

**AC/ DC KILOVOLTMETER**

**MODEL NO. KVM50A**

**SERIAL NUMBER**

**Phenix Technologies, Inc.  
75 Speicher Drive  
Accident, Maryland 21520**

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DMC  
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**DANGER / WARNINGS**

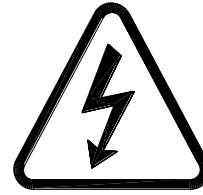
# **DANGER**

**Complete Grounding of this unit is necessary for the safe operation of this equipment. Disconnect inputs before ungrounding this equipment**

## GENERAL SAFETY PRECAUTIONS



# CAUTION



## HIGH VOLTAGE

**This equipment is capable of providing POTENTIALLY LETHAL VOLTAGES! Improper operation or test practices may result in injury or death to the operator or surrounding personnel.**

The operation of High Voltage test equipment should only be performed by personnel familiar with HIGH VOLTAGE testing and safety procedures. The operator of this equipment must be aware of all hazards associated with High Voltage testing. The operator is responsible for himself and others in close proximity of the testing area.

Some General Safety Practices for working with High Voltage Test Equipment have been listed below for your reference.

- Become familiar with your instrument before performing an actual test
- Know your work area, check that all circuits are de-energized and locked out.
- Never work alone; always work with another qualified worker.
- Mark off entire work area with barriers and warning tape.
- Make all personnel aware of your testing activities.
- Be aware of dangerous conditions that may arise from energizing a test specimen.
- Never modify test equipment, modifications to equipment could introduce an unknown hazard or hinder a designed-in safety feature.
- DO NOT operate damaged equipment. Remove power, and do not use the equipment until safe operation can be verified by service-trained personnel.

Phenix Technologies, Inc. assumes no liability for unsafe or improper use of test equipment.

## SECTION 2: TECHNICAL SPECIFICATIONS

### AC/DC KILOVOLTMETERKVM50E

#### KVM50 DIVIDER

HIGH VOLTAGE AC INPUT:	50kVAC maximum						
HIGH VOLTAGE DC INPUT:	50kVDC maximum						
HIGH VOLTAGE PK INPUT:	74kV PEAK (AC)						
DIVIDER RESISTANCE:	300M $\Omega$						
DIVIDER CAPACITANCE:	$\leq 15$ pF						
DIVIDER RATIO:	10,000:1						
INSTRUMENTATION:	AC / BATTERY POWERED						
POWER ADAPTOR:	INPUT: 85-264 Volts AC, 0.6 AMPS, 47-63 HZ OUTPUT: +15 VDC, 1.66 AMP						
INPUT JACK:	+15 VDC, 1 AMP						
BATTERY PACK:	9.6 Volt Ni-MH 3800 mA hr						
VOLTAGE MEASUREMENT:	Voltage is measured by means of Peak Responding, RMS or AVG Circuitry. 4 ½ Digit LCD display.						
RANGES:	Low Range – 20kV AC & DC High Range – 50kV AC & DC						
ACCURACY:	1% of Reading from 10% -100% of Range						
FUNCTION SELECTIONS:	<ol style="list-style-type: none"> <li>1. Peak / <math>\sqrt{2}</math> (Peak responding calibrated to RMS Value)</li> <li>2. Peak (Peak responding calibrated to Peak Value)</li> <li>3. RMS (True RMS)</li> <li>4. AVG (True Average Value, <b>not</b> RMS equivalent)</li> <li>5. Peak DC (Peak responding including ripple peak)</li> <li>6. Ripple Voltage (RMS value of a DC Ripple voltage)</li> <li>7. DC RIPPLE (Peak to peak AC ripple on DC voltage / 2)</li> </ol>						
FREQUENCY RESPONSE: (SINUSOIDAL WAVEFORM)	AC and Ripple voltage measurement functions in the range of 20-1000Hz.						
SETTLING TIME:	<table> <tr> <td>AC Peak, AC Peak / <math>\sqrt{2}</math>,</td> <td>--Up to 30 seconds</td> </tr> <tr> <td>DC Peak, DC Ripple</td> <td></td> </tr> <tr> <td>AC AVG, AC RMS, DC AVG</td> <td>--Up to 5 seconds</td> </tr> </table>	AC Peak, AC Peak / $\sqrt{2}$ ,	--Up to 30 seconds	DC Peak, DC Ripple		AC AVG, AC RMS, DC AVG	--Up to 5 seconds
AC Peak, AC Peak / $\sqrt{2}$ ,	--Up to 30 seconds						
DC Peak, DC Ripple							
AC AVG, AC RMS, DC AVG	--Up to 5 seconds						
ENVIRONMENTAL CONDITIONS:	10-40°C, Indoor/Outdoor in fair weather Humidity <95%, non-condensing Altitude <3000 ft (1000 meters)						

