KD1E Range
Potential Indicators

Operating Instructions

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Limited Warranty & Limitation of Liability

SEAWARD Electronic Limited guarantees this product for a period of 1 year. The period of warranty will be effective at the day of delivery.

Due to a policy of continuous development SEAWARD Electronic Limited reserves the right to alter the equipment specification and description outlined in this publication without prior notice and no part of this publication shall be deemed to be part of any contract for the equipment unless specifically referred to as an inclusion within such contract.

Disposal of Old Product

This product has been designed and manufactured with high quality materials and components that can be recycled and reused.

When the crossed out wheelie bin symbol is attached to a product it means the product is covered by the European Directive 2012/19/EU.

Please familiarise yourself with the appropriate local separate collection system for electrical and electronic products.

Please dispose of this product according to local regulations. Do not dispose of this product along with normal waste material. The correct disposal of this product will help prevent potential negative consequences for the environment and human health.

Operating Instructions

KD1E Range Potential Indicator

The Seaward KD1E range of Potential Indicators provides a means of confirming the presence of voltage on electrical circuits from 1.5 to 33kV.

The KD1E Range of Potential Indicators complies with the UK Electricity Council Engineering Recommendation G9.

Contents

1.0 User Notes

These operating instructions are intended for the use of competent personnel.

The KD1E Range of Potential Indicators has been designed to make measurements in a dry environment.

The KD1E Neon Range of Potential Indicators has been designed for indoor use.

The KD1E Digital Range of Potential Indicators has been designed for outdoor use.

The following symbols are used in these operating instructions and on the KD1E Range of Potential Indicators

Warning of electrical danger!
Indicates instructions must be followed to avoid danger to persons.

Important, follow the documentation!
This symbol indicates that the operating instructions must be adhered to in order to avoid danger.

2.0 Safety Notes

This KD1E Range of Potential Indicators has been built and tested in accordance with:

BS EN 61243-2

The KD1E Range of Potential Indicators has left the factory in a perfectly safe state. To maintain this state and ensure safe operation of the unit, all notes and warnings in these instructions must be observed at all times.

This instrument should only be used by competent, suitably trained personnel, wearing appropriate PPE, after due consideration of any hazard involved.

Never hold the instrument between the hand guard / digital display housing and the contact electrode.

The Potential Indicator and all associated cables and leads must be checked for signs of damage before the equipment is operated.

The Potential Indicator must be proof tested before and after use.

Always ensure the earth cable is securely attached to the equipment and that the clip is connected to earth during tests.

Always ensure equipment is properly rated for use at the voltage in the system under test.

Never allow any part of the instrument below the limit mark to make contact with a live high voltage conductor.

Where applicable, the limit mark is a band, approx. 20mm in width, printed on the body of the detector and extensions rods.

Where safe operation of the Potential Indicator tester is no longer possible it should be immediately shutdown and secured to prevent accidental operation.

It must be assumed that safe operation is not longer possible:

- if the Potential Indicator or the cable show visible signs of damage, or
- the Potential Indicator does not function, or
- after long periods of storage under adverse environmental conditions.

3.0 Accessories

3.1 Optional Accessories

3.1.1 PH3 proof testing unit, for use with contact electrode type domed – Seaward Part 112A913. Supplied with digital readout models.

3.1.2 PH3 proof testing unit, for use with contact electrode type flat – Seaward Part 112A921. Supplied with digital readout models.

3.1.3 “V” form 1.5m straight extension rod. Seaward Part 141A901.

3.1.4 Domed bent end extension rod.
90 degree (Seaward Part 141A900) or
120 degree (Seaward Part 141A912)
PSU100 battery charger – Seaward Part 124A912.

4.0 Description

The KD1E range of neon and digital potential indicators are comprised of the following features:-

4.1 The units consist of an element manufactured from a high quality PVC grade 7 tube that conforms to BS3506. The tube supports and isolates a chain of high value internal resistors.

4.2 The total encapsulation of the load element prevents any internal tracking or leakage.

4.3 A handguard in the form of a flange (neon type) or display housing (digital type) on the handle section of the unit prevents the operators' hands from straying towards the high voltage ends of the potential indicator.

4.4 **Type neon indicator.** The neon indicator is enclosed in a flexible transparent sleeve that prevents the transmission of any outside shocks to the glass envelope of the neon.

4.5 **Type neon indicator.** The neon's are visible through a viewing window located in the PVC tube above the handguard.

4.6 **Type digital indicator.** The voltage display is incorporated into the handguard housing.

4.7 An external domed or flat type (model specific) ensures a positive contact with any terminal required to be tested.

4.8 An insulated earth cable is connected to the potential indicator through the handle section. The earth cable is a permanent connection on neon indicator models but is detachable on digital models. This earth cable is fitted with a suitable clamp that allows the operator to reference the potential indicator to a suitable earth.

