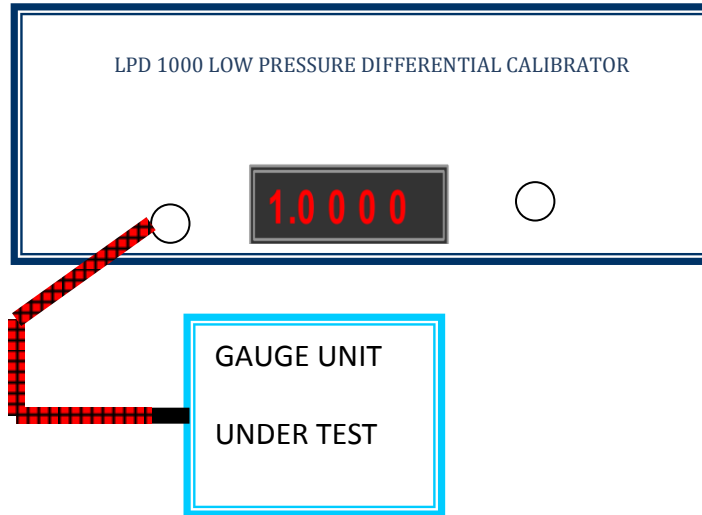
Always charge unit overnight using LPD1000 external charger. Plug into rear of LPD1000 at Charger marked input. **Use only LPD1000 charger.** Switch on LPD1000. Check battery capacity using battery check switch (D). Switch (A) must be in the 1000 Pascal position. A fully charged battery should read >1000 on LED Display (B).

**IT IS RECOMMENDED THAT THE LPD1000 IS NOT USED WHILE CHARGEING**

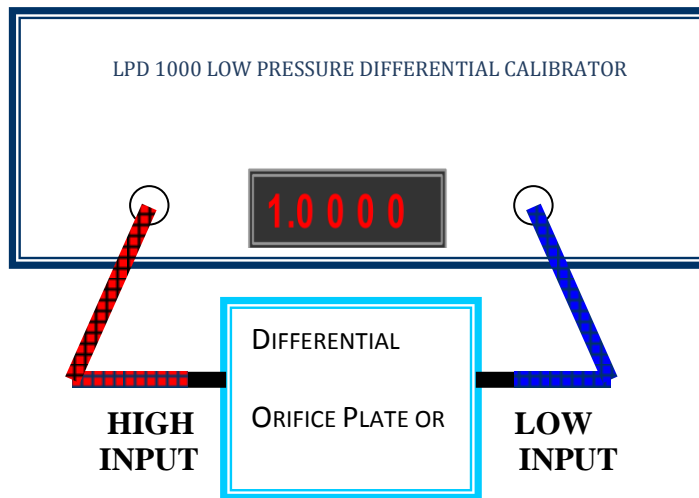
- a] At start of day, switch on LPD1000. (F).
- b] It is recommended that you allow LPD1000 to Equilibrate on-site for 30 minutes before use for optimum accuracy.
- c] Zero unit using vernier adjustment potentiometer (C) on front panel of LPD1000. **Ensure that LPD1000 is open to atmosphere when zeroing.**
- d] Connect LPD1000 to the Unit Under Test in Gauge or Differential mode as required. See 3.3 Applications
- e] Select units of measurement required Pascal or mbar on Switch (A).
- f] Set LPD1000 to required output pressure using “ Pressure Adjust” (E) on unit.
- g] Allow air temperature in pipe work to stabilize.
- h] Fine adjust Pressure (E) if required after stabilization.
- i] It is recommended if large environmental temperature swings occur, to regularly zero LPD1000 (C). **Ensure that LPD1000 is open to atmosphere when zeroing.**
- j] Check internal battery after 10 hours of continual use, if unit fully charged at start of day.

3.3 Applications

GAUGE MODE MEASURE / GENERATE



DIFFERENTIAL MODE MEASURE



**3.4 Monitor Output**

The LPD1000 has a external Voltmeter, logging or recording output. The output is designed to work into a high impedance monitoring device. The output is 0 to 10 Vdc for the zero to full-scale output/display of the LPD1000. Loading of this output will effect the measurement accuracy of the LPD1000. If in doubt monitor display of the calibrator while simultaneously connecting on the external monitoring device.

The monitor output can be used to extend the resolution of the LPD1000 by using a high resolution DMM.

**3.5 Temperature Co-efficient Corrections**

LPD1000 Typically is calibrated in a Laboratory environment of 20 °C ± 2 °C

The typical Traceable Uncertainty of Measurement of the Calibration would be ± 0.2 Pascal in the range 20 to 1000 Pascal.

