PSI4000 / PSI4300 PHASE SEQUENCE INDICATOR

INSTRUCTION MANUAL

MARTINDALE ELECTRIC

GENERAL SAFETY INFORMATION: Always read before proceeding.

Warning
These instructions contain both information and warnings that are necessary for the safe operation and maintenance of this product. It is recommended that you read the instructions carefully and ensure that the contents are fully understood. Failure to understand and to comply with the warnings and instructions can result in serious injury, damage or even death.

In order to avoid the danger of electrical shock, it is important that proper safety measures are taken when working with voltages exceeding 30V AC rms, 42V AC peak or 60V DC.

This product must only be used by a competent person capable of interpreting the results under the conditions and for the purposes for which it has been constructed. Particular attention should be paid to the Warnings, Precautions and Technical Specifications. Always check the unit is in good working order before use and that there are no signs of damage to it. Do not use if damaged.
Where applicable other safety measures such as use of protective gloves, goggles etc. should be employed.

Please keep these instructions for future reference. Updated instructions and product information are available at: www.martindale-electric.co.uk

REMEMBER: SAFETY IS NO ACCIDENT

MEANING OF SYMBOLS:

Equipment complies with relevant EU Directives

End of life disposal of this equipment should be in accordance with relevant EU Directives

Caution - risk of danger & refer to instructions

Caution - risk of electric shock

Equipment protected by double or reinforced insulation (Class II)

Thank you for buying one of our products. For safety and full understanding of its benefits please read this manual before use. Technical support is available from 01923 441717 and support@martindale-electric.co.uk.

CONTENTS

1. INTRODUCTION

1.1 Inspection
Examine the shipping carton for any sign of damage. Inspect the unit and any accessories for damage. If there is any damage then consult your distributor immediately.

1.2 Description
The PSI4000 and PSI4300 are Non-Contact Phase Detector and Phase Sequence Indicators with the following features:

- Non-contact connection clips to enhance user safety during testing and also allow the testing of insulated conductors.
- Illuminated LED's to indicate the detection of live phases.
- Rotating LED's and buzzer tones to indicate clockwise or anticlockwise phase sequence.
- Auto-off function after 5 minutes of non-detection.
- Enhanced brightness switch to make the indication brighter in strong ambient light.
- Magnetic studs on rear casing to allow hands free operation.

The PSI4000 indicates correct phase sequence as a clockwise rotation while the PSI4300 indicates correct phase sequence as an anti-clockwise rotation.

1.3 Accessories (included)
- 4 x 1.5V batteries LR6/AA
- Soft case
- Instructions

1.4 Battery Installation
Refer to section 4.1 (battery replacement) for the battery installation instructions for the PSI4000 / PSI4300.

2. PRODUCT SPECIFIC SAFETY INFORMATION

Measurement Category III (CAT III) is applicable to test and measuring equipment connected to the distribution part of the building's low-voltage MAINS installation.

Measurement Category IV (CAT IV) is applicable to test and measuring equipment connected at the source of the building's low-voltage MAINS installation.

2.1 Precautions

This product has been designed with your safety in mind, but please pay attention to the following warnings and cautions before use.

⚠ Warning

Before use check the unit for cracks or any other damage. Make sure the unit is free from dust, grease and moisture. Also check any associated leads and accessories for damage. Do not use if damaged.

⚠ Warning

Do not use if the battery/fuse cover is not fitted.

⚠ Warning

Always test this unit on an appropriate proving device or known voltage source before and after using it to determine if a hazardous voltage exists in a circuit to be tested. See 3.6.

⚠ Warning

When using the sensor clips, always keep your fingers behind the finger guards.

⚠ Warning

If one or more phase live LED's do not illuminate, this does not necessarily mean the phase or phases suspected of being open or

missing are actually dead. The phase to earth voltage of the suspected phase could be < 75V, or two or all three sensor clips could be sensing the same phase, thereby giving incorrect test indications.

⚠ Caution

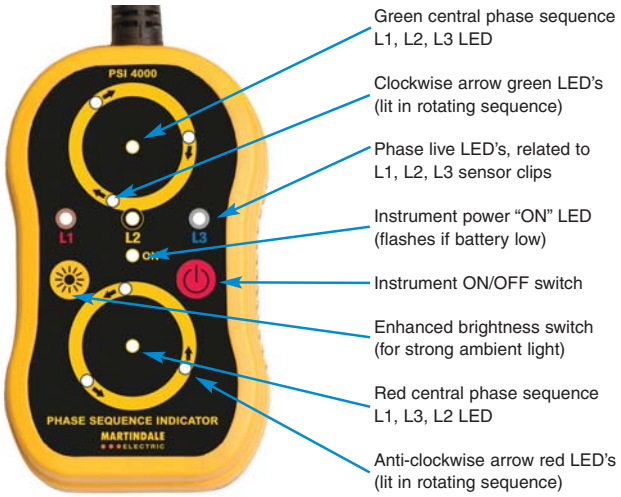
Avoid severe mechanical shock or vibration and extreme temperature.