4.9 Labels present on the equipment and accessories are there to ensure safe use of the equipment.

5.0 Electrical Specifications

Type	Neon Indication					Digital Reading	
Model	**KD1E**	**KD1E/19**	**KD1E/19s**	**KD1E/22**	**KD1E/33**	**KD1E/15D**	**KD1E/33D**
Maximum System voltage	11kV	19kV	19kV	22kV	33kV	15kV	33kV
Maximum System to earth	6.6kV	11kV	11kV	12.5kV	19kV	8.6kV	19kV
Threshold voltage	300	300	300	300	300	/	/
Measuring Range	/	/	/	/	/	0.00 - 8.60kV	0.00 - 19.0kV
Resolutionn	/	/	/	/	/	10V	100V
Sensivity	AC/DC	AC/DC	AC Only	AC/DC	AC/DC	AC/DC	AC/DC
Circuit Current (IEC61243-2)	2.3mA nominal @ 6.6kV	0.7mA nominal @ 11kV	0.9mA nominal @ 11kV	3.5mA nominal @ 12.5kV	1.1mA nominal @ 19kV	0.5mA nominal @ 8.6kV	1.1mA nominal @ 19kV
Dielectric Leaking Current (IEC61243-2)	7µA nominal @ 13.8kV	11µA nominal @ 22.8kV	12µA nominal @ 22.8kV	12µA nominal @ 26.4kV	17µA nominal @ 40kV	9µA nominal @ 18kV	17µA nominal @ 40kV
Length [mm]	330	330	330	665	670	600	600
Diameter [mm]	27	27	27	27	27	27	27
Handle length [mm]	105	105	105	90	250	235	235
Hand Guard Height [mm]	23	23	23	20	20	25	25
Contact Electrode Type	Domed	Flat	Flat	Domed	Flat	Domed	Domed

Extension Rods	1.5m Straight	90° Bent	120° Bent
Maximum System voltage	33kV	15kV	33kV
Dielectric Leakage Current	140µA nomnial	50µA nomnial	130µA nomnial
Length [mm]	1500	780	780
Diameter [mm]	27	27	27
Contact Electrode Type	“V” form	Domed	Domed

6.0 Operation

6.1 **Type digital indicator.** The insulated earth cable, 3m in length, is connected by means of a plug and socket arrangement to the bottom of the handheld section of the potential indicator.

6.2 **Type digital indicator.** On connection of the insulated earth cable to the bottom of the handheld section the digital display is automatically powered up and zeroed ready for operation.

⚠ **Always screw up the plug and socket securely.**

6.3 The earth clamp attached to the free end of the insulated earth cable needs to be attached to a suitable earth point i.e. an earthed strip of frame or an earth electrode.

6.4 Before use the potential indicator must be proof tested on a suitable proving unit such as the Seaward Electronics PH3 proving unit. This proving unit is supplied with digital indicator models and is an optional accessory for neon indicator models.

⚠ **The neon indicator will illuminate for an energised system or for a proving unit test.**

⚠ **If no neon illumination occurs for a proving unit test then the potential indicator must be returned to the supplier.**

6.5 The exposed contact electrode of the potential indicator should be positioned such as to make contact with the voltage source to be measured. For neon model indicators the neon's within the PVC tube will be illuminated to inform the operator that a voltage greater than the threshold voltage of the detector is present. For the digital model indicators the display will indicate a reading to inform the operator of the exact value of the voltage present.

Never hold the potential indicator between the hand guard and the exposed contact electrode.

6.6 The potential indicator must be applied in turn to each phase of the system under test.

6.7 After use the potential indicator must be proof tested on a suitable proving unit such as the Seaward Electronics PH3 proving unit.

6.8 **Type digital indicator.** Once testing is complete unclip the earth clamp from the reference earth point. Disconnect the earth cable from the bottom of the potential indicator and replace the protective cap over the plug of the potential indicator.

Digital indicator only. Always ensure the earth cable is disconnected from the potential indicator when not in use to prevent the battery from being fully discharged.

7.0 Battery Charging

This section is a requirement for digital reading potential indicators only.

A "BAT" sign on the display of the digital potential indicator denotes that the battery requires charging.

During prolonged storage periods the battery will discharge. In order to increase the battery life the instrument should be charged periodically.

7.1 Remove the protective cap from the connector on the bottom of the hand held section of the indicator.

7.2 Insert the 6 pin socket flying lead from the PSU100 battery charger – Seaward Part 124A912 into the connector and firmly screw into place. Connect the mains lead from the charger to a 240VAC 50Hz supply and switch on.

7.3 Once mains has been applied to the battery charger one LED is continuously illuminated and a second LED will flash approximately every 5 seconds to indicate the digital display battery is being charged.

7.4 The charging period should be approximately 14 hours. Once charging is complete both LED's are switched off.

7.5 On completion of the charging cycle, disconnect the battery charger supply from mains, disconnect the 6 pin socket from the base of the potential indicator and replace the protective cap over the plug.

Do not use the potential indicator on a high voltage circuit while the battery is on charge.

