IB-51806 Vacuum Type Remote Racking Device for PowlVac® STD

for use with PowlVac® STD 5kV & 15kV Vacuum Circuit Breakers
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Signal Words

As stated in ANSI Z535.4-2002, § 4.13-4.13.3 the signal word is a word that calls attention to the safety sign and designates a degree or level of hazard seriousness. The signal words for product safety signs are “Danger”, “Warning”, and “Caution”. These words are defined as:

**DANGER**

_DANGER_ indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING**

_WARNING_ indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

**CAUTION**

_CAUTION_ indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Not stated in ANSI Z535.4-2002, § 4.13-4.13.3 as a signal word but used in this manual is “IMPORTANT”. This is defined as:

**IMPORTANT**

_IMPORTANT_ indicates a section of the manual covering a non hazardous situation, but one where Powell feels proper attention is warranted.

Qualified Person

For the purposes of this manual, a qualified person, as stated in NFPA 70®, is one familiar with the construction and operation of the equipment and the hazards involved.

In addition to the above qualifications, one must also be:

1. trained and authorized to energize, deenergize, clear, ground, and tag circuits and equipment in accordance with established safety practices.
2. trained in the proper care and use of personal protective equipment (PPE) such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
3. trained in rendering first aid if necessary.
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Ch 1 General Information

⚠️️ WARNING

The equipment is designed for use, installation, and maintenance by knowledgeable users of such equipment having experience and training in the field of high voltage electricity. This document and all other documentation shall be fully read, understood, and all warnings and cautions shall be abided by. If there are any discrepancies or questions, the user shall contact Powell immediately at 1.800.480.7273.

⚠️️ WARNING

Before any adjustment, servicing, part replacement, or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, the power supply must be disconnected. Failure to follow this warning may result in injury or death.

⚠️️ IMPORTANT

The information in this instruction bulletin is not intended to explain all details or variations of the Powell equipment, nor to provide for every possible contingency or hazard to be met in connection with installation, testing, operation, and maintenance of the equipment. For additional information and instructions for particular problems, which are not presented sufficiently for the user’s purposes, contact Powell at 1.800.480.7273.

⚠️️ IMPORTANT

Powell reserves the right to discontinue and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.
A. **Scope**

The information in this instruction bulletin describes the following Vacuum Remote Racking Devices for PowlVac® STD vacuum circuit breakers:

- 51897G27 - 5kV, 1200, 2000, & 3000A
- 51897G27 - 15kV, 1200, 2000, & 3000A

B. **Purpose**

The information in this instruction bulletin is intended to provide information required to properly operate and maintain the PowlVac STD Vacuum Remote Racking Devices described in **Ch 1 General Information, A. Scope**.

This instruction bulletin provides:

1. Safety guidelines
2. General descriptions on the operation of the PowlVac STD Remote Racking Device
3. Instructions for installation
4. Illustrations, photographs, and description of the equipment described in **Ch 1 General Information, A. Scope**.

The illustrations in this document are provided as general information to aid in showing component locations only.

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**WARNING**

Be sure to follow the appropriate safety precaution while handling any of the equipment. Failure to do so may result in serious injury or death.

To the extent required, the products described herein meet the applicable ANSI, IEEE, and NEMA Standards; however, no such assurance is given with respect to local codes and ordinances which may vary greatly.

C. **Instruction Bulletins Available Electronically**

For more information visit www.powellind.com. To contact the Powell Service Division call 1.800.480.7273 or 713.944.6900, or email info@powellservice.com.
Ch 2 Safety

A. Safe Work Condition

The information in Section A is quoted from NFPA 70E 2004 - Article 120, 120.1 Establishing an Electrically Safe Work Condition.

120.1 Process of Achieving an Electrically Safe Work Condition

1. Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.

2. After properly interrupting the load current, OPEN the disconnecting device(s) for each source.

3. Wherever possible, visually verify that all blades of the disconnecting devices are fully OPEN or that drawout type circuit breakers are withdrawn to the fully disconnected position.

4. Apply lockout/tagout devices in accordance with a documented and established policy.

5. Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are deenergized. Test each phase conductor or circuit part both phase-to-phase, and phase-to-ground. Before and after each test, determine that the voltage detector is operating satisfactorily.

6. Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them. Where it could be reasonably anticipated that the conductors or circuit parts being deenergized could contact other exposed energized conductors or circuit parts, apply ground connecting devices rated for the available fault duty.