**DIMENSIONS:**

30 1/2" H X 9 1/2" W X 9 1/2" D  
775mm H X 241 mm W X 241 mm D

**WEIGHT:**

30.5 LBS. 13.8 kg

\* WEIGHT INCLUDES ALL CABLES

## SECTION 3: UNCRATING/MECHANICAL SET-UP

Exercise care in removing shipping materials so as not to damage the unit.

Perform a visual inspection to determine if the unit was damaged in shipment. If there are any signs of physical damage such as dents, scratches, or oil leaks, contact the Service Department at Phenix Technologies before proceeding.

**Read and understand all setup and operating instructions before use of the unit. Failure to do so may cause damage to the unit and possibly void the warranty.**

## SECTION 4: ELECTRICAL SET-UP / OPERATIONAL NOTES

### **WARNING!**

**THIS UNIT SHOULD ONLY BE OPERATED BY PERSONS KNOWLEDGEABLE OF HIGH VOLTAGE TESTING AND SAFETY PROCEDURES. IMPROPER OPERATION MAY RESULT IN INJURY OR DEATH.**

**ENSURE THAT UNIT TO BE TESTED IS DE-ENERGIZED AND DISCHARGED! ENSURE THAT WORKING ENVIRONMENT IS SAFE AND FREE OF HAZARDS.**

- Place the test set in the desired location. Divider base must be at ground level. High voltage should enter divider from above at an angle of no greater than forty-five degrees from vertical for highest accuracy readings.
- Connect a ground of sufficient size from the source ground to the grounding post located at the base of the divider. (A 10' lead is supplied with the unit.)

**CAUTION: The ground post on the divider base must be connected to the ground or damage to the unit may result.**

- Connect the supplied coaxial cable between the low voltage arm located at the base of the divider and the metering module. (A 25' lead is supplied with the unit.)

NOTE: The coaxial lead is part of the calibration. Significantly changing the length of the meter lead will affect the AC calibration.

**CAUTION: The meter module has to be grounded for safe and proper operation.**

- Connect the ground post on the metering module to an appropriate ground (A 10' lead is supplied with the unit).

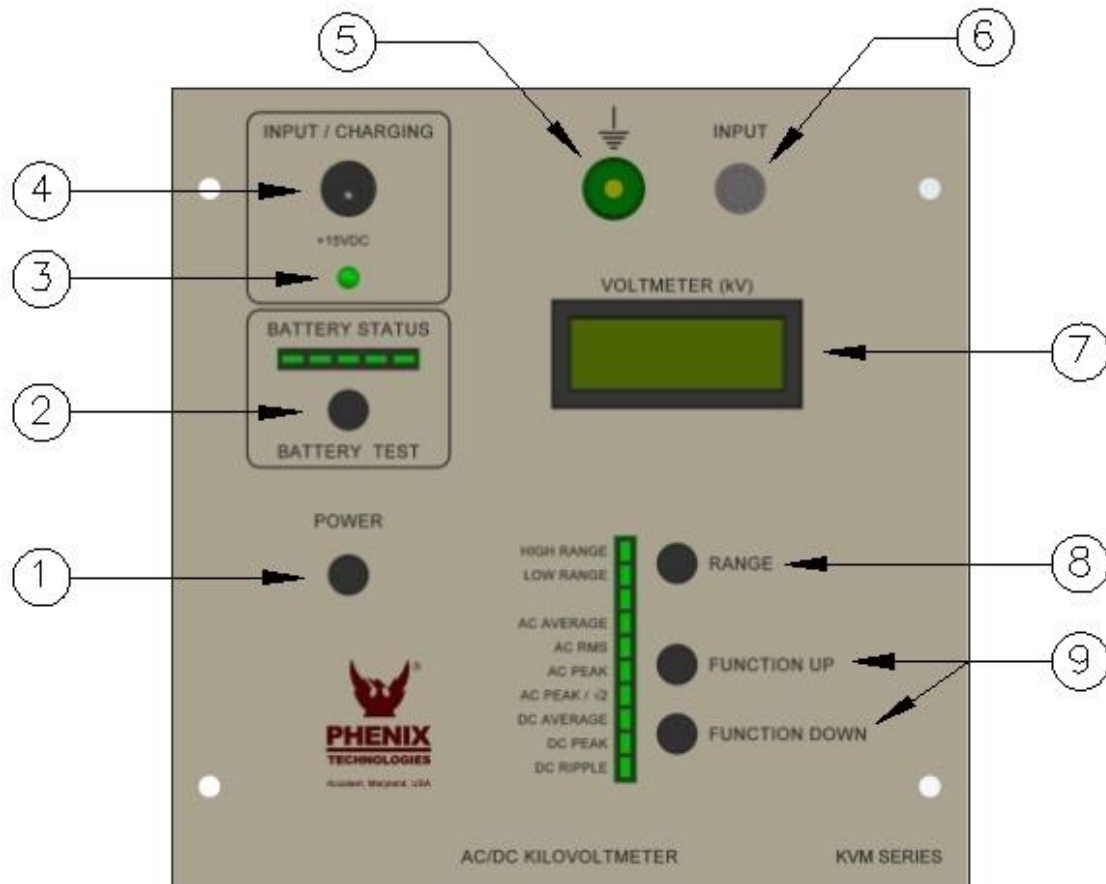
**CAUTION: A ground should always be connected to the ground post on the metering module.**

