

Panduit Press Conference EMEA

Innovations for Secure, Reliable, Efficient
IT and Industry Infrastructure

One Button for More Security in Industry and IT



PANDUIT 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:

# Flashes	Description
1	Check Battery
2	Voltage above Threshold
3	Temperature Out of Range
4	Installation Not Verified
5, 6, 7 or 8	See User Manual

 Equipment De-Energized, < 3V
 Hazardous Voltage Present

 Follow safety procedures & use required PPE



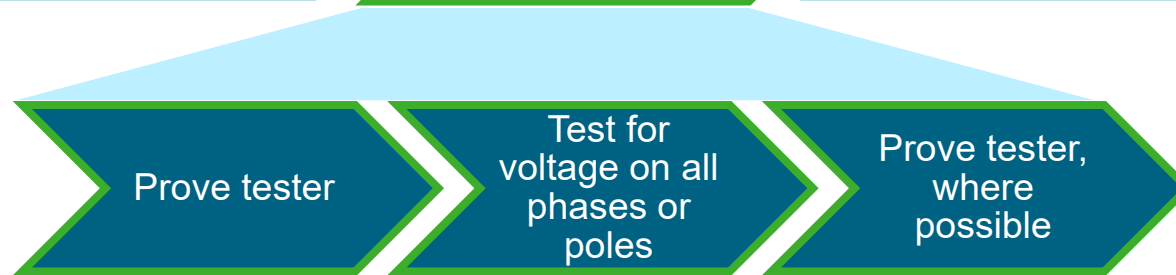
Some Data about Electrical Accidents

- 5333 (+1,5%) workers were killed on the job in 2019
- 732 worker fatalities were related to contact with objects and equipment
- 166 (+6) of the total deaths were attributed to electrocution
- **Electrocution is the sixth leading cause of workplace death (Was the third in 2018)**
- 3 of the top 10 most frequently cited OSHA standards violated are electrical based
- More than 30,000 non-fatal shock accidents occur each year
- Estimated 5 to 10 arc explosions occur in electrical equipment every day in the US
- Average cost per incident estimated at over \$1.000.000
- The average cost of medical treatment for survivors of arc flash is \$1.5 million. Total cost have been estimated at \$12 – 15 million per incident
- In addition 93 fatal injuries in 2019 were linked to running equipment or machinery

Source: www.osha.gov/oshstats/commonstats.html

CENELEC/IEC Standards

EN 50110-1:2013 Operation of electrical installations – Part 1: General Requirements



6.2.4 Verify absence of operating voltage

6.2.4.1 General

The absence of operating voltage shall be verified on all phases or poles of the electrical installation at or as near as practicable to the work location. This condition for parts of the installation that have been switched off shall be verified in accordance with the practice laid down in local instructions. These include for example the use of voltage detectors, voltage detecting systems built into the equipment and/or the use of separately applied voltage detecting systems. Voltage detectors and separately applied voltage detection systems shall be proved immediately before and where possible after use.

...Voltage detectors or voltage detecting systems (VDS) shall comply with IEC 61243-1, -2, -3, or -5.

Portable Testers Have Limitations

Error Setting Function Selection Switch

Electrician severely burned when a multimeter switch **was incorrectly placed in resistance mode** prior to making contact with terminals in a 480V MCC.^[1]

Inadequately Rated Tester

Arc created when a voltmeter was connected across two phases of a bus bar. Arc caused tester to overload and explode resulting in one fatality and another worker with serious burn injuries.^[2]

Error Reading Digital Display

“OL” or over-range was misinterpreted to mean “zero” or no voltage present, resulting in a near-miss.^[1]



Use of Improper Portable Tester

Although a **non-contact voltage probe** did not indicate voltage, a lighting circuit was in fact energized, resulting in electrical shock.^[3]

Using a Voltmeter for verification has limitations...

- Hardware failures
- Human error
- Process failures
- Misinterpretation
- Exposure to hazards

[1] H. L. Floyd and B. J. Nenninger, "Personnel safety and plant reliability considerations in the selection and use of voltage test instruments," *IEEE Trans. Ind. Appl.*, vol. 33, no. 2, pp. 367–373, 1997.

