COMPASS®

Personal Current and Voltage Detector

USER GUIDE

SAFETY WORKERS SIXTH SENSE.

Current as of: 10-14-2024

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INTRODUCTION:

COMPASS® is a personal non-contact voltage and current detector that alerts users when they approach an electrified source. Its advanced notification system is designed to both warn the user that a source is present an inform them of its approximate location.

The internal sensors in COMPASS® were designed to detect both electrical fields (voltage) and magnetic fields (current). This advanced warning device can save lives and prevent serious injury for anyone working in or around live AC sources.

COMPASS® can also be used as a portable non-contact voltage detector (NCVD) in live working conditions above 1KV AC (IEC TR 61243-6: Type I), when mounted to the the end of a suitable hot stick.

COMPASS® PRIMARY FUNCTIONS

- Identify live conductors.
- Detect residual or induced voltage.
- Find energized lines underground or behind non-ferrous material.
- Detect energized threats after accidents, disasters, and power outages.

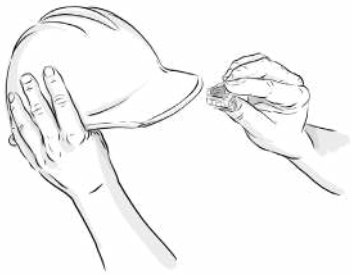
DEVICE SPECIFICATIONS

Size	3.5"x1.2"x.04" (88.9 mm x 30.48 mm x 10.16 mm)-Body. Wt: 0.78 oz (22.1 g)
Power System	Rechargeable Lithium-Polymer (LiPo) Battery (3.7V, 250mAh). Discharge rate varies depending on number of alerts, full charge can last 10+ days (80+ hrs)
Charging	Typically charges to 100% in 1.5 hrs on a USB 2.0 Micro B (5V) charger
Directional Accuracy	Point source: Approximately ±20°
Detection Sensitivity	Seven sensitivity levels + Smart Adaptive mode (see page 7)
Operating Frequency	50 Hz and 60 Hz options are available
Operating Conditions	-20°C to 60°C (-4°F to 140°F): DO NOT charge Compass if <0°C (32°F) RH: Max. 90% Non-Condensing @25°C.
Water Resistance	Rated IP-67
Detection Voltage Ranges	High Voltage Model: 2400VAC-35kVAC RMS Line to Neutral, up to 500 kVAC Low Voltage Model: 120 VAC – 2400VAC RMS Line to Neutral *Detection distances vary depending on conditions, settings, and model.
Case Ratings (Polycarbonate)	Flame Retardant: UL recognition 94 V-0 at 1.5 mm Electric Strength (IEC 60243-1): 35kV/mm Electric Volume Resistivity (IEC 60093): 1.0E+14 ohms*m
Certifications	CE (ROHS, WEEE, 2006/66/EU Battery Directive)
Standards	• EMC: EN 61326-1: 2013 Class B, CISPR 11:2015+A1:2016 Emissions and Immunity for Measurement Equipment. • Safety: EN 61010-1: Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use. • IEC TR 61243-6 (Type I) Guidelines on non-contact voltage detectors (NCVD) for use at nominal voltages above 1kV AC. • ANSI/ISEA Z89.1-2014 Class E Hard Hat, Full Brim, Type 1; Tested Accessory. • Voltage Detectors: ASTM F3283 / F3283M –18; Standard Specification for the Manufacturing of High-Voltage Proximity Alarm to be used for the Detection of Overhead High Voltage Alternating Current (AC).
Conformance (To Other Standards)	ASTM F3283/F3283M - 18: Standard Specification for the Manufacturing of High Voltage Proximity Alarm to be used for the Detection of Overhead High Voltage Alternating Current (AC)

DEVICE POSITIONING

HARD HAT MOUNTING

COMPASS® can be worn on the underside brim of a hard hat, directly in front of the user's face. Make sure the unit is within the user's field of peripheral vision to maximize the visibility and effectiveness of voltage and current alerts.



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DEVICE POSITIONING

HANDHELD OPERATION

If users are working with low voltage sources (120-2400 VAC) COMPASS® can be used as a handheld device. For best results, sensitivity should be set to high. Users should not attempt to detect voltage under 2400 VAC while COMPASS® is still attached to their hard hat.

