HIOKI

PD3129,PD3129-10

PHASE DETECTOR

Instruction Manual

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Please visit our website at www.hioki.com for the following:
- Regional contact information
- The latest revisions of instruction manuals and manuals in other languages.
- Declarations of Conformity for instruments that comply with CE mark requirements.

Warranty

Warranty malfunctions occurring under conditions of normal use in conformity with the Instruction Manual and Product Precautionary Markings will be repaired free of charge. This warranty is valid for a period of three (3) years from the date of purchase. Please contact the distributor from which you purchased the product for further information on warranty provisions.

Introduction

Thank you for purchasing the HIOKI Model PD3129/PD3129-10 PHASE DETECTOR. To obtain maximum performance from the instrument, please read this manual first, and keep it handy for future reference.

Initial Inspection

When you receive the instrument, inspect it carefully to ensure that no damage occurred during shipping. If damage is evident, or if it fails to operate according to the specifications, contact your dealer or Hioki representative.

Maintenance and Service

- To clean the instrument, wipe it gently with a soft cloth moistened with water or mild detergent. Never use solvents such as benzene, alcohol, acetone, ether, ketones, thinners or gasoline, as they can deform and discolor the case.
- If the instrument seems to be malfunctioning, confirm that the batteries are not discharged before contacting your dealer or Hioki representative.
- Pack the instrument so that it will not sustain damage during shipping, and include a description of existing damage. We cannot accept responsibility for damage incurred during shipping.
- If the protective functions of the instrument are damaged, either remove it from service or mark it clearly so that others do not use it inadvertently.
- The magnets on the rear side can be utilized to fix the instrument on a place like a door of power distribution box.

Overview

The PD3129/PD3129-10 is a phase detector, designed to perform phase sequence checks and live line checks of a 3-phase circuit using a static induction voltage clip.
- The static induction voltage clips are used to be able to clip on a insulated wire.
- It is small with a CAT III 600 V (Model PD3129), CAT IV 600 V, CAT III 1000 V (Model PD3129-10) safety rating.
- Red LED lamps are used to make the indication visible in dimly lit areas.
- The direction of phase sequence can be checked easily using the LED lamps, which blink in order.

Safety

This manual contains information and warnings essential for safe operation of the instrument and for maintaining it in safe operating condition. Before using it, be sure to carefully read the following safety precautions.

⚠DANGER

This instrument is designed to comply with IEC 61010 Safety Standards, and has been thoroughly tested for safety prior to shipment. However, mishandling during use could result in injury or death, as well as damage to the instrument. Be certain that you understand the instructions and precautions in the manual before use. We disclaim any responsibility for accidents or injuries not resulting directly from instrument defects.

Safety Symbol

⚠	In the manual, the ⚠ symbol indicates particularly important information that the user should read before using the instrument. The ⚠ symbol printed on the instrument indicates that the user should refer to a corresponding topic in the manual (marked with the ⚠ symbol) before using the relevant function.
⧈	Indicates a double-insulated device.
∼	Indicates AC (Alternating Current).
⎓	Indicates DC (Direct Current).

The following symbols in this manual indicate the relative importance of cautions and warnings.

⚠DANGER	Indicates that incorrect operation presents an extreme hazard that could result in serious injury or death to the user.
⚠WARNING	Indicates that incorrect operation presents a significant hazard that could result in serious injury or death to the user.
⚠CAUTION	Indicates that incorrect operation presents a possibility of injury to the user or damage to the device.

Measurement categories

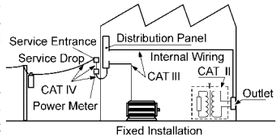
This instrument complies with CAT III 600 V (Model PD3129), CAT III 1000 V, CAT IV 600 V (Model PD3129-10) safety requirements. To ensure safe operation of measurement instruments, IEC 61010 establishes safety standards for various electrical environments, categorized as CAT II to CAT IV, and called measurement categories.

CAT II : Primary electrical circuits in equipment connected to an AC electrical outlet by a power cord (portable tools, household appliances, etc.)
CAT II covers directly measuring electrical outlet receptacles.

CAT III : Primary electrical circuits of heavy equipment (fixed installations) connected directly to the distribution panel, and feeders from the distribution panel to outlets.

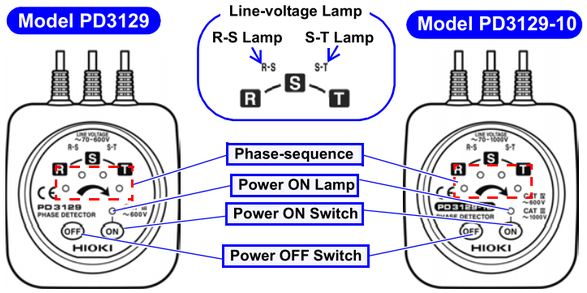
CAT IV : The circuit from the service drop to the service entrance, and to the power meter and primary overcurrent protection device (distribution panel).

