VeriSafe
Absence of Voltage Testers

2.0 AVT + Network Module
VeriSafe

Absence of Voltage Testers
Verifying a De-Energized Condition

NFPA 70E-2021 120.5 Process for Establishing and Verifying an Electrically Safe Work Condition

CSA Z462-2021 4.2.5 g) Exception 2) & Note 1

(7) Use an adequately rated portable test instrument to test each phase conductor or circuit part to test for the absence of voltage. Test each phase conductor or circuit part both phase-to-phase and phase-to-ground. Before and after each test, determine that the test instrument is operating satisfactorily through verification on any known voltage source.

Exception No. 1 to (7): An adequately rated permanently mounted absence of voltage tester shall be permitted to be used to test for the absence of voltage of the conductors or circuit parts at the work location, provided it meets the all following requirements:

1) It is permanently mounted and installed in accordance with the manufacturer’s instructions and tests the conductors and circuit parts at the point of work
2) It is listed and labeled for the purpose of verifying the absence of voltage
3) It tests each phase conductor or circuit part both phase-to-phase and phase-to-ground
4) The test device is verified as operating satisfactorily on any known voltage source before and after testing for the absence of voltage

Informational Note No. 2. For additional information on rating and design requirements for permanently mounted absence of voltage testers, refer to UL 1436, Outlet Circuit Testers and Other Similar Indicating Devices.
Comparison of Test Methods

**MANUAL PROCESS**

1. Select Tester & PPE
2. Open Panel
3. Verify Tester
4. Test for Voltage
5. Verify Tester

**Exposure to Electrical Hazards**

10-20 min

**AUTOMATIC PROCESS**

1. Activate the VeriSafe™ AVT 2.0
2. Open Panel

**VeriSafe™ Absence of Voltage Testers**

No Exposure to Electrical Hazards

10 seconds
VeriSafe AVT

What Happens During the Test?

- Confirms Power is Available to Perform Test
- Checks Health of Key Circuit Elements
- Verifies Threshold Circuits in Tolerance
- Checks on Known Voltage Source
- Verifies Connectivity
- Verifies Threshold is Under 3V
VeriSafe Absence of Voltage Tester (AVT)

A permanently-mounted tester used to verify a circuit is de-energized prior to opening an electrical enclosure.

- **Red LEDs** indicate presence of voltage.
- **Green LED** indicates absence of voltage.
VeriSafe Absence of Voltage Tester (AVT)

A permanently-mounted tester used to verify a circuit is de-energized prior to opening an electrical enclosure.

- **Instruction Label**: Test before door is open.
- **Indicator Module**: Keep hazardous voltage away from door.
- **System Cable**: Hardwired to each phase & ground.
- **Sensor Leads**: Hardwired to each phase & ground.
- **Isolation Module**: Indicate presence of voltage.
- **Red LED**: Indicates presence of voltage.
- **Green LED**: Indicates absence of voltage.
Key AVT Features

• **Built-In Overcurrent Protection**
  - Directly test the source without concerns over fusing

• **No Hazardous Voltage to Door**
  - Reduces risk of electric shock

• **Installation Verification**
  - Confirms contact with test point

• **Active Indications**
  - Positive feedback when absence of voltage is confirmed

Two leads per phase allow installation to be verified
## VeriSafe AVT Indications

### Voltage PRESENCE Indication
- Red LEDs indicate hazardous voltage present

### ABSENCE of Voltage Testing
- Lack of red LEDs does not guarantee voltage absence
- Push to initiate test and see progress
- Green indicates absence of voltage is confirmed
Diagnostic Codes

Which test criteria were not met?

How do I know when to replace the battery?

VeriSafe 2.0
Absence of Voltage Tester
CAT III (1000V), CAT IV (600V)

Tester location: ☐ Line ☐ Load ☐ Other ______

Push Button to Begin Test

Flashing - Test in Progress
Solid - Voltage may be Present
See Diagnostic Code for Status:

<table>
<thead>
<tr>
<th># Flashes</th>
<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Check Battery</td>
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<tr>
<td>2</td>
<td>Voltage above Threshold</td>
</tr>
<tr>
<td>3</td>
<td>Temperature Out of Range</td>
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<tr>
<td>4</td>
<td>Installation Not Verified</td>
</tr>
<tr>
<td>5, 6, 7 or 8</td>
<td>See User Manual</td>
</tr>
</tbody>
</table>

Equipment De-Energized, < 3V
Hazardous Voltage Present

Follow safety procedures & use required PPE
Test for de-energization of the Engel injection mold machine using the VeriSafe AVT. Green light indicates circuit is de-energized. Hydraulic pressure at Gages should go to 0. Attempt to start or operate the equipment.
VeriSafe AVT

Benefits

- Improved Safety & Risk Reduction
- Increased Productivity
- Simplified Process
- Reliable Results
- Flexible Applications
Coming Soon!

