

VeriSafe™ AVT Sensor Lead Connection Options

NOTE: See [VeriSafe AVT Instruction Manual](#) for *complete* Installation Instructions and Commissioning Checklist

1) Where to Install

The VeriSafe AVT is to be installed at the point in the circuit where you would normally test for voltage. If there are more than one energy sources within the enclosure, multiple AVTs will be needed to test each source (each AVT is designed to test one energy source from one to three phases).

2) General Information

The VeriSafe AVT is provided with 14 AWG Class K stranded sensor leads. **Ferrules or terminals are recommended for all sensor lead terminations to ensure reliable connections with stranded wire.**

There are four sets of color-coded sensor leads (three conductors and ground). Each set of sensor leads has a detection lead and a termination lead. The detection lead is used to detect voltage and the termination lead is used to verify that the detection lead is in contact with a conductor. The termination lead does not detect voltage. There are no labels distinguishing the detection and termination leads because it is critical that they are both properly terminated.

Sensor leads for each phase and ground must *not* be mechanically terminated at the same point for the AVT to function properly (see Figures 1 and 2). For example, if the termination shown in Figure 2 fails and the sensor leads remain in contact with each other (yet no longer in contact with the conductor), the installation test will be defeated for that set of sensor leads which may lead to inaccurate results from the AVT. If the detection lead is not contacting a conductor, the result of the installation test will prevent the AVT from returning a green absence of voltage indication.

