

Maintenance

Performance Test

Verify the probe accuracy by measuring a 25 kV dc $\pm 0.25\%$ voltage source. When used with a compatible dc voltmeter, the probe should measure the source with $\pm 1\%$ accuracy. No calibration adjustments are provided.

Cleaning

Use a soft cloth dampened in distilled water to clean the 80K-40. Never use solvents or abrasive cleaners. Make sure the 80K-40 is dry before reuse.

LIMITED WARRANTY & LIMITATION OF LIABILITY

Each Fluke product is warranted to be free from defects in material and workmanship under normal use and service. The warranty period is one year and begins on the date of shipment. Parts, product repairs and services are warranted for 90 days. This warranty extends only to the original buyer or end-user customer of a Fluke authorized reseller, and does not apply to fuses, disposable batteries or to any product which, in Fluke's opinion, has been misused, altered, neglected or damaged by accident or abnormal conditions of operation or handling. Fluke warrants that software will operate substantially in accordance with its functional specifications for 90 days and that it has been properly recorded on non-defective media. Fluke does not warrant that software will be error free or operate without interruption.

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FLUKE®

80K-40

High Voltage Probe

Instruction Sheet

Introduction

The Model 80K-40 is a high voltage accessory probe designed to extend the voltage measuring capability of an ac/dc voltmeter up to 40,000 volts Overvoltage Category I. This means the probe can only be used to make measurements on energy limited circuits within equipment. Examples include high voltage within televisions or photo copy machines. DO NOT use this probe to measure high voltages on power distribution systems. The probe is a precision 1000:1 voltage divider formed by two matched resistors. The unusually high input impedance offered by these resistors minimizes circuit loading and thereby, optimizes measurement accuracy. A special plastic body houses the divider and provides the user with isolation and protection from the voltage being measured.

Specifications

The 80K-40 will achieve rated accuracy when used with a voltmeter (ac or dc) having an input impedance of $10\text{ M}\Omega \pm 1.0\%$.^{*} Specifications for the probe are as follows:

† **Voltage Range:** 1 kV to 40 kV dc or peak ac, 28 kV rms ac

Input Resistance: 1000 M Ω

Division Ratio: 1000: 1 (1000X attenuator)

Accuracy DC:

20 kV to 35 kV: $\pm 1\%$ at 20°C to 30°C; add 1% at 10°C < 20°C and > 30°C to 45°C. (For total measurement accuracy add accuracy specification of voltmeter being used.)

0 kV to < 20 kV and > 35 kV to 40 kV: $\pm 2\%$.

Accuracy AC: 60 Hz, $\pm 5\%$.

Safety: Meets IEC 1010-2-031:1993, Type B, 40 kV dc or, peak ac, 28 kV rms ac, Overvoltage Category I (voltages derived from limited energy transformer).

^{*} The input impedance of Autoranging Fluke handheld digital multimeters varies as a function of range. The only range that deviates significantly from 10 M Ω is the 3V (Models 21, 23, 25, 27, 70, 73, 75, 77) or 4V (Models 10, 11, 12, 29, 79, 83, 85, 86, 87, 88) range where the impedance is 11.11 M Ω . To enhance the measurement accuracy when using this range, apply a correction factor of 0.99, i.e. multiply the displayed reading by .99.

† This probe is intended for low energy applications such as CRT and similar circuits. Above 2000 meters altitude, and up to 5000 meters, derate linearly the working voltage from 40 kV peak to 28 kV peak, and derate linearly the transient overvoltage from 80 kV peak to 57 kV peak. Transient overvoltage refers to micro-second duration impulses caused by lightning or load switching. See International Electrotechnical Commission Publication 664-1980, Clause 3.9 Table II, and Appendix A.

Measurement Considerations

Before attempting to use the 80K-40, the following paragraphs should be read and understood. Particular attention should be given to Operator Safety.

