SAFESIDE®
Permanent Electrical Safety Devices

Medium Voltage Indicator

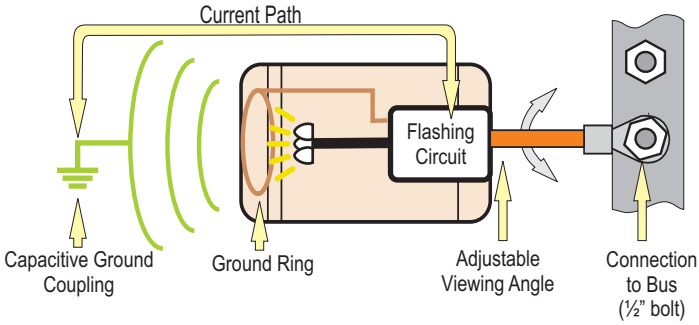
Applications in Safety

LIVE VOLTAGE LOOMS in every piece of electrical equipment. Obviously, finding methods of keeping workers away from electrical energy is a key objective for workplace electrical safety. Equally important, answering the question, “Is voltage present?” becomes the other half of the electrical safety equation. *Without a precise answer to this question, little else matters in electrical safety.* Medium voltage indicators (2K-46KVolts) offer positive benefits because this device keeps workers away from voltage and provides an answer the 'Is there voltage?' question.

What makes medium voltage indicators suitable to meet the high calling of electrical safety? In this article, we will get specific on the design, the application and the installed cost. We will also help you understand how incorporating these devices into a Lock-out Tag-out (LOTO) procedure enhances safety and productivity.

How it Works?

A medium voltage indicator is a single-phase device mounted onto each phase of a power bus. Energy from the bus flows through the indicator circuit through a capacitive ground connection. This means when higher voltages exist the air becomes slightly conductive allowing current to flow 'through the air,' which completes the flashing LED circuit. As the voltage increases, more current flows thereby increasing the flash rate. The enclosure size and the distance between the adjoining phases will also affect the flash rate.

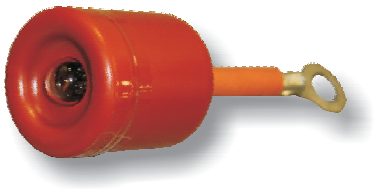


Designed for Electrical Safety: No 'False-Negative'

When an electrician starts working on an energized conductor that he just tested 'dead', dangerous situation called a 'false negative' indication is created. This means the voltage detector (falsely) indicated that there was no voltage (negative). Oppositely, a 'false positive' (voltage indication when voltage does not exist) is completely harmless. The following are examples of how the design of a medium voltage indicator minimizes the opportunity for a 'false-negative' to occur:

- Self-powered circuitry: A voltage indicator connected to a given voltage source has its circuitry powered from the same source (self-powered by line voltage). Circuit designs relying upon another power supply or battery energizing its circuitry increases the number of components and connections between the 'line voltage' and the 'indicator'. Simply put, more stuff means less reliability. *Furthermore, failure of the power supply creates a **'false-negative'** meaning that voltage exists without indication.*
- No fuses: A circuit design of a voltage indicator should not require fusing in order to protect its internal circuitry. Fuses add more connections and components reducing the overall reliability of the voltage indicator. *In this case, a blown fuse creates a **'false-negative'** voltage indication.*
- Maintenance Free: A medium voltage indicator needs to have a long maintenance-free life (7+ years) because maintenance departments have other priorities than maintaining medium voltage indicators. A robust, long-life design means fewer device failures. *This is important because a device failure is another example of a **'false negative'** voltage indication.*
- No 'hard-wired' Ground Connection: A short circuit to ground is a common failure mode with medium voltage equipment. A voltage indicator that provides a hard-wired path to ground introduces a high-risk failure point. A medium voltage indicator without a hard-wired ground connection eliminates this potential point of failure. This feature also provides built-in surge immunity.

R-1VH / R-1VL
Medium Voltage
Indicator



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Less Voltage Exposure Means Less Arc Flash Risk

Without voltage, electrical accidents and arc flashes do not happen. While performing electrical LOTO with a voltage detector installed, the electrician can pre-check the internal voltage state without opening the enclosure. Next, the electrician should replicate a zero voltage reading with his voltmeter as per NFPA 70E 120.1(5). This low-cost, redundant voltage-verification task reduces arc flash risk and increases electrical safety for electricians for around $250 installed cost.

Other benefits of voltage detectors:

- Permanent Device: Unlike a voltmeter, a voltage detector is a permanent part of an electrical system. A voltage indicator is maintenance-free because it receives its power from the line voltage, not from batteries. Permanent voltage detectors are less prone to damage because they cannot fall out of a tool belt like a voltmeter.
- Fuse Status & Power Indicator: Under NFPA 70E, checking fuses or verifying system power requires workers to wear proper personnel protective equipment as part of their LOTO procedure. Having fuse and power status information readily available through a viewing window, or inferred portal, on the electrical enclosure eliminates a reason for workers to access the enclosure.
- Reduced Arc Flash Risk: Using voltage detectors to check for voltage on incoming disconnects creates an opportunity for an arc flash. High-incident energy (Category 3 & 4) panels further intensify this danger. Safety is a natural byproduct when a voltage detector pre-checks voltage before an electrician performs his final voltage check (voltage stick).

Applications

Since medium voltage indicators mount inside enclosures, a viewing window, or an infrared portal, will allow workers to see the flashing LEDs through the panel door without voltage exposure, which install for around $300. Medium or high voltage equipment applicable for this application include:

- Motor Starters
- Metal Clad Switchgear
- Open Bus Work
- Medium Voltage Drives
- Isolation Switches
- Substation Switches
- Transfer Switches
- High-Resistance Ground Switches

High voltage distribution equipment with infra-red portals.

Close-up of infra-red portals.

Medium voltage starters with standard viewing windows.

Increase Productivity and Safety with Mechanical LOTO:

Workers performing mechanical LOTO procedures must isolate electrical energy. A voltage detector provides a means to check voltage inside a medium voltage enclosure. Without a voltage detector, a mechanic performing mechanical LOTO would be required to work in tandem with an electrician using a voltmeter (or voltage stick) to physically verify voltage inside an electrical panel. In this case, the electrician is exposed to voltage. With voltage detectors, the mechanic *alone* can verify zero electrical energy through a viewing window without any exposure to voltage.

Most agree that any low cost device which simplifies maintenance and increases safety contributes to the high calling of electrical safety. The specific design and applications of medium voltage indicators increase employee productivity, but also promotes compliance to NFPA 70E. Incorporating them into LOTO procedures allow a safer way to answer the, “Is there voltage?” question.

Product Information: www.graceport.com/medvolt.cfm

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Warning: Verify an electrical conductor has been de-energized using an adequately rated voltage detector before working on it. Follow appropriate Energy Control (Lockout/Tagout) procedures as per OSHA Subpart; the current edition of NFPA 70E; and the current edition of CSA Z462.