

CHANCE® DC Hi-Pot Adapter

Owner's Manual

Model No. C4031762 and C4031763



NOTICE: Before operating a CHANCE® DC Hi-Pot Adapter, thoroughly read, understand and follow these instructions. Keep these instructions with product for future reference.



Hubbell has a policy of continuous product improvement. Please visit hubbelpowersystems.com to confirm current design specifications.

Guide to Warnings within Manual

The following is a list of warnings used within this manual and should be read in their entirety to ensure safe practices.

DANGER

A **DANGER** refers to operating procedures, techniques, etc., that, if not followed carefully could **RESULT IN DEATH**.

WARNING

A **WARNING** refers to operating procedures, techniques, etc., that, if not followed carefully could **RESULT IN INJURIES OR DEATH**.

CAUTION

A **CAUTION** refers to operating procedures, techniques, etc., that, if not followed carefully could **RESULT IN DAMAGE TO EQUIPMENT** or **LOSS OF SERVICE** to customers.

NOTICE

A **NOTICE** refers to information that is considered important but not hazard related.

Product Safety

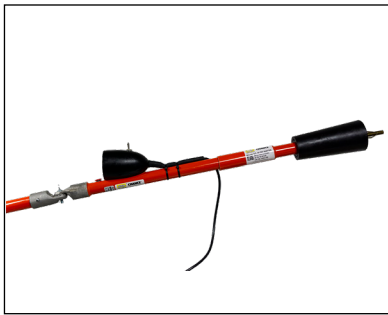
⚠ WARNING

Do not allow the universal coupling or housing to become grounded in any way, or to contact another phase as this will cause erroneous voltage indication and could cause severe personal injury or damage to equipment.

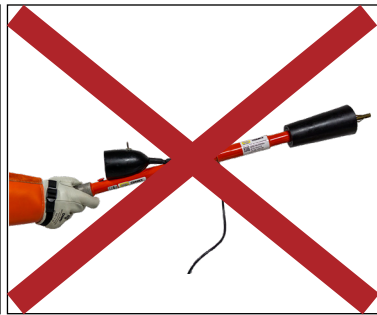
⚠ WARNING

Always use an appropriate length insulated hotstick even when wearing rubber gloves. Contact with the universal coupling or other parts, even with rubber gloves, will cause erroneous voltage indication. Do not engrave on stick or Hi-Pot Adapter.

The DC Hi-Pot Adapter is not to be considered as part of the Minimum Approach Distance (MAD) for the insulated hotstick. Always test the unit before and after each use on a known energized voltage source per the instructions.



CORRECT USE



INCORRECT USE

⚠ WARNING

Before and after each use, always test the unit on a known energized voltage source. See page 6 for instructions to confirm proper operation.