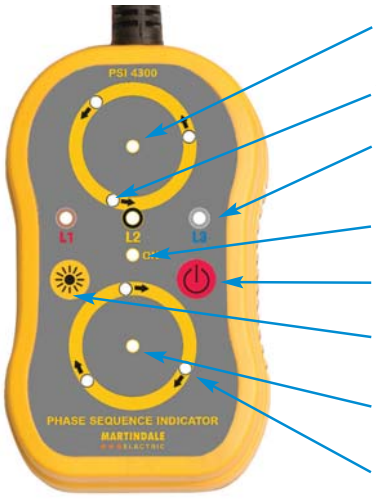
⚠ Caution

Remove the batteries when not in use for an extended period, to avoid corrosion from leaking batteries.

3. OPERATION

3.1 Description of Press Buttons and Indicators





3.2 Low Battery Indication

If the ON LED flashes when the unit is turned on, the batteries are low and need to be replaced (see section 4.1 battery replacement).

3.3 Auto Power Off

If the PSI4000/PSI4300 is inactive for a period of approximately 5 minutes it will automatically power down.

3.4 Enhanced Brightness

Press the button to increase the brightness of the LED's when using the PSI4000/PSI4300 in strong ambient light.

3.5 Testing Considerations

The following considerations should be observed when using the PSI4000 / PSI4300:

- Incorrect phase live test indications will be obtained if two or three sensors are connected to the same phase. The L1, L2 and L3 LED's will only illuminate simultaneously if the sensors are connected to 3 separate phases, with phase to earth voltages ≥75V.
- Touching the sensor clips during testing may give incorrect test indications.
- Incorrect test indications may be obtained if the sensor clips are attached near to a charged body or equipment generating electromagnetic waves.
- The specified conductor size for testing is between 2.4mm and 30mm diameter. Testing conductors outside of this range may give incorrect test indications.
- Test indications may be influenced by other nearby cables with a voltage magnitude that is double or greater than the voltage magnitude of the cables being tested. The sensor clips should be attached as far from such cables as possible.
- Correct wiring status cannot be correctly identified when an earth line is connected between phases via delta connection. Check the connection specification of the 3 phase distribution system being tested.
- Cannot be used to test bus bars or metal shielded cables.
- Do not pull the sensor clip wires to remove the sensor clips from the cables under test. This may break or damage the sensor clip wires.

3.6 Proving Check

Before and after use, prove the function of the PSI4000 / PSI4300 by performing steps 1 to 4 below:

1. Press the button to turn on the instrument. During the power up sequence, all of the LED's will illuminate briefly.
2. If any of the LED's do not flash during the power-up sequence, **do not use** the instrument.

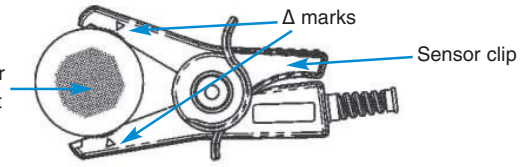
3. After the power-up sequence, only the **ON** LED will stay illuminated, all others will extinguish.
4. Prove the function of the L1, L2, L3 sensor clips by attaching each in turn to a known live insulated conductor energised at 75V AC or greater, and confirm that the L1, L2, L3 LED's illuminate. The tips of the Δ marks at the side of the clip jaws should align with the centre of the conductor used for testing (see figure 1).

Do not use the unit if the L1 or L2 or L3 LED's do not illuminate when performing step 4 above.

3.7 Testing a 3 Phase Distribution System

1. The three sensor clips are marked L1, L2, L3. These relate to the L1, L2, L3 LED's on the instrument facia.
2. To determine phase presence and phase sequence, attach the three sensor clips of the PSI4000 / PSI4300 to the three separate unshielded phase cables of the 3 phase electrical distribution system to be tested, whilst referring to figure 1 and observing the testing considerations of section 3.6.
3. Refer to table 2 of section 3.8 to determine onto which cable to attach L1, L2 and L3 (see Note 2).
4. The presence of live phases and the phase sequence are indicated by the LED's and the buzzer sounding as soon as detection is complete. Refer to table 1 to determine the status of each phase cable from the LED indications (see Note 3).

Figure 1



⚠ Note 1: If one or more phase live LED's do not illuminate, this does not necessarily mean the phase or phases suspected of being open or missing are actually dead. The phase to earth voltage of the suspected phase could be <75V, or two or all three sensor clips could be sensing the same phase, thereby giving incorrect test indications.

Note 2: The colours of the cables under test cannot be relied upon to confirm the expected phases.

Table 1

PSI4000 Indication	PSI4300 Indication	Wiring Condition
L1, L2 or L3 LED's illuminated.		Respective phase or phases live. (see Note 1)
L1, L2 or L3 LED's OFF.		Respective phase or phases missing. (see Note 1)
L1 or L2 or L3 LED's flashing.		Respective phase is an earth phase (Delta connection).
L1, L2 and L3 LED's illuminated. The buzzer sounds intermittently.		All phases live. Phase sequence L1, L2, L3.
Green rotation LED's flash in a clockwise direction.	Green rotation LED's flash in an anticlockwise direction.	
L1, L2 and L3 LED's illuminated. The buzzer sounds continuously.		All phases live. Phase sequence L1, L3, L2.
Red rotation LED's flash in an anticlockwise direction.	Red rotation LED's flash in a clockwise direction.	

