HIGH VOLTAGE INSTRUMENTS LTD

T&R Test (Holdings) Ltd. Company

# *OPERATING AND MAINTENANCE MANUAL*

Product: ***Live Line Indicator***

Type: ***750DC, 1500DC AND 3000DC***


*MANUFACTURED BY:*

**High Voltage Instruments Ltd.**

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# 1 SAFETY RULES

1.1 Only personnel who are fully trained in the use of High Voltage DC Indicators should use this equipment. The systems that it will be used on are powered from high voltages which can be lethal.

1.2 Before use ensure that the indicator and the accessories that are required for use are clean, free from cracks or deep scores, and are properly secured together. The insulation of the earth lead should be sound and it should be securely connected to earth with its clip.

1.3 Make certain that the indicator is properly rated for the voltage of the system under test.

1.4 Check the operation of the indicator before and after each test using a known HV source (see section on proving).

1.5 Do not allow an HV conductor to come in contact with the indicator at a point below the limit mark.

1.6 Safe working distances must always be observed.

REMEMBER

SAFETY IS NO ACCIDENT!

THIS TESTER SHOULD ONLY BE USED BY A COMPETENT,

SUITABLY TRAINED PERSON.

# 2 DESCRIPTION

## *2.1 GENERAL*

The HVIL range of high voltage dc indicators have been designed for use on overhead, catenary lines. Models are available to cover system voltages of 0.75, 1.5 and 3.0kV dc and they can be used indoors and outdoors in all weather.

The function of the indicator is to determine whether a conductor is energised or de-energised so that it may be safely earthed before commencing work.

## *2.2 PRINCIPLE OF OPERATION*

The insulating rod attached to the cone-shaped moulding, houses a resistor chain that draws current from the source under test and conducts it to earth through the earth lead. This current is proportional to the voltage of the source and it is monitored by electronic circuitry in the plastic moulding whose output drives an audible warning device and a system of indicating lamps. The operation is such that, if the source voltage is below a predetermined threshold, the green lamps flash, and, if it is greater, then the red lamps flash and the audible warning device sounds intermittently.

## *2.3 ARMING*

This indicator is powered by a battery and so has to be switched on. This is effected by pressing the arming/test button on the viewing face of the indicator. When this button is depressed, the red lamp illuminates and audible warning sounds.When this button is released,the display changes to a green flashing lamp. The

indicator is then armed and ready for use. This armed condition lasts for approximately 5 minutes.

Arming the indicator also functionally checks the internal circuitry, but is does not check the resisitor chain and the associated wiring. see note on proving

### *2.4 BATTERY*

This indicator is powered by a 9 Volt manganese-alkali battery (IEC 6LF22) which is located in a compartment, accessed from the viewing face of the detector.

### *2.5 INSULATING POLES*

The indicator should always be used with insulating poles. These poles can be directly attached to the indicator if they are Bowthorpe type, or they can be attached via a universal, star-whell adaptor, which is supplied as part of the kit.

### *2.6 LIMIT MARK*

At the top end of the indicator housing, where it is connected to the insulated resistance rod, there is a red band which indicates the limit mark. By definition, the limit mark indicates the physical limit to which the indicator may be inserted between live conductors or may touch them.

### *2.7 LABELS*

Two labels are affixed to the indicator housing. The first label contains information on the manufacturer's name and address, range, model no., serial no., date of manufacture and climactic class. The second label is attached to the battery access lid and it identifies the type of battery that should be used with the indicator.

# 3. INSTRUCTIONS FOR USE

## *3.1 ASSEMBLING THE EQUIPMENT*

Select a contact electrode to suit the application and screw it on to the end of the insulated resistance rod. There are three types of contact electrode: straight, Y and hook.

This indicator should always be used with an insulating pole or poles. Bowthorpe insulating poles, which have a retractable bayonet fitting, plug directly into the socket in the bottom of the indicator housing. It is also possible to connect insulating poles, which have a universal, star-wheel fitting, to this indicator, but a universal, star-wheel adaptor has, first of all, to be screwed into the socket.

## *3.2 ARMING/TESTING*

Press the arming/test button to check the function of the internal circuitry and the battery condition. The red lamp illuminates and the audible alarm sounds. If they do not, replace the battery and press the test button once more. If the lamp and audible alarm still do not function, then the indicator is faulty and should be returned to the manufacturer for repair.

Release the arming/test button. The red lamp and the audible alarm will switch off and the green lamp will flash. The indicator is now in its armed state, ready for use. This state lasts for 5 minutes. If the green lamp does not start flashing when the button is released, then the battery is discharged and should be replaced.

### *3.3 PROVING*

The process of arming an indicator, checks the functionality of the electronic circuitry, but not of the resistor chain and the associated wiring. It is recommended that the indicator is proved against a known high voltage source before and after use. A known high voltage source could be a section of the line which is known to be energised, or in some cases, it could be an insulation tester whose test voltage is greater than the threshold voltage of the indicator.

