HUBBELL
Power Systems

2, 3-Way TECORupter

Turner Electric™ Vacuum Interrupter
Installation and Maintenance Instructions

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⚠ WARNING ⚠

De-energize and properly ground any applicable and adjacent equipment before performing any installation or maintenance. Work should only be undertaken by qualified personnel.

TECORupter high voltage vacuum interrupters are designed for rapid and simple installation. By carefully following these instructions, the possibility of error and delay can be minimized. Time spent reading the instructions can save many hours of installation time.

These instructions are written to cover the installation of the TECORupter. They do not take the place of the setup drawing furnished with this order, but are intended to supplement it. If these instructions do not adequately meet the demands of your installation, please contact your Hubbell territory manager or customer service representative.

Receiving and Inspection

Handle with extreme care. This equipment is a precision-engineered high voltage interrupter. Every effort has been made to properly prepare the equipment for shipment.

Check the total shipment for completeness against the setup drawing. If the crating or interrupter device show evidence of shipping damage, note the issues on the bill of lading and notify your Hubbell representative.

Uncrate and/or remove all wire ties and check to see that the interrupter is undamaged. When uncrating, be careful not to discard any attached bags of parts. If damage has been sustained or parts are missing, please report the issues to your Hubbell representative immediately.

TECORupter Nomenclature

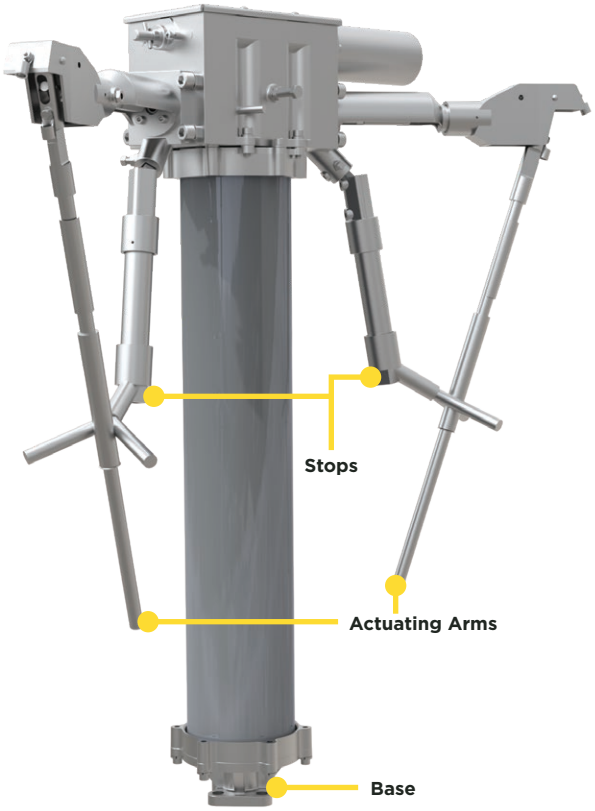

Figure 1: Angled view of the TECORupter

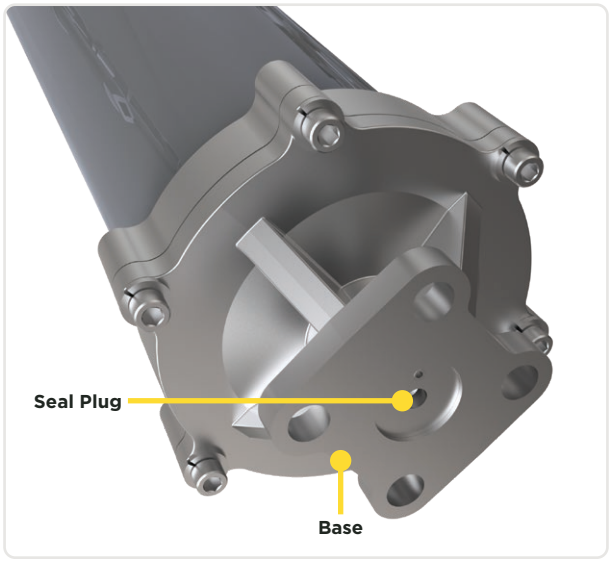

Figure 2: Base view of the TECORupter

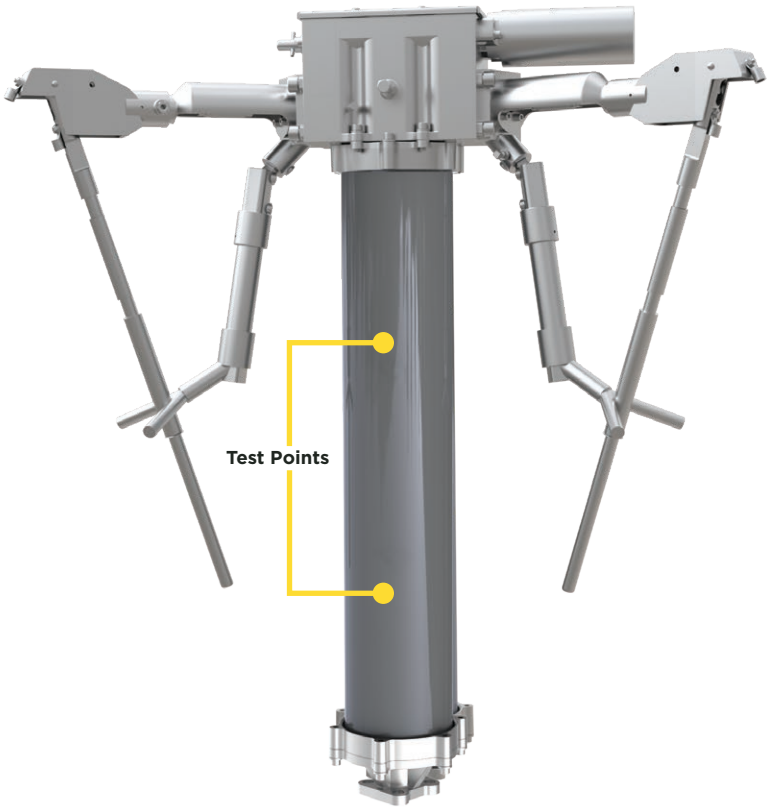

Figure 3: Back view of the TECORupter

Basic Operation

When the actuating arm of the TECORupter is engaged and lifted by the switch's pickup hardware, current flows from the actuating arm, through the vacuum bottles inside the TECORupter, to its base. The arm that is not engaged by the blade will also move outward away from the base. To avoid flashover both arms must be outside of the required air gap when the interrupter opens. When the actuating arm is lifted to the snap length shown on the set-up drawing and illustrated in Figure 4 below, the mechanism within the TECORupter will trip, opening the vacuum bottles and interrupting the current flowing through it.

When the actuating arm is dropped by the switch, the return spring mechanism returns the inner mechanism of the TECORupter to its initial position, which resets the vacuum bottle into the closed position. It is then ready to operate again the next time the switch is opened.

The pick-up finger engages the actuator rod creating a parallel current path. At a pre-determined point, the vacuum contacts separate, interrupting the circuit.