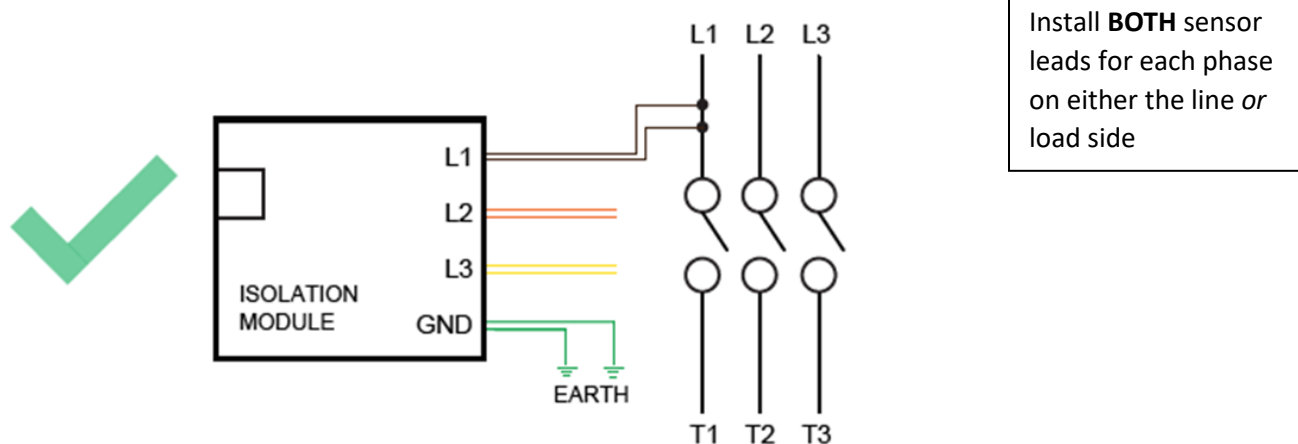
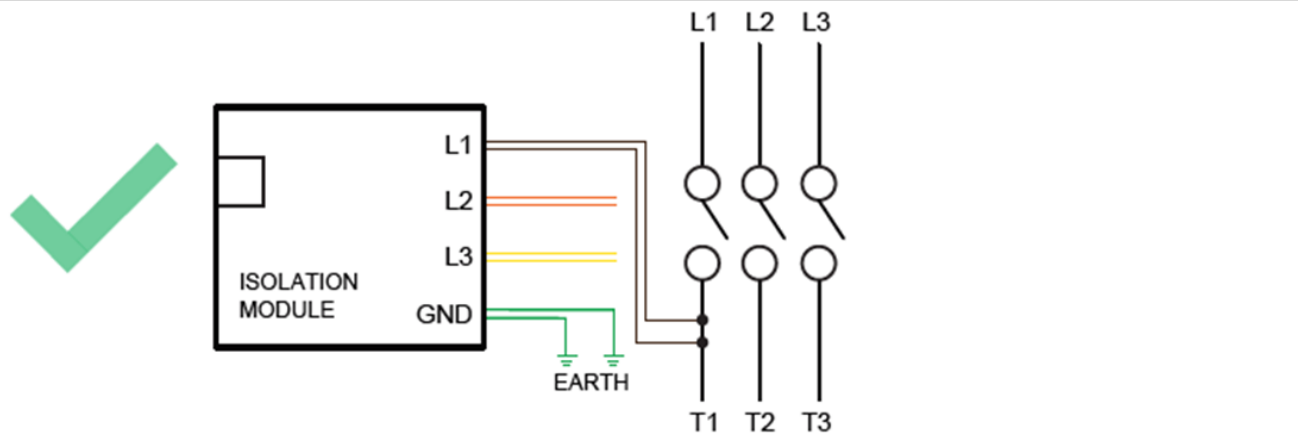
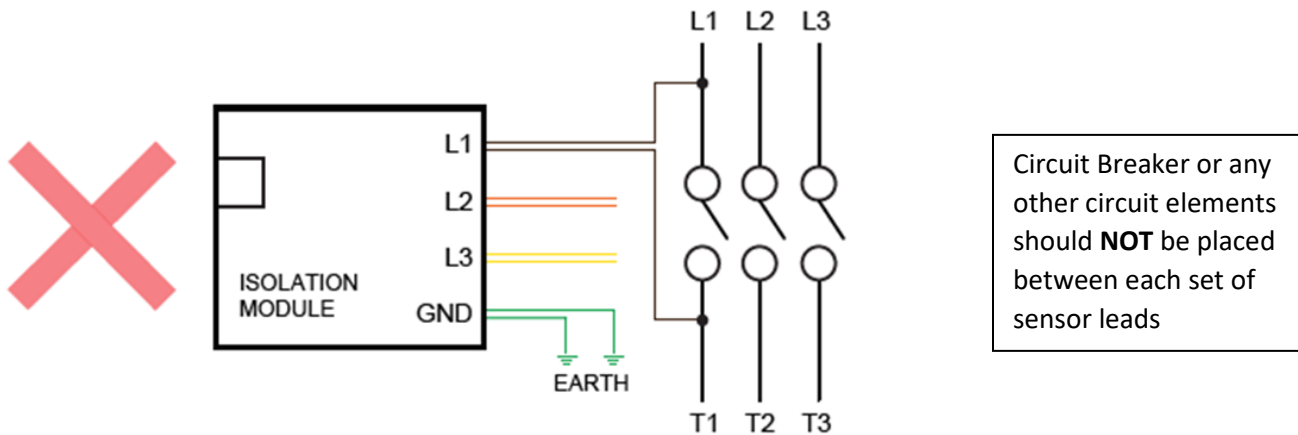


Figure 1 Example of properly terminated sensor leads. Leads are not mechanically connected, and termination points are insulated.