[2] "Hispanic factory worker dies of burns after improperly testing a 480-volt electrical bus bar," Fatality Assessment and Control Evaluation (FACE) Program, Nat. Inst. Occupational Safety Health, Centers Disease Control Prevention, U.S. Dept. Health Human Services, Cincinnati, OH, 2005.

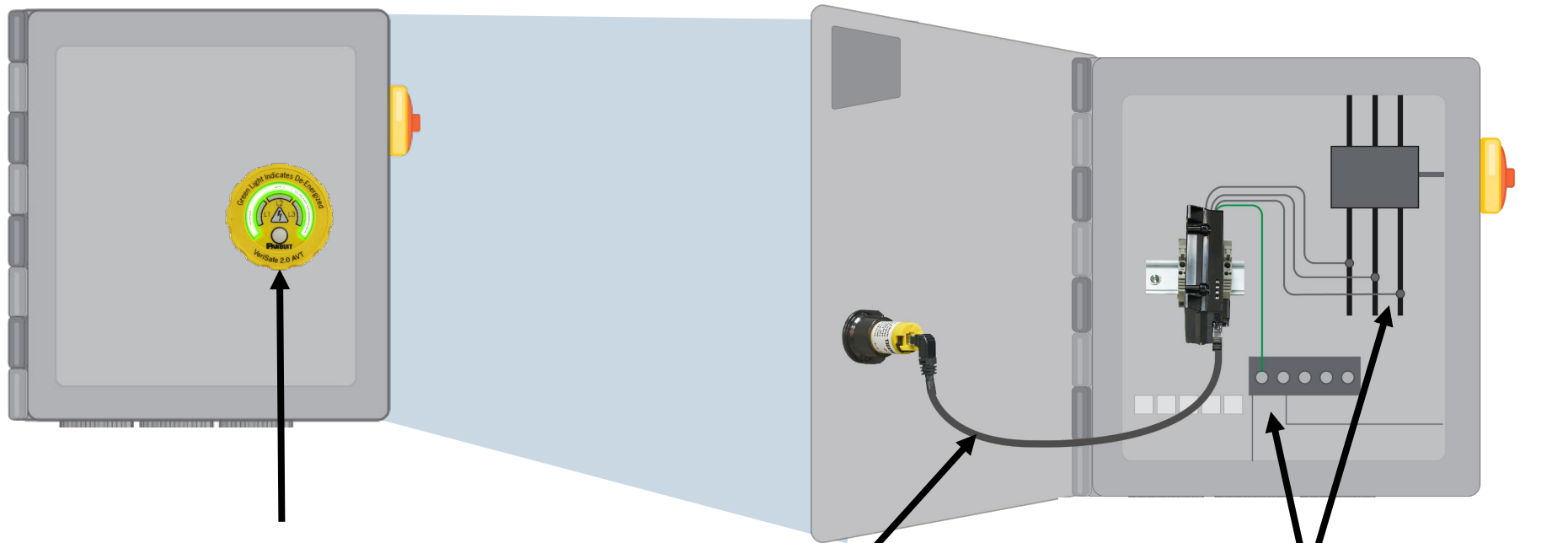
[3] J. Prigmore, J. Bishop and J. Martens, "Electrical Investigations: Case Studies, Common Electrical Safety Mistakes, and Lessons Learned," *IEEE Electrical Safety Workshop*, 2018.

Panduit's Absence of Voltage Tester

VeriSafe

VeriSafe Absence of Voltage Tester (AVT)

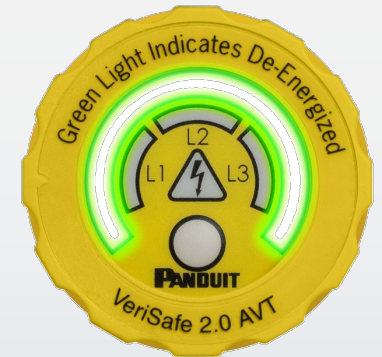
A permanently-mounted tester used to verify a circuit is de-energized prior to opening an electrical enclosure



