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

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

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 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 described in this document may contain high voltages and currents which can cause serious injury or death.

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**

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 maintenance procedure describes the following Anti-Pump Relay Assembly:

- RR2BA-US-DC48V
- RR2BA-US-DC110V
- RR2BA-US-AC120V
- RR2BA-US-AC240V

This device can be used in all PowlVac® circuit breakers and replacement circuit breakers with “push on” wiring harness terminals.

B. Purpose

The information in this maintenance procedure is intended to provide information required to properly install the anti-pump relay described in Ch 1 General Information, A. Scope.

This instruction bulletin provides:

1. Safety guidelines
2. Instructions for installation and placing the anti-pump relay into service
3. Procedure for critical adjustments
4. Illustrations, photographs, and description of the anti-pump relay

The illustrations contained in this document may not represent the exact construction details of each particular type of anti-pump relay. The illustrations in this document are provided as general information to aid in showing component locations only.

All illustrations and photos are shown using deenergized equipment.
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

Study this maintenance procedure and all other associated documentation before installing the anti-pump relay assembly.

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.

It is mandatory that the following rules be observed to ensure the safety of personnel associated with usage, installation, operation, and maintenance of these circuit breakers.

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 anti-pump relay assembly.
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

The equipment described in this document has **DANGER, WARNING, CAUTION, and instruction labels** attached to various locations. All equipment **DANGER, WARNING, CAUTION, and instruction labels** shall be observed when the circuit breaker is handled, operated, or maintained.

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**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 anti-pump relay provides a logic function for the control circuit which prevents a continuous electrical close signal from causing the circuit breaker to continuously reclose after a trip signal.

CAUTION

Ensure that the control circuits are deenergized and the circuit breaker is deenergized, disconnected by means of a visible break, and securely grounded. Do NOT start to work on a closed circuit breaker or a circuit breaker with the main closing spring charged.

You should have the following when receiving the anti-pump relay assembly:

- Anti-Pump Relay

Use existing hardware when replacing the Anti-Pump Relay assembly:

- 6 - 32 x 5/8” Round Head Machine Screws (2)
- #6 Flat Washers (2)
- #6 Star Washers (2)
- Rubber Grommet (2)

Tools required:

- Flat head screwdriver
Ch 4 Installation

A. Removing the Old Anti-Pump Relay Assembly and Installing the Replacement Anti-Pump Relay Assembly

The anti-pump relay (Figure 2, a) is located on the circuit breaker frame, to the top left of the mechanism, and is supported by two screws.

Figure 2 Anti-Pump Relay in Circuit Breaker

1) Removing the Old Anti-Pump Relay Assembly

CAUTION

Ensure that the control circuits are deenergized and the circuit breaker is deenergized, disconnected by means of a visible break, and securely grounded. Do NOT start to work on a closed circuit breaker or a circuit breaker with the main closing spring charged.

Perform the following steps to remove the anti-pump relay assembly:

a. Remove the front cover of the circuit breaker.
b. Disconnect the wires from the anti-pump relay assembly (Figure 3), being careful to note which wires go to which terminals.

c. Remove the upper mounting screw from the anti-pump relay and loosen the lower mounting screw (Figure 4).
d. Lift the relay assembly off of the lower screw and remove from the circuit breaker (Figure 5).
Figure 4  Remove Upper Mounting Screw and Remove Anti-Pump Relay

2) Installing Replacement Anti-Pump Relay Assembly

![Figure 4 Remove Upper Mounting Screw and Remove Anti-Pump Relay]

2. Place the new anti-pump relay over the lower screw (Figure 6). Reinstall and tighten both screws securing anti-pump relay in place (Figure 7).

Figure 5  Anti-Pump Relay Removed

![Figure 5 Anti-Pump Relay Removed]

Figure 6  Reconnect Wires to Anti-Pump Relay

![Figure 6 Reconnect Wires to Anti-Pump Relay]

Perform the following steps to install the anti-pump relay assembly:

a. Prior to installing new relay, reconnect all wires to the proper terminals.

b. Place the new anti-pump relay over the lower screw (Figure 6). Reinstall and tighten both screws securing anti-pump relay in place (Figure 7).

CAUTION

Ensure that the control circuits are deenergized and the circuit breaker is deenergized, disconnected by means of a visible break, and securely grounded. Do NOT start to work on a closed circuit breaker or a circuit breaker with the main closing spring charged.
a. **Anti-Pump Relay**

c. Relays in 250VDC closing circuits are provided with dropping resistors to apply the proper voltage to the relay coil. The resistor is mounted adjacent to the relay. It may be replaced by disconnecting it from the relay and unscrewing the mounting feet from the circuit breaker frame, replacing the resistor and reassembling.

d. Operate the circuit breaker several times to ensure the relay functions properly.

e. Replace the front cover.
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SM-1000 Anti-Pump Relay Assembly

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