B. Safety Guidelines

Each user has the responsibility to instruct and supervise all personnel associated with usage, installation, operation, and maintenance of this equipment on all safety procedures. Furthermore, each user has the responsibility of establishing a safety program for each type of equipment encountered.

The safety rules in this instruction bulletin are not intended to be a complete safety program. The rules are intended to cover only some of the important aspects of personnel safety related to PowlVac® STD Vacuum Type Remote Racking Device.
C. General

1. Only supervised and qualified personnel trained in the usage, installation, operation, and maintenance of the circuit breaker shall be allowed to work on this equipment. It is mandatory that this instruction bulletin, any supplements, and service advisories be studied, understood, and followed.

2. Maintenance programs must be consistent with both customer experience and manufacturer’s recommendations, including service advisories and instruction bulletin(s). A well planned and executed routine maintenance program is essential for circuit breaker’s reliability and safety.

3. Service conditions and circuit breaker applications shall also be considered in the development of safety programs. Variables include ambient temperature; humidity; actual continuous current; thermal cycling; number of operations; interrupting duty; and any adverse local conditions including excessive dust, ash, corrosive atmosphere, vermin and insect infestations.

D. Specific

1. **DO NOT WORK ON AN ENERGIZED CIRCUIT BREAKER.** If work must be performed on a circuit breaker, remove it from service and remove it from the metal-clad switchgear.

2. **DO NOT WORK ON A CIRCUIT BREAKER WITH THE CONTROL CIRCUIT ENERGIZED.**

3. **EXTREME CARE MUST BE EXERCISED TO KEEP ALL PERSONNEL, TOOLS, AND OTHER OBJECTS CLEAR OF MECHANISMS WHICH ARE TO BE OPERATED, DISCHARGED, OR RELEASED.** These circuit breakers utilize stored energy mechanisms. These mechanisms must be serviced only by skilled and knowledgeable personnel capable of releasing each spring load in a controlled manner. Detailed information regarding these mechanisms is found in this instruction bulletin.

4. **DO NOT ATTEMPT TO CLOSE THE CIRCUIT BREAKER MANUALLY ON AN ENERGIZED CIRCUIT.**

5. **DO NOT USE AN OPEN CIRCUIT BREAKER AS THE SOLE MEANS OF ISOLATING A HIGH VOLTAGE CIRCUIT.** For complete isolation, the circuit breaker shall be in the disconnected position or shall be withdrawn completely.

6. **ALL COMPONENTS SHALL BE DISCONNECTED BY MEANS OF A VISIBLE BREAK AND SECURELY GROUNDED FOR SAFETY OF PERSONNEL PERFORMING MAINTENANCE OPERATIONS ON THE CIRCUIT BREAKERS.**

7. Interlocks are provided to ensure the proper operating sequences of the circuit breakers and for the safety of the user. If for any reason an interlock does not function as described, do not make any adjustments, modification, or deform the parts. **DO NOT FORCE THE PARTS INTO POSITION. CONTACT POWELL FOR INSTRUCTIONS.**
E. X-Rays

When high voltage is applied across the contacts of a vacuum interrupter, there is the possibility of generation of X-rays. The intensity of the X-radiation is dependent on the peak voltage and the contact gap. At the normal operating voltage for this type of equipment, the radiation levels are negligible. At the voltages specified for testing, test personnel shall be in front of the circuit breaker such that the two layers of steel used in the frame and front cover construction are between the test personnel and the vacuum interrupters, and that the test personnel be no closer than one meter (3') from the front of the circuit breaker.

THE CIRCUIT BREAKER SHALL BE EITHER FULLY OPEN, OR FULLY CLOSED WHEN MAKING HIGH POTENTIAL TESTS. DO NOT TEST WITH CONTACTS PARTIALLY OPEN.

F. Safety Labels

IMPORTANT

Warning and Caution labels are located in various places in and on the switchgear and on the circuit breaker removable element. Always observe these warnings and caution labels. Do NOT remove or deface any of these warning/caution labels.
Ch 3  **Equipment Description**

A. **General**

The PowlVac® Vacuum Type Remote Racking Device is an accessory which enables circuit breakers to be racked into and out of switchgear from a distance. The accessory consists of a motor control box (Figure 1, e) and electric racking device assemblies (Figure 1, a, b, c, f, & g).