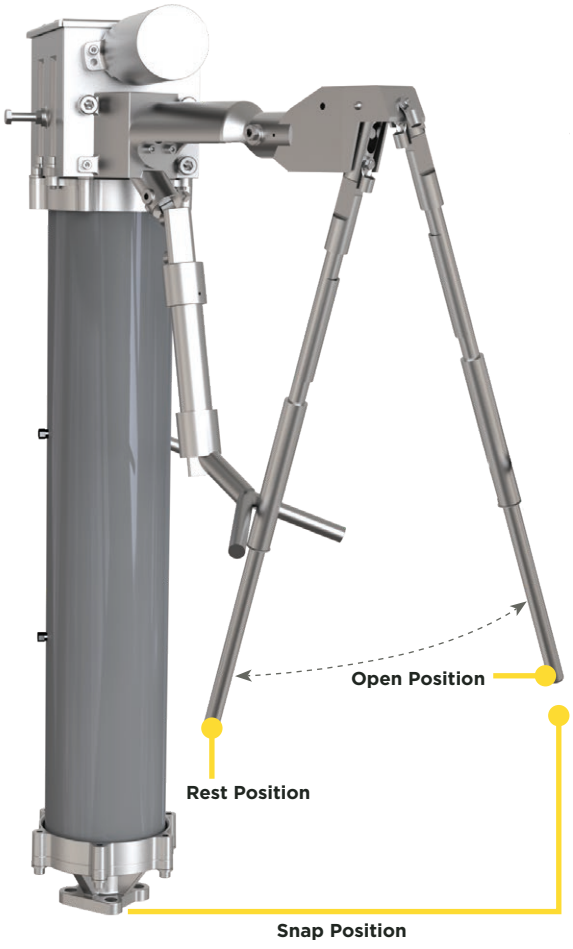

Figure 4: Snap length illustration

TECORupter Testing

The following testing should be conducted on each interrupter unit prior to placing the units in service and at normal maintenance outages. High potential testing provides the best method for verifying the integrity of the vacuum interrupter.

CAUTION: High potential testing should be conducted by qualified personnel only.

Before touching any part of the interpreter assembly after a high potential operation, a grounding stick should always be used to discharge any metal parts of its assembly.

As with any open contacts in a vacuum, hazardous X-rays may be produced if the voltage across the contacts exceeds a certain level with a certain contact gap; therefore, do not conduct high potential tests on the interrupter at voltages higher than the recommended levels. During the high potential test all personnel should be adequately protected from any possible hazard(s). See ANSI/IEEE 37.85-2020 for additional information.

During normal operation, the contacts are closed so there are no X-ray emissions from the TECORupter.

Vacuum Interrupter Integrity Test:

High voltages are not required to determine the quality of the vacuum. A defective or potentially defective module will break down well below the 20kV rms test level.

A full-load interrupter for application at voltages higher than 23kV consists of multiple vacuum modules connected in a series combination. A capacitor is shunted across each module to ensure that each module is subjected to equal potential. The outer surface of the interrupter tube must be dry and free of any surface contaminates. Wiping the surface with methanol using a clean lint-free cloth will normally prepare the surface adequately. Failure to adequately clean the surface will result in erroneous test results.

Testing Procedure:

To test an individual interrupter, move the interrupter actuator arms to the “OPEN” position. There is an audible “POP” when the unit moves into the “OPEN” position, shown in Figure 5. Prop the actuator arms in the open position with a non-conducting member.

With the unit in the open position, each vacuum module should be subjected to 20kV rms 60Hz AC high potential for one minute. Connect the high potential source across the vacuum contact test studs and slowly increase the voltage to the required level.

- **For a Single Bottle (has no Test Points):**

  A reading of 300µA or more indicates that the vacuum bottle is inoperative. AC leakage current and reactive current in µA may result in higher than normal ratings due to the stray capacitance in the circuit. A defective bottle will break down considerably below the 20kV withstand level.

- **For Multiple Bottle Units:**

  Apply 20kV AC 60Hz from head to test point, across each set of test points, and from test point to base. Because of the grading capacitors, the current will measure a few mA. A bad unit will have more than 5mA.

NOTE: If AC testing is not possible, a DC high potential at the 20kV level is acceptable for testing vacuum interrupters. Grading capacitors will be open circuits to DC; therefore, the current reading should be less than 300 µA for all DC measurements. DC leakage current (µA) should not be measured in the field as this is an extremely difficult measurement to obtain and the results may be erroneous.

Continuity Testing:

With the actuator arm in the rest position, a continuity check should be made from head to test point, across each set of test points, from test point to base, and across the whole device.

After testing:

Reset the interrupter unit back to the rest position and carefully repack the unit for delivery to the job site.

In the event a defective vacuum contact is discovered, the complete unit should be returned to the factory. Contact your local Hubbell representative with any questions or issues regarding the units.

