

V-WATCH[®]

PERSONAL VOLTAGE DETECTOR

Operating & Instruction Manual



U.S. Patent 6,329,924
Other Patents Pending

Making the Invisible Visible[®]



HD ELECTRIC COMPANY

A Textron Company

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V-WATCH®

PERSONAL VOLTAGE DETECTOR

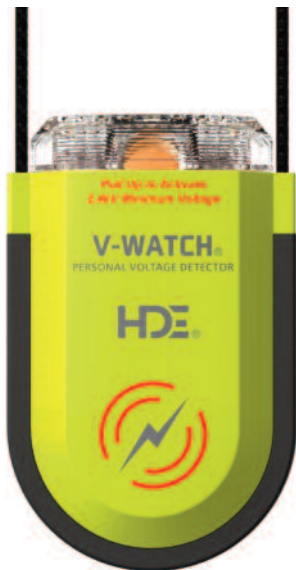
Operating & Instruction Manual

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For the latest information on V-Watch Personal Voltage Detectors including product updates and technical information, visit our website at HDElectricCompany.com

GENERAL DESCRIPTION

The V-Watch® Personal Voltage Detector detects the strong electric fields surrounding high voltage conductors and power distribution equipment. It is a small pocket size device worn on the outside of the clothing or other protective gear by users operating near power lines or high voltage equipment. It provides an extra level of safety for personnel trained in the use and application while working on or near high voltage systems.



The V-Watch Personal Voltage Detector detects electric fields. Make sure you understand these points before proceeding:

- Electric fields surround every energized AC conductor.
- The closer you are to a conductor, the stronger the field will be.
- Higher voltage means a stronger electric field and a greater warning distance. Lower voltage means a reduced warning distance.
- Electric fields are NOT blocked by plastics, dry wood or clothing.
- Electric fields ARE blocked by ANY conductor such as a metal cabinet or door, wet wood, metal fences, green trees, a growing shrub or hedge & tall wet grass.
- The detector will not find cables buried under the ground. The ground is a conductor and will block electric fields.
- Insulation on a wire does not block the electric field and does not affect warning distances.
- Underground primary cables are both insulated AND shielded. The shield is a conductor, is grounded, and will block the electric field.
- Molded cable terminators such as elbows are, like the cables they are installed on, both insulated and shielded and will block electric fields.
- Your body will block electric fields. Wear the detector front and center and do not walk backwards.
- Do not use the detector while holding it in your hand. Wrapping your fingers around the device will block electric fields, preventing it from working properly. 5

SAFETY

- Always use proper high voltage procedures, including personal protective equipment, when working near or around high voltage equipment or conductors.
- Do not rely on the detector as your sole source of high voltage detection. Risk of electrocution is inherent in or around high voltage.
- Never contact high voltage with the V-Watch detector.
- Always use proper high voltage procedures for testing and grounding.
- Because the human body is a good electrical conductor, electric fields are distorted or blocked by the body. Thus, positioning of the detector on the body and its location relative to the voltage source can have a large effect on its sensitivity to electric fields.
- Grounded equipment can appear to be live in close proximity to energized conductors.
- The V-Watch Personal Voltage Detector is not sensing electric fields when it is closed.

WARNING



NOT FOR USE BELOW 2400 VOLTS AC.

OPERATIONAL IMPAIRMENT

If the detector is used in a manner not described in this instruction manual, the protection and effective operation of this equipment may be impaired.

The detector will not detect DC voltage or stored charge such as in charged capacitors or underground cable. When the detector is closed, it will not detect or warn of nearby high voltage. Always use proper high voltage procedures, including personal protective equipment, when working near or around high voltage equipment or conductors. Never contact high voltage. Always use proper high voltage procedures for testing and grounding. Do not rely on the V-Watch Personal Voltage Detector as your sole source of high voltage detection. Risk of electrocution is inherent in or around high voltage.

HOW IT WORKS

The V-Watch Personal Voltage Detector works by sensing the presence of the electric field surrounding anything that conducts high voltage electricity and sounding an alarm. It measures the strength of the electric field; a higher voltage or stronger field will cause the detector to alarm from a greater distance.