When using COMPASS® in handheld mode, DO NOT obstruct the front of the device as this will significantly reduce or even eliminate its detection capabilities. Refer to the photo and illustration at left for details on proper holding technique.

NOTES ON HANDHELD MODE:

- Always wear voltage-appropriate protective equipment when holding COMPASS®
- Detecting current in-hand allows users to trace live wires through some walls.
- Shielding may cause limited alert range when detecting fuse box voltage.
- Do not allow COMPASS® to directly contact a live conductor.

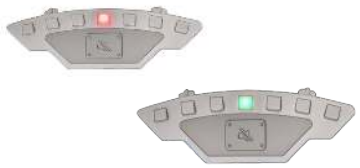
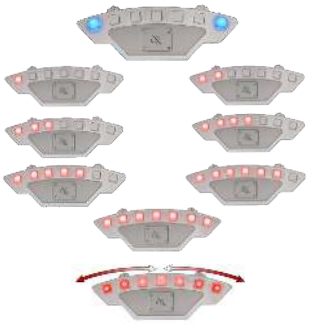
ALTERNATE OPERATING POSITIONS

In addition to hard hat and handheld use, COMPASS® can function on a wrist strap, clipped on a lanyard, or mounted on a hot stick.

SAFETY INFORMATION:

- COMPASS® should be used only by trained and qualified personnel.
- Always adhere to proper high voltage electrical safety practices.
- Extreme humidity may decrease voltage/current detection range.
- Before field use, always confirm that COMPASS® is powered on and working (as indicated by the center light blinking green every 5 seconds) and test with a known source of voltage/current.
- Always test and verify that the sensitivity settings on your COMPASS® are appropriate for the levels of voltage and current most likely to be present in your workspace.
- Some materials may shield electromagnetic fields from the detection circuits of your COMPASS®.
- For optimal safety, always verify a potential voltage source is de-energized before making contact.
- COMPASS® should only be used as a secondary voltage detection method.

OPERATING INSTRUCTIONS

Function	Instructions	Display
Charge	• Plug Charger into Micro USB Port: • One RED LED indicates charging. • One GREEN LED indicates fully charged. • Press button during charging to display battery level. LEDs will turn from RED to GREEN as device charges. • Blinking RED corner LEDs indicate device should be charged ASAP.	
Power On	Press Button, COMPASS® will display: • ORANGE start-up animation. • Center LED should blink GREEN every 5 seconds.	
Mute Alerts	Press button quickly: • GREEN LEDs = audible alerts ON • RED LEDs = audible alerts MUTED • Audible alerts will resume after 5min	
Battery Life	Hold button until corner LEDs turn WHITE, then release.	
Change Sensitivity	Hold button until corner LEDs turn BLUE then release. In this mode, press button until your desired voltage sensitivity level is displayed in RED (see below) then hold button down until LEDs turn GREEN to select. Repeat for current sensitivity, which will display in BLUE. Voltage/Current sensitivity settings display: 1-7 LEDs, 1 is lowest sensitivity and 7 is highest. Smart Adaptive mode: LEDs move in and out. Current detection can be deactivated by setting sensitivity to all BLUE LEDs off.	
Power Down	Hold button until LEDs in both corners turn ORANGE, then release.	
Sleep Mode	If Compass does not move for 60 seconds, the unit will go to sleep to conserve battery life (ORANGE corner LEDs will light up then fade, center LED will stop blinking). When device is moved, corner lights will turn ORANGE again and center LED blinking will resume.	
Reset Device	Hold button down as corner LEDs cycle from WHITE to BLUE to ORANGE. Keep holding button for several seconds after ORANGE lights fade, unit reset is complete after the start-up animation has occured.	
Low Battery	If RED corner LEDs begin blinking periodically, COMPASS® should be charged ASAP.	

ALERTS/DETECTION DISTANCE

PROXIMITY ALERTS

When COMPASS® detects voltage or current, it issues audio (beeping) and visual (flashing LEDs) proximity alerts. As the user approaches an electrified source, LED flashing and audio alerts will steadily increase.