Using a measurement instrument in an environment designated with a higher-numbered category than that for which the instrument is rated could result in a severe accident, and must be carefully avoided.
Use of a measurement instrument that is not CAT-rated in CAT II to CAT IV measurement applications could result in a severe accident, and must be carefully avoided.



Fixed Installation

Names of Parts



Usage Notes

Follow these precautions to ensure safe operation and to obtain the full benefits of the various functions.

⚠WARNING
- Do not allow the instrument to get wet, and do not use it with wet hands. This may cause an electric shock.
- Do not fix the magnets of the rear side of the instrument on bare conductor or busbar. It may cause short circuits.

⚠CAUTION
- **Do not put magnet cards near the instrument. It may damage the stored data.**
- **The instrument should not be used by anyone with a pacemaker or any other medical devices installed in his/her body.**
- **This instrument is designed for use indoors. It can be operated at temperatures between 0 and 40°C without degrading safety.**
- **To avoid damage to the instrument, protect it from physical shock when transporting and handling. Be especially careful to avoid physical shock from dropping.**
- **Do not use the instrument near a source of strong electromagnetic radiation, or near a highly electrically charged object. These may cause a malfunction.**
- **To avoid breaking the cables, do not bend or pull them.**
- **Avoid stepping on or pinching cables, which could damage the cable insulation.**
- **Keep in mind that, in some cases, conductors and wires to be measured may be hot.**

To avoid corrosion from battery leakage, remove the batteries from the instrument if it is to be stored for a long time.

Specifications

Basic Specifications

Function	Phase detection (positive/negative)
Voltage detection method	Static induction
Performance-guarantee voltage range	3-phase Model PD3129:70 to 600 VAC (sine wave, continuous) Model PD3129-10:70 to 1000 VAC (sine wave, continuous)
Operating frequency range	45 to 66 Hz
Object to be connected	Insulated wire Model PD3129 (nominal sectional area of the conductor: 2 to 100 mm², finished outer diameter: up to ϕ2 to 17 mm) Model PD3129 -10 (nominal sectional area of the conductor: 14 to 500 mm², finished outer diameter: up to ϕ7 to 40 mm)

Display

Phase-detection indication	**Positive phase sequence**: The arrow lamp lights up, the four phase-sequence lamps blink in order (clockwise), and the buzzer sounds intermittently. **Negative phase sequence**: The arrow lamp turns off, the four phase-sequence lamps blink in order (counterclockwise), and the buzzer sounds continuously.
Line-voltage indication	R-S lamp, S-T lamp
Power indication	Power ON lamp: lights up (Power ON) blinks (Battery Low)

General Specifications

Operating temperature and humidity	0 to 40°C (32 to 104°F), 80% RH or less (with no condensation)
Storage temperature and humidity	-20 to 60°C (-4 to 140°F), 80% RH or less (with no condensation)
Location for use	Altitude up to 2000 m (6562 feet), indoors
Maximum rated voltage to earth	Model PD3129: 600 V (CAT III) Model PD3129-10: 1000 V (CAT III)
Dielectric strength	Model PD3129: 7060 Vrms Model PD3129-10: 8540 Vrms
Power supply	Rated supply voltage 1.5 VDC × 2 R6P Manganese battery (AA size) × 2
Maximum rated powers	300 mVA
Continuous operating time*	Approx. 70 hours (Power ON, Standby state, using R6P manganese battery) *Battery life
Auto Power Off (This function can not be canceled.)	The power will be turned off automatically if the instrument remains idle for 15 minutes after the power is turned on. To reset, turn the power on again using the Power ON switch.
Auxiliary function	Magnet × 4 pcs (on rear side)
Cable length	Approx. 0.7 m (27.56")
Dimensions	Approx. 70W × 75H × 30D mm (2.76"W × 2.95"H × 1.18"D) (excluding projections)
Mass	Model PD3129: Approx. 200 g (7.1 oz.) Model PD3129-10: Approx. 240 g (8.5 oz.)
Options	Carrying case, Strap*, Spiral tube*, Instruction manual, Two R6P Manganese batteries (AA size) *Attaching as the occasion demands.
Applicable standards **Safety**	Model PD3129: EN61010 Pollution degree 2, Measurement category CAT III (600 V) (anticipated transient overvoltage 6000 V) Model PD3129-10: EN61010 Pollution degree 2, Measurement category CAT IV(600 V), CAT III (1000 V) (anticipated transient overvoltage 8000 V)
EMC	EN61326