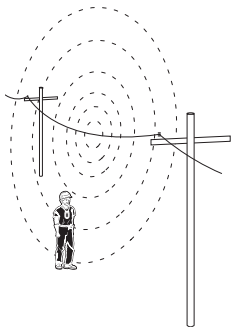
It emits a series of loud beeps and flashing lights when an electric field is first detected. The beeps and flashing lights increase in frequency as the user approaches the source of the high voltage electric field. A steady alternating tone and flashing lights indicates very close proximity to high voltage and the need for extreme caution. This variable beeping rate helps the user to determine if they are approaching the high voltage source or moving away from it to safety.

The detector tests itself automatically each time it is opened. A successful self test is confirmed by a series of tones and flashing lights. A failed test is indicated by a solid error tone and no lights. A low battery alarm is a slow alternating tone and flashing red lights. The unit will shut off when it is closed and this is verified by descending tones.

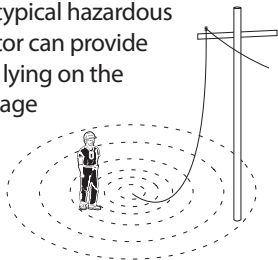
For more information, refer to the A Word About Electric Fields section on page 9.

A WORD ABOUT ELECTRIC FIELDS

Electric fields surround every energized conductor. The V-Watch Personal Voltage Detector measures the strength of these electric fields to warn the user when fields are strong enough to indicate the presence of nearby high voltage conductors.

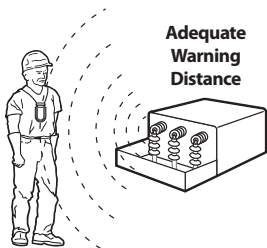


A downed power line is a typical hazardous situation where the detector can provide a warning. This power line lying on the ground sets up a high voltage field surrounding the conductor that the detector will sense and warn the user.

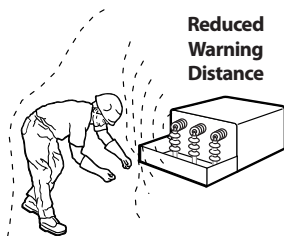


The detector is designed to be worn on the body and it measures the electrical fields typically found in close proximity to the body. Because the human body is a good electrical conductor, electric fields are distorted or even blocked by the body. Thus, positioning of the detector on the body and its location relative to the voltage source can have a large effect on its sensitivity to electric fields.

When properly worn on the front of the body, as shown, and with the user facing a waist height energized conductor, such as a terminal on a pad mount transformer or switch, the detector will start to alarm about 10 feet from a 7kV conductor. If the user were to approach this energized terminal by backing up to it, the warning distance may be reduced to 3 feet or less.



If the user bends over from the waist to reach towards an energized high voltage terminal, the warning distance may also be significantly reduced. In both cases, the high conductivity of the body acts as a shield to conduct the electric field around the detector.



The V-Watch Personal Voltage Detector measures only the strength of the electric field. It cannot directly measure distance to the source of the electric field such as an energized conductor. The higher the voltage, the stronger the field and the greater the alarm

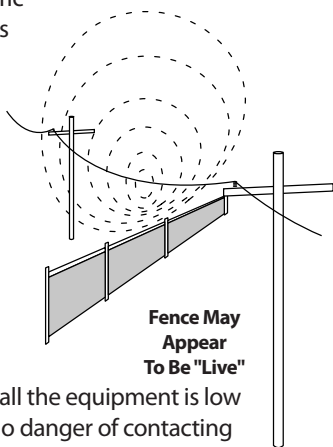
distance. The reverse is also true; the detector may alarm due to the very close proximity of low voltage when the user walks past a typical factory machine such as a running drill press, an office computer terminal or a desk lamp. It may even alarm if it is placed up against a typical 120 volt wall outlet.

Electrically conductive objects located underneath power lines can appear to be live. A metal fence or a growing hedge can cause a distortion of the electric field under these lines and result in high electric field strength near the ground. The V-Watch Personal Voltage Detector will provide an early warning of high electric fields, but not all fields

are directly caused by nearby energized objects.