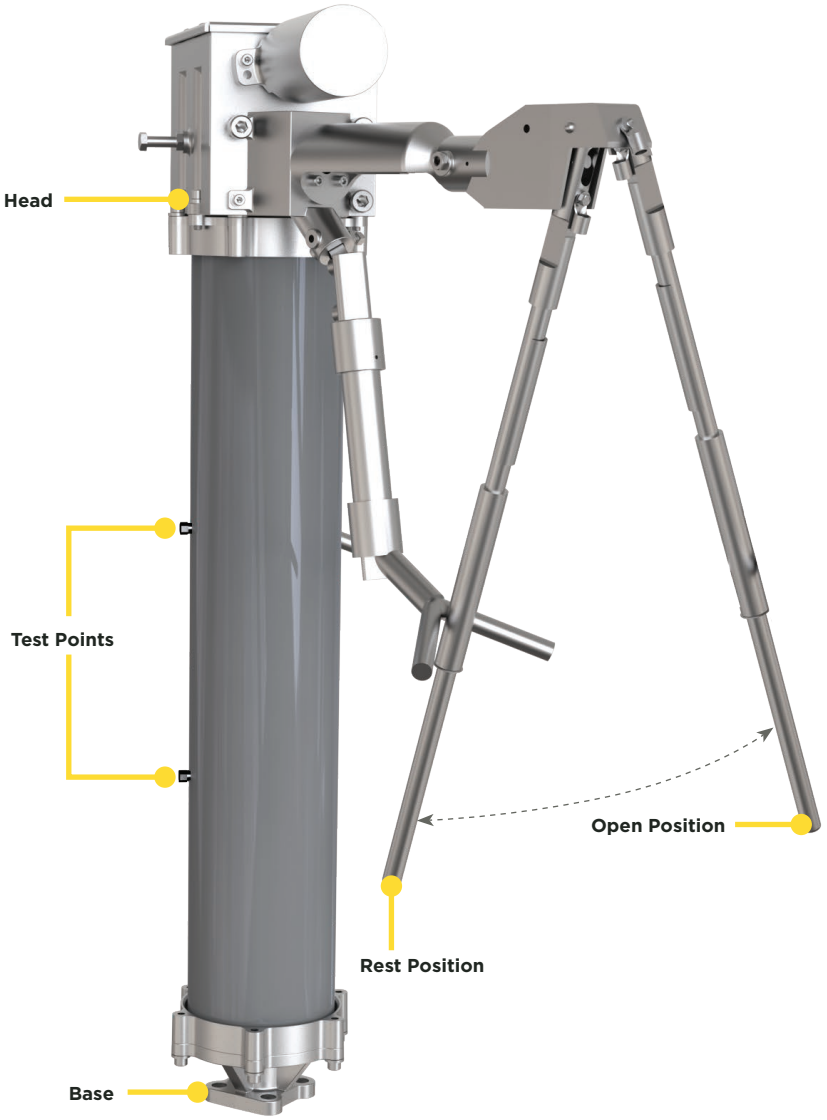

Figure 5: Testing diagram

TECORupter Setups

Each TECORupter will be shipped with a setup drawing, an example of which is shown in Figure 6. The switches and TECORupter must be field adjusted to meet the requirements shown in the setup drawing. Figures 7 through 12 show a typical style of switch and defines the setup requirements for this switch. Each figure shows a setup requirement that must be met for proper operation.

Setup Requirements:

- Check that each of the pickup fingers from all blades engage their respective actuating arm of the TECORupter as each switch is opened.
- Until the pickup finger of the switch being opened engages an actuating arm of the TECORupter, make sure that the quick whip or arcing horn from the opening switch's blade remains in contact with the arcing horn from the opening switch's jaw.
- Before the interrupter contacts open with a "POP", ensure that the minimum distance from metal on the blade to metal on the opening switch's jaw is greater than the "air gap" distance. This dimension is listed on the setup drawing and shown in Figure 12.