Measurement Procedures

⚠DANGER

Observe the following precautions to avoid electric shock.
- **Do not hold the tip of a voltage clip ahead of its barrier.**
- **The maximum rated voltage between input terminals and ground is 600V AC (Model PD3129:CAT III), 1000V AC (Model PD3129-10:CAT III). Attempting to measure voltages exceeding these limits with respect to ground could damage the instrument and result in personal injury.**
- **Even if the line-voltage lamps do not light up, the line may be live. (ex. When the earth potential is 70 VAC or less.) Do not touch the line.**

Preliminary Checks

- Before using the instrument the first time, make sure that the no damage occurred during storage or shipping, that the insulation on the cables is undamaged, and that no bare conductors are improperly exposed. Using the instrument in such conditions could cause an electric shock, so contact your dealer or Hioki representative for repair.
- When the Power ON lamp is blinking, the batteries are running low. Replace the batteries.

Step 1. Performance Check (Indispensable)

Be sure to check the following before use to avoid electrical shock.

Connect each voltage clips to single wire (live line) 70 VAC or more, and check to see if the line-voltage lamp light up. Do not use shielding wire.

Lamp lights up : It can be used.
Lamp does not light up : Do not use it and contact your dealer or Hioki representative for repair.

Check the Size of Your Wire Before Measuring
Wire diameter limits Model PD3129:ϕ2 to 17 mm, Model PD3129-10:ϕ7 to 40 mm
Be sure to use the correct phase detector according to your wire size.

Step 2. Live Line Check

A live line check can be conducted using one of the voltage clips.

⚠CAUTION
- Be sure to clip on a insulated wire.
- If the tip of the clip is closed, a live line check cannot be conducted.
- Do not use shielding wire.

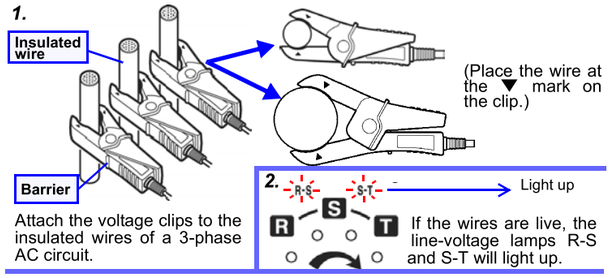
Voltage clip used	Line-voltage lamp to light up
R (red)	R-S lamp only
S (white)	R-S lamp and S-T lamp
T (blue)	S-T lamp only

Lamp lights up : The line is live.
Lamp does not light up : The line is not live or the earth potential is 70 VAC or less.

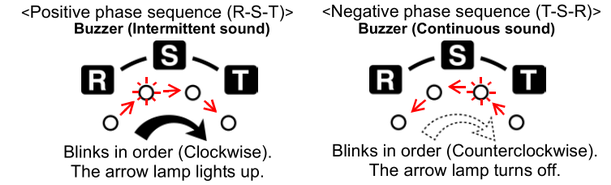
Step 3. Detection

⚠CAUTION

Since the voltage sensors are based on the static induction, it is impossible to find the missing phase of the grounding line on 3-phase 3-lead circuits in principle. In this case, the positive or negative phase sequence may be indicated.
- Do not touch the clips during detection. It may cause a malfunction.
- Always connect three voltage clips to the insulated wires before detecting. It can not be detected properly, if two or less clips are connected. The phase detector (Models PD3129 and PD3129-10) will operate on 2 wires, but this is not proper phase detection.
- Do not detect any circuit except a 3-phase AC circuit. It causes a malfunction.



3. If the phase-sequence lamps blink in the order of the direction indicated by the arrow (clockwise), the connected circuit has a positive phase sequence (R-S-T). The buzzer will sound intermittently.

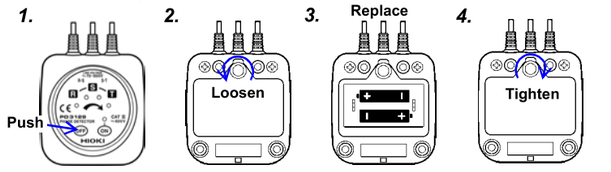


Replacing Battery

⚠WARNING
- To avoid electric shock when replacing the batteries, first disconnect the voltage clips from the object to be measured, and turn off the power.
- After replacing the batteries, replace the battery cover and screws before using the instrument.
- Battery may explode if mistreated. Do not short-circuit, recharge, disassemble or dispose of in fire.
- Handle and dispose of batteries in accordance with local regulations.

Low-battery indicator: When the Power ON lamp is blinking, the batteries are running low. Replace the batteries.

Tools

Screwdriver, Two new R6P manganese batteries (LR6 alkaline battery can be used also.)

1. Turn OFF the power.
2. Turn over the phase detector. Remove the screw, then remove the battery cover
3. Replace the batteries with new ones, noting the polarity.
4. Put the battery cover back in place, and tighten the screw.