To prevent the detector from issuing too many false alarms, it should not be used or worn in typical office or factory

environments where all the equipment is low voltage and there is no danger of contacting energized high voltage conductors.



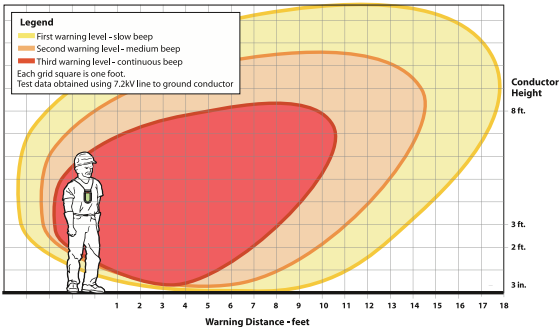
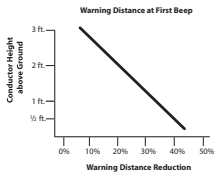
As an additional protection against false alarms from transient voltages, the detector has a built-in time delay and may take up to one second to emit an alarm warning of high voltage. For this reason, a user running towards an energized high voltage source may find the warning distance reduced.



LIMITATIONS FOR USE



WARNING:
Conductors lying
on the ground or
very close to it will
result in reduced
warning distances.



Conductors of different phases in close proximity will also reduce warning distances due to field cancellation effects.

Wearing the V-Watch Personal Voltage Detector in environments such as substations or under transmission lines may result in the detector alarming continuously.



Be aware of unique conditions that may be present around three phase delta systems.

Unlike grounded Y systems, a single phase of a delta system can become grounded without causing an

outage and the delta system can continue to operate with this grounded phase. If this phase is grounded as a result of a downed conductor or other storm damage, it may be grounded only temporarily and could become reenergized if moved or disturbed. **The V-Watch Personal Voltage Detector will not detect any grounded conductor, whether it is a grounded delta phase conductor, a guy wire or a pole ground.**



WARNING: Treat all conductors as live unless or until there is a visible break from a live source and a ground is in place.

INSTRUCTIONS FOR USE



NOT FOR USE BELOW 2400 VOLTS AC.

Before using, read the entire instruction manual and review product labeling. Pull the top of the unit up to verify a good battery and to perform a self test. The test circuitry generates an internal voltage which the detector then detects and indicates by turning on the lights and sounding the beeper. DO NOT USE the detector if the self test error tone is heard or if the detector fails to activate the lights and beeper. Remove from service and contact the factory to arrange for repair.

The detector should always be worn facing any potential high voltage electricity. Wear the detector in the center of the front of your body as shown on page 17 and

always wear in the direction of movement or work. Do not walk backwards or sideways when wearing the detector as it will not detect high voltage behind you or as effectively to the sides. Wear on the outside of all clothing. Keep it away from all other large metal objects such as belt buckles, tool belts or electronic items such as radios, pagers, cell phones or any other electrical devices which may interfere with the detector.

The detector will emit a series of beeps and flashing lights when it detects high voltage. It will beep and flash faster as it gets closer to high voltage. Very rapid beeping and flashing or a constant alternating tone and lights indicates close proximity to high voltage and requires extreme caution.

V-Watch® Personal Voltage Detector

Read instructions before use. Pull open to use and verify self test. Wear outside of all clothing and away from metal objects. Place on front of body in direction of work, this side towards body. Use with extreme caution as high voltage may be nearby.

WARNING: Do not rely on this device as your only indication of high voltage.

DANGER: Lights and beeper indicate proximity to high voltage and associated risks of arcing and electrocution.

Contains FCC ID: T9JRN4020

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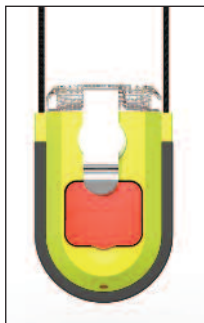
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HOW TO WEAR IT

The V-Watch Personal Voltage Detector should always be worn mid-torso on the front of the body and face in the direction of movement.

