

**AC KILOVOLTMETER  
MODEL NO. KVM300  
VERSION 2.1**

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JPG/SLU  
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KVM300

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**SECTION 1: DANGER / WARNINGS****WARNING !!**

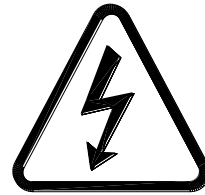
**Complete Grounding of this unit is necessary for the safe operation of this equipment. Disconnect inputs before ungrounding this equipment**

## DANGER / WARNINGS

### 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 KILOVOLTMETER KVM300

#### KVM 300 DIVIDER

HIGH VOLTAGE AC INPUT: 300 KVAC maximum  
 HIGH VOLTAGE DC INPUT: 300 KVDC maximum  
 HIGH VOLTAGE PK INPUT: 300 KV peak max.

DIVIDER CAPACITANCE:  $\leq 67$  pF  
 DIVIDER RESISTANCE: 1,200 M $\Omega$   
 DIVIDER RATIO: 10,000:1

#### INSTRUMENTATION: AC / BATTERY POWERED

POWER ADAPTOR: INPUT: 100-240 Volts AC, 0.4 AMPS, 47-63 HZ  
 OUTPUT: +18 VDC, 0.8 AMP

INPUT JACK: +18 VDC, 0.8 AMP  
 BATTERY PACK: 9.6 Volt Ni-MH 3200 mA hr

VOLTAGE MEASUREMENT: Voltage is measured by means of Peak Responding, RMS or AVG Circuitry. Display is 4 ½ Digit LED with adjustable backlighting

ACCURACY: 1% of Reading  $\pm$  3 counts from 10% -100% of Range

FUNCTION SELECTIONS:

1. Peak /  $\sqrt{2}$  (Peak responding calibrated to RMS Value)
2. Peak (Peak responding calibrated to Peak Value)
3. RMS (True RMS)
4. AVG (True Average Value, **not** RMS equivalent)
5. Peak DC (Peak responding including ripple peak)
6. Ripple Voltage (RMS value of a DC Ripple voltage)

FREQUENCY RESPONSE: (SINUSOIDAL WAVEFORM)

|                           |                           |
|---------------------------|---------------------------|
| Peak / $\sqrt{2}$ , Peak, | --Response: DC, 5-1000Hz  |
| RMS, Ripple V             | --Response: 20 - 1000Hz   |
| AVG                       | --Response: DC, 20-1000Hz |

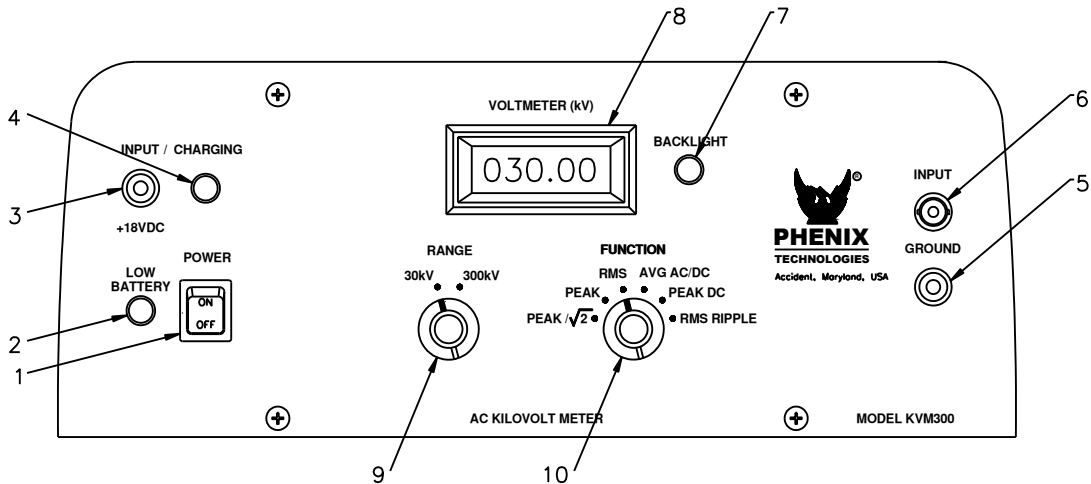
SETTLING TIME:

|                          |                    |
|--------------------------|--------------------|
| Peak / $\sqrt{2}$ , Peak | --Up to 30 seconds |
| RMS, Ripple V            | --Up to 15 seconds |
| AVG                      | --Up to 5 seconds  |

\*Note: The lower the frequency the longer the settling time.