RED LED alerts indicate VOLTAGE

BLUE LED alerts indicate CURRENT

NOTE: If COMPASS® detects that both voltage and current are present, voltage alerts will be given priority over current alerts.

DIRECTIONAL VOLTAGE NOTIFICATIONS

When COMPASS® has gathered sufficient information to approximate the location of an energized source of voltage, the LED alert animation will change from PROXIMITY to DIRECTIONAL mode. In directional mode, the LEDs make a sweeping animation that guides the user's attention to the approximate direction of the source.

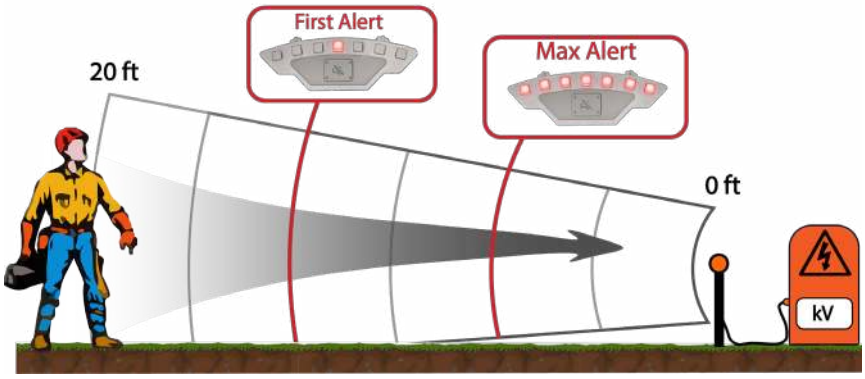
Source to Left

DIRECTIONAL ALERTS
240° active bearing range.
Accurate to approx. +10° from point source.

Source to Right

DETECTION DISTANCES

COMPASS® has been extensively field tested to determine its detection range for both voltage and current. Our testing process is described in the illustration below, and tables on the next page (page 7) display the results of these tests with explanations of how the results were captured.



ALERT DISTANCE TABLES

VOLTAGE DETECTION WARNING DISTANCES

First Alert/Max Alert				
(Sensitivity) LEDs		2.4kV	4.2kV	7.2kV
(Lowest)	1	X/X	X/X	X/X
	2	X/X	4/X	6ft / 2ft
	3	4ft / X	7ft / 3ft	9ft / 4ft
(Medium)	4	6ft / 2ft	8ft/4ft	11ft / 6ft
	5	9ft / 5ft	12.5ft/ 7ft	14ft / 8.5
	6	12ft / 6ft	14ft / 8ft	18ft / 10ft
(Highest)	7	16ft / 10ft	19ft / 12ft	22ft / 14.5 ft

X = DO NOT USE! Alert distance too small or non-existent.

Distances were measured using a 4ft x 2in diameter busbar elevated 2.5 feet above ground, in an outdoor setting (26°C and 35% RH), by a tester walking at a normal speed with a Compass mounted on a full-brim hard hat. Distances will vary depending on conditions, always verify exact distances for a given situation.

High-Voltage First Alert/ Max Alert			
LEDs	14.4kV	19.9kV	Condition
1	12ft / 5ft	18ft/8ft	45deg
2	18ft / 8ft	20ft / 10ft	45deg
1	15ft / 5ft	7ft / 3ft	Level
2	18ft / 7ft	8ft / 4ft	Level

* Data recorded testing 3 phase distribution lines from the bucket of a boom truck moving directly toward outside co doctor and tester wearing a hard hat mounted Compass. Voltages shown are phase to ground, with 34.5kV and 24.9kV being the phase to phase levels. 45deg = Hard hat at 45° downward from outside conductor.
Level = Hard hat level with conductor.