- Connect the source voltage to be measured to the top of the divider by an appropriate and safe method.

**NOTE: Unit is designed to measure voltage in reference to ground. Source voltage and divider ground post must be ground referenced for unit to operate properly.**



## ELECTRICAL SET-UP / OPERATIONAL NOTES



1. **CONTROL POWER SWITCH:** Button will turn on or turn off control power of KVM.
2. **BATTERY STATUS:** Press button to indicate charge level of battery.
3. **INPUT / CHARGING LAMP:** Illuminates when external input / charging power is present.
4. **INPUT JACK:** External input / charging jack provides for battery charging or AC operation with included power adapter.
5. **GROUND STUD:** Ground stud for connected metering module to ground.
6. **BNC INPUT CONNECTOR:** BNC input connector connects the metering module to divider.
7. **METER:** 4 1/2 digit meter displays measured value of input voltage.
8. **MEASUREMENT RANGE SELECTOR:** Pressing range button will changes between the low and high range of the meter.
9. **MEASURING FUNCTION SELECTOR:** Pressing function up/function down will allow for selecting measurement function.

## SECTION 5: OPERATING INSTRUCTIONS

### WARNING

**THIS UNIT SHOULD ONLY BE OPERATED BY PERSONS KNOWLEDGEABLE OF HIGH VOLTAGE TESTING AND SAFETY PROCEDURES. IMPROPER OPERATION MAY RESULT IN INJURY OR DEATH.**

#### 1. DIVIDER WITH METER MODULE OPERATION:

- Make sure connections have been made as described in “Set-Up” section.
- Press and hold power button to turn metering module on.
- Select the desired range for voltmeter based on the expected input signal level.
- Select desired mode for voltmeter with function buttons.

**NOTE: If the Ripple voltage measurement mode is to be selected, the Range selector must be set for the required input voltage level. If ripple voltage is to be read on input voltage over 20kV, the range selector has to be on high range, regardless of the expected ripple voltage level. To avoid damage to the unit, ascertain that the unit will not over-range on the AVG or the DC modes before attempting to read the ripple voltages. DO NOT attempt to read ripple voltage on a range lower than required to measure the full input voltage.**

- Activate high voltage source.
- Measure voltage as required.
- De-activate high voltage source and assure, as appropriate, high voltage source is de-energized and discharged.
- Press and hold power button to turn metering module off.
- After ensuring high voltage source and divider are de-energized and discharged, all leads and connections may be disconnected and unit.
- Do not subject unit to Flashovers. Damage may occur. If meter becomes disabled from Flashover or Transient condition, refer to Troubleshooting section.

## OPERATING INSTRUCTIONS

### 2. STAND ALONE DIVIDER OPERATION:

- Make sure connections have been made as described in “Set-Up” section, except that the meter module will not be used or connected.
- Connect a Voltmeter to the BNC output on the base of the divider with the 25' coaxial cable.

**NOTE:** The divider has a 10,000 to 1 ratio. At 50kV input, the output voltage will be 5V. The meter impedance needs to be  $10M\Omega$  DC, and  $1 M\Omega, \leq 200pF$  AC for the highest possible accuracy. Readings will correspond to the type of meter used. AVG will show AVG, RMS will show RMS etc. Use DC range for DC signals (10 meg input meter).