#### DIMENSIONS: KVM 300

|                               |         |
|-------------------------------|---------|
| Controls 7" H x 12" W x 14" D | 11 lbs. |
| HV 63" H x 26" W x 26" D      | 80 lbs. |



1. CONTROL POWER SWITCH: Depressing this switch will turn on or turn off the control power of the KVM.
2. LOW BATTERY: Battery needs recharged when lamp is illuminated
3. INPUT JACK: External input / charging jack provides for battery charging or AC operation with included power adapter.
4. INPUT / CHARGING LAMP: Illuminates when external input / charging power is present.
5. GROUND STUD: This Ground stud must be connected to ground for metering module ground.
6. BNC INPUT CONNECTOR: This BNC input connector connects the meter module to the divider.
7. BACKLIGHT DIMMER: This dial adjusts the intensity of the backlight for use during low light conditions.
8. METER: This 4 1/2 digit meter displays the measured value of the input voltage.
9. MEASUREMENT RANGE SELECTOR: This rotary selector changes between the low and high range of the meter. Meter low range should not be used past 30kV. Meter may not be accurate past 100% of reading and actual voltage may be much higher than indicated.
10. MEASURING FUNCTION SELECTOR: This rotary selector allows selection of the measurement function of the KVM.

## 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 factory before proceeding.

### NOTE

**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.

**CAUTION: Meter low range should not be used past 30kV. Meter may not be accurate past 100% of reading and actual voltage may be much higher than indicated.**

**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.**



## 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.
- Switch control power switch to **ON** position.
- Select the desired range for the voltmeter based on the expected input signal level.
- Select desired mode for voltmeter with function switch.

**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 30kV the range selector has to be on high range, regardless of the expected ripple voltage level. To avoid damage to the unit ascertain 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. Meter low range should not be used past 30kV. Meter may not be accurate past 100% of reading and actual voltage may be much higher than indicated.
- De-activate high voltage source and assure, as appropriate, that high voltage source is de-energized and discharged.
- When testing is complete, switch control power to **OFF** position.
- After assuring 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.
- Do not subject unit to Flashovers. Damage may occur. If meter becomes disabled from Flashover or Transient condition, refer to Troubleshooting section.
- Battery operational time will be extended if Backlight is kept at minimum setting.
- Low battery lamp comes on at approximately 20% of charge. If unit is run too long after low battery lamp comes on, it will shut down and must be recharged before it will turn on again.

## 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 approximately 10,000 to 1 ratio. At 300kV input the output voltage will be 30V. Readings will correspond to the type of meter used. AVG will show AVG, RMS will show RMS etc. 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 ( $10M\Omega$  input meter).

- Select desired mode for voltmeter.
- Activate high voltage source.
- Measure voltage as required.
- De-activate high voltage source and assure, as appropriate, that high voltage source is de-energized and discharged.
- After assuring 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 an 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 Phenix Technologies' Service Department.

## **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.
- Unit does not measure correctly after flashover or transient discharge occurrence: U5 possibly damaged. Replace with LT1055 OP Amp.

## SECTION 10: 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 Parts Ordering Department at Phenix Technologies.

| <b>Part Number</b> | <b>Description</b>             | <b>Quantity</b> |
|--------------------|--------------------------------|-----------------|
| 30050003           | 25' COAXIAL CABLE              | 1               |
| 30080007           | 10' GND CABLE                  | 1               |
| 1864003            | INPUT POWER SWITCH-SW2         | 1               |
| 1603605            | F1, 5A                         | 1               |
| 1863037            | RANGE / MODE SWITCH            | 1               |
| 1506407            | VOLTMETER-KNS DMO-782          | 1               |
| 1761087            | BACKLIGHT POTENTIOMETER        | 1               |
| 1077167            | MODULAR POWER CORD             | 1               |
| 1795107            | U5, LT1055 OP AMP              | 2               |
| 1590006            | 15 VDC POWER / CHARGING SUPPLY | 1               |
| 1590008            | BATTERY PACK                   | 1               |

## **SECTION 11: 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



## SECTION 12: 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 13: 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 Arrester                    | Parafoudre                                    | Ueberspannungsableiter       |
| C    |        | Capacitor                         | Condensateur                                  | Kondensator                  |
| BSHG |        | Bushing                           | Traversee                                     | Durchfuehoung                |
| C    |        | Electrolytic Capacitor            | Condensateur electrol                         | Eleckrolytik kondensator     |
| F    |        | Fuse                              | Fusible                                       | Sicherung                    |
| CT   |        | Current Transformer               | Transformateur de Courant                     | Stromtransformer             |
| CB   |        | Circuit Breaker                   | Interupteur                                   | 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   | Loesbare Klemme              |
| X    |        | Connector                         | Prise de Courant                              | Steckverbindung              |
| K    |        | Relay Contact Normally Open       | Contact Normalement Ouvert                    | Schlierskontakt              |
| K    |        | Relay Contact Normally Closed     | Contact Normalement Ferme                     | 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 Ferme       | Schrittschalter (Oeffner)    |
| SW   |        | Normally Closed Momentary Switch  | Interrupteur Normalement Ferme Momentanement  | Druckschalter (Oeffner)      |
| SW   |        | Normally Open Momentary Switch    | Interrupteur Normalement Ouvert Momentanement | Druckschalter (Schliesser)   |
| DP   |        | Current Overload Device           | Dispositif De Sûr Intensité                   | UeberstromschutzEinheit      |

## SECTION 14: SCHEMATICS AND DRAWINGS

| Drawing Number | Description      |
|----------------|------------------|
| 1. 7916004     | KVM300 SCHEMATIC |