⚠ DANGER

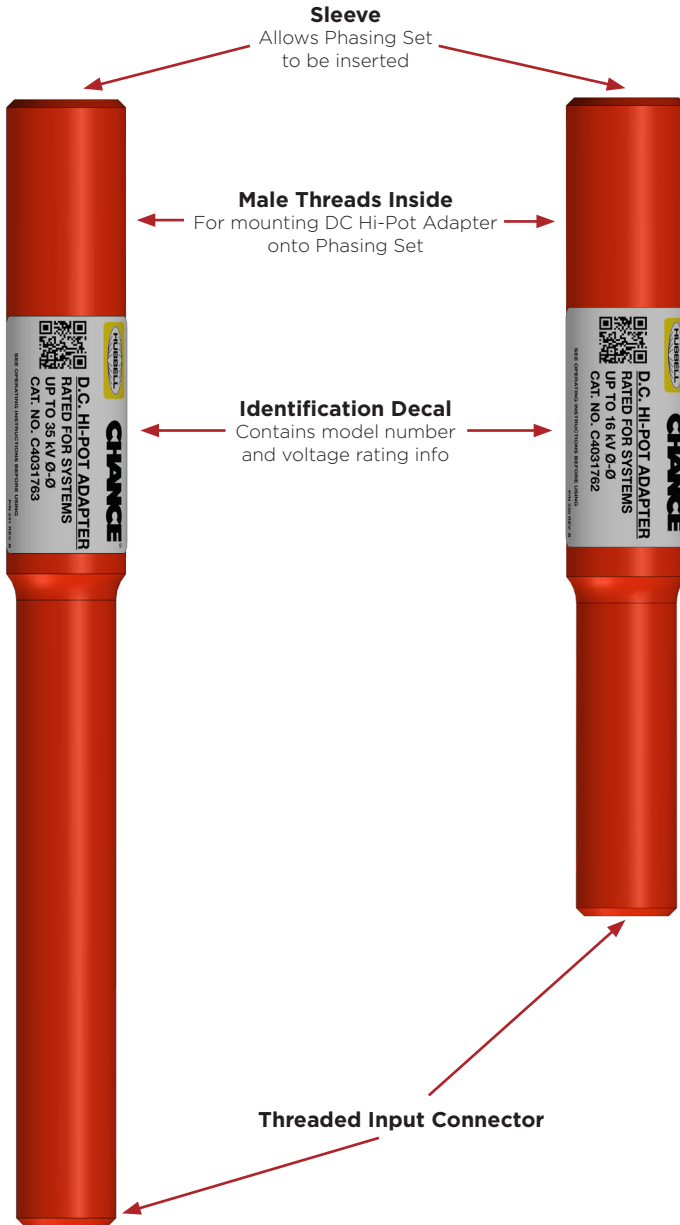
Minimum Approach Distances (MAD) should be adhered to at all times. For the latest information and charts refer to the official OSHA website: <https://www.osha.gov>

⚠ WARNING

The equipment covered in this manual must be used and serviced only by competently trained personnel familiar with and following approved work and safety practices. This equipment is for use by such personnel and this manual is not intended as a substitute for adequate training and experience in safe procedures for this type of equipment.

These instructions neither cover all details or situations in equipment use, nor do they provide for every possible contingency to be encountered in relation to installation, operation or maintenance. Should additional information and details be desired or if situations arise which are not covered adequately for the user's purpose, the specifics should be referred to Hubbell Power Systems.

Components of the DC Hi-Pot Adapter



Function and Design Overview

The CHANCE® DC Hi-Pot Adapter is a valuable tool for locating faulted cable sections in an underground loop. It is a simple, reliable tool that adds capability to the lineman's existing CHANCE® 5&16 kV or 16 kV Phasing Sets, allowing immediate cable testing following storm emergencies and with new construction. The compact size and low cost, compared to other available diagnostic cable testers, allows for multiple trucks to do cable testing without long outages while waiting for more expensive and complicated equipment to arrive on the job site.

The DC Hi-Pot Adapter is designed for use with High Voltage cables consisting of a center conductor surrounded by a properly rated insulating dielectric which has an outer concentric conductive element. The construction of the High Voltage cable allows for a properly isolated cable section to be charged by the DC Hi-Pot Adapter and then hold the charge if no leakage path exists.

The principle behind the successful use of the DC Hi-Pot Adapter is the characteristic that a properly isolated High Voltage URD coaxial cable will act as a capacitor that holds an electrical charge unless a discharge path (fault) is present. When following all instructions, the diagnosis of a "good cable" is one that shows a decreasing voltage differential between the source and the cable under test. Once the cable reaches its maximum (capacitive) voltage charge, the Phasing Set will show little if any voltage differential between the AC source and the isolated cable under test. If the isolated cable under test is faulted, it will not be able to hold a DC charge and the Phasing Set will show a voltage differential between the AC source and the cable under test. A discharge path (fault) from the center conductor of the High Voltage URD cable and the concentric neutral will be electrically evident when properly utilizing the DC Hi-Pot Adapter.

Utilities have discovered that utilizing the DC Hi-Pot Adapter on Phasing Sets allows a safe, silent, and non-damaging way to test the isolated cable condition before energizing. The adapter is essentially a diode that converts the AC line voltage to a DC voltage.

Utilizing the DC Hi-Pot Adapter also limits exposure of the suspect cable section to additional damage from high fault currents. The DC Hi-Pot Adapter is a compact unit that threads onto the end of the Phasing Set by use of the 1/4" x 20 stud. Provisions include being able to safely interface to the cable through use of bushing adapters and feedthroughs.

