

Bierer
METERS

Safety is number one.



PD800W™
PD Series Cordless
Phasing Tester
Operating Instructions

CE

Patent No. 6,617,840 and 6,734,658



MADE IN
USA

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Limitation of Warranty and Liability

Bierer & Associates Inc. warrants this product to be free from defects in workmanship and material, under normal use and service conditions for a period of one year from date of shipment.


Due to continuous product improvement and development, Bierer & Associates Inc. reserves the right to modify product designs and specifications without notice.


It is impossible to eliminate all risks associated with the use of high voltage electrical devices including this device. Risks of serious injury or death are inherent in working around energized electrical systems. Such risks include but are not limited to variations of electrical systems and equipment, manner of use or applications, weather and environmental conditions, operator mentality, and other unknown factors that are beyond the control of Bierer & Associates Inc.


Bierer & Associates Inc. do not express or imply to be an insurer of these risks, and by purchasing or using this product you **AGREE TO ACCEPT THESE RISKS**. IN NO EVENT SHALL Bierer & Associates Inc. BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT.


SAFETY MESSAGE DEFINITIONS per ANSI Z535

These instructions contain important safety messages to alert the user to potentially hazardous situations, how to avoid the hazard, and the consequences of failure to follow the instruction.

The safety alert symbol  identifies a safety message. The signal word following the symbol indicates:

 **DANGER** A hazardous situation which, if not avoided, **will** result in death or serious injury and equipment damage.

 **WARNING** A hazardous situation which, if not avoided, **could** result in death or serious injury and equipment damage.

 **CAUTION** A hazardous situation which, if not avoided, **could** result in minor or moderate injury and equipment damage.

NOTICE Important safety message relating to equipment damage only.

PRODUCT SAFETY INFORMATION



WARNING

1. Meter assembly and live line tool adapters shall be considered **non-insulating**. Do not let live line tool fittings come in contact with energized or grounded conductors. **The live line tool adapters, fittings, and handles supplied with meters shall not be used on any other devices.**
2. Use appropriate length live line tools for voltage being worked and maintain minimum approach distances as outlined in OSHA 1910.269, Table R-6.
3. All Phasing Meters and Voltage Detectors manufactured during and after 2007 will have a limit mark engraved on the high voltage probe(s) 2.5 inches from the tip to indicate to the user the physical limit that should not be exceeded when approaching and contacting an electrical conductor or other electrical test points. Zero Ohm insulated adapters (81280IE) should be used if limit mark will be exceeded.
4. This equipment should be used only by qualified employees, trained in and familiar with the safety-related work practices, safety rules and other safety requirements associated with the use of this type of equipment.
5. These instructions are not intended as a substitute for adequate training, nor do they cover all details or situations which could be encountered when operating this type of equipment.
6. Before operating this equipment, read, understand and follow all instructions contained in this manual. Keep instructions with equipment.

INSPECTION & MAINTENANCE BEFORE USE



WARNING

1. Prior to using any high voltage test equipment a careful inspection should be made to ensure the unit is free from any contaminants such as dirt, grease, etc. and that there are no apparent physical damages.
2. High voltage probe assemblies shall be wiped clean prior to each use with a silicone impregnated cloth and kept clean and free of contaminants. This will prevent tracking on the outside of the probe and meter error.
3. Always confirm internal battery voltage before and after use.

DESIGN and FUNCTION



WARNING – Limit Mark

-see “Product Safety Information”, item 3, page 3.

The cordless PD800W is designed to operate similar to a conventional phasing tester, but is easier to use because it does not require an interconnect cable. The unit consists of a Reference Probe (transmitter) and a Meter Probe (receiver) and will operate reliably at distances up to 100 feet. The phasing tester is useable from 120V to 800kV.

Each unit has a five-position switch for the following functions:

Off – Unit off for storage or transport.

Deg – Phase angle measurement in degrees for use on Secondary, URD and Overhead. Direct contact from 120V to 51kV (**including capacitive test points**). Non-contact from 51kV to 800kV

URD – Phasing Underground Residential Distribution with Voltage Indications. Direct contact from 4kV to 51kV (**not for capacitive test points**).

OH – Phasing Over-Head conductors with voltage indications Direct contact from 4kV to 51kV.

T – Tests basic meter function and displays the internal 9V battery voltage.

Voltage indications and degree readings are supplemented with phase indicator lights on the Meter Probe for dual confirmation of the phase relationship between the Reference Probe and Meter probe.

0° - indicates an in-phase condition.

120° - indicates out-of-phase condition of 120 degrees.

240° - indicates an out-of-phase condition of 240 degrees.

