

AC/ DC KILOVOLTMETER
MODEL NO. KVM100 / KVM 200
Version 2.3

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

Copyright © Phenix Technologies, Inc.

JSH
SEPTEMBER 7, 2011
Rev 4/5/2017 nab

TABLE OF CONTENTS

Description	Section Number
DANGER / GENERAL SAFETY PRECAUTIONS	1
TECHNICAL SPECIFICATIONS	2
UNCRATING/MECHANICAL SET-UP	3
ELECTRICAL SET-UP / OPERATIONAL NOTES	4
OPERATING INSTRUCTIONS	5
CALIBRATION	6
MECHANICAL MAINTENANCE	7
STORAGE OF EQUIPMENT	8
TROUBLESHOOTING	9
PARTS LISTS	10
RECOMMENDED SPARE PARTS	11
PARTS ORDERING INFORMATION	12
RETURNED MATERIAL	13
CIRCUIT DIAGRAM SYMBOLS	14
ELECTRICAL SCHEMATICS	15
CUSTOMER COMMENTS / SUGGESTIONS	16

DANGER / WARNINGS

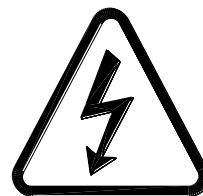
DANGER

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 KILOVOLTMETER KVM100 / KVM 200

	<u>KVM100 DIVIDER</u>	<u>KVM 200 DIVIDER</u>
HIGH VOLTAGE AC INPUT:	100kVAC maximum	200 KVAC maximum
HIGH VOLTAGE DC INPUT:	100kVDC maximum	200 KVDC maximum
HIGH VOLTAGE PK INPUT:	142kV PEAK (AC)	200 KV peak max.
DIVIDER CAPACITANCE:	≤ 200 pF	≤ 100 pf
DIVIDER RESISTANCE:	380M Ω	760 m Ω
DIVIDER RATIO:	10,000:1	10,000:1

INSTRUMENTATION: AC / BATTERY POWERED

POWER ADAPTOR:	INPUT: 100-240 Volts AC, 0.4 AMPS, 47-63 HZ OUTPUT: +18 VDC, 1 AMP	
INPUT JACK:	+18 VDC, 1 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 from 10% -100% of Range	
FUNCTION SELECTIONS:	<ol style="list-style-type: none"> 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, RMS, Ripple V AVG	--Response: DC, 5-1000Hz --Response: 20 - 1000Hz --Response: DC, 20-1000Hz
SETTLING TIME:	Peak / $\sqrt{2}$, Peak RMS, Ripple V AVG	--Up to 30 seconds --Up to 15 seconds --Up to 5 seconds *Note: The lower the frequency the longer the settling time.

ENVIRONMENTAL CONDITIONS

10-40°C, Indoor/Outdoor in fair weather
Humidity <95%, non-condensing
Altitude <3000 ft (1000 meters)

2.2

DIMENSIONS:

KVM 100

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

30.5 LBS. 13.8 kg

* WEIGHT INCLUDES ALL CABLES

KVM 200

43 1/2" H X 9 1/2" W X 9 1/2" D
1105" H X 241 mm W X 241 mm D

*** WEIGHT:**

43 LBS. 19.5 kg

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.

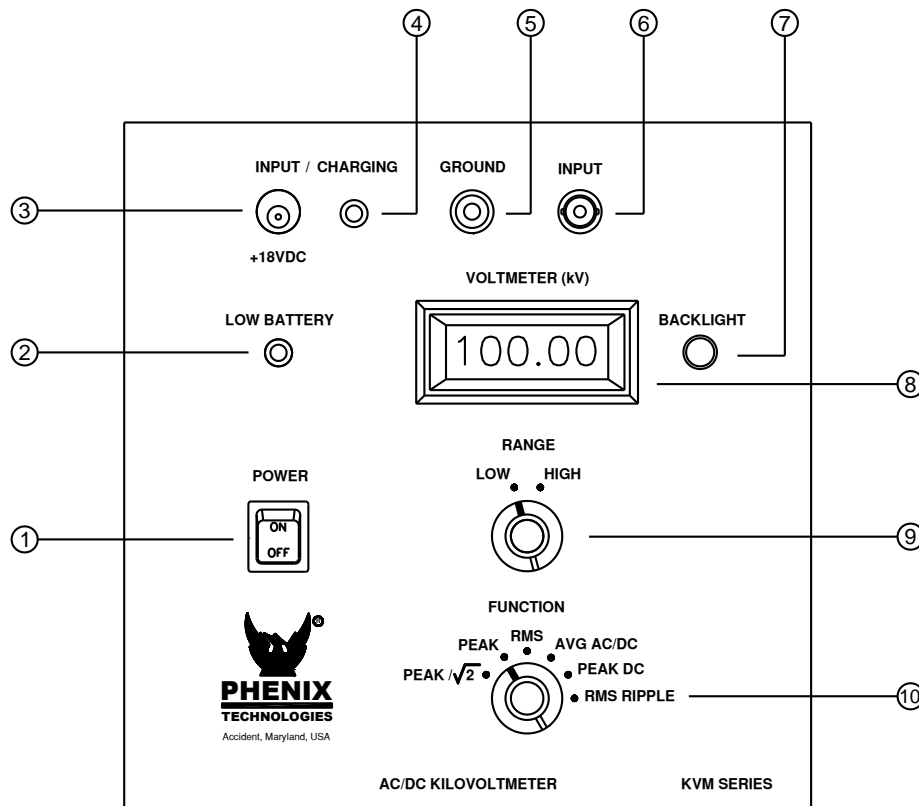
- Connect the ground post on the metering module to an appropriate ground (A 10' lead is supplied with the unit).