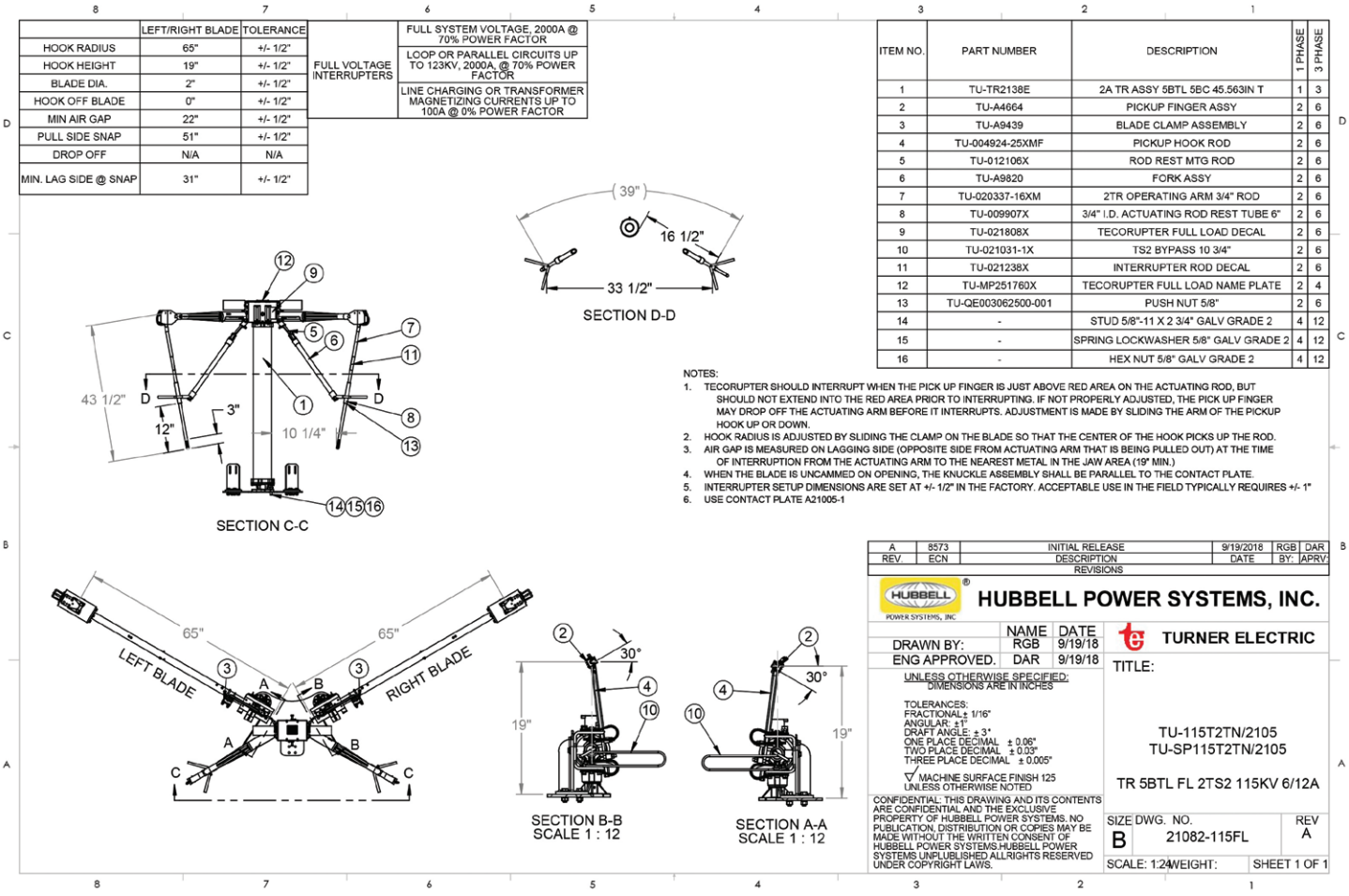

Figure 6: The above drawing is a sample of a TECORupter setup drawing.

