



**MARTINDALE**  
● ● ● **ELECTRIC**

LP2000

DIGITAL LOOP  
AND Ipsc TESTER

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**INSTRUCTION MANUAL**

Martindale Electric Company Ltd

LITLP2000

ISSUE 3



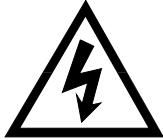
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# 1. SAFETY RULES

## WARNING

### DISCONNECT FROM SUPPLY BEFORE OPENING TESTER



This tester has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous if lack of caution and/or poor safety practices are used.

### READ THE MANUAL



Read this Instruction Manual carefully and completely. Voltages and currents within the capability of this instrument can be hazardous. Follow the instructions in this manual for every test. Read and understand the general instructions before attempting to use this tester. Do not exceed the limits of this tester.

## **SAFETY CHECK**

Double check the lead connections before making a test.

Are you following all the instructions?

Use only the specified type of fuse and insert it correctly.

Do not use leads that are damaged and in need of repair.

Do not use in wet conditions.

**THIS INSTRUMENT SHOULD ONLY BE USED BY A  
COMPETENT, SUITABLY TRAINED PERSON.**

**REMEMBER**

**SAFETY IS NO ACCIDENT**

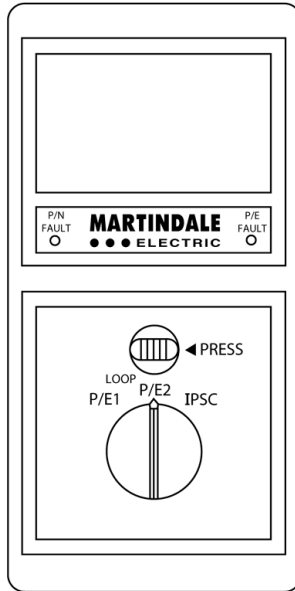


Fig. 1 Digital Loop and IpSC Tester

ALL WARRANTIES IMPLIED BY LAW ARE HEREBY LIMITED TO A PERIOD OF 24 MONTHS, AND THE PROVISIONS OF THE WARRANTY ARE EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED.

The purchaser agrees to assume all liability for any damages and bodily injury which may result from the use or misuse of the product by the purchaser, his employees, or others, and the remedies provided for in this warranty are expressly in lieu of any other liability Martindale Electric Co Ltd may have including incidental or consequential damages.

Martindale Electric Co Ltd reserve the right to discontinue models at any time, or change specification, price or design, without notice and without incurring any obligation.

## **2. GENERAL DESCRIPTION**

The model LP2000 Digital Loop Tester is a hand-held, mains powered instrument designed to measure the loop and prospective short circuit current (IpSC) of electrical circuits in accordance with the 16th Edition of the IEE wiring regulations (BS7671). It has a 3½digit liquid crystal display and is available in various versions. The loop is measured over two ranges to

## **8. LIMITED WARRANTY**

Martindale Electric Co Ltd warrant instruments and test equipment manufactured by them to be free from defective material or factory workmanship and agree to repair or replace such products which, under normal use and service, disclose the defect to be the fault of our manufacturing, with no charge for parts and service. If we are unable to repair or replace the product, we will make a refund of the purchase price. Consult the Instruction Manual for instructions regarding the proper use and servicing of instruments and test equipment. Our obligation under this warranty is limited to repairing, replacing or making refund of any instrument or test equipment which proves to be defective within 24 months from the date of original purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorised persons in any way so as, in our sole judgement, to injure their stability or reliability, or which have been subject to misuse, abuse, misapplication, negligence or accident or which have had the serial numbers altered, defaced or removed. Accessories, not of our manufacture used with this product, are not covered by this warranty.

To register a claim under the provisions of this warranty, return the instrument or test equipment to Martindale Electric Co Ltd, Metrohm House, Penfold Trading Estate, Imperial Way, Watford, WD24 4YY. Upon our receipt and inspection of the product we will advise you as to the disposition of your claim.

199.9 $\Omega$  with auto range at 15 $\Omega$  and with resolutions of 0.01 and 0.1 $\Omega$ . The Ipsc is measured over one range of 19.99 kA with a resolution of 0.01kA.

Three measurement modes, selected by the function switch, enable loop measurements to be made between the phase and earth conductor in the mains lead and prospective short circuit current measurements between the phase and neutral conductors in the mains lead. A reading is initiated and displayed when the test button is depressed. The lamps indicate the status of the phase neutral and phase earth conductors and the status of those lamps can be interpreted to determine the absence of a conductor or the reversal of two conductors (See Wiring Fault Diagnosis Table Page 8). Fuse protection is provided by a 5A, anti-surge fuse fitted on the printed circuit board and a 13A fuse in the plug. Thermal overload protection is provided by inhibiting tests for a ten second period after any test, thus preventing overheating of the internal circuitry.

The principal of operation of the tester is that a voltage proportional to the incoming supply on no load is compared to that same voltage when a 10 $\Omega$  load is connected for two half cycles of the mains supply. These signals are combined and fed to a digital voltmeter LSI device whose output provides a reading of the loop resistance or Ipsc. This device has a hold facility so that after 1 second, the reading is retained for as long as the test button is depressed. If there is a perturbation on the incoming supply during the measurement cycle, the reading could be inaccurate. It is, therefore, recommended that at least two repeatable readings are obtained.