B. **Motor Control Box**

The motor control box (Figure 2) supplies power and enables the selection of operating modes for the electric racking device. The motor control box has a 50 foot long cord (Figure 1, d) with a plug that is inserted into the electric racking device twist lock power cord receptacle (Figure 5, d). The length of the cord enables the user to move to a remote location from the circuit breaker during the racking in or racking out procedures. The motor control box power supply cord (Figure 1, h) plugs into a 110VAC outlet.

C. **Electric Racking Device**

The electric racking device uses a suction cup (Figure 1, a) to connect to the front of the circuit breaker. The drive socket (Figure 1, c) engages the circuit breaker racking shaft through the racking shaft access door located on the circuit breaker front cover. After the racking device is installed, the motor adjustment knob (Figure 1, f) can be turned to engage the drive socket with the circuit breaker racking shaft. When the racking device is connected to the motor control box and energized, the drive socket operates the circuit breaker racking mechanism during the racking in or racking out procedures.
Figure 1  PowlVac® STD Remote Racking Device

a. Suction Cup
b. Vacuum Tube
c. Drive Socket
d. Control Box Cord
e. Control Box
f. Adjustment Knob
g. Access Hole
h. Electrical Cord
Figure 2  Closeup of Control Box

1. Electrical Cord
2. In Indicator Light
3. Out Indicator Light
4. Power Switch
5. In/Out Selector Switch
6. Handle
Ch 4  Installation & Operation

A. RECEIVING

Upon receipt, remove any shipping material and inspect the electric racking device for damage that may have occurred during shipment. Check the equipment received against the shipping documents to ensure receipt of the complete shipment.

B. HANDLING

The electric racking device weighs 20 lbs. and the motor control switchbox assembly weighs 5 lbs. The preferred method for moving the electric racking device and motor control switchbox is to place them securely on a hand operated shop cart. When handling the electric racking device, personnel should securely grasp the suction cup staff (Figure 4) during movement and installation to avoid possible personal injury or damage to the electric racking device. Avoid dropping or hitting the electric racking device with hard objects.

C. OPERATION

WARNING

Do NOT work on an energized circuit breaker. Follow circuit breaker safety guidelines and operating instruction provided in the specific circuit breaker instruction bulletin.

Attaching and operating the electric racking device can be accomplished by one person. When circuit breaker racking is required, the electric racking device engages the racking shaft through the access door on the front cover. The racking device is operated by the motor control switchbox.

When racking in a circuit breaker, move the circuit breaker to the required switchgear location. Push the circuit breaker in to the switchgear compartment until the anti-rollout latch engages the switchgear rollout stop block.

For more information on the circuit breaker handling, see the instruction bulletin for the circuit breaker in use.

CAUTION

Protect the motor control switchbox and the racking device from moisture. Failure to do so may cause damage to the equipment.

CAUTION

Do NOT handle or carry the racking device by the power cords. Damage to the power connections may cause an electrical short. The power cords should be inspected for any signs of damage before each use.
Figure 3 Installing the Remote Racking Device to the Circuit Breaker

- a. Drive Socket
- b. Manual Trip Lever
- c. Secondary Disconnect (override shown in this picture)
**Figure 4**  Releasing the Manual Trip Lever

**Figure 5**  Attaching the Remote Racking Device to the Circuit Breaker

- a. Red Line on Vacuum Tube
- b. Vacuum Tube Pump
- c. Adjustment Knob
- d. Power Cord Receptacle
Figure 6  Attachment to Circuit Breaker Completed

Figure 7  Plugging In the Motor to the Control Box

Figure 8  Turning Selector Switch

Figure 9  Activate Remote Racking Device
Figure 10  Removing the Remote Racking Device from the Circuit Breaker
D. Inserting the Circuit Breaker into One-High/Lower Switchgear Equipment

**CAUTION**

*Before installing any circuit breaker into a compartment, the user MUST verify that the circuit breaker rating meets or exceeds the metal-clad switchgear rating.*

Follow the steps below to insert the circuit breaker into the switchgear compartment:

**CAUTION**

*Prior to inserting the circuit breaker into the circuit breaker compartment, make sure that the control circuits are deenergized.*

**CAUTION**

*Prior to inserting the circuit breaker into the circuit breaker compartment, ensure that the circuit breaker is OPEN and the mechanism is discharged.*