NOTICE

The DC Hi-Pot Adapter was designed for use with the CHANCE® 16 kV Phasing Set (H1876). Use the adapter with the proper voltage rating for your system.

NOTICE

The 35 kV DC Hi-Pot Adapter (C4031763) can be used on all High Voltage distribution cables up through 35 kV. Likewise, two 16 kV DC Hi-Pot Adapters (C4031762) can be stacked together and used on up to 35 kV systems.

Features

Utilizing the DC Hi-Pot Adapter:

- Protects the cable under test from additional high fault current damage
- Does not require an upstream protective device to operate during the test
- Results can be determined silently without the loud report of the fuse operation
- Prevents blinking of lights and power surges due to faults that may be present on the system

Theory of Operation

The DC Hi-Pot Adapter utilizes diode technology to electrically convert the AC Phase-to-Neutral voltage to a DC voltage which is equivalent to the peak AC voltage value. The adapter, as a half-wave rectifier, causes the Phasing Set to measure the DC equivalent RMS* (Root-Mean-Squared) voltage of what was (before rectification) an AC full sine wave voltage. The meter looks like it is reading one-half of the expected AC voltage source. This is due to the meter not seeing the full AC sine wave measurement (from peak positive to peak negative), it only sees half of the sine wave converted to an RMS equivalent DC peak. With rectification, the result is a DC equivalent of the source peak AC voltage and as such it is a more robust test method when looking for cable failure modes.

To confirm the proper operation of a DC Hi-Pot Adapter: properly install the Phasing Set, the DC Hi-Pot Adapter, and appropriate Bushing Adapters onto tested hotsticks of appropriate length. With one side of the Phasing Set / DC Hi-Pot Adapter connected to Neutral (Ground), safely insert the other stick of the Phasing Set into a known High Voltage AC source. If you see a reading that appears to be approximately 1/2 of the Phase-to-Neutral voltage, then the DC Hi-Pot Adapter is working as designed. If no voltage meter reading is seen during this test, check connections to ensure direct contact with the Voltage Source on one stick and the Neutral (Ground) on the other stick (through the DC Hi-Pot Adapter). If you still do not get a reading, either the Phasing Set or the DC Hi-Pot Adapter may be in need of repair. Try another (known to be operating) Phasing Set with the same DC Hi-Pot Adapter, so by process of elimination you determine which component is needing repair.

Examples of typical Phasing Set meter readings when verifying the operation of the DC Hi-Pot Adapter:

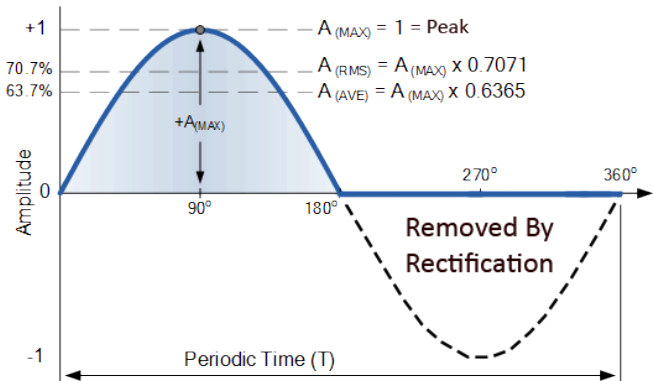
13.2 kV Phase-to-Phase = 7.6 kV (RMS) Phase-to-Neutral, since the Phasing Set meter reads in RMS the meter will show approximately 4 kV.

25 kV Phase-to-Phase = 14.4 kV (RMS) Phase-to-Neutral, since the Phasing Set meter reads in RMS the meter will show approximately 7 kV.

35 kV Phase-to-Phase = 20.23 kV (RMS) Phase-to-Neutral, since the Phasing Set meter reads in RMS the meter will show approximately 10 kV.

NOTE: The DC Hi-Pot Adapters were designed to work in conjunction with CHANCE® Phasing Set (HI876). This is the ONLY time we would recommend using a 16 kV rated Phasing Set on a 35 kV system - only when using the 35 kV Hi-Pot Adapter (C4031763).