### **3. OPERATING INSTRUCTIONS**

#### **3.1 SOCKET OUTLET**

##### **A. Phase Earth Loop**

- 1) Set the function switch to P/E.
- 2) Connect the tester to the socket with its mains lead.
- 3) Check that the PE and PN lamps light. If either fails to light then do not operate the tester, switch off the socket as there may be a wiring fault. Correct the fault before proceeding further and check the instrument. The Wiring Fault Diagnosis Table on page 8 may be of assistance.
- 4) If the READY symbol on the LCD shows, press and hold the test button to obtain a loop reading.
- 5) The reading obtained in 4 should now be compared to the appropriate table in the IEE Wiring Regulations (BS7671) to verify the protection device against disconnection time.

##### **B. Bonded Metalwork**

- 1) Set the function switch to P/E2.
- 2) Connect the tester to a socket adjacent to the metalwork with its mains lead.
- 3) Plug the wander earth lead into the 4mm socket beside the mains inlet on the tester and press the probe firmly onto the bonded metal work. Proceed as in A, 3-5.

### **6. SPARES AND ACCESSORIES**

- |     |                     |            |
|-----|---------------------|------------|
| (1) | Wander Earth Probe  |            |
| (2) | Mains Lead standard | TL205      |
| (3) | Fuse (Internal)     | FUSE 5A250 |
| (4) | Flying Lead         | TL85       |

### **7. REPAIRS**

Please return the tester to:

**Martindale Electric Company Ltd**  
Metrohm House,  
Penfold Trading Estate,  
Imperial Way, Watford, WD24 4YY,  
UK.

## 5.2 MECHANICAL

Instrument Housing:	54 X 190 X 90mm approx. Moulded in ABS and polycarbonate
Weight:	0.4kg (Less Carry Case)
Display:	Custom Liquid Crystal
Socket:	4mm Shrouded Mains CEE22 (IEC320)
Leads:	Mains lead with moulded plug (13A fuse) on 240V versions Wander Earth Lead with fused retractable probe and 4mm safety plug

## 5.3 ENVIRONMENTAL

Operating Temperature:	0°C to +40°C
Storage Temperature:	-20°C to +70°C
Operating Humidity:	90% RH max at +40°C

**WARNING:** The Wiring Regulations require protective conductors (including Bonded Metalwork) to be checked with a continuity tester before performing a loop test. Care should be taken since when a test is performed on a system with a poor earth, the tip of the wander earth lead if connected will be energised for two half cycles.

### C. Ipsc

- 1) Set the function switch to Ipsc and proceed as inA, 2-4.
- 2) The reading obtained will be the prospective short circuit current (Ipsc) in kA.

## 3.2 THREE PHASE AND OTHER UNTERMINATED SUPPLIES

As an accessory a multi-purpose mains lead is available which facilitates the testing of supplies that have no socket outlet. This lead has a moulded Euro free socket at one end and double insulated phase, neutral and earth tails at the other. The earth tail is terminated with a shrouded crocodile clip and the phase and neutral tails have interchangeable fused probes and crocodile clips. If there is no neutral available on a three phase system then the neutral probe/clip should be taken to earth.

## 3.3 CIRCUITS INCORPORATING RESIDUAL CURRENT DEVICES

If a residual current device is incorporated in the installation, it may be found that the RCD will trip during a phase earth loop test. This is likely to occur where the tripping time is 20ms or less since

the tester passes up to 24A to earth during a test for up to 2 half cycles.

It will therefore probably be necessary to bypass the RCD with links during the test, making sure that the links are removed after the test. With the RCD bridged, the protection of the circuit against earth faults is removed and precautions should be taken to ensure that the circuit is not used when the RCD is inoperative.

It will be necessary to isolate the live side of the RCD before inserting and removing links. Depending upon the type of installation, the electricity supply authority may have to be consulted before the supply can be isolated.

#### 4. WIRING FAULT DIAGNOSIS

The two neon lamps indicate the status of the socket phase-neutral and phase-earth conductors and so can be interpreted to diagnose the wiring fault in the socket.

The table below aids this diagnosis.

Lamp	Neutral Disconn.	Phase Disconn.	Phase & Neutral Reversed	Earth Disconn.	Phase & Earth Reversed
P/N	O	O	X	X	O
P/E	X	O	O	O	X

Lamp on: X  
Lamp off: O

**NOTE: AN INDICATION ON THE P/E LAMP DOES NOT INDICATE A SATISFACTORY EARTH**

WE RECOMMEND THAT, IF THIS INSTRUMENT IS USED FOR VERIFYING ELECTRICAL INSTALLATIONS, IT IS RE-CALIBRATED EVERY 12 MONTHS

### 5. SPECIFICATION

#### 5.1 ELECTRICAL

Supply Voltage: 200 to 260V rms, 50/60Hz  
 Test Current: 24A, rms, for two half cycles at 240V  
 Loop Range: 0 to 15Ω nominal in steps of 0.01Ω  
 15 to 199.9Ω in steps of 0.1Ω  
 Accuracy: ±2% of reading, ±2 digit  
 Temperature Coefficient: ±0.1%/°C  
 Ipsc Range: 0 to 19.99kA in steps of 0.01kA  
 Fuse: 5A, HBC, Anti-Surge ceramic, DIN 5 X 20mm

Transient Protection: VDR at input

Thermal Protection: Electronic delay

Safety: EMC: To BS EN 50081-1  
 BS EN 50082-1  
 LVD: To BS EN 61010-1

Installation Category: Category III