PN 481978

January 1978, Rev.9, 3/97

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Operator Safety ⚠



Indicates the operator must refer to an explanation in this manual.



Indicates terminals at which lethal voltages may exist.

Warning

- To avoid damage or electric shock:
 - Use within ratings and under dry (no condensation) conditions.
 - The 80K-40 user should be familiar with, and exercise, all possible high voltage safety practices.
 - When making a measurement, never make body contact with the probe tip or the red portion of the probe. Always hold the probe by its black handle.
 - Before making a measurement, make sure that the tab side of the output connector is connected to the voltmeter's low input terminal.
 - The clip lead must be attached to earth ground.

Voltmeter Compatibility

Accuracy of the meter is not included in the accuracy of the probe, and must be added to the probe accuracy to determine system accuracy.

The 80K-40 is mechanically compatible with any ac or dc voltmeter or multimeter capable of accepting a standard spaced, 0.75" (19mm) double, banana plug, having standard, .160" (4mm) plugs.

The 80K-40 probe is electrically compatible with any ac or dc voltmeter or multimeter that has an input impedance of $10\text{ M}\Omega \pm 1\%$. Voltmeters or multimeters with other input impedances require the use of an external shunt or a correction factor to obtain an accurate measurement. Higher impedance voltmeters or multimeters should be equipped with a shunt, and lower impedance voltmeters or multimeters should be assigned correction factors. Applicable formulas follow:

- a. The following formula is used to determine the value of an external shunt resistor (meter impedance $>10\text{ M}\Omega$):

$$R_s = \frac{R_m \times 10}{R_m - 10}$$

Where: R_s = Shunt resistance in $\text{M}\Omega$

R_m = Voltmeter input impedance in $\text{M}\Omega$ ($>10\text{ M}\Omega$)

Example: If $R_m = 20\text{ M}\Omega$,

$$R_s = \frac{20 \times 10}{20 - 10} = \frac{200}{10} = 2.0\text{ M}\Omega$$

- b. Use the following formula to calculate a correction factor (meter impedance $<10\text{ M}\Omega$):

$$C_f = \frac{1.11 + R_m}{1.11 \times R_m}$$

Where: C_f = Correction factor (multiplier for meter reading)
 R_m = Voltmeter input impedance in $\text{M}\Omega$

Example: If $R_m = 1\text{ M}\Omega$,

$$C_f = \frac{1.11 + 1}{1.11 \times 1} = \frac{2.11}{1.11} = 1.901$$

Therefore: A meter reading of 0.526 volts represents an input of: $0.526 \times 1.901 = 1$ or 1 kV.

Circuit Loading

The 80K-40 represents a $1000\text{ M}\Omega$ load to the circuit being measured, or $1\text{ }\mu\text{A}$ per 1 kV. Table 1 shows the circuit loading and input/output characteristics of the probe over its measurement range.

Table 1. 80K-40 Circuit Loading and Input/Output Characteristics

Input Voltage	Loading Current	Output Voltage
10V	10 nA	10 mV
100V	100 nA	100 mV
1 kV	1 μA	1V
10 kV	10 μA	10V
20 kV	20 μA	20V
30 kV	30 μA	30V
40 kV	40 μA	40V

Operation

Use the following procedure to operate the 80K-40:

- Select and energize a compatible voltmeter.
- Equip the voltmeter with a suitable shunt, if required.
- Select an appropriate voltage range (1 volt reading per 1000 volt input. See Table 1).
- Connect the probe's output leads to the voltmeter input terminals.
- Connect the probe's clip lead to ground. See OPERATOR SAFETY.
- Connect probe tip to circuit being measured and observe voltmeter reading. Apply correction factor to reading when necessary.