“DY”- blinking light indicates a Delta/Wye transformation (30 degree phase shift) in conjunction with one of the other three phase indicator lights.

Note 1: For best results, always position the Reference Probe and Meter Probe perpendicular to the conductors being tested and away from all other conductive surfaces such as adjacent phases, neutrals and grounded structures. Maintain a minimum distance of two feet between the body of the probes and all other conductors or grounded surfaces. Maintain a minimum distance of two feet between your hands and the body of the probe regardless of the voltage being tested. Never hold the tester with rubber gloves when in use.

Note 2: When phasing on **URD** transformer bushings use 8128TBALB Bushing Adapters on both the Reference and the Meter Probe.

BATTERY REPLACEMENT for LCD and LED PROBES

The threaded live line tool fitting on the face of the **LCD** meter probe is furnished with two flat edges for use with a wrench or slip joint pliers to remove and install the fitting from the meter housing. The live line tool fitting on the face of the **LED** meter probe is furnished with a hole for use with a screw driver to insert and remove or install the fitting from the meter housing. To remove, turn the live line tool fitting in a counterclockwise direction and install in a clockwise direction.



WARNING

- **When in operation the selector switches on the Reference Probe and Meter Probe must be in the same position. Failure to do so could produce false readings, resulting in equipment damage and/or personal injury. Always check the selector switch on both units before and after each use.**

METER SET-UP and TESTING



WARNING

- see “Product Safety Information”, page 3.
- see “Inspection & Maintenance”, page 3.

Testing the Meter Probe:

The Meter Probe completes a self check each time the selector switch is moved from one position to another. It displays the number 51.0 +/- 5 (full scale) and blinks 0, 120, 240 phase sequence indicator lights followed by a blinking **D** (Delta/ Wye Transformation) indicator light.

Test:

The internal 9V battery voltage may be checked by turning the rotary selector switch to the **T** position and holding for several seconds until the indicator lights stop blinking. If the battery voltage displayed is less than 8 volts, shown on the meter as 80, the battery should be replaced. A standard 9 volt battery is located behind the live line tool attachment.

Testing the Reference Probe:

Turn the Meter Probe selector switch to the **URD** or **OH** position. The results of the Reference Probe self checks will be displayed on the Meter Probe. Each time the selector switch on the Reference Probe is moved from one position to another, the number 51.0 will be displayed on the Meter Probe for several seconds.

Test:

The internal 9V battery is checked by turning the selector switch to the **T** position and holding for several seconds. The internal battery voltage of the reference will be displayed on the Meter Probe. If the battery voltage displayed on the Meter Probe is less than 8V, shown on meter as 80, the battery should be replaced. A standard 9 volt battery is located behind the live line tool attachment.



WARNING

- **When in operation the selector switches on the Reference Probe and Meter Probe must be in the same position. Failure to do so could produce false readings, resulting in equipment damage and/or personal injury. Always check the selector switch on both units before and after each use.**

PHASE ANGLE MEASUREMENTS

Direct Contact from 120V to 51kV including Capacitive Test Points



WARNING – see “Meter Set-Up & Testing”, page 6.

1. Attach the Reference and Meter Probe to the appropriate length live line tool for the voltage being tested. Minimum 2 feet (**See Note 1 Pg. 5**)
2. Set the selector switch on both probes to the **Deg** position.
3. With the Reference Probe, touch all conductors one at a time to verify all of the phases are energized. (**See Note 2 on Page 5**).
4. The **White** phase indicator light will be on if there is at least 120 volts present on the conductor.
5. Touch both the Reference Probe and the Meter Probe to a single (the same) energized conductor. The Meter Probe should indicate near zero degrees on the digital display and show a zero degree indication light. A **0°** light on the meter probe indicates an in phase condition. (**See Note 2 on Page 5**).
6. Leave the Reference Probe on the first energized conductor. Touch the Meter Probe to another energized conductor.
7. If the conductors are in phase, the Meter Probe should indicate near zero degrees on the digital display and show a zero degree indication light.
8. If the conductors are out of phase, the Meter Probe will indicate either of the following:
 - a. Nominal 120 degrees and a **120** degrees indicator light or
 - b. Nominal 240 degrees and a **240** degrees indicator light.



WARNING – see “Meter Set-Up & Testing”, page 6.

Delta/ Wye Transformation

The PD800W provides an additional feature of flagging a Delta Wye Transformation with a blinking yellow indicator light labeled "DY".

Expected phase angles when phasing a three-phase system are 0 degrees, 120 degrees, and 240 degrees. The PD800W continuously monitors all phase angles between the Reference Probe and the Meter Probe when used in either the **Deg**, **URD**, or **OH** mode. If the phase angle deviates more than +/- 20 degrees from any of the three expected values of 0, 120, or 240 degrees the **Yellow "DY"** light will blink.