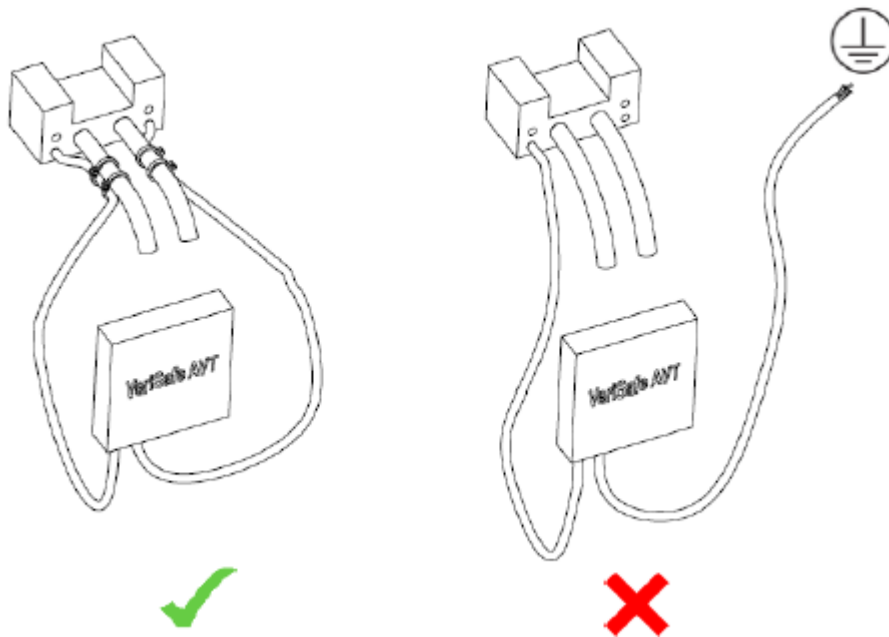
Figure 2 Terminating both sensor leads at the same point may result in inaccurate AVT results.

There is no maximum distance limitation between the two leads on each phase, however there should not be any circuit elements (ex. Circuit breaker, fuse, VFD, switch or similar control devices etc.) installed between each pair of sensor leads. (see diagram below)



When installing an AVT, care should be taken to ensure that sensor leads used to connect the AVT to the line or bus and to ground shall not be any longer than necessary and shall be routed to avoid sharp edges, pinch points or mechanical damage. Do not extend the sensor leads with a splice that exceeds the overall conductor length of 10 feet from the isolation module to the sensor lead tap termination (to comply with NEC tap rule, the AVT can be treated as a feeder circuit per NEC article 240.21 (B) (1) (b) exception. This rule allows a tap of no more than 10 feet on a feeder circuit without the need for overcurrent protection).

Secure the sensor leads to the power conductor or another nearby rigid feature to prevent movement of the sensor lead in the event that the termination point failed. Sensor leads can be secured using cable ties, clamps, mounts, or tape. The sensor leads should be secured at multiple locations, including near the termination point. (see the diagram below)



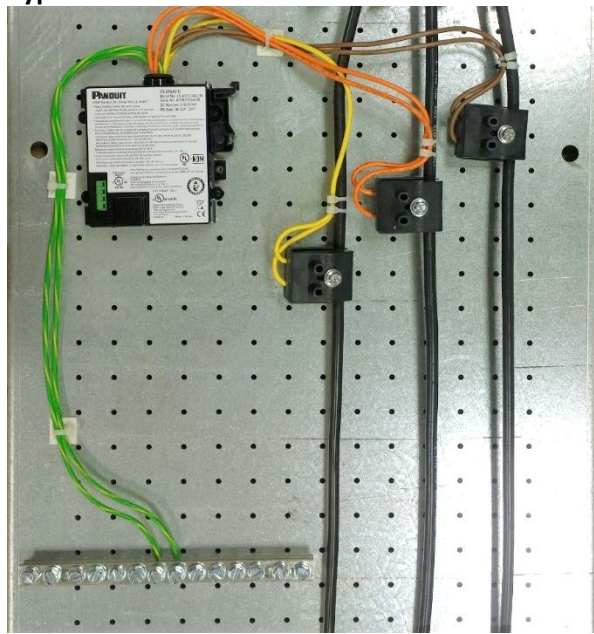
In addition, the sensor lead terminations should be inspected periodically, like other critical terminations inside an electrical enclosure, to ensure they are tight, and the sensor leads are secure.