1. Remove the yellow cover that is placed on the suction cup of the remote racking device.
2. Ensure the secondary disconnect device is connected to the circuit breaker (Figure 3, c).
3. Push the manual trip lever on the circuit breaker and open the racking shaft shutter (Figure 3, b). Using the drive socket on the remote racking device (Figure 3, a) open the racking shaft shutter by pushing it down. There is about a ¼ inch lip where the socket should be placed to push the shaft shutter down. Once the shutter has started moving down the manual trip lever can be released (Figure 4).
4. Push the remote racking device into the shaft shutter and align the remote racking device with the circuit breaker drive shaft. Turn the red adjustment knob (Figure 5, c) on the back of the remote racking device to achieve alignment. Turn the adjustment knob until there is resistance and the socket will be on the circuit breaker racking shaft. If the socket fails to engage/align, this is an indication the door is not opening completely. Check the screw which holds the pull ring and verify it is flush with the bottom of the shutter tab. If the screw is projecting past the bottom of the shutter, add a washer to the screw.
5. Attach the remote racking device to the front cover by pumping the suction cup vacuum tube (Figure 5, b) until the red line (Figure 5, a) on the vacuum tube is no longer visible.

**Note:** *The suction cup must be connected to a smooth part of the circuit breaker. The suction can NOT be made over hardware, holes, edges, etc. Remove dust, dirt, grease, etc. from the contact point on the front cover of the circuit breaker and wipe the suction cup clean.*

6. Insert the cylindrical plug into the remote racking device outlet (Figure 7). Lock the plug by turning it clockwise.
7. Ensure the control box power switch is in the “OFF” position.
8. Plug the device into a 120VAC power source.
9. Turn the power switch to the “ON” position.
10. Move the selector switch (Figure 8) on the push button to the “IN” position.

**Note:** *The chrome housing on the push button is actually a switch, and can be moved to either the “IN” or “OUT” positions.*
11. Physically move the motor control switchbox to a remote area and operate the electric racking device.
12. To begin racking the circuit breaker into the compartment, press the push button on the control box (Figure 9).

   **Note:** *If the push button is released during operation the motor will stop.*

13. When the push button is pressed, the “IN” indicating light (Figure 2, b) will be energized and illuminated.
14. When the circuit breaker is fully racked in, the remote racking device’s torque limiter will begin to slip and there will be a clear clicking sound along with a vibration of the racking device. At this point, release the racking push button.
15. Unplug the 120VAC source and remove the remote racking device (Figure 10). Pull the tabs on the suction cup to break the suction from the circuit breaker.
Figure 11  Removing Drive Socket from Remote Racking Device

Figure 12  Inserting Drive Socket into Circuit Breaker

Figure 13  Attaching Remote Racking Device to the Drive Socket
E. Inserting the Circuit Breaker into Two-High Switchgear Equipment

**CAUTION**

Before installing any circuit breaker into a compartment, the user MUST verify that the circuit breaker rating meets or exceeds the metal-clad switchgear rating.

Follow the steps below to insert the circuit breaker into the two-high switchgear compartment:

1. On the side of the remote racking box, there is a square cut-out for accessing the socket (Figure 11). Use a small screwdriver or 1/8 inch punch to depress the locking pin and pull the socket assembly out.
2. Remove the yellow cover that is placed on the suction cup of the remote racking device.
3. Ensure the secondary disconnect device is connected to the circuit breaker (Figure 3, c).
4. Push the manual trip lever on the circuit breaker and open the racking shaft shutter (Figure 12). Using the drive socket on the remote racking device (Figure 12) open the racking shaft shutter by pushing it down. There is about a ¼ inch lip where the socket should be placed to push the shaft shutter down. Once the shutter has started down the manual trip lever can be released.
5. Place the remote racking device on the drive socket (Figure 13).
6. Insert the cylindrical plug into the remote racking device outlet (Figure 7). Lock the plug by turning it clockwise.
7. Ensure the control box power switch is in the “OFF” position.
8. Plug the device into a 120VAC power source.
9. Turn the power switch to the “ON” position.
10. Move the selector switch (Figure 8) on the push button to the “IN” position.

**Note:** The chrome housing on the push button is actually a switch, and can be moved to either the “IN” or “OUT” positions.

11. Physically move the motor control switchbox to a safe area and operate the electric racking device.
12. To begin racking the circuit breaker into the compartment, press the push button on the control box (Figure 9).
Note: If the push button is released during operation the motor will stop.