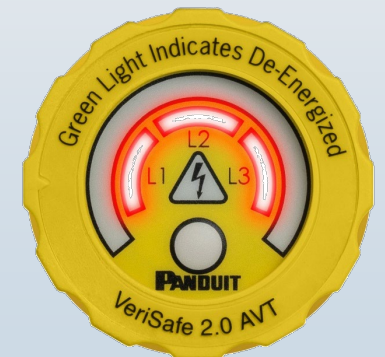
Test before door is open

Keep hazardous voltage away from door

Hardwired connections to each phase and ground



Green LED indicates absence of voltage

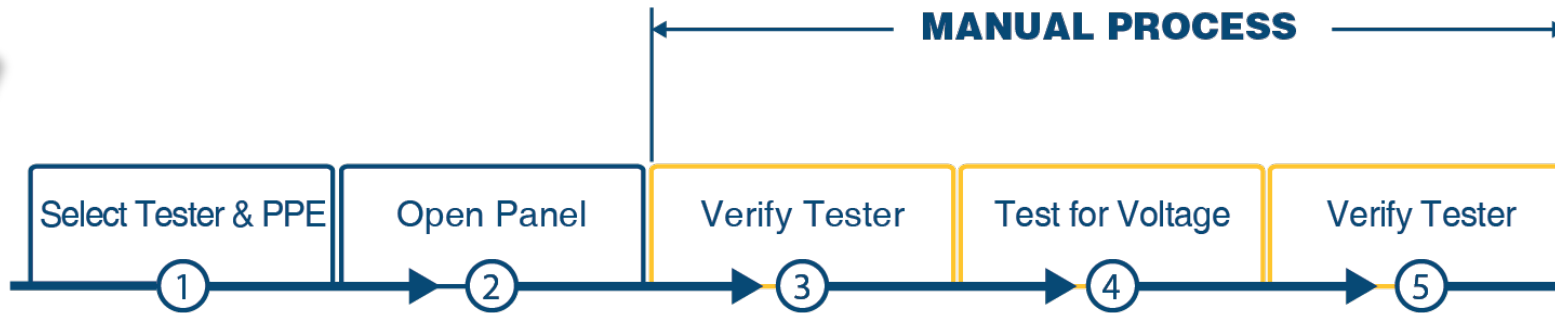


Red LEDs indicate presence of voltage

Comparison of Test Methods



PORTABLE TESTERS



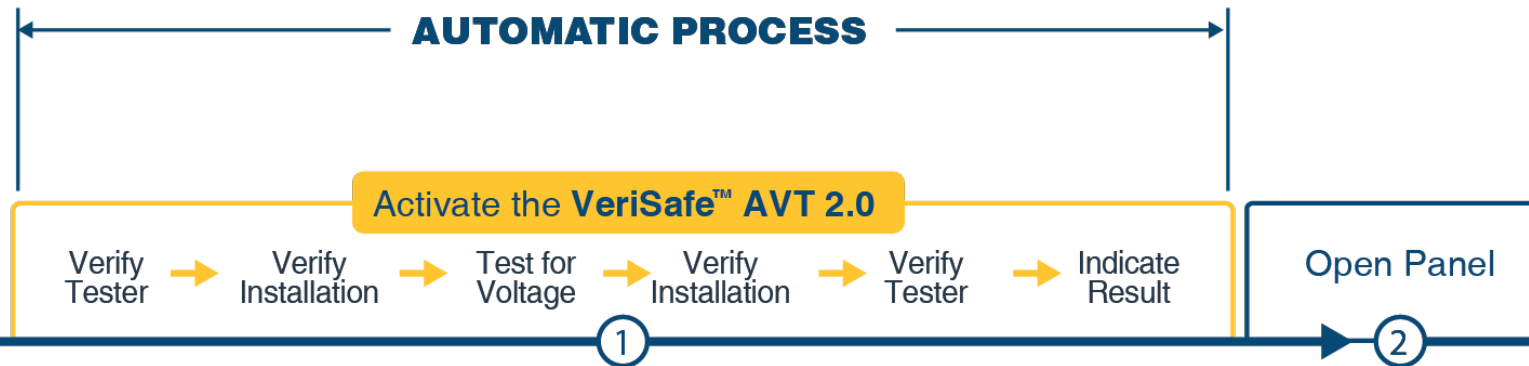
Exposure to Electrical Hazards



10-20 min



VeriSafe™
Absence of Voltage Testers

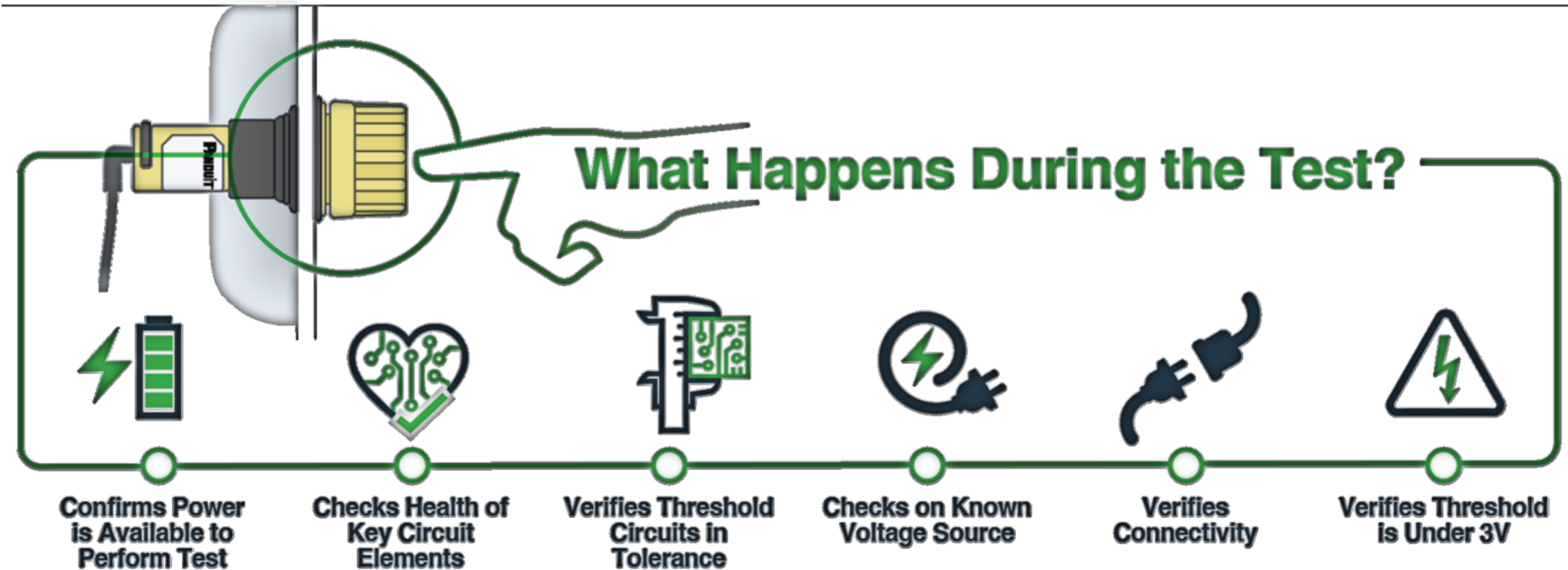


No Exposure to Electrical Hazards



10 seconds

VeriSafe 2.0 Absence of Voltage Tester



VeriSafe 2.0

VeriSafe 2.0 AVT

All existing VeriSafe AVT features, plus...

- + Battery-free option
- + Expanded ratings
- + Initiate the test from multiple locations
- + Network connectivity

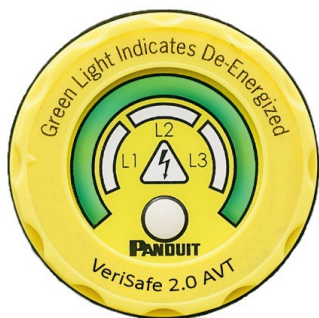


VS2-AVT-_-_-_-



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

Isolation Module

- Prevents hazardous voltage from reaching door
- Universal mounting (DIN rail or surface tabs)
- Approximately 10,16 x 12,7 x 2,54 cm
- Option for three-phase or DC/single-phase
- Sensor leads (pigtail)



Absence of Voltage
Contacts (SIL 3)