Always insulate the sensor lead termination points. A variety of methods can be used to insulate the termination. Some connectors have insulating housings, others have accessories to insulate the connector. Insulating tape or heat shrink can also be used.

Use approved connection methods and follow **local codes and standards** when terminating the sensor leads.

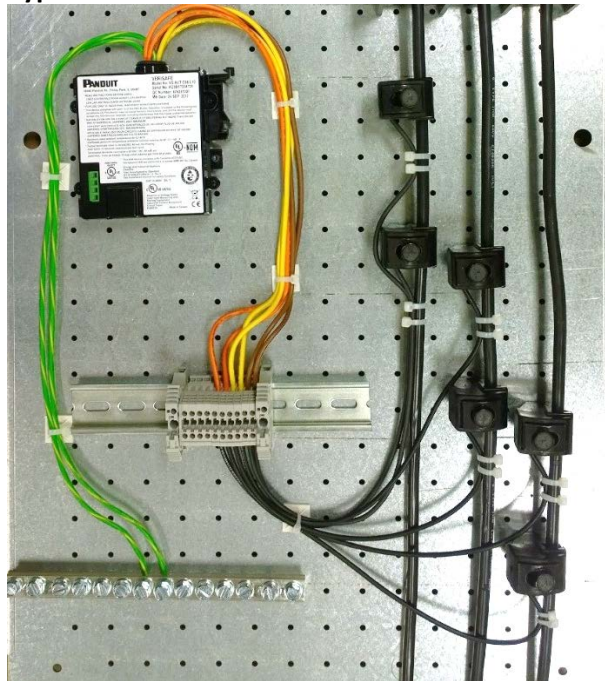
3) Common Methods for Terminating VeriSafe AVT Sensor Leads

This section describes some of the common methods used to terminate VeriSafe AVT sensor leads. Other methods or combinations of these methods can be used as long as they comply with the [VeriSafe AVT Instruction Manual](#) and local installation codes and standards.

VeriSafe Insulation Piercing Connector	
<p>Typical Installation</p> 	<p>Considerations</p> <ul style="list-style-type: none"> • Single connector is used to terminate two sensor leads, allowing for a smaller connector footprint and faster installation • Insulation piercing connectors do not compromise the integrity of the conductor • AVT sensor leads must have ferrules applied at all termination points
<p>SCCR Impact</p> <p>No Impact</p>	
<p>Limitations</p> <ul style="list-style-type: none"> • If extending the sensor leads, the total length of the sensor leads plus the sensor lead extensions must be less than 10ft from the isolation module to the connection point on the power conductor (to comply with NEC tap rule) 	
VeriSafe Insulation Piercing Connector Kit	
Each kit includes three connectors & ferrules to install one AVT	
Part Number	Product Description
VS-CKP14-6	VeriSafe AVT Insulation Piercing Connection Kit for tapping 14 to 6 AWG conductors. Rated for 600V
VS-CKP4-000	VeriSafe AVT Insulation Connection Kit for Tapping 4 to 3/0 AWG conductors. Rated for 600V.
VS-CKP1K4/0-500	VeriSafe AVT Insulation Connection Kit for Tapping AWG 4/0 to 500 MCM conductors. Rated for 1000V.

Insulation Piercing Connector with Terminal Block

Typical Installation



NOTE: This installation method is recommended for run conductors larger than 500 MCM (Panduit IPC connectors are compatible with class K sensor lead wiring and cover AWG 14 to 500 MCM run conductors.)