8.0 Optional Extension & Bent End Rods

8.1 Attachment

8.1.1 Loosen but do not fully remove the knurled head on the extension rod.

8.1.2 If the equipment is fitted with removable contact electrodes, remove the domed head from the digital unit or neon unit. Store the domed heads in a safe location.

8.1.3 Attach the extension rod onto either the digital unit or neon unit and ensure that the two elements are fully mated without over tightening.

8.1.4 Tighten the knurled head at the end of the extension rod to secure the two elements together.

⚠ **At no time after the extension unit has been fully tightened to either the digital unit or phasing rod should any attempt be made to separate the two elements until all testing (including proof testing) has been completed.**

8.1.5 To remove an extension rod from either the digital unit or neon unit, loosen the knurled head at the end of the extension rod before detaching the extension rod from either the digital unit or the phasing rod.

8.1.6 Replace the domed head on the digital unit and / or neon unit and tighten the knurled head on the extension rod when complete.

8.2 Operation of Extension and Bent end Rods on HV Systems

8.2.1 Extension rods can be used on a HV system with either the digital unit or neon unit. Extension rods cannot be used without first being connected to either a digital unit or neon unit.

8.2.2 The digital unit and phasing rod can be used on a HV system up to the designated voltage levels without an extension rod.

⚠ **Always fit the forked head to extension rods when testing Overhead Lines.**

8.3 Proof Testing of the Extension Rod

8.3.1 Extension rods must be proof tested using the Seaward PH3 proving unit, both before and after use. For more detailed information see section 9.

9.0 Proof Testing

9.1 Features of a PH3 Proving Unit

9.1.1 The terminations on the unit comprise of a knurled earth terminal at one end and a small test point on the top of the unit. The PH3 is available with a test point designed to mate with either a domed or a flat contact electrode type. Refer to section 3.1.

9.1.2 A push switch operates the test voltage output.

9.1.3 The unit requires an alkaline PP3 type battery, also identified as a MN1604 and with the IEC identifier 6LR61.

9.1.4 Ensure that the red LED on the proving unit operates before and after the unit has been used.

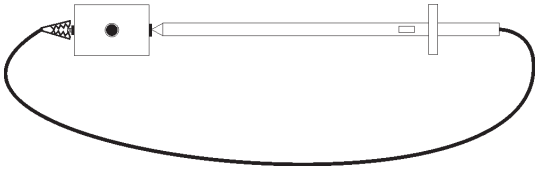
Warning – Do not touch the earth terminal and the brass tip on the proving unit simultaneously. When the push button is pressed 1.3KV is generated between these points.

9.2 Testing Potential Indicators using a PH3 Proving Unit.

9.2.1 Type digital indicator. Using the 6 pin plug on the base of the potential indicator connect the insulating earth cable to the indicator and securely fasten.

9.2.2 The earth clamp attached to the free end of the insulated earth cable should be attached to the knurled earth terminal on the proving unit.

9.2.3 Push the brass tip on the proving unit onto the exposed contact electrode of the potential indicator.



9.2.4 Press the pushbutton on the proving unit. The neon's on neon potential indicator models will illuminate to prove the indicator is operational. The display on digital tential indicators will indicate a voltage of greater than 1.1kV.

Warning – Do not touch the earth terminal and the brass tip on the proving unit simultaneously. When the push button is pressed 1.3KV is generated between these points.

9.2.5 On completion of the proving test, release the push button, disconnect the earth clamp from the knurled nut and remove the proving unit brass tip from the exposed metal head of the potential indicator.

10.0 Maintenance

10.1 The KD1E range of potential indicators is extremely robust and should always be kept free from dust or any loose carbon particles.

10.2 Ensure the KD1E range of potential indicators is kept dry with no surface moisture on either the body or housing / hand guard of the indicator.

10.3 The body of the potential indicator should be regularly inspected to ensure no deep scratches or physical damage.

10.4 Ensure the insulation of the cable is fully intact and that no sharp creases have occurred in the cable.

10.5 It is recommended that the potential indicator should be regularly proof tested at scheduled maintenance intervals as well as before and after testing on energised circuits.

10.6 If any of the above conditions have been observed then the potential indicator must be appropriately secured to prevent any further use.

10.7 Ensure that the equipment is stored dry with no surface moisture on the body or housing / hand guard of the indicator or phasing rod.

10.8 Always transport the equipment in the carrying case provided. Always handle with care.

10.9 There are no user serviceable parts on the equipment.

Digital Indicator only – Always ensure the earth cable is disconnected from the potential indicator when not in use, to prevent the battery from being fully discharged.

11.0 Cleaning

11.1 Clean the external case of the potential indicator with a clean dry cloth.

11.2 Avoid using solvents and abrasive scouring agents to clean the external case of a potential indicator.

11.3 **Type digital indicator.** Check the battery contacts and mounting compartment are free of electrolytic contamination.

11.4 **Type digital indicator.** Any contamination of the battery contacts or compartment should be cleaned with a dry cloth.