PHASE ANGLE MEASUREMENTS

Non-Contact from 51kV to 800kV



WARNING – see “Meter Set-Up & Testing”, page 6.

1. Attach the Reference and Meter Probe to appropriate length live line tools for the voltage being tested. Minimum 2 feet (**See Note 1 on pg. 5**)
2. Select the **OH** position on the Reference Probe.
3. Bring the Reference Probe to a distance from each conductor that is close to the minimum approach distance for the voltage being tested to verify all conductors are energized. (**See OSHA 1910-269, Table R-6 for a minimum approach distance**).
4. The **White** phase indicator light will be on if the electric field present at the minimum approach distance equals at least 600 volts.
- 5. Reset the selector switches on both probes to the Deg position.**
6. Bring both the Reference Probe and Meter Probe close to the minimum approach distance of a single (the same) conductor. The Meter Probe should indicate near zero degrees on the digital display and show a **0°** indication light.

NOTE 3: On lines 51kV to 600kV the Reference Probe may be suspended from the conductor with optional insulated support hook attachment PD800SH2. Above 600kV use PD800SH4. Meter Probe must be used in non-contact mode as described above in No. 6.

7. Leave the Reference Probe in position with the first conductor. Bring the Meter Probe close to the minimum approach distance of another energized conductor.
8. If the conductors are in phase, the Meter Probe should indicate near zero degrees on the digital display and show a **0°** indication light.
9. If the conductors are out of phase, the Meter Probe will indicate either of the following:
 - a) Nominal 120 degrees and a **120** degrees indicator light or
 - b) Nominal 240 degrees and a **240** degrees indicator light



WARNING – see “Meter Set-Up & Testing”, page 6.

TESTING PHASE SEQUENCE

Phase sequence will be either: **(1 - 2 - 3)** or **(3 - 2 - 1)**
(A - B - C) or **(C - B - A)**

Phase sequence is the order in which the voltages of a three phase system rise and fall. Only two sequences are possible, sometimes referred to as Clockwise or Counter Clockwise rotation. However, three different physical connections are possible to achieve each sequence. Any one of the phases of a three-phase system may be assigned the status of leading phase. This convention is currently left to the discretion of the electric utility.

Sequence: **(1 - 2 - 3)** or **(A - B - C)** **A - B - C - A - B - C - A - B - C**

(B - C - A) **B - C - A - B - C - A - B - C - A**

(C - A - B) **C - A - B - C - A - B - C - A - B**

Sequence: **(3 - 2 - 1)** or **(C - B - A)** **C - B - A - C - B - A - C - B - A**

(B - A - C) **B - A - C - B - A - C - B - A - C**

(A - C - B) **A - C - B - A - C - B - A - C - B**



WARNING – see “Meter Set-Up & Testing”, page 6.

1. Attach the Reference Probe and the Meter Probe to the appropriate length live line tools for the voltage being tested.
2. Set the selector switches on both probes to the **Deg** position.
3. Touch or approach “1” (“A”) phase with the Reference Probe.
4. Touch or approach “2” (“B”) phase with the Meter Probe.
5. Sequence (1 - 2 - 3)
(A - B - C) will be indicated by a nominal 120 degrees on the digital display and a **120** degree indicator light.
6. Sequence (3-2-1)
(C - B - A) will be indicated by a nominal 240 degrees on the digital display and a **240** degree indicator light.



WARNING – see “Meter Set-Up & Testing”, page 6.

VOLTAGE INDICATIONS URD and OH

Direct Contact from 4kV to 51kV

(Does not include Capacitive Test Points)

By design, the PD800W consists of two individual direct contact voltage detectors which communicate with each other via a radio link. When used to display voltage in the **URD** or **OH** positions, the readings are a composite of the actual voltage on the line and the capacitive coupling between the live line tool fitting (quick change, universal, or grip all) to other potentials in the vicinity.

If the live line tool fitting is close to another phase, ground or other voltage source, the reading will be higher than normal. If the live line tool fitting is close to conductors or equipment of the same phase, the reading will be lower than normal. In the PD800W, the phase to phase voltage indications are derived from the two phase to ground voltages present on the Reference Probe and the Meter Probe. The resulting phase to phase reading will be proportional to the phase to ground readings.

Example: If due to field conditions both the Reference Probe and Meter Probe sense 9kV phase-to-ground on a 7.2 kV phase to ground system, the phase-to phase indication would be 16 kV rather than 12 kV. In this example, the meter is simply indicating that the two conductors are out of phase. The out of phase condition will be confirmed with the presence of a **Blue** or **Red** indicator light.