Theory Of Operation

The 80K-40 High Voltage probe, is designed to extend the voltage measurement range of an ac/dc voltmeter up to 40,000 volts. Electrically, the probe is a passive attenuator as shown in Figure 1. Its high input impedance ($1000\text{ M}\Omega$), as well as its accuracy and stability characteristics are achieved through the use of special thick film resistors. When the probe is connected to a voltmeter with a $10\text{ M}\Omega$ input resistance the probe becomes an accurate 1000:1 divider. Notice that the divider depends upon a ground lead to complete the low side of the circuit path. Therefore, this connection must always be secure before attempting a voltage measurement. Otherwise, instrument damage or a shock hazard will result.

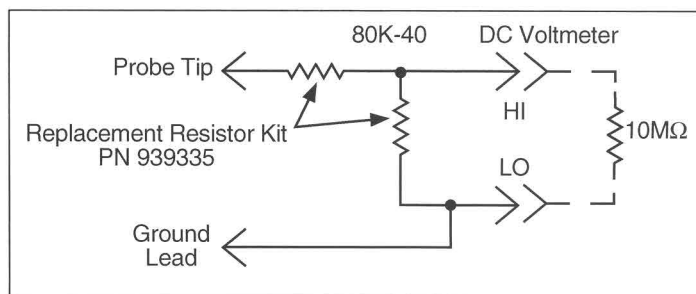


Figure 1. 80K-40 Simplified Circuit Diagram

40,000 Volt High Voltage Probe

- A high voltage probe which extends the voltage-measuring capability of an ac/dc voltmeter or DMM to 40,000 volts dc
- Unusually high input impedance of 1000 M Ω minimizes circuit loading and optimizes measurement accuracy
- Special plastic body provides the user with isolation and protection from the voltage being measured
- High accuracy when used with a voltmeter or DMM having an input impedance of 10 M $\Omega \pm 1\%$
- Voltage rating: Low energy applications such as CRT supplies: 40 kV dc or peak ac
- Measurement range: 1 kV to 40 kV dc or peak ac, 28 kV rms ac
- Connect clip to earth ground
- Input impedance: 1000 M Ω
- Output to meter: 1 V per 1 kV of input voltage (division ratio is 1000:1)
- **Accuracy dc:** 20 kV to 35 kV: $\pm 1\%$ at 20 °C to 30 °C; add 1 % at 10 °C to <20 °C and >30 °C to 45 °C. For total measurement accuracy, add accuracy of voltmeter being used 0 kV to <20 kV and >35 kV to 40 kV: $\pm 2\%$ at 10 °C to 45 °C
- **Accuracy ac:** 60 Hz, $\pm 5\%$ at 10 °C to 45 °C
- One-year warranty
- For application, operation assistance or information on Fluke products call: 800-443-5853 in the USA and Canada, 31 40 2 678 200 in Europe, or 425-356-5500 from other countries
- **Compatible with any ac or dc voltmeter or DMM that has an input impedance of 10 M $\Omega \pm 1\%$. Voltmeters or DMMs with other input impedances require the use of an external shunt or a correction factor to obtain accurate measurement. DMM or voltmeter must accept standard-diameter, 4 mm (.160 in), banana plugs.**



Warning! To avoid damage or electrical shock, use within ratings under dry (no condensation) conditions

- **Safety:** Meets IEC 1010-2-031:1993, Type B, 40 kV dc or peak ac, 28 kV rms ac Overvoltage CAT I (voltage derived from limited energy transformers)

姓 氏 성

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Sr./Sra., Herr/Frau,
Tratamento

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---	---	----

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☐ No, Non, No, Nein, Não

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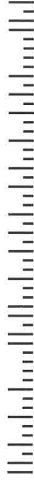
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Suomi

Tämä tuote noudattaa WEEE-direktiivin (2002/96/EY) merkintävaatimuksia. Kiinnitetty etiketti osoittaa, että tätä sähkö-/elektroniikkalaitetta ei saa hävittää kotitalousjätteissä.

Tuoteluokka: Viitaten WEEE-direktiivin liitteessä I mainittuihin laitteisiin, tämä tuote on luokiteltu luokan 9 "Tarkkailu- ja ohjauslaitteet" -tuotteeksi.