Low Voltage First Alert / Max Alert			
LEDs	120V	240V	1.2KV
1	3ft / X	3ft / 2ft	12ft / 8ft
2	3.5ft / X	4ft / 3ft	13ft / 9ft
3	4ft / 2ft	5ft / 3ft	15ft / 10ft
4	5ft / 3ft	6ft / 3.5ft	16ft / 10ft
5	6ft / 3.5ft	6ft / 4ft	19ft / 12ft
6	7ft / 4ft	7ft / 5ft	21ft / 12ft
7	8ft / 5ft	9ft / 7ft	30ft / 21ft

CURRENT DETECTION WARNING DISTANCES

		Absolute Distance First Alert / Max Alert				
(Sensitivity) LEDs		1A	10A	50A	100A	200A
(Lowest)	1	X/X	1ft / X	2.25ft / 1.75ft	3.5ft / 2.5ft	4.5ft / 3.5ft
	2	X/X	1.25ft / X	2.75ft / 2ft	3.75ft / 3ft	5ft / 4ft
	3	X/X	1.5ft / X	3ft / 2.25ft	4.25ft / 3.5ft	5.5ft / 4.5ft
(Medium)	4	.5ft / X	1.75ft / 1.25ft	3.5ft / 2.75ft	5ft / 4ft	6ft / 5ft
	5	.75ft / .25ft	2ft / 1.5ft	4ft / 3.25ft	5.5ft / 4.5ft	7ft / 6ft
	6	1.125ft / .5ft	2.75ft / 1.75ft	5.5ft / 3.5ft	7ft / 5ft	9ft / 6.5ft
(Highest)	7	1.175ft / .75ft	3.75ft / 2ft	7ft / 4.5ft	9ft / 6ft	11ft / 7.5

X = alert distance under 1ft.

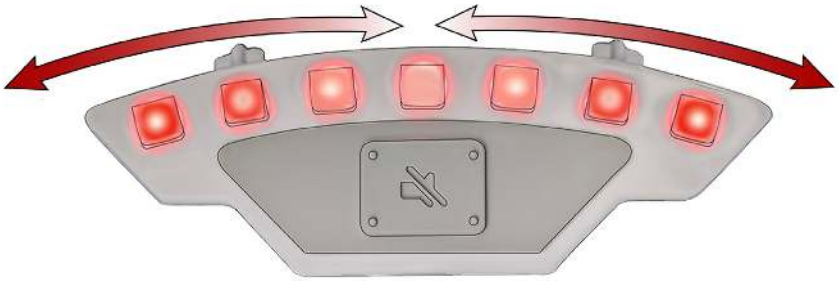
Distances were measured using a cable carrying current 2.5 feet above ground, outdoors at 21°C and 40% RH, by a tester with a COMPASS® mounted on a full-brim hard hat. Absolute distances were measured with the tester moving slowly, whereas walkup distance was measured at a normal walking pace toward cable.

Detection distances will vary in different conditions. Always verify exact distances for a given situation. Compass current sensors are slower to react than voltage sensors, users should move slowly when trying to detect current.

		Walkup Distance First Alert / Max Alert	
(sensitivity) LEDs		100A	200A
(Lowest)	1	X / X	X / X
	2	X / X	X / X
	3	X / X	1ft / X
(Medium)	4	1ft / X	2ft / 2ft
	5	1.5ft / 1ft	3ft / 2.5ft
	6	2.5ft / 2ft	5ft / 3ft
(Highest)	7	4ft / 3ft	6.75ft / 4.25ft

SMART ADAPTIVE MODE

Smart Adaptive Mode is designed for users working in an environment where electric and magnetic fields are known to be present. COMPASS® can quickly adapt to the ambient fields and pause alerts if the user is not moving closer to a detected source. If the user then moves closer to the detected source, alerts will begin again.



- COMPASS® will adjust to a constant field after 5 seconds and alerts will pause automatically.
- You do not need to press the button to adjust sensitivity once you have entered Smart Adaptive mode.
- The corner LEDs will periodically flash YELLOW once COMPASS® has adjusted to an environment, but keep in mind that this means that a field strong enough to normally trigger an alert is still nearby.
- If the user moves away from the energized source and the field strength is reduced for approximately 5 seconds, COMPASS® will re-adjust and regain sensitivity, indicated by corner LEDs flashing BLUE.

WARNING: Smart Adaptive alerts are based on change in ambient electric or magnetic fields, not proximity to the source. Alerts may not occur within the OSHA Minimum Approach Distance (MAD) in this mode.