Note 3: This instrument only confirms the presence of live phases and the phase sequence in the location being tested for example a phase marked as "L1" elsewhere in the fixed installation may not be same phase as one marked as "L1" in the location being tested. That must be verified by separate tests to confirm absence of phase offset.

3.8 Wiring Colour Coding

In April 2004 the colour coding of UK wiring was harmonised with the IEC wiring colour code. Table 2 shows the old UK colour code and the new IEC colour code.

Table 2

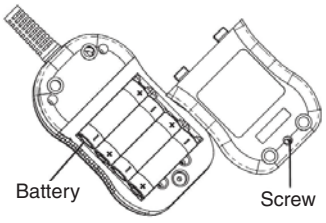
	Earth	Neutral	Line 1	Line 2	Line 3
Old UK Colours	Green / Yellow	Black	Red	Yellow	Blue
New IEC Colours	Green / Yellow	Blue	Brown	Black	Grey

4. MAINTENANCE

4.1 Battery Replacement

⚠ To avoid shock or injury, disconnect the PSI4000 / PSI4300 sensor clips from any external circuits before proceeding.

The battery compartment is underneath the unit and can be accessed by undoing the screw securing the battery cover, and lifting it off.



Observing correct polarity, fit 4 new 1.5V LR6/AA alkaline batteries. Replace the battery cover and screw.
Note: Do not mix old and new batteries.

4.2 Cleaning

The unit may be cleaned using a soft dry cloth. Do not use moisture, abrasives, solvents, or detergents, which can be conductive.

4.3 Repair & Service

There are no user serviceable parts in this unit other than those that may be described in section 4. Return to Martindale Electric if faulty. Our service department will quote promptly to repair any fault that occurs outside the guarantee period.
Before the unit is returned, please ensure that you have checked the unit and batteries.

4.4 Storage Conditions

The instrument should be kept in warm dry conditions away from direct sources of heat or sunlight, and in such a manner as to preserve the working life of the unit. It is strongly advised that the unit is not kept in a tool box where other tools may damage it.

5. WARRANTY AND LIMITATION OF LIABILITY

This Martindale product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is 2 years and begins on the date of receipt by the end user. This warranty extends only to the original buyer or end-user customer, and does not apply to fuses, disposable batteries, test leads or to any product which, in Martindale's opinion, has been misused, altered, neglected, contaminated, or damaged by accident or abnormal conditions of operation, handling or storage.

Martindale authorised resellers shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of Martindale.

Martindale's warranty obligation is limited, at Martindale's option, to refund of the purchase price, free of charge repair, or replacement of a defective product which is returned to Martindale within the warranty period.

This warranty is the buyer's sole and exclusive remedy and is in lieu of all other warranties, expressed or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. Martindale shall not be liable for any special, indirect, incidental or consequential damages or losses, including loss of data, arising from any cause or theory.

Since some jurisdictions do not allow limitation of the term of an implied warranty, or exclusion or limitation of incidental or consequential damages, the limitations and exclusions of this warranty may not apply to every buyer. If any part of any provision of this warranty is held invalid or unenforceable by a court or other decision-maker of competent jurisdiction, such holding will not affect the validity or enforceability of any other provision or other part of that provision.

11 Nothing in this statement reduces your statutory rights.

MARTINDALE ELECTRIC

Specification
PSI4000/PSI4300
Phase Sequence Indicator

PSI4000
clockwise
rotation

PSI4300
anti-clockwise
rotation

Measurement principle: Static induction
Input voltage range:
150V to 1000V AC (phase to earth) (serial no's 9995965-9996166 only)
75V to 1000V AC (phase to earth)
Input frequency range: 45Hz to 65Hz
Temperature & Humidity: Operating: -10°C to 50°C ≤ 80% R.H.
Storage: -20°C to 60°C ≤ 80% R.H.
Altitude: up to 2000m
Power: 4 x 1.5V LR6/AA alkaline batteries.
Battery current consumption: 16mA
Low battery warning: Power LED flashes below 4.6 ± 0.1V DC battery voltage
Auto power off time: Approx 5 minutes
Standby current: 0.5mA
Sensor clip cable length: Approx. 800mm
Minimum conductor diameter: 2.4mm
Maximum conductor diameter: 30mm
Dimensions: 118 x 69 x 38 mm
Weight: 370g approx (batteries included)
Includes: 4 x 1.5V alkaline batteries, soft case & instructions
Safety: Conforms to BS EN61010-1, BS EN 61557-1 & BS EN61557-7
CAT III 1000V, CAT IV 600 V.
Class II Double Insulation
Pollution Degree: 2
EMC: Conforms to BS EN 61326-1

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- Thermometers & Probes
- Test Leads
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- Specialist Drummond Testers

MARTINDALE ELECTRIC

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