Figure 7: The "**hook radius**" is the distance from the switch blade pivot point to the blade's pick up finger, shown above.

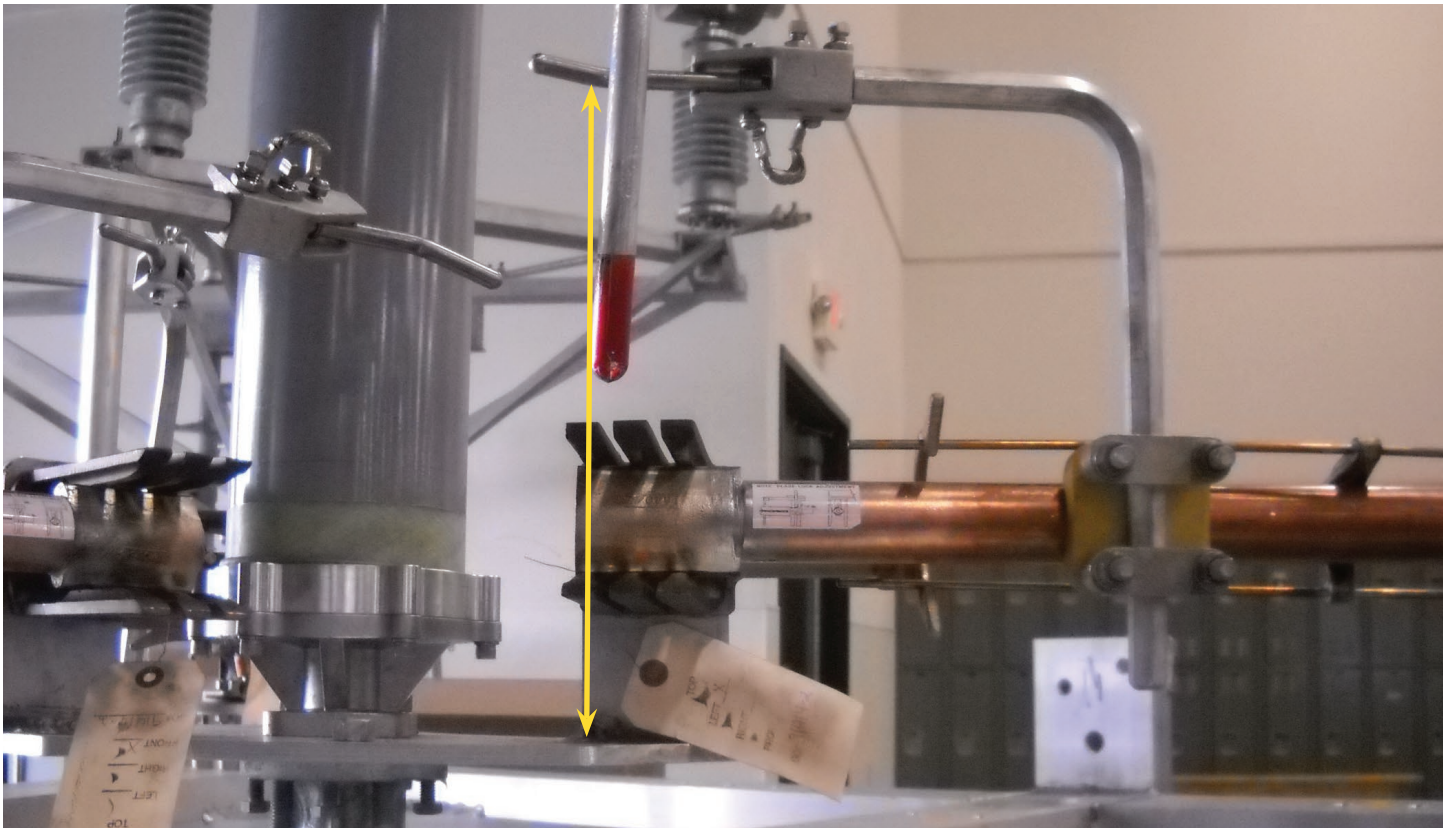

Figure 8: The "**hook height**" is the vertical distance from the mounting plate to the center of the blade's pick up finger, shown above.