Ei saa heittää kotitalousjätteiden mukana!

Palauta tarpeettomat tuotteet ottamalla yhteyttä valmistajan websivustoon, joka mainitaan tuotteessa tai paikalliseen myyntitoimistoon tai jakelijaan.

Dansk

Denne produkt er i overensstemmelse med kravene om afmærkning i WEEE-direktivet (2002/96/EC). Det påhæftede mærkat angiver, at du ikke må bortskaffe dette elektriske/elektroniske produkt via husholdningsaffald.

Produktkategori: Med reference til kravene i WEEE-direktivets bilag I klassificeres dette produkt som et produkt til "overvågning og kontrolinstrumentering" i kategori 9.

MÅ ikke bortskaffes via husholdningsaffald!

Hvis du vil returnere uønskede produkter, skal du besøge producentens websted, som vises på produktet, eller den lokale forhandler eller distributør.

English

This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category: With reference to the equipment types in the WEEE Directive Annex I, this product is classed as category 9 "Monitoring and Control Instrumentation" product.

Do not dispose in domestic household waste!

To return unwanted products, contact the manufacturer's web site shown on the product or your local sales office or distributor.

Français

Ce produit est conforme aux normes de marquage de la directive DEEE (2002/96/CE). La présence de cette étiquette indique que cet appareil électrique/électronique ne doit pas être mis au rebut avec les déchets ménagers.

Catégorie de DEEE : Cet appareil est classé comme catégorie 9 parmi les « instruments de surveillance et de contrôle » en référence aux types d'équipements mentionnés dans l'Annexe I de la directive DEEE.

Ne pas éliminer avec les autres déchets ménagers !

Pour renvoyer les produits indésirables, contacter le site Web du fabricant mentionné sur le produit, ou son distributeur ou bureau de ventes local.

Español

Este producto cumple la Directiva WEEE (2002/96/EC) sobre requisitos de las marcas. La etiqueta que lleva pegada indica que no debe desechar este producto eléctrico o electrónico con los residuos domésticos.

Categoría del producto: con referencia a los tipos de equipo del anexo I de la Directiva WEEE, este producto está clasificado como categoría 9 de "Instrumentación de supervisión y control".

¡No lo deseche con los residuos domésticos!

Para devolver productos que no desee, póngase en contacto con el sitio Web del fabricante mostrado en el producto, o con la oficina de ventas o distribuidor local.

Deutsch

Dieses Produkt stimmt mit den Kennzeichnungsanforderungen der WEEE-Richtlinie (2002/96/EC) überein. Das angebrachte Etikett weist darauf hin, dass dieses elektrische/elektronische Produkt nicht in Hausmüll entsorgt werden darf.

Produktkategorie: In Bezug auf die Gerätetypen in Anhang I der WEEE-Richtlinie ist dieses Produkt als Kategorie 9 "Überwachungs- und Kontrollinstrument" klassifiziert.

Nicht in Hausmüll entsorgen!

Zur Rückgabe von unerwünschten Produkten die auf dem Produkt angegebene Website des Herstellers oder die zuständige Verkaufsstelle bzw. den zuständigen Fachhändler konsultieren.

Italiano

Questo prodotto risponde ai requisiti sull'etichettatura stabiliti nella Direttiva RAEE (2002/96/CE). Il simbolo apposto indica che non si deve gettare questo prodotto elettrico o elettronico in un contenitore per rifiuti domestici.

Categoria del prodotto: con riferimento ai tipi di apparecchiature elencate nell'Allegato 1 della Direttiva RAEE, questo prodotto rientra nella categoria 9 "Strumenti di monitoraggio e di controllo".

Non gettare in un contenitore per rifiuti domestici.

Per restituire prodotti non desiderati, visitare il sito Web del produttore riportato sul prodotto o rivolgersi al distributore o all'ufficio vendite locale.