Because it is sensitive to electric fields in front of the user, and to a lesser extent on either side, proper positioning is important. Adjust the lanyard so that the detector is located at mid torso and facing forward. The clip on the back of the unit can provide additional support by clipping to a shirt front or safety vest.



WHEN AND HOW TO USE IT

The V-Watch Personal Voltage Detector can be used anytime, anyplace and for any reason. The decision of when to use it is made by the user and by your company's safety and work practices.

When used properly, the detector can provide an additional warning to users exposed or working around energized high voltage electricity and equipment. Awareness of the presence of a high voltage electric field allows the user to take additional precautions against accidental contact with energized equipment. The variable frequency beeping gives the user an indication of the source and direction of the high voltage.

The detector provides an early warning of the proximity of potentially hazardous high voltage electricity and equipment. It will start to beep with flashing lights slowly as an electric field is first detected and will then beep faster, increasing to a steady alternating tone and flashing lights if the user continues to approach the source of the high voltage electric field. A steady alternating tone and flashing lights indicates the need for extreme caution, as the source of the high voltage electric field is close.



When the V-Watch Personal Voltage Detector is in use with a good working battery, it is always on, always ready to warn of potentially hazardous high voltage. The battery life is approximately six months of continuous use or two years in storage. When the job requiring the protection of the detector for the user is completed, the detector should be closed by pushing down on the top.



CAUTION: The V-Watch Personal Voltage Detector is not sensing electric fields when it is closed.

BATTERY REPLACEMENT INSTRUCTIONS

A low battery is indicated by red flashing lights and a slow alternating tone. Always replace all three AAA batteries at the same time, either three alkaline or three lithium types as specified below.

To access the battery compartment, turn the V-Watch detector off by pushing the top down. The battery compartment is on the back of the unit. Rotate the belt clip sideways and then remove the battery compartment cover. Note the battery polarity which is also printed inside the unit.



After installing the new batteries, replace the battery cover and turn the V-Watch detector on by pulling

the top up. A successful self test is indicated by a tone series and flashing lights. If the self test is not successful, do not use the V-Watch detector and return it to the factory for service.



CLEANING

To clean, wipe with a damp cloth with water. Do not use harsh chemicals or solvents.

TECHNICAL SPECIFICATIONS

SENSITIVITY: Factory set at 50/60 Hz sensing threshold (first beep). The detector will only detect AC voltage. Do not use below 2400 Volts.

TYPICAL WARNING DISTANCE: 7 feet (2.13m) from a 4kV AC conductor.

OPERATING FREQUENCY: 50Hz/60Hz

BATTERY: Three AAA alkaline batteries ANSI-24A, IEC-LR03 or lithium ANSI 24-LF, IECFR03.

Life 2 years in storage, six months of continuous use.

BEEPER SOUND PRESSURE LEVEL: 100 db.

WEIGHT WITH BATTERY: 7.97 oz (226g)

DIMENSIONS:

Closed: 5.53" (14.0cm) x 3.54" (9.0cm) x 1.42" (3.6cm)

Open: 6.29" (15.9cm) x 3.54" (9.0cm) x 1.42" (3.6cm)

VOLTAGE RANGE: 2400VAC and above.

ENCLOSURE MATERIAL: ABS UL 94-HB.

PRINTED CIRCUIT BOARDS: FR-4 UL94V-0.

ENVIRONMENTAL CONDITIONS

CONDITIONS: Indoor and outdoor use, IP 68

ALTITUDE: Up to 6,566 ft. (2000M)

OPERATING TEMPERATURE: -20°F to +120°F
(-29°C to +49°C)

HUMIDITY: 95% to 49°C (non-condensing)

OVERVOLTAGE CATEGORY: II Non-contact

POLLUTION DEGREE: PD4

MANUFACTURING LOCATION

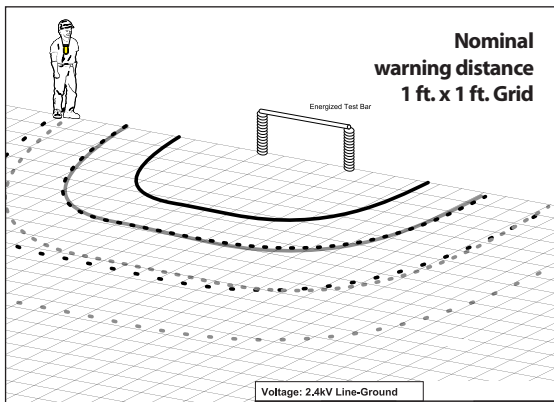
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ACCESSORIES

V-Watch Personal Voltage Detectors come standard with three AAA lithium batteries, padded carrying bag and instruction manual.