13. When the push button is pressed, the “IN” indicating light (Figure 2, b) will be energized and illuminated.
14. When the circuit breaker is fully racked in, the remote racking device's torque limiter will begin to slip and there will be a clear clicking sound along with a vibration of the racking device. At this point, let go of the racking push button.
15. Unplug the 120VAC source and remove the remote racking device (Figure 10). Pull the tabs on the suction cup to break the suction from the circuit breaker.

F. REMOVING THE CIRCUIT BREAKER FROM THE LOWER SWITCHGEAR COMPARTMENT

Prior to removing the remote racking motor from the circuit breaker compartment, make sure that the control circuits are deenergized.

Prior to removing the circuit breaker from the circuit breaker compartment, ensure that the circuit breaker is OPEN.

Note: If the circuit breaker indicator flag states “CLOSED”, close the compartment door and trip the circuit breaker electrically from a remote location.

Follow the steps below to remove the circuit breaker from the switchgear equipment:

1. Remove the yellow cover that is placed on the suction cup of the remote racking device.

2. Push the manual trip lever on the circuit breaker and open the racking shaft shutter (Figure 12). Using the drive socket on the remote racking device (Figure 12) open the racking shaft shutter by pushing it down. There is about a ¼ inch lip where the socket should be placed to push the shaft shutter down. Once the shutter has started down the manual trip lever can be released.
3. Place the remote racking device on the drive socket (Figure 13).
4. Insert the cylindrical plug into the remote racking device outlet (Figure 7). Lock the plug by turning it clockwise.
5. Ensure the control box power switch is in the “OFF” position.
6. Plug the device into a 120VAC power source.
7. Turn the power switch to the “ON” position.
8. Move the selector switch (Figure 8) on the push button to the “OUT” position.

Note: The chrome housing on the push button is actually a switch, and can be moved to either the “IN” or “OUT” positions.

9. To begin racking the circuit breaker out of the compartment, press the push button.

Note: If the push button is let go during operation the motor will stop.

10. When the push button is pressed, the “OUT” indicating light (Figure 2, c) will be energized and illuminated.
11. When the circuit breaker is fully racked OUT, the remote racking device's torque limiter will begin to slip and there will be a clear clicking sound along with a vibration of the racking device. At this point, let go of the racking push button.
12. Unplug the 120VAC source and remove the remote racking device. Pull the tabs on the suction cup to break the suction from the circuit breaker.
G. **Removing the Circuit Breaker from the Upper Switchgear Compartment (Two-High Design)**

Follow the steps below to remove the circuit breaker from the upper compartment of the switchgear:

1. On the side of the remote racking box, there is a square cut-out for accessing the socket (Figure 11). Use a small screwdriver or 1/8 inch punch to depress the locking pin and pull the socket assembly out.
2. Remove the yellow cover that is placed on the suction cup of the remote racking device.
3. Ensure the secondary disconnect device is connected to the circuit breaker (Figure 3, c).
4. Push the manual trip lever on the circuit breaker and open the racking shaft shutter (Figure 12). Using the drive socket on the remote racking device (Figure 12) open the racking shaft shutter by pushing it down. There is about a ¼ inch lip where the socket should be placed to push the shaft shutter down. Once the shutter has started down the manual trip lever can be released.
5. Place the remote racking device on the drive socket (Figure 13).
6. Insert the cylindrical plug into the remote racking device outlet (Figure 7). Lock the plug by turning it clockwise.
7. Ensure the control box power switch is in the “OFF” position.
8. Plug the device into a 120VAC power source.
9. Turn the power switch to the “ON” position.
10. Move the selector switch (Figure 8) on the push button to the “OUT” position.

**Note:** The chrome housing on the push button is actually a switch, and can be moved to either the “IN” or “OUT” positions.

11. Physically move the motor control switchbox to a safe area and operate the electric racking device.
12. To begin racking the circuit breaker into the compartment, press the push button on the control box (Figure 9).

**Note:** If the push button is released during operation the motor will stop.

13. When the push button is pressed, the “OUT” indicating light (Figure 2, c) will be energized and illuminated.
14. When the circuit breaker is fully racked out, the remote racking device’s torque limiter will begin to slip and there will be a clear clicking sound along with a vibration of the racking device. At this point, let go of the racking push button.
15. Unplug the 120VAC source and remove the remote racking device (Figure 10). Pull the tabs on the suction cup to break the suction from the circuit breaker.
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