TECORupter Setups

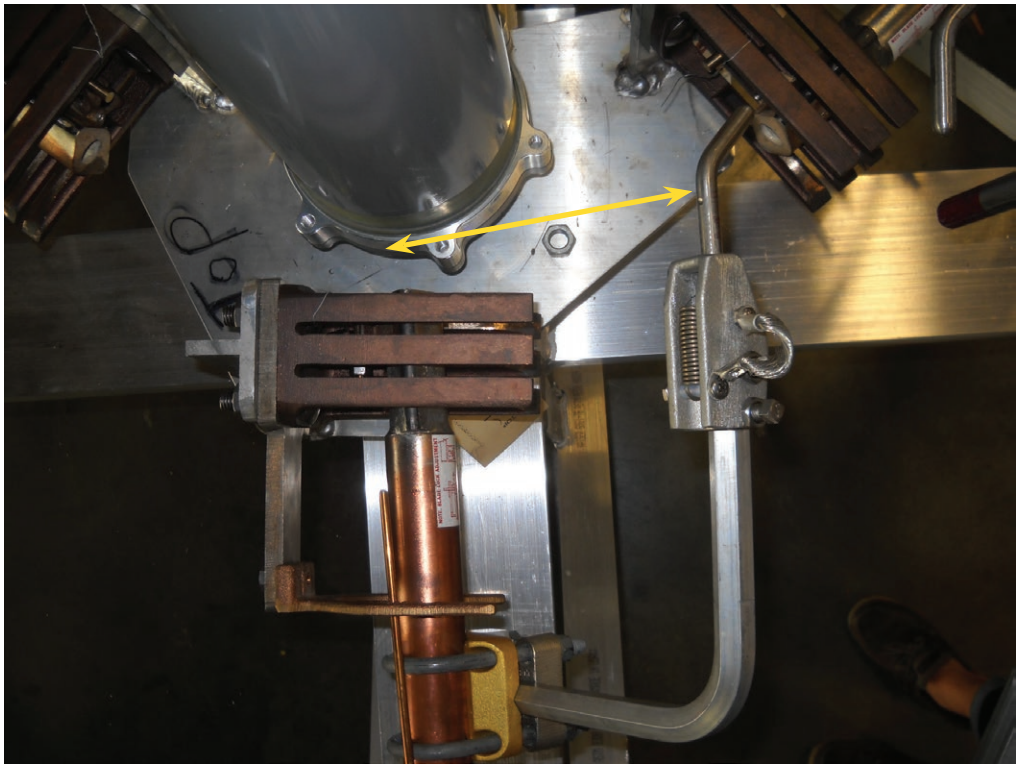

Figure 9: The "**hook off of blade**" dimension is the horizontal distance from the center of the switch blade to the blade's pick up finger, shown above.

Figure 10: The "**interrupts at**" or "**lag side snap**" dimension is measured from the TECORupter base to the actuating rod tip on the side not being pulled by the switch blade at the point where the interrupter opens. An example of the measurement is shown above, labeled "A". The "**pull side snap**" dimension is measured from the base to the actuating rod tip on the side being pulled by the switch blade at the point where the interrupter opens. An example of the measurement is shown above, labeled "B". The audible "pop" of the interrupter opening should occur just before the switch's pick up finger reaches the red section of the actuating rod.