Sicame has part # TTD0810XF (image below) that covers 3/0 to 750MCM and accepts one 14AWG tap. A terminal block is needed to convert to the sensor lead stranding from class K to a stranding compatible with the Sicame connectors (This Sicame SKU is not compatible with class K wiring of the VeriSafe). Also, you will need six Sicame connectors to install an AVT (Each Sicame connector only accommodates one 14 AWG tap)



Considerations

- If the AVT sensor leads are not compatible with insulation piercing, insulation displacement, or “hot tap” style connectors, use of a terminal block provides a means of converting the AVT sensor leads to a wire type that is compatible with these connectors.
- Select proper extension wire that is compatible with the specific insulation piercing connector for the sensor lead extension.
- Ensure that the insulation piercing connector will not compromise the integrity of the conductor.
- **AVT sensor leads must have ferrules applied at all termination points**

SCCR Impact

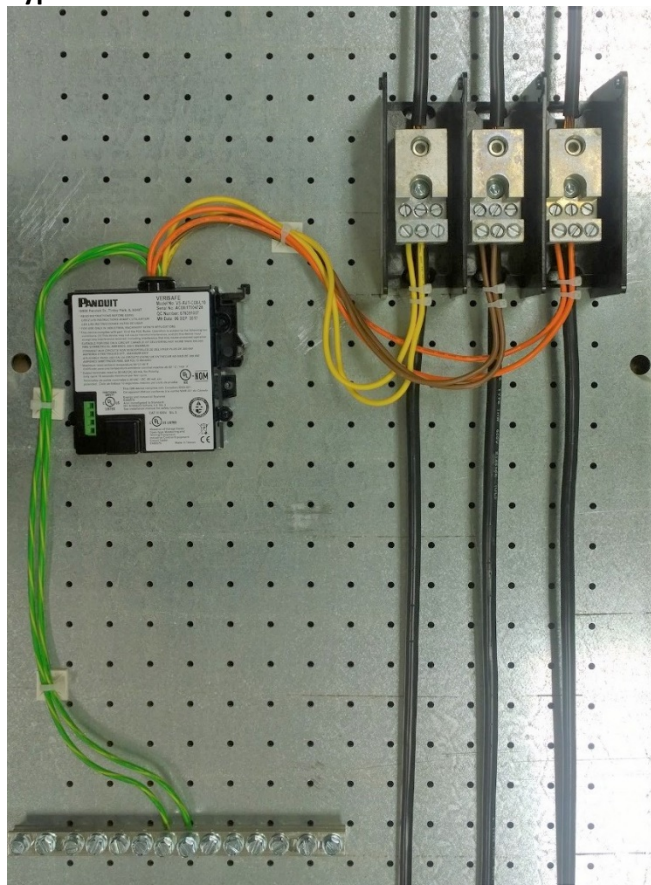
No impact

Limitations

- The total length of the sensor leads plus the sensor lead extensions must be less than 10ft from the isolation module to the connection point on the power conductor (to comply with NEC tap rule)
- Must use separate connector for each sensor lead

Power Distribution Block (PDB)

Typical Installation



Considerations

- Ideal for new installations where space for the power distribution block is more likely to be available.
- Select PDBs with ports capable of accepting 14 AWG AVT sensor leads.
- **AVT sensor leads must have ferrules applied at all termination points**