MAXIMIZING ALERT ACCURACY

When using COMPASS®, always be aware of potential variables that could affect the accuracy of alerts:

- Warning distances can vary due to a live conductor's exposed surface area, elevation above ground, and proximity to any other grounded conductive objects.
- If the user is walking briskly, this may reduce initial warning distances by approximately two (2) feet.
- Warning distances can be reduced by large conductive objects such as a fence or vehicle as these objectS will attract the electric field of a nearby energized conductor.
- 3-phase systems can hinder detection accuracy by creating electric fields that effectively cancel out their overall field strength.
- Humid conditions will reduce detection distance.
- Always verify COMPASS® will function in each work environment before relying on it as a safety device.
- Smart Adaptive Mode should be used only by experienced electrical professionals.

TROUBLESHOOTING

SELF-TEST:

COMPASS® is equipped with a Self-Test to regularly verify in the background that all sensors are working properly. The unit automatically runs diagnostic scans approx. every 10 minutes and if any abnormality is detected, COMPASS® will respond by locking out all user input and the corner LEDs will flash RED and YELLOW. If these LEDs keep flashing RED and YELLOW, stop using COMPASS® and contact customer service. Self-test does not test the visual and audible alert systems, so these should still be tested by user before each use.

WARNING: DO NOT use COMPASS® if these lights are on or flashing.

TROUBLESHOOTING:

If your COMPASS® appears to be unresponsive (e.g. the center GREEN LED is not flashing), it may have gone into sleep mode. Move the unit several inches to see if the corner LEDs light ORANGE before the center LED resumes its normal flashing. If COMPASS® remains unresponsive, you should:

1. Try charging on any micro USB power source for at least 90 minutes, OR
2. Reset by pressing and holding the button for 8-10 seconds until LEDs display start-up animation, OR
3. If COMPASS® continues to malfunction or provides the RED/YELLOW "self-test" error warning after you have attempted charging and/or resetting, stop using immediately and contact Safeguard for service:

If you have attempted all troubleshooting measures and COMPASS® continues to malfunction, STOP using immediately. To resolve the issue, please fill out an RMA form at:
safeguardequipment.com/return
or call
208-773-9263

LIMITED WARRANTY

1-YEAR LIMITED WARRANTY AND LIMITATION OF LIABILITY

Effective November 1, 2017, this warranty applies to all products manufactured and sold by Safeguard Equipment, Inc. (the "Products").

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 and/or other unknown factors, all of which are beyond the control of Safeguard Equipment, Inc. Safeguard Equipment, Inc. does not agree to be an insurer of these or other risks, and shall have no liability for any claims arising from these or other risks inherent in electrical systems.

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

Safeguard Equipment, Inc. warrants to the original purchaser that the Products will be free from defects in material and workmanship under normal, with regular service and preventative maintenance, for a period of one (1) year 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 Safeguard Equipment, Inc. 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. Safeguard Equipment, Inc. will have no responsibility to honor claims received after the date the applicable Warranty Period expires.

Upon notice of your claim, Safeguard Equipment, Inc. will provide a return authorization number and further instructions on how to return the product for service. You must follow Safeguard Equipment, Inc.'s instruction. You are responsible for all Product removal, handling, re-installation, and shipping (both to and from Safeguard Equipment, Inc.). Products returned for repair, as well as repaired or replacement Products, shall be sent postage / freight prepaid. After receipt of a product that Safeguard Equipment, Inc. determines is defective, Safeguard Equipment, Inc. 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, Safeguard Equipment, Inc. 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, Safeguard Equipment, Inc. may dispose of the product at its discretion and with no liability to you. Safeguard Equipment, Inc.'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 including, but not limited to, lightning, floods, hurricanes, tornadoes or any other such catastrophic events.
- Safeguard Equipment, Inc. does not warrant any third party products or associated hardware or their performance or suitability for use and application.
- All repairs must be authorized by Safeguard Equipment, Inc. Unauthorized repairs will not be reimbursed under any circumstances.
- Safeguard Equipment, Inc. 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.

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