V-WATCH DETECTOR WARNING DISTANCES



Test Details

All of the warning distances are shown on a 1 foot grid and all distances are to scale.

Voltage: 2.4kV Line-Ground

Location	Slow Beep	Medium Beep	Fast Beep
Side of Bar	11.5 ft.	8 ft.	5.5 ft.
End of Bar	9 ft.	6 ft.	3.5 ft.

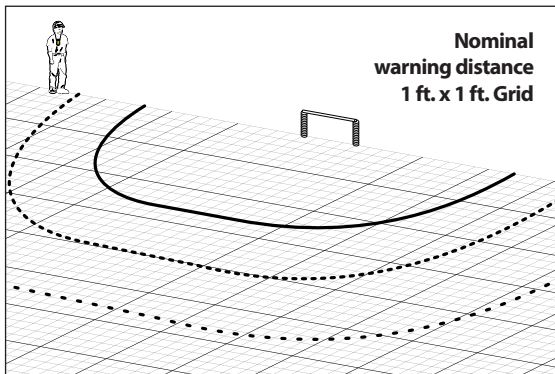
Test Voltage 7.2kV Line-Ground

Location	Slow Beep	Medium Beep	Fast Beep
Side of Bar	15.5 ft.	11 ft.	8 ft.
End of Bar	13 ft.	9 ft.	6 ft.

The energized bar is 4 feet long and 30 inches above the ground on insulators. It is energized from behind and the indicated voltage is line to ground.

For this test, the V-Watch Detector was worn on the shirt front as pictured. Warning distances will be reduced slightly if it is worn on the belt and will be reduced substantially if an arm is extended toward the energized source or if the user approaches the energized source backwards.

V-WATCH DETECTOR WARNING DISTANCES



Test Details

All of the warning distances are shown on a 1 foot grid and all distances are to scale.

Test Voltage 19.9kV Line-Ground			
Location	Slow Beep	Medium Beep	Fast Beep
Side of Bar	28 ft.	20 ft.	13 ft.
End of Bar	23 ft.	17 ft.	12 ft.

The energized bar is 4 feet long and 30 inches above the ground on insulators. It is energized from behind and the indicated voltage is line to ground.

For this test, the V-Watch Detector was worn on the shirt front as pictured. Warning distances will be reduced slightly if it is worn on the belt and will be reduced substantially if an arm is extended toward the energized source or if the user approaches the energized source backwards.

LIMITED WARRANTY & LIMITATION OF LIABILITY

This warranty applies to all products sold by HD Electric Company (the "Products"); provided, however, that the term Products does not include any third party products purchased through HD Electric Company, for which no warranties are made (the "Third Party Products"). Third Party Products may be subject to a separate manufacturer's warranty; [should you have any question regarding whether a separate warranty applies, please contact HD Electric Company].

NOTICE: READ THIS LIMITATION OF WARRANTY AND LIABILITY BEFORE BUYING OR USING THE PRODUCTS CONTAINED HEREIN.

It is impossible to eliminate all risks associated with the use of the Products. Risks of serious injury or death, including risks associated with electrocution, arcing and thermal burns, are inherent in work in and around energized electrical systems. Such risks arise from the wide variety of electrical systems and equipment to which Products may be applied, the manner of use or application, weather and environmental conditions or other unknown factors, all of which are beyond the control of HD Electric Company.

HD Electric Company does not agree to be an insurer of these risks, and shall have no liability for any claims arising from such risks.

WHEN YOU BUY OR USE THESE PRODUCTS, YOU AGREE TO ACCEPT THESE RISKS.