*The RMS voltage of a sine wave is determined by multiplying the peak voltage value by 0.7071



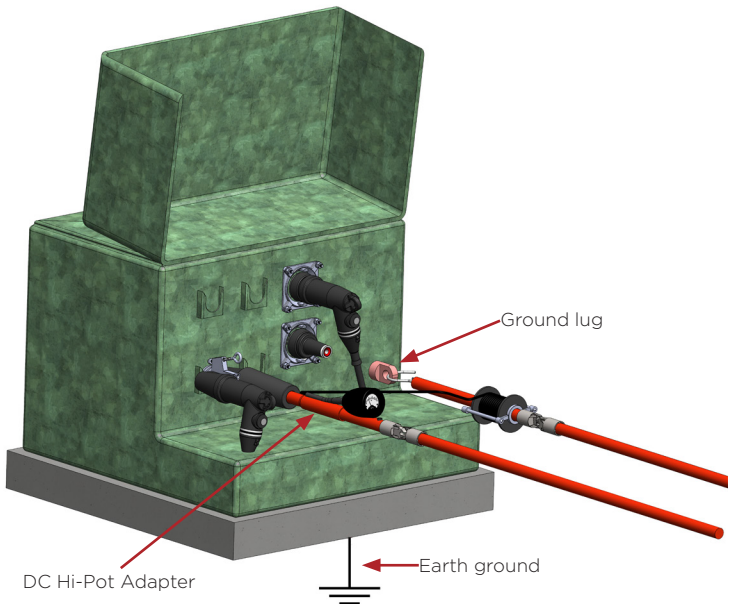
Fault Finding on Underground Cable

Before making any connections to High Voltage, safely install the DC Hi-Pot Adapter on the end of the meter probe portion of the Phasing Set. The end of the DC Hi-Pot Adapter should be mated with an appropriately rated bushing adapter designed for URD work. The reel probe should be mated with an appropriately rated elbow adapter designed for URD work. The meter can then be used to indicate the voltage charge of the cable being tested. Phasing Sets must be used with 2 Epoxiglas Insulating Universal Hotsticks of appropriate length.

⚠ WARNING

Utilizing the DC Hi-Pot Adapter requires the cable under test to be disconnected at the elbows from all transformers and be properly isolated then discharged prior to being tested.

To Discharge Before and After Each Test



⚠ WARNING

Discharge the properly isolated cable section prior to and after each test. Failure to do so can result in injury to personnel and/or damage to equipment. Completely disconnect both probes of the Phasing Set from all conductors and apparatus before changing any adapters or attempting to discharge cable. The tested cable should be discharged to a grounded source. This should be done with the DC Hi-Pot Adapter properly installed to control the discharge current. See above illustration.

Fault Finding on Underground Cable (cont.)

The DC Hi-Pot Adapter provides a DC voltage to charge a fault-free cable to an equivalent of the peak Phase-to-Neutral AC voltage source. A short section of cable will charge in seconds while a long section of cable may require a minute or more.

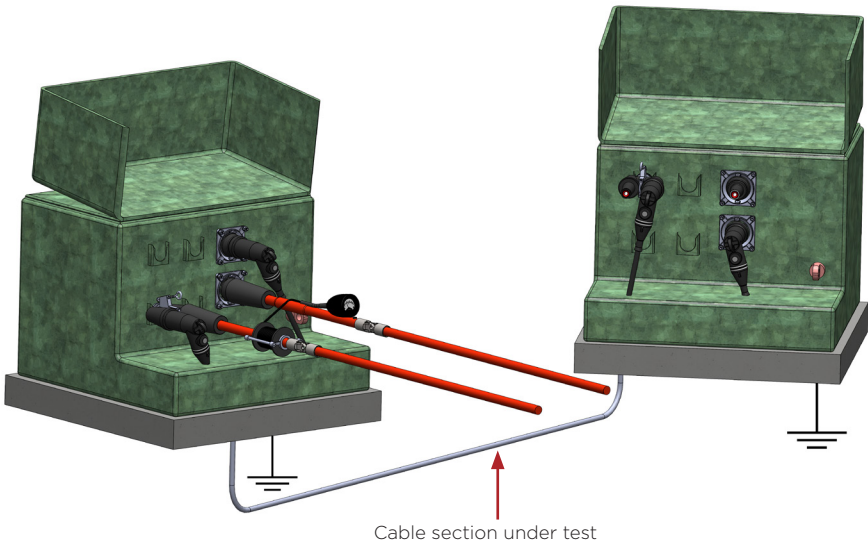
Faulted Cable Indication

If the cable being tested contains a fault, or if a temporary ground has been left on the system, the cable can not be charged, so the meter will indicate a difference in potential between the incoming AC voltage source and the cable being tested.