VeriSafe 2.0 AVT + Network Module
VeriSafe 2.0 AVT

All existing VeriSafe AVT features, plus…

- Network connectivity
- Flexible power options
- Expanded ratings
- Optimized configurations
- Initiate the test from multiple locations

VS2-AVT-__-__-__-__-__
Power for the Absence of Voltage Test

Battery
- 3.6 V industrial lithium battery
- Replace without opening the enclosure

Auxiliary DC
- 12-24 VDC
- Must be available when main is de-energized

Network Module
- Network module provides power & communication to the AVT
- Auxiliary DC or PoE must be available when main is de-energized
  - 12-24 VDC
  - 10/100 PoE, IEEE 802.3af Type 1 Class III PoE topology
Indicator Module

- Battery-free option when space savings is crucial
- Select faceplate optimized for your power system
- Option for two indicators

Three-phase
DC/Single-Phase

Indicator Faceplates

Battery-Powered Indicator
Battery-Free Indicator
Two Indicator Modules (optional)

- 2.0 AVT has two keyed jacks for local indicators
  - Keyed jacks to avoid confusion with network port

- Initiate test from either location, results displayed at both indicators
### Changes from VeriSafe 1.0 AVT to VeriSafe 2.0 AVT

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<td>600 V</td>
<td>1000 V</td>
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<td><strong>OVERVOLTAGE</strong></td>
<td>CAT III</td>
<td>600 V</td>
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<td><strong>CATEGORY</strong></td>
<td>CAT IV</td>
<td>1000 V</td>
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<td><strong>VOLTAGE PRESENCE INDICATORS</strong></td>
<td>AC only</td>
<td>AC &amp; DC</td>
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<td><strong>POWER FOR AVT TEST</strong></td>
<td>3.6 V Battery</td>
<td>3.6 V Battery</td>
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<td>12-24V DC</td>
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<td><strong>INTEGRATION</strong></td>
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<td><strong>SOLID STATE CONTACTS</strong></td>
<td>Absence of Voltage (SIL 3)</td>
<td>Absence of Voltage (SIL 3)</td>
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<td>Measured Values*</td>
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<td><strong>DEDICATED DC/SINGLE-PHASE SKUS</strong></td>
<td></td>
<td>✓</td>
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<td><strong>NUMBER OF INDICATORS</strong></td>
<td>1</td>
<td>2</td>
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<td><strong>OPERATING TEMPERATURE</strong></td>
<td>-25 – 60 C</td>
<td>-25 – 60 C</td>
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<td><strong>HAZARDOUS LOCATIONS</strong></td>
<td>Class 1 Division II (Separate SKU)</td>
<td>Class 1 Division II Class 2 Division II ATEX Zone 2 and 22 / IECEx</td>
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<tr>
<td><strong>CONNECTIVITY TEST</strong></td>
<td>Open Lead Detection</td>
<td>Open Lead Detection</td>
</tr>
<tr>
<td><strong>ABSENCE OF VOLTAGE THRESHOLD</strong></td>
<td>1.5 – 2.9 V</td>
<td>2.7 - 2.9 V</td>
</tr>
</tbody>
</table>

* Requires Network Module, **VS2-NET**

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**What’s Different?**

The next-generation VeriSafe AVT has an enhanced set of features and will be compatible with additional applications.

The 2.0 AVT uses new technology for the connectivity test and voltage threshold measurement, making it more robust for many applications.
VeriSafe Network Module
For use with 2.0 AVT

- **Network/PoE Connection**
  - Live Voltage Monitoring
  - Test Result Log
  - Temperature
  - Connection Status
  - Battery Voltage

- **Voltage Presence**
  - Status for each phase
    (not part of safety function)

- **Connect to AVT**
  - Power
  - Communication

- **DC Power Input**

**On-board Web Application**

- **VeriSafe AVT**
  - Voltage Presence
  - Voltage Measurements

**New in 2022!**

- Custom Add On Profile
- Automatic Diagnostics Ready
AVT Integration

Power Source(s) or Test Point(s)

Controller, PLC or Relay Logic

- Audible Alarm
- Visible Stack Light
- Door Lock(s)

SIL 3 Standard I/O

Door Position Sensor(s)

VeriSafe AVT

VeriSafe Network Module (requires 2.0 AVT)

Voltage Presence (no safety function)

VeriSafe AVT

VeriSafe Network Module (requires 2.0 AVT)

Voltage Absence (SIL 3)

Network Module (optional)