Sensor Leads
2 per Phase/G



DC Power Input (optional) or
Connect to **Network Module** (optional)

Indicator Modules
Keyed jacks
AUX indicator (optional)



Feature	VeriSafe 1.0 AVT	VeriSafe 2.0 AVT
MAXIMUM VOLTAGE (NOMINAL)	600 V	1000 V
OVERVOLTAGE CATEGORY	CAT III CAT IV	600 V 300 V
VOLTAGE PRESENCE INDICATORS (RED LEDS)	AC only	AC & DC
POWER FOR AVT TEST (YELLOW & GREEN LEDS)	3.6 V AA Battery - -	3.6 V AA Battery 12-24V DC PoE*
ABSENCE OF VOLTAGE THRESHOLD	1.5 – 2.9 V	2.7 - 2.8 V
CONNECTIVITY TEST	Open Lead Detection -	Open Lead Detection + Matched Pair Technology
INTEGRATION	SOLID STATE CONTACTS Absence of Voltage (SIL 3) - -	SOLID STATE CONTACTS Absence of Voltage (SIL 3) Voltage Presence* Network*
VOLTAGE REPORTING	-	Measured Values*
DEDICATED DC/SINGLE-PHASE SKUS	-	✓
NUMBER OF INDICATORS	1	2
OPERATING TEMPERATURE	0 – 60 C	-25 – 60 C
HAZARDOUS LOCATIONS	Class 1 Division II (Separate SKU)	Class 1 Division II Class 2 Division II ATEX Zone 2 and 22 / IECEx

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



Absence of Voltage Testers

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.

Network Module & Webserver Interface

What's in the VeriSafe Network Module?

Network/PoE

- EtherNet/IP, Modbus TCP
- Live Voltage Monitoring
- Test Result Log
- Temperature
- Connection Status
- Battery Voltage

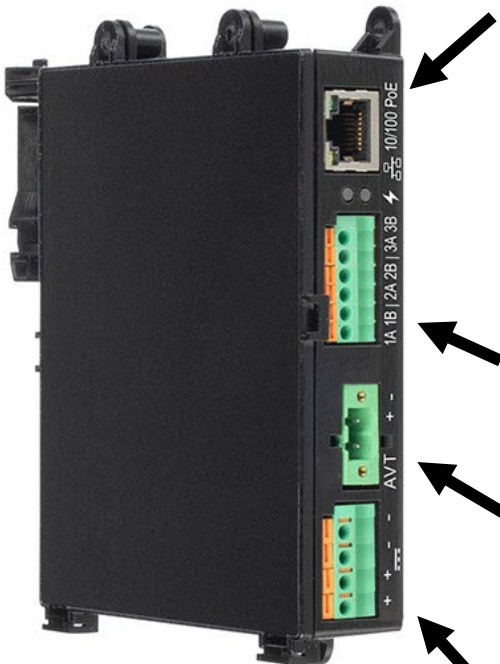
Voltage Presence

- Status for each phase

Connect to AVT

- Power
- Communication

DC Power Input



On-board Web Application

VeriSafe™ AVT
Network Module

VeriSafe 2.0

name ✓

VeriSafe 2.0 ↻

Date & Time: 7/20/21, 8:11 PM

Updated 7/20/21, 8:11 PM

Battery Voltage 3.2 V

AVT Temperature 20°C (68°F)

Updated 7/20/21, 8:11 PM

Connection Status L1 YES

Connection Status L2 YES

Connection Status L3 YES

Connection Status GND YES

Test Result 1 Pass

Test Result 1 Date 7/20/21, 8:11 PM

Test Result 2 Pass

Test Result 2 Date 7/14/21, 2:36 PM

Updated 0 seconds ago ✓

Voltage Presence

L1
⚡

L2
⚡

L3
⚡

Voltage Measurements

Line To Ground		RMS	Peak
L1	480 Vrms	678 V	
L2	479 Vrms	677 V	
L3	480 Vrms	679 V	

Line To Line		RMS	Peak
L1-L2	277 Vrms	392 V	
L1-L3	277 Vrms	392 V	
L2-L3	277 Vrms	392 V	

VeriSafe 2.0 AVT with Network Module

Leverage solid-state contacts to integrate the AVT with other systems.