SCCR Impact

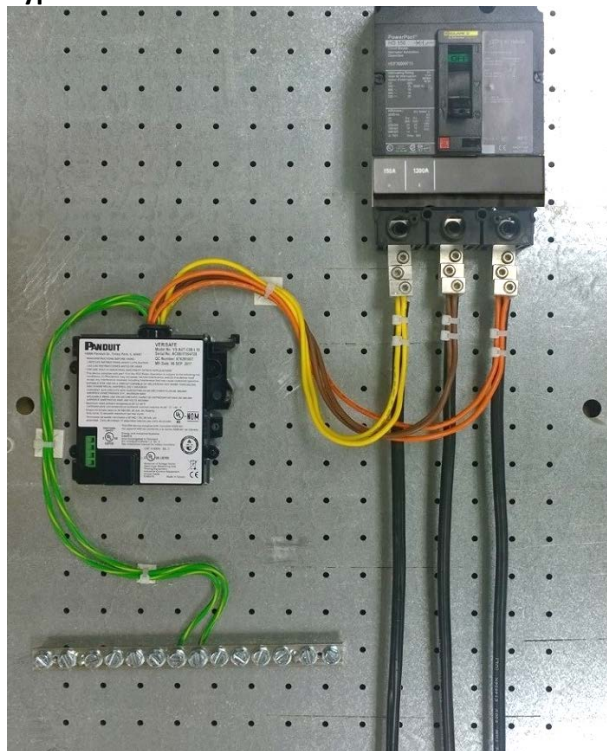
- If a power distribution block (PDB) is added for VeriSafe installation and not considered in the SCCR calculations, because the run conductor is spliced on either end of the PDB, the added PDB has become part of the power circuit and may affect the SCCR.
- If the power distribution block (PDB) is already present in the circuit and considered in the SCCR calculations, there is no impact to the SCCR rating.
NOTE: The AVT is not part of the power circuit, as it only acts as a sensing/monitoring device and does not carry power.

Limitations

- If extending the sensor leads, the total length of the sensor leads plus the sensor lead extensions must be less than 10ft from the isolation module to the connection point on the power conductor (to comply with NEC tap rule)
- Space must be available in panel to install the PDB.
- Sensor leads must not be terminated in the same port.
- For applications that require larger than 2/0 AWG conductors, most power distribution blocks will not have ports sized to accept both the larger conductor and smaller 14AWG AVT sensor leads.

Multi-tap Lugs

Typical Installation



Considerations

- AVT may be installed on the line side or load side of the disconnect
- It may be possible to terminate one AVT sensor lead on the load side lug of a disconnect and the other AVT sensor lead on the upstream lug of the next component. If this method is used, there must not be any circuit elements installed between the AVT sensor leads.
- Lugs must be rated to accept multiple wires and compatible with the 14 AWG AVT sensor leads
- Multi-tap lugs can be added or changed on some electrical disconnects
- **AVT sensor leads must have ferrules applied at all termination points**

SCCR Impact

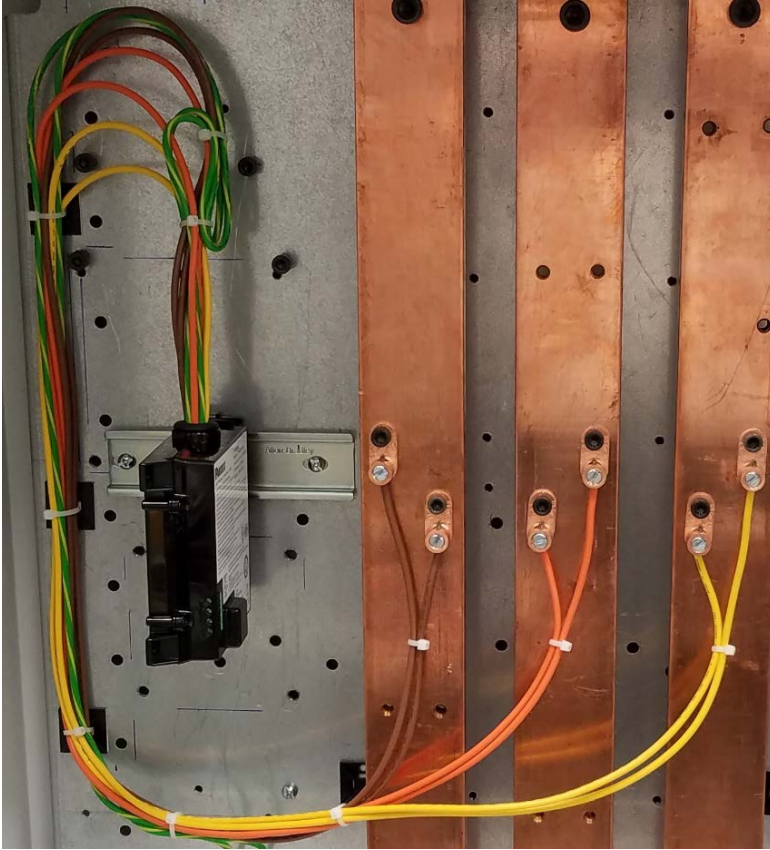
- Changing or adding a lug may impact SCCR
 - If the lugs are already present in the circuit and considered in the SCCR calculations, there is no impact to the SCCR rating.
- NOTE: The AVT is not part of the power circuit, as it only acts as a sensing/monitoring device and does not carry power.