2.0 AVT Isolation Module

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Applications
VeriSafe Absence of Voltage Testers

Data Center Applications
VeriSafe Absence of Voltage Testers

Industrial Applications
Outdoor Applications

• Increased temperature range and UV resistance

• Higher voltage/overvoltage ratings

• 2.0 AVT outdoor applications
  – Service entrance
  – Outdoor switching
  – Rooftop HVAC
Hazardous Locations

Flammable Gases/Vapors
- Class I Division 2
- Class I Zone 2
- ATEX/IECEX Zone 2

Combustible Dust
- Class II Division 2
- Class II Zone 2
- ATEX/IECEX Zone 22
Control Panels, On Machine, Automation Panels

• Increased productivity for electricians, mechanical maintenance, and operators
• Retrofit or install at OEM
• Optional: integrate AVT with control systems
  ‒ Prevent access to an enclosure or manufacturing area
  ‒ Increase productivity
Disconnect Switch

- Install AVT on the line side, load side, or both
  - Line side – allows switch to be maintained
  - Load side – allows work to be performed downstream (motors, pumps)
External Disconnect on Control Panel

- Use AVT to test load side of external disconnect/line side of main control panel
  - No access to live parts when main control panel is open
Motor Control Centers

- Incoming compartments
  - Main lug only
  - Line side of main
  - Load side of main
- Individual units
  - Starters
  - Feeders
  - Drives
- Factory installed or retrofit
Power Distribution Equipment

- Switchgear, switchboards, power distribution panels, transformers

- Mitigate exposure to high incident energy
  - Line side of main
  - Secondary side of a transformer

- Test to ensure feeders are fully open
DC & Single-Phase Applications

- Optimized isolation module and indicator faceplate available
  - VS2-AVT-1P-

- Ideal for 120V control power, lighting panels, DC applications
Retrofit Option

Utilize an adjacent enclosure

- Limited panel space
- Unable to modify main enclosure door
Two Indicator Modules

Primary Indicator Module

Auxiliary Indicator Module
Network Applications
*Requires Network Module VS2-NET

- Monitor and troubleshoot with real-time voltage status
- View test results and data logs
System Integration
Outputs (SIL 3)

- Timestamp
- Access control

Combine the AVT with an electronic lock for an added layer of protection.

Absence of Voltage Tester

Access Control Kit

Includes keyed mechanical override for troubleshooting

Contacts close when the absence of voltage is verified
Access Control
AVT + Lock

1. VeriSafe 2.0 AVT
2. Power is isolated/locked out
3. Operator initiates absence of voltage test by pushing test button.
4. AVT outputs change state when absence of voltage is confirmed (part of safety function)
5. Controller releases lock when output contacts close, allowing Operator to enter enclosure or gated area.
Power Monitoring
AVT + Network Module (contacts)

1. VeriSafe 2.0 AVT + Network Module

2. Loss of voltage in one or more phase
   - Power is isolated/locked out
   - Voltage drop
   - Blown fuse(s)

3. Solid state contact(s) change state when voltage presence drops below threshold (~47V ac or ~60V dc).

4. Change in contact status triggers an action (ex. Notification logged/sent, stack light is activated, timer is activated, HMI signal etc.) to alert Operator to test (optional).

5. Operator can initiate absence of voltage test by pushing test button at either location at any time.

Requires VeriSafe 2.0 AVT + Network Module.
Maximum voltage 1kV AC or DC.
Option for one or two AVT Indicator Modules
Power Monitoring
AVT + Network Module (wired Ethernet)

1. VeriSafe 2.0 AVT with Network Module + Network Connection

2. Network module monitors voltage levels at test point.

3. Anomaly detected (loss of voltage, loss of connection, temperature threshold, etc.)

4. Send signal to trigger alert (activate stack light, sound alarm, send notification, etc.)

5. Operator initiates absence of voltage test by pushing test button.
   Test can be initiated at either indicator.
   Result will be shown simultaneously on both indicators

Requires VeriSafe 2.0 AVT + Network Module + Network Connection
Maximum voltage 1kV AC or DC.
Option for one or two AVT Indicator Modules

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Product Test
Stored Energy

1. VeriSafe AVT installed on test cables to monitor voltage at product under test*.

2. Power is isolated/locked out.

3. Network module monitors voltage levels at product/cables.

4. When voltage reaches ~3V activate stack light. This is a signal to Production Associate the system is ready to test.

5. Production Associate initiates absence of voltage test by pushing AVT test button.

6. When absence of voltage is confirmed, gate unlocks, and Production Associate can safely enter and remove cables from Product.

Requires VeriSafe 2.0 AVT + Network Module. Maximum voltage 1kV AC or DC.

* AVT should be installed as close to product under test as possible.