HD Electric Company warrants to the original purchaser that the Products (excluding any third party products purchased through HD Electric Company, for which no warranties are made) will be free from defects in material and workmanship, under normal use and regular service, and preventative maintenance for a period of one (1) year (ten (10) years for HDE Capacitor Controls) from the date of shipment (the "Warranty Period"). Should any failure to conform with this warranty be found during the Warranty Period, you must notify HD Electric Company of your claim within thirty (30) days of discovery, and within the Warranty Period. Your failure to give notice of claims of breach of warranty within the Warranty Period shall be deemed an absolute and unconditional waiver of claims for such defects. HD Electric Company will have no responsibility to honor claims received after the date the applicable Warranty Period expires.

Upon notice of your claim, HD Electric Company will provide a return authorization number, and further instructions on how to return the product for service. You must follow HD Electric Company's instruction. You are responsible for all Product removal, handling, re-installation, and shipping (both to and from HD Electric Company). Products returned for repair, as well as repaired or replacement Products shall be sent postage / freight prepaid. After receipt of a product which HD Electric Company determines is defective, HD Electric will, at its option, either (1) repair (or authorize the repair of) the Product or (2) replace the Product, subject to the following: The Products are made using parts sourced from a variety of manufacturers. Due to the rapidly changing technology environment, parts may become obsolete / unavailable over time (end of life). In the event that a Product cannot be repaired or replaced due to unavailability of parts, HD Electric Company will use commercially reasonable efforts to obtain substitute parts or conduct work around design, but cannot guarantee its ability to do so.

Items not found defective will be returned at your expense, or failing receipt of instruction from you on return of such items within five (5) business days of our notice to you that the product is not defective, HD Electric may dispose of the product at its discretion and with no liability to you. HD Electric Company's determination of defects is final. Products repaired or replaced during the Warranty Period shall be covered by the foregoing warranties for the remainder of the original Warranty Period or ninety (90) days from the date of delivery of the repaired or replaced Products, whichever is longer.

LIMITATIONS:

This warranty is void in the event of misuse, alteration, faulty installation, or misapplication of the product.

This warranty does not cover failure of product or components due to any ACT OF NATURE; lightning, floods, hurricanes, tornadoes or any other such catastrophic events.

HD Electric Company does not warrant any third party products or associated hardware or their performance or suitability for use and application. Such items are provided "as-is".

All repairs must be authorized by HD Electric Company. Unauthorized repairs will not be reimbursed under any circumstances.

HD Electric Company is not required to make replacement or loaner equipment available while Products are being repaired or replaced, or to compensate you for any in/out labor charges or expenses associated with removal, handling or re-installation of the Products.

TO THE MAXIMUM EXTENT PERMITTED BY LAW, THIS WARRANTY AND THE REMEDIES SET FORTH ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, REMEDIES AND CONDITIONS, WHETHER ORAL OR WRITTEN, EXPRESS OR IMPLIED. HD ELECTRIC EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE, MERCHANTABILITY AND NON-INFRINGEMENT.

IN NO EVENT SHALL HD ELECTRIC COMPANY BE LIABLE FOR ANY INDIRECT, INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THESE PRODUCTS. THIS SHALL INCLUDE BUT, NOT LIMITED TO, LOST PROFITS OR REVENUE, LOSS OF USE OF THE PRODUCTS, COST OF SUBSTITUTE PRODUCTS, FACILITIES OR SERVICES, OR DOWNTIME.

IN NO EVENT SHALL HD ELECTRIC COMPANY HAVE ANY LIABILITY FOR ANY THIRD PARTY PRODUCTS OR ASSOCIATED HARDWARE, OR CUSTOMER-OWNED SYSTEMS, EQUIPMENT OR SOFTWARE.

HD Electric Company must have prompt notice of any claim so that an immediate product inspection and investigation can be made. Buyer and all users shall promptly notify HD Electric Company of any claims, whether based on contract, negligence, strict liability, or other tort or otherwise be barred from any remedy.

HD Electric Company is committed to ongoing review and improvement of its product lines, and thus reserves the right to modify product design and specifications without notice.

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