The operating procedure recommends regular on-site Zeroing of the LPD1000. This procedure will eliminate any drifts due to field ambient temperature effects of the LPD1000’s internal pressure transducer.

**Addition sources of uncorrected drift in Pascal due to temperature differentials from calibration / on-site temperatures can be defined:**

**EXAMPLE WHEN FIELD TEMPEMERURE IS 25 °C**

FIELD PRESSURES IN PASCAL:	1000	500	250	100	20
Pressure Transducer Span TC 0.01 % of reading / °C	0.5 Pa	0.25 Pa	0.125 Pa	0.05Pa	0.01Pa
Digital DisplayTC 0.003 % / °C	0.15 Pa	0.075 Pa	0.038 Pa	0.015Pa	0.003Pa
Total	0.65Pa	0.325 Pa	0.163 Pa	<0.1 Pa	< 0.1 Pa

With a resolution on the LPD1000 of 0.1 Pascal temperature effects at 25 °C at pressures less than 100 Pascal are ± 1 LSD or less

Typical field Accuracy Applications require ± 2 Pascal Accuracy therefore even at 30 °C TC effects at 1000 Pascal are only ± 1.3 Pa.

*Field Indoor Ambient Environmental temperature would require to be 5 °C or 35 °C to approach the 2 Pascal limit.*

### 4.0 CALIBRATION

#### 4.1 Procedure

The unit must only be calibrated in environmentally controlled laboratory. The environment should ideally be 20°C . The uncertainty of measurement to 2 sigma confidence levels should be better than  $\pm 0.5$  Pascal.

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## 5.0 MAINTENANCE

### 5.1 General

Other than cleaning or replacement of blown fuses or lamps all other repairs must be undertaken by authorised qualified personnel.

### 5.2 Cleaning

Clean case with a damp cloth and mild detergent

### 5.3 Fuse & Lamp Replacement

#### Fuse

The instrument is protected by an external fuse on the front face of the calibrator. The fuse is a standard **32 mm 250 mA** fuse.

#### **WARNING**

#### **REPLACEMENT FUSES MUST BE CORRECT TYPE AND RATING**

Procedure for the replacement of the fuse is simple, just unscrew front of fuse holder and replace fuse.

**CONTACT LCM IF RATED FUSE CONTINUALLY BLOWS. Do not open the instrument to attempt repair. Repair must only be undertaken by Authorised/Qualified personnel**

#### **Lamp**

The replacement Power Switch on/off lamp is obtainable from LCM quote calibrator model and LP1. Replacement is by removing red lamp cover and unplugging miniature blown lamp.

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**5.4 Silica-Gel Replacement**

Quantity 2 of 10 gram silica-gel sachets are used in the volume. These sachets should be replaced during the units annual re-calibration.

**5.5 Storage**

Store the instrument in a dry, dust-free environment, free from corrosive fumes which may damage the internal components.

Storage must be in at atmospheric Pressure and Humidity. Do not exceed storage ranges as detailed in Specification Section Page 2

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### 5.6 Replacement Pressure Fittings

All external and internal pressure fittings are **PARKER** stainless steel. It is recommended that only Parker fittings are fitted if replacements are required; as all pressure test and calibration data is based on these fittings.

For identification purposes the Parker description and part codes are provided for the two low and high differential port bulk-head, external pipe and hose adapter fittings are given.

- A]** Parker Tube to Hose Connector 4B2HF4-316
  
- B]** Parker Union 4SC4-316
  
- C]** Parker Tube end bulk head adapter 4 TUBE4-316

## Table of relevant pressure units and conversion factors 13

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Pressure Unit	Pascals
1 mbar	100
1 torr	133.322
1 mmHg *1	133.322
1 mmH <sub>2</sub> O *2	9.80665
1 N/m <sup>2</sup>	1
1 inH <sub>2</sub> O *3	249.089

**\*1 Conventional mmHg 13595.1 kg/m<sup>3</sup> Density at standard Gravity 9.80665 m/s<sup>2</sup>**

**\*2 Conventional mmH<sub>2</sub>O 1000.0 kg/m<sup>3</sup> Density at standard Gravity 9.80665 m/s<sup>2</sup>**

**\*3 Conventional inH<sub>2</sub>O 1000.0 kg/m<sup>3</sup> Density at standard Gravity 9.80665 m/s<sup>2</sup>**

# **USER MANUAL 001**

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