### *3.4 TESTING*

Attach the earth lead clip securely to a good, convenient earth point. ARM the indicator Now present the indicator to the conductor under test, touching it with the contact electrode. If the voltage on the conductor is greater than the threshold voltage of the indicator, then the red lamp will flash and the audible alarm will sound. This indicates that the conductor is live. The voltage present display will continue as long as the indicator contact electrode is touching the live conductor.

If the voltage on the conductor is less than the threshold voltage of the indicator, then the green lamp will continue to flash and the red lamp and the audible alarm will not operate.

## *3.5 BATTERY REPLACEMENT*

If during arming/testing, see 3.2, the indications are that the battery should be replaced, the following procedure should be carried out.

The battery housing is located on the viewing face of the indicator. Its position is indicated by the label attached to its cover. Undo the two captive fixing screws and remove the battery compartment cover. Slide out the battery and unclip the battery connector. Fit a new battery, type IEC 6LF22, in the reverse order, making sure that the fixing screws are properly tightened to ensure a good water seal.

# 4. SPECIFICATIONS

## *4.1 ELECTRICAL*

This specification applies at an ambient temperature of +20°C except where otherwise stated.

Voltage Ranges:

750, 1500 and 3000 Volts dc (3 models)

Threshold Voltage:

33% of the Voltage Range (e.g. 250, 500 and 1000Vdc) for 750, 1500 and 3000Vdc ranges respectively

Temperature Drift of

+/- 10% of measured threshold voltage from

Threshold Voltage:

-25°C to +55°C

Resistor Chain Resitance:

1.5, 3 and 6MW for 750, 1500 and 3000Vdc ranges respectively

Operating Time:

5 minutes nominal.

Visual Indication:

Alarm condition, red LEDs flashing at 2Hz

Safe condition, Green LEDs flashing at 2Hz

Audible Indication:

Buzzer with 3.1kHz tone modulated at 2Hz, 70dBA at 1.5 metres

Measuring Current:

0.5mA nominal at rated voltage

Response Time:

1 second maximum

Battery:

9V manganese-alkali cell, IEC 6LF22

Battery Life:

250 operations minimum

Spark Protection:

The indicator will not be damaged as a result of spark discharge from a source 1.2 times the rated voltage

Bridging Protection:

Tested at 1.2 times the rated bar test rig.

Leakage Current:

The leakage current will not exceed 0.2mA dc with the rated voltage applied to the contact electrode.

Earth Lead:

Will withstand 1.2 times the rated voltage in the water bath test.

## *4.2 MECHANICAL*

| | | |
|---|---|---|
| Indicator Housing | Length: | 170mm nominal length |
| | Diameter: | 96mm |
| | Material: | ABS/Polycarbonate |
| Resistance Rod | Length: | 605mm nominal length |
| | Diameter: | 21mm |
| | Material: | PVC material |

## *4.3 ENVIROMENTAL*

| | |
|---|---|
| Vibration: | According to IEC1243, part 1 |
| Drop: | According to IEC1243, part 1 |
| Shock: | According to IEC1243, part 1 |
| Deflection: | According to IEC1243, part 1 |

# 5 CARE AND MAINTENANCE

## *5.1 SOTRAGE*

The indicator and its accessories should be stored in the proprietary carrying bag when not in use.

## *5.2 TRANSPORTING*

When the equipment is in transit it should be stored in its carrying case/bag. Whilst the equipment has been designed for field use it should not be subjected to excessive bumps and shocks.

## *5.3 CLEANLINESS*

Dirt can cause surface tracking and it is therefore necessary to keep the detector and its accessories clean by using a detergent solution. The equipment should be dried and polished with the liquid polymer polish provided.

## *5.4 MECHANICAL DAMAGE*

If surface scratches or dents can be easily seen by the naked eye then the equipment should be returned to the manufacturer for repair since these blemishes act as traps for dirt and moisture.

## *5.5 CALIBRATION*

It is recommended that the equipment should be recalibrated and tested every 12 months by the manufacturer.

# 6 SPARES & ACCESSORIES

| | | |
|---|---|---|
| 6.1 | Straight contact electrode | CMH0110 |
| 6.2 | Y contact electrode | CMH0298 |
| 6.3 | Hook contact electrode | CMH0297 |
| 6.4 | Universal star wheel pole adaptor | DDC0244 |
| 6.5 | Cleaning kit | DDM5003 |
| 6.6. | Battery (IEC 6LF22) | CEJ0016 |
| 6.7 | Instruction manual | CMR0129 |
| 6.8 | Carrying bag | CMP5023 |

# 7 LIMITED WARRANTY

High Voltage Instruments 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 twelve 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

**High Voltage Instruments Ltd,**

**15-16 Woodbridge Meadows**

**Guildford, GU1 1BJ, U.K.**

Upon our receipt and inspection of the product we will advise you as to the disposition of your claim.

ALL WARRANTIES IMPLIED BY LAW ARE HEREBY LIMITED TO A PERIOD OF TWELVE 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 High Voltage Instruments Ltd may have including incidental or consequential damages.

High Voltage Instruments Ltd reserve the right to discontinue models at any time, or change specification, price or design, without notice and without incurring any obligation.

# 8. REVISION

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