

White Safetyline

The White Rubber Corporation

Operating Instructions

PD800W

Cordless Phasing Tester

Patent Number 6,617,840 B2

Other Patents Pending

Caution

The Equipment covered in these operating instructions should be used by qualified employees, trained and familiar with the safety related work practices, safety rules and other safety requirements associated with the use of this type of equipment. These instructions are not intended as a substitute for adequate training, nor do they cover all details or situations which could be encountered in relation to the operation of this type of equipment.

Warning

Use appropriate length live line tool for the voltage being worked and maintain minimum approach distances as outlined in OSHA 1910.269, table R-6. Do not let live line tool fittings become grounded in any way. This may damage the equipment and cause personal injury.

Meter housing shall be considered **non-insulating**. Meter should not be used as an insulating tool.

Notice

Before operating this equipment, read, understand and follow all instructions contained in this manual. Keep instructions with equipment.

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Design and Function

The PD800W is designed to operate similar to a conventional phasing tester without the interconnect cable and consists of a Reference Probe (transmitter) and a Meter Probe (receiver). The phasing tester is usable from 208 volts to 800kV.

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

- Off** Unit off for storage or transit.
- Deg** Phase angle measurement in degrees for use on Secondary, URD and Overhead.
 - Direct contact from 208 volts to 69kV (including capacitive test points).
 - Non-contact from 69kV to 800kV (without the use of extension resistors).
- URD** Phasing Underground Residential Distribution with Voltage Indications.
Direct Contact from 4kV to 35kV. (Not for capacitive test points)
- OH** Phasing Over-Head conductors with Voltage Indications.
Direct Contact from 4kV to 69kV.
- T** Tests basic meter functions and displays the internal 9 volt 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 the Meter probe.

- **White** phase indicator light indicates an in phase condition.
- **Blue** phase indicator light indicates an out of phase condition of 120 degrees.
- **Red** phase indicator light indicates an out of phase condition of 240 degrees.
- **Yellow** (Blinking) indicator light indicates a Delta/Wye transformation in conjunction with one of the other phase indicator lights.

Note 1: For best results, always hold 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 hand 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 Safety Line 8128TBALB bushing adapters on both the Reference Probe and the Meter Probe:

PD800W Setup and Testing

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 510 +/- 5 (full scale) and blinks the 0, 120, 240 phase sequence indicator lights followed by a blinking DY (Delta Wye Transformation) indicator light.

Test: The internal 9 volt 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 510 +/- 5 will be displayed on the Meter Probe for several seconds.

Test: The internal 9 volt battery voltage may be checked by turning the rotary selector switch to the T position and holding for several seconds. The internal battery voltage of the Reference Probe will be displayed on the Meter Probe. If the 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.

Battery Replacement

A standard 9 volt battery is located behind the 5/8" x 11 threaded live line tool fitting on the probe housing. Two flat edges are furnished for use with a wrench or slip joint pliers to remove and install the fitting from the probe housing. To avoid damaging the antenna, it is recommended that the antenna be removed prior to unscrewing the live line tool fitting from the housing. To remove the antenna, rotate counter clockwise and reinstall finger tight.

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 208V to 69kV

Including Capacitive Test Points

1. Test the PD800W as described in the meter setup and testing section, Pg 2.
2. Attach the Reference Probe and Meter Probe to the appropriate length live line tool for the voltage being measured. Minimum 2 feet **(See note 1 on Pg 1)**
3. Set the selector switches on both probes to the **Deg** position.
4. With the Reference Probe, touch all conductors one at a time to verify all of the phases are energized. **(See note 2 on Pg 1)**
5. The white phase indicator light will be on if there is at least 120 volts present on the conductor.
6. Touch both the Reference Probe and the Meter Probe to a single (the same) energized conductor. The meter should indicate near zero degrees and the White zero degree indicator light on the Meter Probe will be on. Two white lights indicate an in phase condition. **(See note 2 on Pg 1)**
7. Leave the Reference Probe on the first energized conductor. Touch the Meter Probe to another energized conductor.
8. If the conductors are in phase, the degree indication on the Meter Probe should be near zero and the White zero degree indicator light will be on.
9. If the conductors are out of phase the Meter Probe will indicate either of the following:
 - a. Nominal 120 degrees and the Blue 120 degree indicator light will be on.
 - b. Nominal 240 degrees and the Red 240 degree indicator light will be on.
10. Retest the PD800W as described in the meter setup and testing section, Pg 2.

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 test.