Good Cable Indication

If the cable is good, the meter needle will rise as the cable charges and then the meter indication will drop back to near zero when a full charge is reached. Most cables will have a small residual leakage path even though a fault is not present, so the reading will be near zero (but not directly at zero). Longer cable sections will take longer for the meter needle to go to near zero. If any unusually large meter reading is encountered, a thorough investigation should be conducted before energizing the cable. The user should be especially cautious if only one phase of a three phase system shows this condition.

DC Hi-Pot Test Procedure



Maintenance

The CHANCE® DC Hi-Pot Adapter is an electronic instrument and, if properly cared for, will provide many years of trouble-free service. Keep all parts clean and dry. **Clean only with water or a mild soap & water solution. Do not use chemical solvents.** When using soap for cleaning, it is required to thoroughly rinse all soap residue off the unit before placing back into service. Any remaining soap residue may allow high voltage tracking especially in the presence of high humidity and/or moisture. Do not use CHANCE® Moisture Eater II wipes on any part of the DC Hi-Pot Adapter as it will cause damage.

We recommend that every Hi-Pot Adapter be wiped clean and visually inspected for defects daily and before each use. If any defect or contamination that could adversely affect the proper operation, accuracy or mechanical integrity of the tool is suspected, the Hi-Pot Adapter shall be removed from service. Before placing back into service, the meter should be properly repaired (if necessary), cleaned, inspected, and tested for full operation.

Do not engrave on stick or Hi-Pot Adapter. Abuse or misuse will damage the unit. Store in a dry location, do not drop, and protect from jostling or impacts during storage, carrying, or use. See page 10 "Specifications" for operating and storage temperatures and humidity ranges.

NOTICE

A standard Volt-Ohm Meter (VOM) will show "open" (no continuity) when measuring in both directions across the DC Hi-Pot Adapter. This is due to the extremely high value (in MegOhms) of the actual Rectifier diodes that are used to provide a high peak inverse voltage (PIV) rating when exposed to High Voltage levels. It is recommended to confirm the proper operation of the DC Hi-Pot Adapter by using the method described on page 6.

⚠ CAUTION

Be careful when handling the Hi-Pot Adapter. Do not drop or scratch the tool.

Repairs

For Hubbell Power Systems authorized repair or factory calibration, please contact:

BEVINS
Protecting crews since 1957

M.W. Bevins Co.
9903 E. 54th St.
Tulsa, OK 74146
(918) 627-1273
(918) 627-1294 (FAX)
www.bevinsco.com

Specifications

Weight:

C4031762 0.45 kg (1 lb)

C4031763 0.57 kg (1.5 lb)

Dimensions:

C4031762 10" Length

C4031763 13" Length

Battery requirements: N/A**Operating voltage range(s):**

C4031762 16 kV AC (maximum Phase-to-Phase system voltage), 50/60 Hz

C4031763 35 kV AC (maximum Phase-to-Phase system voltage), 50/60 Hz

Operating temperature range: -20° to +80°C (-4°F to 176°F)**Operating humidity range:** 5% to 95% Rh**Storage temperature:** -20° to +60°C (-4°F to 140°F)

Recommended storage at 21°C +/- 2°C (70°F +/- 5°F)

Storage humidity range: 5% to 95% Rh

Recommended storage at 45% Rh +/- 8% Rh

Limitations: Always use appropriate length insulated hotstick even if wearing rubber gloves.

Do not use if damaged or malfunctioning. Keep all warning labels clean and readable. Store in a dry location.

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Hubbell has a policy of continuous product improvement.
Please visit hubbellpowersystems.com to confirm current design specifications.

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Rev D.



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