- Absence of Voltage Contacts
 - Located on Isolation Module
 - Redundant, part of safety function (**SIL 3**)
 - Normally open, change state with absence of voltage indicator (green LED)

- Voltage Presence Contacts
 - Located on Network Module
 - Normally open, change state with voltage presence indicators (red LEDs)



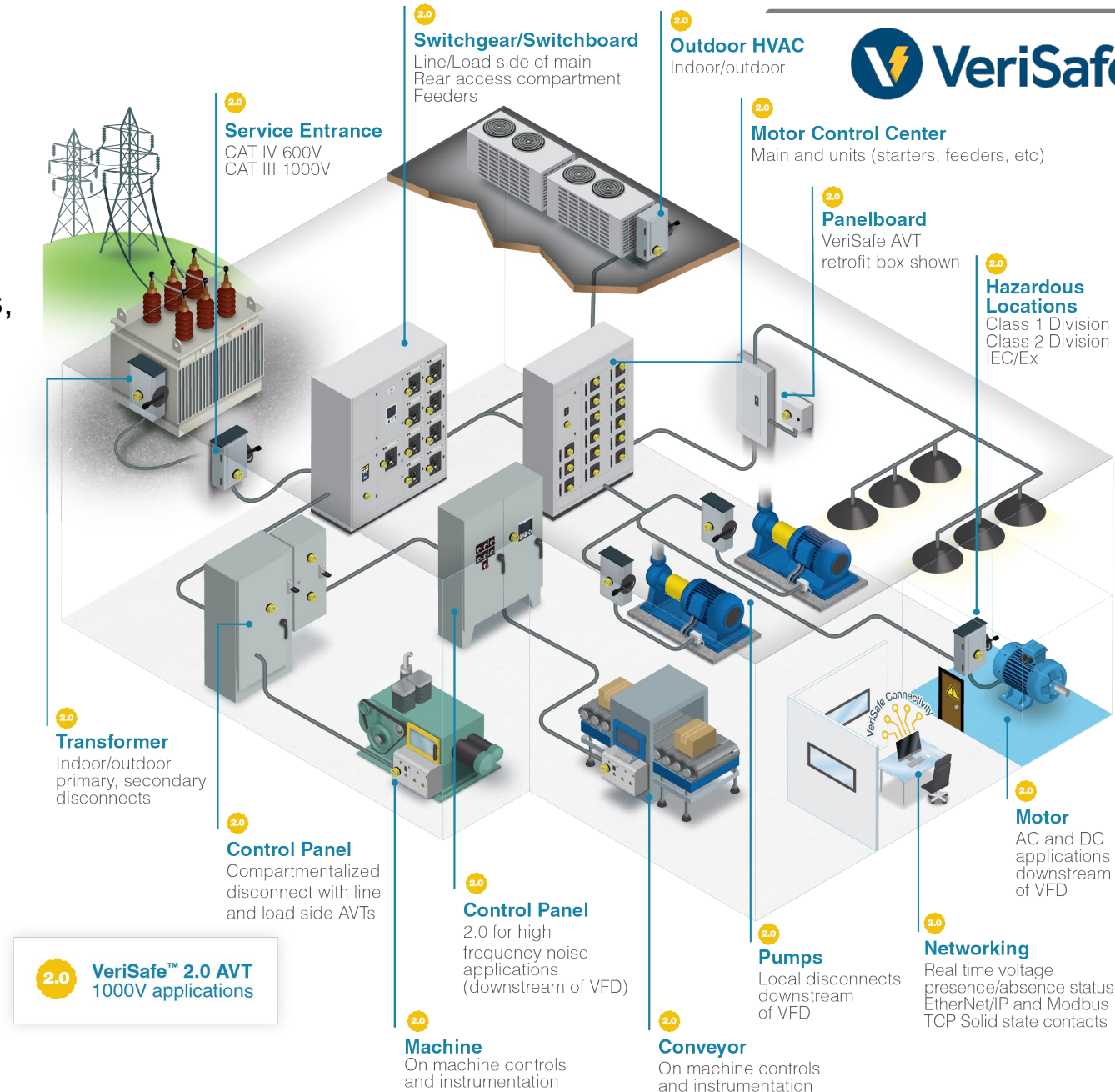
Support Infrastructure

Ideal Applications

- Switchgear, Switchboards, PDUs, Disconnect Switches, Bus Duct, Motor Control Centers, HVAC controls