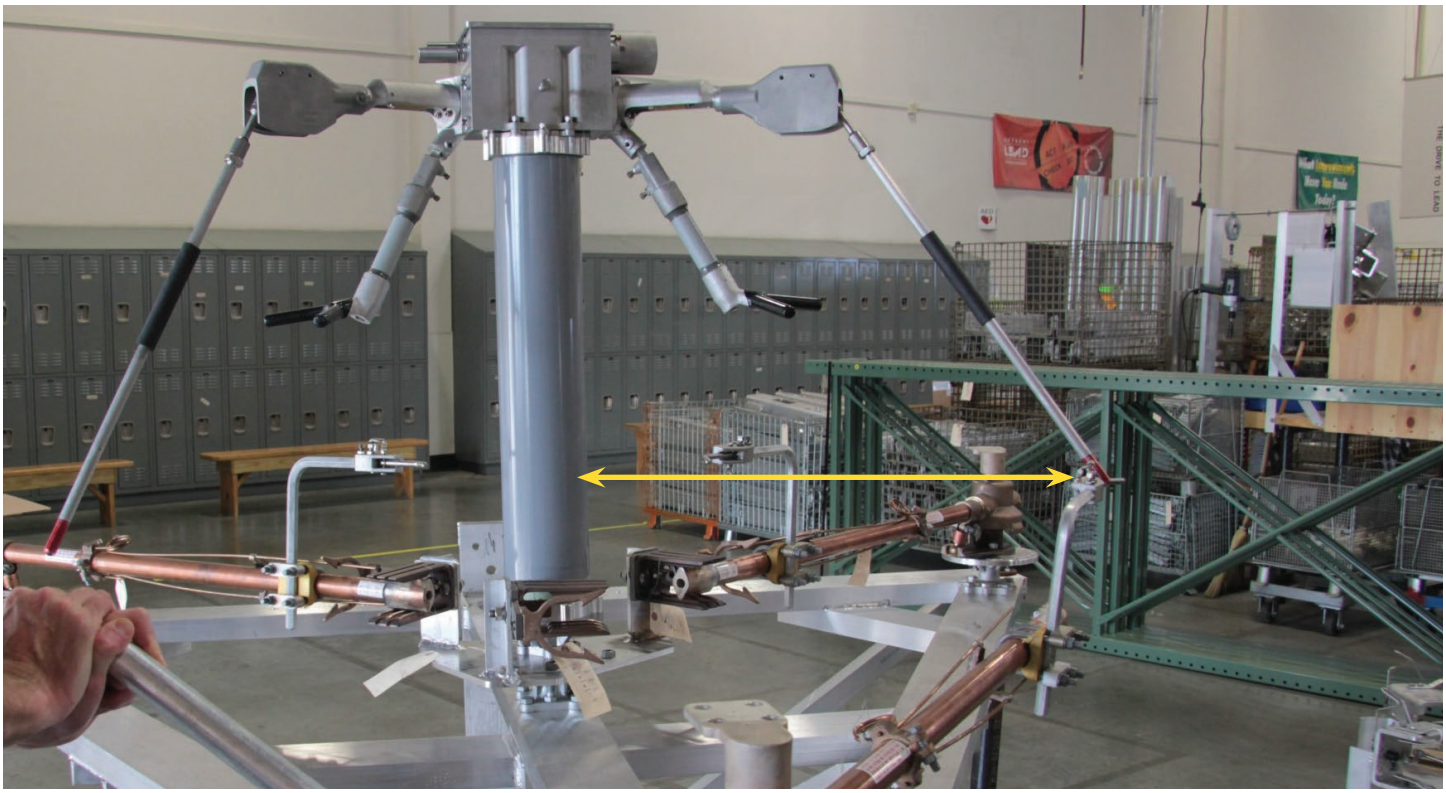

Figure 11: The "**Drops Off At**" dimension is measured from the base to the actuating rod tip at the point where the actuating rod drops off of the pick up finger. An example of the measurement is shown above.

Figure 12: The "**Air Gap**" dimension listed on the setup drawing is the minimum distance allowable from metal to metal when the interrupter opens. In order for the TECORupter to operate correctly, the distances pointed out in the picture above must be greater than the air gap dimension listed on the setup drawing. Both the "pull side" and the "lag side" should be checked.

HUBBELL
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Turner Electric® was acquired by HPS in 2015 and continues its efforts to be the go-to company for utility engineers worldwide for their unique transmission and substation solutions.

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