Português

Este produto está em conformidade com as exigências de rotulagem da Diretiva WEEE (2002/96/EC). O rótulo afixado indica que o utilizador não deve deitar este produto eléctrico/electrónico fora juntamente com o lixo doméstico.

Categoria do produto: No que se refere aos tipos de equipamento listados no Anexo I da Directiva WEEE, este produto está classificado como produto da categoria 9, "Instrumentação de monitorização e controlo".

Não deite fora juntamente com o lixo doméstico!

Para devolver produtos indesejados, contacte o fabricante através do Website constante do produto ou contacte o seu representante de vendas ou distribuidor local.

Nederlands

Dit product voldoet aan de merktekenvereisten van de AEEA-richtlijn (2002/96/EG). Het aangebrachte merkteken duidt erop dat dit elektrische/elektronische product niet met het huishoudelijk afval mag worden afgevoerd.

Productcategorie: Met betrekking tot de apparatuurcategorieën van bijlage I van de AEEA-richtlijn, valt dit product onder categorie 9 'meet- en controle-instrumenten'.

Niet afvoeren met huishoudelijk afval!

Om ongewenste producten te retourneren, neemt u contact op met de website van de fabrikant die op het product staat vermeld, of met uw plaatselijke verkooppunt of distributeur.

Svenska

Denna produkt uppfyller märkningskraven enligt WEEE Directive (2002/96/EC). Märkningsetiketten anger att du inte får kassera denna elektriska/elektroniska produkt tillsammans med vanliga hushållssopor.

Produktkategori: Med hänvisning till utrustningstyperna i WEEE Directive Annex I, är denna produkt klassad som kategori 9 "Monitoring and Control Instrumentation" (Instrument för övervakning och styrning).

Får ej kasseras tillsammans med vanliga hushållssopor!

Returnera ej önskvärda produkter genom att gå till tillverkarens webbplats, vilken anges på produkten, eller till det lokala försäljningskontoret eller distributören.

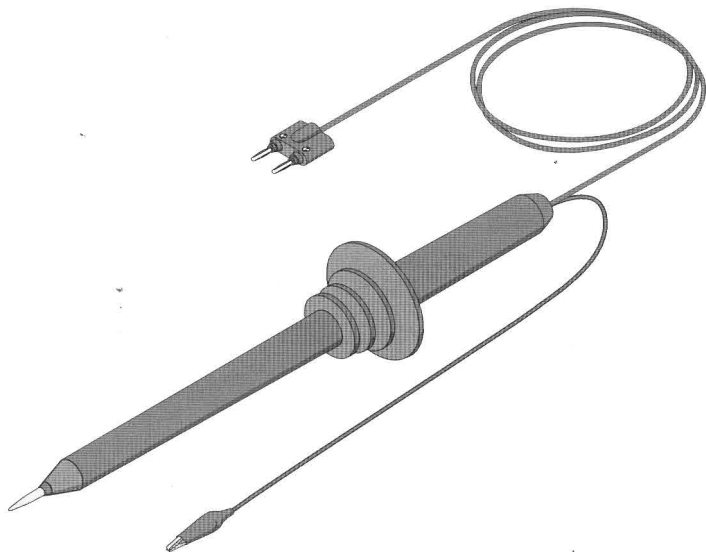
Norsk

Dette produktet oppfyller bestemmelsene ifølge WEEE-direktiv (2002/96/EC) med krav til merking. Påsatt merke viser at det ikke er tillatt å kassere dette elektriske/elektroniske produktet sammen med husholdningsavfall.

Produktkategori: På grunnlag av utstyrstypene i WEEE-direktivet, vedlegg I, er dette produktet klassifisert i kategori 9, "Instrumentering for overvåking og kontroll".

Må ikke kastes sammen med husholdningsavfall!

Ved behov for returforsendelse av uønskede produkter må du gå til produsentens nettside som er angitt på produktet, eller du må kontakte det lokale salgskontoret eller den lokale forhandleren.



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