Limitations

- If extending the sensor leads, the total length of the sensor leads plus the sensor lead extensions must be less than 10ft from the isolation module to the connection point on the power conductor (to comply with NEC tap rule)
- AVT sensor leads must not be terminated in the same port.
- Lugs must be compatible with the electrical disconnect.

Busbars

Typical Installation



Considerations

- Sensor leads may be terminated using barrel post lug, ring terminals, bolted connections or other compliant methods
- Carefully route and secure sensor leads
- Consult manufacturer before making modifications to busbars
- **AVT sensor leads must have ferrules (or terminals) applied at all termination points**

SCCR Impact

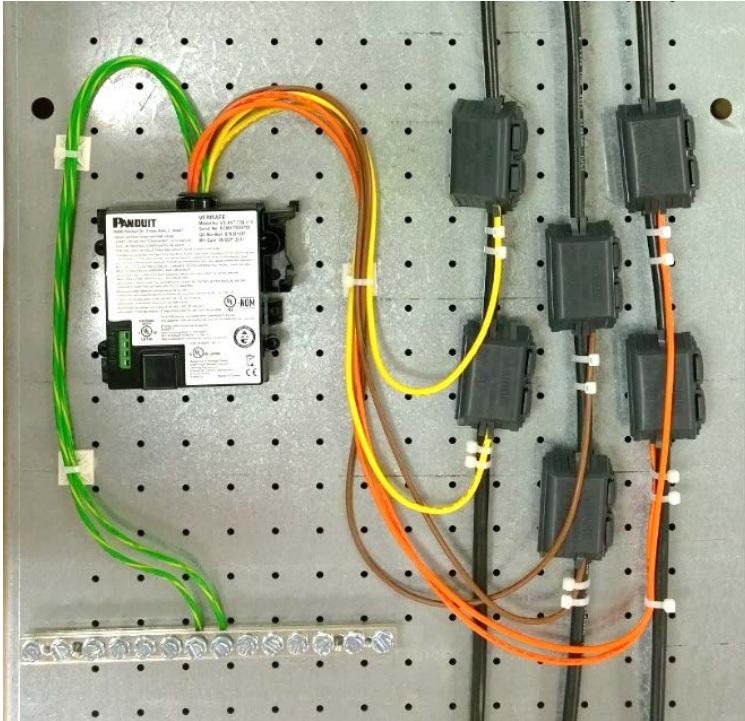
No Impact

Limitations

- If extending the sensor leads, the total length of the sensor leads plus the sensor lead extensions must be less than 10ft from the isolation module to the connection point on the power conductor (to comply with NEC tap rule)
- Sensor leads must not be terminated under the same screw.

Split Bolt Connectors

Typical Installation



Considerations

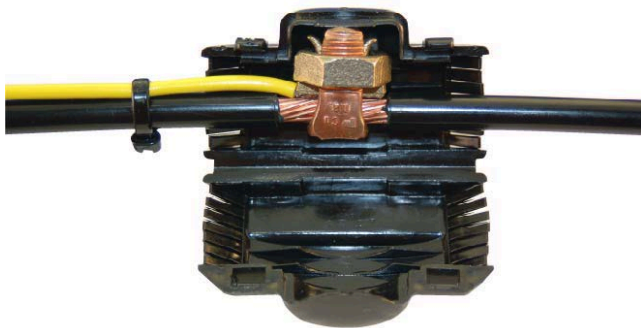
- Sensor leads must be secured to the power conductor
- Connections must be insulated
- **AVT sensor leads must have ferrules applied at all termination points**