Value Prop

- Increased **safety** and **risk reduction**
 - No exposure to electrical hazards during test
- Increased **productivity**
 - Results in less than 10 seconds
 - No need to call an electrician
- Simplified process for easier **compliance**
 - Recognized by NFPA 70E & CSA Z462



Target Markets



DATACENTERS



DISTRIBUTION



UTILITIES



AUTOMOTIVE



PAPER & PULP



STEEL

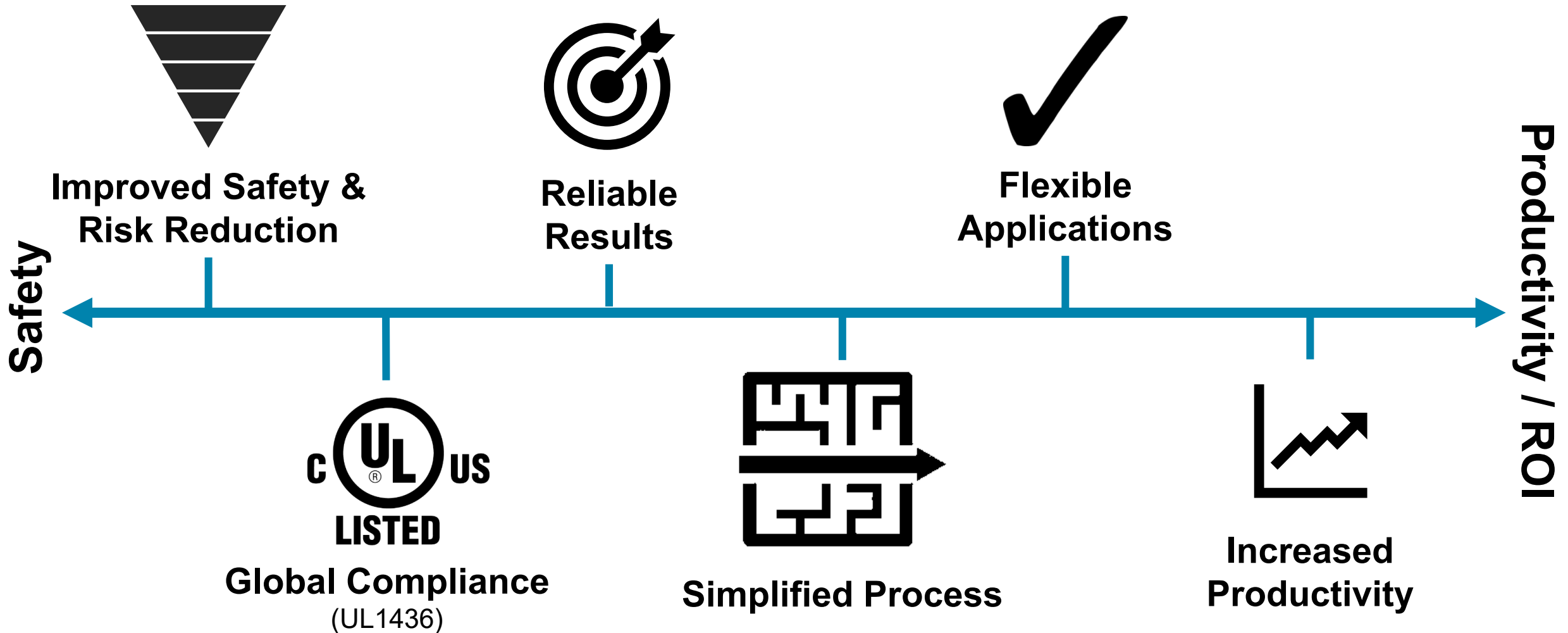


FOOD & BEV



OIL & GAS

VeriSafe™ Absence of Voltage Tester – Benefits



One Button for More Security in Industry and IT

Thank You.