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: 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.
10. MEASURING FUNCTION SELECTOR: This rotary selector allows selection of the measurement function of the KVM.

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 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, that high voltage source is de-energized and discharged.
- When testing is complete, switch control power to **OFF** position.
- 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.
- 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 a 10,000 to 1 ratio. At 100kV input, the output voltage will be 10V. 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.
- Unit does not measure correctly after flashover or transient discharge occurrence: U5 possibly damaged. Replace with LT1055 OP Amp.

SECTION 10: KVM100/200 PARTS LIST

QTY.	ITEM	PART #	DESCRIPTION
METERING MODULE			
1	PWR CORD	1077167	18/3 9'10" STRT MOD PWR CORD
1	25D	1151201	25 PIN D-SUBMIN CONN. (FEMALE) W/SOLDER CUP
1	25D	1151210	FA920 FEMALE SCREWLOCK
1	BATTERY	1590008	BATTERY BOSS BATTERY PACK
1	BATTERY	1590007	BATTERY PACK PIGTAIL (BB-CABLE-A)
1	BNC	1153068	31-010 BNC PNL MT ISOL
2	C4 B-BACK	1098080	100 UF, 50 V
1	CASE-GND	1351103	BINDING POST (GREEN) 459-104
1	CHARGE LMP	1420117	LED,GRN-CHROME BEZEL
1	CONTROLLER	1590012	BATTERY BOSS POWER CONTROLLER UNIT
1	DC JK	1351210	DC POWER JACK- 2.5MM
1	DIODE	1780025	1N4007 (1000VR, 1.0A)
1	F1	1603910	S-8002-1 ONE POLE FUSEBLOCK (AGC)
1	F1	1603605	AGC-5
1	LOWBAT LMP	1420116	LED,RED-CHROME BEZEL
1	M1	1506407	4-1/2 DIGIT BACK LIGHT METER
1	METER PLUG	1152235	1-640440-8,CON 18CKT.1
1	NE1	1609990	NE-2B NEON
1	PWR ADAPT	1590006	18VDC SW. POWER SUPPLY (CE)
1	R51	1761087	100 OHM, 1 TURN, 1/2 WATT POT
1	R51	1355120	8MM, 1/8" COLLET KNOB
1	R51	1355125	8MM FLAT CAP-LT GRAY
1	R64	1722050	.5W, 1.2K, 1%
1	R65	1720600	.5W, 300 OHMS, 1%
4	SPACERS	1350410	SPCR 6-32 M/F X 3/4 BRS 1/4 HEX
2	SW1, SW3	1355310	KNOB PKAP-50B-1/4
2	SW1,SW3	1863037	ROTARY SW 2P 2-6 POS-N.S.
1	SW2	1864003	DPST ROCKER SWITCH
1	PCB 1256	31125602	KVM100/200 PCB1256 20-1KHZ RMS
1	CABLE	30080007	GND CABLE, 10FT, GRN/YEL STRIPE 10 GA, BLK BOOT
DIVIDER BASE			
1	BNC	1153068	BNC, ISOLATED PANEL MOUNT,31-010
1	PCB1282 (DVD100)	31128201	DVD100 LOW ARM ASSEMBLY
1	PCB1282 (DVD200)	31128202	DVD200 LOW ARM ASSEMBLY
2	FEED THRU	2410050	LUNDEY-250S
1	NE2	1609990	NE2 NEON LAMP
1	GROUND TERMINAL	1351100	BINDING POST, BLACK
1	METERING CABLE	30050003	CABLE, COAXIAL, 25'
1	GROUND CABLE	30080007	10' GROUND CABLE
1	TOROID (DVD100)	2401120	ALUMINUM SPINNING – 1" X 6"
2	TOROID (DVD200)	2401030	ALUMINUM SPINNING – 2" X 8"

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.

Part Number	Description	Quantity
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 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

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	Tranversee	Durchfuehung
C		Electrolytic Capacitor	Condensateur electrol	Eleckrolytik kondensator
F		Fuse	Fusible	Sicherung
CT		Current Transformer	Transformateur de Courant	Stromtransformer
CB		Circuit Breaker	Interrupteur	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 Ferme	Oeffnungskontakt
K		Changeover Contact	Contact de Changement	Umschaltkontakt
		Shielded Wire	Cable blindé	Abgeschirmetes Kabel
TR		Transistor	Transistor	Transistor
M		Analog Meter	Insrument 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 Sur Intensite	UeberstromschutzEinheit

SECTION 15: SCHEMATICS AND DRAWINGS

Drawing Number	Description
1. 7916002	KVM100/200 SCHEMATIC