Note 4: Higher than normal reading in the **OH** position can sometimes be lowered closer to normal by retesting in the **URD** position, especially when used in close proximity to neutrals and other grounded surfaces.

Inspect and Test the Unit. Attach the Reference Probe and/or the Meter Probe to the appropriate length live line tool for the voltage being tested. Minimum 2 feet. **(See Note 1 on Page 5)**

1. Phase-to-Phase Voltage Indication - Direct Contact from 4kV to 51kV Does not include Capacitive Test Points

Normal phase-to-phase voltage indications may be obtained in the **URD** or **OH** position by touching one energized phase conductor with the Reference Probe and one energized phase conductor with the Meter Probe. **(See Note 1 on Page 5)**

2. Zero-Voltage Indication - Direct Contact from 4kV to 51kV Does not include Capacitive Test Points

Normal zero-voltage indication may be obtained in the **URD** or **OH** position by touching the Reference Probe and Meter Probe to energized conductors of the same phase and voltage. **(See Note 1 on Page 5)**

VOLTAGE INDICATIONS URD and OH (cont'd.)

Direct Contact from 4kV to 51kV

(Does not include Capacitive Test Points)

3. Phase-to-Ground Voltage Indication - Direct Contact from 4kV-to-51kV

Does not include Capacitive Test Points

The Meter Probe may be used in the **URD** or **OH** position as a stand alone digital voltage detector to obtain a phase-to-ground voltage indication by touching the energized conductor directly. When using the Meter Probe in this manner, the Reference Probe must be switched off and should be stored in the padded box.

4. Reference Probe as a Voltage Detector - Direct Contact from 240V to 51kV

Including Capacitive Test Points

The Reference Probe may be used as a stand alone voltage detector by touching the energized conductor or capacitive test point directly. The **White** indicator light will be on if the voltage is equal to or greater than the threshold values below (**See Note 1 on Page 5**).

a) **Deg** position: 240V

b) **URD** or **OH** position: 800V

Use (a) above for capacitive test points and voltages up to 480V and use (b) above for voltages 600V-to-51kV

5. Non-Contact from 51kV to 800kV

The Reference Probe may be used as a non-contact stand alone voltage detector. The presence of an electric field at the minimum approach distance will cause the **White** indicator light to come on. (**See OSHA 1910.269, Table R-6 for minimum approach distance**).

Deg Electric field greater than 120V at the minimum approach distance.

URD or OH Electric field greater than 800V at the minimum approach distance.

FCC INSTRUCTIONS TO THE USER

This equipment (Reference Probe) has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not used in accordance with this instruction manual may cause interference to radio communications. Operation of this equipment in a residential area is likely to cause interference in which case the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the equipment.
2. Increase the separation between the equipment and the radio service that is experiencing the interference.
3. Consult the dealer or an experienced radio technician for help.

The user is cautioned that changes or modifications made to the equipment or antenna could void the user's authority to operate this equipment.

FCC COMPLIANCE INFORMATION STATEMENT

Trade Name: Cordless Phasing Tester

Model Number: Bierer PD800W

Compliance Test

Report Number: B31202D2

Compliance Test

Report Dates: 12/01/03 & 12/02/03

Responsible Party: Bierer & Associates, Inc.

Address: 10730 Farrow Rd., Blythewood, SC 29016

Telephone: 803-786-4839

This equipment (Meter Probe) has been tested and found to comply with limits for a Class B, RF Receiver pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular situation. If the unit does cause harmful interference to radio or television, please refer to the three steps listed above under "FCC Instructions to the User".

PARTS & ACCESSORIES

PART NO.	DESCRIPTION
8128TBALB	15 -25kV Bushing Adapter
8128LHM	Hook Probe Adapter
8128LPM	Straight Probe Adapter
3403	Quick Change to Universal Adapter
3402TH5811	Quick Change to Grip All Adapter
10022CHL	Handle w/Threaded Ferrule and Cap (2 required*)
10022HHSL	Handle w/Threaded Ferrule and Ferrule w/Stud (2 or 4 required*)
PD800ANT	Antenna for Reference or Meter Probe
PD800SH2	Support Hook 2 ft., 51kV to 600kV
PD800SH4	Support Hook 4 ft., above 600kV

*Nominal one inch in diameter and two feet in length; handle assemblies may be two, four or six feet in length.

Limit Mark

All Phasing Meters and Voltage Detectors manufactured after 2007 will have a limit mark engraved on the high voltage probe(s) 2.5 inches from the tip to indicate to the user the physical limit that should not be passed when approaching and contacting an electrical conductor or other electrical test points.



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