SCCR Impact

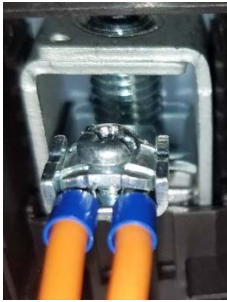
No Impact

Limitations

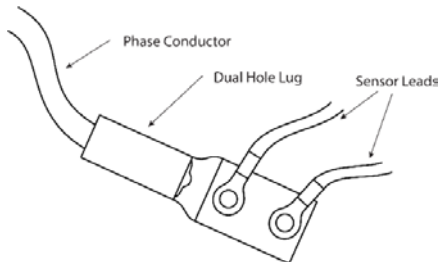
- If extending the sensor leads, the total length of the sensor leads plus the sensor lead extensions must be less than 10ft from the isolation module to the connection point on the power conductor (to comply with NEC tap rule)



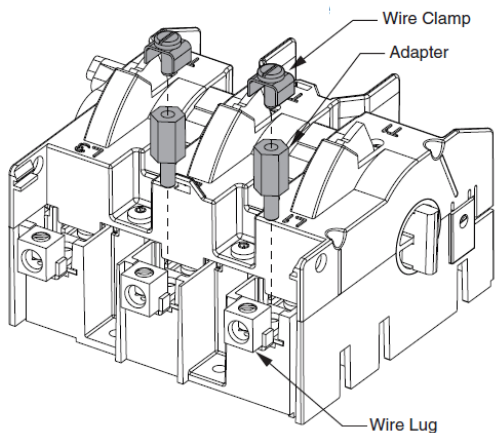
Other Examples



- Siemens control tap (Top image as shown Siemens part number is [3VA91430JH12](#)) that is compatible with one bolt connection yet allows for two separate “ports” separated by a set screw.
- Sensor leads are not tied together and separated by the terminal screw
- AVT sensor leads must have ferrules applied

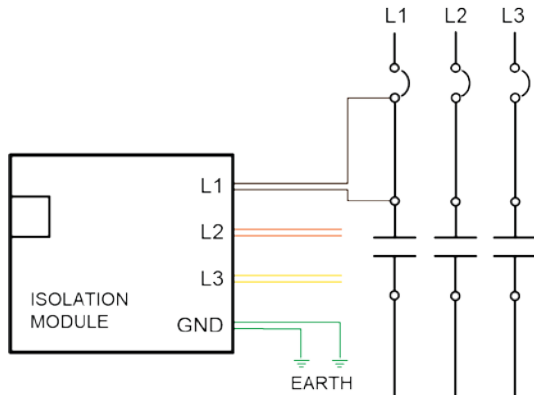


- Utilize dual hole lugs. Connect sensor leads with ring terminals.
- Each AVT sensor lead must be terminated at a separate point.
- Panduit product series dual hole lug “LCC” – [link](#) to catalog cut sheet



- Rockwell terminal adapters (SKU as shown is [1494U-ALT31](#)) with a control wiretap may be used on line or load side of the Rockwell 194U disconnects from 30-600A.
- An acceptable method for terminating one of the AVT sensor leads. Note terminal adapters are sold in packages of 2.

Other Examples



- VeriSafe AVT installation with one of the phase sensor leads terminated on the *load* side lug of the disconnect and the other sensor lead terminated on the *line* side lug of the next component in the circuit.

VeriSafe with Parallel Conductor Runs

Some applications may use multiple cables per phase. In these cases, it is recommended to install each sensor lead on a separate cable for redundancy. The diagram below provides additional guidance regarding recommended terminations for parallel conductors.

● = Recommended AVT Sensor Lead Termination