- Select desired mode for voltmeter.
- Activate high voltage source.
- Measure voltage as required.
- De-activate high voltage source and ensure, as appropriate, that high voltage source is de-energized and discharged.
- After ensuring that high voltage source and unit are de-energized and discharged, all leads and connections may be disconnected and unit packaged for transport or storage.

### 3. STAND ALONE METER MODULE OPERATION:

It is not recommended to operate the meter head without the divider. The meter head is not a stand alone voltmeter.

## **SECTION 6: CALIBRATION**

It is recommended that calibration be performed on a yearly basis.

**CAUTION: CALIBRATION SHOULD ONLY BE DONE BY PERSONS FAMILIAR WITH HIGH VOLTAGE TESTING AND SAFETY PROCEDURES!**

### **CALIBRATION PROCEDURES**

Due to the complexity and the standards required to calibrate this instrument, Phenix Technologies does not recommend customer calibration. For further information please contact our Service Department.

## **SECTION 7: MECHANICAL MAINTENANCE**

### **SURFACE**

All surfaces will provide adequate protection against the elements in normal use. It is recommended that the finish be wiped down with nothing stronger than ordinary household cleaner for longer life and for proper electrical operation of the unit. Also inspect all fabrication joints for oil leakage. If a leak is found, consult the Service Department at Phenix Technologies.

## **SECTION 8: STORAGE OF EQUIPMENT**

If the equipment will be stored for a prolonged period, the following precautions are recommended.

- The equipment should be covered and kept in a warm, dry environment (95% maximum humidity, 5 to 50 degrees C).
- Prior to placing the equipment back into operation, all aspects of the maintenance schedule should be strictly adhered to.

## SECTION 9: TROUBLESHOOTING

### METERING MODULE

- **Unit will not turn on:** Battery may be discharged. Recharge battery
- **Unit blanked out during testing because of transient discharge occurrence and won't come back on by cycling the power switch:** Carefully remove front panel, and unplug the battery pack for approximately 30 seconds, then retry power switch.

## SECTION 10: KVM50EA PARTS LIST

QTY.	ITEM	PART #	DESCRIPTION
<b>METERING MODULE</b>			
1	BATTERY	-	BATTERY PACK
1	BNC	1153068	31-010 BNC PNL MT ISOL
1	CABLE	30080007	10FT 10 GA GND CABLE
1	CASE-GND	1351103	BINDING POST (GREEN) 459-104
1	DC JK	-	DC POWER JACK- 2.1MM
1	M1		4-1/2 DIGIT LCD PANEL
1	METER PLUG	1152210	1-640440-0,CON 10CKT.1
1	NE1	1609990	NE-2B NEON
1	PCB 1372P1	-	BATTERY POWER MANAGER
1	PCB 1405P0	-	KVM INTERFACE BRD
1	PCB 1417P1	-	METERING BRD
1	PWR ADAPT	-	15VDC SW. POWER SUPPLY 2.1MM
1	PWR CABLE	1077167	INPUT POWER CABLE
<b>DIVIDER BASE</b>			
1	BNC	1153068	31-010 BNC PNL MT ISOL
2	SPACER	1350101	SPCR #6 X 1/4 ALUM 1/4 RND
1	BINDING POST	1351103	BINDING POST (GREEN) 459-104
1	NE2	1609990	NE-2B NEON
3	HIGH ARM	1748315	15W,100MEG,1% MG815 {SGT154}
1	BRACKET	40400058	LOW ARM BRKT, DVD SERIES
1	CABLE	30050003	RG-58 CBL, 25FT, BNC-BNC
1	CABLE	30080007	GND CABLE, 10FT, GRN/YEL STRIPE 10 GA, BLK
1	LOW ARM	7060193746	KVM50E PCB



## SECTION 11: RECOMMENDED SPARE PARTS

Phenix Technologies recommends that the customer purchase and stock the following parts for normal maintenance of the unit. The recommended quantity should be sufficient to support the unit during normal operation.

If the unit will be operated at an isolated site for an extended period or will be subjected to unusual stresses, a larger quantity of parts should be stocked as spares. In such a case, contact your Phenix Technologies' sales representative for a recommendation.

Current prices may be obtained by contacting the Service Department at Phenix Technologies.

<b>Part Number</b>	<b>Description</b>	<b>Quantity</b>
30050003	25' COAXIAL CABLE	1
30080007	10' GND CABLE	1
1077167	MODULAR POWER CORD	1

## SECTION 12: PARTS ORDERING INFORMATION

Replacement parts are available from Phenix Technologies, Inc.