Phase Angle Measurements Non-Contact from 69kV to 800kV Without Extension Resistors

1. Test PD800W as described in the meter setup and testing section, Pg 2.
2. Attach the Reference Probe and the Meter Probe to the appropriate length live line tool for the voltage being tested. Minimum 2 feet **(See note 1 on Pg 1)**
3. Select the **OH** position on the Reference Probe.
4. Bring the Reference Probe to the minimum approach distance of the conductors one at a time. **(See OSHA 1910.269 Table R-6 for minimum approach distance)** Verify all of the conductors are energized with the presents of a White indicator light on the Reference Probe. (Do not make contact with the line)
5. The white phase indicator light will be on if the electric field present at the minimum approach distance equals at least 600 volts.
6. **Reset the selector switches on both probes to the Deg position.**
7. Bring both the Reference Probe and the Meter Probe to the minimum approach distance of a single (the same) conductor. **(See OSHA 1910-269 Table R-6 for minimum approach distance)** The Meter Probe should indicate near zero degrees and the White zero degree indicator light on the Meter Probe will be on. Two white lights indicate an in phase condition.
8. Leave the Reference Probe in position with the first conductor. Bring the Meter Probe to the minimum approach distance of another energized conductor.
9. If the conductors are in phase, the degree indication on the Meter Probe should be near zero and the White zero degree indicator light on the Meter Probe will be on. Two white lights indicate an in phase condition.
10. If the conductors are out of phase the Meter Probe will indicate either of the following:
 - a. Nominal 120 degrees and the Blue 120 degree indicator light will be on.
 - b. Nominal 240 degrees and the Red 240 degree indicator light will be on.
11. Retest the PD800W as described in the meter setup and testing section, Pg 2.

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 test.

Testing Phase Sequence

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

(A - B - C)

or

A - B - C

or

C - A - B

A - B - C - A - B - C - A - B - C

B - C - A - B - C - A - B - C - A

C - A - B - C - A - B - C - A - B

Sequence (3 - 2 - 1)

(C - B - A)

or

C - B - A

or

A - C - B

C - B - A - C - B - A - C - B - A

B - A - C - B - A - C - B - A - C

A - C - B - A - C - B - A - C - B

Procedure:

1. Test the PD800W as described in the meter setup and testing section, Pg 2.
2. Attach the Reference Probe and the Meter Probe to the appropriate length live line tools for the voltage being tested. (See note 1 on Pg 2)
3. Set the selector switches on both probes to the **Deg** position.
4. Touch or approach "1" ("A") phase with the Reference Probe.
5. Touch or approach "2" ("B") phase with the Meter Probe.
6. Sequence (1 - 2 - 3)
(A - B - C) will be indicated by a nominal 120 degrees and a Blue 120 degree indicator light.
7. Sequence (3 - 2 - 1)
(C - B - A) will be indicated by a nominal 240 degrees and a Red 240 degree indicator light.
8. Retest the PD800W as described in the meter setup and testing section, Pg 2.

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 test.

Voltage Indications URD and OH

Direct Contact from 4kV to 69kV

(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 the Meter Probe indicate 9kV phase to ground on a 7.2kV phase to ground system. The phase to phase indication would be 16kV rather than 12.4kV. In this example, the meter is simply indicating that the two conductors are out of phase and the Blue or Red indicator light will be on.

Phase to Ground Voltage Indication from 4kV to 69kV

The Meter Probe may be used in the **URD** or **OH** position as a stand alone digital voltage detector to obtain a nominal phase to ground voltage reading by touching the conductor directly. When used in this manner, the Reference Probe should be switched off. (See note 2 on Pg 1)

In situations where the Meter Probe is too far away to be seen, the Reference Probe may be used to directly contact the conductor and the nominal voltage indication will appear on the Meter Probe. When used in this manner, the Meter Probe should not be elevated into or near an electric field.

Phase to Phase Voltage Indication from 4kV to 69kV

Nominal phase to phase voltage indications may be obtained in the **URD** or **OH** position by touching one energized phase with the Reference Probe and another energized phase with the Meter Probe. (See note 2 on Pg 1)

Zero Voltage Indication from 4kV to 69kV

Nominal zero voltage indications may be obtained in the **URD** or **OH** position by touching both the Reference Probe and the Meter Probe to energized conductors of the same phase and voltage. (See note 2 on Pg 1)

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 test.

Reference Probe as a Voltage Detector

Direct Contact on Secondary, URD or Overhead

The Reference Probe may be used as a direct contact stand alone voltage detector. The presence of a voltage will cause the White indicator light to come on.

Deg position	Contact threshold voltage approximately 120V. Use Deg position on Capacitive Test Points.
URD & OH	Contact threshold voltage approximately 600V. Not for use on Capacitive Test Points.

Non-Contact on Overhead

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 Position	Electric field greater than 120V at the minimum approach distance.
URD & OH	Electric field greater than 600V at the minimum approach distance.

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 Degree, 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.

Parts and Accessories

<u>Part No.</u>	<u>Description</u>
81280TBALB	15 -25 kV Bushing Adapter
81280LHM	Hook Probe Adapter
81280LPM	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 Probe or Meter Probe

*Nominal one inch in diameter and two feet in length. Handle assemblies may be 2, 4, or 6 feet in length.

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 Declaration of Conformity

Trade Name:	Cordless Phasing Tester
Model Number:	PD800W
Compliance Test Report Number:	B31202D2
Compliance Test Report Date:	12/01/03 & 12/02/03
Responsible Party:	Walter S. Bierer
	Bierer & Associates, Inc.
Address:	183 Elton Walker 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.

I the undersigned, hereby declare that to the best of my knowledge based on test reports conducted by an independent NVLAP accredited test laboratory, the equipment specified above conforms to the above requirements.

Walter S. Bierer

Date 12-18-03

Walter S. Bierer
President

Notes: _____

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