Changes to Phenix Technologies' products are sometimes made to accommodate improved components as they become available, and to give you the benefit of the latest technical improvements developed in our Engineering Department. It is, therefore, important when ordering parts to include the serial number of the unit as well as the part number of the replacement part.

When your purchase order is received at our office, a representative of Phenix Technologies will contact you to confirm the current price of the part being ordered. If a part you order has been replaced with a new or improved part, an Applications Engineer will contact you concerning any change in part number.

Send orders for replacement parts to:

Service Department  
Phenix Technologies, Inc.  
75 Speicher Drive  
Accident, Maryland 21520

PH: 1 (301) 746-8118  
Fax: 1 (301) 895-5570  
E-mail: [info@phenixtech.com](mailto:info@phenixtech.com)

## **SECTION 13: RETURNED MATERIAL**

If for any reason it should become necessary to return this equipment to the factory, the Service Department of Phenix Technologies, Inc. must be given the following information:

Name Plate Information  
Model Number  
Serial Number  
Reason for Return  
Cause of Defect

If Phenix Technologies, Inc. deems return of the part appropriate; it will then issue an "Authorization for Return."

If return is not deemed advisable, other inspection arrangements will be made.

NOTE: Material received at this plant without the proper authorization shall be held as "Customer's Property" with no service until such time as the proper steps have been taken.

Your cooperation is requested in order to ensure prompt service.

## SECTION 14: CIRCUIT DIAGRAM SYMBOLS

CIRCUIT DIAGRAM SYMBOLS  
SYMBOLS POUR SCHEMA DE CIRCUIT  
SYMBOLE ZU SCHEMA

REF	SYMBOL	DESCRIPTION	DESCRIPTION	BEMENKUNG
A		Amplifier	Unite d'amplificateur	Verstärker
ARSR		Surge Arrestor	Parafoudre	Ueberspannungsableiter
C		Capacitor	Condensateur	Kondensator
BSHG		Bushing	Traversee	Durchfuehung
C		Electrolytic Capacitor	Condensateur electrol	Eleckrolytik kondensator
F		Fuse	Fusible	Sicherung
CT		Current Transformer	Transformateur de Courant	Stromtransformer
CB		Circuit Breaker	Intérupteur	Unterbrecher
K		Relay, Contactor	Relais, Contacteur	Relais, Schütz
L		Inductor	Self	Drossel, Spule
MOT		Motor	Moteur	Motor
MOV		Movistor	Parafoudre	Movistor
NE		Neon	Parafoudre	Ueberspannungsableiter
LP		Lamp, Indicator	Lampe	Meldeleuchte
R		Resistor	Resistance	Widerstand
R		Variable Resistor	Resistance Variable	Widerstand
T		Transformer	Transformateur	Transformer
TB		Terminal Block	Borne	Lösbare Klemme
X		Connector	Prise de Courant	Steckverbindung
K		Relay Contact Normally Open	Contact Normalement Ouvert	Schlierskontakt
K		Relay Contact Normally Closed	Contact Normalement Fermé	Oeffnungskontakt
K		Changeover Contact	Contact de Changement	Umschaltkontakt
		Shielded Wire	Cable blindé	Abgeschirmetes Kabel
TR		Transistor	Transisteur	Transistor
M		Analog Meter	Instrument Analogue	Analog Meter
D		Diode	Diode	Diode
Z		Zener	Diode Zener	Zener
SCR		Thyristor	Thyristor	Thyristor
SW		Normally Open Maintained Switch	Interrupteur Normalement Maintenu Ouvert	Schrittschalter (Schliesser)
SW		Normally Closed Maintained Switch	Interrupteur Normalement Maintenu Fermé	Schrittschalter (Oeffner)
SW		Normally Closed Momentary Switch	Interrupteur Normalement Fermé Momentanement	Druckschalter (Oeffner)
SW		Normally Open Momentary Switch	Interrupteur Normalement Ouvert Momentanement	Druckschalter (Schliesser)
DP		Current Overload Device	Dispositif De Sur Intensité	UeberstromschutzEinheit

**SECTION 15: SCHEMATICS AND DRAWINGS**

<b>Drawing Number</b>	<b>Description</b>
1. 7916005	KVM CONTROLS SCHEMATIC
2. 796-XX-XXXX	KVM50EA SCHEMATIC



